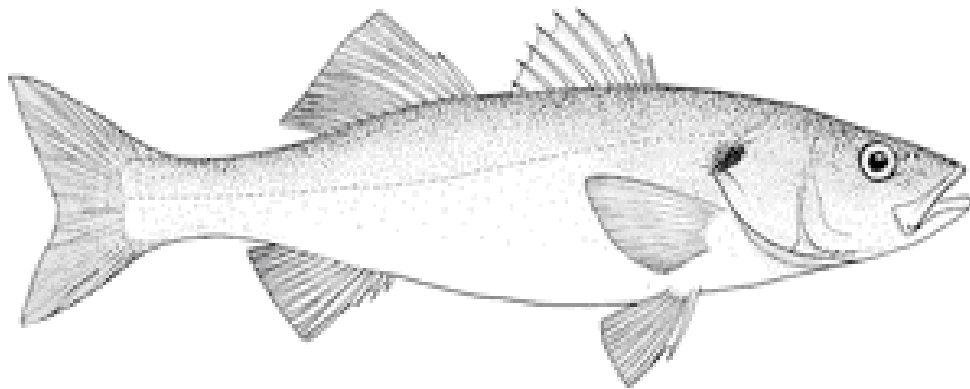


## **Age compositions and discarding of bass in the UK commercial fisheries.**



An updated summary of data requested by the Bass Anglers Sportfishing Society following a meeting between BASS, Defra and Cefas on 10 June 2011.

Cefas

August 2011

## Introduction

This note summarises data shown at a meeting requested by the Bass Anglers Sportfishing Society, involving BASS, Defra and Cefas on 10 June 2011, to discuss options for bass management. The following information is provided:

1. Data on age compositions of bass in the commercial fisheries
2. Estimates of length frequencies of landed and discarded bass, and quantities discarded, by all UK vessels
3. Bass discards in commercial fishing trips where bass is specified by the skipper as one of the target species for the trip.

