

FINAL REPORT.

EXPERIMENTAL AIMED PAIR TRAWLING
SOUTHERN QUEENSLAND
(FIRTA 84/85)

PAIR TRAWLING TRIALS - SOUTHERN QUEENSLAND

INTRODUCTION

Following reports from fishermen that although large schools of fish occurred over a wide area off the southern coast of Queensland, several attempts at trawling had been unsuccessful.

Two ex-Victorian fishermen had used a fish trawl which had been successful in southern waters without catching anything of significance. From a second vessel monitoring the schools by echo sounder, it was found the fish rose over the net as it approached thus avoiding capture. It was obvious the net was visible to the fish and even during darkness, due to luminescence in the water, this was still the case.

In an endeavour to overcome this difficulty, at least during daylight, it was decided to construct a trawl from monofilament material which should be less visible. Also, to decrease noise caused by turbulence at the otter boards, which may have also acted as a warning to the fish, a pair trawl operation was considered an improvement.

On 12 July 1983 the Minister for Primary Industry approved the expenditure of \$10,000 from the Fisheries Development Trust Account to cover the cost of materials for the construction of a suitable net (Fig 1). It was believed necessary to have a high opening net as the fish schools rose well off the seabed at times. By using a pair trawl, which would not require otter boards, a 30% saving in towing resistance would enable a larger net to be used by the comparatively small vessels. To fulfill the requirements a Duthie butterfly design was chosen as it could be fished above the seabed if required. Construction of the net was undertaken at Mooloolaba and rigged as shown in Figure 2.

THE NET

Figures 1 and 2 describe the net. Headline height was normally about 25 metres, depending on the distance between vessels. A higher opening of up to 48 metres was obtained when the net was raised above the seabed but net spread was significantly reduced.

Headline length was 77 metres and the footrope length 103 metres.

The circle at the footrope bosom or centre of the bottom square was 262 metres when stretched or 1476 meshes of 178 mm.

VESSELS EMPLOYED

The two vessels engaged in the trials were the Hustler and San Antone. San Antone II was used during 1984 as the original vessel had been sold.

Hustler is owned by Mr M Howarth and is a typical wooden prawn trawler of 14 metres with a main engine of 179 kilowatts.

San Antone II, the vessel used during the main fishing phase of the project (1984) is a 15.2 metre steel prawn trawler with main engine power of 164 kilowatts and owned by Mr G Pinzone.

Both vessels are fitted with colour echo sounders and the Simrad net monitor was connected to the sounder aboard San Antone II.

NET TRIALS (1983)

On completion of construction, initial net trials were carried out off Fraser Island on clear seabed. A headline height of up to 25 metres was achieved, depending on the distance between the vessels. This was considered most satisfactory. However, towing speed was less than anticipated at only 2.5 knots. Nevertheless, with such a large net mouth opening, almost 150 metres around at the footrope bosom in practice, this low towing speed was not considered to be of great significance at that time.

A major difficulty was the handling of the bobbin line during both setting and hauling. To facilitate easier handling, belly lines were attached at the footrope quarters and run to the lower wing ends. Once these ropes were reached, on hauling, they were led through the lazy line blocks on the prawn trawling gantry, onto the winching nigger heads and the centre of the bobbin line brought aboard. The bobbins were also lifted overboard by these lines on shooting the net. The remaining wing bobbing were flected either overboard or on board, as the case may be, using the lifting tackle. Even with this method of handling it was obviously too time consuming and difficult for a commercial operation.

Several attempts to tow the net through fish schools failed to catch anything and towing warp breakage occurred on several occasions causing tows to be abandoned. The trials were terminated prematurely as the inshore prawn season commenced at the beginning of November, several weeks earlier than anticipated.

As the fishermen concerned were not being paid for the pair trawling operations, the project was postponed until August 1984, the next off-season for prawns.

ADDITIONAL EQUIPMENT

Due to the handling difficulties experienced in 1983, it was decided a net reel should be constructed and installed aboard Hustler. Also, it was felt some contribution to operational costs should be made by the Commonwealth as fuel and ice costs had been met by JP & E Racovolis of Mooloolaba during the 1983 trials. This arrangement would enable a more specific period to be devoted to the project. Consequently an application for funds was made to the Fishing Industry Research Trust Account.

