

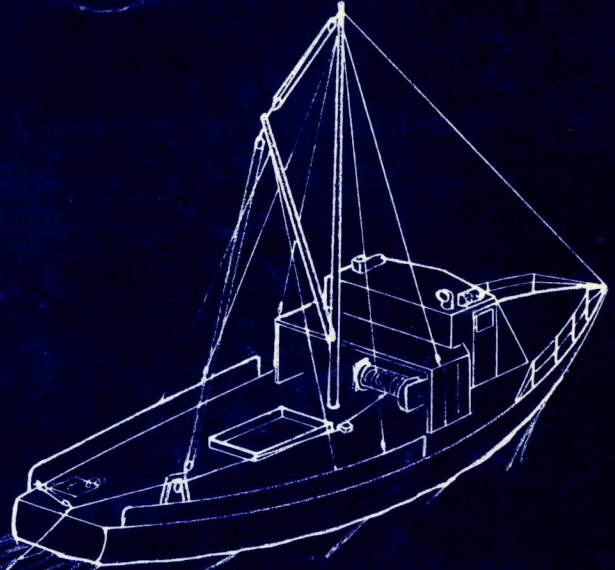
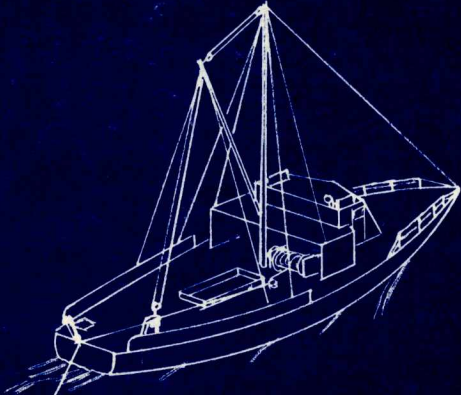


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**SMALL BOAT PAIR  
MIDWATER TRAWLING PROJECT  
1974**

BY  
G. BROTHERS

SH  
344.6

INDUSTRIAL DEVELOPMENT BRANCH  
NEWFOUNDLAND REGION

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14320

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PART II

The Herring Pair Midwater Trawl Project

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**PART I**

**SMALL BOAT PAIR MIDWATER TRAWLING FOR CAPELIN**

**BY**

**G. BROTHERS**

**IN CONJUNCTION WITH**

**CAPTAIN G. THOMPSON**

**Technical Advisor**



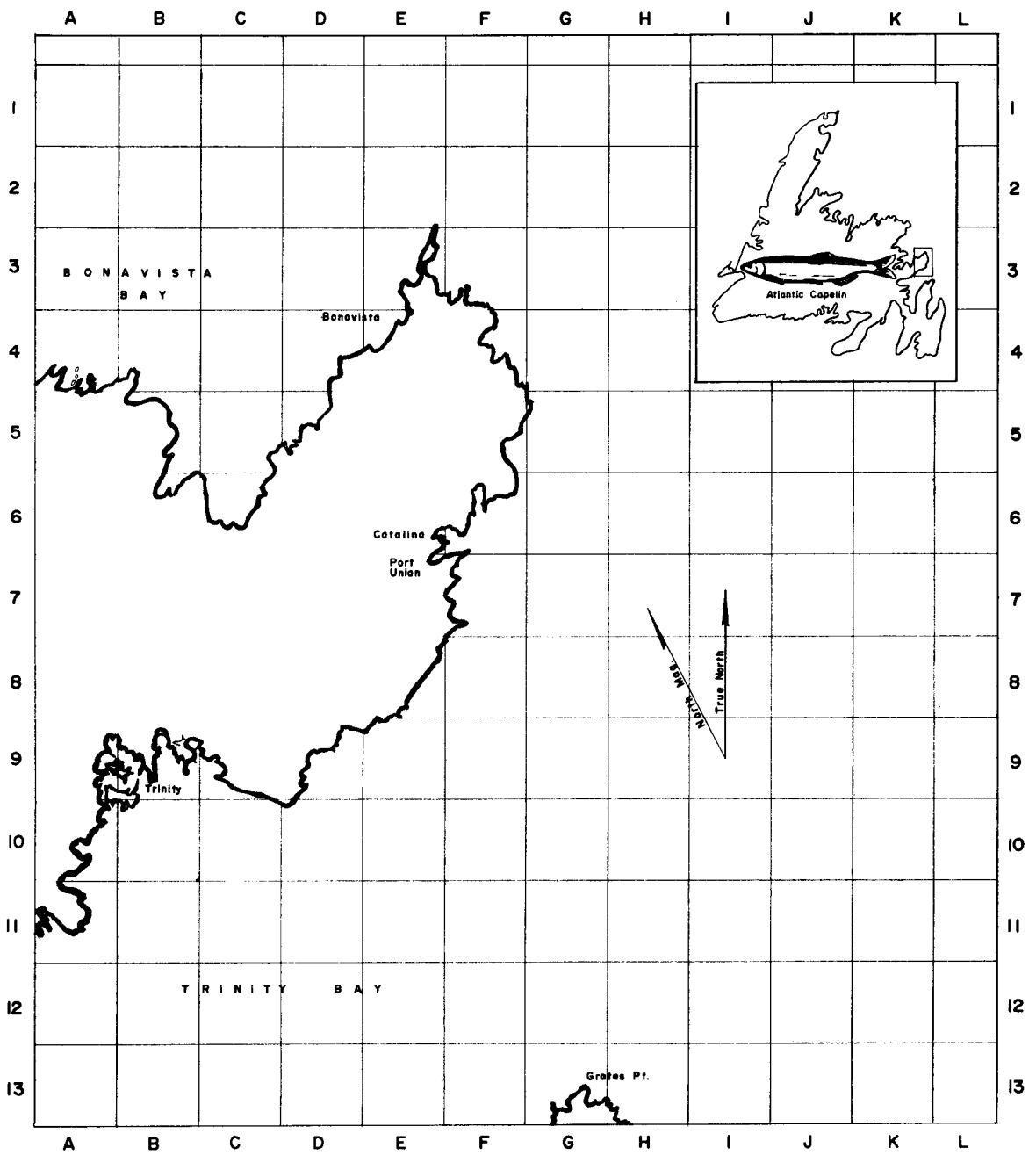
## I. INTRODUCTION

In a continuing effort to expand and diversify the catching capabilities of small fishing vessels, the Industrial Development Branch, Fisheries and Marine Service, Department of the Environment, conducted an experimental fishing operation in Trinity North, Newfoundland, during the early summer of 1974. The purpose of this project was to determine the feasibility of catching capelin, using the pair midwater trawling technique on two 40' longliners with a combined 140 horsepower. This technique was introduced during 1973 with considerable success on a pair of 58' longliners, with a combined 500 h.p. However, this method of fishing has not been tried before on the smaller longliners in Newfoundland.