### 1. Bass age compositions

#### 1.1. *Annual age compositions of landings*

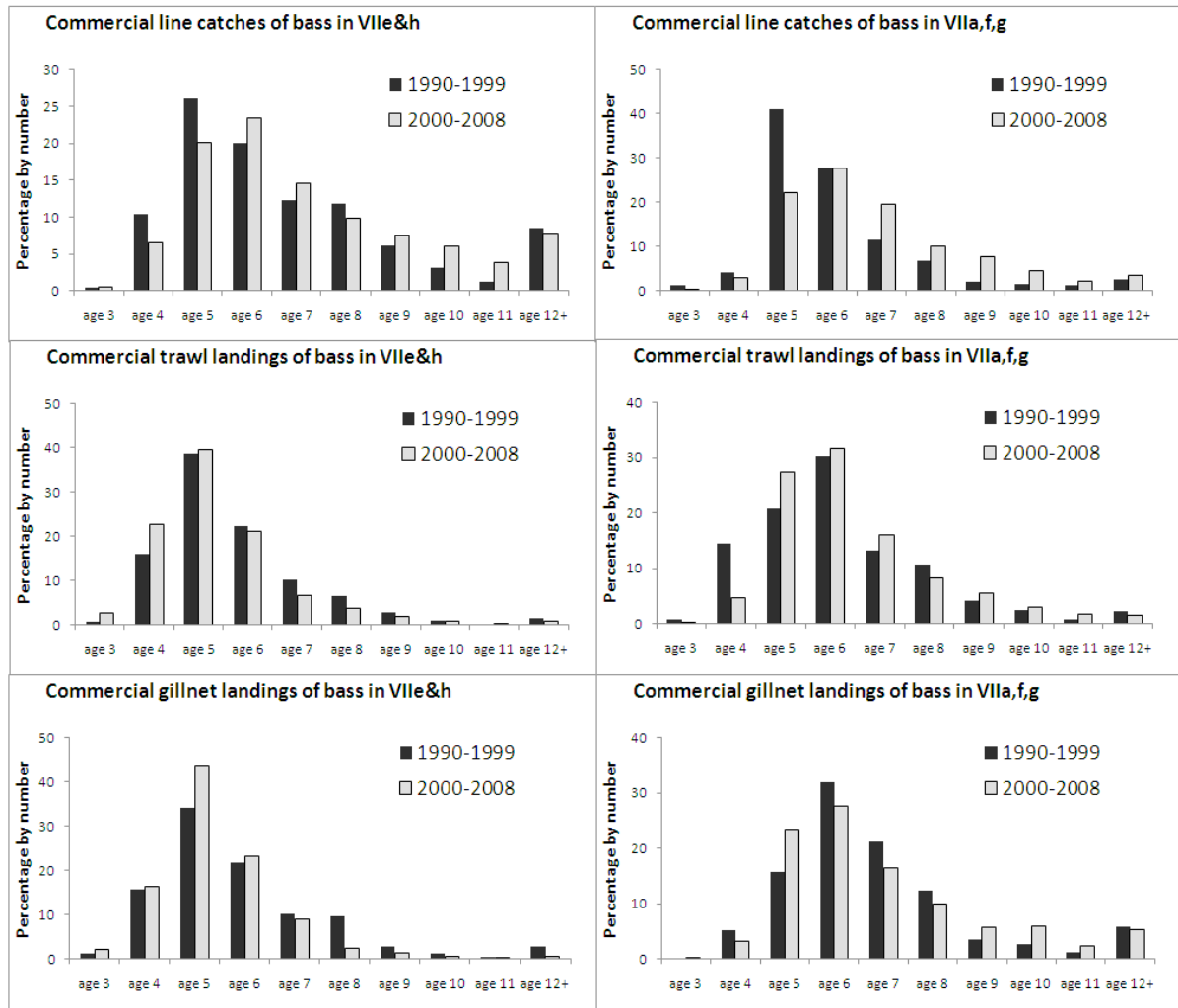
The annual fishery catches of a species can be broken down into numbers at each age class based on regular sampling of the catches at the ports or at sea. Samples of scales or otoliths are collected to determine the age of individual fish caught. The annual age compositions of the catches can provide information on the overall population age composition and death rates due to fishing, but only after the selectivity patterns in the fishery are taken into account.

The term “selectivity” refers to the relative probabilities that fish of different ages in the population will be caught by vessels using a particular type of fishing gear. It is the combined effect of factors such as the mesh size of nets, and the sizes or ages of fish in the area where the fishery is operating, that determines overall selectivity of a gear. For example vessels fishing only in a fish “nursery area” would have a high probability of catching juvenile fish and a very low probability of catching large adult fish which occur elsewhere. A vessel using gill nets will catch only the sizes of fish that can get meshed in the nets. The selectivity of hook and line gear depends partly on hook and bait size, and the extent to which fishermen target areas with particular sizes of fish. Trawl fisheries tend to be amongst the least selective gears, with age compositions depending on the age composition on the ground and the mesh size of the net.

During 2008 – 2009, the total reported UK landings of bass into England and Wales (and E&W vessels landing elsewhere) were 741t and 670t respectively. The largest UK fishery for bass was using fixed and drift nets, which took 43-47% of the total landings. The next most important gear was otter trawls (28-31%), followed by hook and line (22%), pair trawls (2-3%) and other gears including beam trawls (1-2%). In the 1990s and 2000s, the age compositions of UK commercial fishery landings of bass in ICES Divisions VIIe,h (western Channel and approaches) and VIIa,f&g (Irish Sea and Celtic Sea) have tended to peak at 5 – 6 years of age in the line, trawl and gillnet fisheries (Figure 1.1). The line fishery in the western Channel and western approaches has significant catches at ages 12 and over in both decades.

