A Study of the Catch Composition, Effort Levels and Discard Rates in the English Set Net Fisheries During 1992/3

MAFF R&D Commission
Seafish Report No.431
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Sea Fish Industry Authority

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Summary

This study covers a year's sampling from 1st September 1992 to 30th September 1993 of the static net fisheries of England. The fishing activity was allocated to 13 *métiers* for the purpose of directing the sampling effort and as a means of describing the fisheries. The criteria used to describe the *métiers* were - region, target species, boat size, gear type and port.

A two man team worked full-time on this project for the entire period. The following data were collected and stored on a database:-

- An effort census was carried out using a questionnaire and the results used to obtain raising factors for the catches of the species sampled.
- Measurements of length frequency distributions of catches of target and non-target (including shellfish) species divided into landings and discards.

These results were then analysed and presented in the following forms for each *métier:-*

- Length frequency distributions for all main species.
- An estimate by numbers and weights of total landings and discards during the year studied for all species based upon the effort census and data from the samples.

The *métier* concept is discussed. It was found that boat size may not be a relevant criterion when allocating vessels to *métiers* because vessels of all sizes may fish the same grounds with the same gear. However, it is suggested that vessels fishing different grounds should be grouped into different *métiers* because of the variation in catch composition between grounds.

The length frequency distributions of target species for all *métiers* show that the mesh sizes are well matched to the target species and that discard rates of target species are low. Of the non-target species total catches and discards by number and weight are low as a proportion of overall catches. These results indicate that static nets, as operated by the vessels sampled in this study, are highly selective for both target and non-target species.

The feasibility of further work is discussed and any likely bias due to the lack of samples from the part-time fishermen and those reluctant to take sampling officers on fishing voyages is noted.

The sampling team observed one porpoise and two guillemots captured in the nets in the whole period of the study. This suggests that the "non-resource by catch" is very low in these fisheries.

Acknowledgements

The authors would like to acknowledge the contributions made to this study by a number of individuals and organisations. Each has helped to paint a useful and informative description of this important sector of fishing activity.

Vessel owners and skippers, the National Federation of Fishermen's Organisations and a number of Producer Organisations understood the need for this work and cooperated to a remarkable extent. Their help was invaluable.

Project assistant Jeff Brown worked hard and effectively. His efforts often resulted in success where none seemed likely.

Finally, and by no means least, Dr. Mike Pawson conceived the work, helped to structure the study and patiently helped us correct the report.

1. Introduction

This study originated from a number of bodies. MAFF, the European Commission and the English fishing industry all expressed their needs. Ultimately the work was funded by MAFF and was endorsed by the National Federation of Fishermen's Organisations.

Earlier projects at Seafish (Technical Report Nos. 235, 382, 391, and 402; Consultancy Report No. 66 and Internal Report No. 1398) have been concerned with the selectivity of set net designs and the effects of fishing practices on discard rates and quality of catch species. They have highlighted the unrecorded loss from stocks of commercial species (of gadoids and brown crabs in particular) discarded or otherwise lost from set nets and, in some cases, have indicated the cause of this and how such losses might be reduced. Unfortunately, it is not possible to assess quantitatively the proportions which non-catch mortality or discarding represents of the total mortality of the respective populations, because effort and catches in set net fisheries are not well recorded in official Sea Fisheries statistics. In view of the concern expressed by environmental groups about possible mortalities of non-target species in fixed gear (known as 'non-catch' and including mammals and sea birds), information was required on the total effort exerted and consequent catches of this type of gear. Such information could be used to give a more balanced picture of the environmental effects of static netting compared with other forms of fishing.

In the past, the EC have not accounted for the set net sector when planning their Multi Annual Guidance Programme (MAGP) targets for community fleet capacity, as the available information has been unreliable and incomplete. Recent recognition that fixed netting includes major fisheries, gave rise to the need to incorporate the fixed net fleet into the overall management of fishing effort.

Set net fisheries are normally considered to be more selective than trawl fisheries with respect to fish sizes and species. The benefits to fishermen of expanding or changing to set netting (such as reduced catching costs and relative freedom from restriction, compared to trawling) need to be balanced against the increased awareness of the impacts these methods may be having on marine populations. Consequently, fishermen themselves have wanted an objective description of this sector in order to present their own case about the impact of set nets on marine populations in the UK and elsewhere in the world.

One of the benefits of this study to the fishing sector is the provision of good effort and catch data on the fixed net fisheries in England, giving MAFF an improved picture of the current state of set netting. It is important that any detrimental aspects of set netting are put into perspective so that advice to Governments (including the EC) may be provided and appropriate controls considered. If direct effort controls were to be implemented, a knowledge of set net effort (which cannot directly be related to mobile gear effort) would be required.

As an example, the data collected in this study on brown crabs should enable estimates to be made of the associated mortality of otherwise unrecorded discards. Non-catch levels, for example sea birds and marine mammals, could also be estimated. A knowledge of total effort in set net fisheries should enable an assessment to be made of the likely impact of further displacement from

effort-controlled mobile gears, indicate the basis for control measures and clarify the potential costs to fishermen.

2. Aims and Objectives

The aims of this study were to describe in terms of effort and catch characteristics, the major static net fisheries in the Northeast, Southeast and Southwest of England.

The objectives were:

- to identify, describe and categorise the major fixed net fisheries in these areas and to evaluate their fishing effort by effort census; and
- to reveal, through sampling, the catch characteristics of each fishery and estimate the total landings and discards of each fishery.

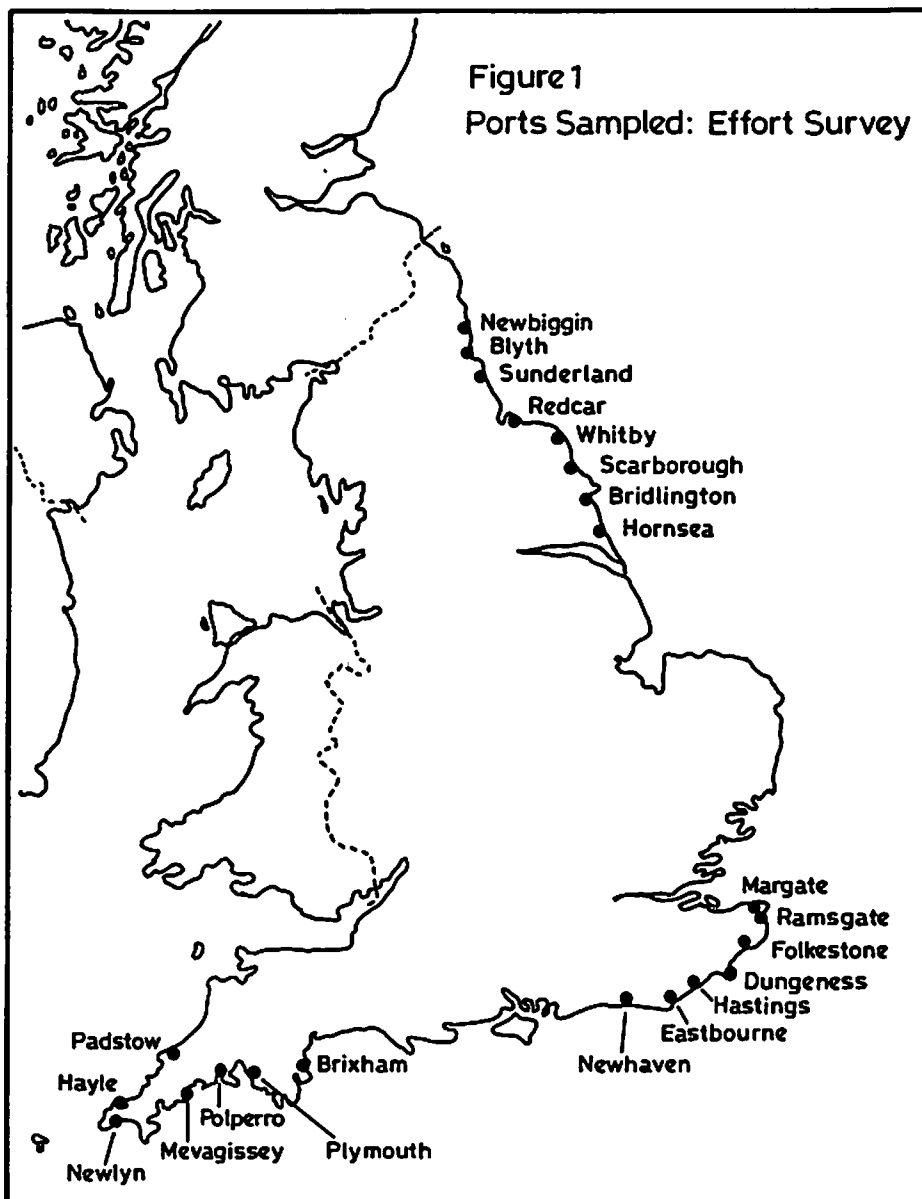


Figure 1
Ports Sampled: Effort Survey
Newbiggin
Blyth
Sunderland
Redcar
Whitby
Scarborough
Bridlington
Hornsea
Margate
Ramsgate
Folkestone
Dungeness
Hastings
Eastbourne
Newhaven
Brixham
Padstow
Hayle
Polperro
Mevagissey
Plymouth
Newlyn

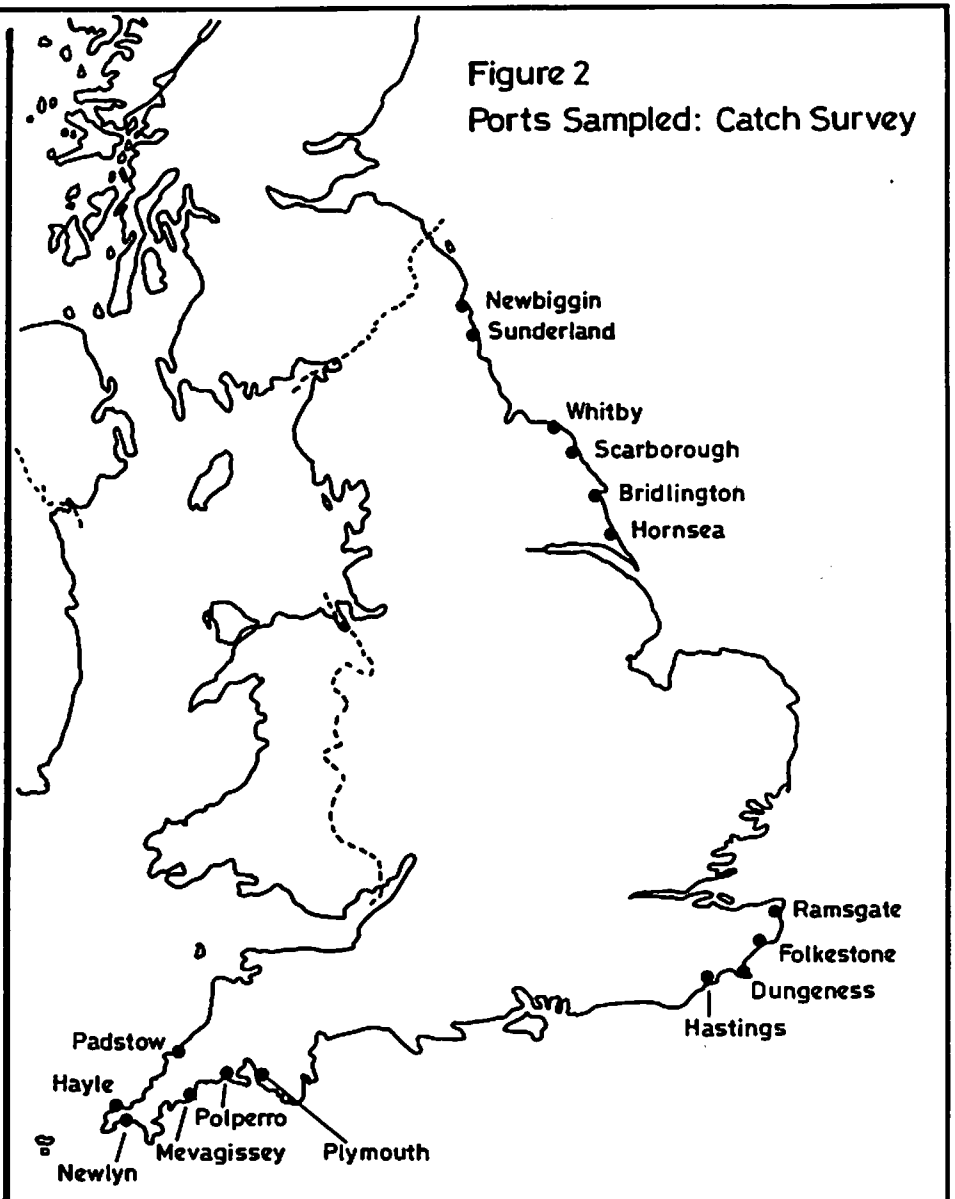


Figure 2
Ports Sampled: Catch Survey
Newbiggin
Sunderland
Whitby
Scarborough
Bridlington
Hornsea
Ramsgate
Folkestone
Dungeness
Hastings
Padstow
Hayle
Polperro
Mevagissey
Plymouth
Newlyn

Figs. 1 & 2

3. Methods

3.1 *Métier* Concept

This study used the *métier* concept to stratify sampling effort. A *métier* defines a type of fishing activity usually by reference to vessels targeting a particular species with a certain gear type on certain grounds. The concept can be used to segregate effort more precisely, but for this study it was decided that any further breakdown of *métiers* into mesh sizes and material types would create difficulties in sampling as any one boat may use different gear types, mesh sizes and material types all in one day.

By allocating the activity of boats in a fleet into *métiers*, the competition for a resource and fishing grounds can be studied within that fleet. It is also possible to find out whether different gear types compliment each other within a fleet by selecting totally different target species.

The annual duration of a *métier* usually reflects the local seasonal availability of target species, but can be influenced by other factors, for example, the market demand for the particular species.

3.2 Sampling Strategy and Effort Census

The method used to determine a sampling strategy was based on the *métier* concept of classifying fisheries described above. Sampling was aimed at each *métier* identified by the effort census, although specific areas were delineated by the extent of each gear type used and not by region. Figure 1 shows the distribution of ports where the effort census was carried out and Figure 2 shows the ports from which sampling of catch was conducted.

The effort census in this study was performed by using the questionnaire as shown in *Appendix 1.* This questionnaire was implemented in the form of structured interviews with the operators of a total of 41 boats. It was designed to reveal the fishing effort exerted by each *métier.* Effort was in turn quantified by the number of nets used, their characteristics and soak times, the duration of the season in which the gear was fished and the number of boats participating within each *métier.*

The questionnaire was also designed to collect information on gear specification, distances to fishing grounds, the number of nets lost in a season, how many *métiers* the boat might participate in and why fishermen may move between *métiers.* All the effort and catch information collected was confidential and no names of boats or fishermen were recorded in the database.

Boats in the fleet were grouped as vessels of <10m, 10-15m and >15m length over all (LOA). Sampling was carried out over the course of one year from 1st September 1992 to 30th September 1993 in order to include any seasonal variations in catch. Table 1 shows the *métiers* that were identified and the distribution of sampling effort.

Table 1
Summary of *Métiers*

Region	Target Species	Boat Size (LOA)	Gear Type	Ports	Days
NORTH EAST	Cod	<10m and ≥ 10m	Trammel nets	Sunderland/Bridlington/ Newbiggin/Scarborough	26
	Sole	≥10m	Trammel nets	Bridlington/Hornsea	5
	Turbot	≥10m	Tangle nets	Bridlington	1
SOUTH EAST	Cod	≥10m	Gill nets	Ramsgate	6
	Sole	≥10m	Trammel nets	Hastings/Dungenes/Folkestone	7
	Plaice	≥10m	Trammel nets	Hastings	3
SOUTH WEST	Hake	>15m	Gill nets	Newlyn	6
	Monk/Turbot/Ray Monk/Turbot/Ray Crawfish,Lobster, Monk	≥10 ≤15m >15m ≥10m	Tangle nets Tangle nets Tangle nets	Plymouth/Padstow/Polperro Newlyn Newlyn	8 6 1
	Ling/Pollack/Cod Ling/Pollack/Cod	≥10 ≤15m >15m	Gill wreck nets Gill wreck nets	Hayle Newlyn	1 6
				TOTAL	81

This table describes by region, target species, gear type and boat size (where appropriate) the *métiers* defined in this study.

3.3 Access to Boats

During the initial stages of the study, access to boats was obtained through local Producer Organisations and NFFO representatives. The objectives and the need for a study were explained to fishermen. It was emphasised that although the work had been commissioned by MAFF, all the information collected was unattributable. Thus there would be no records of vessels' names or numbers in the study and fishermen's rights to confidentiality were guaranteed.

3.4 Onboard Sampling Procedure

Nets are hauled aboard, one at a time, through a net hauler. Hauling is fairly slow and often pauses as the boat manoeuvres around the gear. During the study this allowed all species brought aboard to be identified, measured and classified into landings and discards. Data could also be recorded before the next fleet of nets was hauled. In the case of brown crab, catch was divided up into landings, discards and clawed crab in order to distinguish between discarded whole crab and crab which only had their claws landed.

The sampling arrangements on board vessels were not consistent as different crews often worked different patterns. The samplers had to be flexible in order not to disrupt normal working practices. Usually, however, the crew were asked to place discards into separate bins

and whenever possible, the discards were measured immediately to prevent any unnecessary mortalities occurring, after which the landings were measured.

A calibrated one metre board was used to measure the total length of fish from snout to the end of the tail fin to the nearest centimetre except for rays which had their wing span measured. A set of callipers with 1mm intervals was used to measure shellfish. Crab species were measured by carapace width and lobsters and crawfish by carapace length. Crab, lobsters and spurdog were sexed.

Each sample record represents one day's catch by one boat fishing in one *métier*. In the cases where two different gear types were being hauled in one day from the same boat, the catch data from each were separated into two samples. As all of the day's catch was measured, each sample represents the total landings and discards from that day's fishing. No raising factors were therefore required.

4. Results and Discussion

4.1 Analysis and Presentation

The results are presented by region and by *métier* within each region (Table 1). The analysis of the effort and catch data was designed to reveal the effort, catch and discard characteristics of each *métier* in the following terms:

i. The effort data describe the fishing activity in each *métier* in qualitative and quantitative terms. The mesh size range, description of the gear, locations and distances to the fishing grounds are described. One respondent was questionned for each boat. However in the case of No. Of Respondents/Mesh Size histogrammes some boats had two or more mesh sizes in their inventory of nets. In these cases each mesh size was registered as a response. In the No. Of Respondents/Distance to Grounds histogrammes each response is from one boat but in some cases they are divided into maximum and minimum distances. Quantitative estimates were made from the questionnaire data of the activities of the vessels in terms of days per month fishing (under ideal circumstances with no breaks for bad weather), soak time and length of gear used. The number of boats in each *métier* was estimated from fishermen's estimates by port and from independent estimates made by the researcher (described as the "overall estimate" in the tables). Minor *métiers* observed but not surveyed in the catch survey are shown in Appendix 2.

ii. The catch data describe the characteristics of the catches in terms of length/frequency distributions for the finfish, wing span/frequency for rays and skates, carapace length/frequency for the lobster and carapace width/frequency for crabs. The weights of each species were derived from the measured dimension/weight relationships obtained from Coull et al (1989) in the case of finfish and S. Lovewell (pers com) in the case of shellfish. The standard MAFF species codes were used in the figures and tables. Appendix 3 shows MAFF codes, the common names and minimum landing sizes of all species observed.

The percentage discard rates were calculated as follows:

$$\%\ DIS(No) = \left(\frac{Discards(No)}{Discards(No) + Landed(No)} \right) \times 100\%$$

$$\%\ DIS(Wt) = \left(\frac{Discards(Wt)}{Discards(Wt) + Landed(Wt)} \right) \times 100\%$$

Where % DIS (No.) and % DIS (Wt) are the percentage discard by numbers and weights respectively.

iii. The effort data were used to obtain estimates of the total effort exerted in each *métier* in terms of days per annum when the gear was set. This was estimated from:

- Effort of boats sampled in effort questionnaire:

$$\text{E SURVEY} = \text{Mean number of days per month fished} \times \text{Number of months of operation in that } \textit{métier}$$

- Total effort of *métier:*

$$\text{E MÉTIER} = \frac{\text{Overall estimate of number of boats in } \textit{métier}}{\text{Mean number of boats (as reported in questionnaire) fishing per month during the months of operation of the } \textit{métier}} \times \text{E SURVEY}$$

iv. The raising factors as applied to the catch data were calculated as follows:

$$\text{BOATS SUR} = \frac{\text{E SURVEY}}{\text{Number of days sampled}}$$

$$\text{BOATS ALL} = \frac{\text{E MÉTIER}}{\text{Number of days sampled}}$$

Some data for boat size categories within the same *métier* have been grouped where the gear, ground and target species have been the same, but boat size categories have been different. This has been done in order to incorporate as much as possible catch and discard data into mesh size groups for further analysis of data, for example the mesh size selectivity analysis in Figure 5.

4.2 Northeast *Métiers*

4.2.1 Effort Survey : Métier Definition and Seasonality

Three *métiers* were identified on the Northeast Coast:

i. Trammel netting for cod, all boat sizes.
ii. Trammel netting for sole, boats ≥ 10m.
iii. Tangle netting for turbot, boat ≥ 10m.

The cod and sole *métiers* use a very similar mesh size(Figure 3) and they are predominantly pursued between October and March. Some respondents described their target species in the sole *métier* as being "cod and soles" which suggests that the differences between these *métier* are minor. The use of floatline as flotation in the sole *métier* rather than individual floats in the cod *métier* (Sections 4.2.2.1 and 4.2.3.1) may be a distinguishing feature. Apart from a tendency to fish nearer their home port and switch to other static rather than mobile gear during other seasons, there do not appear to be any distinguishing features between the larger ≥10m and <10m boats. Other common activities mentioned included potting, salmon netting, wreck fishing (in the summer), angling parties and beam trawling were mentioned as alternative activities.

The turbot tangle net *métier* is distinct and does not overlap in terms of grounds or boats with the other Northeast *métiers*. The respondent switched from trawling to this *métier* during the summer turbot season.

