Experimental Fishing Using Fish Traps

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Seafish Report No. 446

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Sea Fish Industry Authority

Technology Division

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Summary

This report describes fishing trials undertaken by Seafish under MAFF Commission 1993/94, Project Code MF0614. The Commission reflects the increasing level of interest in the U.K. for the use of fish traps, the need to investigate various operational and logistical aspects and the potential advantages that the method may offer in some circumstances.

Six Neptune traps modelled on the successful Alaskan traps were used during the trials along with two different baits.

The trials took place onboard the *MFV CHRISTEL STAR* sailing from the port of Bridlington. This port was chosen due to its proximity to the area around Flamborough Head which has both prolific numbers of wrecks and also hard, rough ground unsuitable for trawling.

The traps were set each morning and re-baited and hauled the next day. A total of ten days were used for the trials with the slack tide days producing the best results.

It was concluded that the time of year when carrying out these trials was not beneficial to a successful outcome. The tides were exceptionally strong and the weather curtailed dropping the traps any distance from land. The general absence of fish on the grounds was also a contributing factor towards low catch rates by the traps.

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1. Introduction

In many parts of the world trapping finfish is both profitable and recognised as having a low environmental impact. The method dates back many centuries especially in tropical and semi-tropical areas but is now gaining popularity in colder waters. Alaskan vessels are currently grossing some $3 million using traps, mainly on cod, and a U.K. company has a franchise to manufacture and sell the Alaskan designed trap. About 80 traps have been sold to date.

The potential benefits that this method offers, relative to towed gear and set nets, are:

- improved discard survival,
- high size selectivity,
- highest fish quality,
- species selectivity *via* bait type, and
- ability to preclude the risk of ghost fishing.

If it were possible to maximise and quantify these benefits then trapping could be a way of maintaining fishing activity in areas that are considered environmentally sensitive.

In order to realise these benefits it is necessary to work with traps and obtain systematic data on the best ways of deploying them. These trials were intended to start that process.

On a longer timescale this work can be put into a broader context - the need for data on both the absolute and the relative levels of unintended impact from different fishing methods. Seafish is already moving in the direction of this type of assessment methodology with work on scallop dredges and environmental impact assessment. The issues involved may put independent researchers in an invidious position with respect to different sectors of the industry but those issues are here to stay. The fishing industry, like terrestrial industries, must be willing and able to account for and justify its various operations. Failure to do so will leave it increasingly vulnerable to questioning by a whole range of other interest groups.

2. Background

In many parts of the world fish trapping is a profitable and environmentally benign method of fishing. In Alaska for instance, catching fish in traps progressed from using small traps to catch sablefish *(Anaplopma fimbria)* in the early 1980s to using large rectangular traps with dimensions up to 2.5m x 2.5m x 1.0m. By the end of the 1980s the local Kodiak crab fleet began looking at the cod trap fishery as a legitimate target fishery which, as a result, saw landings peak in the early 1990s. Landings totalling nearly 6000 tonnes produced an income from the fishery of some $3 million which supplemented the declining King and Tanner crab landings.

3. Materials and Methods

The type of trap selected for evaluation was the Neptune Trap *(see Fig. 1)*. This has been developed from the Alaskan traps which have been well tried, tested and used extensively in waters of the United States and Canada. They are constructed using 25mm exterior solid steel bars and 16mm interior steel bars featuring four Neptune 51 entrances *(see Fig. 2)*, zinc anodes and an escape hatch closed using a galvanic timed release device. The Neptune 'cod trigger' is a one-way tunnel device constructed from flexible plastic. The interlocking fingers are attached to a black plastic frame which is fastened to the entrance by using hose clips, plastic wire ties or heavy twine. They are fastened flush to the inside of the tunnel entrance with the fingers angled into the interior of the pot. Each trap was covered over using 45mm bar length square mesh plastic netting; dimensions of the traps used were 2.13m x 1.3m x 0.8m. Six traps in total were purchased to carry out the trials and two were covered in 30mm diamond mesh to act as selectivity control where appropriate[1].

The vessel chosen for the operation was the Bridlington based trawler *MFV CHRISTEL STAR*. The *CHRISTEL STAR (H56)* is a stern trawling vessel of length 13m and a GRT of 29.87 and a 195Kw engine. The owners of the vessel have been involved in trawling the Bridlington area for some thirteen years and in netting and trapping in the area for eight years previous to this.