In March 1984 the Minister for Primary Industry approved a grant of \$128,000 for continuation of the project.

Tenders for a net monitor were called by the Purchasing Division of the Department of Administrative Services and a Simrad net monitor and automatic cable winch, etc were obtained at a cost of \$20,470. It was intended that this equipment would be employed in other Commonwealth funded trawling projects as only one other similar monitor was being used in Australia at that time. The use of a net monitor was considered beneficial to the project as net opening height, footrope bottom contact and fish movement in the trawl mouth could all be monitored simultaneously and escapement of fish over the headline could also be monitored by operating a single switch.

Unfortunately on arrival of the cable winch it was found that it was not powered as originally specified. This created significant difficulties as the electric drive motor had to be removed and alternative hydraulic drive arrangement fitted in its place.

Prices were obtained for construction of a hydraulic net drum. These ranged from \$3,800 to \$5,996. The lowest price was accepted and the net drum constructed and installed on Hustler. Two separating flanges were fitted on the drum inside the end flanges to keep the bridles and associated hardware away from the net.

The net drum facility greatly improved hauling and handling of the net and although some twists in bridles and wing swallow tails occurred on occasions when shooting, the net could easily be rehailed, the twists removed, and the net reset.

To facilitate connection of the net monitor transducer a plug was located at the starboard bridle ends with the cable attached along the headline bridle and around the headline to the monitor in the centre. This was the side of the net always passed to the second vessel on which the cable winch and monitor display were installed. Also, it was at this point that the weight had to be attached to the bridle end connection before shooting the net. This arrangement relieved the crew of the net carrying vessel of some of the workload as in addition the net monitor cable winch tension control was operated from this vessel.

The net monitor transducer was located some 8 metres behind the headline in the centre of the top square to ensure it recorded fish above the footrope as there was a headline overhang of about 10 metres.

Three bridles of 60 metres were attached to each side of the net with extensions to the towing point of the side panels as this was set back from the top and bottom wing ends (see Figs 1 and 2). These bridles were all wound onto the net drum but separated from the net as described previously.

Weights of 250 kilograms in the form of tear drop shaped chain links were attached to the bridle ends by 'C' clip hooks and chain (see photo).

OPERATIONS - 1984

The net was hauled and set in the conventional manner for pair trawling. A bowline was always attached between the vessels before any transfer of the net occurred. The net bridles were attached to the outside warps of each vessel to facilitate maintaining a straight course while alongside one another.

On shooting the net, once the bow line was released, the towing warps were hauled amidships by a snatch block attached to the opposite warp. The warps were hauled and payed out with the snatch block in this central position enabling the vessels to be easily manoeuvred.

Twenty-eight trawls were carried out between 16 August and 21 September in depths from 60 to 100 metres. Most trawls were aimed at fish schools located by echo sounder on the Shark Cat. All schools were sampled by hand line from this vessel as it continually monitored and marked the school as the net approached. Generally fish were caught from the schools and included both large and small snapper, pearl perch, parrot fish, job fish, emperor and other less important species.

Although many schools of bait fish, of unidentified species, were encountered, a considerable number of predator species were also present.

On one occasion six Spanish mackerel of about 30 kilograms were meshed in the monofilament section of the trawl together with several large snapper. Practically all fish caught were large in size and meshed in the monofilament.

Due to a repetition of this situation, the apparent escapement of practically all the small fish and the meshing of the larger faster swimming fish, it was apparent there was a serious problem. Although the net monitor recorded fish beneath the headline and above the footrope it was not possible to ascertain whether they were moving into the net, travelling with the net, or moving into and then out of the net.

Unfortunately one of the two transducers in the net monitor was faulty from the outset and as no replacement was available it was decided the downwards looking transducer was the more important. Any escapement of fish over the headline was therefore impossible to monitor by this means. However, from the echo sounder on the Shark Cat it appeared no fish were rising over the headrope. The only logical explanation which could be agreed to was that because the monofilament netting was not visible and therefore had no herding affect on the fish, escapement was occurring through the meshes. This would account for the large fish meshing or entangling in odd parts of the net and also explain why practically no fish found their way into the cod end. Slower than optimum trawling speed could have added to the problem.