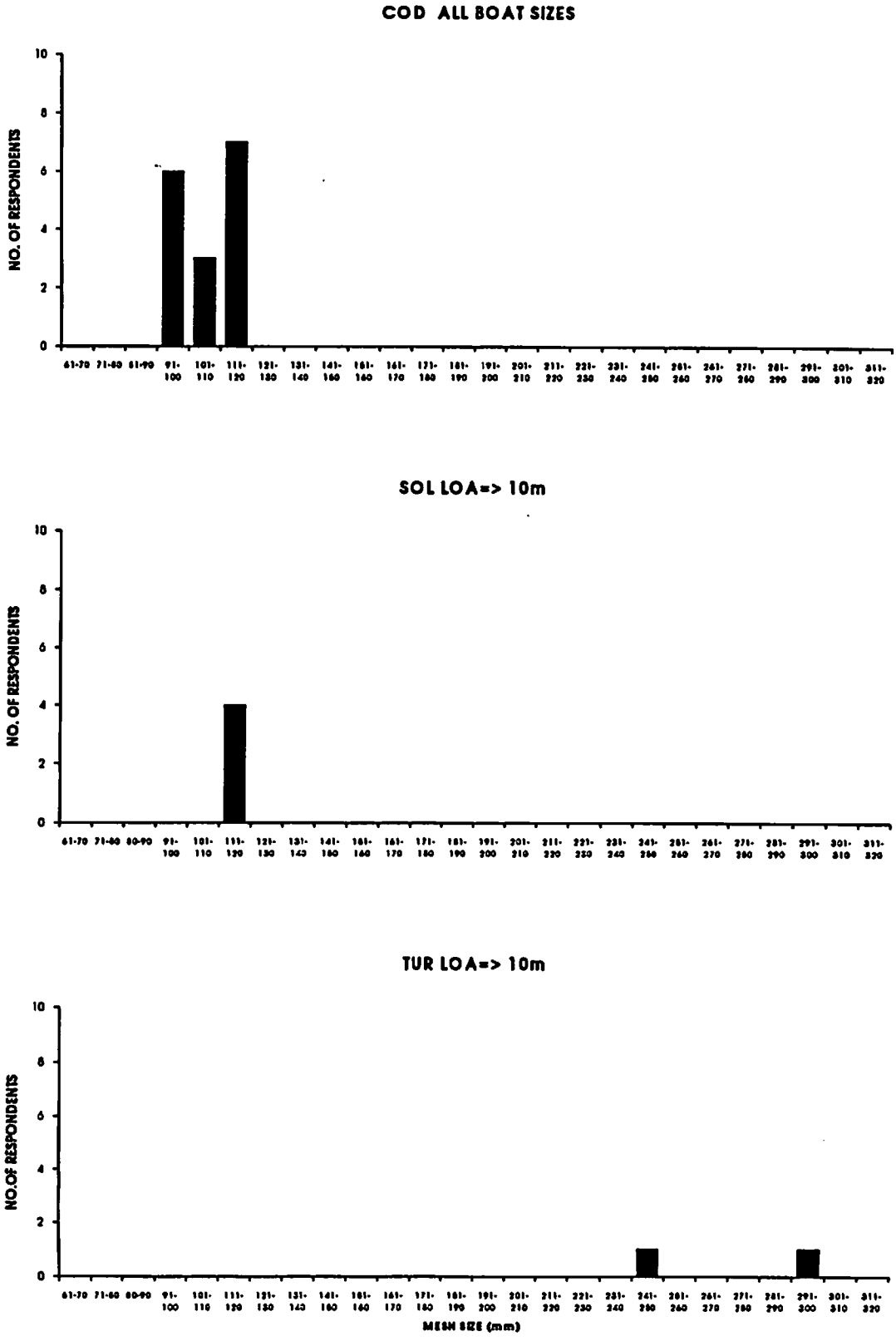
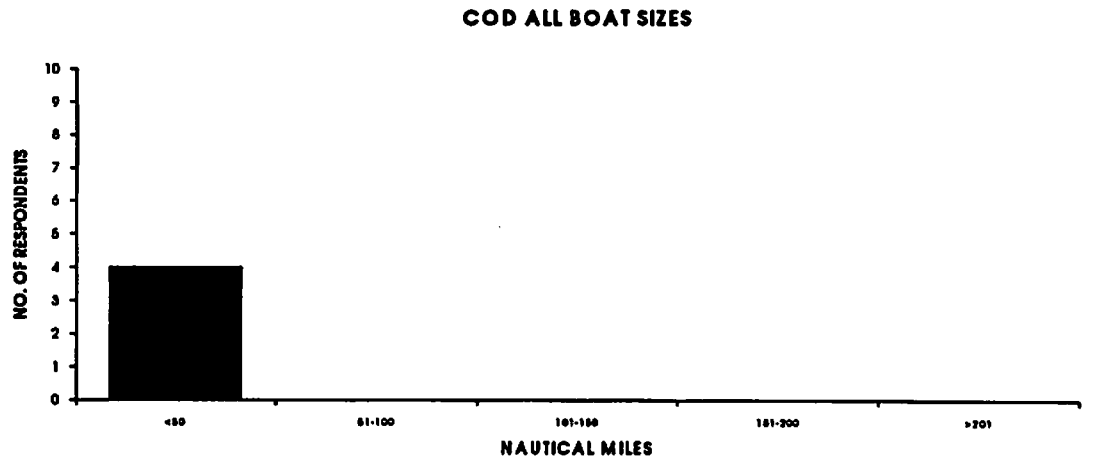
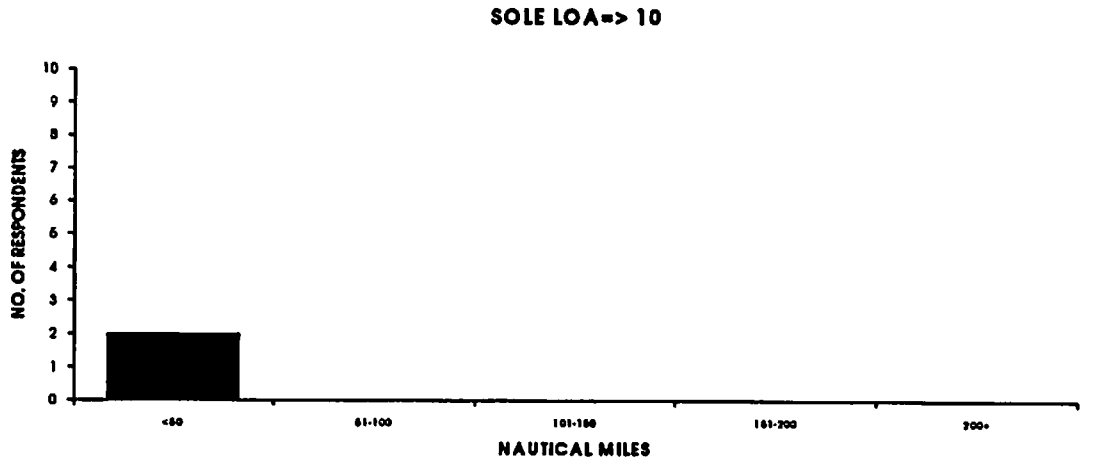


Fig 3. Effort Survey. Mesh sizes in NE métiers; these histograms show the number of respondents who reported nets in each mesh size category.





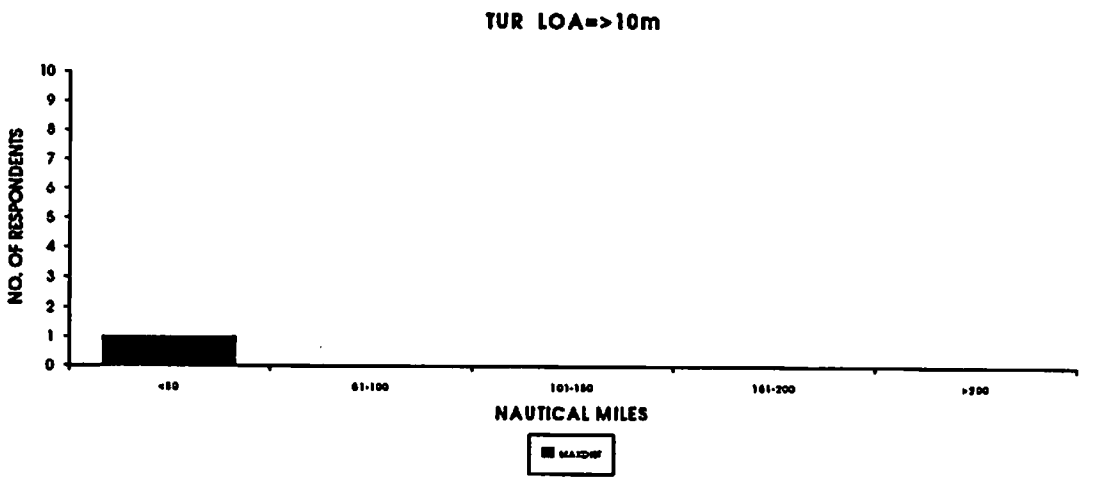


Fig 4. Effort Survey. Distance to fishing grounds in NE métiers.

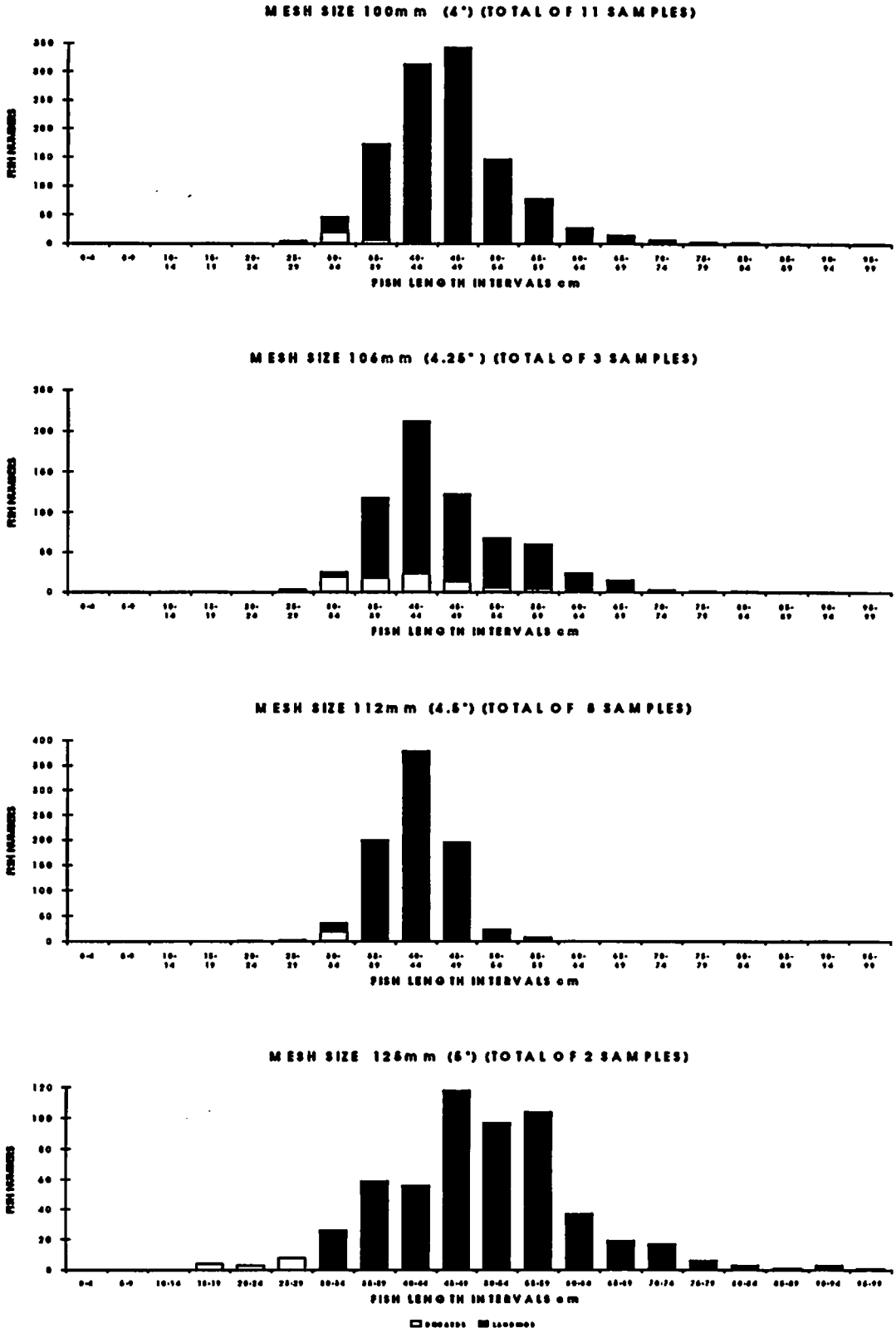


Fig 5. Comparisons between length frequency distributions in four mesh sizes in the NE cod trammel net métier.

4.2.2 Northeast Cod Trammel Net *Métier* (Boat Sizes <10m and ≥10m)

4.2.2.1 Effort survey (Table 2)

This is the largest netting *métier* prosecuted off the Northeast coast of England and takes place predominantly during the winter months between October and May although there is some activity all the year round. There is another *métier* which uses gill nets to target cod on this coast. No catch data are available from gill nets but effort data are shown in Table 44. The boats fish the inshore grounds located no more than 15Nm[1] from port. The average soak time is 22-26 hours. Most of the grounds can only be fished at neap tides, but some are only restricted by bad weather. Spring tides prevent fishing in some areas because strong tidal flows cause the nets to flatten and twist which restricts their fishing capacity and adds many hours to the work involved in clearing the nets.

4.2.2.2 Catch survey : target species (Table 3 and Figure 5)

The combined results for all mesh sizes (100-125mm) are shown in Table 3. These results show that this *métier* captures and lands predominantly 35-59cm cod. The mesh sizes used are well matched to the minimum landing size (MLS) of 35cm.

The overall discard rate of 5% is made up of fish above and below the MLS in approximately equal proportion (2.8% above MLS and 2.2% below MLS). Those above MLS were probably discarded due to spoilage.

Figure 5 describes the length frequency distributions of cod captured in the various mesh sizes sampled in this *métier*. Although there is a clear increase in the proportion of larger cod captured in the largest (125mm/5") mesh size when compared with the smallest (100mm/4") mesh size, the intermediate mesh sizes at 106mm (4.25") and 112mm (4.5") do not appear to catch cod larger than those captured by the 100mm (4") mesh. However, these results were obtained at different times and locations and it is possible that these results reflect local differences in fish size distribution.

4.2.2.3 Catch survey : non-target species (Table 3)

These consist of whiting, pouting and dabs. Although the discard rates by number for these species are high at 71-100% the overall number and weight of these species discarded is very low when compared with the number and weight of cod landed.

4.2.2.4 Catch survey : shellfish (Table 4)

No brown crabs were landed whole; crabs of all sizes were all either clawed or discarded. No size selection appeared to take place in crabs but lobsters were very sharply selected by the fishermen at 80-89mm. This length range corresponds with the MLS of 85mm.

[1] Nm = Nautical miles

Table 2
Effort Survey - NE Cod Trammel Net *Métier*
(Boat size <10m>10m combined)

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	10	2726	1440	6000	20.2	13	30
FEB	10	2726	1440	6000	20.2	13	30
MAR	10	2726	1440	6000	20.2	13	30
APRIL	9	2751	1440	6000	20.2	13	27
MAY	6	3636	1440	6000	20	13	27
JUNE	4	3569	1575	6000	21.3	13	27
JULY	4	3569	1575	6000	21.3	13	27
AUGUST	4	3569	1575	6000	21.3	13	27
SEPT	4	3569	1575	6000	21.3	13	27
OCT	9	2751	1440	6000	20.3	13	30
NOV	9	2751	1440	6000	20.3	13	30
DEC	9	2751	1440	6000	20.3	13	30
MEANS	7.33	3091.17	1485.00	6000.00	20.58	13.00	28.50

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	3.4	2.6	4.6
MEAN SOAK(HRS)	24	22	26
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	30.6	30.6	30.6
MAX LOST (m)/BOAT/SEASON)	130	0	900
MIN LOST (m)/BOAT/SEASON	112	0	720
PURCHASED(m)/BOAT/SEASON	929	250	1620

C: ESTIMATED NO. OF BOATS				
PORT	Nobservd	Mean	Min	Max
BRD	3	15	10	20
NWB	2	6.5	6	7
SUN	1	8	8	8
SCA	1	16	16	16
WHB	2	16.5	15	18
OVERALL		98		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	1811	1144	2508
EFFORT IN METIER (EMETIER)	24196.2	15288	33516

Table 3
Catch Survey - NE Cod Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	NSAMPLES:		RAISING FACTORS	
NE COD TRML	100-125	24		BOATS SUR	75
				BOATS ALL	1008

B: SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER								
LENGTH or WIDTH(cm) GROUP(cm)	COD NUMBERS/LENGTH		WHG NUMBERS/LENGTH		BIB NUMBERS/LENGTH		DAB NUMBERS/LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14								
15-19				2		6		2
20-24		1		37	1	58		23
25-29		12	4	45	3	67		22
30-34	51	59	27	37	16	66		15
35-39	310	26	19	13	19	11		1
40-44	937	31	4	3	8	5		
45-49	792	16		1		1		
50-54	330	6						
55-59	244	3						
60-64	90							
65-69	46							
70-74	22							
75-79	9							
80-84	1							
85-89								
90-94	1							
95-99	1							
100-104								
105-109								
110-114								
115-119								
120-124								
140-144								
145-150								
TOTAL(No.)	2834	154	54	138	47	214	0	63
%DISC(No.)		5		72		82		100
EST WT(Kg)	3781	108	20	32				13
%DISC(WT.)		3		62				100

C: RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR	213802	11618	4074	10411	3546	16145	0	4753
BOATS ALL	2857168	155259	54441	139128	47384	215749	0	63515

D: RAISED ESTIMATES : WEIGHTS TONNES/ANNUM								
BOATS SUR	285.27	8.15	1.51	2.39	0.00	0.00	0.00	1.00
BOATS ALL	3812	109	20	32	0	0	0	13

Table 4
Catch Survey - Shellfish NE Cod Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
NE COD	100-125	24		BOATS SUR	75
TRML				BOATS ALL	1008

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER				
CARAPACE LENGTH or	CRE:CLAWED NUMBERS /CARAPACE WIDTH		LBD NUMBERS /CARAPACE LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				17
70-79				31
80-89	12	7	29	4
90-99	39	13	35	
100-109	82	18	1	
110-119	83	19	1	
120-129	84	10		
130-139	76	5		
140-149	91	25		
150-159	65	10		
160-169	73	10		
170-179	17	11		
180-189		12		
190-199		10		
200-209		2		
210-219		1		
220-229				
230-239				
240-249				
250-259				
TOTAL(No.)	622	153	66	52
%DISC(No.)		20		44
EST WT(Kg)	453	145	27	11
%DISC(WT.)		24		27

B; RAISED ESTIMATES : NUMBERS/ANNUM				
BOATS SUR	46925	11543	4979	3923
BOATS ALL	627085	154251	66540	52425

B; RAISED ESTIMATES : WEIGHTS TONNES/ANNUM				
BOATS SUR	34	11	2	1
BOATS ALL	457	146	27	11

4.2.3 Northeast Sole Trammel Net *Métier* (Boat Size ≥10m)

4.2.3.1 Effort survey (Table 5)

This *métier* occurs between October and March and it is estimated that 55 boats are involved. The grounds fished are inshore within a radius of no more than 10Nm from port. The average soak time is 24 hours and each boat deploys about 2500m of net per day. This *métier* is distinguished from the Northeast cod *métier* (Section 4.2.2) by the use of floatline instead of individual floats on the headline and possibly by the utilisation of different grounds.

4.2.3.2 Catch survey : target species (Table 6)

In this *métier* 3% of the total catch of soles were discarded, the majority of which were below the MLS of 24cm. There is a steep rise in the numbers of soles between the 20-24cm and 25-30cm (from 60 to 400 soles). These two observations show that the selectivity of the gear is well matched to the MLS of this species.

4.2.3.3 Catch survey : non-target species (Table 6)

The three principal non-target species are cod, whiting and pout whiting. Of these, cod were the most important by weight and are landed with only a 12% discard rate by number, the majority of which were concentrated just below the MLS of 35cm. Comparison between the length frequency data for cod for this fishery suggests that the fishery targets cod of a smaller size group (compare Tables 3 and 6). Even for equivalent mesh sizes (compare Figure 5 with Table 6) the sole *métier* captured smaller cod; for a mesh size of 100mm the most common length group is 45-49cm in the cod *métier*, whilst in the sole *métier* it is 40-45cm. This could be due to differences between fish populations available to the different *métiers*. Almost all the whiting and pout whiting were discarded. However, as in the cod *métier*, numbers are low when compared with the target species.

4.2.3.4 Catch survey : shellfish (Table 7)

The majority of brown crab below 170mm are discarded whilst the larger ones are clawed. This *métier* catches a higher proportion of lobsters than the Northeast cod *métier*. These are fairly sharply selected at 80-90mm carapace length (corresponding with the MLS). Care is taken with lobster discards which are returned to the sea alive.

Table 5
Effort Survey - NE Sole *Métier* (Boat sizes >10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	2	2500	2500	2500	20	20	20
FEB	2	2500	2500	2500	20	20	20
MAR	2	2500	2500	2500	20	20	20
APRIL	1	2500	2500	2500	20	20	20
MAY	0						
JUNE	0						
JULY	0						
AUGUST	0						
SEPT	0						
OCT	2	2500	2500	2500	20	20	20
NOV	2	2500	2500	2500	20	20	20
DEC	2	2500	2500	2500	20	20	20
MEANS	1.86	2500	2500	2500	20	20	20

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	3.9	3.9	3.9
MEAN SOAK(HRS)	24	24	24
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	0	0	0
MAX LOST (m)/SEASON/BOAT	0		
MIN LOST (m)/SEASON/BOAT	0		
PURCHASED(m)/SEASON/BOAT)	480	457	500

C: ESTIMATED NO OF BOATS				
PORT	Nobservd	Mean	Minimum	Maximum
BRD	2	14.5	14	15
OVERALL		55		

D: EST. EFFORT(BOATDAYS/ANNUM)	Mean	Max	Min
EFFORT OF BOATS SURVEYED (ESURVEY)	260	260	260
EFFORT IN METIER EMETIER	7700	7700	7700

Table 6
Catch Survey : NE Sole Trammel Net *Métier* (Boat Sizes >10m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS:	
NE_SOL	100-106	6		BOATS SUR	43.33
TRML				BOATS ALL	1283.33

B;SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER								
TOTAL LENGTH or	SOL NUMBERS/LENGTH		COD NUMBERS/LENGTH		WHG NUMBERS/LENGTH		BIB NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14						1		
15-19		3				1		2
20-24	28	39			1	5		15
25-29	394	1		7	8	18		28
30-34	500		4	11	4	30		15
35-39	231		62		2	20		17
40-44	35		43			13		11
45-49	30		26			12		
50-54	3		1			9		3
55-59						2		
60-64								
65-69								
70-74								
75-79								
80-84								
85-89								
90-94								
95-99								
100-104								
105-109								
110-114								
115-119								
120-124								
125-129								
130-134								
135-139								
140-144								
145-150								
TOTAL(No.)	1221	43	136	18	15	111	0	91
%DISC(No.)		3		12		88		100
EST WT(Kg)	459.0	4.3	113.5	6.3	3.3	50.8		
%DISC(WT.)		1		5		94		

C; RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR	52910	1863	5893	780	650	4810	0	3943
BOATS ALL	1566950	55183	174533	23100	19250	142450	0	116783

D; RAISED ESTIMATES : WEIGHTS (TONNES)/ANNUM								
BOATS SUR	19.89	0.19	4.92	0.27	0.14	2.20	0.00	0.00
BOATS ALL	589.05	5.48	145.66	8.12	4.25	65.18	0.00	0.00

Table 7
Catch Survey : Shellfish NE Sole Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
NE SOL TRAMMEL	100-106	6		BOATS SUR	43
				BOATS ALL	1283

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER				
CARAPACE LENGTH or WIDTH(cm)	CRE;CLAWED NUMBERS /CARAPACE WIDTH		LBD NUMBERS /CARAPACE LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				37
70-79				34
80-89		22	12	6
90-99		43	16	1
100-109		46	3	2
110-119		41	7	2
120-129		44	13	
130-139		33	8	
140-149		47	3	
150-159		46		
160-169	6	49		
170-179	33	30		
180-189	51			
190-199	25			
200-209	4			
210-219				
220-229				
230-239				
240-249				
250-259				
TOTAL(No.)	119	401	62	82
%DISC(No.)		77		57
EST WT(Kg)	117	149	46	18
%DISC(WT.)		56		28

B; RAISED ESTIMATES : NUMBERS/ANNUM				
BOATS SUR	5157	17377	2687	3553
BOATS ALL	152717	514617	79567	105233

B; RAISED ESTIMATES : WEIGHTS TONNES/ANNUM				
BOATS SUR	5	6	2	1
BOATS ALL	150	191	59	22

4.2.4 Northeast Turbot Tangle Net *Métier* (Boat Size ≥10m)

4.2.4.1 Effort survey (Table 8)

These results show a *métier* operating between the months of June and August prosecuted by 7 boats mostly based in Grimsby. The grounds extend to 10Nm offshore and the nets are soaked for three days with a mean length of 8000m of net per boat. The *métier* utilises large mesh nets of between 270-300mm mesh.