The area chosen to set the cages was around Flamborough Head which is well known for wrecks and rough ground. *Fig. 3* shows known wrecks all within a relatively small area of seabed, many of them unworkable by towed gear, with some areas of hard ground between. In the late summer months many pot fishermen have reported catching quantities of codlings in their pots and angling parties target this area all year round.

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[1] 30mm full mesh

A total of 10 days charter/part charter of the vessel was arranged. The operation consisted of setting and hauling the traps within the vessel's normal fishing routine.

Handling was very simple once a routine was established. The traps were hauled to the side with little effort and then hauled inboard and laid on the deck for emptying. As the traps were all set singly they were quickly re-baited and then heaved outboard before the next was picked up and brought to the surface; in this way very little deck space was needed to haul and set the traps once they were all placed in position. Any subsequent movement of the traps was carried out with a maximum of two traps on the deck.

During the first week of the trial the traps were set in pairs at three locations within a mile of each other. The traps within each pair were baited with fresh mackerel and mussels alternately and each trap was given a number. The traps were set each morning and left for 24 hours before being hauled.

The bait was selected after advice from local potting crews and with regard to availability. It was extensively 'minced' and placed within a plastic bait jar and also bait socks made up of 12mm nylon netting. Both of these were hung in the traps in a central position suspended with twine from the top and bottom of the trap.

The contents of each trap were identified, measured and the traps were then re-baited and set again for the next 24 hours.

A decision was made based on the first week's results as to which bait to use in all traps during the second week of the trial. If traps did not produce fish then they were moved to another location (wreck) after two days. The locations were always within the same area and never moved more than two miles.

A note was made of the weather, the tidal conditions and any other external factors that were thought may affect fishing conditions for each day of the trials and also of the depth of the water.

Mackerel bait was chosen after the first week, as the few fish that were captured seemed to prefer the traps containing this bait. However, fresh mackerel proved difficult to obtain and it was decided to use horse mackerel in its place as there was a good supply of this species in frozen form. The change of bait appeared to be fortunate as some traps subsequently started producing fish and crustacea.

All fish were measured as soon as they were taken out of the traps and returned immediately to the sea where they were observed to swim away in an apparently unstressed condition.

On the whole the entrances remained unaltered, i.e. the fingers remained interlocked except for the occasions when seal damage was observed; the placing of vertical bars in the entrance to restrict the width available could be an answer to this problem.

4. Results

A total of 50 trap hauls were made with 28 of these yielding no catch. The results are summarised in *Table 1* from which it can be seen that catch rates generally were low. A number of reasons for this are discussed in the following section.

It is worth noting that the traps appeared to be successful for lobster of which some 19 were caught after the tides began to slacken. Three dover sole were also taken.

5. Discussion

It should be remembered that this trial was as much a learning exercise as anything else and that expectations were not high.

Fishing in the general area by the boats using trawl gear was very poor throughout the duration of the trials. Several boats fishing in the vicinity were catching on average only 40kg per hour of cod and codling and at times were producing 48kg for 3 hours even around the wrecks which are normally very productive.

It would appear that tides have a strong effect on the efficiency of the traps; it was particularly noticeable that the traps did actually start to produce fish when the tides started to slacken.

Examination of *Table 1* shows that the days during which there were strong tides (in fact among the strongest tides of the year) fish were extremely scarce as were crustacea. As the tides eased the catch rates for the traps made a gradual improvement and on the best day (Day 7), trap 3 produced four cod of a reasonable size.

As expected, bait would seem to have a strong influence on the capture of fish and it should be well minced up in large quantities and put inside bait bags so that small particles can wash out to aid attraction.

It was thought that the bait socks were of more value in dispersing a 'scent' than the jars but that the jars were of more benefit in retaining the bait over a longer period.

From the results section *(Table 1)* some traps were stated as having seal damage. This is to be considered as an educated guess due to the type of damage seen on the traps although no seals were actually seen near the traps. The 'fingers' appeared to have been forced up through the meshes on the top of the traps so they stayed open and the lower 'fingers' were bent downwards. It was speculated that even a large conger eel would be incapable of doing this without being trapped and it is known that seals are renowned for their resourcefulness in gaining access to an easy meal.

