Discard and Effort Survey: Channel ICES Areas VIId and e 1997/98 First Interim Report February 1998

Confidential Report No. CR140

February 1998

Sea Fish Industry Authority

Technology Division

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Project Ref MF0138

Authors: A. Searle, J. Lansley, W. Lart
Date: 17th February 1998

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Summary

This report describes the activities of the Seafish discard team during the period July-December 1997. Production of this report fulfills milestone 01/2 (31st January 1998) in the Application for a Research Contract. The project is therefore 3 weeks behind to the original plan as described in this proposal. It is not considered seriously behind schedule.

A total of 10 discard trips have been undertaken of which seven have been analysed and presented in this report. These results are discussed together with the planned feasibility study of fishermen sampling their own discards.

Contents

Summary

1. Introduction 1

2. Objectives 1

3. Trips by Quarter 2
3.1 Planned trips 3
3.2 Achieved trips 4

4. Results 5
4.1 Trip 40 6
4.2 Trip 41 6
4.3 Trip 42 7
4.4 Trip 43 11
4.5 Trip 44 11
4.6 Trip 45 14
4.7 Trip 46 16
4.8 Trip 47 20
4.9 Trip 49 23
4.10 Trip 51 23

5. Discussion 27
5.1 Targets and Achievements 27
5.2 Vessel selection 27
5.3 Sampling Techniques 28
5.3.1 Otter and Beam Trawlers 28
5.3.2 Scallop Dredgers 28
5.3.3 Raising the scallop dredge data 29
5.4 Species identification 29
5.5 Motives for discarding 29
5.6 Comparison between regions 30
5.7 General attitudes to survey 30
5.8 Safety aspects 31
5.9 Discard sampling by fishermen 31
5.9.1 Methods 32
5.9.2 Reward 32
5.10 Effort survey and fish price 32

6. References 33

Appendices:

I: Letter from Isabelle Peronnet
II: Species names

1. Introduction

The 1997/98 Channel discard survey is, in part, a continuation of the 1995 (Course *et al.*, 1996) study carried out by Seafish commissioned by MAFF. The current survey is also charged with developing and trialing a discard self-sampling protocol, to be evaluated at the end of the survey. This report describes the activities during the first six months of the project; July-December 1997.

2. Objectives

Production of this report fulfills milestone 01/2 (31st January 1998) in the Application for a Research Contract and includes results and discussion required to fulfill objectives 01, 01/2, 02, 02/1 and 02/2. The project is therefore three weeks behind the original plan as described in the proposal but is not considered to be seriously behind schedule .

01) To complete the Channel discard and effort survey using existing sampling strata and protocols:

  01/1) Use of effort survey to indicate the proportion of effort sampled (effort survey data is discussed but not presented).

  01/2) The results will be analysed to reveal the characteristics of discarding in the various towed gear métiers. In order to set the results in an economic context, price and values data for the main exploited species will be obtained and analysed.

02) A number of vessels from a selection of gear types would be chosen from those already taking part in the Channel discard survey. A programme of work with the following objectives would be carried out:

  02/1) There would be an investigation into the suitability of current sampling techniques for use by the fishermen. Any necessary modifications would be compatible with 01.

  02/2) A suitable level of financial reward will be assessed and the total cost of 'self sampling' will be estimated.

3. Trips by Quarter

Trip classification

The sampling strategy adopted used the métier system defined by the Channel Fisheries Study Group (See Course *et al* 1996). Listed below are the codes and descriptions of the towed gear métiers to be sampled over the course of the two years of the study.

CODE	NAME	DESCRIPTION
U1.1	UK TR WEST	UK otter trawl - western Channel
U1.2	UK TR EAST	UK otter trawl - eastern Channel
U1.3[2]	UK PAIR TR WEST	UK pair trawl - western Channel
U2.1	UK BEAM OFF EAST	UK beam trawl - offshore, eastern Channel
U2.2	UK BEAM OFF WEST	UK beam trawl - offshore, western Channel
U2.3	UK BEAM IN WEST	UK beam trawl - inshore, western Channel
U4.1	UK DREDGE WEST (Scallop)	UK scallop dredge, western Channel
U4.5	UK TR WEST (Queen)	UK queen scallop trawl, western Channel

The trip weighting for the 1997/98 discard survey was, to some extent, predetermined by the successes and failures of the previous Channel surveys. Improvements in the definition of métiers, in particular the inshore and offshore beam trawlers, access to not previously sampled ports/areas, the sampling of scallopers and inshore beamers were considered priorities by MAFF, the commissioning agents. It was also agreed that there should be quarterly sampling of at least one vessel for which there was quarterly sampling during the previous study in order to provide continuity between the two surveys.

Planning of the sampling by quarter was therefore based on the foregoing using 1996 effort and landing statistics obtained from MAFF's statistical division to weight sampling effort in the various métiers. The plan for the fourth quarter of 1997 onwards is shown in Table 1 (Section 3.1).

The project's late start and the lack of statistical information from MAFF (although some good quality information for 1995 was obtained from CEFAS Lowestoft) meant that it was difficult to set targets for the third quarter of 1997. However some sampling was carried out and is shown in Table 2 (Section 3.2) together with the planned and achieved trips undertaken in the fourth quarter 1997.

The results for the third quarters of both 1997 and 1998 will be used in conjunction to give a year round picture of the fisheries.

3.1 Planned trips

TABLE 1. DISCARD SAMPLE WEIGHTING: CHANNEL 97/98

FOURTH QUARTER 1997				
PORT	OTTER	BEAM (IN)	BEAM (OFF)	SCAL. DREDGE
RYE	1			
NEWHAVEN			1	
SHOREHAM				
PORTSMOUTH			1	
POOLE				
BRIXHAM			1R	
PLYMOUTH				1
LOOE				
FALMOUTH				
NEWLYN	1	1	1	

FIRST QUARTER 1998				
PORT	OTTER	BEAM (IN)	BEAM (OFF)	SCAL. DREDGE
RYE				1SD
NEWHAVEN				
SHOREHAM				
PORTSMOUTH			1	
POOLE				
BRIXHAM			1R	
PLYMOUTH				1SD
LOOE				
FALMOUTH				
NEWLYN	1	1	1	

SECOND QUARTER 1998				
PORT	OTTER	BEAM (IN)	BEAM (OFF)	SCAL. DREDGE
RYE	1			1SD
NEWHAVEN			1	
SHOREHAM			1	
PORTSMOUTH	1		1	1SD
POOLE	1			
BRIXHAM		1	1R	
PLYMOUTH				1SD, 1FD
LOOE				
FALMOUTH				1FD
NEWLYN	1		1	

THIRD QUARTER 1998				
PORT	OTTER	BEAM (IN)	BEAM (OFF)	SCAL. DREDGE
RYE	1			
NEWHAVEN				
SHOREHAM				
PORTSMOUTH				
POOLE				
BRIXHAM			1R	1FD
PLYMOUTH		1		1SD
LOOE				
FALMOUTH				1
NEWLYN	1		2	1

Note the number of trips undertaken in the final quater will be dependent on how much time is required for the final writeup. Four trips have already been undertaken in this quarter during 1997.

KEY:

R = Repeat trip on vessel which has been sampled quarterly throughout the study

FD = French Dredge

SD = Spring Loaded Dredge

3.2 Achieved trips

The planned and achieved trips are shown below; the reasons for variation between the planned and achieved trips are discussed in Section 5.1

TABLE 2

THIRD QUARTER 1997	Man Weeks							
	Otter Trawl		Beam Inshore		Beam Offshore		Scallop	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
Shoreham, Newhaven, Rye		0				0		
Weymouth, Poole, Portsmouth						0		
Newlyn, Looe, Plym, Brixham		1		0		1		1FD
Totals		1		0		1		1

Total Trips			Target	Achieved
			0	4

FOURTH QUARTER 1997	Man Weeks							
	Otter Trawl		Beam Inshore		Beam Offshore		Scallop	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
Shoreham, Newhaven, Rye	1	2			1	0		
Weymouth, Poole, Portsmouth					1	1		
Newlyn, Looe, Plym, Brixham	1	1	1	1	2	1	1	0
Totals	2	3	1	1	4	2	1	0

Total Trips			Target	Achieved	Difference
			8	6	2

FD = French Dredge

4. Results

The results are presented by trip in Sections 4.1 to 4.10. These results serve two functions:

1. They enable the project manager and commissioning agents to monitor the project in terms of the quality and quantity of the data.

2. They allow the fishermen on whose boats the data is being collected to monitor the results from their particular trips (fishermen only get to see their own trips' data).

The results include reference to trips undertaken but not fully data processed yet and they are presented in 'fishermen friendly' terms; weights in stones and histogrammes presented in an easy to understand format.

There remains some data processing to complete on the scallop dredge trips and the final beamer trip (U2.2) requires data processing. Also for some trips information on certain species do not require raising (Secion 5.3). However some modification is required to the primary database to achieve this so these data are not available yet.

These data are presented by trip. Trips start at trip 40 so as to provide data sequential to the previous study which finished on trip 39 (trip numbers 48 and 50 are not allocated yet). The results include a brief description of the trip in terms of the métier (see Course *et al.*, (1996) for métier definitions) mesh size used and the hauls sampled compared with the total hauls for the trip. The raw data are raised to haul level and then added for all the hauls sampled for that trip. The catch for the non-sampled hauls is ignored. The figures contain length-frequency distributions for selected species for each trip.

For the final report the results will be analysed in a similar way to Course *et al* (1996).

NOTE: for the above reasons these data should not be considered definitive.

4.1 Trip 40

Home Port: Newlyn
Metier: U1.1
Sailed: 14/08/97
Landed: 15/08/97
Gear: Otter trawl
Cod-end Mesh Size: 80 mm
No. Hauls Sampled: 1
Total Hauls For Trip: 1

Table 3 Trip 40 ; Catch composition

	NUMBERS					WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	8	0	8	100	0	0.1	0.0
Cuckoo ray	3	3	5	50	0	0.0	0.1
Dab	23	3	25	90	90	0.5	0.2
GUG	53	572	625	9	0	0.6	12.9
GUR	0	15	15	0	0	0.0	0.4
Tub Gurnard	0	3	3	0	0	0.0	0.2
Lemon sole	8	30	38	20	20	0.2	1.4
Megrim	0	23	23	0	0	0.0	1.5
Plaice	13	86	99	13	5	0.4	4.9
Spotted Ray	5	3	8	67	0	0.1	0.2

This was a short training trip on which only one haul was sampled due to gear failure

4.2 Trip 41

Home Port: Plymouth
Metier: U4.1 (inshore)
Sailed: 05/09/97
Landed: 05/09/1997 (Plymouth)
Gear: Scallop Spring Dredge
Ring Diameter: 100 mm
No. Hauls Sampled: 6
Total Hauls For Trip: 7

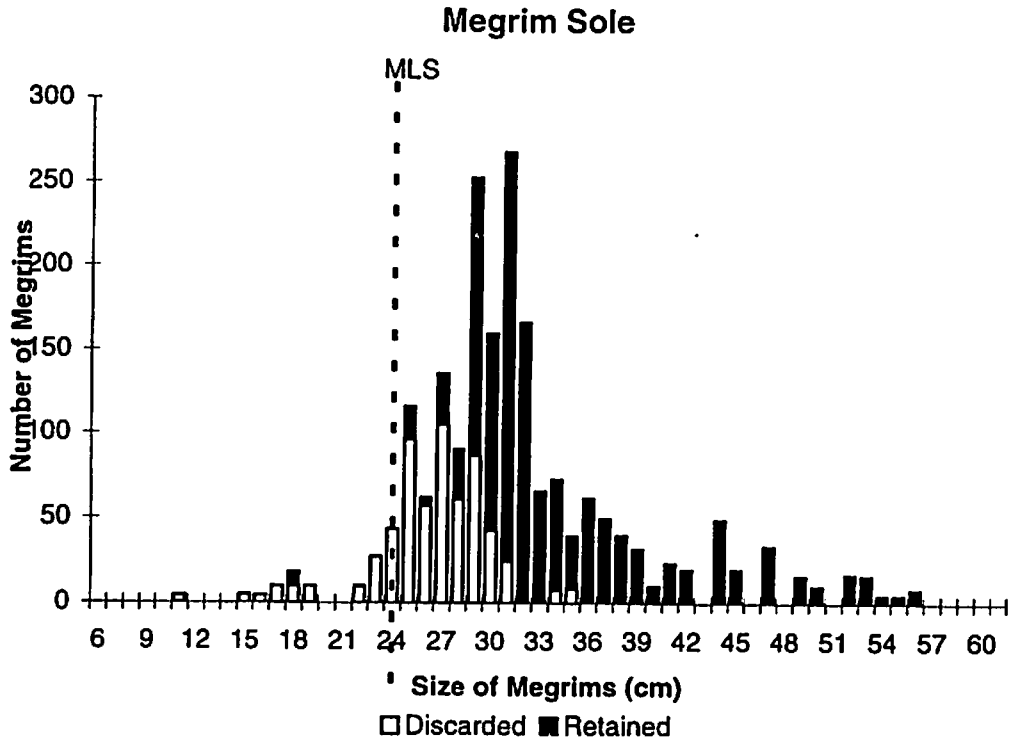
Training trip.
Procedure for processing scallop trips yet to be finalised.