The data in Figure 1.1 exclude discards for which sampling for age compositions has been limited. Discarding is mainly bass below the minimum landing size of 36cm, i.e. up to 4-5 years old. There has been little or no at-sea sampling of commercial line fisheries for bass to estimate quantities discarded, as it is expected that most discarded fish will survive.

No length or age composition data are available for UK recreational fishery catches.



**Fig. 1.1.** The age compositions of bass in the annual landings of the UK commercial fisheries in the western Channel and approaches (ICES Div. VIlle&h) and Irish and Celtic Seas (VIIa,f,g) in 1990-1999 and 2000-2008. The figures are the total number of fish in each age class, expressed as percentages. Discards are not included. The “age 12+” category represents all fish at age 12 and over (Data are from EU Nespman project report [http://ec.europa.eu/fisheries/documentation/studies/nespman/index\\_en.htm](http://ec.europa.eu/fisheries/documentation/studies/nespman/index_en.htm)).

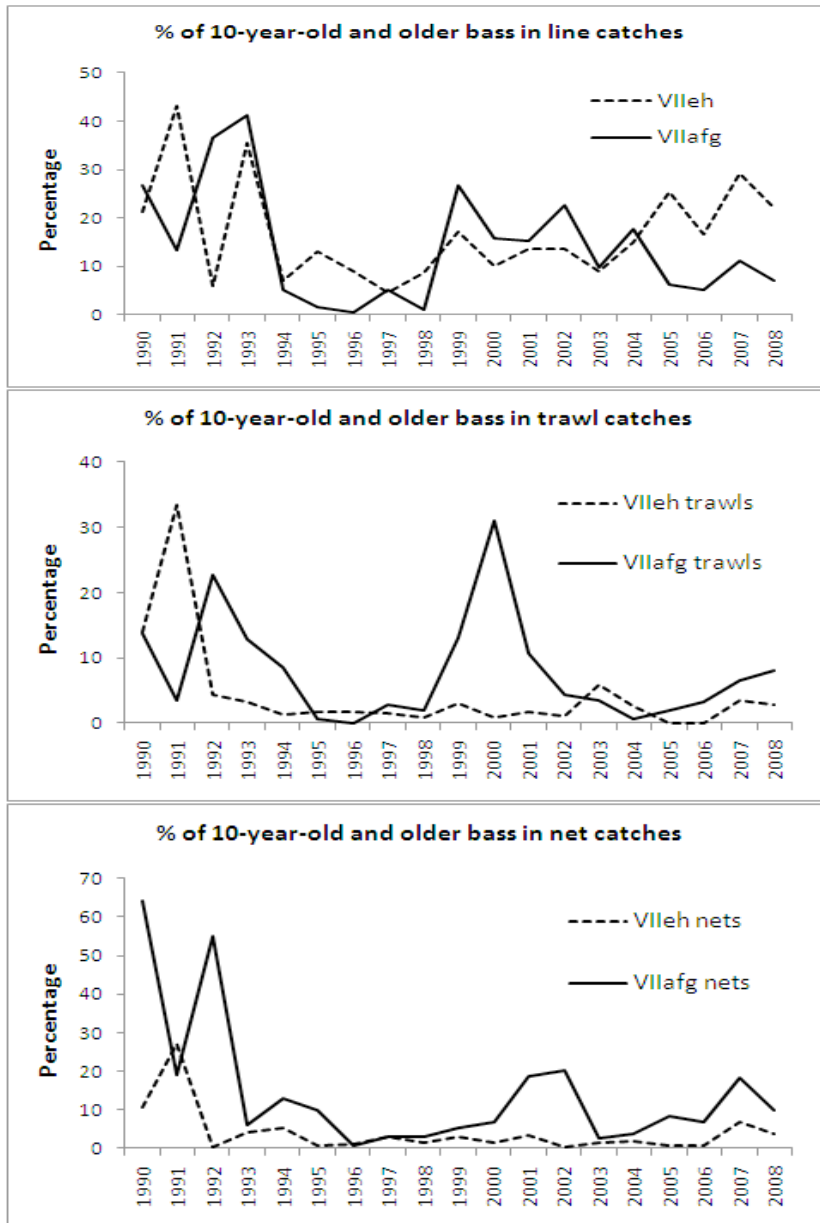
## 1.2 What determines the number of large “specimen” bass in an area?