Many vessels of this type have low horsepower, sufficient for operating "fixed" gear, but not for "towed" gear, using one boat. However, the use of two boats to tow a single trawl, a method used successfully by Spanish fishermen for many years, is proving to be a very effective catching technique.

Over the past few years, longliners have had to travel greater distances and are experiencing declining landings. It has now reached the point where it is very difficult for the small longliner to compete in the fishery, using present fishing techniques (gillnetting, longlining, etc.) when fishing for only groundfish. However, if the pair midwater trawling technique proves successful, it could have a tremendous effect on the small longliner fishery in Newfoundland, for the catching of capelin and other pelagic species.

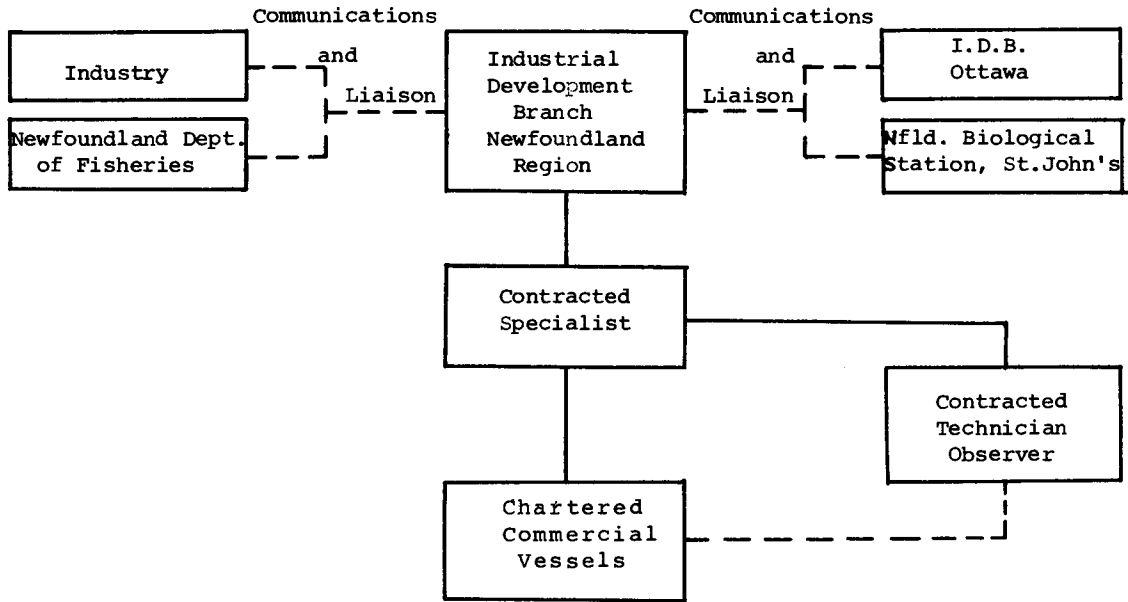
A modified pair midwater trawl is presently under construction, with a view to continuing this project during the fall for herring fishing. If successful, this type operation can be extended to other areas of the Province, where many longliners are experiencing limited groundfish landings and short fishing seasons. ~~The~~ successful, this type operation can be extended to other areas of the Province, where many longliners are experiencing limited groundfish landings and short fishing seasons. The successful introduction of this technique could contribute greatly to a more diversified and productive operation over a longer fishing season.



DEPARTMENT OF THE ENVIRONMENT  
 FISHERIES AND MARINE SERVICE  
 1974 CAPELIN HARVESTING PROGRAM

Fig. 1

## II. ORGANIZATIONAL STRUCTURE



## IV. PROGRAM PLANNING DIAGRAM AND TIME FRAME

PLAN	ORGANIZE	TRAIN	IMPLEMENT	EVALUATE
a) Program Planning b) Order of Equipment c) Selection of Vessels d) Selection of Contracted Personnel	a) Charter of Vessels b) Purchase of Equipment c) Modification of Vessels	a) Training of Fishermen b) Demonstration of Technique	a) Experimental Fishing Operations Utilizing this Pair Midwater Trawl Technique	a) Results Evaluated Relevant Information Compiled and Transferred to Industry
MAY 1-31	JUNE 1-20	JUNE 21-30	JULY-AUGUST	SEPTEMBER
PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5



### III. FISHING VESSELS' EQUIPMENT AND GEAR

#### 1. FISHING VESSELS' (FIGURE 2)

In order to carry out this experiment, two 40' Newfoundland gillnet longliners were chartered — the M/V "Dolphin I", owned and operated by Mr. Gordon White, and the M/V "Starfish III", owned by Mr. Harvey Russell and Mr. Ramond Jarrett, and operated by Mr. Ramond Jarrett. Both are from Catalina.

The M/V "Starfish III" is one year old. She was built by the owners. Last summer this vessel was involved in the gillnet fishery.

The M/V "Dolphin I" is several years old. She was built by Vokey's Shipyard in Trinity, Trinity Bay. She has been involved in the gillnet and longline fishery each fishing season since she was built.

Both vessels are manned by three crew members, including the skipper. A 70 h.p. diesel engine is the driving power behind each vessel.

The electronic equipment on board each vessel consists of an echo sounder, radar and radio telephone.

#### 2. DECK EQUIPMENT AND LAYOUT (FIGURE 3)

Before this program began, both vessels were rigged with a hydraulic gurdy for gillnetting and longlining. To carry out this project, the gurdy was removed and a small single drum hydraulic winch installed, using the same hydraulic system and near the same location. These winches were purchased from Hall and Stavert Ltd., Charlottetown, Prince Edward Island, who designed and constructed them for this program.

The aftermast, sail, and supporting ramp had to be removed to provide additional head room, and also make way for the gallows. Installation of gallows, gallows block, deck block, and a mast and boom on each vessel completed the rigging.