4.3 Trip 42

Home Port: Newlyn
Metier: U2.2
Sailed: 09/09/97
Landed: 16/09/97
Gear: Beams = 7.5, chain mat, single wheel bogies
Cod-end Mesh Size: 85 mm
No. Hauls Sampled: 12
Total Hauls For Trip: 22

Table 4 Trip 42 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	391	0	391	100	0	5.1	0.0
Cuckoo ray	113	251	364	31	0	0.2	8.5
Tub Gurnard	10	0	10	100	0	1.2	0.0
Lemon sole	28	67	95	29	0	0.7	5.3
Megrim	617	1368	1986	31	20	12.5	73.4
Plaice	0	8	8	0	0	0.0	1.2
Argentine	18	0	18	100	0	4.5	0.0
Blond ray	0	6	6	0	0	0.0	0.5
Cod	0	28	28	0	0	0.0	10.9
Edible crab	0	16	16	0	0	0.0	0.0
Dragonet	35	0	35	100	0	0.1	0.0
Gurnard	341	0	341	100	0	8.6	0.0
Haddock	0	15	15	0	0	0.0	3.2
Hake	20	0	20	100	50	0.4	0.0
LSD	9	0	9	100	0	2.0	0.0
Monk	0	150	150	0	0	0.0	74.1
Rockling	13	0	13	100	0	3.8	0.0
Scallops	0	10	10	0	0	0.0	0.0
Shagreen ray	5	0	5	100	0	0.2	0.0
Sole	0	10	10	0	0	0.0	1.7
Spotted ray	0	5	5	0	0	0.0	0.9
Squid	12	0	12	100	0	0.4	0.0
Turbot	0	10	10	0	0	0.0	4.4
Boarfish	53	0	53	100	0	0.2	0.0



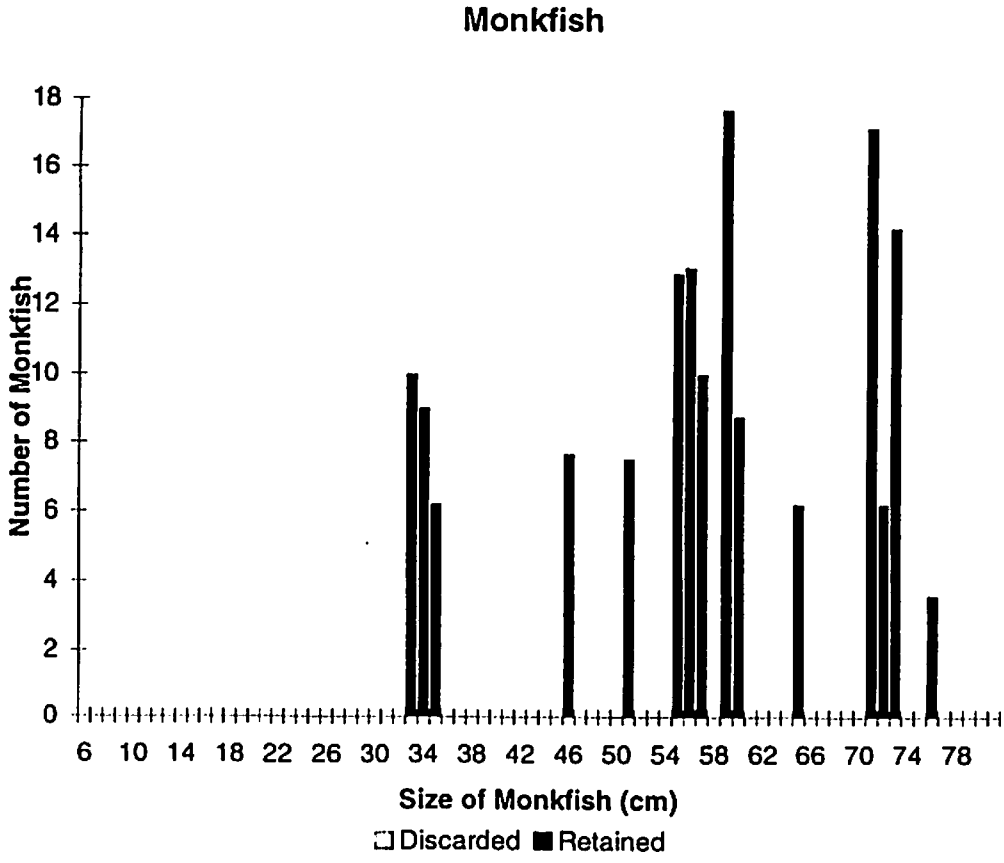
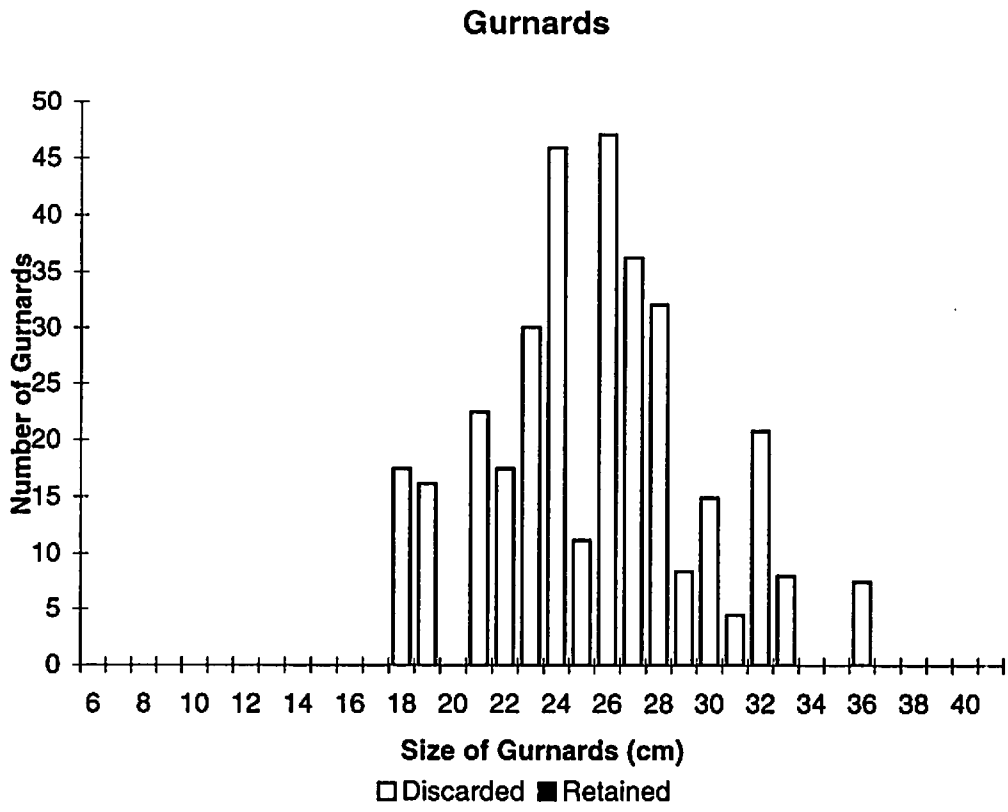


Figure 1 Trip 42 Length-Frequency distributions for Megrim and Monkfish catches.



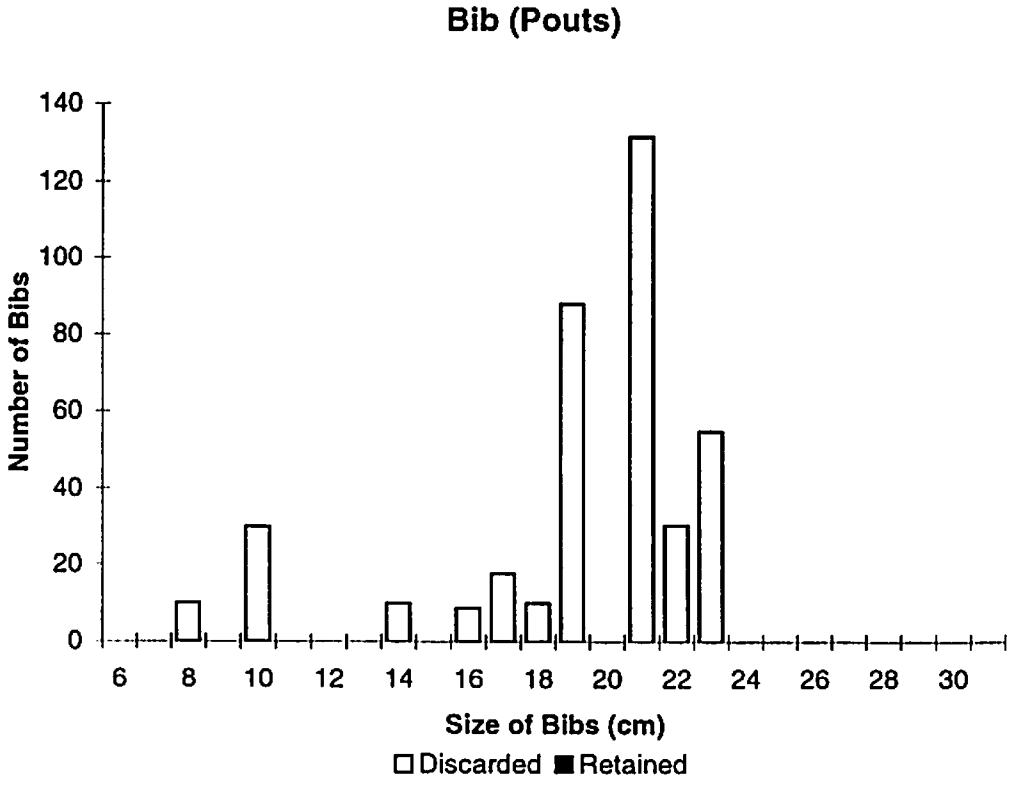


Figure 2 Trip 42 Length-frequency distributions of Gurnard and Bib catches.

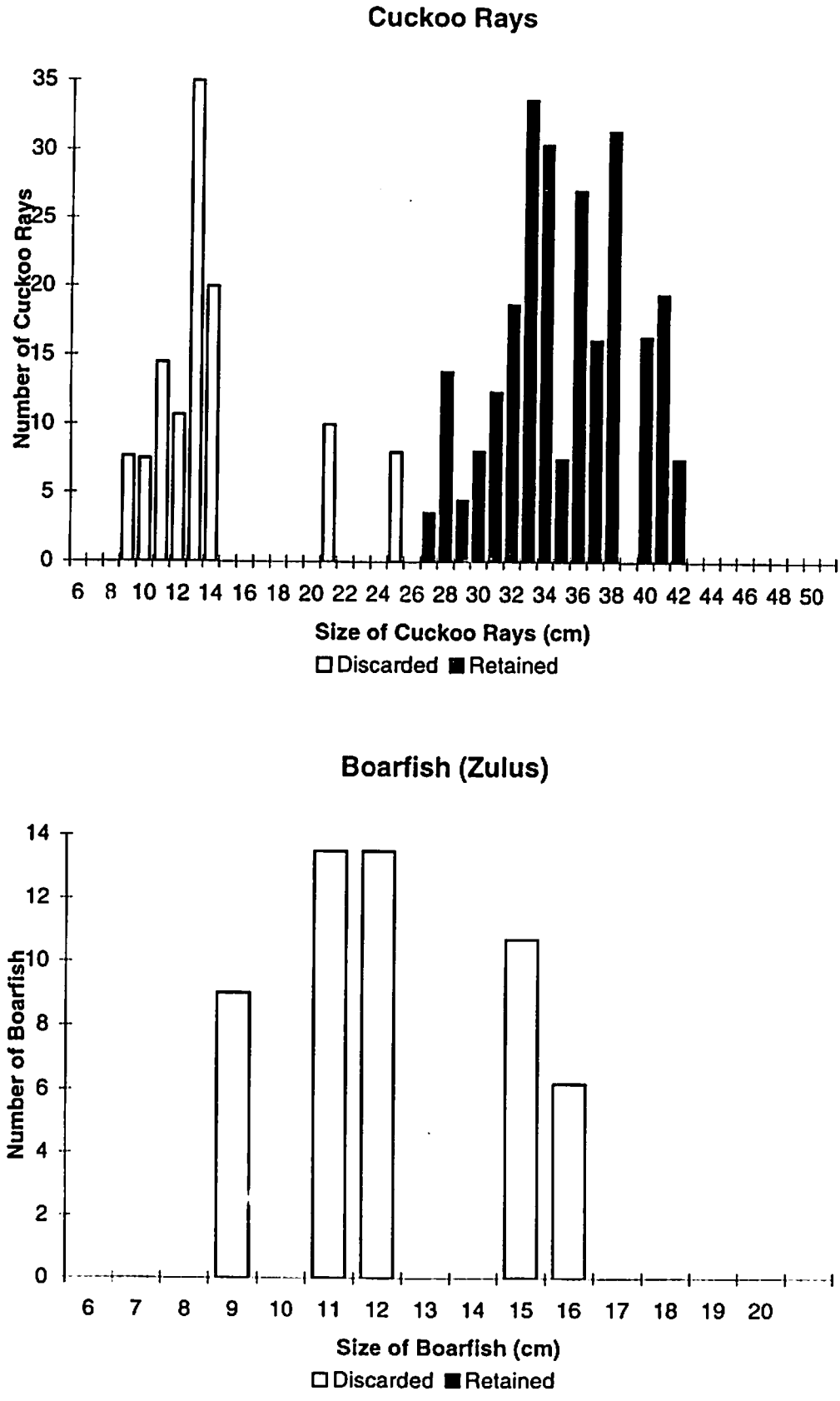


Figure 3 Trip 42 Length-frequency distributions of Cuckoo Ray and Boar fish catches.