Due to the frustration caused by the fish entering the net mouth, as observed on the net monitor, but not being caught, several fish taken by hand line from a school through which the net was towed were tried in the 178 mm mesh and fish of 400 mm length were found to fit through easily. Although this was suspected towards the latter part of the project, there was nothing that could be done as no smaller size netting of the required strength was available in Australia, or overseas. A special order would have required far more netting to be manufactured than was required.

In order to ensure a normal trawl would not catch fish in the area, and as a last resort, it was decided to verify previous results by using a standard high opening Frank and Bryce pair trawl. This net was towed for 5 hours during darkness and covering 17 nautical miles over some of the best fishing ground located without catching any commercial species.

After this exercise the project terminated and the equipment was removed from the vessels and forwarded to store.

CONCLUSIONS

The large monofilament pair trawl was operated satisfactorily from comparatively small vessels with the installation of a hydraulic net drum. Without this facility a net of this size with footrope bobbins would be impossible to operate in other than very calm conditions.

Although towing speed may have been somewhat slower than normal for fish trawling it was originally believed sufficient for a net with such a large mouth opening however, this now appears in doubt.

The footrope rig proved capable of riding over heavy seabed but on several occasions a ledge or pinnacle of a metre or so in height would foul the bobbin line and/or footrope. Nevertheless only on one occasion was the net severely damaged which, because of its size, necessitated it being removed from the vessel.

The monofilament netting was apparently invisible to the fish as shown by the number of fish meshed indiscriminately throughout the net. However the monofilament failed to herd the fish due to its invisibility and, because of the mesh size in the front section of the net, fish of up to 400 mm were apparently able to escape through the 178 mm meshes.

Although this is a normal size mesh to find in a standard fish trawl, the Frank and Bryce was 228 mm, the fact that it was invisible appears to have contributed significantly to the net being unsuccessful. This is rather ironic as the sole purpose of using monofilament was to make the net less visible.

However, had the net, even if invisible, been all made from the smaller 114 mm mesh a different result would almost certainly have been achieved. Unfortunately the 114 mm mesh which was available at the time was only No 30 and while considered too light, had to be used as no other size was available.

Enquiries are continuing into the possibility of obtaining a special order of 114 mm x No 70 monofilament being manufactured but to date no interest has been shown because of the small quantity involved.

A trawl net made from 114 mm mesh would need to be of smaller dimensions as towing load would be increased considerably. Nevertheless it appears that a smaller net manufactured from smaller mesh could be successful in southern Queensland. It may be possible to use otter boards rather than pair trawling but because of the noise factor and additional drag two boats towing the net still appears the most likely method to succeed.

