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CANADIAN PAIR SEINING EXPERIMENT 1969

by



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Fishing Operations Section,
Industrial Development Branch,
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Department of Fisheries and Forestry

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Industrial Development Branch,
Fisheries Service, Department of Fisheries and Forestry,
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This was a project carried out by the Industrial Development Branch,
Fisheries Service,
Department of Fisheries and Forestry, Ottawa

NEWS RELEASE

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DEPARTMENT OF FISHERIES AND
FORESTRY OF CANADA

MINISTÈRE DES PÊCHES ET DES
FORÊTS DU CANADA

FOR IMMEDIATE RELEASE
SEPTEMBER 12, 1969
OTTAWA

Catches of hake and sole ranging from five to ten thousand pounds in the space of one hour by two small fishing boats working together have now become commonplace in an experimental project off Prince Edward Island. These astounding results are being achieved by an entirely new fishing technique, now known as Canadian pair seine netting, first announced by Fisheries and Forestry Minister Jack Davis on June 23, when preliminary trials had shown promise of success.

Two 40-foot Prince Edward Island lobster boats, the "Norma M" and the "Marie Lou II", each powered with a 110 horsepower diesel engine, were converted for the new method to allow them to tow a single seine net between them. The conversion and trials were carried out under the supervision of Captain James Thomson, an experienced Scottish fishing skipper under contract to the Industrial Development Branch, Fisheries Service, Department of Fisheries and Forestry.

In a further announcement today, Mr. Davis said that following the initial successful trials, the capacity of the winches on the boats had been increased and further refinements to the fishing gear carried out. The two boats, now operating in about 20 fathoms of water off Souris, P.E.I., have had individual one-hour tows which have resulted in hauls of more than 10,000 pounds of hake and sole, while tows of more than 5,000 pounds are considered routine.

One big advantage for small boat fishermen in the new technique is that the machinery and gear needed to adapt their vessels are relatively inexpensive, and power requirements low, in comparison to those of regular draggers. Lobster fishermen will be able to utilize their boats during the many off-season months when normally they are tied up, and other types of low-powered inshore vessels can also be used.

This newly developed Canadian pair seine netting technique is similar in concept to pareja (pair) trawling, which is carried out on the Atlantic by large Spanish deep sea trawlers. The net used is funnel-shaped, somewhat like a regular otter trawl but with a higher vertical opening. The skippers of the small boats haul their net by two winches, one on each vessel, co-ordinating their operations by radio-telephone. Captain Thomson estimates that as many as eight tows can be made in a normal working day unless, of course, extremely heavy catches necessitate trips back to port to unload.

A number of interested fishermen from Prince Edward Island and other Atlantic coast provinces have visited Souris to observe the fishing operation, and numerous enquiries have already been made about the possibility of introducing this very productive fishing method to other parts of Canada. Mr. Davis points out that this is one of the objectives of the project, and that a full report, including specifications of machinery and gear, and a description of the fishing method, including diagrams, photographs and recent catch records, will be available shortly from his Department's Industrial Development Branch, Ottawa.

49/12/9/69

Fisheries Information Branch
997-4627

INTRODUCTION

There are literally thousands of inshore fishing vessels on both the East and West Coasts of Canada which are very limited in capability, due to the fact that they are designed to carry out a single, specific fishing method. The objective of this experiment therefore was to endeavour to develop a new, productive method of fishing which would allow such vessels to diversify their operations and by lengthening the operating season, increase the annual income of both vessels and crews. In addition, it was thought possible that such a venture could help to relieve the critical fishing pressure on stocks of valuable species such as lobster.

Towed gear, such as trawls and Scottish seine nets, is by far the most efficient known for catching bottom oriented species such as cod, haddock, hake and flat fish. However, one of the most serious limitations of Canadian inshore boats is the lack of towing power necessary for trawling. The Scottish seine net, on the other hand, is much easier to tow, and it was therefore decided to combine the two methods by towing a net of this type between two inshore boats.

Prince Edward Island lobster boats were chosen to carry out the experiment in view of the enthusiasm and interest shown by the P. E. I. Department of Fisheries, and because, if successful, there would be great interest from fishermen in that province. Suitable grounds also exist close to the P. E. I. coast.

The original concept came from Captain James Thomson, a Scottish seine net skipper with many years' experience, who has been engaged on contract by the Industrial Development Branch for varying

periods during the past four years. Discussions took place in 1968 between the P. E. I. Department of Fisheries, the Industrial Development Branch and Captain Thomson, and it was decided to implement the project in 1969. Assuming its success, the application of the fishing method would be widespread, therefore the total cost would be borne by the Federal Department of Fisheries and Forestry.

IMPLEMENTATION

This began in April 1969 with an agreement to charter two Prince Edward Island lobster boats, the "Mary Lou II" and the "Norma M". It will be noted from the following particulars that these vessels are almost identical, and although this is not considered absolutely essential, it is an advantage if both vessels have similar towing power, overall length and freeboard.

Pair Seining Equipment

	"Norma M" Captain Peter L. Arsenault, Abram's Village	"Mary Lou II" Captain Joseph Caissie, Maximville
Date of Reg.	Charlottetown, April 18/66	Charlottetown
Reg. length	38 5/10'	40 4/10'
" breadth	12 2/10'	12 1/10'
" depth	3 7/10'	3 8/10'
Engine	112 hp Perkins Diesel	112 hp Perkins
Reduction gear	2. 5-1	2. 5-1
Propeller - 3 blade	20" by 24"	20" by 24"
P. T. O. front fitted to	Ford 4-speed transmission	Ford 4-speed transmission
Main shaft	1-1/2" stainless Citizens Band Radio, depth sounder	1-1/2" stainless Citizens Band radio depth sounder
Mast	18' by 7" dia.	18' by 7" dia.
Booms	16'	16'

Each vessel can carry approximately 10, 000 lb of fish and ice, allowing 15" remaining freeboard.