4.4 Trip 43

Home Port: Plymouth/Fleetwood (6 months in each port).
Metier: U4.1 (offshore)
Sailed: 26/09/97
Landed: 03/10/1997 (Plymouth)
Gear: Scallop French Dredge
Ring Diameter: Belly 80 mm, Back 75 mm
No. Hauls Sampled: 36
Total Hauls For Trip: Approx. 70

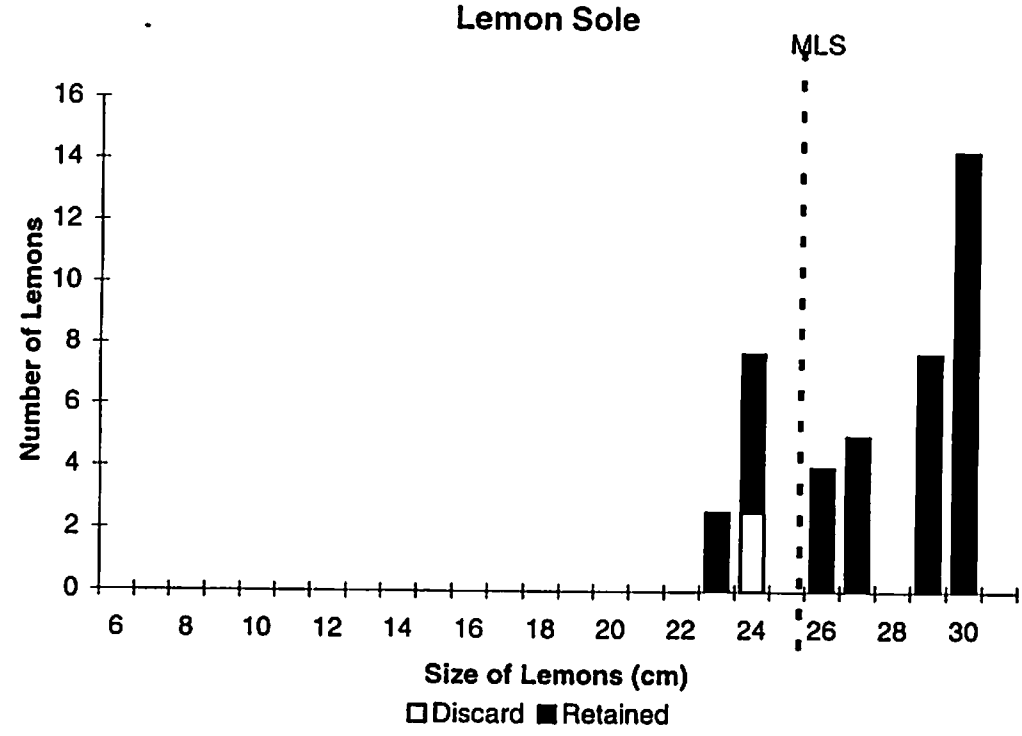
Procedure for processing scallop trips yet to be finalised.

4.5 Trip 44

Home Port: Newlyn
Metier: U2.3
Sailed: 23/10/97
Landed: 27/10/97
Gear: Beams = 4.5 m, chain mat, twin wheel bogies
Cod-end Mesh Size: 80 mm
No. of Hauls Sampled: 9
Total Hauls For Trip: 11

Table 5 Trip 44 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	153	13	165	92	0	1.1	0.1
Cuckoo ray	3	15	18	14	0	0.0	0.3
Lemon sole	3	39	41	6	0	0.1	1.5
Megrim	9	71	80	11	0	0.0	3.7
Plaice	4	36	40	10	0	0.1	1.5
Brill	0	23	23	0	0	0.0	5.6
Cod	0	5	5	0	0	0.0	0.7
Edible Crab	8	46	54	15	9	0.0	0.0
Cuttlefish	0	63	63	0	0	0.0	0.0
Dragonet	119	8	126	94	0	0.1	0.0
Flounder	0	3	3	0	0	0.0	0.1
Gurnard	0	15	15	0	0	0.0	0.2
Haddock	0	17	17	0	0	0.0	1.0
LSD	5	70	75	7	0	0.1	8.9
Red Mullet	0	4	4	0	0	0.0	0.1
Pollack	4	0	4	100	100	0.2	0.0
Spider crab	0	12	12	0	0	0.0	2.0
Sole (Dover)	0	151	151	0	0	0.0	8.7
Sand Sole	4	7	11	38	0	0.0	0.1
Spotted ray	6	0	6	100	0	0.0	0.0
Turbot	0	4	4	0	0	0.0	2.1
Whiting	0	5	5	0	0	0.0	0.2
Wrasses	16	0	16	100	0	0.1	0.0



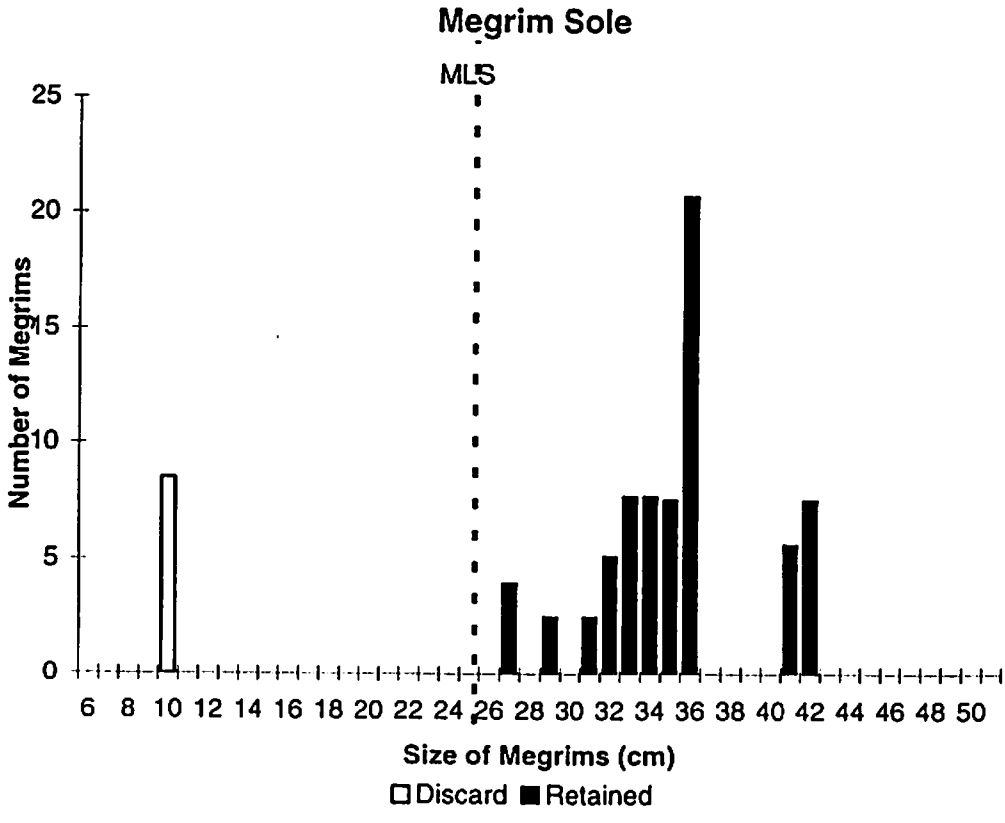


Figure 4 Trip 44 Length-Frequency distributions of Lemon and Megrim sole catches.

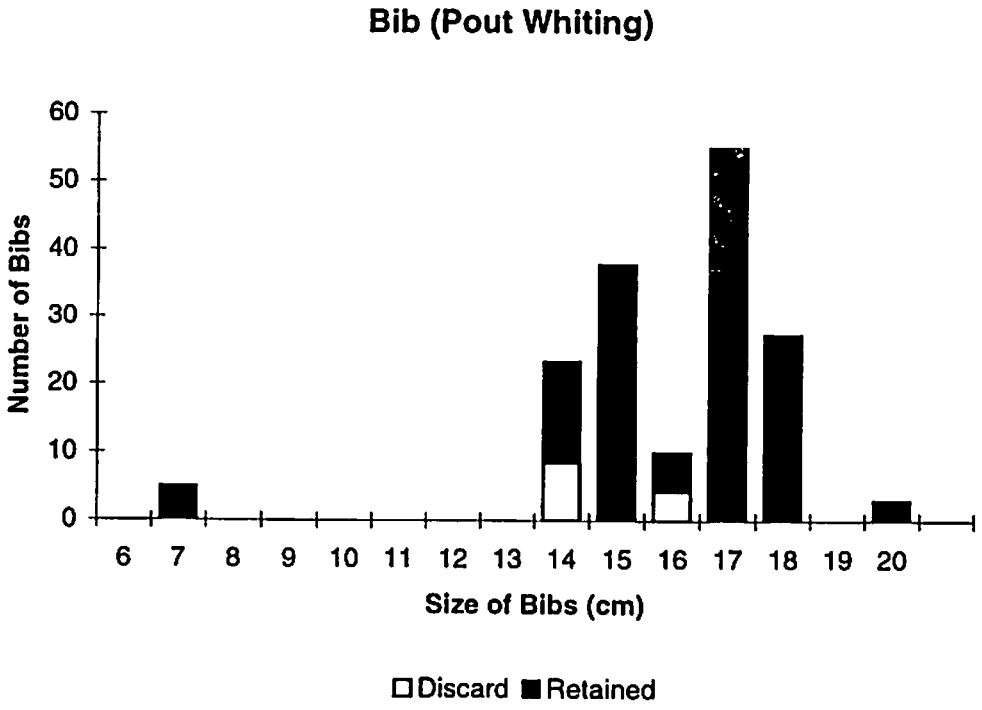


Figure 5 Trip 44 Length-Frequency distributions of Bib catches

4.6 Trip 45

Home Port: Rye
Metier: U1.2
Sailed: 22/10/97
Landed: 22/10/1997 (Sold Hastings)
Gear: Rockhopper Otter Trawl
Cod-end Mesh Size: 90 mm
No. Hauls Sampled: 3
Total Hauls For Trip: 4

Table 6 Trip 45 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	34	118	152	22	0	0.9	2.4
Dab	0	7	7	0	0	0.0	0.2
Tub Gurnard	0	9	9	0	0	0.0	0.9
Lemon sole	133	147	280	48	6	3.1	7.0
Plaice	0	5	5	0	0	0.0	1.4
Cod	70	299	369	19	0	3.6	29.1
Scad	0	36	36	0	0	0.0	1.8
LSD	14	0	14	100	0	1.2	0.0
Spider crab	40	0	40	100	0	4.2	0.0
Squid	0	76	76	0	0	0.0	1.7
Thornback Ray	0	8	8	0	0	0.0	0.9
Whiting	20	187	207	10	0	0.7	8.8