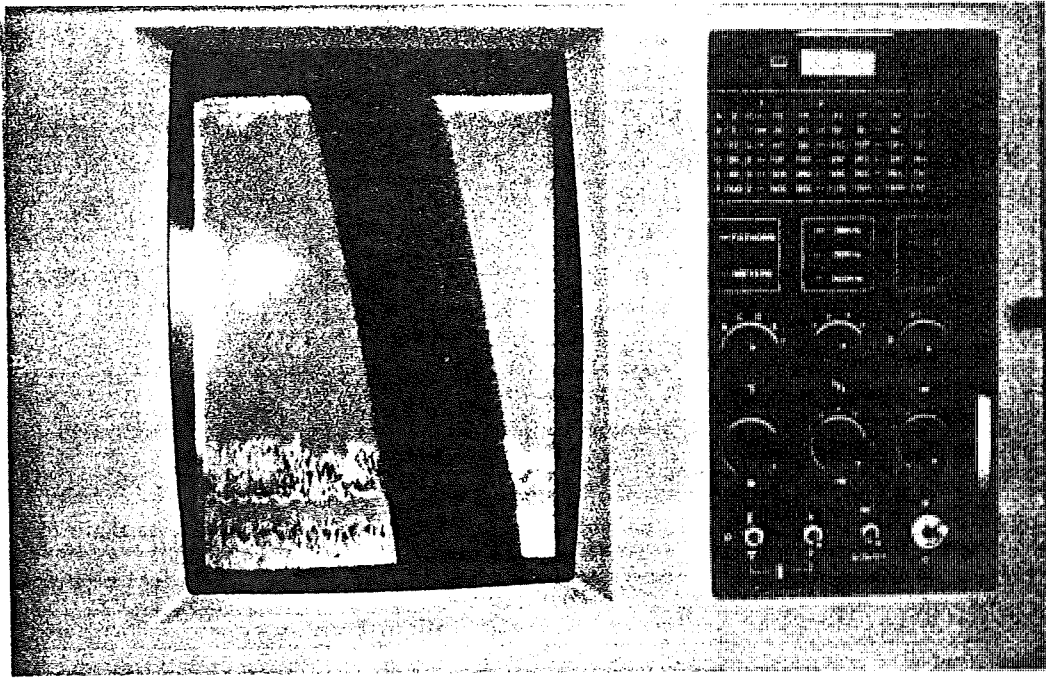
RECOMMENDATION

Because of the apparent availability of large quantities of several commercially important species of trawl fish along an extensive area of the southern Queensland coast, and which are currently only exploited by handline or longline fishermen, the following recommendations are made:-

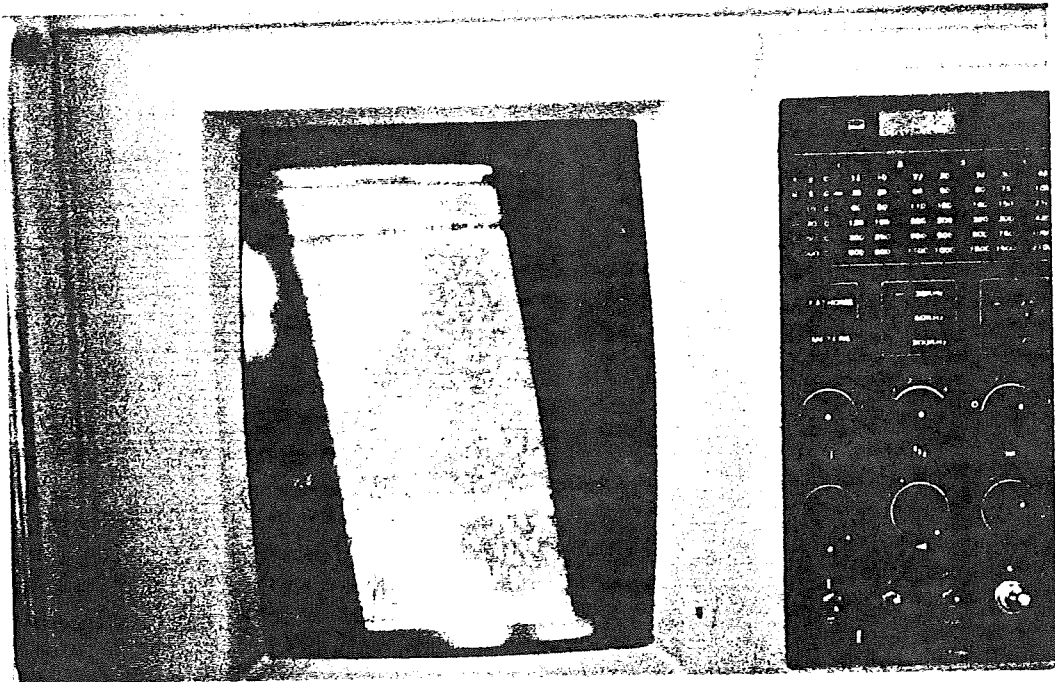
- (1) Should suitable monofilament material become available in the near future FIRC give consideration to the funding of materials and construction of a further net for exploratory fishing in this area
 - it is believed cost would be below \$15,000
 - .. but will depend on the value of the \$A at the time
 - industry appears willing to undertake further trials at their own cost.

- (2) Consideration be given to expediting a biological study of at least three commercial species presently exploited by handline fishermen as it appears many fish, particularly snapper, are large in size and could therefore attract more vigorous exploitation
- many snapper appear to be in excess of 5 years of age
 - snapper job fish and pearl perch appear to be present in large quantities and worthy of further investigation.