Each vessel was subsequently rigged out with the following additional machinery equipment and gear:

Modified double head transom fairlead	\$ 57.75
Hall & Stavert double drum (20" x 10" drum capacity of each 300 fath. 3/8 wire) winch (#3) with warping head and drive sprockets with 1-1/4" pitch roller chain drive	4 12.20
Echo Sounder Kelvin Hughes M. S. 39F. B. (FA) basic unit plus additional ground discriminating transducer and change over switch	1,258.00
Installation cost	254.08
2 coils (120 fath.) Manilla seine rope	101.60
5 coils 3/8" wire cable	300.00
Seine net (#6)	400.00
Net Bridles	50.00
Spare cod-ends, wings, mending twine, needles, floats, spikes, shackles, split links, blocks, fish-scoops	250.00 approx.
In addition, the hold was divided into compartments or checkers with individual plywood hatches. The cost per vessel for material for this work was approximately	75.00
Total cost per vessel -	<u>\$ 3,158.63</u>

It was originally intended to insulate the holds, but since the boats would be "day fishing", i. e., landing every night, this was not done because the extra work entailed would have held up the start of operations. However, this does not mean that some form of insulation for the hold and hatch covers should not be considered, especially on boats operating some distance from the fish plant.

For purposes of comparison, a 320 Vinge seine trawl was obtained from the New Brunswick Department of Fisheries, to which we are very grateful. Trials with this net indicated that it was not as productive as the #6 seine net when used in the two-boat operation. It is thought that the delicate balance of the Vinge trawl is probably affected by the method of towing, and since the seine is fairly robust and has much larger wings, it is apparently more suitable for this application. However, further trials will be carried out with the Vinge trawl in deep water.

Both vessels were rigged out with tire fenders on one side to prevent damage when coming alongside at sea, and it was found that this manouvre was possible in any weather in which the gear could be handled.

PRELIMINARY TRIALS

Some delays were experienced in fitting out the vessels at Georgetown, P. E. L., although these were not the fault of the shipyard, but fishing trials finally got under way in early June close to Boughton Island. This was not considered a good fishing area, but the bottom was known to be smooth mud and the Georgetown shipyard was close by in case alterations to the boats or equipment became necessary. At first all wire cable (500 fath. each side) was used, but this proved impossible to tow since the wires cut into the bottom, causing the gear to "mud up". Consequently, 100 fathoms each side of 2-3/8 circ. manilla rope was inserted next to the net; this remedied the problem immediately.

On the first day, using 100 fathoms of rope next to the net and 300 fathoms of wire, three successful tows were completed for a total of slightly more than 2,000 lb of mixed cod and flounder. This was not too spectacular, but one must bear in mind that the technique was completely new and each tow was a new experience.

The boats towed comfortably at 1,200 r. p. m., which is a little more than 50% maximum power (2,200 r. p. m.)

Captain Thomson estimated that the ground swept by the gear before the net closed was equal to that covered by a large Scottish seiner working a total of 3,000 fathoms of rope.

It was a pleasant surprise to find that the net remained open so long. This phenomenon was identified with the wire cable, which dug in the soft mud, despite the fact that it was used only on the "down" leg of the set (fig. 1). This is a very important feature of the experiment, to which can be attributed the subsequent large hauls of hake and flats.

Note - Wire warps are used by Icelandic seine net boats which fish on hard sand. In Japan, lengths of chain are inserted at intervals along the rope warps and Danish vessels use large sliding weights, one on each side, which are hung next to the boat before hauling commences. The weights slide down the ropes to the bottom and are retrieved at the net. All these techniques are designed to keep the net open as long as possible.

As the crews became familiar with the gear, efficiency in setting, towing and hauling resulted in increased catches. Much of the preliminary fishing operations was unproductive because of the "trial and error" methods needed to work out the most satisfactory system of handling the gear.

Catch records for this "trial and error" period have not been included purposely, because they do not reflect the true catching power of the gear. Certain modifications were eventually carried out as a result of these early experiences, however, and those records which are included reflect an efficient operation.

The most remarkable aspect was the simplicity and economy of the operation. The outfitting costs and operating costs are extremely low when measured against the potential earnings of the vessels.

SUBSEQUENT MODIFICATIONS

The original winch drums would only hold about 75 fathoms of rope in addition to the wire, and the practice therefore was to haul the 25 fathoms of rope next to the net by means of the winch warping head, and coil this excess on deck.

The shallow area being fished showed signs of diminishing in supply of flats, and it became necessary to consider trying other grounds in deeper water. As this would require longer warps, it was decided to modify the frame and drums of the winches to accommodate 400 fathoms of wire and 200 fathoms of rope. The drum flanges would be increased from 20" to 30", and although this would alter the gearing ratio considerably, giving a much faster line pull in the "full drum" condition, the winch manufacturer gave his assurance that even with the increased diameter the winches would have an ample line pull. Since it was known that single seine net vessels require a line pull of only 3,000 lb this was not a critical factor, assuming that each winch would be pulling only 50% of the weight.

Work on the winches was completed and fishing recommenced on July 22 off Souris, P. E. I. The winches worked well and catches immediately increased, using 200 fathoms of rope and 400 fathoms of wire on each boat.