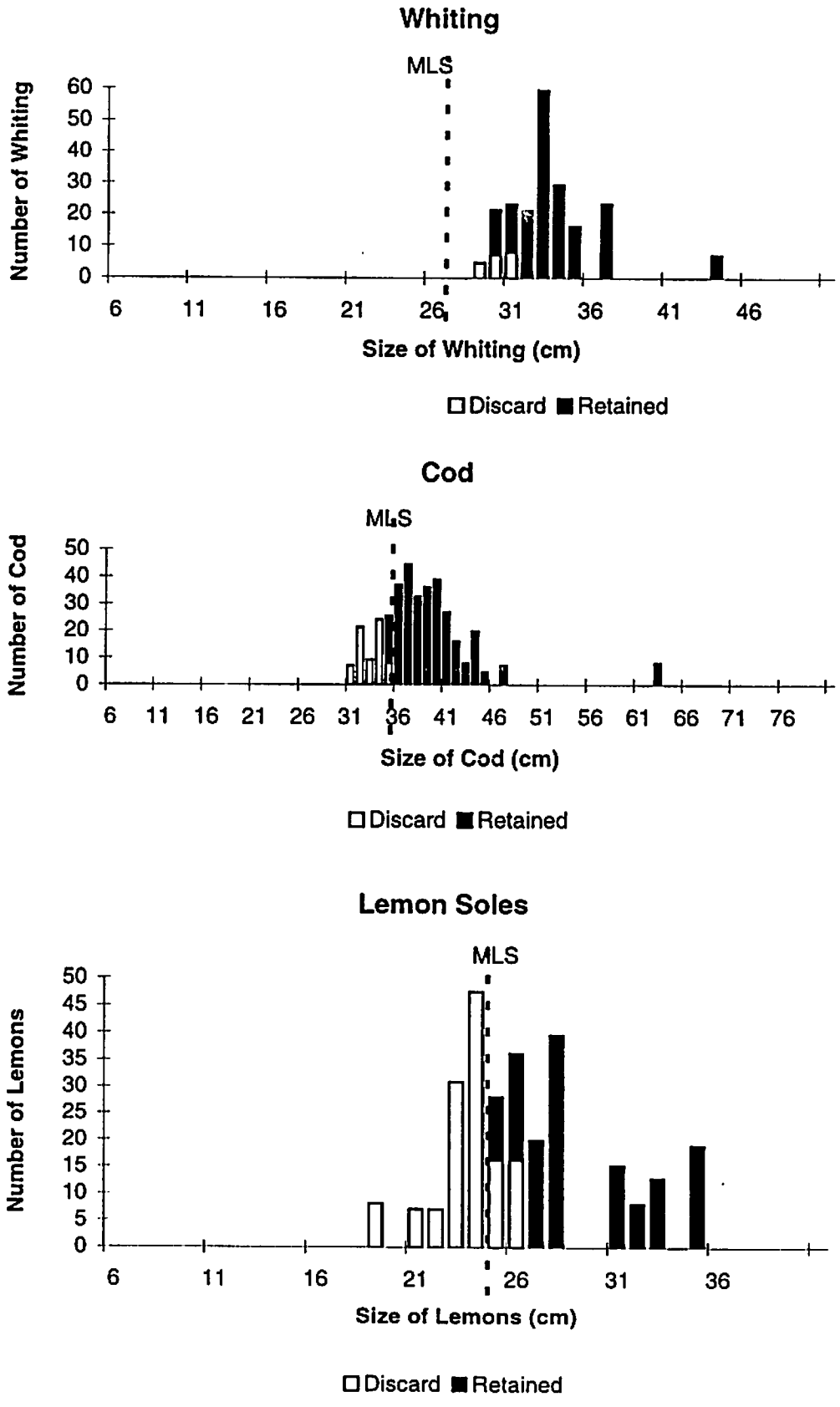


Figure 6 Trip 45 Length frequency distributions for whiting, cod and lemon sole catches

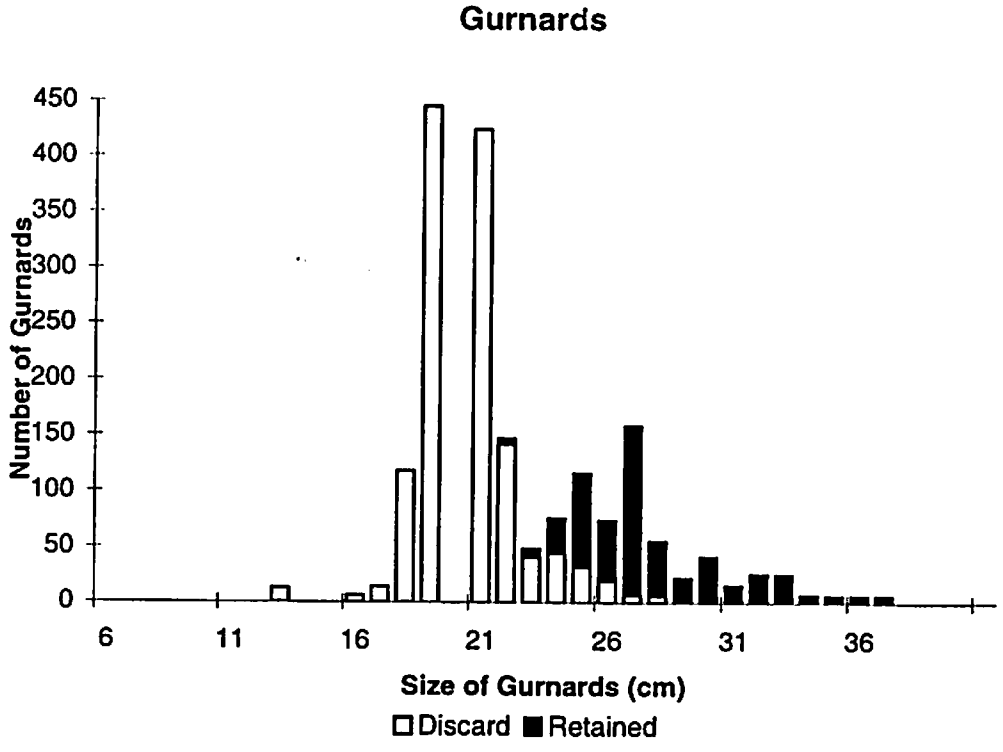
4.7 Trip 46

4.7 Trip 46; Note Trip cut short to tow another vessel in

Home Port:	Newlyn
Metier:	U1.1
Sailed:	11/11/97
Landed:	15/11/97
Gear:	Otter trawl
Cod-end Mesh Size:	95 mm
No. of Hauls Sampled:	8
Total Hauls For Trip:	9

Table 7 Trip 46 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	1688	444	2132	79	0	18.5	32.9
Cuckoo ray	12	81	93	13	0	0.1	2.3
Tub Gurnard	13	38	51	25	0	0.0	2.6
Lemon sole	34	248	281	12	2	0.8	13.4
Megrim	0	64	64	0	0	0.0	4.8
Cod	NA	NA	NA	NA	NA	NA	NA
Edible Crab	6	0	6	100	0	0.0	0.0
Dragonet	74	0	74	100	0	0.1	0.0
Gurnard	1316	540	1856	71	0	15.2	17.2
Haddock	0	249	249	0	0	0.0	28.9
Herring	12	0	12	100	0	0.2	0.0
Hake	0	62	62	0	0	0.0	2.6
Scad	701	0	701	100	0	11.9	0.0
John Dory	0	6	6	0	0	0.0	0.9



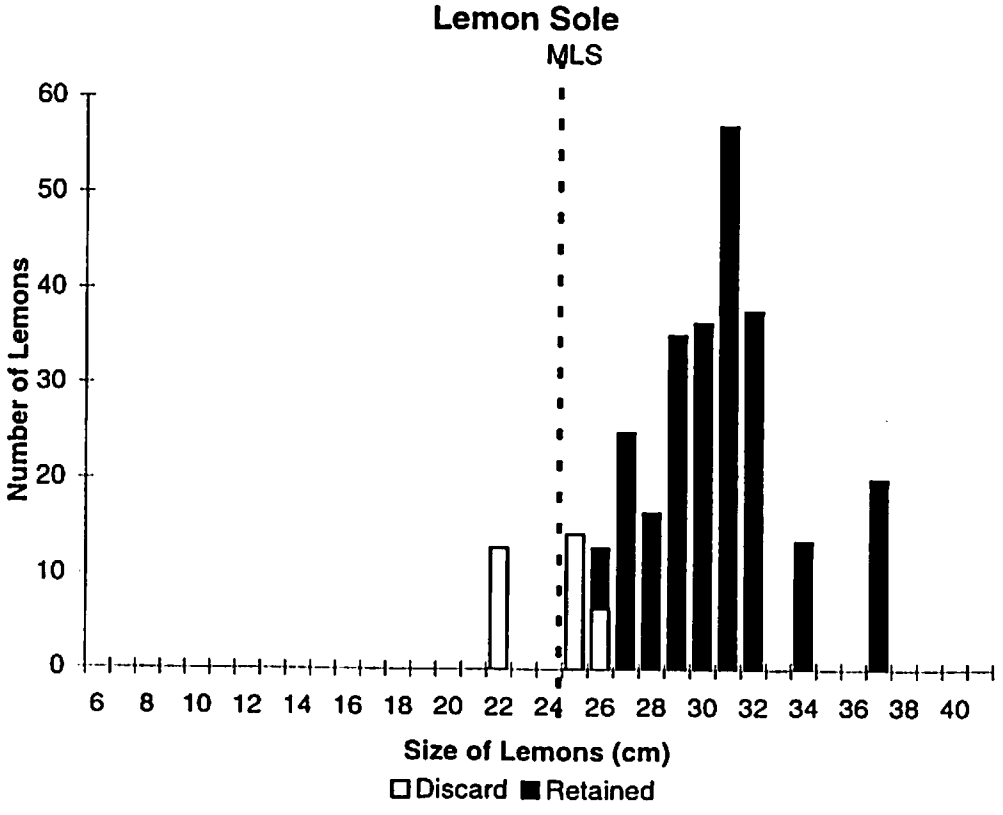
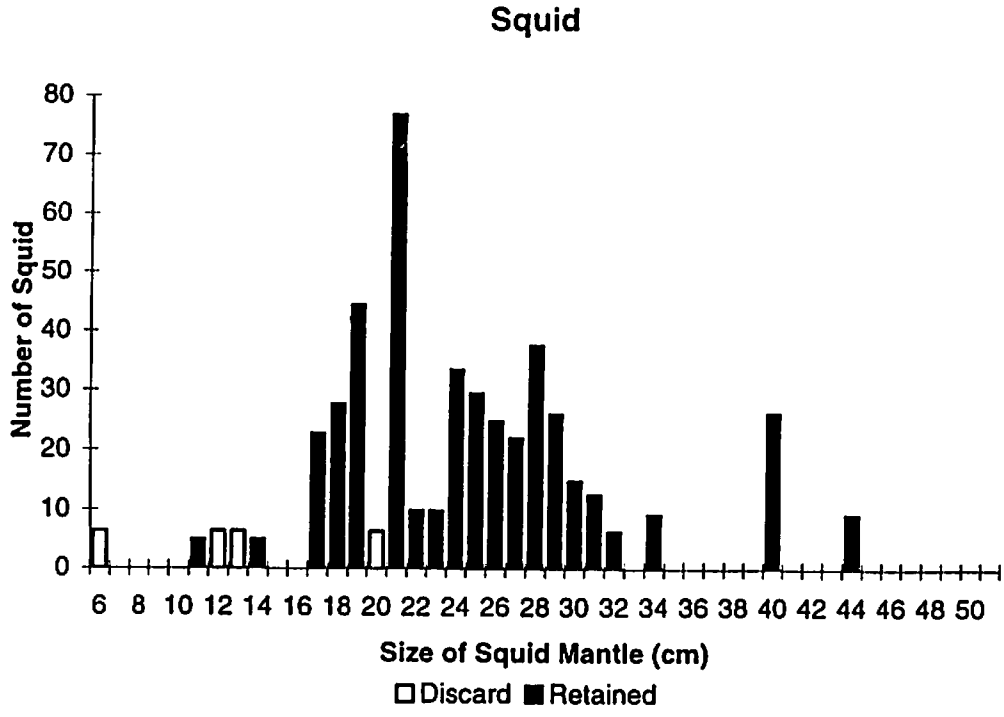


Figure 7 Trip 46 Length-frequency distributions for gurnard and lemon sole catches