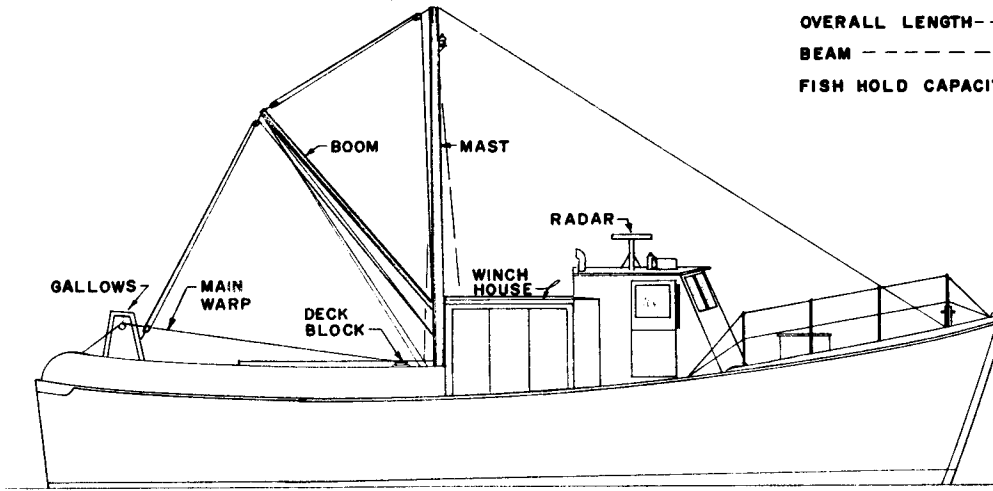
During the four days rigging at Catalina, the bridles (top bridles — 10 fathoms, bottom bridles — 13 fathoms) were made up. The main warp was marked at 25 fathom intervals and an eye spliced into the end for the bridles to shackle into on each vessel.

#### 3. THE PAIR MIDWATER TRAWL (FIGURE 4)

The pair midwater trawl used on this project was a cut-down version of the trawl used last year by the two 58' pair midwater trawlers in Conception Bay. It was designed by Mr. J. Rycroft, Chief, Exploratory Fishing Division, Industrial Development Branch, Ottawa. The trawl was constructed by Misner's Fisheries, Port Dover, Ontario. It consisted of 8" mesh in the wings and first belly, 6" mesh in the second belly, 4" mesh in the third belly, 2" mesh in the fourth belly, and 1¼" mesh in the extension and cod end. The extension and cod end were also lined with ¾" mesh. Since the twine sizes in the trawl were 210 D/ 21, 210 D/ 18 and 210 D/ 15 braided nylon, it was very light.

# A GILLNET LONGLINER RIGGED FOR PAIR MIDWATER TRAWLING

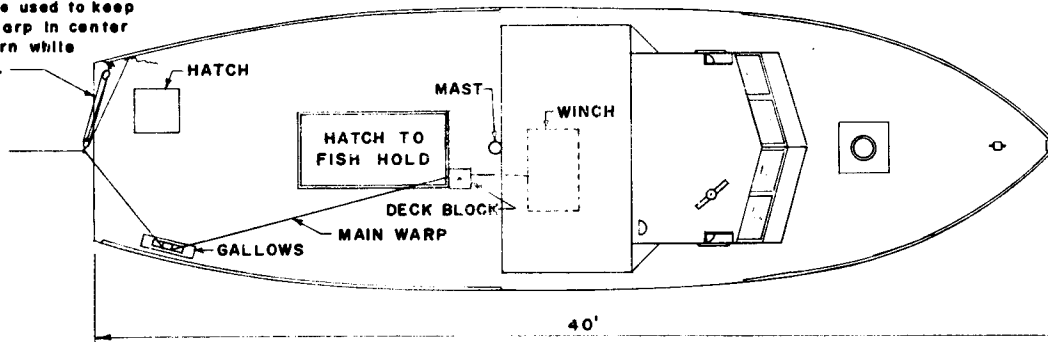
OVERALL LENGTH----- 40'  
 BEAM ----- 11'-6"  
 FISH HOLD CAPACITY-- 18,000 LBS.



S I D E V I E W

FIG. 2

Note:  
 Double sheave blocks  
 & tackle used to keep  
 main warp in center  
 of stern while  
 towing.