Detailed catch records are included (see appendix) for the period July 22 to September 26, together with abstracts from Captain Thomson's and observer Bruce Lewis' reports and a description of the fishing operation.

The largest individual haul was made in one hour for 10,257 lb of hake and flats. On this particular occasion only 2 tows were made for a total of approximately 17,000 lb of fish.

RECOMMENDATIONS

The success of this completely new method of fishing is very encouraging for owners of vessels of this type. Our experiments have clearly shown, however, that there are basic prerequisites and limitations which must be considered. These are listed below.

1. Smooth mud, sand, sand and mud or sand and shingle are the only types of bottom on which this gear can be fished. Such bottom must exist within the operating range of the vessels.
2. Both vessels should be of a like design and size, and
3. Co-ordination and co-operation between the two skippers is a must.
4. A thorough understanding of the local tide direction and strength.
5. Ropes and wires must be exactly equal and adequately marked at regular intervals.

EXTRACT FROM A REPORT BY CAPTAIN J. THOMSON

This type of fishing is entirely new, although it certainly originated from the one-boat Scottish seine, and the whole idea was to use the same type of net with two small boats (lobster or scallop boats). I am now happy to report that this pair seine method can produce better results at about one-third the cost in fuel of one large Scottish seiner. One thing that I would like to stress is this -- that this gear will only work on clean bottom (i. e., mud, sand, sand and mud, and sand and shingle) and it would be futile for boats to rig out for this fishing if suitable bottom is not available in the near vicinity. Rock or stony bottom cannot be considered for this method of fishing. We started off (as already reported) with 500 fathoms of 3/8" wire on each side; we made a few sets with this but were unable to pull the gear over the bottom, the wires biting into the sand and mud at the bights (which we more or less expected). The first successful fishing was done when we put 100 fathoms of 2-3/8" by circ. manilla rope next to the net and set with 400 fathoms of 3/8" (diameter wire), and we were able to give almost the 100 fathoms of sweep on both sides, but if we over-ran the 100 fathoms of sweep and had maybe 10 to 20 fathoms of wire in the sweep before straightening out for the direction of tow, the set was lost, as the wire bedded in the sand or mud.

For the first 2-week period from June 9 - 20, we had 6 days of fishing in grounds 3 to 5 miles off from Basin Head, in the Souris area. We caught 22,370 lb of fish consisting of 20,275 lb flats (90% of these were black backs; the other 10% were yellow tails and plaice), 215 lb of

hake, and 1,885 lb cod. We subsequently shifted to the area off Egmont Bay, but the fish there were very small and scarce, so we moved to Borden about 15 miles S. E. approximately and worked on the outside or north side of the small draggers fishing there for hake.

The bottom was muddy and shoal, that is from 7 to 12 fathoms, the tide was from 2 to 3 knots, and we experienced considerable difficulty in operating the gear there, both on account of the soft mud and the stronger tides. In order to get the gear to move along the bottom, we had as low as 100 fathoms of wire and 100 fathoms of rope; this worked all right with our No. 6 net, but was no good with our 320 Vinge. We fished 6 days from June 23 - July 4 and caught 10,980 lb (8,970 lb flats, 169 hake, and 325 lb cod). I came to the conclusion that 100 fathoms of rope was not enough to give the desired sweep for this fishing and decided to double the length to 2 coils per side, but this could only be done with bigger drums on the winches, and indeed this was necessary if we were to try deeper waters of say 30 to 60 fathoms.

We took our winches ashore to Hall & Staverts, Charlottetown (where they originated) and had the drums increased from 20" diameter to 30" diameter. This meant that we were off the sea from July 7 to July 18.

We started fishing again on July 21 and had 7 days fishing up to August 1. In that time we caught 39,905 lb of fish (24,275 lb flats, 14,785 lb hake, 845 lb cod). From August 4 to 14 we had 8 days of fishing and caught 67,870 lb of fish (18,350 lb flats, 41,100 lb hake, 420 lb cod).

Total to date for 27 days fishing is 141,580 lb fish (71,870 lb flats, 65,785 lb hake, 3,475 lb cod). The fuel burned per day was 15 to 16 gallons diesel oil per boat.

The boats carry only 2 men each, but in my opinion this size crew is too small; 3 or even 4 men would be required to cope with big fishing of, say, over 10,000 lb per day. We had mostly 4 sets per day, but 8 sets could be made comfortably from dawn to dusk.

The gear fishes best before the tide, although on weak tides there is little or no difference in fishing either way. Across the tide is futile, that is, in tides 1-1/2 knots or more. There is one very important feature to watch in this operation, when both boats are towing abreast and one of the boats finds it necessary to increase speed to keep in line with the other. This is the lee-tide boat. Increasing speed and rudder angle will not have the desired effect, but an even tow can be made by changing the warp from the middle roller position to the inside quarter. When this is done, both boats can tow at the same revs. per minute.

When the boats come alongside, both must continue to tow until the net is closed. This can be determined by ascertaining that the wires are bearing in a parallel direction.

When heaving up the gear, the propellers should remain engaged ahead all the time, and only be de-clutched when the net surfaces.

The successful fishing of pair seine depends on complete harmony between the two captains, and one of the captains should be in complete command of the whole operation.

We have learned a lot since starting this operation, and I have no doubt that there is a whole lot more to be learned. This type of fishing is entirely new, and I believe that it will have far reaching effects to the benefit of the earnings of the inshore fishermen of Canada. One very encouraging feature is the gear costs, which are about 1/3 compared with the conventional normal Scottish seine. The running costs are about 1/3 for 2 small boats compared to those of one of our larger Scottish seiners. Clean bottom, already mentioned, is imperative, and the grounds most suitable for this gear are those adjacent to the Magdalen Islands where there are plenty of fish in season.