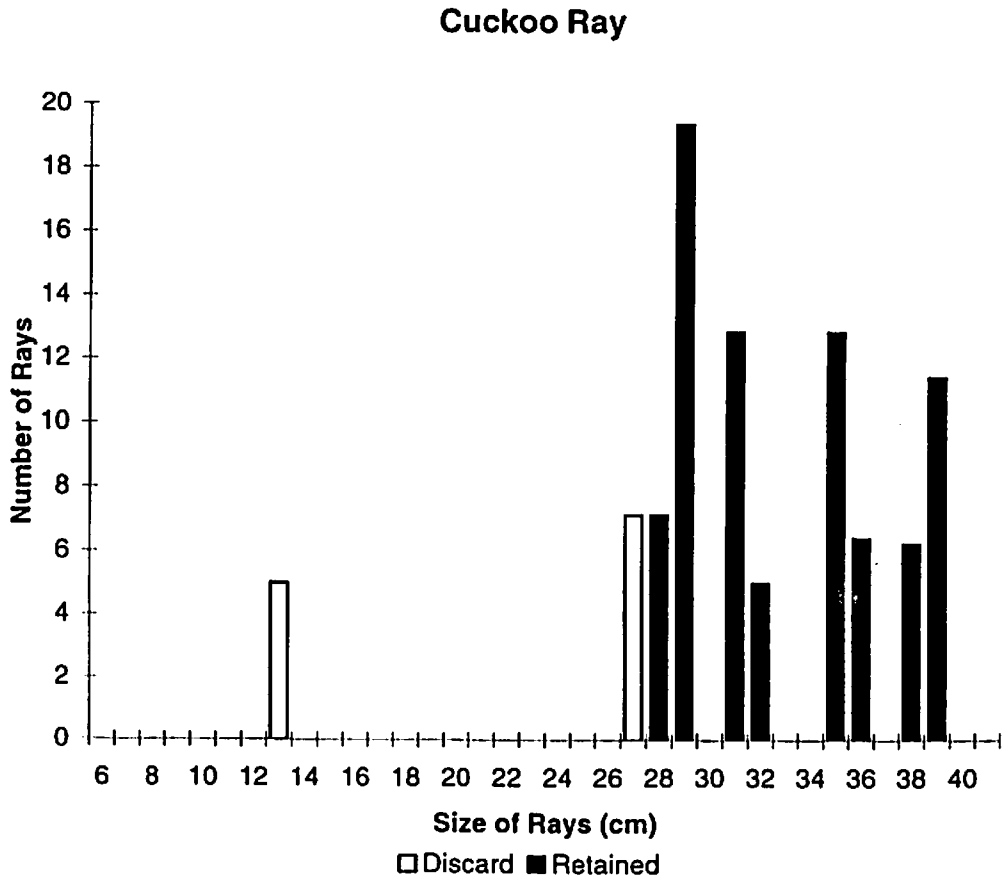
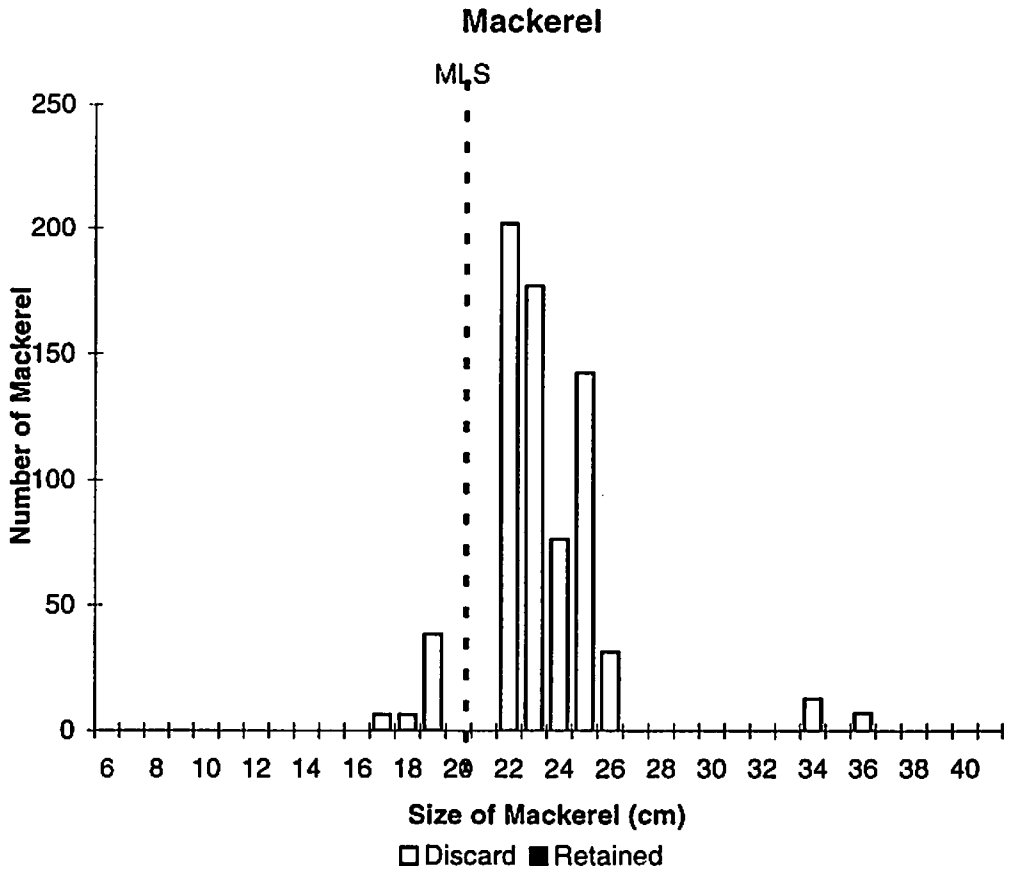


Figure 8 Trip 46 Length-frequency distributions for squid and cuckoo ray catches.



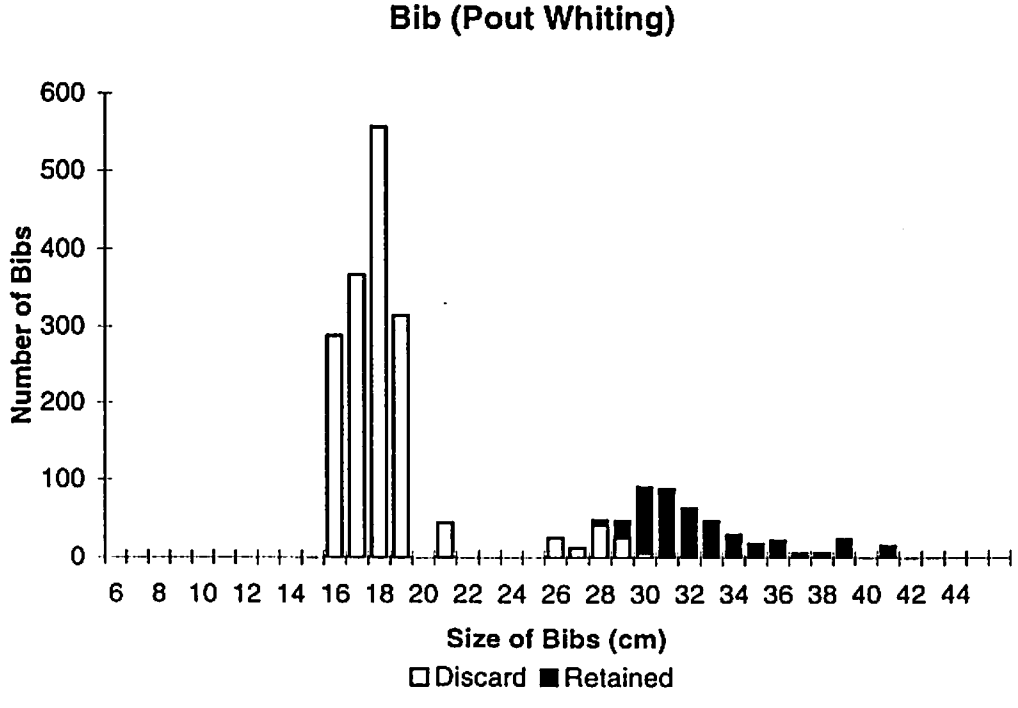


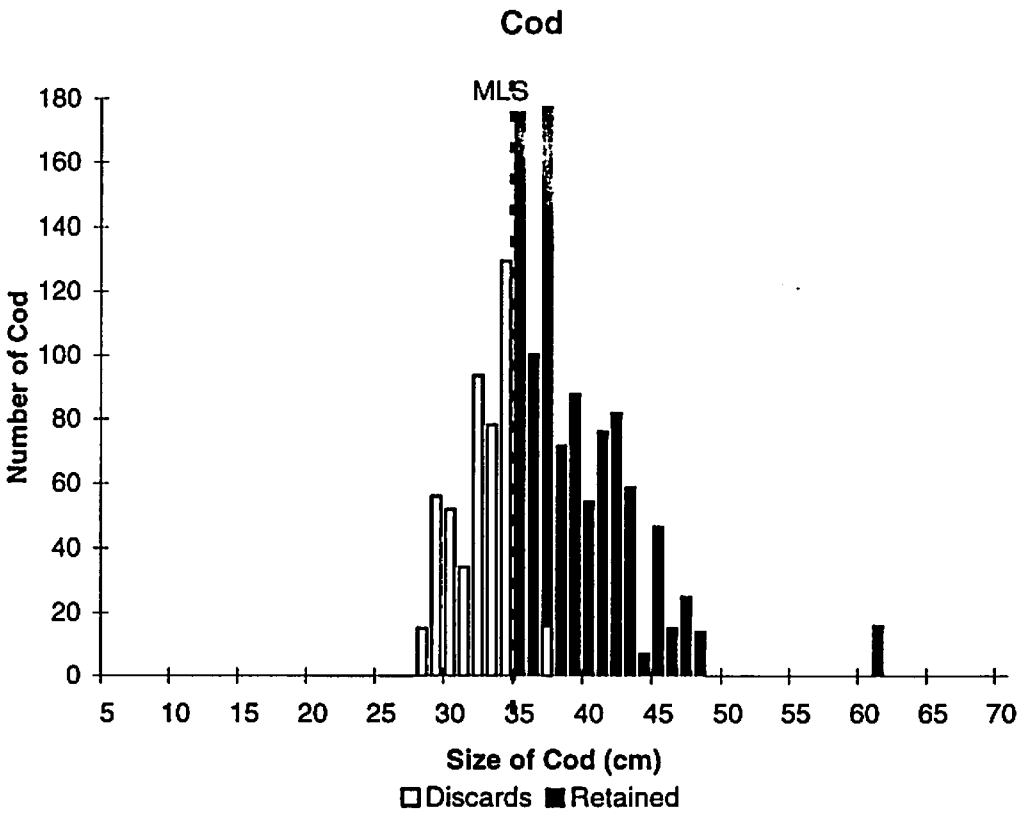
Figure 9 Trip 46 Length-frequency distributions for mackeral and bib catches.