D E C K L A Y O U T

FIG. 3

# A CAPELIN PAIR MIDWATER TRAWL

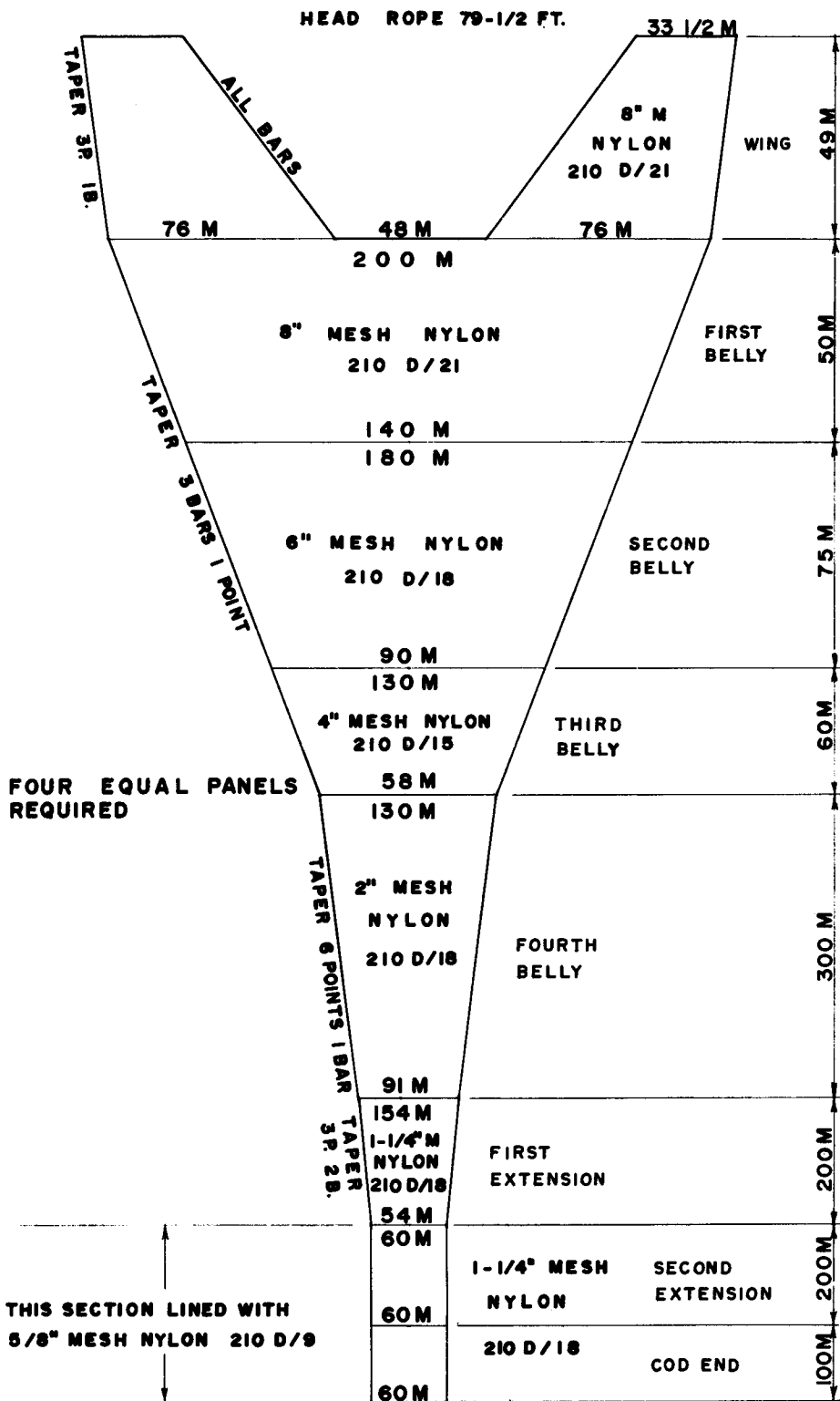
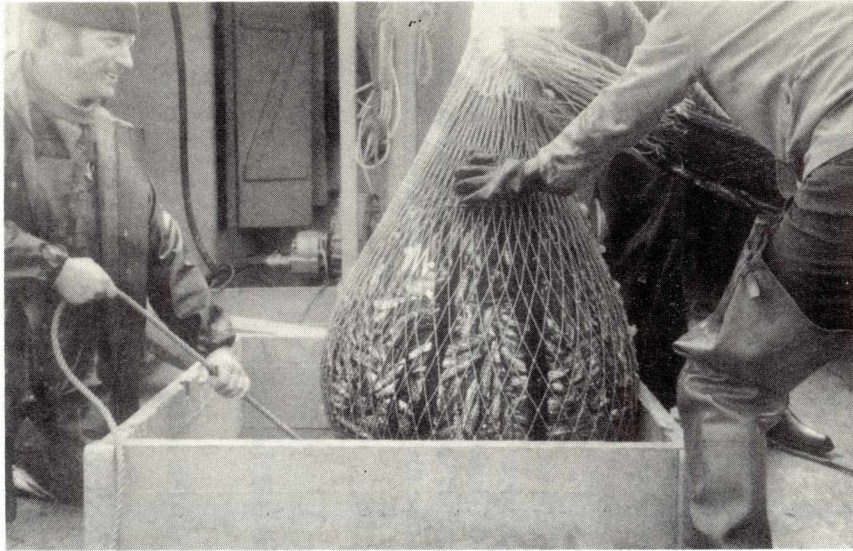
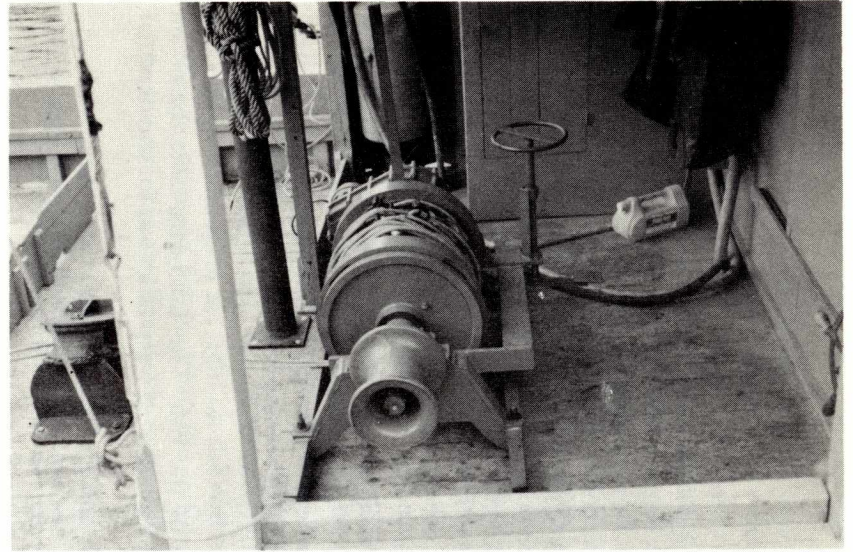


FIG. 4





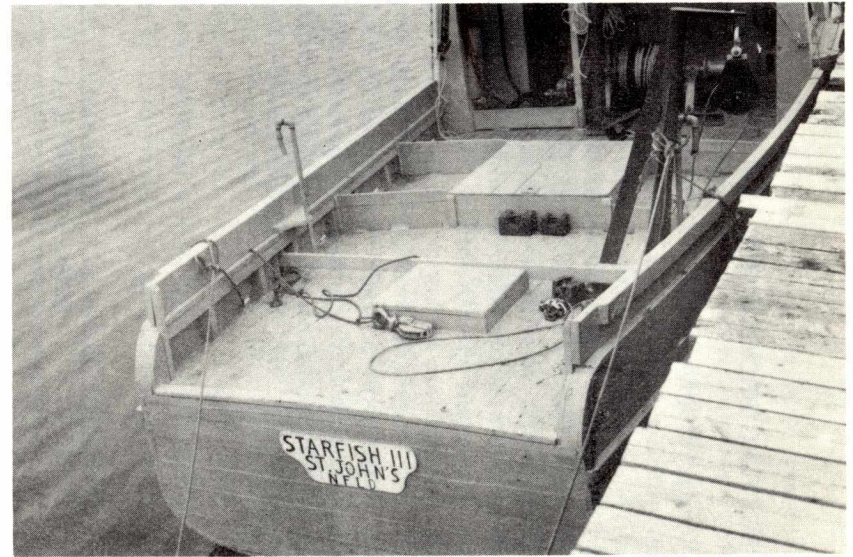
Mr. Raymond Jarrett — happy skipper releasing the first bag of fish