Consideration may also be given to funding the operational costs of two more powerful vessels, experienced in pair trawling, from southern waters. Additional trawling speed could be achieved and normal multifilament nets may then prove effective.



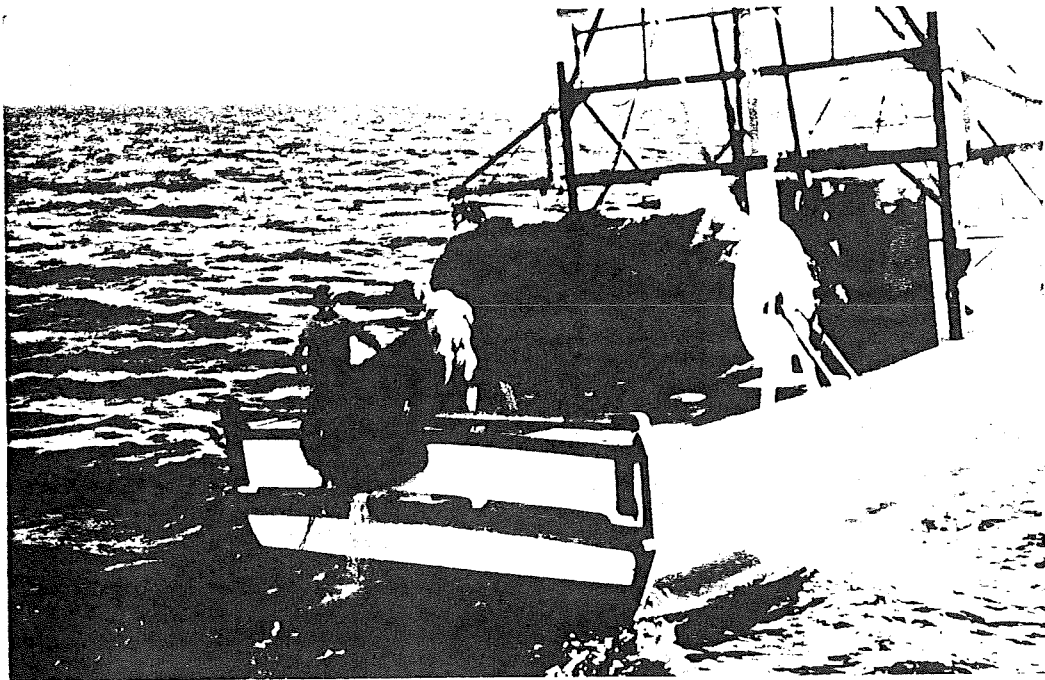
Masses of fish recorded above the seabed



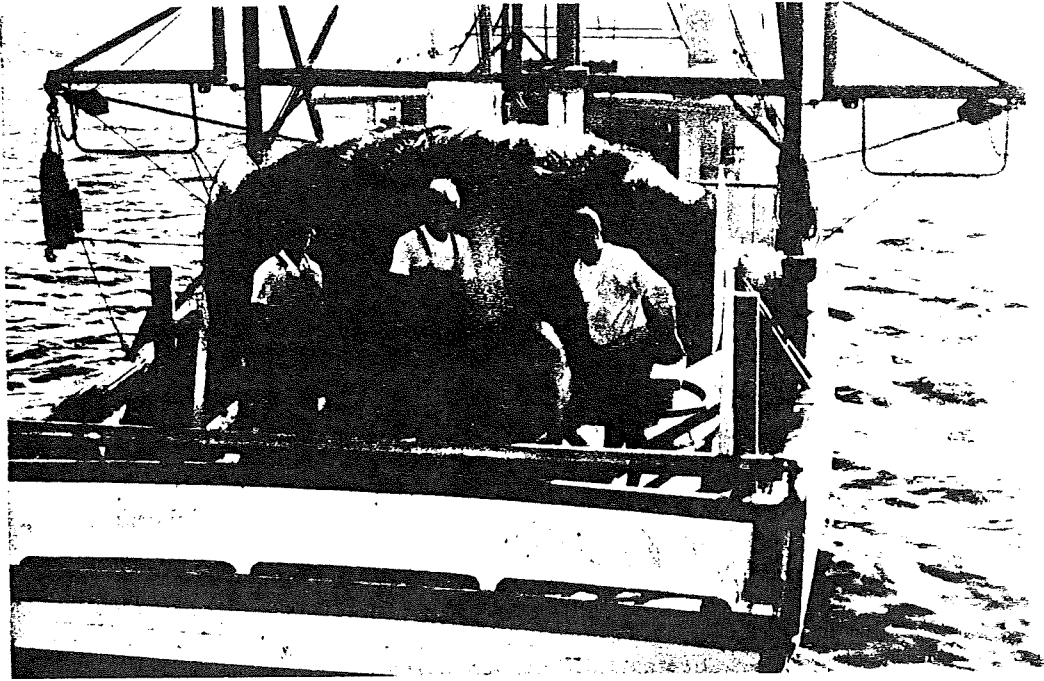
Net mouth opening at top with scale expansion
at bottom (A poor photo)