4.8 Trip 47

Home Port: Rye
Metier: U1.2
Sailed: 23/10/97 & 24/10/97
Landed: 23/10/97 & 24/10/98 (Sold Hastings)
Gear: Light Ground Otter Trawl
Cod-end Mesh Size: 90 mm
No. Hauls Sampled: 7
Total Hauls For Trip: 7

Table 8 Trip 47 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	118	27	145	81	0	1.4	2.1
Bass	0	9	9	0	0	0.0	1.0
Cod	475	993	1468	32	1	11.3	113.3
Dab	4338	672	5010	87	87	66.5	21.2
Flounder	20	54	74	27	27	0.6	3.2
Tub Gurnard	0	7	7	0	0	0.0	0.3
Gurnard	7	0	7	100	0	0.2	0.0
Herring	0	172	172	0		0.0	4.5
Scad	0	164	164	0	0	0.0	6.2
Lemon sole	0	9	9	0	0	0.0	0.4
Plaice	33	723	756	4	3	0.9	37.4
Spider crab	59	0	59	100	0	5.1	0.0
Sole (Dover)	0	56	56	0	0	0.0	1.7
Squid	0	27	27	0	0	0.0	0.2
Thornback Ray	23	0	23	100	0	0.5	0.0
Turbot	0	15	15	0	0	0.0	5.1
Whiting	104	645	749	14	14	3.3	35.5



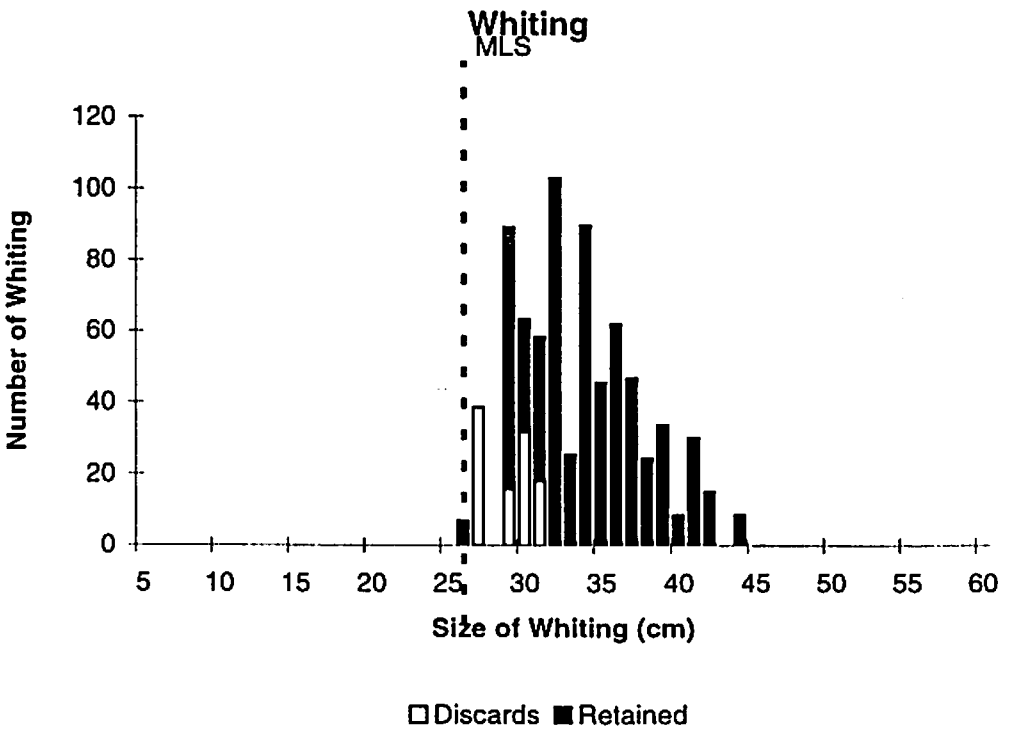
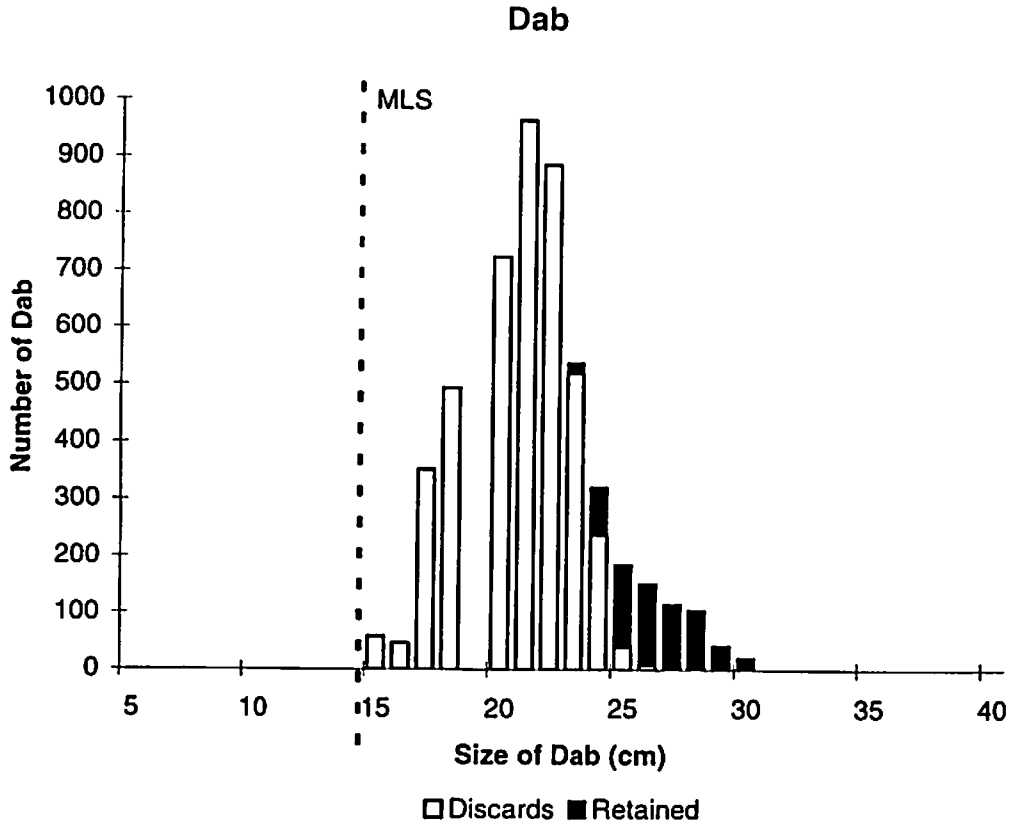


Figure 10 Trip 47 Length-frequency distributions for cod and whiting catches.



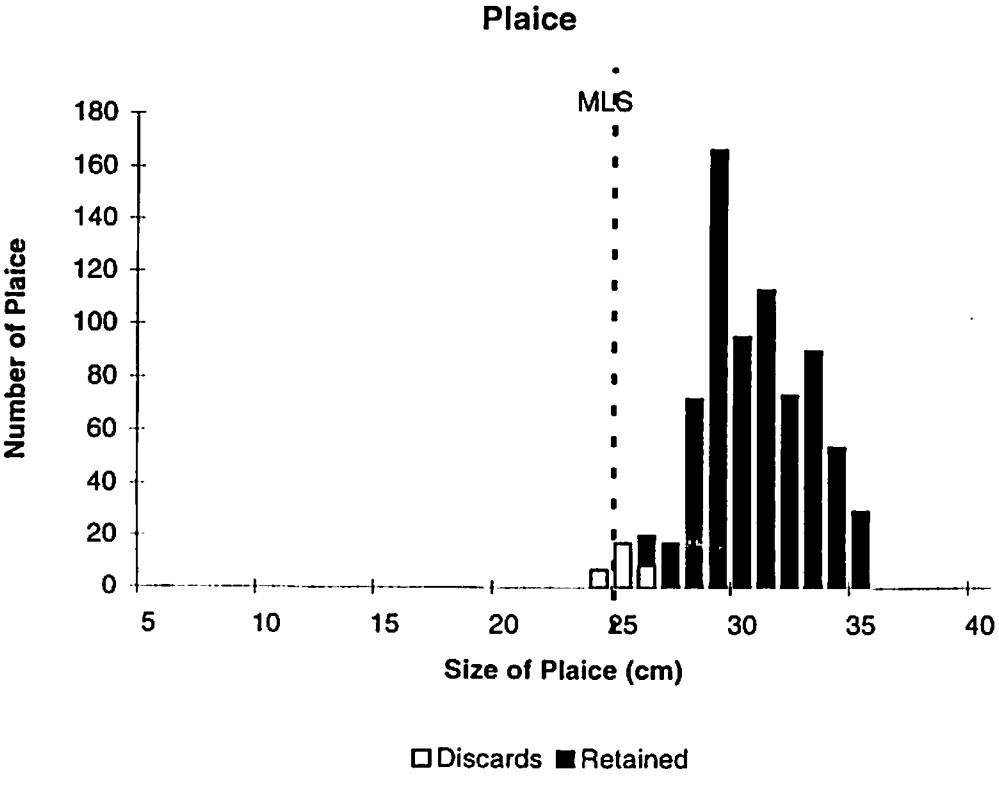


Figure 11 Trip 47 Length-frequency distributions for dab and plaice catches.

4.9 Trip 49

Home Port: Portsmouth
Metier: U2.2
Sailed: 03/11/97
Landed: 08/11/97 (Plymouth)
Gear: Beams = 11.7 m, traditional shoes, chain mat
Cod-end Mesh Size: 80 mm
Cover Bag Mesh Size: 100 mm
No. Hauls Sampled: 16
Total Hauls For Trip: Approx. 35

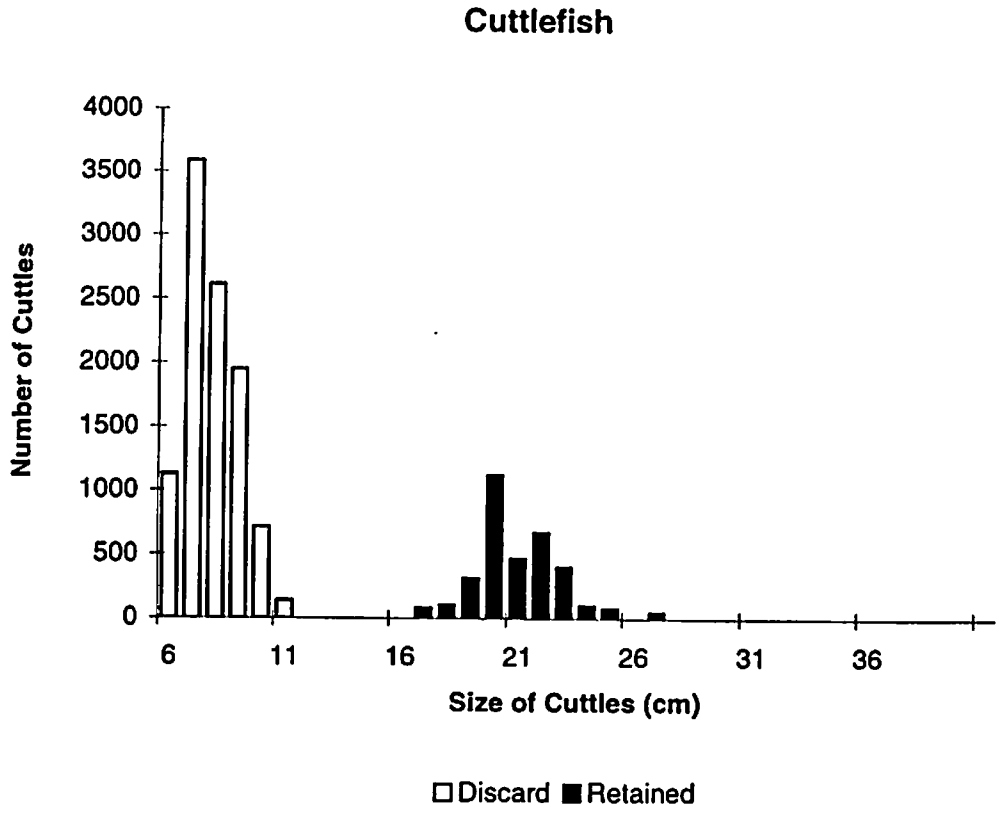
Table 9 Trip 49 ; Catch composition

	NUMBERS					WHOLE WEIGHT (st)	
SPECIES	Discards	Retained	Total Catch	% Discard Rate	% DIS above MLS	Discards	Retained
Pout whiting	3536	721	4257	83	0	104.7	56.8
Dab	548	967	1514	36	36	11.2	30.1
Tub Gurnard	60	176	236	25	0	2.8	9.6
Lemon sole	0	477	477	0	0	0.0	36.5
Plaice	0	4116	4116	0	0	0.0	258.4
Brill	0	61	61	0	0	0.0	16.2
Cod	0	38	38	0	0	0.0	7.2
Edible Crab	512	0	512	100	0	0.1	0.0
Cuttlefish	11267	2303	13570	83	0	45.9	70.9
Dragonet	7480	0	7480	100	0	8.7	0.0
Gurnard	4454	48	4502	99	0	66.4	1.9
Scad	67	0	67	100	0	0.5	0.0
LSD	45	0	45	100	0	7.0	0.0
Monkfish	0	48	48	0	0	0.0	59.1
Scaldfish	299	0	299	100	0	1.1	0.0
Spider crab	110	0	110	100	0	18.1	0.0
Sole (Dover)	0	1646	1646	0	0	0.0	93.2
Squid	309	83	392	79	0	1.2	5.3

4.10 Trip 51

Home Port: Brixham
Metier: U2.2
Sailed: 01/12/97
Landed: 06/12/97
Gear: Beams = 8 m, twin wheel bogies, chain mat
Cod-end Mesh Size: 80 mm
No. Hauls Sampled: 24
Total Hauls For Trip: 41