4.2.4.2 Catch survey : target species (Table 9)

Turbot made up the majority of the landings of this *métier* both by numbers and weight. There was no discarding of this species indicating that the selectivity of the gear is well matched to the target species and market requirements and there is no evidence of spoilage in spite of the relatively long soak time.

4.2.4.3 Catch survey : non-target species (Table 9)

A few large ling and cod are also captured in the gear, none of which were discarded; there is no evidence of spoilage in these species.

4.2.4.4 Catch survey : shellfish (Table 10)

The shellfish consisted of a few brown crabs all of which were clawed.

Table 8
Effort Survey - NE Turbot *Métier* (Boat Size >10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	0						
FEB	0						
MAR	0						
APRIL	0						
MAY	0						
JUNE	1	8000	8000	8000	30	30	30
JULY	1	8000	8000	8000	30	30	30
AUGUST	1	8000	8000	8000	30	30	30
SEPT	0						
OCT	0						
NOV	0						
DEC	0						
MEANS	1.00	8000.00	8000.00	8000.00	30.00	30.00	30.00

B: GEAR DETAILS	Mean	Mn	Max
SET DEPTH (m)	2.4	2.4	2.4
MEAN SOAK(HRS)	72	72	72
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	15.3	15.3	15.3
MAX LOST (m)/SEASON/BOAT	2000	2000	2000
MIN LOST (m)/SEASON/BOAT	2000	2000	2000
PURCHASED(m)/SEASON/BOAT)	4000	4000	4000

C: ESTIMATED NO OF BOATS				
PORT	Nobservd	Mean	Minimum	Maximum
BRD	1	7	7	7
OVERALL		7		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Mn	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	90.00	90.00	90.00
EFFORT IN METIER (EMETIER)	630	630	630

Table 9
Catch Survey : NE Turbot Tangle Net *Métier* (Boat Sizes >10m)

A: METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
NETUR	300	1		BOATS SUR	90.00
TNGL				BOATS ALL	630

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER						
TOTAL LENGTH or WIDTH(cm)	TUR NUMBERS/LENGTH		LIN NUMBERS/LENGTH		COD NUMBERS/LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4						
5-9						
10-14						
15-19						
20-24						
25-29						
30-34						
35-39	5				1	
40-44	14				2	
45-49	14				3	
50-54	6				1	
55-59	3		1			
60-64	1		1			
65-69			2			
70-74	1					
75-79						
80-84						
85-89						
90-94						
95-99						
100-104						
105-109						
110-114						
115-119						
120-124						
125-129						
130-134						
135-139						
140-144						
145-150						
TOTAL(No.)	44		4		7	
%DISC(No.)						
EST WT(Kg)	94.6		6.3		7.6	
%DISC(WT.)						

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	3960	0	360	0	630	0
BOATS ALL	27720		2520	0	4410	0

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM						
BOATS SUR	8.51	0.00	0.57	0.00	0.68	0.00
BOATS ALL	59.58	0.00	3.96	0.00	4.78	0.00

Table 10
Catch Survey : Shellfish Turbot Tangle Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
NE TUR	300	1		BOATS SUR	90.00
TANGLE				BOATS ALL	630

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER		
TOTAL	CRE; CLAWED NUMBERS	
LENGTH or	/CARAPACE WIDTH	
WIDTH(cm)	LANDINGS	DISCARDS
0-9		
10-19		
20-29		
30-39		
40-49		
50-59		
60-69		
70-79		
80-89		
90-99		
100-109	6	
110-119	2	
120-129	2	
130-139	3	
140-149	3	
150-159		
160-169		
170-179		
180-189		
190-199		
200-209		
210-219		
220-229		
230-239		
240-249		
250-259		
TOTAL(No.)	16	
%DISC(No.)		
EST WT(Kg)	5.8	
%DISC(WT.)		

B; RAISED ESTIMATES : NUMBERS/ANNUM		
BOATS SUR	1440	0
BOATS ALL	10080	0

C; RAISED ESTIMATES : WEIGHTS TONNES/ANNUM		
BOATS SUR	0.52	0.00
BOATS ALL	3.66	0.00

4.3 Southeast *Métiers*

4.3.1 Effort Survey, *Métier* Definition and Seasonality

Three *métiers* were identified in this region:-

i. Wreck netting for cod.
ii. Trammel netting for sole.
iii. Trammel netting for plaice.

There are no obvious vessel size differences so all vessels were classified as being ≥ 10m LOA. All three fisheries are pursued on local grounds within 30 miles of the boats' home ports.

Vessels switch between *métiers* on a seasonal basis. The plaice and sole fisheries are pursued by the same vessels on the same grounds; "Bullock Bank" and "The Varne" are mentioned as important grounds. The principal differences between these *métiers* are the mesh size, the sole being targeted with smaller mesh(Figure 6); seasonality, plaice are considered to be more available during the period September to March; and the soak time, which according to the effort survey is shorter in the plaice *métier* (Table 13 compared with Table 16).

The cod *métier* is pursued during the winter months when vessels switch from the sole and possibly the plaice *métiers*. There is at least one boat which also pursues other *métiers* for rays and skates as far away as the Wash during the period May to October (see Appendix 2).

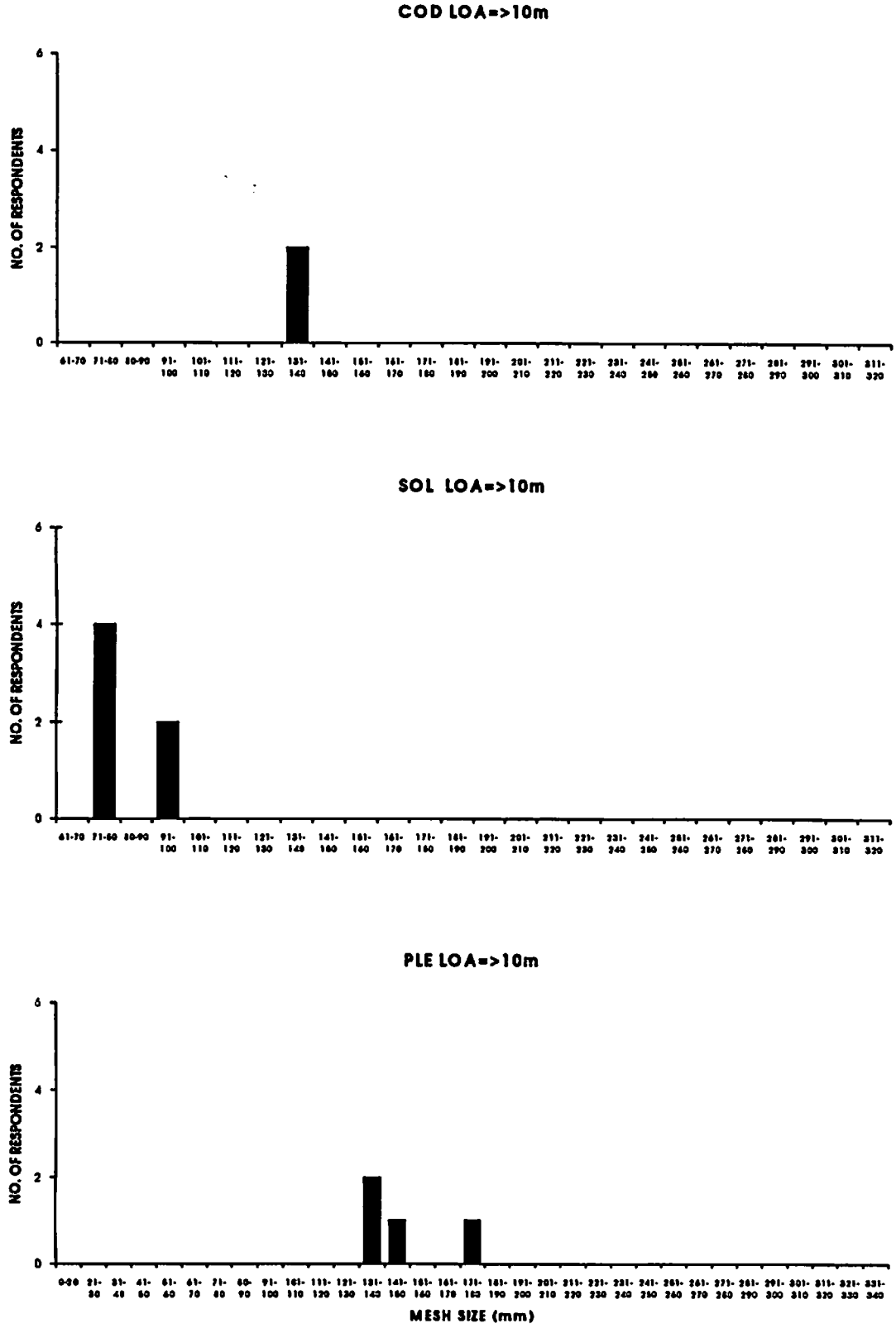


Fig 6. Effort Survey. SE métiers; these histograms show the number of respondents who reported nets in each mesh size category.

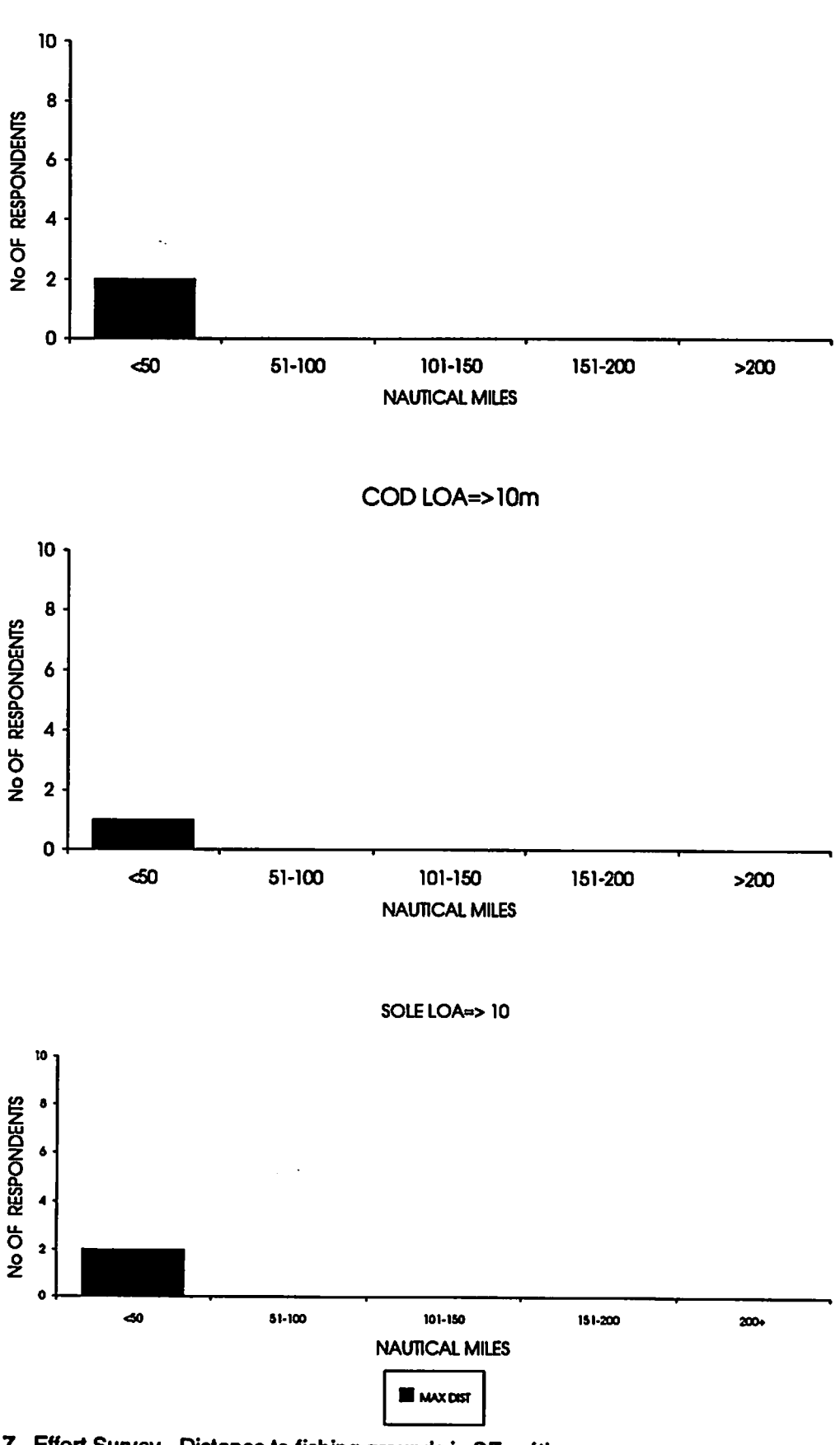


Fig 7. Effort Survey. Distance to fishing grounds in SE métiers.

4.3.2 Southeast Cod Gill Wreck Net *Métier* (Boat Size ≥10m)

4.3.2.1 Effort survey (Table 11)

Vessels operate this *métier* during the winter period between November and May. The grounds fished extend only 10Nm from port. The soak time is constrained to 4-5 hours because the fishermen are concerned that their dahn buoys might be cut loose from the gear by shipping.

4.3.2.2 Catch survey : target species (Table 12)

The majority of cod captured in this fishery are in the range 35-54cm and the discard rate is very low at 2.5% with the majority of discards (74%) below the minimum landing size. This suggests that the mesh size is well matched to the minimum landing size (MLS). Fish larger than the MLS are only likely to be discarded if spoilage has taken place. It seems likely that 4-5 hours is insufficient time for spoilage to occur.

4.3.2.3 Catch survey : non-target species (Table 12)

Of these, all ling are landed and made up approximately a quarter of the landings by weight; at this quantity the ling could be regarded as another target species; in some of the questionnaires it was referred to as such. The small quantities of pout and whiting are all discarded - they make up a very small proportion of the total catch.

4.3.2.4 Catch survey : shellfish

No shellfish species were recorded in this *métier*. Whether this is a function of the grounds fished or short soak time of the gear is unknown. The gear would seem less likely to attract crustacea with only a few spoiled fish in it.

Table 11
Effort Survey : SE Cod Wreck Net *Métier* (Boat Sizes >10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	1	1600	1600	1600	14.5	14	15
FEB	1	1600	1600	1600	14.5	14	15
MAR	1	1600	1600	1600	14.5	14	15
APRIL	1	1600	1600	1600	14.5	14	15
MAY	0						
JUNE	0						
JULY	0						
AUGUST	0						
SEPT	0						
OCT	0						
NOV	1	1600	1600	1600	14.5	14	15
DEC	1	1600	1600	1600	14.5	14	15
MEANS	1.00	1600.00	1600.00	1600.00	14.50	14.00	15.00

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	1.95	1.95	1.95
MEAN SOAK(HRS)	4.5	4.5	4.5
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	62	62	62
MAX LOST (m)/SEASON/BOAT	800	800	800
MIN LOST (m)/SEASON/BOAT	800	800	800
PURCHASED(m)/SEASON/BOAT)	1200	1200	1200

C: ESTIMATED NO OF BOATS				
PORT	Nobserve	Mean	Max	Min
RAM	1	15	15	15
OVERALL		17		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	87	84	90
EFFORT IN METIER (EMETIER)	1479	1428	1530

Table 12
Catch Survey : SE Cod Wreck Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	No OF SAMPLES		RAISING FACTORS	
SE COD WRK NET	150	6		BOATS SUR	15
				BOATS ALL	246.5

B; LENGTH/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER								
TOTAL	COD		LIN		BB		WHG	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14								
15-19								
20-24		6				5		
25-29		7				13		4
30-34	11	9				22		10
35-39	155					18		13
40-44	298	2				2		5
45-49	326	2						
50-54	173	3						
55-59	78							
60-64	59		3					
65-69	30	1	4					
70-74	15		14					
75-79	6		15					
80-84	6		22					
85-89	4		22					
90-94			12					
95-99	2		7					
100-104			4					
105-109								
110-114			2					
115-119								
120-124								
125-129								
130-134								
135-139								
140-144								
145-150								
TOTAL(No.)	1163	30	106			60		32
%DISC(No.)		3				100		100
EST WT(Kg)	1586	18	444					12
%DISC(WT.)		1						100

C; RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR	16864	435	1523	0	0	870	0	464
BOATS ALL	286680	7395	25883	0	0	14790	0	7888

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM								
BOATS SUR	23	0	6	0	0	0	0	0
BOATS ALL	391	4	109	0	0	0	0	3

4.3.3 Southeast Trammel Net *Métier* for Sole (Boat Size ≥10m)

4.3.3.1 Effort survey (Table 13)

This *métier* occurs during the period January until October with around 48 vessels from the ports of Eastbourne, Hastings, Rye, Dungeness and Folkestone taking part. The grounds are up to 30Nm from port and include "Bullock Bank" and "The Varne" in mid Channel. Soak time is 20 hours and in contrast to the sole nets in the Northeast sole tangle net *métier* floats are used for flotation. The mesh size reported in the questionnaire can be as small as 80mm (3.25"). However, samples were taken from 95-115mm (3.75-4.5") mesh.

4.3.3.2 Catch survey : target species (Table 14)

The overall discard rate by number for soles in this fishery was observed to be 8%. This consists mostly of fish in the 20-25cm length group, below the minimum landing size of 24cm. This indicates that the soles were discarded due to being undersized rather than to spoilage. The mesh sizes used were the smallest used in any of the *métiers* in this study.

4.3.3.3 Catch survey : non-target species (Table 14)

The catch of non-target species consisted mostly of small dabs and pouting with a few small plaice. The dabs and pouting were discarded; only the larger plaice were landed.

4.3.3.4 Catch survey : shellfish (Table 15)

The majority of the shellfish discards, both by weight and number, were spider crabs. Although these crabs were of marketable size, at the time of the survey there was little incentive to land spider crabs. Most of the brown crabs were discarded with a few of the larger ones being clawed.

Table 13
Effort Survey : SE Sole Trammel Net *Métier* (Boat Size >10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	1	3600	3600	3600	25	25	25
FEB	2	3800	3600	4000	28	25	31
MAR	2	3800	3600	4000	28	25	31
APRIL	2	3800	3600	4000	28	25	31
MAY	2	3800	3600	4000	28	25	31
JUNE	3	3733	3600	4000	26.17	20	31
JULY	3	3733	3600	4000	26.17	20	31
AUGUST	3	3733	3600	4000	26.17	20	31
SEPT	3	3733	3600	4000	26.17	20	31
OCT	3	3733	3600	4000	26.17	20	31
NOV	0						
DEC	0						
MEANS	2.40	3746.50	3600.00	3960.00	26.79	22.50	30.40

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	3.5	3.1	4.3
MEAN SOAK(HRS)	18	14	20
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	11.3	11.3	11.3
MAX LOST (m)/SEASON/BOAT	1050	1000	1150
MIN LOST (m)/SEASON/BOAT	1060	1000	1150
PURCHASED(m)/SEASON/BOAT	2167	2000	2500

C: ESTIMATED NO OF BOATS				
PORT	Nobserved	Mean	Minimum	Maximum
HAS	1	38	38	38
DUN	2	12	12	12
OVERALL		48		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	643	540	730
EFFORT IN METIER (EMETIER)	12857	454	11328

Table 14
Catch Survey : SE Sole Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS				
METIER	MESHmm	No OF SAMPLES	RAISING FACTORS	
SE SOL	95-115	6	BOATS SUR	107.14
TRML			BOATS ALL	2142.8

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER								
TOTAL	SOL		DAB		BIB		PLE	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14								
15-19				64		3		21
20-24	57	64		330		9	6	17
25-29	504	10		112		44	50	5
30-34	343	2		1		25	13	1
35-39	62					8		
40-44	12							
45-49	1							
50-54	3							
55-59	1							
60-64	2							
65-69	1							
70-74								
75-79								
80-84								
85-89								
90-94								
95-99								
100-104								
105-109								
110-114								
115-119								
120-124								
125-129								
130-134								
135-139								
140-144								
145-150								
TOTAL(No.)	986	76		507		89	69	44
%DISC(No.)		7		100		100		
EST WT(Kg)	290.4	9.2		64.1			16.2	5.0
%DISC(WT.)		3		100				24

C; RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR	105640	8143	0	54320	0	9535	7393	4714
BOATS ALL	2112801	162853	0	1086400	0	190709	147853	94283

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM								
BOATS SUR	31.11	0.99	0.00	6.86	0.00	0.00	1.74	0.54
BOATS ALL	622.27	19.71	0.00	137.29	0.00	0.00	34.73	10.71

Table 15
Catch Survey : Shellfish SE Sole Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
SE SOL TRML	95-115	6		BOATS SUR	107
				BOATS ALL	2143

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER				
TOTAL LENGTH or WIDTH(cm)	CRE; CLAWED /CARAPACE WIDTH NUMBERS		SCR /CARAPACE LENGTH NUMBERS	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				
70-79				
80-89				
90-99				
100-109				
110-119				
120-129				11
130-139				27
140-149		4		32
150-159	1	10		44
160-169	7	14		27
170-179	7	11		13
180-189	2	2		1
190-199				
200-209				
210-219				
220-229				
230-239				
240-249				
250-259				
TOTAL(No.)	17	41	0	155
%DISC(No.)		71		100
EST WT(Kg)	13.3	28.5		237.9
%DISC(WT.)		68		100

C; RAISED ESTIMATES : NUMBERS/ANNUM				
BOATS SUR	0	4393	0	16607
BOATS ALL	0	87855	0	332134

D; RAISED ESTIMATES; WEIGHT TONNES/ANNUM				
BOATS SUR	1.42	3.05	0.00	25.49
BOATS ALL	28	61	0	510

4.3.4 Southeast Plaice Trammel Net *Métier* (Boat Size ≥10m)

4.3.4.1 Effort survey (Table 16)

This *métier* is exploited by the same boats as the Southeast sole *métier* and occupies the same grounds. The main differences are a larger mesh size - 120mm-150mm (4.75-6") for plaice compared with 70-100mm (3-4") for sole - and the soak time - a mean of 8 hours for plaice and 18 hours for the sole.