It would appear that the traps are very efficient at catching lobsters particularly the larger ones which are very rarely if ever caught using the standard creels. There is very little movement at this time of year by lobsters as the water is too cold and it is quite possible that placing the traps close to wrecks would prove profitable when the water warms up later in the year.

The provision of escape hatches with galvanic timed release devices would seem to have been vindicated as one of the traps was put too close to a wreck and subsequently lost when the rope parted trying to haul it. There is little chance of the trap continuing to fish as the device will release the hatch after another 18 days and anything already in the trap should escape. Any more fish or crustacea tempted to go in the trap can easily get out. The wreck has been marked and divers will retrieve the trap for Seafish at the first available opportunity.

6. Conclusions

These trials demonstrated the importance of correct timing as the exercise coincided with strong spring tides, poor weather and a scarcity of fish on the selected grounds. These problems were unavoidable due to constraints imposed on the trials which were outside the control of Seafish. Any future trials should be carried out at a more appropriate time with sufficient amounts of fish being reported on the grounds. Weather conditions should be such that they allow the traps to be set further offshore on wrecks which are known to be prolific fish aggregators.

Fish traps do have potential, as shown by the Alaskan cod trap fishery which produced up to 6000 tonnes of cod in the early 1990s. The charter vessel has volunteered to carry on working two of the traps throughout the year and to keep a record for the authority of catches and soak times. It is thought that they will probably perform better during the summer months in areas of known fish aggregations.

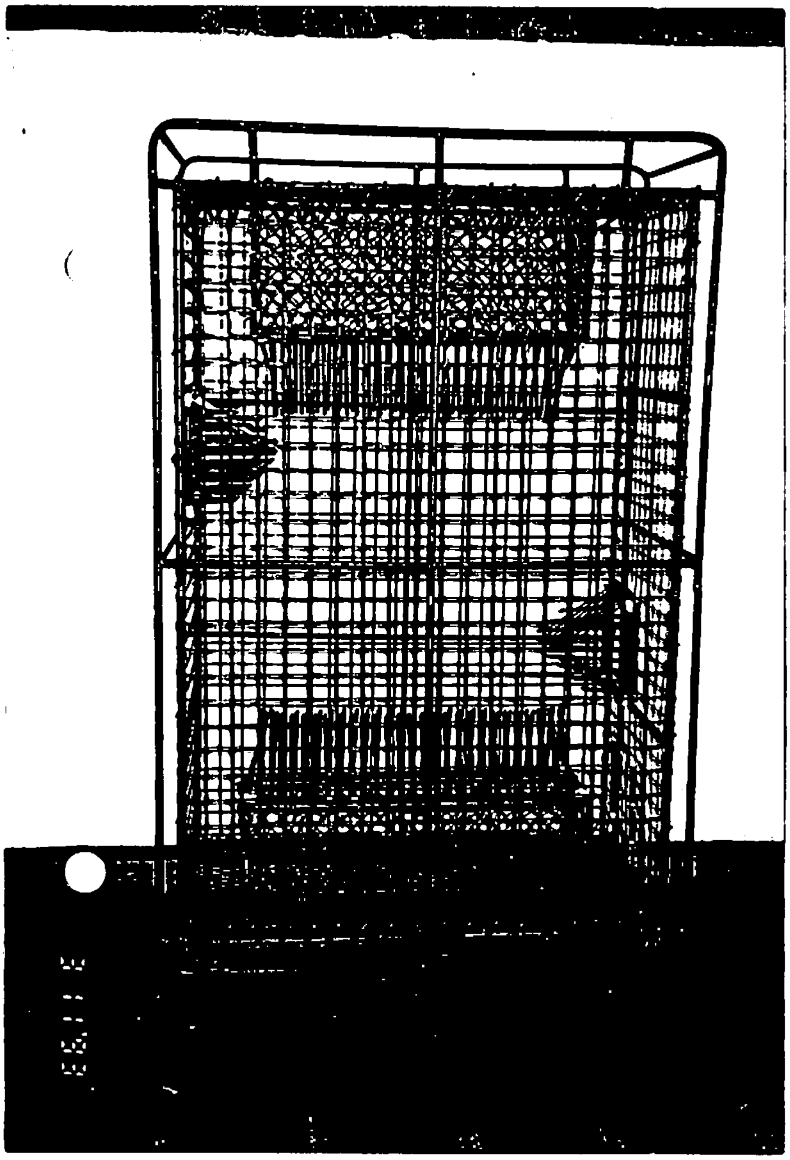
7. Future Work

Fish trapping merits further investigation as there is much still to learn before they realise their full potential.