Data processing in progress



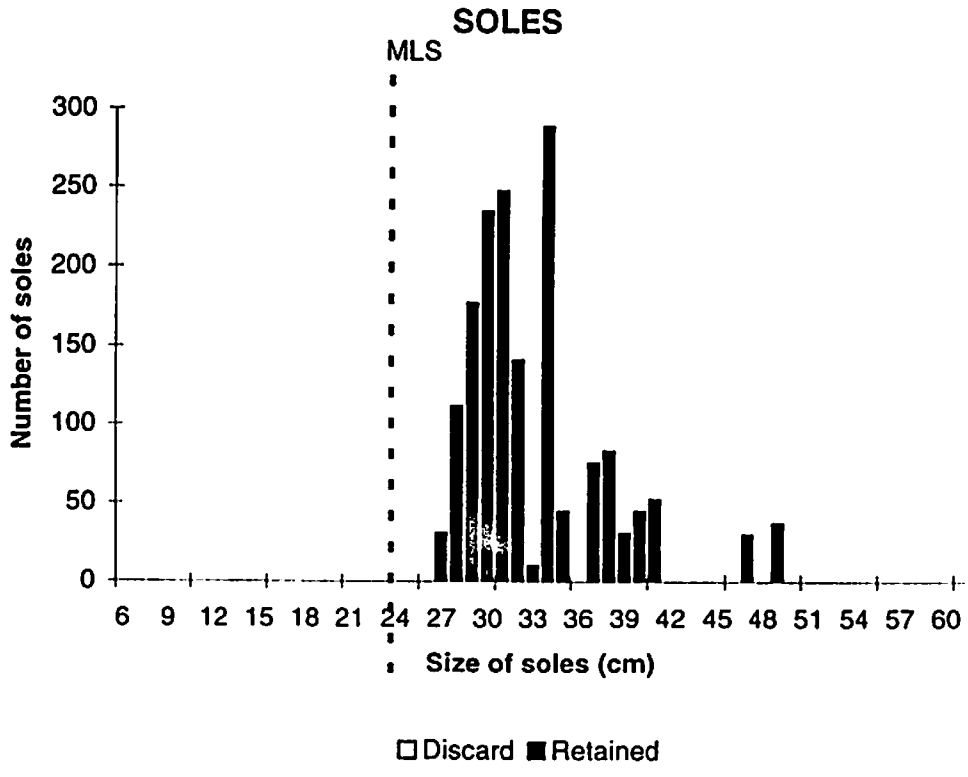


Figure 12 Trip 49 Length-frequency distributions for cuttlefish and sole catches.

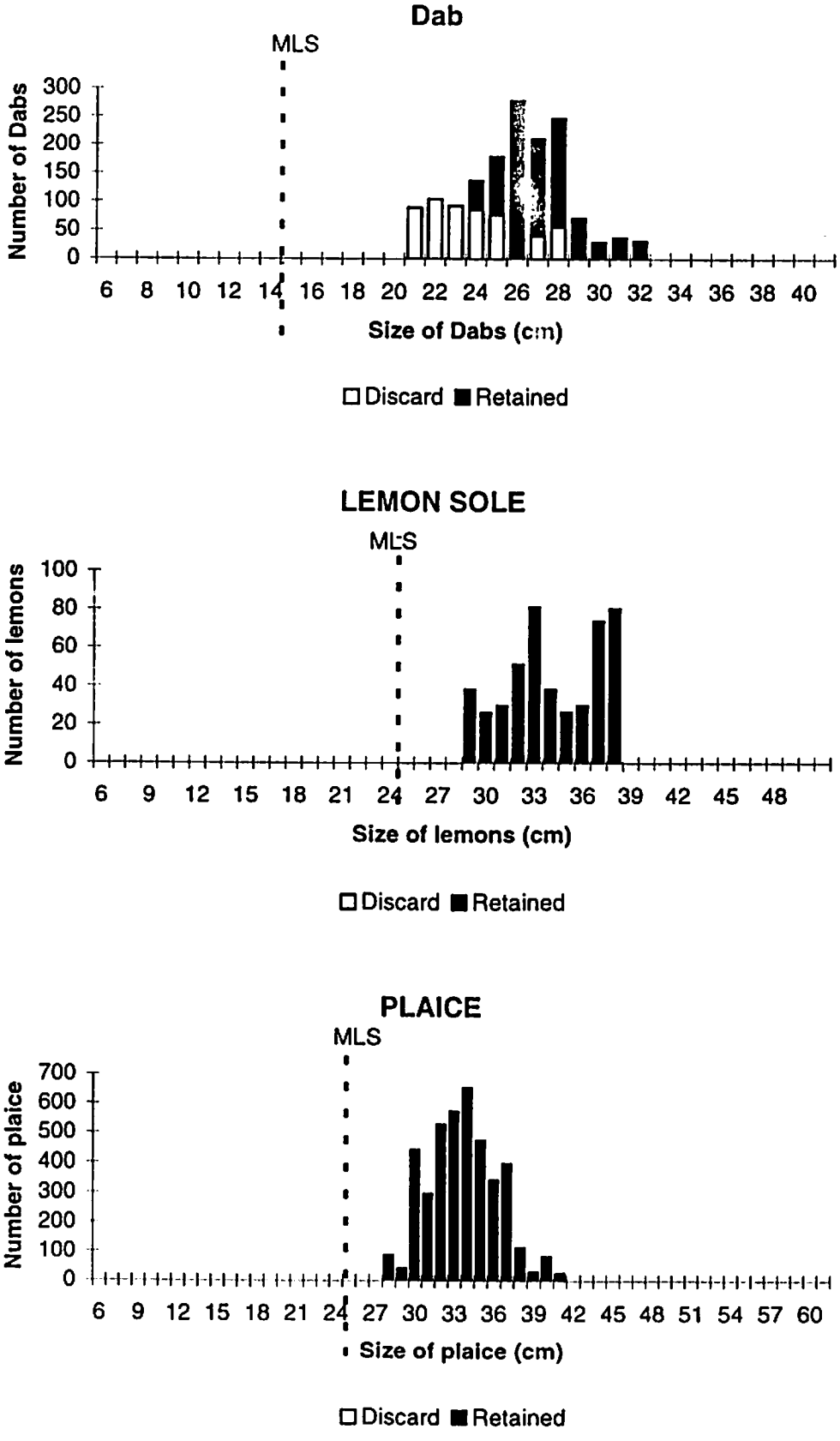


Figure 13 Trip 49 Length-Frequency distributions for dab, lemon sole and plaice catches.

5. Discussion

5.1 Targets and Achievements

As can be seen from the Table 2 cooperation was gained for the first time in ports which had previously been opposed to the survey, namely Rye and Newlyn. For both ports, access has been gained or promised for otter trawlers, inshore beamers, scallopers and offshore beamers (in Newlyn). Access to a Portsmouth based offshore beamer was also achieved for the first time. Failure to achieve all the planned trips for the quarter was for a variety of reasons listed below:

- As yet, access to offshore beamers based in the South East region has not been achieved. This is in part due to the limited number of offshore beamers available for selection in this region and non cooperation by one owner in Newhaven.

- The final offshore beamer trip from Newlyn was cancelled due to illness and subsequent poor weather, although the vessel will be sampled early in the following quarter (1st, 1998).

- The planned scallop trip from Plymouth was cancelled as the targeted vessel changed from dredges to beams early in the quarter.

- Offshore beamer and scalloper trips undertaken are usually of over a week in duration, thereby reducing the time available for the other métiers to be sampled.

5.2 Vessel selection

As before selection of the vessels for sampling was carried out by the Discard Officer. There was no effort to introduce a random element into the vessel selection. Introduction of random selection of vessels would be difficult for a number of reasons:

- Vessels in the current survey are only approached which appear, or are known to be, seaworthy, properly equipped with liferaft, EPIRB, etc., and manned by a qualified and competent crew. This is particularly important in view of recent vessel losses and in general the Discard Officers would expect to feel assured of the safety of the vessel over and above the bear minimum required by law. The Discard Officers have complete autonomy in accepting or rejecting vessels on safety grounds and have substantial experience and knowledge of the fleets to draw on in choosing vessels.

- Choosing vessels from a database without reference to the condition of vessels on the ground is likely to cause delays due to selected vessels being unavailable, uncooperative or unsuitable.

The final analysis of the results will include observations of between vessel variation over the course of the whole Channel discard study. This will give an indication of the extent of the between vessel variation and therefore the importance of randomising the choice of vessels. Of course if vessels perceived as unsafe had consistently different discarding practices then some bias would be inevitable.

5.3 Sampling Techniques

The sampling techniques used are substantially the same as those developed and used by Emberton *et al.*, (1995) and Course *et al.*, (1996) for the previous discard surveys. The development of a workable scallop sampling protocol and some minor changes in beaming/trawling sampling are detailed below.

It is important to realise that flexibility is an essential part of the discard sampling method. No two fishing vessels are identical and this means that the chosen method must be capable of being applied to the wide range of conditions and environment that the Discard Officer finds him or herself in. Any changes or adaptions in the sampling method are recorded, although few of the larger otter and beam trawlers caused significant problems.

5.3.1 Otter and Beam Trawlers

During the actual sampling of the catch, it was noted that large fish, for example cod of >60cm typically slid off of the shovel before the sample was completely removed from the haul mass. Two solutions have been suggested:

- Once inserted, the sides of the sampling shovel are extended vertically upwards, by eye, and any large fish within this 'virtual shovel' that subsequently fall off are placed by hand into the sample basket.

- Where possible, all large species (i.e. cod, monk, ling) liable to 'fall off' the sample, are separated from the haul and individually measured. The ability to do this is dependent on several factors, the speed of the crew during sorting and gutting and the number of smaller individuals in the haul to be measured being the major ones.

5.3.2 Scallop Dredgers

Scallop dredgers posed separate problems as offshore scallop dredgers had not been surveyed before and a satisfactory sampling technique had not yet been fully developed. After some experimentation during trip 43 (French dredges) the following technique was adopted and it is hoped will be workable aboard both French dredge vessels and spring loaded dredge vessels:

- As rocks and other matter routinely make up 80-90% of the hauls, sampling the whole catch is impossible within the time available. Therefore sampling using a shovel is considered not viable. Rocks, shells and other benthos are therefore simply recorded as present under the generic 'trash' category and are not quantified.

- Half the dredges on one side were chosen each haul and from these all the fish and a number of scallops were collected. When weather permitted and the catch rate was low, all fish from the sampled side were taken to increase accuracy of the sample. This method required assistance from the deck hand in clearing the remaining dredges of the sampled side. Therefore this method was only utilised when the Discard Officer felt confident that the deck hand present would pick up all fish species, which wasn't always the case.

- It was found that due to short towing times and the number of other fish species caught, sixty scallops were the maximum number that could be measured from each haul if other fish species were also to be accurately measured and otoliths extracted. Therefore the first sixty scallops picked up working along the deck were taken or the scallops from the selected dredges if there were ≤60.

- In addition to the total number of scallops retained, the total weight of fish retained for each sampled haul was also recorded.

Observations on board the vessel indicated that catch rates for both shellfish and finfish species sides were similar for both sides of gear. It was however, evident from that there was a difference in the catch rate of finfish between outside dredges and inside dredges, inside dredges catching exhibiting the highest catch rate for fish.

This was to be attributed (by the mate) to be due to fish attempting to escape through the gap between the two sets of gear and consequently being caught in the inside dredges. Allowance was made for this effect by sampling inboard and outboard dredges as equally as was practically possible.

5.3.3 Raising the scallop dredge data

The intention is to raise the numbers of scallops captured by the quantity of scallops landed for each haul and the fish either by the weight of fish or by the proportion of the dredging effort sampled. This will be undertaken before further scallop dredging trips are carried out.

5.4 Species identification

An increase in the number of species identified has been observed possibly due to an increase in the western range of the survey. Species added to the database include:

Black bream *Spondyliosoma cantharus*
Boarfish ('Zulu') *Capros aper*
Imperial scaldfish *Arnoglossus imperialis*
Smooth hound *Mustelus mustelus*
Starry smooth hound *Mustelus asterias*
Stripped red mullet *Mullus surmuletus*
Thickback sole *Microchirus variegatus*
Topknot *Zeugopterus punctatus*
Tub gurnard *Trigla lucerna*
Rockling *Gaidropsarus spp.*

See Appendix 2 for a full list of species.

5.5 Motives for discarding

The reasons for the discarding of fish are numerous and have been listed and discussed in previous discard survey reports (Emberton *et al.*, (1995) and Course *et al.*, (1996)) and elsewhere Crean (1994). The most commonly expressed reasons so far expressed include:

- Bycatch composition and quota restrictions encouraged high grading in some areas. This was particularly evident on the offshore scallop trip (French dredges) where significant quantities of megrims, plaice and monk, which were above MLS (Minimum Landing Size) and marketable, were dumped in favour of Dover and lemon sole. Current market prices favoured the soles. Therefore, the intention was to fill their 10% by-catch quota of finfish with these higher value species maximising the profit margin, logical behaviour in any business venture. During the last month of the quarter quota restrictions was also cited as the reason for the high grading of plaice aboard a southwest beam trawler trip.