OPERATING PROCEDURE

1. A dhan buoy with pallet and flag is set to an anchor in order to determine the exact direction of the tide.
2. Since each boat has a net, it is convenient to shoot alternately, i. e., for the first tow boat A. shoots his net and on tow number 2, boat B. shoots. This saves a lot of time, as there would otherwise be a period spent clearing fish from the net and re-laying it ready for the next haul.

One boat shoots his net codend first, at right angles to the tide, and then passes the appropriate wing and bridle or end of rope to his partner.

3. The net is towed out straight and both boats then shoot equal lengths of rope still at a right angle to the tide.
4. When the rope has almost run out, the boats turn 90° either "down" tide or "up" tide, depending on the pre-arranged direction of tow.

N. B. - At all times radio communication is imperative.

5. The required length of wire is run out and towing commences. A good set, dead before the tide is illustrated in Fig. 1. Both boats maintain the same compass course while towing and in this regard it is important that the compasses be adjusted correctly.
6. Towing is maintained at about 1,200 r. p. m. which is a speed over the ground of about 3 knots before a 1-1/2 knot tide. The distance between boats in Fig. 1 at the start of the tow, steering due south is 200 fathoms. This distance gradually closes automatically until the boats are alongside.

N. B. -- In rough weather a safe distance can be maintained rather than have the boats in contact.
7. As soon as the two wires lead parallel, dead astern, the winch clutches are engaged and heaving up commences. Until the net breaks surface, both vessels continue to tow ahead. Warps are kept even while heaving up by closely watching the "marks" as they come in. If the marks are uneven, one winch must be stopped until this is remedied.
8. When the net bridles reach the transom rollers, one is passed over to the boat which shot the net and both crews haul the net back. Of course, in order to do this one crew must transfer to the other boat.
9. If the haul is good, the boats usually steam back up through the tide to the marker buoy and repeat the procedure. It is advisable to have a marker buoy at each end of the set, however, as knowledge of the exact direction of the tide is important.

In Fig. II the set is exactly the same as Fig. I except that the tide is running from the ENE rather than from the north. To tow as in Fig. I would be futile as this would spoil the set; the reason being that both boats are setting down with the tide, and not in the direction that they are towing. To counteract the tide the boats must tow at a speed

S. E. , but with both rollers in the centre to steer S. E. is futile because the rudder must go hard over to port and this annuls the power to the propeller. The rollers must then be shifted to the position to port of the centre hole. By so doing, the course of the tow can be kept with very little rudder needed, thus getting practically all the power needed from the propeller.

Both boats should be angled to the gear, that is steering identical courses and towing at identical revs. By so doing, a set across or partly across the tide can be fairly successful. This points up the need for caution before setting as knowing the exact direction of the tide is a must. Towing through the tide makes quite a good set, but it is more difficult to maintain the course of tow than it is before or with the tide.

EXTRACT FROM A REPORT BY
BRUCE LEWIS - OBSERVER

Pair Scottish Seine Project - Prince Edward Island
August 4 - 17, 1969

Pounds of fish caught during this two-week period amount to better than 66,000. This is an estimate of whole weight. The weight of landed fish will be less as the round fish are sold gutted.

The procedure has been mastered by the two boat captains and the area is now familiar so there are no spoiled sets. The performance of the boats has impressed everyone who has had the interest to spend a day fishing with us. Our total daily catch is usually three and four times that of the inshore fishermen in the area who are presently using gill nets and baited trawls.

The Debby Brian, a fifty-five foot boat rigged for Scottish seine, has been fishing beside us this past week. Comparing the two for the week, we feel the pair seiners will out-fish the single boat with the same net. This is possible from the very nature of the paired idea. We can set our net and begin to tow in about six or seven minutes, whereas the Debby Brian takes at least thirty-five minutes before she can begin to move the net. Although she fishes with ten coil of warp aside the pair seiners can keep their five coil aside open longer and thus cover more bottom. To out-fish a Scottish seiner was a bit of a revelation to all concerned. The taste of sweet success should be enjoyed by all responsible for the project.

The C.B.C. spent part of a day taking pictures of the operation on Tuesday the twelfth of this month. The film is to appear as a program for the Fishermans Log series.

During the next two-week period we hope to increase our total catch and demonstrate to as many as are interested. Deep water trials will follow sometime in the near future.

CANADIAN PAIR SEINE FISH LANDINGS - SOURIS, P.E.I. - 1969

<u>Date</u>	<u># Tows</u>	<u>Flats</u>	<u>Hake</u>	<u>Cod</u>	<u>Total lb</u>
July 22	2	2510	322		2832
" 23	4	2543	400		2943
" 24	4	2700	4000		6700
" 28	5	6408	4328	192	10928
" 30	5	3010	1911	100	5021
" 31	4	1732	3430		5162
Aug. 1	3	2445	2000		4445
" 4	4	3260	5790		9050
" 5	3	3487	5828		9315
" 7	5	3278	7385		10663
" 8	2	2145	5944		8089
" 11	3	2633	2455		5088
" 12	3	2860	1142		4002
" 13	5	3037	4035		7072
" 15	2	130	6167		6297
" 19	4	1450	6900		8350
" 21	1	1300	3500		4800
" 22	2	400	14300		14700
" 25	4	3200	3100		6300
" 26	3	2000	8400		10400
" 27	3	2400	5000		7400
" 28	2	4200	11000		15200
Sept. 1	3	2200	17800		20000
" 2	4	3400	12000		15400
" 3	3	1700	6200		7900
" 4	3	2500	4000		6500
" 5	2	1050	950		2000
" 11	4	2700	3100		5800
" 12	2	1400	1000		2400
" 17	2				10800
" 18	2				12800
" 19	2				5500
" 22	4				10300
" 23	2				10750
" 24	4				10000
" 25	2				4000
" 26	2				3230