A single drum winch used for pair midwater trawling



The M/V "Dolphin No. 1", fully rigged with trawl aboard ready for pair midwater trawling



The M/V "Starfish III" was the second vessel used in the experiment



#### IV. METHOD OF OPERATION

##### 1. SETTING PROCEDURE (FIGURE 5)

The pair midwater trawl technique is used for catching pelagic fish (capelin, herring, etc.). When a school of fish is located on the echo sounder, preparations begin to make a set. The vessel carrying the trawl is headed in the direction in which the set is to be made. Geared ahead to approximately one-quarter speed, the cod end is thrown over the stern. The weight of the cod end in the water, with the vessel moving slowly ahead, forces the lengthening piece, bellies, and wings into the water also. As the wings are hauled off the stern, the vessel is slowed down, and the tips of the port wings are passed to the second vessel, which is close to the port side. (If there is very much wind, over 10 m.p.h., the tips of the wings are hauled over to the second vessel by a rope). The top and bottom wings are linked into the bridles, and a 28 pound weight is linked into the bottom bridle on each vessel. Now the vessels are geared ahead to three-quarter speed, and headed approximately 130° away from the trawl while the bridles are released from each winch. When approximately 5 fathoms of the bridles have gone out, the vessels are slowed in, the brakes are applied to each winch, and a 56 pound weight is linked to the bottom bridle on each vessel. As the brakes are released, both vessels are again speeded up to three-quarters speed, and the required amount of warp is let out. Now the vessels are slowed in before the brakes are applied to the winches for the final time.

The amount of warp let out depends on the depth of the fish. The following table, based on information gained during the experiment, will indicate the amount of warp to let out for the depth of the fish:

ECHO SOUNDER MARKINGS	LENGTH OF WARP
for Marks just under Surface	25 fathoms
for Marks 2 to 4 fathoms down	35 fathoms
for Marks 5 to 8 fathoms down	50 fathoms
for Marks 9 to 12 fathoms down	75 fathoms
for Marks 12 to 20 fathoms down	100 fathoms

The above table applies to the vessels used in this experiment, or vessels with equivalent power and size only.

##### 2. TOWING PROCEDURE (FIGURE 6)

When the trawl is set, the vessels are speeded up to full speed. Then the distance between the two vessels is adjusted to approximately one-half the warp length. Both vessels hold a predetermined course throughout the tow. A careful eye is kept on the echo sounder on both vessels for sharp decreases in depth, or the end of the school of fish (Figure 7), for either case the trawl would be taken back. Usually a tow lasts for 10 to 30 minutes.

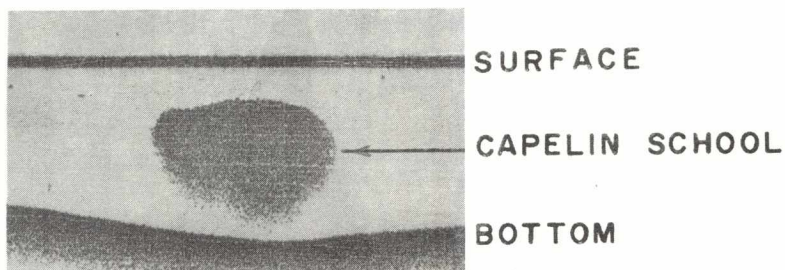


Fig. 7

### 3. HAULING PROCEDURE (FIGURE 8)

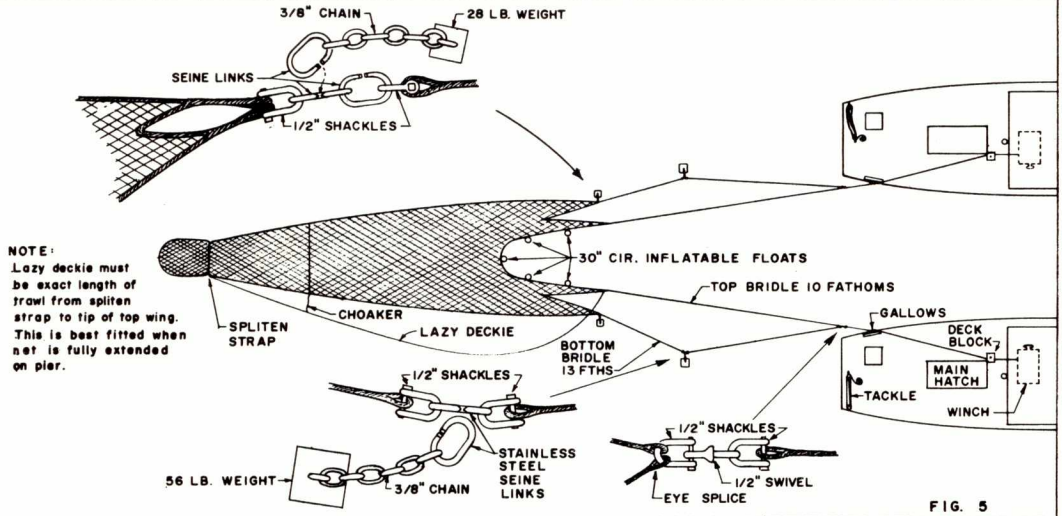
When the set is completed, the vessels are slowed in and the winches are put into gear. As the warps are being reeled in, both vessels gradually move towards each other. When the 56 pound weights come up to the gallows, the winches are put out of gear and the brakes are applied. By this time the two vessels have come side by side. Sixty inch circumference inflatable buoys and rubber tires prevent damage to the vessels in rough weather conditions.

When the 56 pound weights are disconnected, the winches are again put into gear as the brakes are released. The winches remain in gear until the 28 pound weights and the tips of the wings come aboard. Then they are put out of gear, and the brakes are applied for the final time. Here, the wings on the port vessel are disconnected from the bridles and passed to the starboard vessel. At this time, two of the three crew members from the port vessel board the other vessel to help haul in the trawl.