The switch between *métiers* is dependent on the availability of plaice on the grounds which anecdotally occurs during the winter months from September until March although the effort survey does not bear this out. Market conditions would affect the switch.

4.3.4.2 Catch survey : target species (Table 17)

Plaice landed measured between 30 and 49cm in length with no discards. These results may be compared with those obtained by Arkley and Swarbrick (1990) for 150mm multi monofilament trammel nets in this fishery. The range of plaice sizes in that study were 23-50cm with 2% being below the mls (27cm). The catches peaked in numbers at 35-39cm which is the same as for the current work. There are also a few marketable turbot, bass and cod landed but these are not seen as important target fish in this fishery.

4.3.4.3 Catch survey : non-target species (Table 17)

The discards consist of flounders and whitings none of which were retained. This is presumably for market reasons in the case of flounders and size and market consideration in the case of whitings.

4.3.4.4 Catch survey : shellfish

No shellfish were captured in this *métier* during the day's sample taken. This contrasts with the sole *métier* in which spider crabs were captured in abundance. Since the grounds were in the same area it seems possible that this is a function of soaktime or season.

Table 16
Effort Survey : SE Plaice *Métier* (Boat Size >10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT MEAN	MIN	MAX	DAYS FISHED/BOAT/MONTH MEAN	MIN	MAX
JAN	0						
FEB	1	1800	1800	1800	N/D	N/D	N/D
MAR	1	1800	1800	1800	N/D	N/D	N/D
APRIL	1	1800	1800	1800	N/D	N/D	N/D
MAY	2	2400	1800	3000	30.5	30	31
JUNE	2	2400	1800	3000	30.5	30	31
JULY	1	1800	1800	1800	N/D	N/D	N/D
AUGUST	1	1800	1800	1800	N/D	N/D	N/D
SEPT	1	1800	1800	1800	N/D	N/D	N/D
OCT	1	1800	1800	1800	N/D	N/D	N/D
NOV	1	1800	1800	1800	N/D	N/D	N/D
DEC	0						
MEANS	1.2	1920	1800	2040	30.5		

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	3.4	3.2	3.5
MEAN SOAK(HRS)	8.25	2.5	14
HANGING RATIO	0.415	0.33	0.5
FLOTATION(g/m)	11.3	11.3	11.3
MAX LOST (m)/SEASON/BOAT	50	0	100
MIN LOST (m)/SEASON/BOAT	50	0	100
PURCHASED(m)/SEASON/BOAT	1500	0	3000

C: ESTIMATED NO BOATS				
PORT	Nobservd	Mean	Minimum	Maximum
EAS	1	2	2	2
OVERALL		48		

D: EST.EFFORT (BOAT DAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	366		
EFFORT IN METIER (EMETIER)	14640		

Table 17
Catch Survey : SE Plaice Trammel Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	No OF SAMPLES		RAISING FACTORS	
SE PLE	150	1		BOATS SUR	366
TRML				BOATS ALL	14640

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER						
TOTAL	PLE		FLE		WHG	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4						
5-9						
10-14						
15-19						
20-24				1		4
25-29						18
30-34	13			12		8
35-39	16			5		
40-44	5			3		
45-49	1					
50-54						
55-59						
60-64						
65-69						
70-74						
75-79						
80-84						
85-89						
90-94						
95-99						
100-104						
105-109						
110-114						
115-119						
120-124						
125-129						
130-134						
135-139						
140-144						
145-150						
TOTAL(No.)	35			21		30
%DISC(No.)				100		100
EST WT(Kg)	19.8					6.0
%DISC(WT.)						100

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	12810	0	0	7686	0	10980
BOATS ALL	512400	0	0	307440	0	439200

D; RAISED ESTIMATES : WEIGHTS TONNES/ANNUM						
BOATS SUR	7.25	0.00	0.00	0.00	0.00	2.18
BOATS ALL	289.87	0.00	0.00	0.00	0.00	87.25

4.4 Southwest *Métiers*

4.4.1 Effort Survey, *Métier* Definition and Seasonality

Four major *métiers* were identified in this area:

i. Gill netting for hake (boat size LOA>15m).

ii. Tangle netting for turbot, monkfish and ray (divided into; inshore boat sizes LOA >10m ≤15m and offshore boat sizes >15m).

iii. Tangle netting for crawfish, lobster and monkfish (boat sizes >10m).

iv. Wreck netting for ling, pollack and cod (divided into: inshore boat sizes LOA >10m ≤15m and offshore >15m).

Although there were subdivisions for boat size, the only *métier* in which this is important (on the basis of the effort survey) is that targeting monkfish, turbot and ray. There is a distinct difference between the smaller boats (≥10m and <15m) which fish closer inshore (Figure 9) and carry less net than the larger boats. The small vessels fish from April until December whilst the larger offshore vessels fish from April until August (Tables 21 and 24). There is some evidence of the distance to the grounds being less in the inshore ling, pollack and cod *métier* (Figure 9) but the sample size of the smaller boats (≥10m, <15m) is very small; some evidence of differences between catches in the inshore and offshore wreck netters was also observed; Tables 32 and 33.

These *métiers* are complementary with vessels partaking in two or more *métiers*, either simultaneously or at different times of year according to seasonal and market trends. Hake is the mainstay of the larger boats which steam as far as 200 miles to fish in the southwest approaches. They are likely to switch to the ling, cod and pollack *métier* during March or April. This is mostly attributed to a decrease in the price of hake during these months. In the summer, some boats switch to the monk, turbot and ray *métier*; fish availability and economic factors being cited as of importance in these changes.

The crawfish, lobster and monk *métier* is a more specialised fishery on rough ground 10-15 miles southwest of Newlyn. Six vessels partake in this activity during the summer when it is seen as a summer alternative to the ling, cod and pollack wreck net *métier*, which vessels exploit during the winter. Fishing for crawfish using tangle nets is not considered viable during the winter because the gear is vulnerable to being broken up on the rough grounds during bad weather.

Vessels partaking in the ling, pollack and cod *métier* fish wrecks and rough grounds as far as 200Nm from their port. Activity in this fishery takes place mostly during the months January until April. It is considered less profitable during the summer when fish become less available on the wrecks.

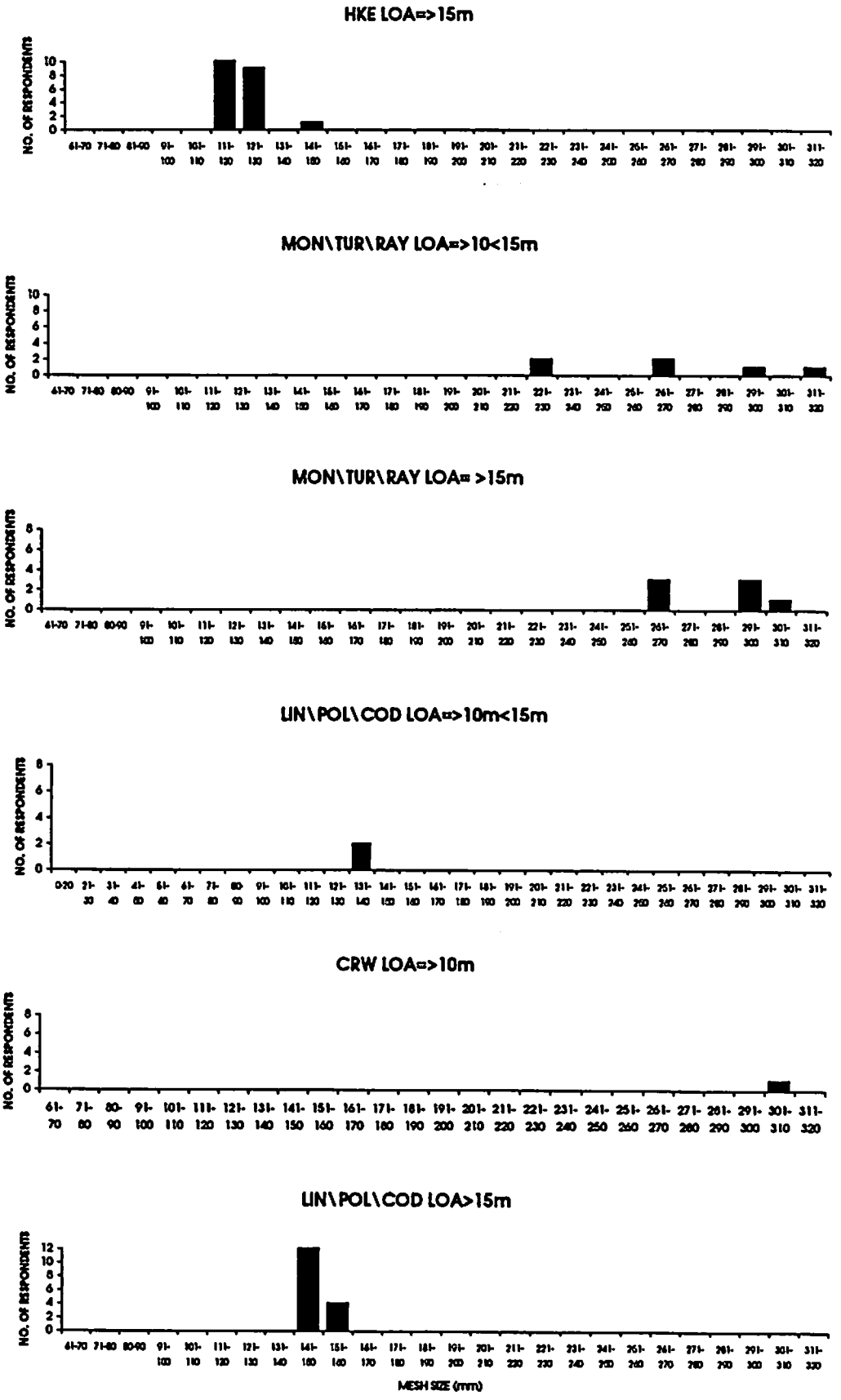


Fig 8. Effort Survey. Approximate number of nets/mesh size in SW métiers.

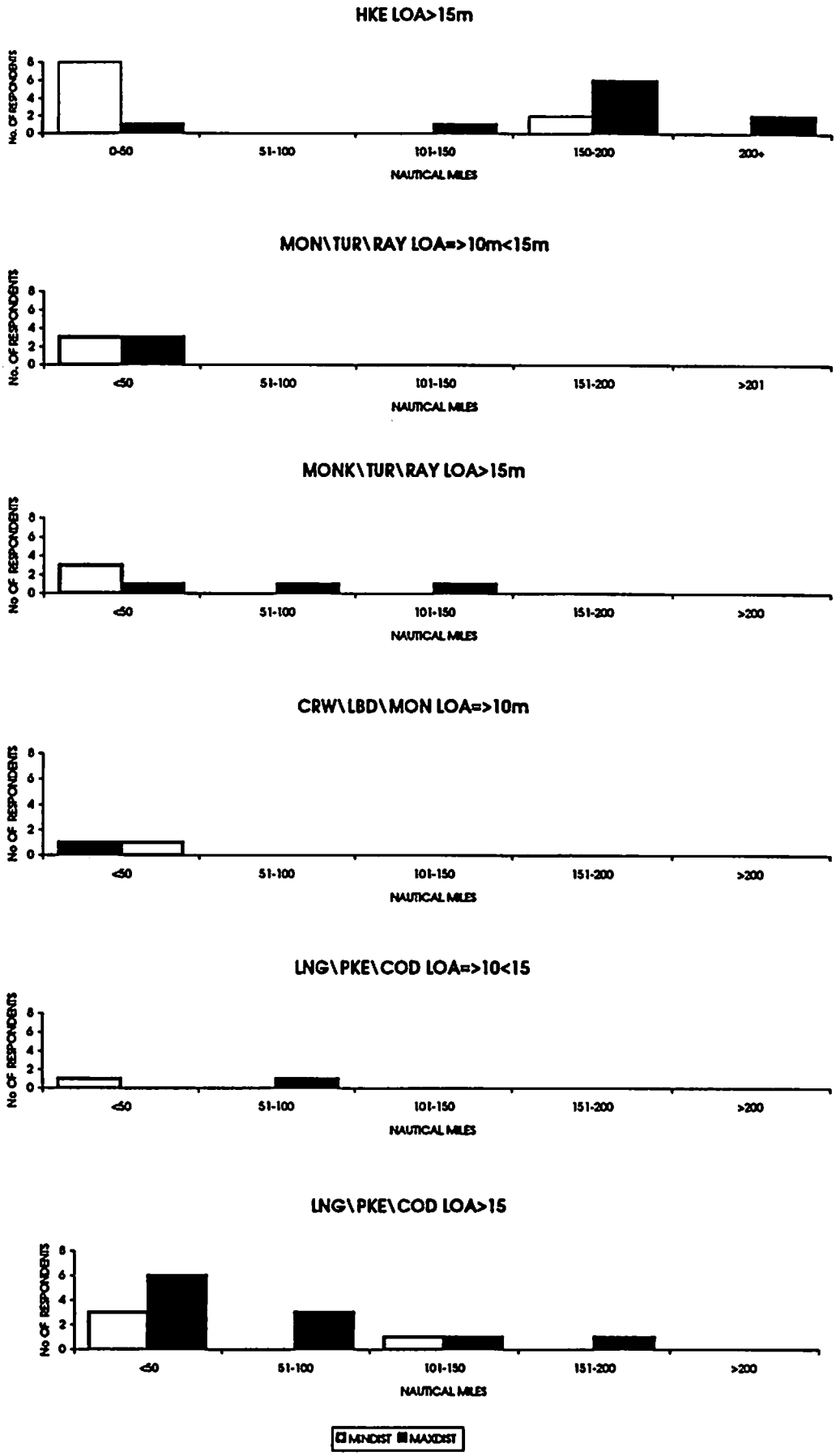


Fig 9. Effort Survey. Distance to grounds in SW métiers.

4.4.2 Southwest Hake Gill Net *Métier* (Boat Size ≥15m)

4.4.2.1 Effort survey (Table 18)

The effort is probably overestimated since the respondents usually indicated that they fished this *métier* all the year round and yet they also switched to other fisheries at other times of year. With static netting it is possible to set nets in two *métiers* at one time; for example, nets may be set on wrecks whilst the boat is also fishing on hake grounds, so this might in part account for apparent overlap.

4.4.2.2 Catch survey : target species (Table 19)

Hake exhibited minimal discard rates at less than 1% of the catch by weight and number. The size distribution of those discarded indicates that discarding was due to spoilage or quality and not size.

4.4.2.3 Catch survey : non-target species (Table 19)

The pollack and ling exhibited very low discard rates by number and weight (0% in the pollack and 1.7% by number and 0.2% by weight in the ling).

Spurdog, horse mackerel (scad) and pollack were always encountered on the hake grounds. The discarding of spurdog appears to be mostly related to size; of the 72% discarded the majority were below 60cm. Horse mackerel were all discarded presumably because of a lack of a market for these species. This *métier* is the only one where pouting were landed; there is some discarding (discard rate 23% by number), the majority being smaller than 29cm.

4.4.2.4 Catch survey : shellfish (Table 20)

Brown crabs were caught in small numbers in this métier. However, none was landed. Crab claws are likely to spoil if kept for the duration of a 7 day trip so there is little incentive to keep them.

Table 18
Effort Survey : SW Gillnet *Métier* for Hake (Boat Size >15m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	10	10176	8100	12600	13.3	12.0	15.0
FEB	6	10578	9450	12600	12.7	12.0	14.0
MAR	6	10578	9450	12600	12.7	12.0	14.0
APRIL	7	10477	9450	12600	12.9	12.0	14.0
MAY	7	10477	9450	12600	12.9	12.0	14.0
JUNE	6	10556	9450	12600	12.7	12.0	14.0
JULY	6	10556	9450	12600	12.7	12.0	14.0
AUGUST	9	10196	8100	12600	13.2	12.0	15.0
SEPT	9	10196	8100	12600	13.2	12.0	15.0
OCT	10	10176	8100	12600	13.3	12.0	15.0
NOV	10	10176	8100	12600	13.3	12.0	15.0
DEC	10	10176	8100	12600	13.3	12.0	15.0
MEANS	8	10360	8775	12600	13.0	12.0	14.5

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH(m)	5.209	4.284	6.961
FLOTATION(g/m)	66.096	0.3	44.444
HANGING RATIO	0.523	0	0.605
MAX LOST (m)	3410.778	0	9450
MAX LOST (m)/SEASON/BOAT	2060.778	546	6955
MIN LOST (m)/SEASON/BOAT	3699.5		7490
PURCHASED(m)/SEASON/BOAT	16.8	15	24

C: ESTIMATED NUMBER OF BOATS				
PORT	Nobserv'd	Mean	Min	Max
NEW	3	39	35	47
PAD	2	6	6	6
MEV	1	2	2	2
OVERALL		47		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	1246	1152	1392
EFFORT IN METIER (EMETIER)	7319	6768	6057

Table 19
Catch Survey : SW Hake Gillnet *Métier* (Boat Size >15m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
SW HKE	119	9		BOATS SUR	138.41
GILL NET				BOATS ALL	813

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER												
TOTAL	HKE		LIN		HOM		DGS		POL		BIB	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4	0	0	0	0						0		
5-9	0	0	0	0						0		
10-14	0	0	0	0						0		
15-19	0	0	0	0						6		
20-24	0	0	0	0		34				29	3	6
25-29	0	0	0	0		82				19	6	29
30-34	0	0	0	0		166		4		6	30	19
35-39	1	0	0	0		99		4		6	84	6
40-44	3	0	0	0		24		5		1	81	6
45-49	1	0	0	0		2		12		0	22	1
50-54	3	0	0	0				16	2	0		
55-59	13	0	0	0				8	9	0		
60-64	14	0	0	0				11	11	0		
65-69	48	2	1	3				9	16	0		
70-74	33	1	10	0			4	6	43	0		
75-79	41	2	35	0			3	4	18	0		
80-84	68	0	29	3			6	2	36	0		
85-89	79	0	21	5			5	2	58	0		
90-94	77	0	36	3			2	2	136	0		
95-99	8	0	46	1			8		229	0		
100-104	5	0	37	0			2	1	190	0		
105-109	4	0	2	0			3		6	0		
110-114	0	0	6	0						0		
115-119	6	0	35	0						0		
120-124	0	0	29	0						0		
125-129	0	0	12	0						0		
130-134	0	0	6	0						0		
135-139	0	0	11	0						0		
140-144	0	0	29	0						0		
145-150	0	0	0	0						0		
TOTAL(No.)	404	6	335	17		407	33	86	794		226	66
%DISC(No.)		1		2		100		72				23
EST WT(Kg)	1670.0	13.6	5039.0	71.1		138.5	541.2	273.2				
%DISC(WT.)		0		0		100		34				

C; RAISED ESTIMATES : NUMBERS/ANNUM												
BOATS SUR	55919	692	46369	2353	0	56335	4568	11904	109901	0	31282	9135
BOATS ALL	328526	4066	272416	13824	0	330966	26835	69934	645668	0	183779	53670

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM												
BOATS SUR	231.2	1.9	697.5	9.8	0.0	19.2	74.9	37.8	0.0	0.0	0.0	0.0
BOATS ALL	1358.0	11.1	4097.6	57.8	0.0	112.6	440.1	222.1	0.0	0.0	0.0	0.0

Table 20
Catch Survey : Shellfish SW Hake Gillnet *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
SW HKE	119	9		BOATS SUR	15.38
				BOATS ALL	813

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER		
TOTAL LENGTH or WIDTH(cm)	CRE /CARAPACE WIDTH LANDINGS	NUMBERS DISCARDS
10-19		
20-29		
30-39		
40-49		
50-59		
60-69		
70-79		
80-89		
90-99		3
100-109		11
110-119		7
120-129		5
130-139		12
140-149		8
150-159		15
160-169		11
170-179		5
180-189		7
190-199		6
200-209		3
210-219		
220-229		
230-239		
240-249		
250-259		
TOTAL(No.)	0	93
%DISC(No.)		100
%DISC(WT.)		50

C; RAISED ESTIMATES : NUMBERS/ANNUM		
BOATS SUR	0	1430
BOATS ALL	0	75626

D; RAISED ESTIMATES : WEIGHTS (TONNES)/ANNUM		
BOATS SUR	0.00	0.77
BOATS ALL	0.00	81.32

4.4.3 Southwest Inshore Monkfish, Turbot and Ray *Métier* (Boat Sizes ≥10m, <15m)

4.4.3.1 Effort survey (Table 21)

Activity in this *métier* peaks between May and August. Boats partaking in it work out of Padstow, Hayle, Newlyn, Mevagissey, Polperro, Looe and Plymouth.

4.4.3.2 Catch survey : target species (Table 22)

With the exception of two monkfish (probably discarded because of spoilage or quality) in the 85-89cm length groups, all of the target species of monkfish, turbot and ray were landed. Thus the mesh size and soak time appears well matched to the target species.

4.4.3.3 Catch survey : non-target species (Table 22)

These consisted of brill, plaice and whiting. Only the whiting were discarded possibly due to spoilage. Whiting represent a very small proportion of the catch by weight and numbers.

4.4.3.4 Catch survey : shellfish (Table 23)

Spider crabs and brown crabs make up the majority of shellfish caught in this *métier*. The majority of the larger spider crabs are landed, but since spoilage is rarely an important factor in discarding whole crab the small amount of discarding of larger spider crabs may be market led. The majority of brown crabs are clawed; the small amount of discarding of whole crabs is probably due to insufficient demand for crab claws, or possibly problems experienced with spoilage of the severed claw onboard the vessel. Whatever the reason, the discard regime for brown crabs varies from boat to boat. Lobsters are all retained and were found to be all of 11cm carapace length or greater.