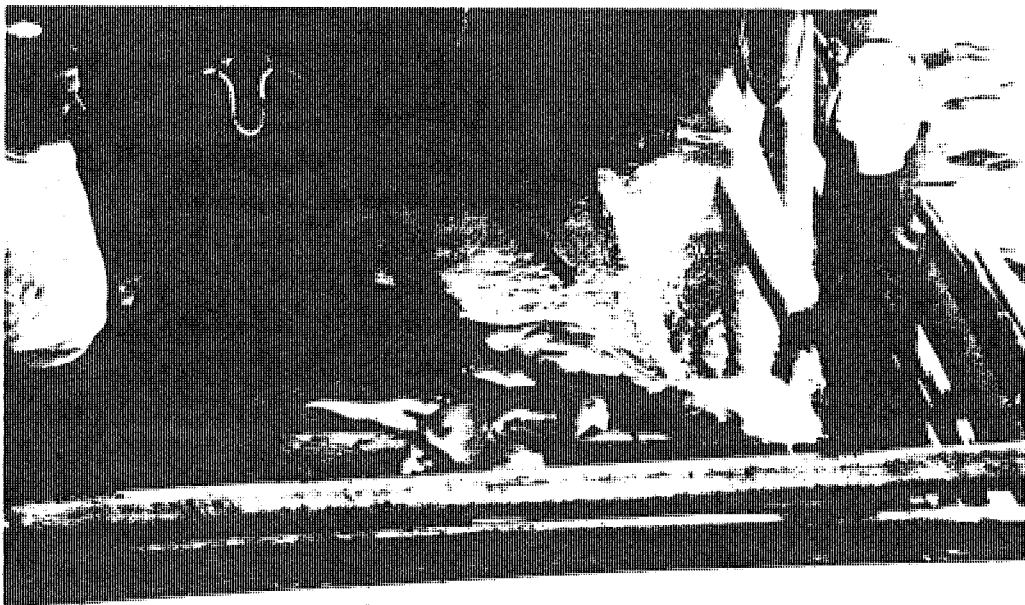
A recording of fish schools above the seabed
(many such schools were encountered)