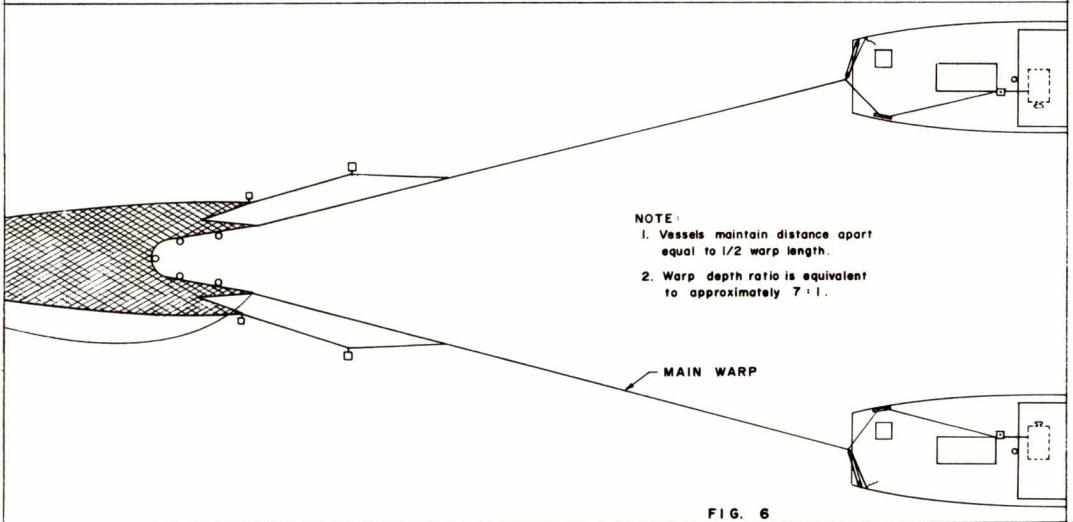
As the trawl is being hauled in by hand, strain is taken off the webbing by the lazy dicky, which is hauled in by the winch. When all the webbing is in to the lengthening piece, the vessel, with increased speed, is turned hard to port, and the cod end comes along the port side of the vessel. The splitted strap is hauled up to the rail by the lazy dicky and the fish tackle is hooked into it. The bag of fish is hoisted aboard, and the cod end block is released over the hatch and the fish go into the hold. Should there be more than one bag of fish, (which is usually the case, since the cod end only holds 600 pounds of fish), the cod end block is again set tight on the cod end and thrown over the side. Strain is again taken on the webbing to force the fish back into the cod end. By use of the winch, the lazy dicky hauls the splitted strap up to the rail and the fish tackle is again hooked on.

This procedure continues until all the fish is aboard. If there is more than enough fish for one vessel, the remainder is loaded aboard the second vessel.

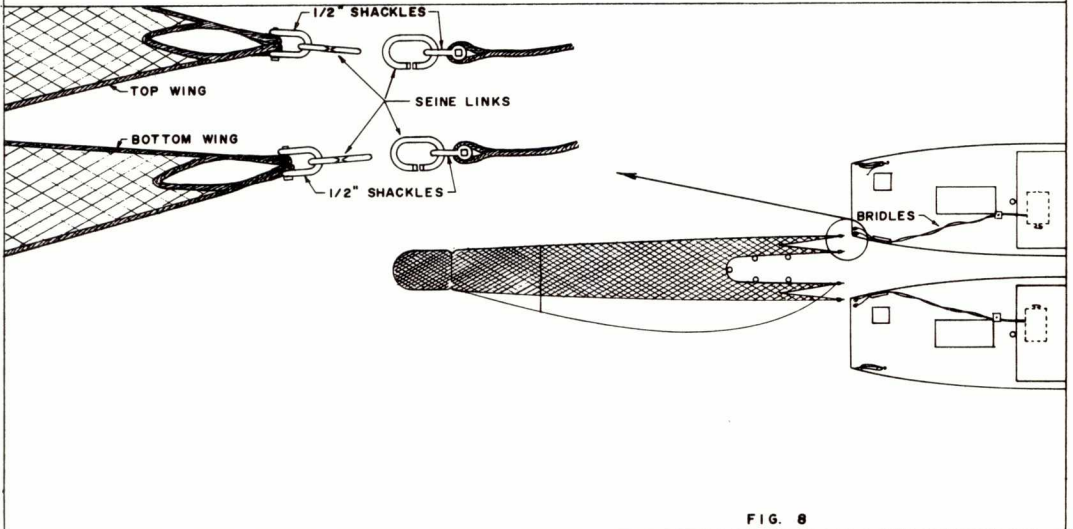
## SETTING



## TOWING



## HAULING



## V. GENERAL COMMENTS

### 1. WEATHER AND ICE CONDITIONS

During the past fishing season, the northeast coast of Newfoundland was plagued with more heavy ice and icebergs than has been known for the past 50 years. After the project began June 16th, there were frequent delays due to heavy ice, and on one occasion, the vessels were tied up for a full week.

The ice conditions also caused the water temperature to be much lower; therefore, the capelin which would normally land near the headlands, landed further in the bay. This meant additional steaming and searching time. It is felt that if normal conditions had prevailed, landings would have been considerably higher.

### 2. UNLOADING TIME

When the capelin finally moved out close to the headlands, much better fishing was experienced. One week the vessels were landing full loads daily between 1200 and 1500 hours, but due to difficulties with unloading equipment, did not finish discharge until later in the evening. With efficient discharge, two loads per day could be landed without difficulty. This is very important because with a short season and a low priced product, volume makes the difference.

### 3. FISHING EFFORT

As is the case with most new methods being introduced, a period of instruction is necessary which should not be considered as commercial fishing effort. However, this experiment was fortunate to have two very excellent crews who took to the method quite readily and a minimum of effort was expended in the demonstration stage.

### 4. SEPARATION OF FEMALES

Throughout this project, a large percentage of the catch was female capelin bearing roe. Since the price paid to fishermen is better for roe-bearing capelin, a greater effort was necessary in plant to recover more of the females and thereby provide increased incentive through higher earnings. Also worthy of mention is the fact that fish landed with this method were completely free from debris and did not create a problem experienced with processing equipment due to rocks, sand, etc., found in capelin harvested from the beaches and delivered to the plant by truck.