Table 21
Effort Survey : SW Inshore Monkfish, Turbot and Ray Tangle Net *Métier* (Boat Sizes >10m, <15m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	0						
FEB	0						
MAR	0						
APRIL	2	8000	4000	12000	19.5	14	30
MAY	3	7733	4000	12000	17	10	30
JUNE	3	7733	4000	12000	17	10	30
JULY	3	7733	4000	12000	17	10	30
AUGUST	3	7733	4000	12000	17	10	30
SEPT	2	9600	7200	12000	18.5	10	30
OCT	2	7200	7200	7200	12	10	14
NOV	1	7200	7200	7200	12	10	14
DEC	1	7200	7200	7200	12	10	14
MEANS	2	7792	5422	10400	15.8	10.4	24.7

B:GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	2.3	2	2.6
MEAN SOAK(HRS)	80	48	144
HANGING RATIO	0.443	0.33	0.5
FLOTATION(g/m)	0	0	0
MAX LOST (m)/SEASON/BOAT	13845	1280	22500
MIN LOST (m)/SEASON/BOAT	11145	1280	18000
PURCHASED(m)/SEASON/BOAT	15125	1280	18000

C: ESTIMATED NO OF BOATS				
PORT	Nobservd	Mean	Minimum	Maximum
PAD	1	3	3	3
BRI	1	3	3	3
PLY	1	9	9	9
OVERALL		45		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	316	279	658
EFFORT IN METIER (EMETIER)	6390	5640	13320

Table 22
Catch Survey : SW InshoreMonkfish, Turbot, Ray Tangle Net *Métier* (Boat Sizes >10m, <15m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESH mm	NSAMPLES:		RAISING FACTORS	
SW MON	225-312	7		BOATS SUR	45.08
TUR RAY INSH TNGL				BOATS ALL	912.86

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER												
TOTAL	MON		TUR		WHG		SKA		PLE		BLL	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/WINGSPAN		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4												
5-9												
10-14												
15-19												
20-24												
25-29												
30-34			1			1	3					
35-39			2			9	2					
40-44			7			6						
45-49			15			2	3		1		1	
50-54			19				1		3		2	
55-59			18				3					
60-64	1		16				6		6		2	
65-69	1		3				14		3		1	
70-74			5				13				1	
75-79	1						7					
80-84							3					
85-89	2	2					2					
90-94	2						1					
95-99	4											
100-104	1											
105-109	2											
110-114												
115-119												
120-124												
125-129	1											
130-134												
135-139												
140-144												
145-160												
TOTAL(No.)	15	2	86	0	0	18	58	0	12	0	7	0
%DISC(No.)		12		0		100		0		0		0
EST WT(Kg)	198.2	20.0	311.9			9.5	502.5		24.6		29.7	
%DISC(WT.)		9		0		100		0		0		0

C; RAISED ESTIMATES : NUMBERS/ANNUM												
BOATS SUR	676	90	3877	0	0	811	2615	0	541	0	316	0
BOATS ALL	13693	1826	78506	0	0	16431	52946	0	10954	0	6390	0

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM												
BOATS SUR	8.93	0.90	14.06	0.00	0.00	0.43	22.65	0.00	1.11	0.00	1.34	0.00
BOATS ALL	180.93	18.22	284.67	0.00	0.00	8.66	458.71	0.00	22.45	0.00	27.14	0.00

Table 23
Catch Survey : Shellfish SW Inshore Monkfish, Turbot, Ray Tangle Net *Métier* (Boat Sizes >10m, <15m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESH mm	NSAMPLES:		RAISING FACTORS	
SW MONTUR	225-312	7		BOATS SUR	45.08
RAY INS TNGL				BOATS ALL	912.86

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER						
TOTAL	CRE:CLAWED NUMBERS		SCR NUMBERS		LBD NUMBERS	
LENGTH or	/CARAPACE WIDTH		/CARAPACE LENGTH		/CARAPACE LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
10-19						
20-29						
30-39						
40-49						
50-59						
60-69						
70-79						
80-89						
90-99				2		
100-109	1			4		
110-119				16	3	
120-129	4			16	2	
130-139	32			23	2	
140-149	84		2	21		
150-159	96	5	7	3		
160-169	89	7	32			
170-179	58	10	58	8		
180-189	16	10	28		1	
190-199	21	16	29	8		
200-209	3	5	16			
210-219		4	5			
220-229		1	1		1	
230-239						
240-249						
250-259						
TOTAL(No.)	404	58	178	101	9	0
%DISC(No.)		13		36		0
EST WT(Kg)	261.8	59.8	326.9	90.2	16.5	
%DISC(WT.)		19		22		0

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	18212	2615	8024	4553	406	0
BOATS ALL	368794	52946	162489	92199	8216	0

D; RAISED ESTIMATES : WEIGHT(TONNES)/ANNUM						
BOATS SUR	12	3	15	4	1	0
BOATS ALL	369	53	162	92	8	0

4.4.4 Southwest Offshore Monkfish, Turbot and Ray Tangle Net *Métier* (Boat Sizes >15m)

4.4.4.1 Effort survey (Table 24)

Although the mesh sizes used in this *métier* are similar to those used inshore the distances steamed to the fishing grounds and quantity of net used per boat are very much larger. The season is shorter being concentrated in the period April-August. Three ports are important in this fishery - Padstow, Newlyn and Mevagissey.

4.4.4.2 Catch survey : target species (Table 25)

These results were obtained from an experimental operation to investigate the effect of soak time and mesh size on the selectivity and spoilage of fish in this gear. The gear was fished normally but it seems likely that the soak times are probably not typical.

No discards were reported for any of the target species. Comparison between the inshore and offshore fisheries show proportionately more smaller monkfish in the offshore fishery and fewer but larger turbot in the offshore fishery.

4.4.4.3 Catch survey : non-target species (Table 25)

No plaice or brill were encountered in the offshore fishery. All whitings were discarded probably reflecting high spoilage rates.

4.4.4.4 Catch survey : shellfish (Table 26)

Only brown crab, all of which were clawed, were encountered in the offshore fishery. This contrasts with the inshore fishery where spider crab and lobsters were also present in the catches.

Table 24
Effort Survey - SW Offshore Monkfish, Turbot, Ray Tangle Net *Métier* (Boat Sizes >15m)

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	0						
FEB	0						
MAR	0						
APRIL	1	90000	90000	90000	18	14	22
MAY	4	59525	7100	90000	18.75	14	25
JUNE	4	59525	7100	90000	18.75	14	25
JULY	4	59525	7100	90000	18.75	14	25
AUGUST	3	77000	51000	90000	20.33	14	25
SEPT	0						
OCT	0						
NOV	0						
DEC	0						
MEANS	3.2	69116	32460	90000	18.9	14.0	24.4

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	2.4	2.2	2.6
MEAN SOAK(HRS)	72	72	72
HANGING RATIO	0.45	0.3	0.5
FLOTATION(g/m)	0		
MAX LOST (m)/SEASON/BOAT	13800	1280	22500
MIN LOST (m)/SEASON/BOAT	11145	1280	18000
PURCHASED(m)/SEASON/BOAT	15125	1280	18000

C: ESTIMATED NO OF BOATS				
PORT	Nobservd	Mean	Minimum	Maximum
PAD	1	5	5	5
OVERALL		45		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	194	143	250
EFFORT IN METIER (EMETIER)	2724	2016	3513.6

Table 25
Catch Survey - SW Offshore Monkfish, Turbot, Ray Tangle Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	NO OF SAMPLES		RAISING FACTORS	
SW MON TUR RAY OFFS TNGLE	262-300	6		BOATS SUR	32.28
				BOATS ALL	453.98

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; %DISCARDS BY WEIGHT AND NUMBER								
TOTAL LENGTH or	MON NUMBERS/LENGTH		TUR NUMBERS/LENGTH		SKA NUMBERS/WINGSPAN		WHG NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14								
15-19								
20-24								2
25-29								
30-34								1
35-39	2							
40-44	3				9			1
45-49	4				19			1
50-54	9				12			2
55-59	6				5			7
60-64	2				1			6
65-69			2					3
70-74			2					2
75-79			1					4
80-84			1					1
85-89			1					
90-94								
95-99								
100-104								
105-109								
110-114			1					
115-119								
120-124								
125-129								
130-134								
135-139								
140-144								
145-150								
TOTAL(No.)	25	0	8	0	46	0	0	30
%DISC(No.)		0		0		0		100
EST WT(Kg)	51.7		109.1		146.4			60.1
%DISC(WT.)		0		0		0		100

C; RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR	807	0	258	0	1485	0	0	968
BOATS ALL	11350	0	3632	0	20883	0	0	13620

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM								
BOATS SUR	2	0	4	0	5	0	0	2
BOATS ALL	23	0	50	0	66	0	0	27

Table 26
Catch Survey - SW Offshore Monkfish, Turbot, Ray Tangle Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS				
METIER	MESHmm	NSAMPLES	RAISING FACTORS	
SW_MON TUR	262-300	6	BOATS SUR	32.28
RAY TNGL			BOATS ALL	453.98

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER		
TOTAL	CRE	CARAPACE
LENGTH or	WIDTH/NUMBERS	
WIDTH	LANDINGS	DISCARDS
10-19		
30-39		
40-49		
50-59		
60-69		
70-79		
80-89		
90-99		
100-109		
110-119	1	
120-129		
130-139		
140-149	3	
150-159	2	
160-169	22	
170-179	29	
180-189	29	
190-199	16	
200-209	3	
210-219	3	
220-229		
230-239		
240-249		
250-259		
TOTAL(No.)	108	0
%DISC(No.)		0
EST.WT(Kg)	99	
%DISC(WT.)		

C; RAISED ESTIMATES : NUMBERS/ANNUM		
BOATS SUR	3.49	0.00
BOATS ALL	49.03	0.00

D; RAISED ESTIMATES : WEIGHTS(TONNES)/ANNUM			
BOATS SUR	3.20	0.00	
BOATS ALL	44.94	0.00	

4.4.5 Southwest Crawfish, Lobster and Monkfish Tangle Net *Métier* (Boat Size ≥10m)

4.4.5.1 Effort survey (Table 27)

This *métier* occurs during the 6 months between April and September on hard rocky ground approximately 10-15Nm southwest of Newlyn. Considerable lengths of netting are used; 13,000m per boat and the soak times are long at up to 7 days. Six boats are active in this fishery, all from Newlyn.

4.4.5.2 Catch survey : target species (Tables 28 and 29)

The sample examined is numerically very small so may not be representative. However, it does show that some discarding of crawfish does occur possibly because of spoilage or condition of the animals. Very small numbers of lobsters and monkfish were caught and only two lobster (undersized) and one monkfish were reported as discards.

4.4.5.3 Catch survey : non-target species and other shellfish (Tables 28 and 29)

Brown crabs were the highest catches by weight and numbers. All of these were clawed with no discards. Other species caught included brill and turbot in very small numbers.

Table 27
Effort Survey : SW Crawfish, Lobster and Monkfish Tangle Net *Métier* (Boat Sizes ≥10m)

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	0						
FEB	0						
MAR	0						
APRIL	1	12600	12600	12600	30	30	30
MAY	1	12600	12600	12600	30	30	30
JUNE	1	12600	12600	12600	30	30	30
JULY	1	12600	12600	12600	30	30	30
AUGUST	1	12600	12600	12600	30	30	30
SEPT	1	12600	12600	12600	30	30	30
OCT	0						
NOV	0						
DEC	0						
MEANS	1	12600	12600	12600	30	30	30

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (M)	N/A		
MEAN SOAK(HRS)	168	168	168
HANGING RATIO	0.5	0.5	0.5
FLOTATION(G/M)	0	0	0
MAX LOST (m)/SEASON/BOAT	9000	9000	9000
MIN LOST (m)/SEASON/BOAT	6300	6300	6300
PURCHASED(m)/SEASON/BOAT	12600	12600	12600

C: ESTIMATED NUMBER OF BOATS				
PORT	Nobservd	Mean	Min	Max
NEW	1	3	3	3
OVERALL		6		

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	180	180	180
EFFORT IN METIER (EMETIER)	1080		

Table 28
Catch Survey : Shellfish SW Crawfish, Lobster and Monkfish Tangle Net *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER:	MESHmm	NSAMPLES:		RAISING FACTORS	
SW CRW	300	1		BOATS SUR	180
TNGL				BOATS ALL	1080

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER						
TOTAL	CRW	NUMBERS	LBD	NUMBERS	CRE	NUMBERS
LENGTH or	/CARAPACE LENGTH		/CARAPACE LENGTH		/CARAPACE WIDTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
10-19						
20-29				2		
30-39						
40-49						
50-59						
60-69						
70-79						
80-89			1			
90-99						
100-109	3					
110-119	3					
120-129	1	1				
130-139	2	2	6			
140-149	5	1			14	
150-159	3		1		16	
160-169					19	
170-179					20	
180-189					17	
190-199					5	
200-209					3	
210-219					3	
220-229					4	
230-239						
240-249						
250-259						
TOTAL(No.)	17	4	8	2	101	0
%DISC(No.)		19		20		0
EST WT(Kg)	25.1	6.7	10.2		84.5	
%DISC(WT.)		21		0		0

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	3060	720	1440	360	18180	0
BOATS ALL	18360	4320	8640	2160	109080	0

D; RAISED ESTIMATES : WEIGHTS (TONNES)/ANNUM						
BOATS SUR	5	1	2	0	15	0
BOATS ALL	27	7	11	0	91	0

Table 29
Catch Survey : Finfish SW Crawfish Tangle Net *Métier* (Boat Sizes >10m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	No OF SAMPLES		RAISING FACTORS	
SW CRW	300	1		BOATS SUR	180
TNGL				BOATS ALL	1080

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER						
TOTAL LENGTH or WIDTH(cm)	MON NUMBERS/LENGTH		BLL NUMBERS/LENGTH		TUR NUMBERS/LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4						
5-9						
10-14						
15-19						
20-24						
25-29						
30-34						
35-39						
40-44						
45-49					2	
50-54						
55-59	2		2		1	
60-64						
65-69	3					
70-74						
75-79						
80-84						
85-89						
90-94	1					
95-99	1	1				
100-104						
105-109						
110-114						
115-119						
120-124						
125-129						
130-134						
135-139						
140-144						
145-150						
TOTAL(No.)	7	1	2		3	
%DISC(No.)		13				
EST WT(Kg)	44.9	13.8	7.0		7.9	
%DISC(WT.)		24				

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	1260	180	360	0	540	0
BOATS ALL	7560	1080	2160	0	3240	0

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM						
BOATS SUR	8	2	1	0	1	0
BOATS ALL	49	15	8	0	9	0

4.4.6 Southwest Inshore/Offshore Pollack, Cod, Ling Gill Wreck Net *Métiers* (Boat Sizes ≥10m, <15m and ≥15m)

4.4.6.1 Effort survey (Tables 30 and 31)

These *métiers* are prosecuted on wrecks and rough ground and can be fished all the year round. However, their highest effort occurs during the period January until April with some boats switching from the hake *métier*. This is attributed to a drop in the price for hake, making the cod, ling and pollack more attractive. A low availability of fish on the wrecks during the summer months makes other *métiers* more attractive.

Effort information on the inshore fishery is sparse so that it is difficult to elucidate whether there are real differences in fishing patterns between the inshore and offshore fisheries. Both *métiers* use relatively short (300m) fleets of net and one fleet is generally used per wreck. The mesh size and material type, 150mm monofilament, is used both inshore and offshore and therefore some comparisons can be made.

4.4.6.2 Catch survey : target species (Tables 32 and 33)

Taking both *métiers* together the only discards were a few cod below the minimum landing size in the inshore fishery. Given that both *métiers* use the same mesh sizes differences in the length frequency distributions could be attributed to differences in the available fish. The most striking difference is the absence of ling in the inshore *métier*; maybe this species are more prevalent on the deeper wrecks. The cod appear to be smaller and the pollack larger in the inshore fishery, though the sample size from the inshore fishery may not be representative.

4.4.6.3 Catch survey : non-target species and shellfish

No non-target species or shellfish were recorded from this sample. This is a common feature with the sample from the Southeast cod gill wreck net *métier*.

4.4.6.4 Catch survey : hake nets fished on wrecks (Table 34)

Table 34 presents the results obtained from hake nets (119mm mesh) fished on wrecks. These results were obtained for three days of fishing using hake nets on wrecks; this was due to there being a lack of hake on the hake grounds. It is unknown what proportion of hake nets are used in this way; generally, only old nets are used since nets are likely to be damaged by this practice.

Table 30
Effort Survey : SW Inshore Pollock, Cod and Ling (Boat LOA >10m, <15m)

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	1	1440	1440	1440	15	14	16
FEB	1	1440	1440	1440	15	14	16
MAR	1	1440	1440	1440	15	14	16
APRIL	0						
MAY	0						
JUNE	1	1440	1440	1440	15	14	16
JULY	1	1440	1440	1440	15	14	16
AUGUST	1	1440	1440	1440	15	14	16
SEPT	1	1440	1440	1440	15	14	16
OCT	1	1440	1440	1440	15	14	16
NOV	1	1440	1440	1440	15	14	16
DEC	1	1440	1440	1440	15	14	16
MEANS	1	1440	1440	1440	15	14	16

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	3.9	3.9	3.9
MEAN SOAK(HRS)	23	23	23
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	29.1	29.1	29.1
MAX LOST (m)/SEASON/BOAT	3600	3600	3600
MIN LOST (m)/SEASON/BOAT	3600	3600	3600
PURCHASED(m)/SEASON/BOAT	10800	10800	10800

C: ESTIMATED NO OF BOATS	Nobservd	Mean	Min	Max
OVERALL	14			

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	150	140	160
EFFORT IN METIER (EMETIER)	2100	1960	2240

Table 31
Effort Survey : SW Offshore Pollock, Cod and Ling Gill Wreck Net *Métiers* (Boat Sizes >15m)

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	7	3669	900	8100	12.33	8	16
FEB	7	3669	900	8100	12.33	8	16
MAR	6	3830	900	8100	12.4	8	16
APRIL	5	3984	900	8100	13.25	10	19
MAY	1	2700	2700	2700	10	10	10
JUNE	2	2070	1440	2700	12.5	10	16
JULY	2	2070	1440	2700	12.5	10	16
AUGUST	2	2070	1440	2700	12.5	10	16
SEPT	2	2070	1440	2700	12.5	10	16
OCT	3	1680	900	2700	12.5	10	16
NOV	4	2070	900	3240	11	8	16
DEC	4	2070	900	3240	11	8	16
MEANS	3.75	2662.67	1230.00	4590.00	12.07	9.17	15.42

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	5	3.9	6.3
MEAN SOAK(HRS)	17.3	8	24
HANGING RATIO	0.52	0.5	0.65
FLOTATION(g/m)	50	29.1	92.9
MAX LOST (m)/SEASON/BOAT	1520	1080	3600
MIN LOST (m)/SEASON/BOAT	1370	810	3600
PURCHASED(m)/SEASON/BOAT	5060	2715	12960

C: ESTIMATED NO OF BOATS				
PORT	Nobserv'd	Mean	Min	Max
OVERALL	24			

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	543	413	694
EFFORT IN METIER (EMETIER)	3475	2640	4440

Table 32
Catch Survey : SW Inshore Pollock, Cod and Ling *Métier* (Boat Sizes >10m, <15m)

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	No OF SAMPLES		RAISING FACTORS	
SW POL COD	150	1		BOATS SUR	160
LIN INS WRK				BOATS ALL	2100

B; LENGTH/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER				
TOTAL LENGTH or WIDTH(cm)	COD NUMBERS/LENGTH		POL NUMBERS/LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4				
5-9				
10-14				
15-19				
20-24		1		
25-29		5		
30-34		2		
35-39				
40-44	2			
45-49	4			
50-54	1			
55-59	2			
60-64	3			
65-69	7			
70-74	8			
75-79	3			
80-84			8	
85-89			4	
90-94			11	
95-99			21	
100-104			24	
105-109				
110-114				
115-119				
120-124				
125-129				
130-134				
135-139				
140-144				
145-150				
TOTAL(No.)	30	8	68	0
%DISC(No.)		21		0
EST WT(Kg)	89.4	2.1	*	
%DISC(WT.)		2		

* Length/weight relationship not available for POL

C; RAISED ESTIMATES : NUMBERS/ANNUM				
BOATS SUR	4500	1200	10200	0
BOATS ALL	63000	16800	142800	0

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM				
BOATS SUR	13	0	#VALUE!	0
BOATS ALL	188	4	#VALUE!	0

Table 33
Catch Survey : SW Offshore Cod, Pollock and Ling *Métier*

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS					
METIER	MESHmm	No OF SAMPLES		RAISING FACTORS	
SW POL COD	150	6		BOATS SUR	91
LIN OFF WRK				BOATS ALL	579.24

B; LENGTH/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER						
TOTAL	COD		LIN		POL	
LENGTH or	NUMBERS/LENGTH		NUMBERS/LENGTH		NUMBERS/LENGTH	
WIDTH(cm)	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4						
5-9						
10-14						
15-19						
20-24						
25-29						
30-34						
35-39						
40-44						
45-49						
50-54					2	
55-59	10				25	
60-64	26				57	
65-69	52				91	
70-74	54				153	
75-79	45				134	
80-84	32		1		143	
85-89	12		24		81	
90-94	5		32		51	
95-99			85		11	
100-104			137			
105-109			78			
110-114			50			
115-119			33			
120-124			17			
125-129						
130-134						
135-139						
140-144						
145-150						
TOTAL(No.)	236	0	457	0	748	0
%DISC(No.)		0		0		0
EST WT(Kg)	1001.4		3914.2		*	
%DISC(WT.)		0		0		0

* Length/weight relationship not available for POL

C; RAISED ESTIMATES : NUMBERS/ANNUM						
BOATS SUR	21359	0	41361	0	67699	0
BOATS ALL	136701	0	264713	0	433272	0

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM						
BOATS SUR	91	0	354	0		0
BOATS ALL	580	0	2267	0		0

Table 34
Catch Survey : SW Hake Gillnet *Métier* Set on Wrecks

A; METIER, MESH SIZE, NO OF SAMPLES AND RAISING FACTORS				
METIER:	MESHmm	NSAMPLES:	RAISING FACTORS	
SW HKE GNF (WRECK)	119	3	BOATS SUR	N/A
			BOATS ALL	N/A

B; SIZE/FREQUENCY DISTRIBUTIONS OF LANDINGS AND DISCARDS BY SPECIES; % DISCARDS BY WEIGHT AND NUMBER								
TOTAL LENGTH or WIDTH(cm)	HKE NUMBERS/LENGTH		LIN NUMBERS/LENGTH		POL NUMBERS/LENGTH		BIB NUMBERS/LENGTH	
	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS	LANDINGS	DISCARDS
0-4								
5-9								
10-14								
15-19								
20-24								
25-29								
30-34							24	
35-39							19	
40-44								
45-49								
50-54								
55-59								
60-64					6			
65-69			3	3	1			
70-74	7		7		4			
75-79	3		11		9			
80-84	16		23	5	67			
85-89	21		29	5	31			
90-94	74		55	3	108			
95-99	64		130	1	36			
100-104	3		153					
105-109			93					
110-114			31					
115-119			37					
120-124			7					
125-129								
130-134								
135-139								
140-144								
145-150								
TOTAL(No.)	188		569	17	262		43	0
%DISC(No.)				2				
EST WT(Kg)	1073		4470	71				
%DISC(WT.)		0		0				

C; RAISED ESTIMATES : NUMBERS/ANNUM								
BOATS SUR								
BOATS ALL								

D; RAISED ESTIMATES; WEIGHT(TONNES)/ANNUM								
BOATS SUR								
BOATS ALL								

5. General Discussion

5.1 *Métier* Definition

Although the survey did not collect precise information on the locations of effort and catches, there is evidence that the Northeast and Southeast *métiers* tend to be localised in these areas (Figures 4 & 7) within 50 miles from port. Although the Southwest *métiers* range more widely from their home port (Figure 9), they tend to steam westward to the southwest approaches rather than eastward up the channel. Thus with the possible exception of the wreck netters it is unlikely that vessels from the different regions would be found fishing on the same fishing grounds.