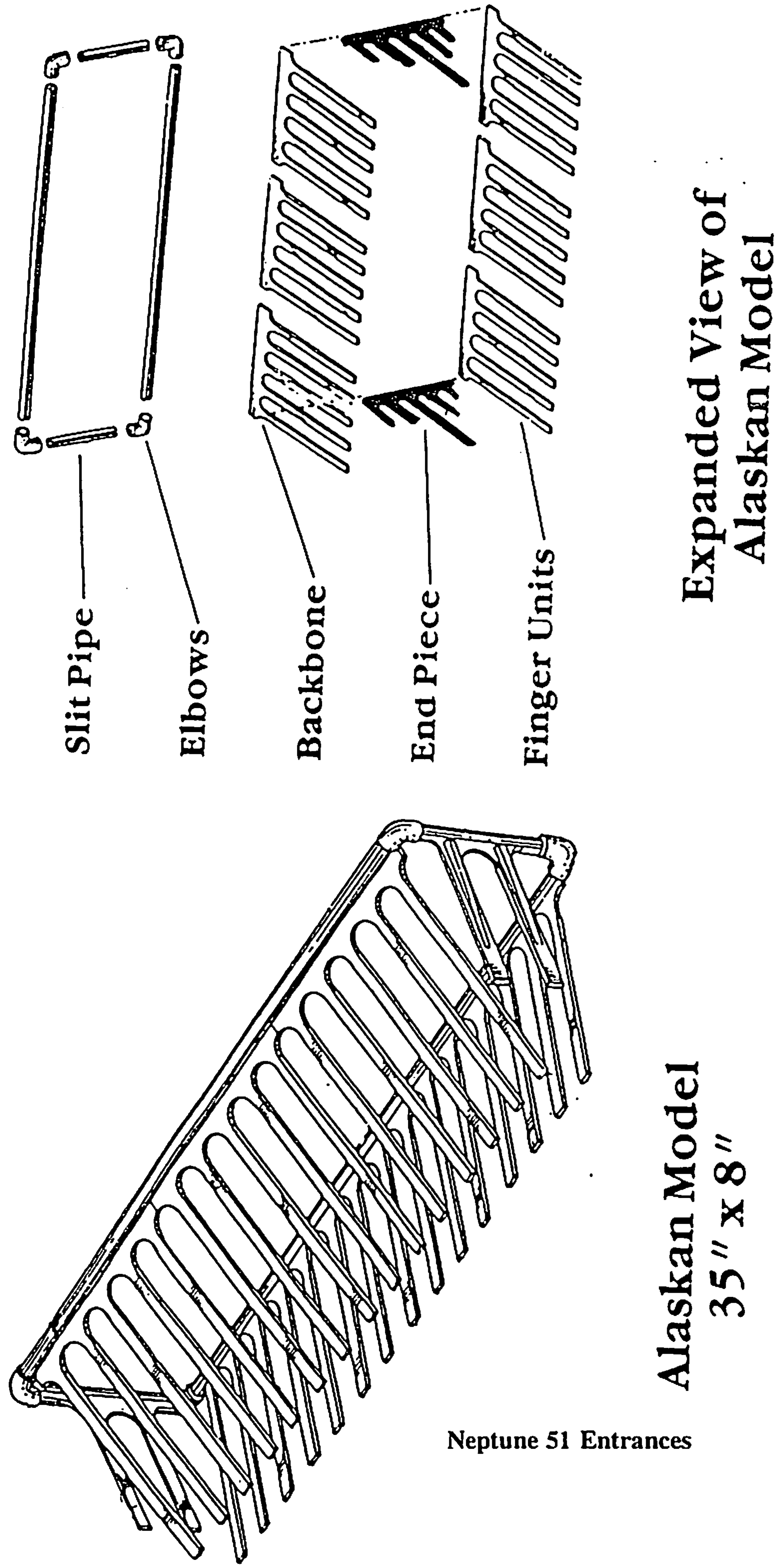
Seafish intends to carry out further trials in 1994/95. This will involve comparing fish traps directly with trawling, netting and possibly line-fishing using a multi-discipline approach. The gear and fish technology departments will be involved in assessing the differences in gear efficiency and fish quality along with an economic and environmental impact appraisal from other sections of Seafish.