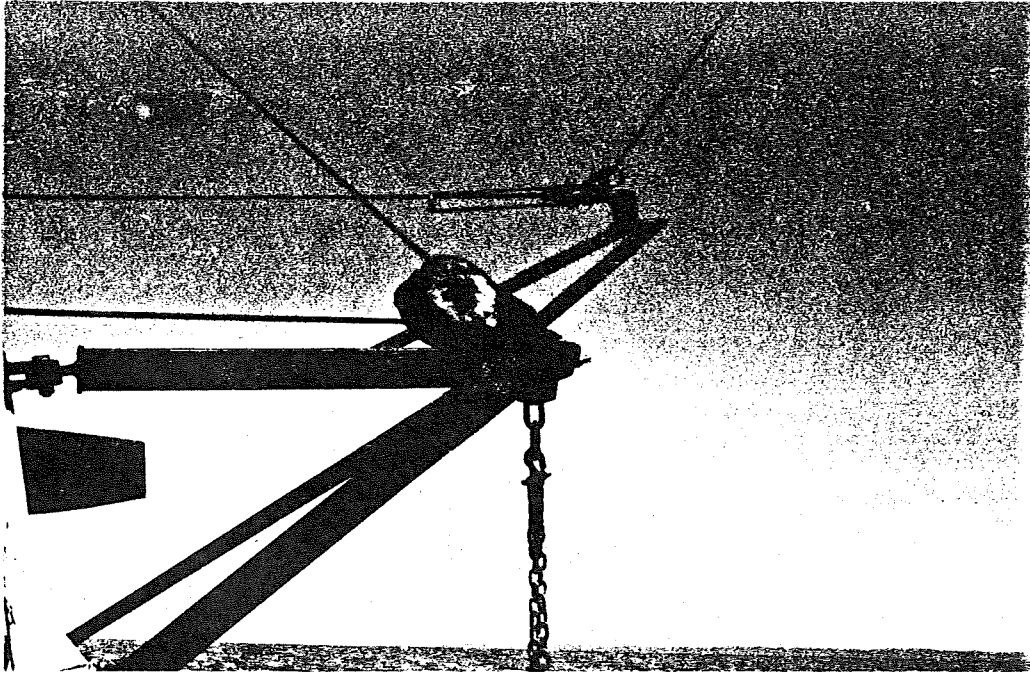
A codend of 'rubbish' is taken aboard



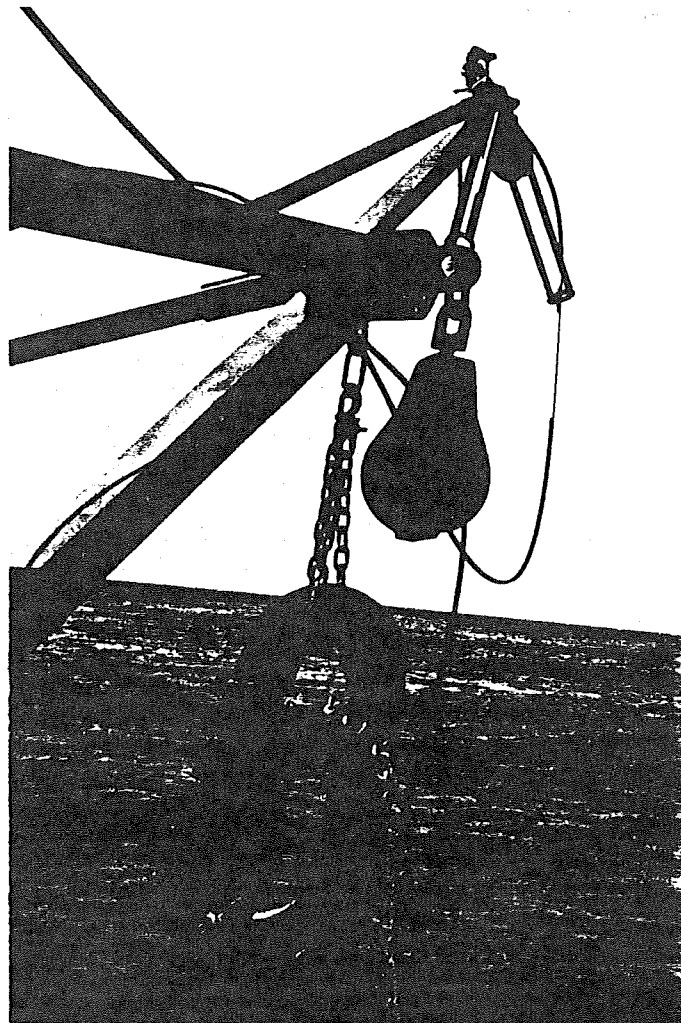
Skipper of Hustler, Mick Howarth with a snapper caught
in the trawl