This justifies treating the data by region; the suite of *métiers* in each region can be seen as discreet in geographical terms. However, in the case of migrating stocks they may not be discreet in terms of the resource base.

In future surveys splitting the *métiers* further into locations fished might be justified because grounds within regions are likely to produce different profiles of catch composition. However, classification of *métiers* by vessel size proved a less relevant characteristic. It is probably only justified if larger vessels are carrying more gear or there is a significant difference in the grounds fished.

As far as mesh size and gear type are concerned the *métiers* sampled mostly had a narrow range of mesh sizes and the gear descriptions were well defined. Thus there seems little justification in splitting the *métiers* into further gear types, although future studies would have to be aware of any local changes in gear type.

5.2 Sampling Strategy

Division of the fleet into the thirteen *métiers* proved a useful tool in the design of sampling strategy. Ideally each *métier* would be sampled in proportion to the effort exerted in that métier.

Practical difficulties, however, made this impossible. Chance factors played a large part in being in the right place at the right time to get onto a vessel and to meet the skippers in the first place.

A positive aspect of the study was the good cooperation with fishermen received by the Seafish staff in being able to board boats and stay for whole fishing trips. On the other hand, since some skippers would not allow sampling there is inevitably bias in these samples. Also none of the vessels sampled or questioned in the effort survey was fishing part-time so no information is available in this study on this section of the fleet.

5.3 Effort Assessment

The assessments of effort in each *métier* were made by simply raising the number of days per month which the fishermen considered that they fished by the number of boats partaking in that *métier.*

This may result in an overestimate for two reasons:

i. The respondents to the questionnaire are likely to state the maximum number of days per month which they would like to fish rather than the actual number of days with allowance for bad weather.

ii. The respondents may state that they fished all the year round for hake for example, but also pursue in other activities at some time during the year; for example the wreck net *métier*. Although it is possible to fish two *métiers* at the same time in static net fishing, this was not investigated. It seems more likely that the boats switch completely from one activity to another. This was not allowed for in the effort estimates. The proportion of effort in each *métier* would be expected to vary between years due to changes in market conditions and fish availability.

The implications of the above effects are that effort and hence catch are likely to be overestimated by this method of raising effort estimates.

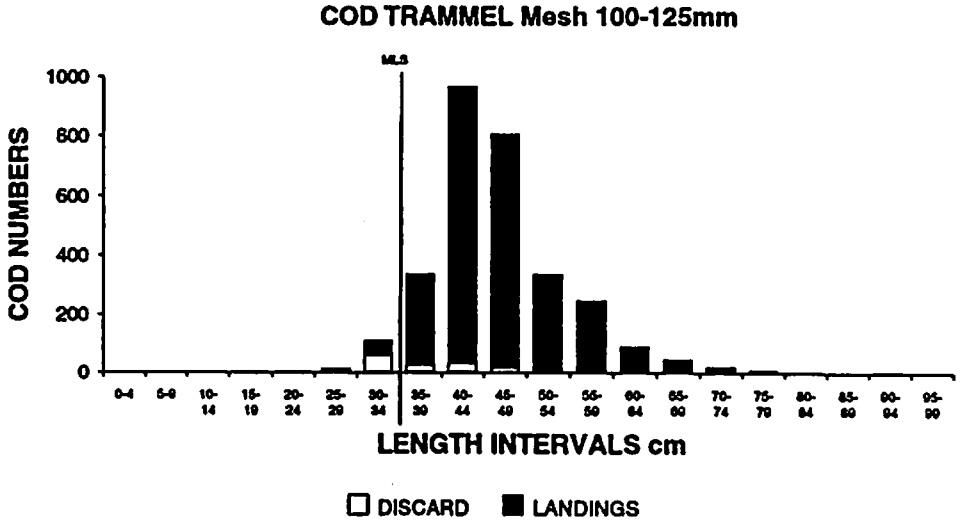
It is probably best to consider these estimates as describing potential effort and the raised estimates as potential levels of catch. Actual effort and catch would vary from year to year between *métiers*.

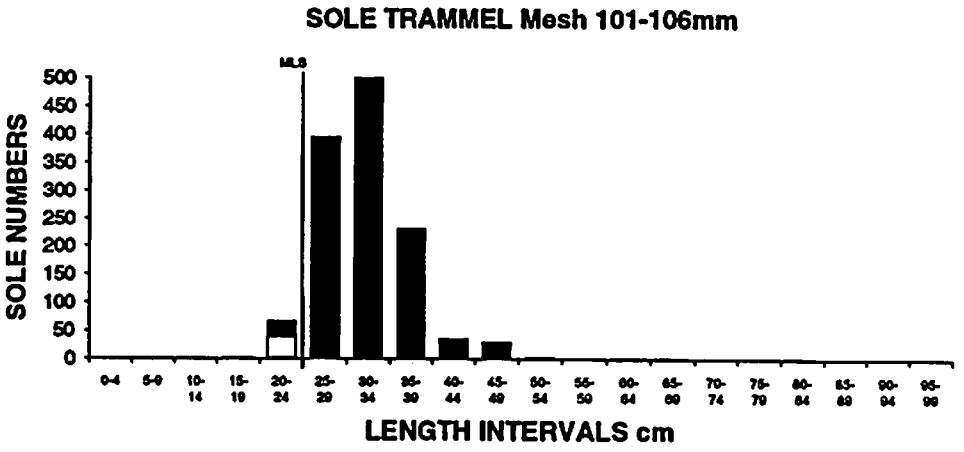
5.4 Selectivity of Static Nets

The length frequency distributions for the target species as defined by the métier's description are shown in Figures 10-17.

In all cases the length frequencies of the catches of the target species indicated that the mesh size of static nets was well matched to the size of fish targeted. The peak catches in the length frequency distributions usually corresponded to fish lengths substantially greater than the MLS. This suggests that the choice of mesh size is made to target larger fish in the population than those immediately above the MLS. This illustrates the ability of static net fishermen to be able to target the required length distribution of fish in their target species by correct adjustment of mesh size and therefore reduce the percentage of fish discarded due to being below the size required.

In this context it is worth comparing the mesh sizes revealed from the effort survey with the mesh sizes for these species suggested in the proposed EC Council Regulation (10991/94 COM(94)481 final) on mesh sizes (see Table 35 on page 73).





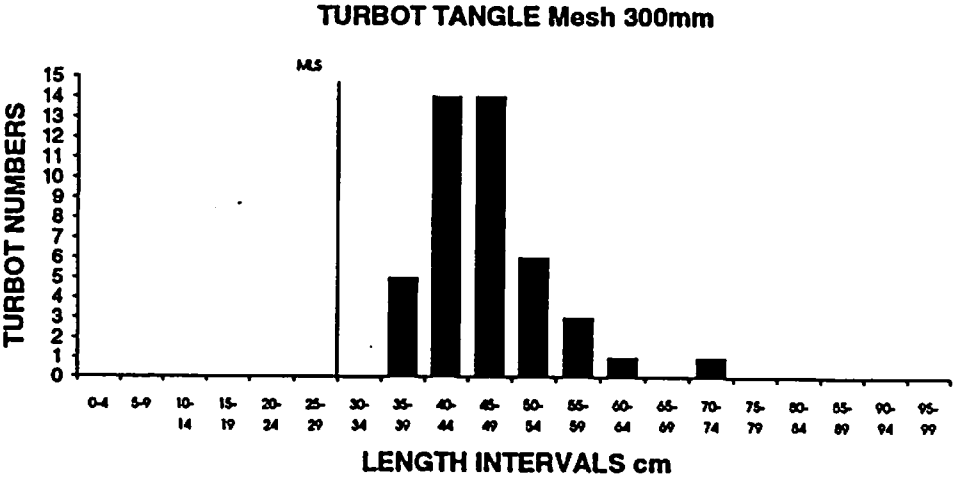


Figure 10 - Catch Survey: NE *Métiers* Length Frequency Distributions of Target Species

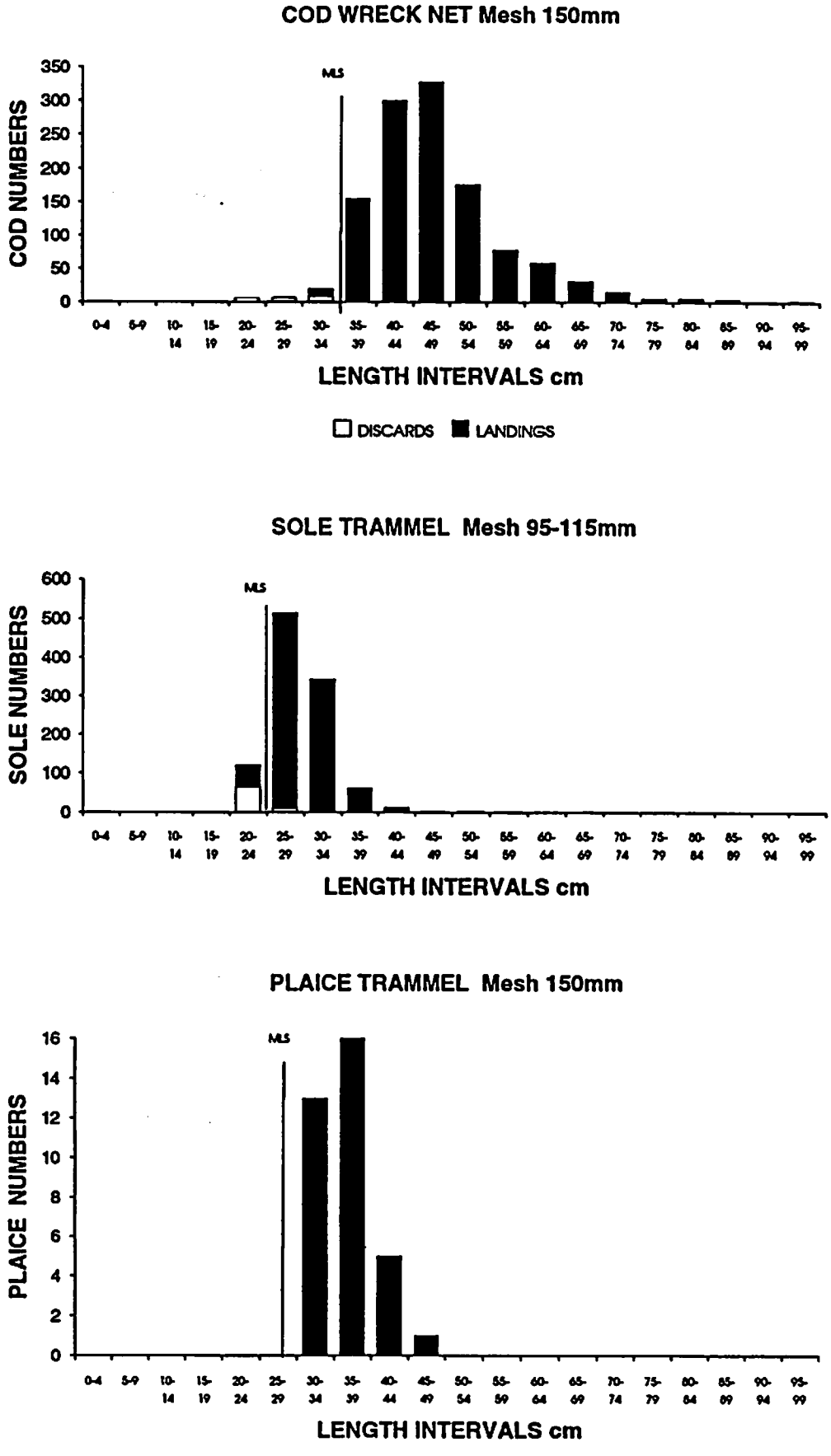


Figure 11 - Catch Survey: SE *Métiers* Length Frequency Distributions of Target Species

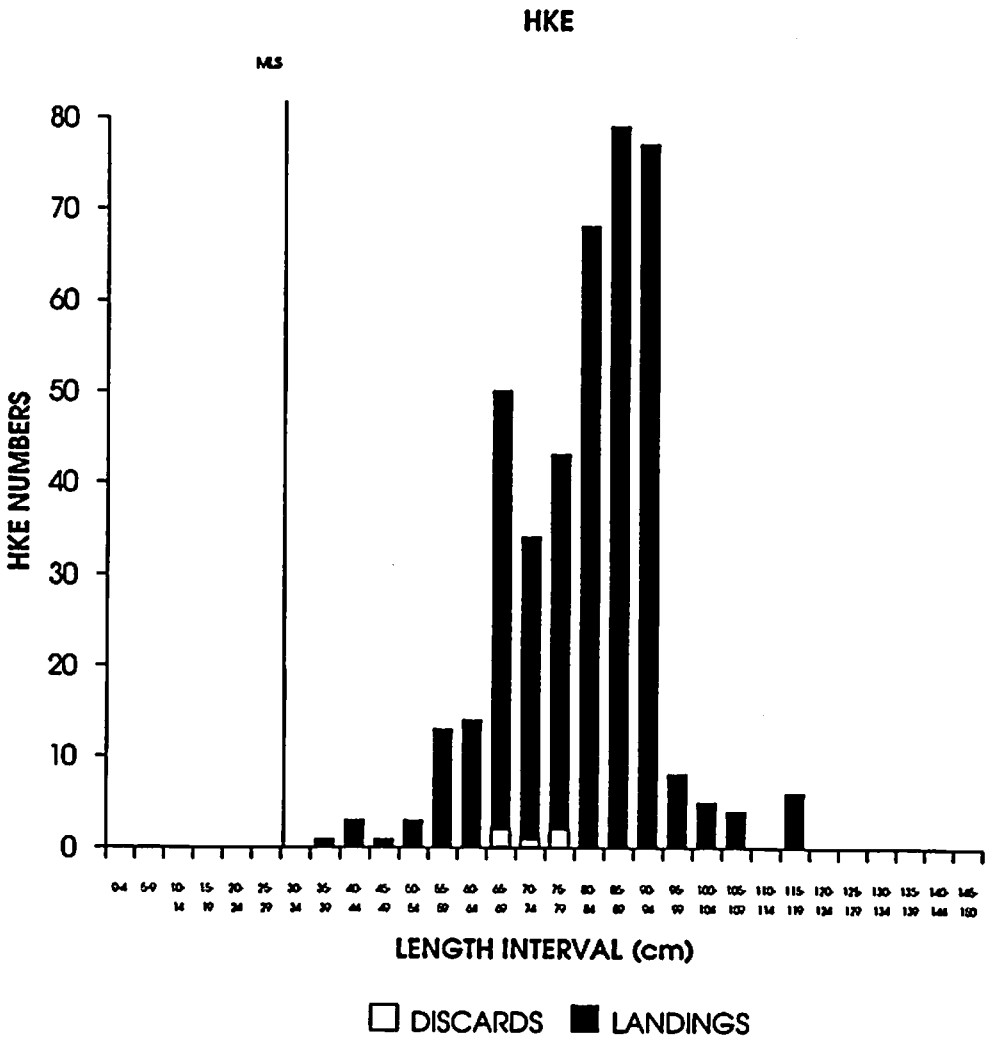


Figure 12 - Catch Survey: Length Frequency Distribution of Target Species in SW Gillnet Hake *Métier.* Mesh 119mm

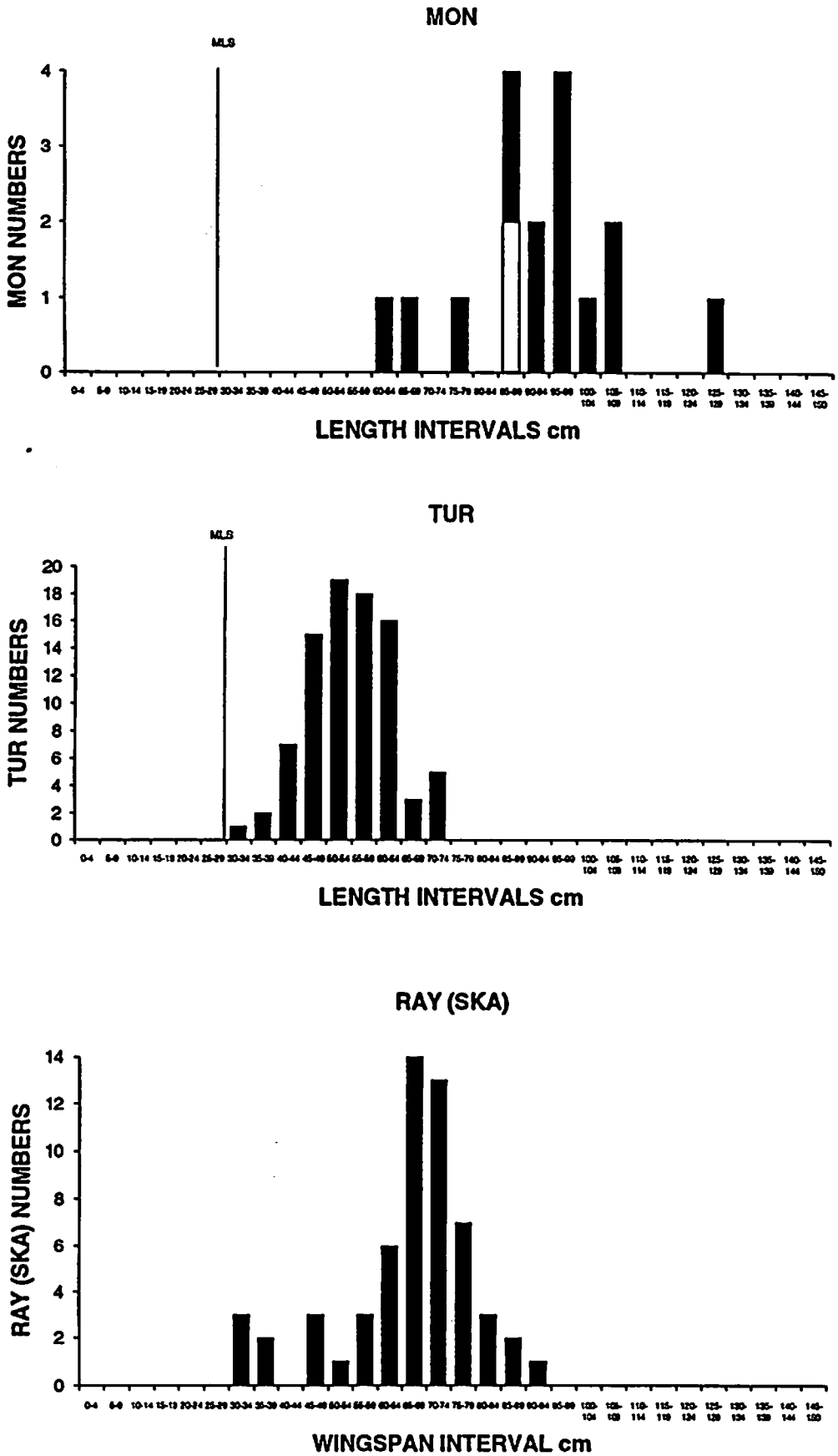


Figure 13 - Catch Survey: Length Frequency Distribution of Target species in the Inshore Monk, Turbot, Ray Tangle Net *Metier*, Mesh 225-312mm

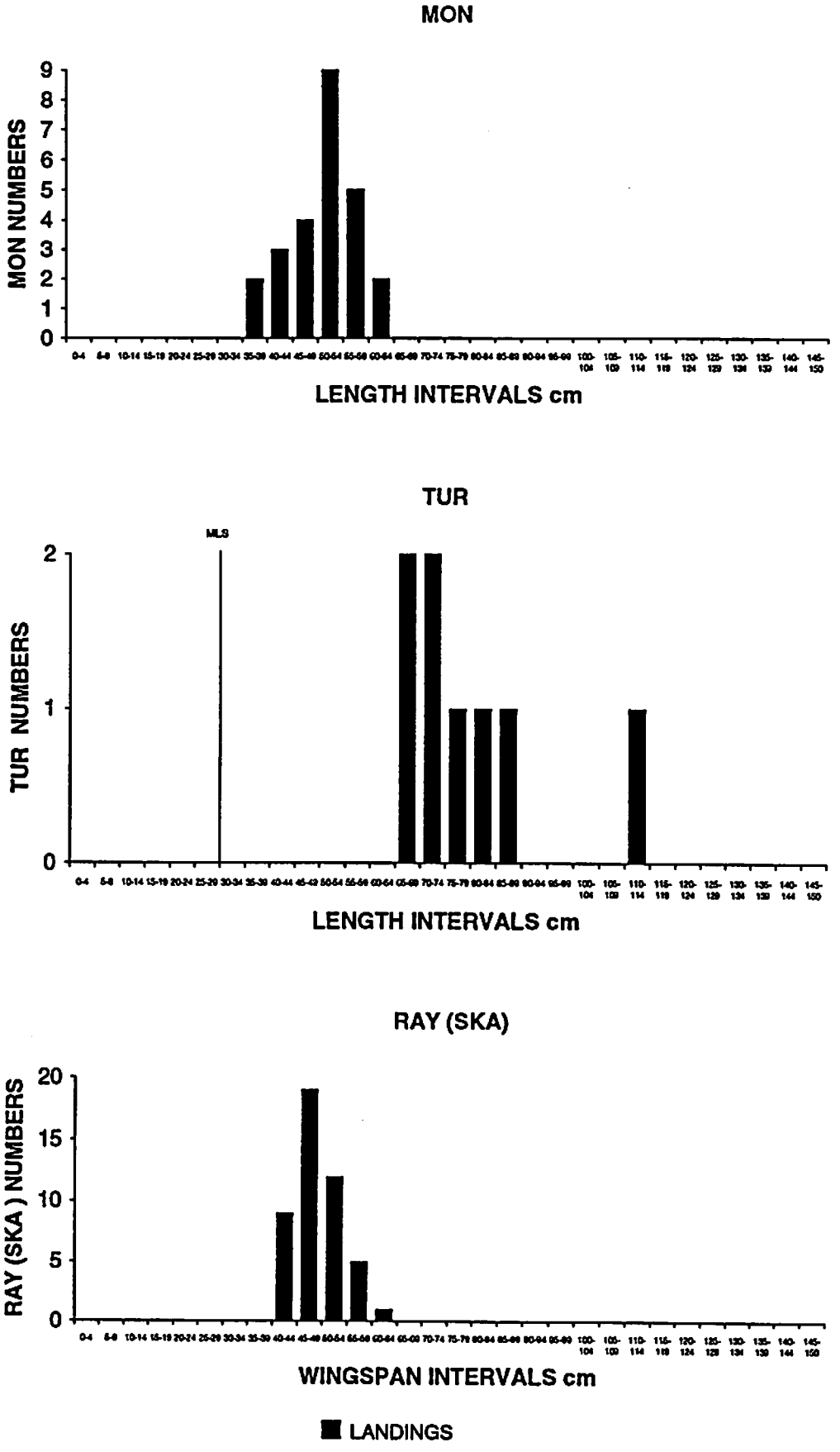


Figure 14 - Catch Survey: Length Frequency Distribution of Target Species in the SW Offshore Monkfish, Turbot, Ray *Métier*: Mesh 262-300mm