Total Landings - July 22 to Sept. 26 - 342,415 lb

Total Days Fished - 37

Total No. of Tows - 114

Average Tows per Day (approx.) - 3

Average Weight per Tow - 3,239 lb

It is significant that 5 tows were made only on 4 occasions. In a fully commercial operation, at least this number of tows may be possible every day and on this basis the daily potential catch rate could be in the region of 16,000 lb.

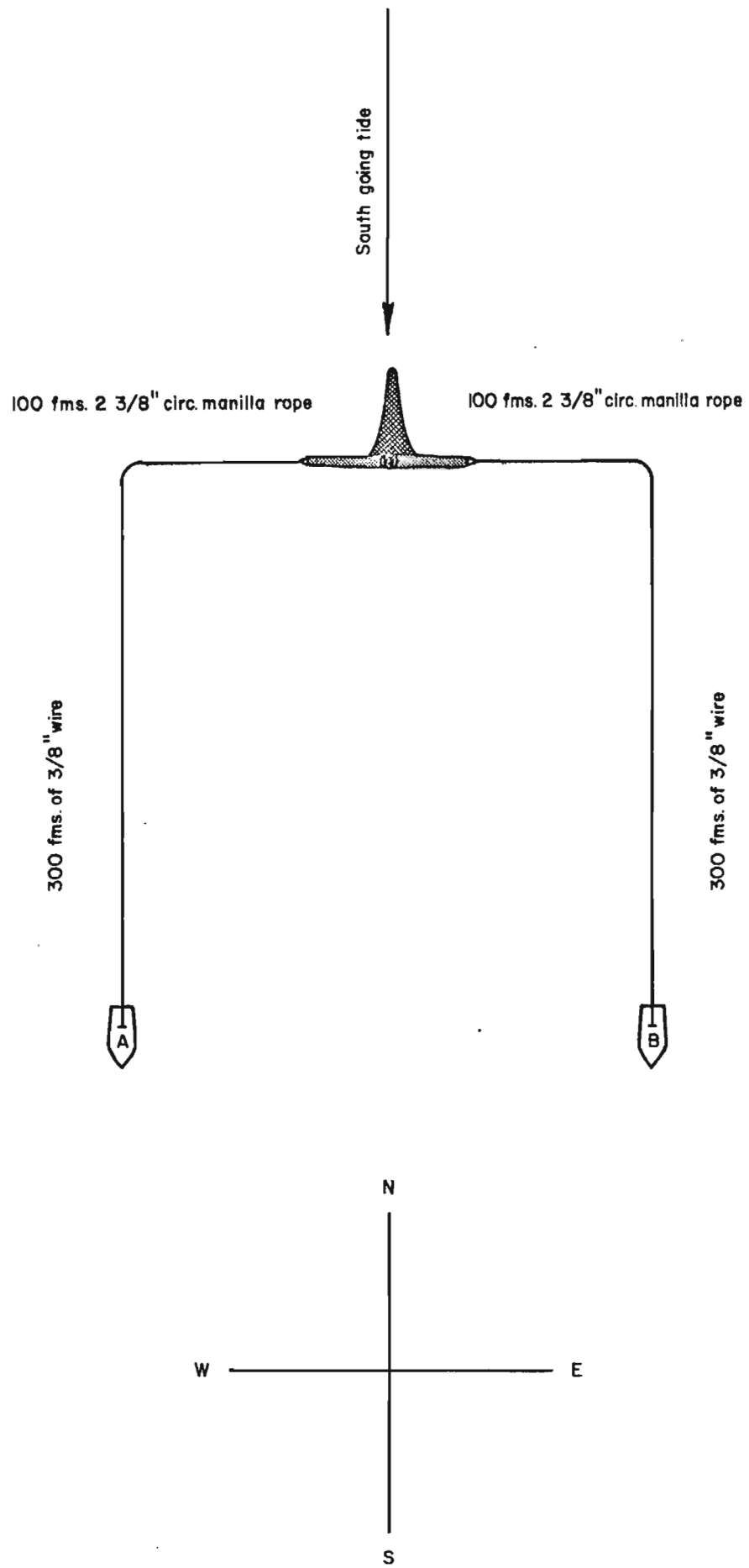


FIG. 1

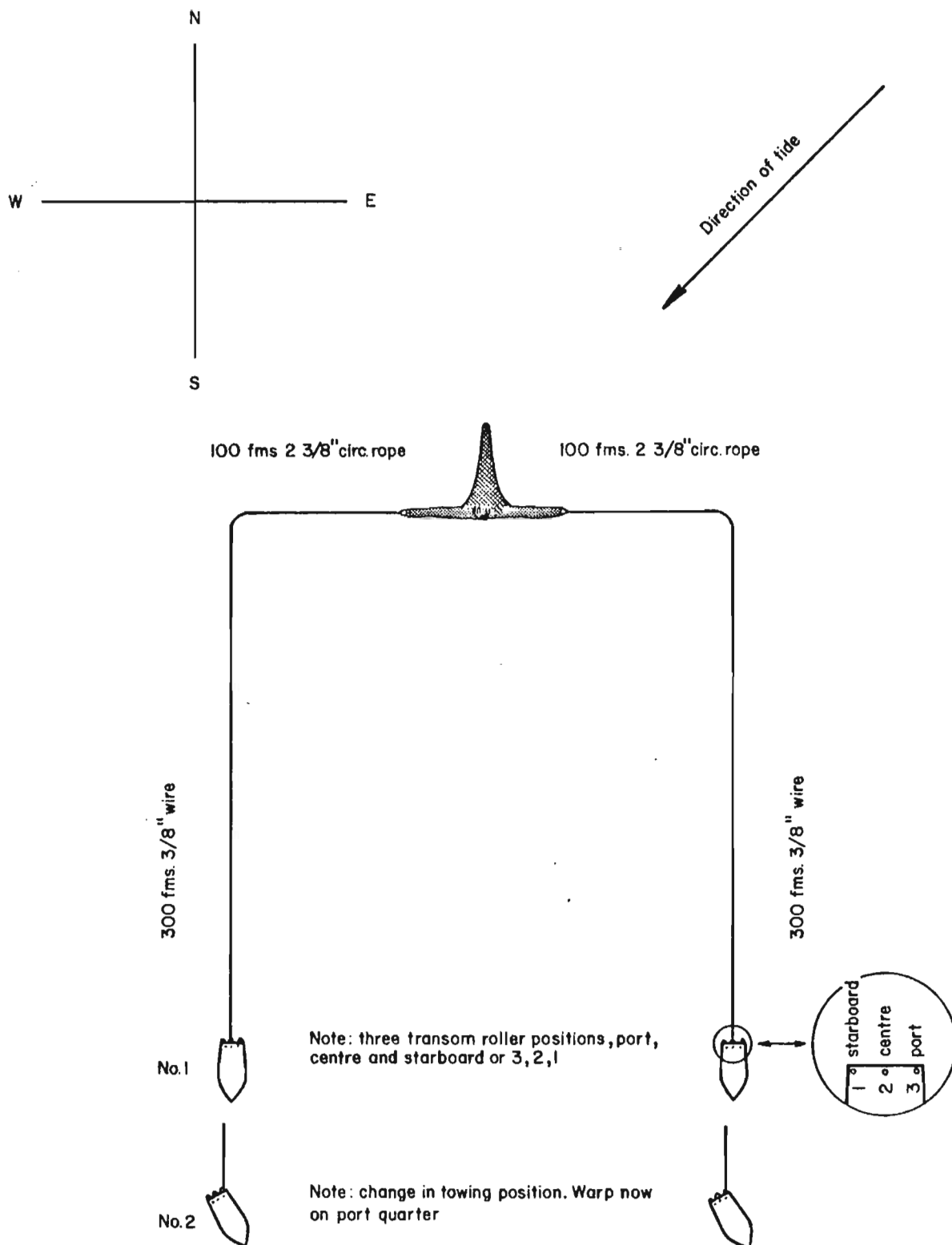
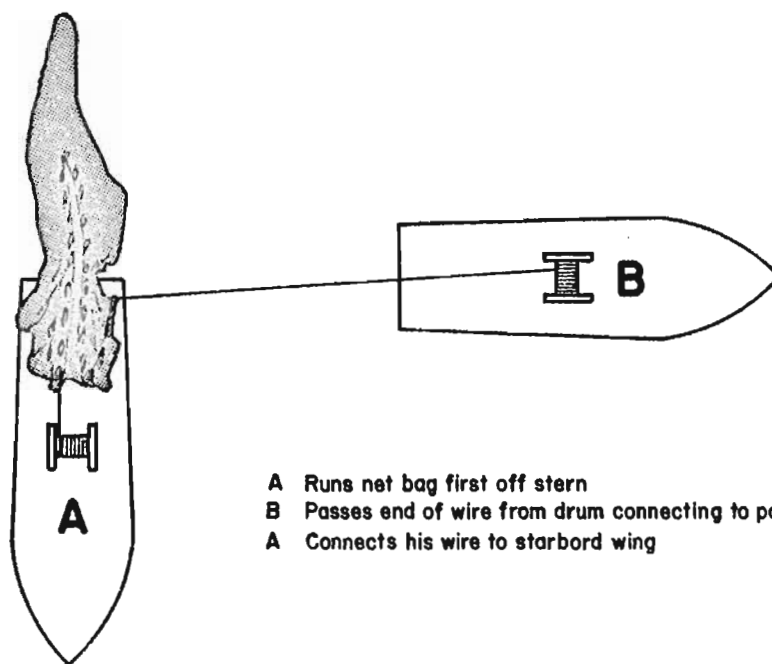


FIG. 2



- A Runs net bag first off stern
- B Passes end of wire from drum connecting to port wing
- A Connects his wire to starbord wing



- A & B Tow out net straight for direction of tow
- A Swinging to opposite course from B