## VI. CONCLUSION

This project proved that the pair midwater trawling technique is a very competitive method of catching capelin. During the short time the capelin are on the beaches, the beach seine is probably more effective. However, the pair midwater trawl has a much longer season since it is effective in catching capelin before they come to the beaches and also after they leave the beaches.

The capelin landed by pair midwater trawl are superior to those landed by a beach seine or a cast net. The capelin landed by beach seines and cast nets are known to contain a percentage of debris such as sand and gravel. This debris is very damaging to the processing machinery. The capelin landed by pair midwater trawl are completely clean, and also contain a very high percentage of females.



## VII. ACKNOWLEDGEMENTS

- I. Mr. B.F. King, Exploratory Fishing Division, Industrial Development Branch, Fisheries and Marine Service, Ottawa, for assistance in obtaining a pair midwater trawling specialist, also arranging for the construction of a suitable trawl.
- II. Mifflin Fisheries Ltd., Catalina, for the use of their premises and equipment while rigging the vessels.
- III. The captains and crews of the vessels for their excellent co-operation throughout the project.
- IV. The Provincial Department of Fisheries for the services of project observer, R. Harnum, who assisted in recording necessary data.
- V. Fish<sup>ERY</sup>~~ing~~ Products Ltd., for their co-operation.

Drafting for this report was done by Mr. T. P. Carew of the Inspection Branch.

TABLE NO. 1

IX. MATERIALS REQUIRED TO OUTFIT ONE SET OF CAPELIN PAIR MIDWATER TRAWLERS					
NO.	ITEM	SPECIFICATIONS	QUANTITY	APPROX. UNIT COST	APPROX. TOTAL PRICE
1	Hydraulic Winch	Single Drum	2	\$ 2,400.00	\$ 4,800.00
2	Pair Midwater Trawl	Small, light	1	2,000.00	2,000.00
3	Wire	3/8" Dia.	400 ftms.	440.00	440.00
4	Gallow Block	-	2	175.00	350.00
5	Mast and Boom	Mast 15' x 4" Dia., Boom 10' x 3" Dia.	2 sets	600.00	1,200.00
6	Gallows	-	1 set	600.00	600.00
7	Deck Block	Upright	2	175.00	350.00
8	Wooden Block	Double Sheeve 6" Dia.	4	16.50	66.00
9	Wooden Block	Single Sheeve 6" Dia.	4	10.00	40.00
10	Nylon Rope	5/8" Dia.	100 ftms.	155.00	155.00
11	Wooden Block	Double Sheave 4" Dia.	4	11.00	44.00
12	Wooden Block	Single Sheeve 4" Dia.	4	6.50	26.00
13	Poly Rope	3/8" Dia.	200 ftms.	48.00	48.00
14	Iron Snatch Block	6" Dia.	2	37.50	75.00
15	Turn Buckles	3/8" Dia.	10	4.00	40.00
16	Iron D Shackles	1/2" Dia.	48	1.00	48.00
17	Iron Swivels	1/2" Dia.	6	3.00	18.00
18	Threaded Rods	5/8" Dia. x 3'	24	1.00	24.00
19	Nuts & Washers	5/8" Dia.	100	.10	10.00
20	Shackle	5/8" Dia.	4	2.00	8.00
21	Shackle	7/8" Dia.	2	3.00	6.00
22	Inflatable Buoys	8" Cir.	4	13.50	54.00
23	Inflatable Buoys	30" Cir.	20	4.00	80.00
					\$10,482.00

TABLE NO. 2

X. EVALUATION OF RESULTS						
BIWEEKLY						
WEEK NO.	DATE	NO. OF SETS	QUANTITY OF FISH	NO. OF FISHING DAYS	NO. OF FISHING HOURS	REMARKS
1	JUNE 16 JUNE 22	-	-	-	-	CHARTER BEGAN JUNE 19. RIGGING VESSELS UNTILL END OF WEEK
2	JUNE 23 JUNE 29	18	29,100	6	7 1/2	3 TRIAL SETS MADE AT THE BEGINNING
3	JUNE 30 JULY 6	10	53,500	4	2	IN PORT TWO DAYS REPAIRING DAMAGE. ALSO HIGH WINDS
4	JULY 7 JULY 13	6	1,800	1	1 1/2	5 DAYS LOST THIS WEEK DUE TO HEAVY ICE CONDITIONS
5	JULY 14 JULY 20	12	10,700	4	4	ENGINE TROUBLE, ONE DAY
6	JULY 21 JULY 27	28	194,100	6	8	EXCELLENT CATCHES THIS WEEK
7	JULY 28 AUGUST 3	41	125,800	6	14	MAJOR TRAWL DAMAGE OCCURRED ONE DAY
TOTAL:		115	415,000	27	37	

PART II

SMALL BOAT PAIR MIDWATER TRAWLING FOR HERRING

BY

G. BROTHERS

IN CONJUNCTION WITH

CALVIN WHIFFEN

## SUMMARY

On October 28th, the small boat pair midwater trawling project, which was carried out during June and July for capelin fishing, was reactivated for herring fishing. To carry out Part II of this project, the same vessels, rigged with the same equipment were used. However, a trawl (Figure 1), one-fifth smaller than the capelin pair midwater trawl, was designed by Captain G. Thompson and constructed by Misner's Fisheries Ltd., Port Dover, Ontario. A smaller trawl was necessary to give increased towing speed to catch herring, which are a much faster moving fish than capelin.

Although the vessels' speed was increased from 1.5 knots, using the capelin pair midwater trawl, to two knots (bearings taken from radar), using the herring pair midwater trawl, the increase was insufficient and negative catches resulted. On several occasions, good echo sounding marks were recorded on both vessels (Figures 2 and 3), while the trawl was being towed, but no fish was caught. After completing tow No. 3 on November 8th a jigger was used to determine the species, we were successful in taking six herring in a few minutes. The recordings were from three fathoms down to ten fathoms, in twelve to fifteen fathoms of water. While towing, we were using twenty-five and thirty-five fathoms of warp. The herring pair midwater trawl, ~~which~~ opened to a depth of approximately four and one-half fathoms. During three sets in Spillers Cove, inside Cape Bonavista on November 8th, the 56 pound weights used on the bridles of the net were shined by bottom contact, which indicated that the net was towed through the schools of fish.