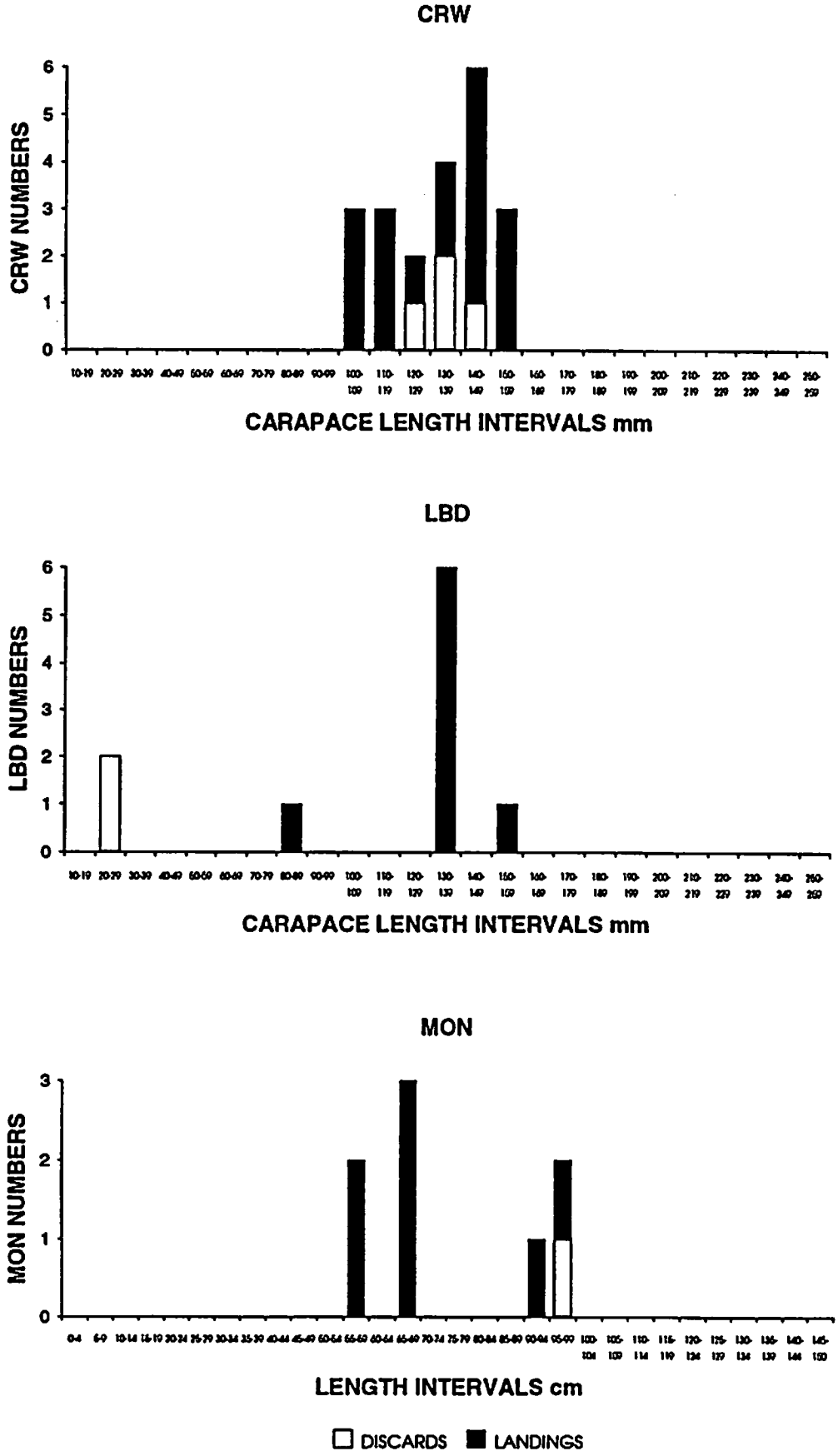


Figure 15 - Catch Survey: Crawfish, Lobster, Monkfish Tangle Net *Métier:* Length Frequency Distributions for Target Species: Mesh 300mm

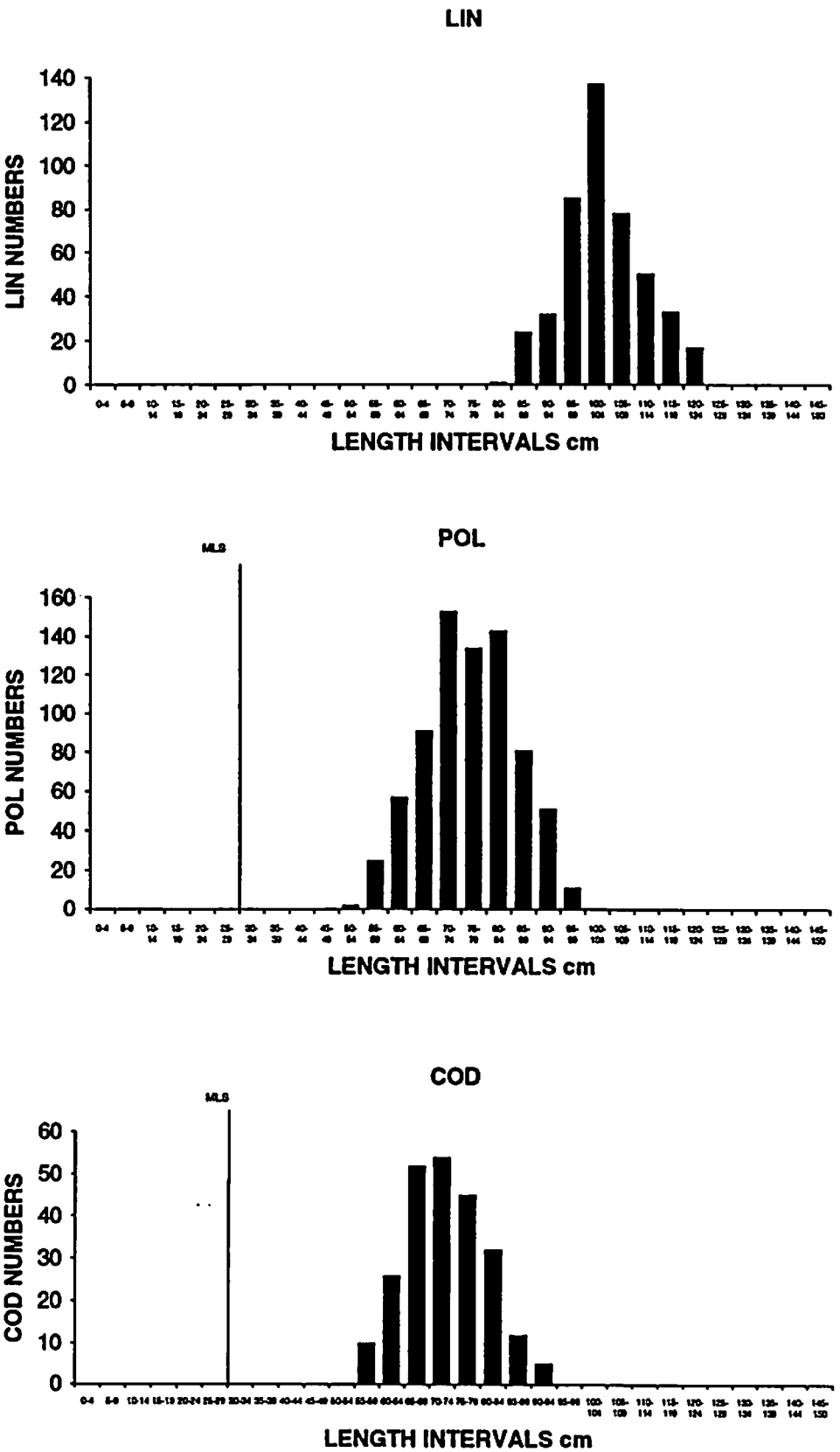


Figure 16 - Catch Survey: Length Frequency Distribution of Target Species in the Ling, Pollock, Cod Offshore *Métier*: Mesh 150mm

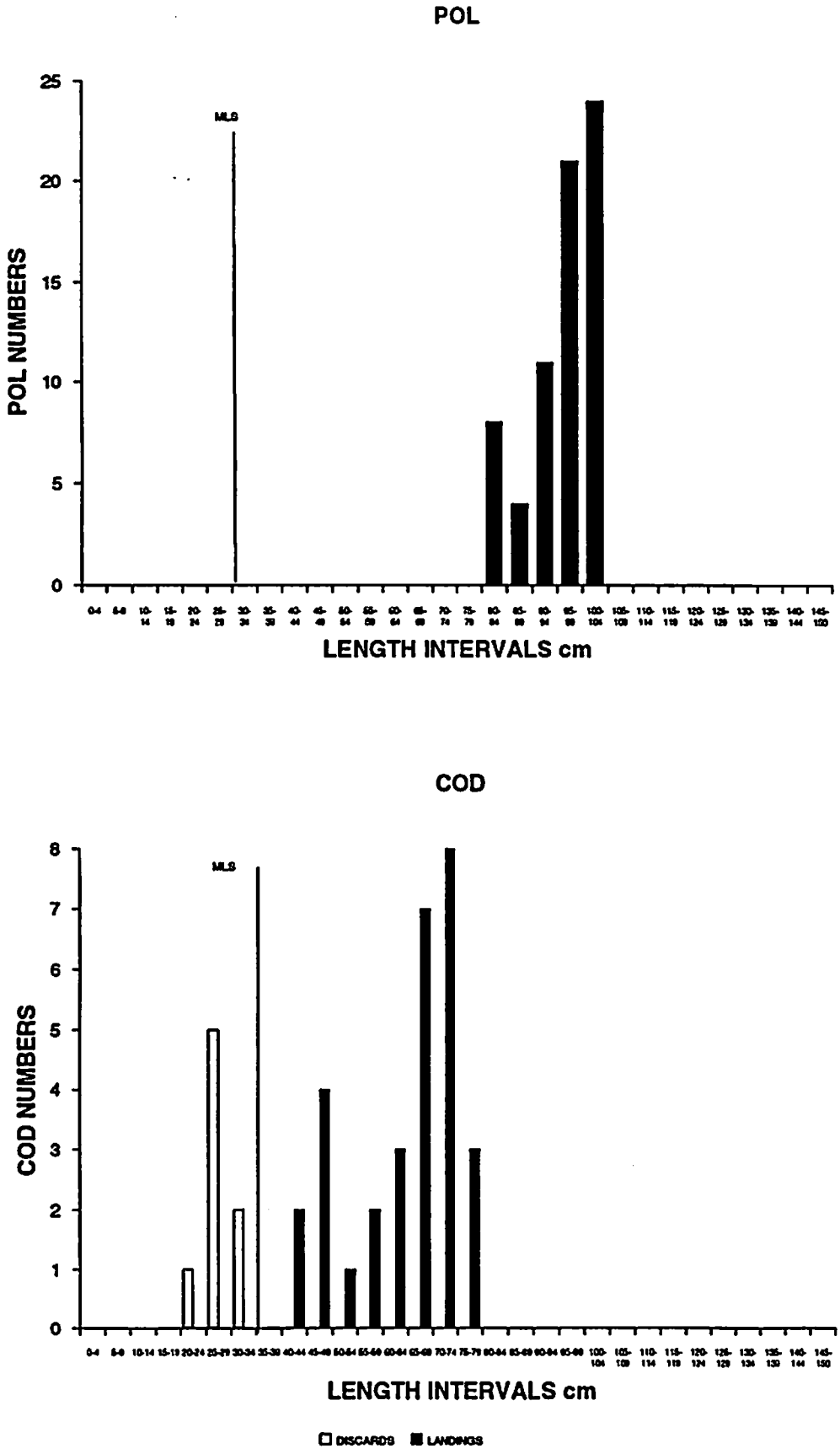


Figure 17 - Catch Survey: Length frequency distribution of target species Ling, Pollock, Cod Inshore Wreck Net Metier: Mesh 150mm

Table 35
Mesh Sizes Under Proposed EC Council Regulation Compared with the Results from this Study

	Mesh Size in Survey		
Métier	Catch Survey	Effort Survey	Proposed EC Council Regulation
NECOD	100-125	91-120	115-205
SECOD	150	131-140	115-205
SW COD/POL/LIN	150	141-160	115-205
SWHKE	119	111-160	115-205
NETUR	300	241-300	>210
SW MON/TUR/RAY	225-312	231-310	>210
NESOLE	100-106	111-120	80-110
SESOLE	95-115	80-100	80-110
SEPLE	150	161-200	115-205

These data indicate that, with the exception perhaps of the NE Cod *métier*, the mesh sizes used in these *métiers* coincide well with those proposed by the EC. Although the NE Cod *métier* was an exception, the smallest mesh size (100mm) used in this study did not catch large numbers of undersized fish and the peak catches of cod were between 35 and 59cm in length for all mesh sizes (Figure 5) and Table 3.

5.5 Discarding Due to Spoilage

Although some non-target species suffer spoilage due to long soak times, for example whiting in the monkfish, turbot and ray *métier*, this is rarely a problem with the target species. There is some evidence that a longer soak time had a higher discard rate due to spoilage; compare the cod data for the northeast and southeast cod *métiers*. However, this was only found to add small amounts of discards to already low discard rates and was not consistent between *métiers*. For example, compare the discard rate (0%) for cod in the NE Turbot *métier* which has a 3 day soak time with the NE Cod *métier* which has a discard rate of 2.8% of fish above MLS and a soak time of 1 day. Perhaps ground type also has an influence.

5.6 Comparison of Raised Estimates of Catch by *Métier*

Figures 18, 19 and 20 show the overall estimates for weights of catches, discards and landings by region, *métier* and species. These are all extracted from the catch and effort survey tables.

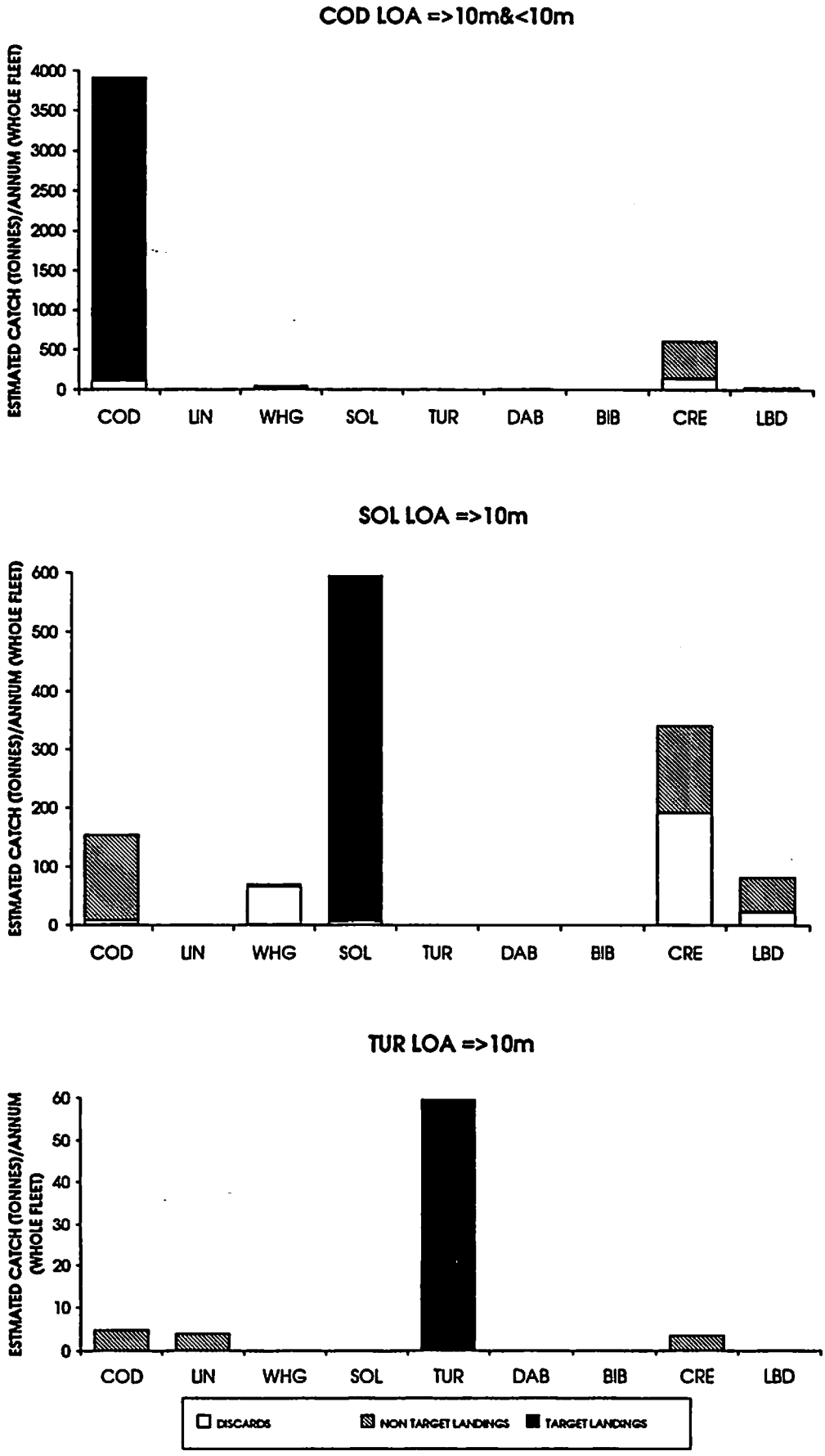


Figure 18 - Catch and Effort Surveys: NE *métiers* estimated annual catch by species in tonnes/annum

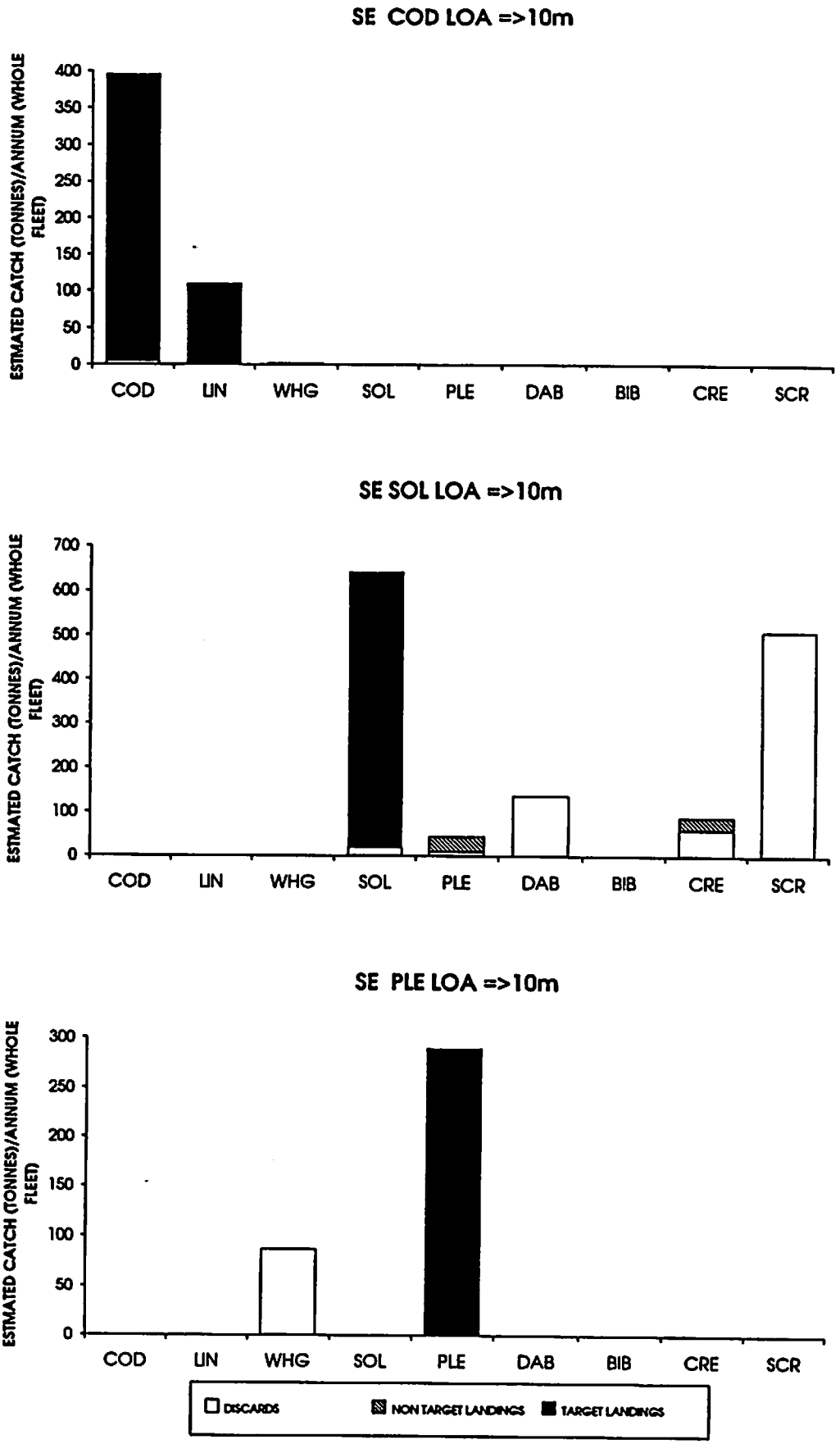


Figure 19 - Catch and Effort Survey: SE *métiers* estimated annual catch in tonnes/annum