FIG. 3

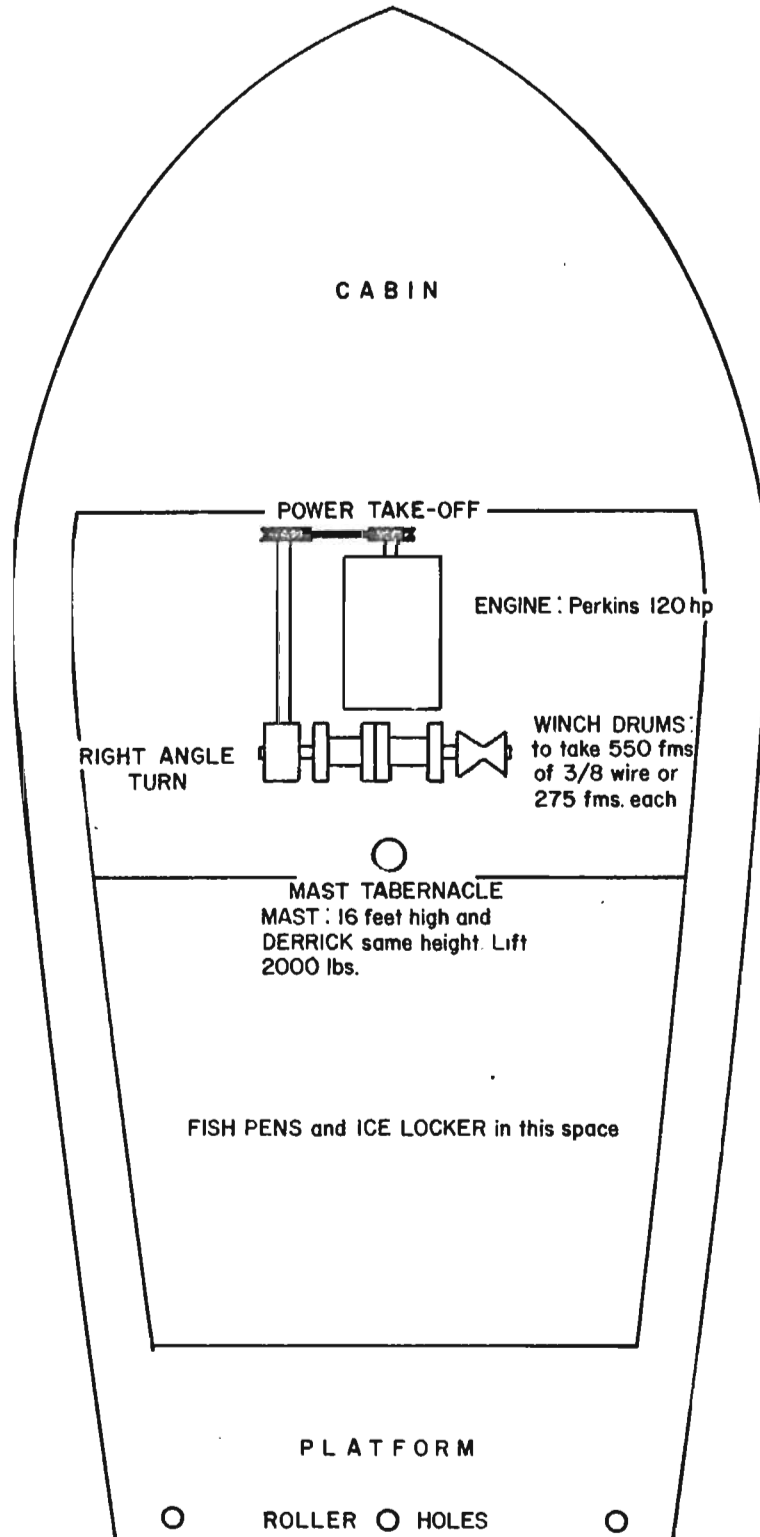


FIG. 4

ADDENDA

The initial experimental phase is complete and the vessels are now engaged in a full-scale commercial operation. Two additional boats of the same type have now been rigged out for pair seining in Prince Edward Island, and it is understood that they also are experiencing good hauls of about 3,500 lb average.

The Industrial Development Branch of the Fisheries Service of the Department of Fisheries and Forestry in the next fiscal year intends to carry out further experiments using boats of 65 feet in length, and possibly even larger. The industry will be kept informed of further developments such as these at appropriate times.

ACKNOWLEDGEMENTS

The Industrial Development Branch wishes to thank the Prince Edward Island Department of Fisheries for its co-operation and assistance during the course of this project. We also thank Mr. Bruce Lewis, our observer, for a job very competently carried out.

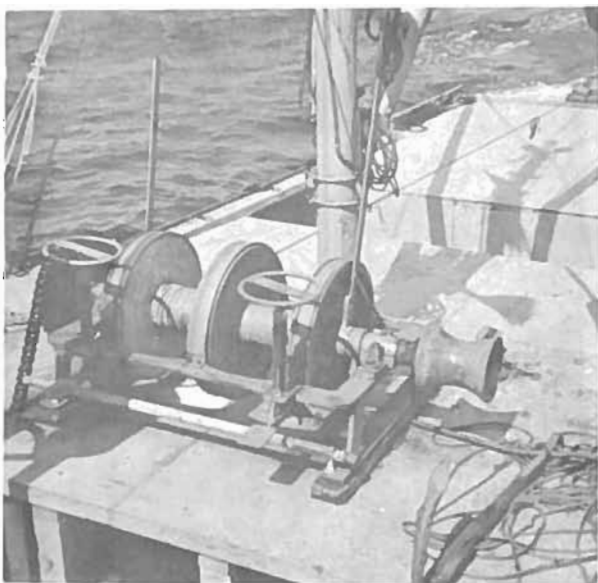
Captain James Thomson supervised the rigging out of the boats and the fishing operations throughout the total experimental phase. It is largely due to his untiring efforts and expertise that the program has been so successful. We therefore express deep appreciation to Captain Thomson on behalf of all concerned.



Ready to shoot - note tire fenders for coming alongside partner boat at sea.



Immediately after shooting the net it is towed out straight.