Tagging studies have shown that individual bass in the south-west and English Channel tend to stay within very localised areas, and often return to the same stretch of coastline even after extensive annual migrations to offshore spawning grounds. Bass in the Irish Sea and North Sea appear to have a weaker affinity to particular areas. The availability of large bass in a given area around the coast therefore depends on a combination of several factors:

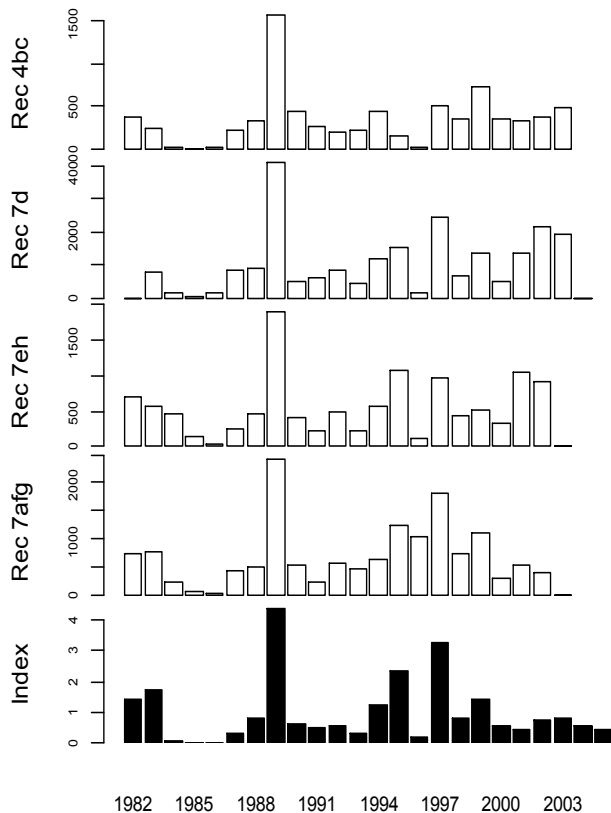
- Localised fishing pressures in the inshore zone;
- Fishing pressure on offshore grounds;
- The occurrence of very strong or very weak year classes (fish from a given year’s spawning) from earlier years.

Variations in year-class strength can have a strong influence on the number of large bass in the population 10 or more years later. This is illustrated in Figures 1.2 and 1.3 which show the contribution of 10-year-old and older bass to UK commercial fishery landings (Fig. 1.2) in relation to historical estimates of year-class strength (Fig. 1.3).

In the mid 1990s, the proportion of the fishery catches comprising 10+ fish was relatively low (Fig. 1.2), and this reflects a period of poor recruitment in the mid 1980s (Fig. 1.3). In contrast, the strong 1989 year class and some subsequent above-average year classes have resulted in an increasing proportion of 10+ fish from the late 1990s onwards.



**Fig. 1.2.** Percentage of UK commercial landings of 3-year-old and older bass (numbers of fish) comprising fish of 10 years old and older, in lines, trawls and gillnets.



**Fig. 1.3.** Trends in recruitment (year-class strength) of bass in UK waters, by area, from a stock assessment model incorporating UK fishery age compositions up to 2006 (ICES, 2008). The height of each bar represents the relative abundance of young fish from a given year's spawning. Bottom plot is the independent recruitment index from the Cefas trawl survey in the Solent (not included in the assessment model). Years refer to year of spawning (year class).