- Morale and fatigue of the crew affected the sorting of low value species such as pout whiting. It was observed aboard one vessel that large marketable pouts were kept if the skipper was on watch and keeping an eye on things, and dumped if he was not.

- Size of fish influenced the discarding of all valuable species. MLS were strictly adhered to on all vessels for the main commercial species. Dabs appeared to be the only species, subjected to an MLS, to be frequently discarded in a significant quantity, above the minimum size. On smaller vessels fish were subjected to two stages of sorting. The first is a 'rough sort' from the deck and into baskets. The second sort is at the gutting table against a ruler if in doubt. Samples taken and presented to the fishermen for sorting were subjected to the first 'rough sort' only. Any fish below MLS were later identified as such at the time of gutting and then discarded. Since the fish are measured subsequently and some more discarded if they are below the MLS then the technique and subsequent processing of the data must reflect this. Currently the technique does not allow for this system of sorting and thus results in some fish of below the MLS appearing in the retained category. This is the case for cod caught during trip 45.

- Market prices clearly influenced the discarding practice of low value species such as dab, pout whiting, and lesser spotted dogfish.

5.6 Comparison between regions

Due to the limited number of trips undertaken so far, the only trips available for a fair comparison between regions are the otter trawl trips from Rye and Newlyn. Due to differences in catch composition the only species available for comparison are lemon soles caught during trips 45 and 46. Results show the same quantity of lemon soles were caught in each trip, 280 and 281 respectively (see Tables 6 and 7). The graphs (Figures 6 and 7) show a greater presence of juvenile lemons in métier U1.2 (otter trawl east) compared to métier U1.1 (otter trawl west). The actual total lemon sole discard rate for the Eastern trip was 48% compared with 12% for the Western Channel trip. These results are consistent with the findings of the 1995 study (Course *et al.*, (1996)).

5.7 General attitudes to survey

Despite initial scepticism, the general reaction from the skippers and owners approached has been very positive. Quite often, any initial resistance to the survey is overcome once the difference between Seafish and MAFF is explained, despite the fact that the survey is commissioned by MAFF.

There has been genuine interest shown in the survey among the skippers and crews participating, particularly when it is pointed out that data of this type could be of use when identifying possible 'closed areas'. This topic was constantly raised by the participants as something "that should be researched". Considerable interest is also shown during the species identification process, fish outside of the haul sample often being brought to the Discard Officer to identify during the trip. The gift of the book used to identify fish could perhaps be considered as a suitable and cost-effective reward for those participating in the current survey.

As noted above, outright refusal has so far been met only once by a South East boat owner, suspicion as to the true nature of the survey and fear of prosecution being the reason for refusal. In this particular case the local 'policing climate' and quota restrictions seem to have combined to deny Discard Officer access. This is the exception so far however, many participating vessels giving both actual and declared landing tallies, although this is no longer insisted upon in every case. The overwhelmingly positive attitudes encountered so far bode well for the success of the self-sampling pilot, as do general conversations on the subject with fishermen.

The authors believe that the trust and cooperation shown is in no small part due to the ex-fishing status of the Discard Officers, the insistence on *actual* anonymity and the fact that we have no interest in directly identifying 'black fish' or quota limits. A 'good will' by-product of the survey is that the Seafish 'brand' is disseminated to far more fishermen than is usual in Seafish Technology projects (these generally focussing on one or two vessels for the duration of the study), in an atmosphere which demands mutual trust and respect.

5.8 Safety aspects

As discussed above, safety has perhaps become more of an issue than in previous surveys and Seafish has responded to this in several ways. Firstly, it has been emphasised by the Discard Officers' line managers that the decision on whether or not to go to sea on a vessel is entirely theirs, and that the personal safety of the Discard Officer is the main factor in any such decision. Personal Locator Beacons (PLBS) have been issued in addition to the standard safety equipment worn (DOT life jacket and flotation suit) and miniflares are carried at all times on deck.

New oilskin trousers incorporating a life jacket (developed by Seafish Technology and Crewsaver) are to be given to the Discard Officers in the new year for evaluation. A few trial samples will be offered by the Discard Officers to fishermen to allow them to comment on the prototypes. In the opinion of the Discard Officers these will be looked on favourably by most fishermen and could make a major contribution to the safety of singlehanded fishermen, and those such as gillnetters who are unable or (unwilling) to work in 'traditional' style buoyancy devices.

5.9 Discard sampling by fishermen

Discussion with fishermen has produced a generally favourable response to the idea of self-sampling of discards. Perhaps this is part of the growing realisation among fishermen, that it is better to be involved with the gathering of information that can potentially have a major

impact on their working lives, than to merely complain about the accuracy or otherwise of such information collected by others.

The Discard Officers have already identified several vessels whose crews have shown an interest in the pilot study and are considered to be capable of carrying out the sampling accurately and reliably. Contact has been established (see Appendix 1) with French researchers at IFREMER who already carry out a programme of discard sampling by their fishermen.

5.9.1 Methods

Discussions have taken place within the discard team on the method to be used for sampling discarded fish and accounting for concomitant retained fish. It has been agreed that it should be possible to ask the fishermen to collect samples of the catch and sort them into landed and discarded fish.

However, it is considered that asking the fishermen to measure the lengths of retained fish as described in the original proposal may not be a practical proposition. Therefore it has been decided to ask the fishermen to simply count the main retained species (a pre determined list of species will be provided) and account for the minor species by volume. The Discard Officer would then obtain length-frequency distributions for the landed fish from samples taken from the fish hold when the vessel lands and would measure all fish in the discard samples.

Thus length-frequency distributions for both landings and discards would be obtained by trip but discard rates would be obtained by haul. Analysis of between haul variation in the discard rate should enable an assessment of the validity of this method.

Companies supplying suitable equipment; bags and labels are being contacted and suitable premises for analysis of the discard samples are being identified.

5.9.2 Reward

The reward for participating in the survey is provisionally set at around £25 per sample; each trip would consist of 10 samples. This figure is based on the French experience detailed in Peronnet (*pers. comm.*; see letter in the Appendix 1).

This has not been finalised but it is expected that the fishermen would take an interest at this level of reward. It is suggested that any payment is made in cash and that it is stressed that the payment is for the entire crew, ensuring the willing cooperation of those on the deck actually carrying out the sampling.

5.10 Effort survey and fish price

As in the previous contract an effort survey is also being carried out. In this survey it has been decided to concentrate on the actual activities of the vessels sampled during the year prior to the start of the project rather than questioning a larger sample of the fleet. This will improve the definition of the métiers. The fish price data are being obtained where possible from the fishermen rather than through MAFF as was previously the case.

6. References

Course, G., M. Emberton, and W. J. Lart (1996) Discard and Effort Survey: Channel ICES Areas VII d and e 1995. Seafish Consultancy Report No. 110.

Crean, K., and D. Symes (1994) The Discards Problem: Towards a European solution. *Marine Policy,* 18 (5) 422-434.

Emberton, M., G.Course and W. J. Lart, (1995) Irish Sea Finfish and *Nephrops* Discard Study 1993/1994. Seafish Consultancy Report No. 99.

Perronet, I (1995) *in* Assessment of discarding Rates for Commercial Species of Fish: Final Report to the Commission of the European Communities. MAFF.

Appendix 1

Letter from Isabelle Peronnet

IFREMER

Station de Lorient

8 rue François Toullec - 56100 LORIENT
Tel 02 97 87 73 10 - Telecopie 02 97 83 41 06

Dear Bill

It is true that I have worked since a few years with profesionnals in order to make discards sampling. we usually ask them quite simple things to do.

1° to take samples themselves

When the crew has finished to sort the commercial fish according to their habits. A fisherman gives an estimate(in number of baskets) of the bulk of waste on the deck and takes a sample of half basket of waste or so 20-30kg from two different parts of the bulk. This sample is put in a plastic bag whith 100 g of boracic acid and ice. Then the bag is closed , labelled, and stored in the hold. Boracic acid is used for conservation of discarded fish but above all to denature it. Fish become unfit for human consumption, and thus the problems with market regulation are avoid. However, some fishermen refuse to use boracic acic because their boats are not equipped with a partitionned hold where it is possible to isolate the bags from the commercial fish. In fact, the discard bags made of a plastic canvas are not watertight and thus there is a possibility of contamination of the commercial fish by boracic acid. In any case, it is not a problem since ice is sufficient to obtain a very good conservation of the fish.

2° Various pieces of information

For each sampled haul fishermen have to note on pre-printed sheets :

- date, time, geographic positions of the haul
- the quantities of each commercial species caught (in number of baskets)
- the total quantity of discards remaining on the deck(in number of baskets)
- the quantity of discards put in a bag(in fraction of basket
- the characteristics of the gear used for that haul
- the damages should the occasion arise

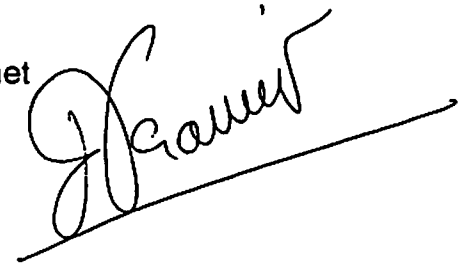
The lenght of the commercial fish are sampled in auction by the technicians of the laboratory when the boat arrives

Fishermen receive a sum of 250 French Francs per haul sampled in compensation of the extra work and the occupancy of the fish hold.

I hope I will anser your questions about discard$ sampling. If you need some more information don't hesitate to contact me . I aplogie for my bad English i hope you can anderstand me

Best wishes

Isabelle Péronnet



Appendix 2

Common names, Latin names and Codes of Species named in tables and figures; section 5.4 contains some new ones

COMMON	LATIN NAME	CODE
Atlantic herring	*Clupea harengus*	HER
Atlantic mackerel	*Scomber scombrus*	MAC
Bass	*Dicentrachus labrax*	BSE
Bastard Sole	*Microchirus azevia*	SOB
Blond ray	*Raja brachyura*	BLO
Brill	*Scophthalmus rhombus*	BLL
Boarfish (Zulu)	*Capros aper*	ZUL
Cod	*Gadus morhua*	COD
Common skate	*Raja batis*	CSK
Cuckoo ray	*Raja naevus*	CUR
Cuttlefish	*Sepia officinalis*	CTL
Dab	*Limanda limanda*	DAB
Electric ray	*Torpedo marmorata*	ELE
Four-eyed sole	*Microchirus ocellatus*	SOF
Garfish	*Belone belone*	GAR
Greater spotted dog	n/a	DGN
Haddock	*Melanogrammus aeglefinus*	HAD
Hake	*Merluccius merluccius*	HKE
Imperial scaldfish	*Arnoglossus imperialis*	SCI
John dory	*Zeus faber*	JOD
Lemon sole	*Microstomus kitt*	LEM
Ling	*Molva molva*	LIN
Lobsters	*Homarus gammarus*	LBD
Lumpsucker	*Cyclopterus lumpus*	LUM
Lesser spotted dogfish	*Scyliohinus canaculus*	LSD
Megrim	*Lepidorhombus whiffiagonis*	MEG
Octopus	Unspecified	OCT
Pilchards	*Sardina pilchardus*	PIL
Plaice	*Pleuronectes platessa*	PLE
Pollack	*Pollachius pollachius*	POL
Pout whiting (Bib)	*Gadus luscus*	BIB
Queen scallops	*Aquipecten opercularis*	QSC
Red mullet	*Mullus surmuletus*	MUR
Saithe, coley, blackjack	*Pollachius virens*	POK
Sand sole	*Pegusa lascaris*	SOS
Scaldfish	*Arnoglossus laterna*	SCA
Scallops	*Pecten maximus*	SCX
Sea bream	*Pagellus spp.*	SBZ
Shagreen ray	*Raja fullonica*	SHG
Sole (Dover)	*Solea solea*	SOL
Solenette	*Buglossidium luteum*	SON
Spider crabs	*Maia squinado*	SCR
Spotted Ray	*Raja montagui*	SPO
Sprats	*Sprattus sprattus*	SPR
Spurdog	*Squalus acanthias*	DGS
Squid	*Loligo spp.*	SQC
Thick-backed sole	*Microchirus variegatus*	SOT
Thornback ray	*Raja clavata*	THR
Thors scaldfish	*Arnoglossus thori*	SC
Three-bearded Rockling	n/a	RCK
Tope	*Galeorhinus galeus*	GAG
Turbot	*Scophthalmus maximus*	TUR
Whiting	*Merlangius merlangus*	WHG
Witch	*Glyptocephalus cygnoglossus*	WIT
Wrasses	Unspecified	WRA