It is the opinion of both crews, the adviser, and myself, that the vessels could not tow fast enough to catch herring.

We hope to continue the pair midwater trawling project for herring next year using vessels with sufficient horsepower.

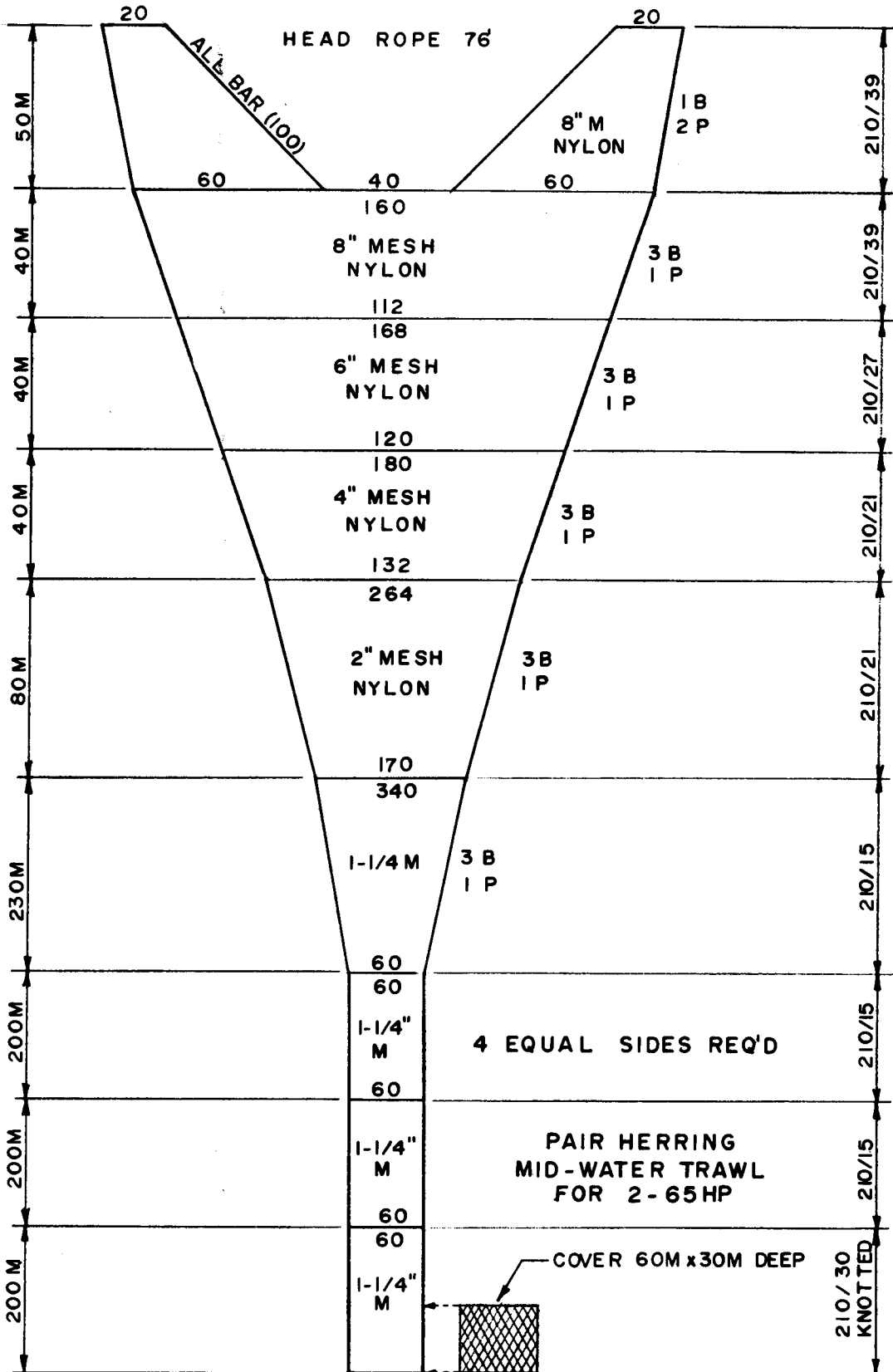
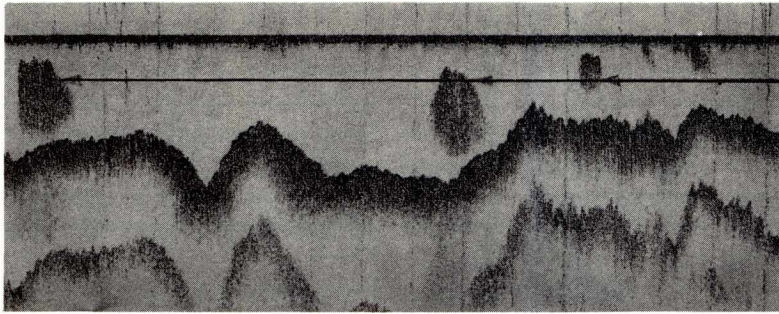


FIG. 1

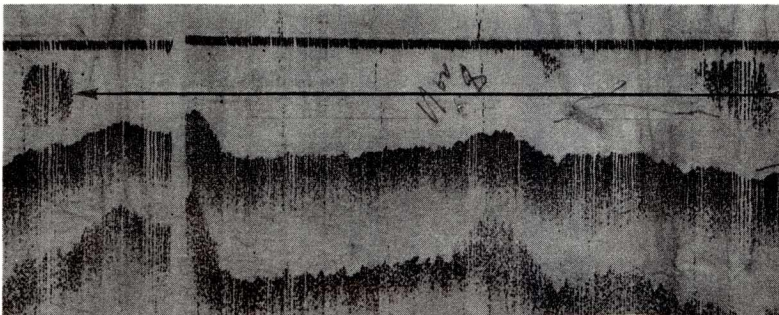


SURFACE  
HERRING

BOTTOM

RECORDING FROM M/V "STARFISH III"  
THIRD SET NOV. 8, 1974

FIG. 2



SURFACE  
HERRING SCHOOL

BOTTOM

RECORDING FROM M/V "DOLPHIN NO. I"  
THIRD SET NOV. 8 1974

FIG. 3

FOR FURTHER INFORMATION CONTACT

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