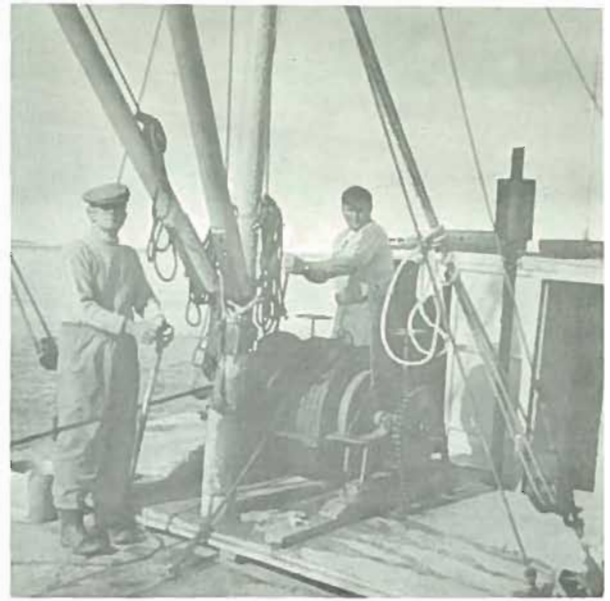
View of the winch before the drums were enlarged.



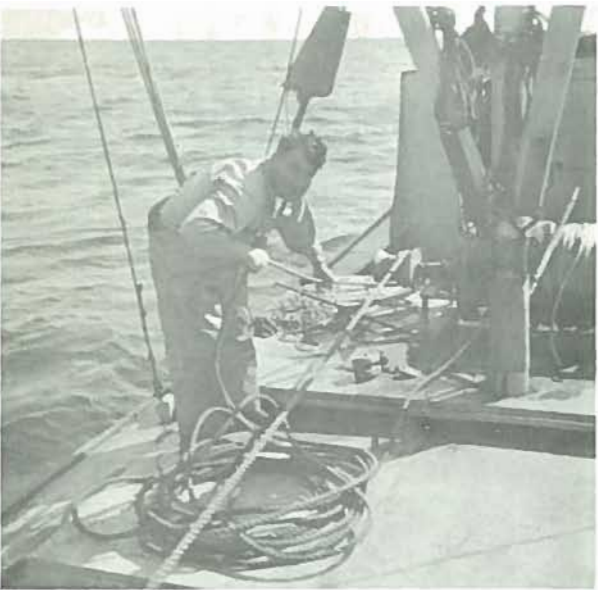
Towing. View of the transom fairlead.



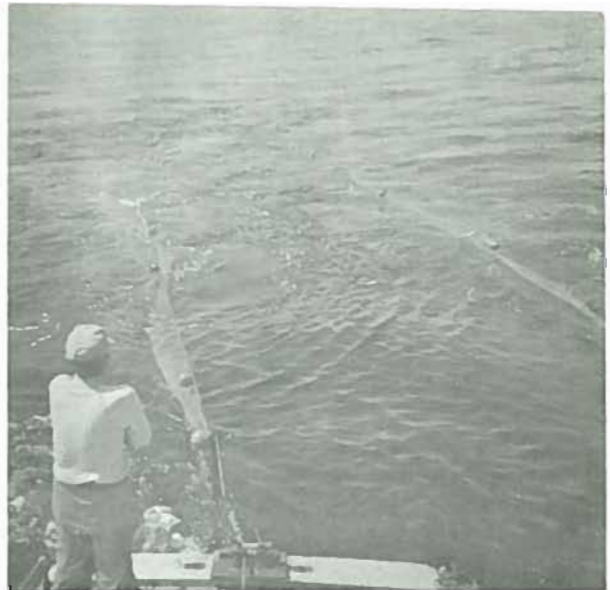
Winch after modification to drums.



Hauling. When one drum is full, the warp is quickly transferred to the other.



Before the winch drums were enlarged, some of the rope had to be taken in by hand from the warping head and coiled on deck.



The net breaks surface.



Both crews haul the net.



"Fleeting" a heavy lift of flats.



Splitting the bag.



Heaving on the splitting strap.



A lift of flats comes on board.



As much as one ton can be lifted.



Rolling in the cod end.



Full to the hatches.



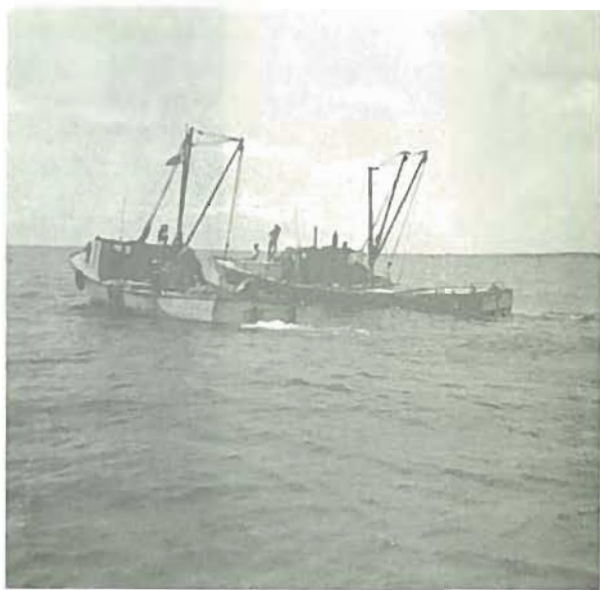
Working deck, looking
aft.



Running repairs are seldom
necessary.



Winch after modification.



Two boats coming together
at end of tow.

Splitting a large bag of hake.