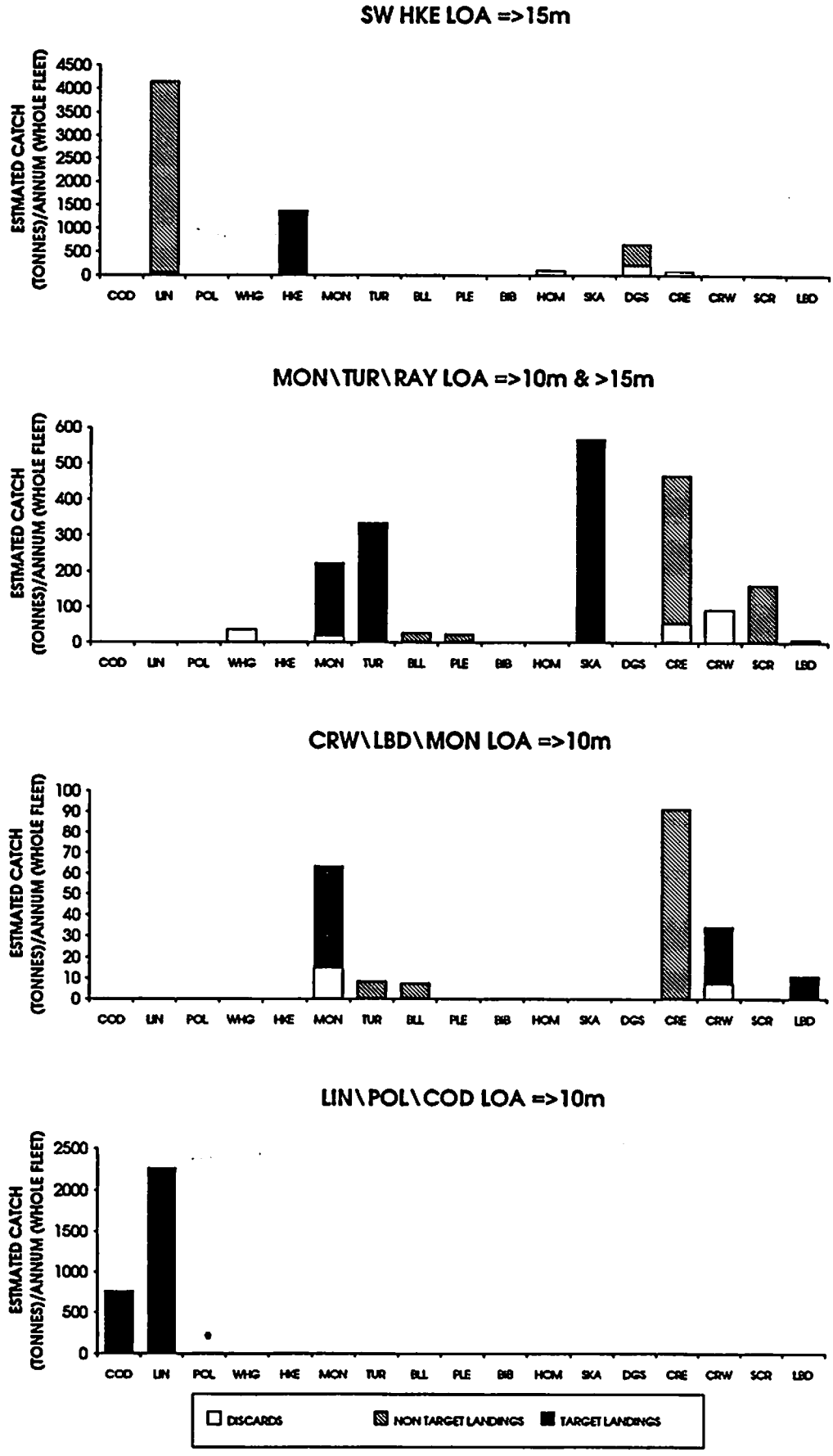


Figure 20 - Catch and Effort Surveys: SW *métiers* estimated annual catch by species in tonnes/annum

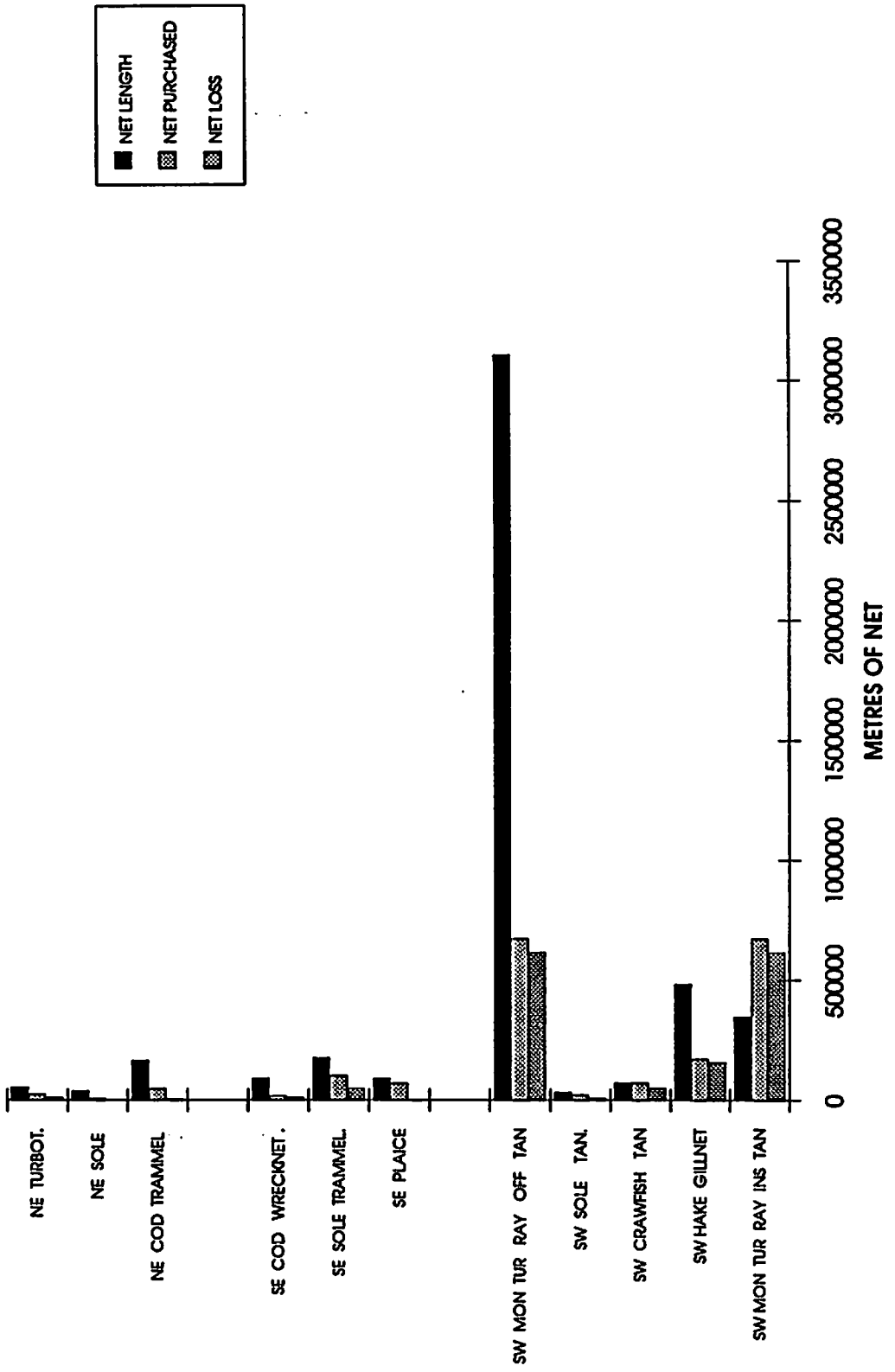


Figure 21 - Estimated total length of net, net lost and net purchased by metier.

It must be understood that because of the dynamic nature of effort, the resource availability within and between these *métiers,* the limited amount of sampling undertaken and possible bias in the effort assessment discussed in Section 5.3, these results must be interpreted with some caution. However, some inferences may be drawn.

Overall all the *métiers* show good selectivity of the target species. The levels of discards of the target species are in all cases very low. With respect to non-target species, only very few exhibit a 100% discard rate and this may be due to a lack of demand for the species concerned although spoilage may be a factor in some species. In terms of total quantities, the overall catches and landings of non-target species may be compared with reported landings for these species.

5.7 Comparison with MAFF Reported Statistics

In order to compare the effort and landings estimates made in this study with those reported to MAFF, extractions were made by DFR Lowestoft from the MAFF fisheries statistics database. Extractions were obtained of effort in days fishing and reported landings for the period from 1st October 1992 to 30th September 1993. Table 36 describes the parameters of the extractions.

Table 36
Parameters of extractions of reported set net effort and landings from MAFF Fisheries Statistics Database

Region	Ports	Gear	ICES Rectangles
NORTH EAST	All ports Hornsea, Newbiggin	Set Nets	36FO, 37E9, 37FO 38E8, 38E9, 39E7 36E9, 39E9, 40E9
SOUTH EAST	All ports Newhaven, Margate	Set Nets	30F1, 30F0, 31F1
SOUTH WEST	All ports Brixham, Padstow	Set Nets	All rectangles

Tables 37-40 compare the estimates of effort and landings made in this study and those obtained from the MAFF database. These tables show very poor correspondence between the reported effort and landings and the estimates made in this study. In all cases the estimates for effort exceed the overall effort reported in the set net fisheries by a factor of 2-3 for effort and by a much larger margin for landings. Some overestimates of the effort was expected since the estimates were made of total potential effort (Section 5.3). However, the quantities reported as landed appear very much lower then the estimate for landings. They are so much lower that, unless there has been gross under-reporting, the estimated number of boats partaking in these activities must be in doubt.

Table 37
Estimated and Reported Effort in Days Fishing

Region	Estimated Effort (EE)	Reported Effort (RE)	RE/EE as a Percentage
NE	32526	6981	21
SE	28976	9157	32
SW	23088	6981	30

5.8 Nets Used, Nets Lost and Nets Purchased

The questionnaire yielded data on the length of nets used, lost and purchased in each *métier.* The mean values of these estimates shown in the effort tables were raised to the number of boats estimated to be participating in each *métier.* These results are shown in Figure 21.

These estimates are critically dependent upon how representative the sample is and the estimate of the number of boats participating in these *métiers.* The estimate of the numbers of boats in each *métier* is probably too high so the estimated lengths of nets used, purchased and lost are likely to be overestimates.

In the southwest *métiers* similar quantities of net are purchased and lost; this suggests that the fishermen questioned were simply replacing lost or damaged net. In the southeast and northeast fisheries there is some evidence that there may be some expansion in the overall quantity of nets used because nets purchased exceed nets lost; these ratios are crucially dependent on the particular state of the questioned fishermen's nets.

These results give no indication of the likely fate of 'lost' nets. Whether they represent damaged panels cut out and replaced during maintenance or nets lost during fishing is unknown.

Table 38
North East Métiers

	Estimated and Reported Landings (Tonnes)	
	Estimate	MAFF Reported Landings
COD	3963	101
LIN	4	23
WHG	24	46
SOL	589	19
TUR	60	3
DAB	13	1
BIB	*	1
CRE	457	5
LBD	86	0

Table 39
South East Métiers

Species	Estimated and Reported Landings (Tonnes)	
	Estimate	MAFF Reported Landings
BIB	0	0.7
COD	414	0.5
CRE	28	1.8
DAB	0	1.2
LIN	109	0.1
PLE	325	0.6
SCR	0	0.0
SOL	622	0.7
WHG	0	0.5

Table 40
South West Métiers

Species	Estimated and Reported Landings (Tonnes)	
	Estimate	MAFF Reported Landings
BIB	0	6
BLL	35	2
COD	768	16
CRE	505	3
CRW	27	2
DGS	440	12
HKE	1358	25
HOM	0	1
LBD	19	0
LIN	6365	23
MON	253	14
PLE	22	3
POL	0	23
SCR	162	0
SKA	569	8
TUR	343	13
WHG	0	12

6. Conclusions

- It is possible to obtain catch and effort information from the English static netting fleet. There is no evidence of serious bias due to fishermen's reluctance to allow sampling.

- The *métier* concept was useful in describing the effort in the static netting fleet. Future studies should include better resolution in terms of grounds fished.

- All the *métiers* studied show good selectivity of the target species and very low discard rates in these species.

- Most of the catches of non-target species were landed. These catches were generally estimated to be low compared with the overall estimated landings of the target species.

- Comparison between the estimated figures for effort and landings as obtained from this study and those reported by MAFF show a very poor correspondence between the two sources.

- The total catch of non resource species encountered in this study were a single porpoise captured in static gear fished in parallel with the study's gear (in a French trammel net fished in parallel with the tangle nets in the monk, turbot and ray tangle net *métier*) and two guillemots. This suggests that the non resource catch is low.

7. Further Work

A range of further work is possible to follow on from this study:-

- Future studies should be based at a regional level and include comparison between fishing grounds. Sampling should be conducted over several years to investigate the dynamics of the fisheries.

- The part-time fishing sector of the set net fleet in England has yet to be accounted for. In some areas it is suspected that effort exerted is relatively high. An effort census is needed on the part-time set net fisheries in order to estimate the total effort exerted by the set net fleet.

- Further work could focus on comparing discard rates from this study with appropriate discard rates from concomitant trawl fisheries. This would establish whether set netting has any advantages over other fishing methods in terms of selectivity and discard rates.

- An investigation should be undertaken into the wide discrepancy between the landings as estimated in this study and those reported in the MAFF database.

- It may be possible to investigate competition between *métiers* for resources through further analysis of effort and catch composition.

8. References

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Coull *et al*, 1989, 'Length/weight relationships for 88 species of fish encountered in the North East Atlantic, SOAFD Report No. 43.

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APPENDIX 1

Effort Appraisal Form and Catch Recording Sheet

EFFORT APPRAISAL (FIXED NETS)			Sheet No.	
Boat Code No.			Date / /	
Registered (Y/N)				
Power				
LOA				
Home port				
Gear type			*Season	
Target species				
Fishing grounds				
Distance or time to grounds				
METHOD OF DEPLOYMENT				
Length of individual fleets				
Number of fleets fished at any one time				
Number lifted per day				
Soak time (approx)				
Number of soak days per month*				
TECHNICAL DESCRIPTION				
Material type		Headline		
Mesh size		Footrope		
Hanging ratio		Weighting		
Mesh deep		Flotation		
Set length		No. nets per fleet		
Panel length		Other		
Average number of nets lost per season				
Number of nets purchased per season				
Any gear changeover? (Y/N)				
If yes, to what?				
Reason:				
Any towed gears used? (Y/N)				
If yes, when? (months)				
Fishermans opinion on the number of boats involved in this activity with this gear type from this port				
Comments				

CATCH RECORDING SHEET (fixed nets)

BOAT CODE No. | GEAR | REGION | SAMPLE No. | DATE

PORT | AMOUNT | RECTANGLE | SOAK TIME

CATEGORY	CATEGORY	CATEGORY	CATEGORY	CATEGORY	CATEGORY
TOTAL WEIGHT	TOTAL WEIGHT	TOTAL WEIGHT	TOTAL WEIGHT	TOTAL WEIGHT	TOTAL WEIGHT
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0
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2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

APPENDIX 2

Minor *Métiers*

Some *métiers* were encountered in the effort survey but not surveyed in the catch survey. They are:

1. **Set and drift gill nets for cod, bass, sole and skate (Table 41)**

   This fishery is prosecuted by possibly up to 15 boats from Ramsgate, although this is perhaps an overestimate because the respondent describes there being "15 boats netting" which may include other netting *métiers*. Fishing grounds are described as "southern North Sea and Wales" and mesh sizes are from 112mm-175mm (4½-7").

2. **Tangle nets set for skates and rays (Table 42)**

   The respondent who prosecuted this *métier* worked out of Ramsgate using large meshed nets of 250-300mm (10-12") fishing for skate and ray in the Wash during the summer months. Three boats prosecute this fishery from Ramsgate, although there are probably others from other ports.

3. **Tangle nets set in the southwest for soles (Table 43)**

   This is a spring fishery (from March to May) prosecuted off St. Agnes from the port of Hayle. Around 4-6 boats set nets of mesh size 125-128mm (5-5¼") during this period.

4. **Gill netting for cod off the northeast coast (Table 44)**

   This *métier* targets cod in the same area as the NE trammel net fishery. The choice of nets is dependent upon environmental conditions.

Table 41
Effort Survey : Set Drift Gillnets for Cod, Bass and Skate

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	1	3600	2160	5760	AMAP	AMAP	AMAP
FEB	1	3600	2160	5760	AMAP	AMAP	AMAP
MAR	1	3600	2160	5760	AMAP	AMAP	AMAP
APRIL	1	3600	2160	5760	AMAP	AMAP	AMAP
MAY	1	3600	2160	5760	AMAP	AMAP	AMAP
JUNE	1	3600	2160	5760	AMAP	AMAP	AMAP
JULY	1	3600	2160	5760	AMAP	AMAP	AMAP
AUGUST	1	3600	2160	5760	AMAP	AMAP	AMAP
SEPT	1	3600	2160	5760	AMAP	AMAP	AMAP
OCT	1	3600	2160	5760	AMAP	AMAP	AMAP
NOV	1	3600	2160	5760	AMAP	AMAP	AMAP
DEC	1	3600	2160	5760	AMAP	AMAP	AMAP
MEANS	1	3600	2160	5760	AMAP	AMAP	AMAP

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	5.33	1.75	9.09
MEAN SOAK(HRS)	7.5	3	12
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	n/a	n/a	n/a
MAX LOST (m)/SEASON/BOAT	4500	2700	6300
MIN LOST (m)/SEASON/BOAT	4500	2700	6300
PURCHASED(m)/SEASON/BOAT	5850	2700	7200

C: ESTIMATED NO. OF BOATS				
PORT	Nobservd	Mean	Min	Max
RAM	1	15		

AMAP = as much as possible

Table 42
Effort Survey : Skate and Ray Tangle Net *Métier*

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN							
FEB							
MAR							
APRIL							
MAY	1	2700	2700	2700	30	30	30
JUNE	1	2700	2700	2700	30	30	30
JULY	1	2700	2700	2700	30	30	30
AUGUST	1	2700	2700	2700	30	30	30
SEPT	1	2700	2700	2700	30	30	30
OCT	1	2700	2700	2700	30	30	30
NOV							
DEC							
MEANS							

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	2.14	1.73	2.60
MEAN SOAK(HRS)	48	48	48
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	0	0	0
MAX LOST (m)/SEASON/BOAT	300	300	300
MIN LOST (m)/SEASON/BOAT	300	300	300
PURCHASED(m)/SEASON/BOAT	2100	2100	2100

C: ESTIMATED NO. OF BOATS				
PORT	Nobservd	Mean	Min	Max
RAM	1	3		

Table 43
Effort Survey : SW Sole Tangle Net *Métier*

A: ESTIMATED EFFORT BY MONTH	NBOATS FISHING	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
		MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	0						
FEB	0						
MAR	2	3600	4500	4500	10	8	14
APRIL	2	3600	4500	4500	10	8	14
MAY	2	3600	4500	4500	10	8	14
JUNE	0						
JULY	0						
AUGUST	0						
SEPT	0						
OCT	0						
NOV	0						
DEC	0						
MEANS	0						

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	1.31	1.30	1.33
MEAN SOAK(HRS)	16	12	18
HANGING RATIO	0.5	0.5	0.5
FLOTATION(g/m)	0	0	0
MAX LOST (m)/SEASON/BOAT	1260	1260	1260
MIN LOST (m)/SEASON/BOAT	63	63	63
PURCHASED(m)/SEASON/BOAT	2520	1890	3150

C: ESTIMATED NO. OF BOATS				
PORT	Nobservd	Mean	Min	Max
HAYLE	1	6		
HAYLE	1	4		

Table 44
Effort Survey : NE Cod Gill Net *Métier*

A: ESTIMATED EFFORT BY MONTH	NBOATS	LENGTH OF NETS(m)/BOAT			DAYS FISHED/BOAT/MONTH		
	FISHING	MEAN	MIN	MAX	MEAN	MIN	MAX
JAN	3	2460	1440	3240	15	15	15
FEB	3	2460	1440	3240	15	15	15
MAR	2	2340	1440	3240	15	15	15
APRIL	0	0	0	0	0	15	0
MAY	1	1440	1440	1440	15	15	15
JUNE	0	0	0	0	0	0	0
JULY	0	0	0	0	0	0	0
AUGUST	0	0	0	0	0	0	0
SEPT	3	2460	1440	6000	15	15	15
OCT	3	2460	1440	6000	15	15	15
NOV	3	2460	1440	6000	15	15	15
DEC	3	2460	1440	6000	15	15	15
MEANS	1.75	1545.00	960.00	2930.00	10.00	11.25	10.00

B: GEAR DETAILS	Mean	Min	Max
SET DEPTH (m)	2.9	2.7	3.2
MEAN SOAK(HRS)	24	22	26
HANGING RATIO	0.517	0.5	0.55
FLOTATION(g/m)	n/a	n/a	n/a
MAX LOST (m)/BOAT/SEASON)	0	0	0
MIN LOST (m)/BOAT/SEASON	0	0	0
PURCHASED(m)/BOAT/SEASON	675	675	675

C: ESTIMATED NO. OF BOATS				
PORT	Nobserva	Mean	Min	Max
NWB	2	9	9	9
BLY	1	16	16	16
OVERALL				

D: EST.EFFORT (BOATDAYS/ANNUM)	Mean	Min	Max
EFFORT OF BOATS SURVEYED (ESURVEY)	210	236	210
EFFORT IN METIER (EMETIER)			

APPENDIX 3

Table 45
MAFF Codes (as used in Figures and Tables)
Common name, Latin name and Minimum Landing Size

MAFF CODE	COMMON NAME	LATIN NAME	NATIONAL MLS (cm)
BIB	Pout whiting (pouting)	*Gadus luscus*	
BLL	Brill	*Scophthalmus rhombus*	
COD	Cod	*Gadus morhua*	35
CRE	Crab - brown; mixed sexes	*Cancer pagurus*	various
CRW	Crawfish (incorr. crayfish)	*Palinurus elephas*	
DAB	Dab	*Limanda limanda*	
DGS	Spurdog	*Squalus acanthias*	
FLE	Flounder (fluke)	*Platichthys flesus*	
HKE	Hake	*Merluccius merluccius*	30
HOM	Scad, horse mackerel	*Trachurus trachurus*	
LBD	Lobsters	*Homarus gammarus*	8.5
LIN	Ling	*Molva molva*	
MON	Monkfish, Anglerfish	*Lophius piscatorius*	
PLE	Plaice	*Pleuronectes platessa*	27
POL	Pollack	*Pollachius pollachius*	30
SCR	Spider crabs	*Maia squinado*	12
SKA	Ray	*n/a*	
SOL	Sole (Dover)	*Solea solea*	24
TUR	Turbot	*Scophthalmus maximus*	30
WHG	Whiting	*Merlangius merlangus*	27