8. Acknowledgements

Thanks are due to Gary and Andy Lee for all their assistance in enabling the trials to be carried out smoothly and to Richard Cox of Neptune Marine Products for supplying the traps at a special rate and for passing on information about the traps and how they are deployed in the U.K.

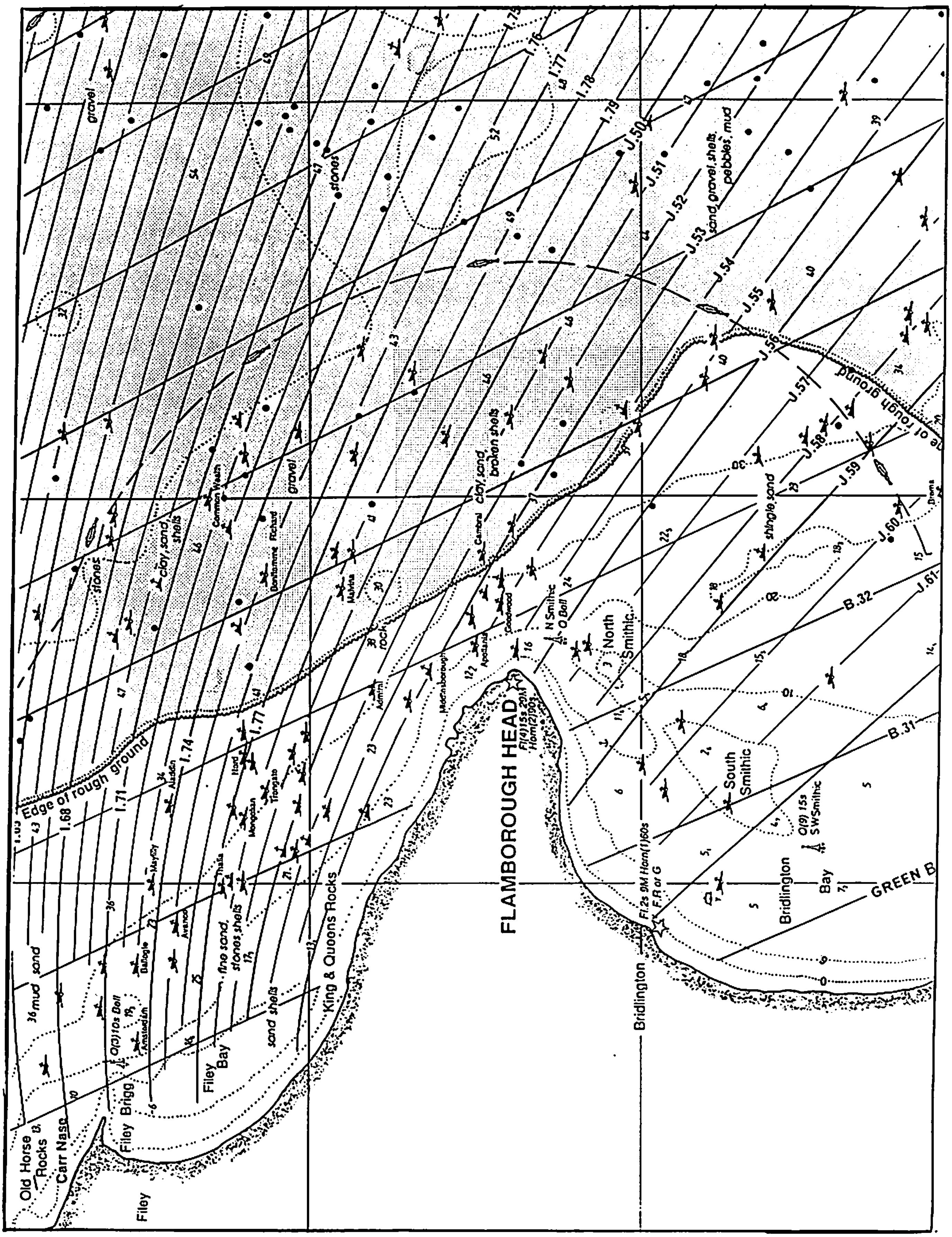


The Neptune Fish Trap FIG. 1



Neptune 51 Entrances

FIG. 2



Distribution of Wrecks Around Flamborough Head FIG. 3

TABLE 1

KEY: C = COD, LO = LOBSTER LI = LING, DS = DOVER SOLE		TRAP No:					
		1	2	3	4	5	6
DAY 1							
Ht TIDE (m)	6.6						
WEATHER	SW4-5						
	DEPTH (fm)	17	17	7	7	25	25
	BAIT	MUSSEL	MACKEREL	MACKEREL	MUSSEL	MACKEREL	MUSSEL
	CATCH (cms)	NIL	NIL	*C-53	NIL	NIL	NIL
DAY 2							
Ht TIDE (m)	6.4						
WEATHER	SW4-5						
	DEPTH (fm)	17	17	7	7	25	25
	BAIT	MUSSEL	MACKEREL	MACKEREL	MUSSEL	MACKEREL	MUSSEL
	CATCH (cms)	NIL	DS-26	NIL	NIL	NIL	NIL
DAY 3							
Ht TIDE (m)	6.1						
WEATHER	W5-6						
	DEPTH (fm)	7	7	7	7	7	7
	BAIT	MUSSEL	MACKEREL	MACKEREL	MUSSEL	MACKEREL	MUSSEL
	CATCH (cms)	NIL	NIL	*LO-83	NIL	NIL	NIL
DAY 4							
Ht TIDE (m)	5.7						
WEATHER	NW6-7						
	DEPTH (fm)						
	BAIT	**TRAPS	LEFT	IN	DUE	TO	WEATHER