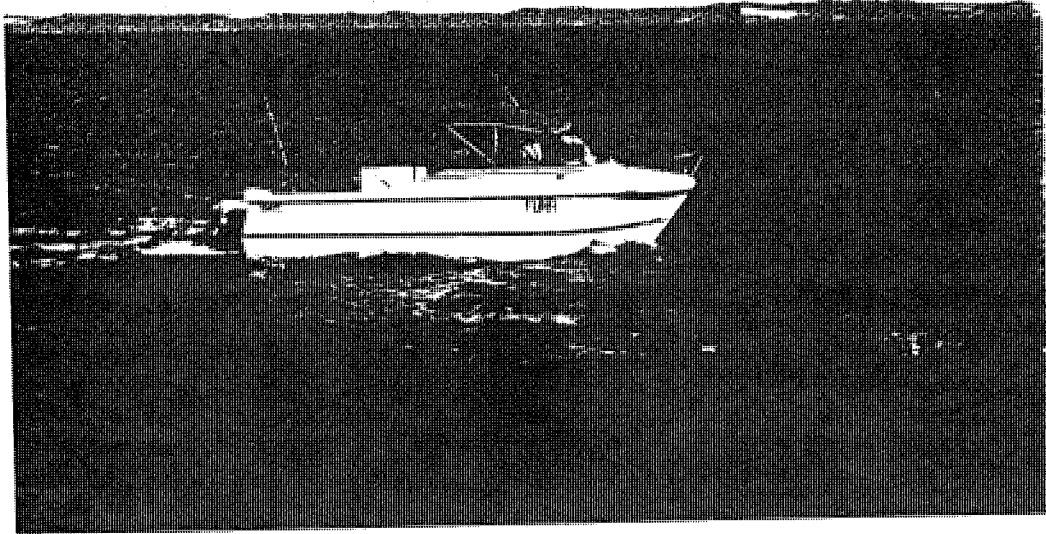
Several snapper and emperor on deck



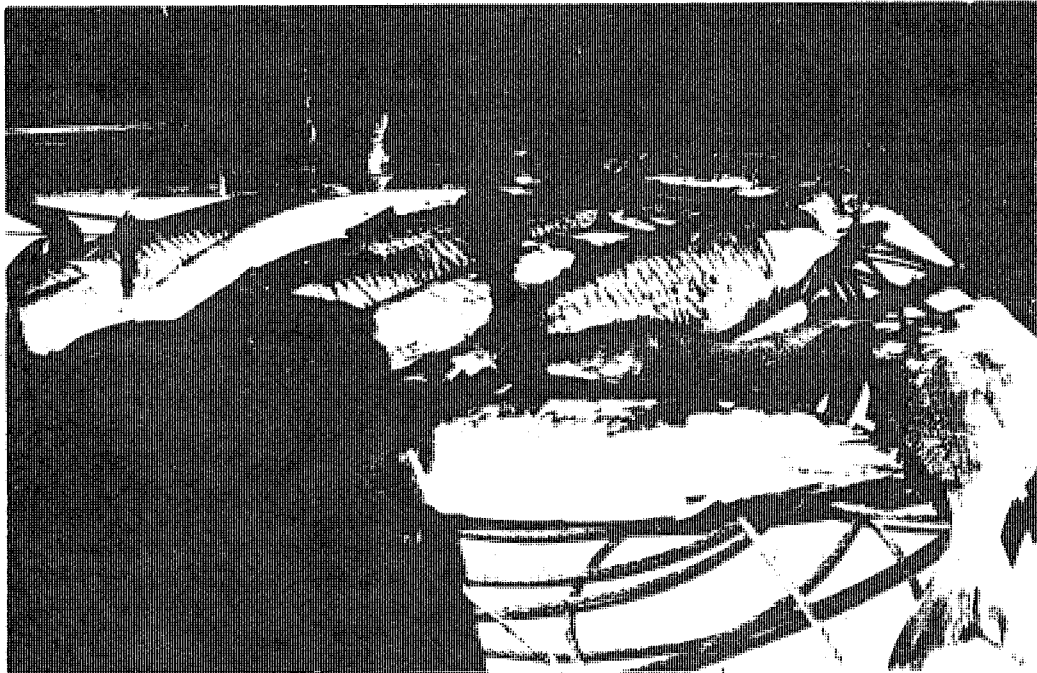
The towing arrangement for the net monitor cable
The net warp is also shown running to the snatch block



The bridle weight shown in the stowed position



The Shark Cat monitoring a school of fish



Spanish mackerel and snapper meshed in the trawl