	CATCH (cms)						
DAY 5							
Ht TIDE (m)	5.2						
WEATHER	W4-5						
	DEPTH (fm)	7	7	7	7	14	14
	BAIT	MUSSEL	MACKEREL	MACKEREL	MUSSEL	MACKEREL	MUSSEL
	CATCH (cms)	NIL	NIL	**ENTRY OPEN	C-46	C-51,DS-23	NIL
DAY 6							
Ht TIDE (m)	4.9						
WEATHER	W3-4						
	DEPTH (fm)	17	17	25	25	14	14
	BAIT	SCAD	SCAD	SCAD	SCAD	SCAD	SCAD
	CATCH (cms)	LO-16,17, 11,LI-71	**SEAL DAMAGE	C-48,49 LI-75,DS-16	C-40	**TRAP LOST	NIL
DAY 7							
Ht TIDE (m)	4.9						
WEATHER	SW3-4						
	DEPTH (fm)	17	17	25	25		14
	BAIT	SCAD	SCAD	SCAD	SCAD		SCAD
	CATCH (cms)	LI-73	LO-12,13, 13,13,14	LO-11,15 COD-58,54, 44,50	NIL		NIL
DAY 8							
Ht TIDE (m)	4.8						
WEATHER	SW4-5						
	DEPTH (fm)	17	17	25	25		14
	BAIT	SCAD	SCAD	SCAD	SCAD		SCAD
	CATCH (cms)	LO-16,13	NIL	LO-13,13-- **SEAL DAMAGE	NIL		NIL
DAY 9							
Ht TIDE (m)	4.9						
WEATHER	W5						
	DEPTH (fm)	17	17	25	25		23
	BAIT	SCAD	SCAD	SCAD	SCAD		SCAD
	CATCH (cms)	**SEAL DAMAGE	LI-74, LO-9	NIL	C-53 LO-12		C-68
DAY 10							
Ht TIDE (m)	5.1						
WEATHER	SW3-4						
	DEPTH (fm)	17	17	25	25		23
	BAIT	SCAD	SCAD	SCAD	SCAD		SCAD
	CATCH (cms)	NIL	C-42	LO-8.5,14	C-64 LO-13		C-43

* FISH MEASURED HEAD TO TAIL-END
LOBSTER CARAPACE LENGTH MEASURED

** FACTORS AFFECTING FISHING