## 2. Bass discards: all UK vessels

Cefas places scientific observers on a sample of UK-registered commercial fishing vessels in each quarter of the year to estimate the quantities and sizes of each species discarded at sea. The size composition of the retained catch is also recorded. Since 2002, the observer programme has covered most areas in ICES Areas IV (North Sea) and VII (English Channel and western waters; Figure 2.1). Prior to 2006, the programme only covered vessels of 10m length and over, but has subsequently extended to under-10m vessels.

This report describes the length distribution of retained and discarded bass caught using a variety of mesh sizes in gill net, beam trawl and otter trawl gears. Vessels using hook and line have been poorly sampled at sea as it is assumed that most line-caught bass survive after being discarded, and no data on discards are available.

## Data collection and analysis

The data presented here are for all vessels catching bass, irrespective of the species being targeted. Section 3 of this report provides data for trips where the skipper recorded bass as one of the target species.

As the Cefas at-sea observer programme covers a wide range of gears, areas and times, only a small fraction of the trips will have bass as a target or by-catch. To provide meaningful results for each ICES Division, gear-type and mesh-size combination, it was therefore necessary to combine the data for the sampled vessels over the years 2002 - 2008. Only those area-gear combinations with sufficient data to give meaningful results are presented. Table 2.1 shows the number of sampled fishing trips for which data were available for these ICES Division/gear type/mesh size combinations.

The size compositions of the landed and discarded part of the catches of bass are plotted for each area / gear / mesh size combination to show how discarding relates to the minimum landing size of 36cm.

## Results

There were marked differences in the length distribution of fish caught by the three fishing gears and various mesh sizes (Figs 2.2 – 2.6).

Beam trawlers caught a larger proportion of fish below the current MLS of 36cm in ICES Divisions VIId than in other areas, although their overall landings of bass are very low (Fig. 2.2; Table 2.1).

In all areas, otter trawlers (80-99mm mesh) caught bass below the current MLS (Figs 2.3 and 2.4). The discard rate was highest for 80-89mm trawls in Division VIId (proportion discarded was 63 % by number and 49% by weight – Table 2.1) due to the apparent low availability of bass above MLS.

The majority of bass caught by gill netters using 90-99 mm mesh were between 39 and 45 cm *TL* (Fig. 2.6). At mesh size ranges of 100-119 cm and 120-149 cm, the majority of bass were greater than 45 cm *TL*. Hence, the discard rates for gill netters were very low (0% – 3%: Table 2.1).

Discarding rates were in line with the length distribution and the minimum landing size, so that areas with a high proportion of fish below 36 cm *TL* were also areas with a high proportion of discarding. For all gears and mesh sizes, very few fish were discarded above the MLS.

## Discussion

These observations indicate that discarding of undersized bass is primarily a concern for otter trawling using mesh sizes < 100mm in certain areas. If a larger MLS was imposed, an increase in discarding could only be avoided by using gears with better selectivity characteristics for bass, and/or fishing in areas where bass below 40cm or 45cm are rare.

Preliminary work in Division VIIIf on otter trawl gears has shown that the use of a square mesh panel of appropriate mesh size may reduce the capture of undersized bass (Catchpole 2009).

**Table 2.1.** Percentage of bass catch discarded (by number and by weight) on observed trips for all years combined (2002 - 2008). See Fig. 2.1 for map of ICES Divisions.

Gear and mesh size	ICES Division	Percentage discarded by number	Percentage discarded by weight	Number of observed trips
Beam trawl 80-89 mm	7d	30	13	9
	7e	8	8	46
	7f	0	0	2
	7g	0	0	4
Otter trawl 80-89 mm	4b+c	34	15	15
	7d	63	49	9
	7e	9	5	127
	7f	9	4	35
	7g	4	2	8
Otter trawl 90-99 mm	7e	3	1	24
	7f	20	14	3
Otter trawl 100-119 mm	4c	10	2	1
	7d	2	1	1
Gill net 90-99 mm	4c	3	2	5
Gill net 100-119 mm	4c	0	0	4
	7e	2	2	1
Gill net 120-149 mm	7e+f+g	3	2	9

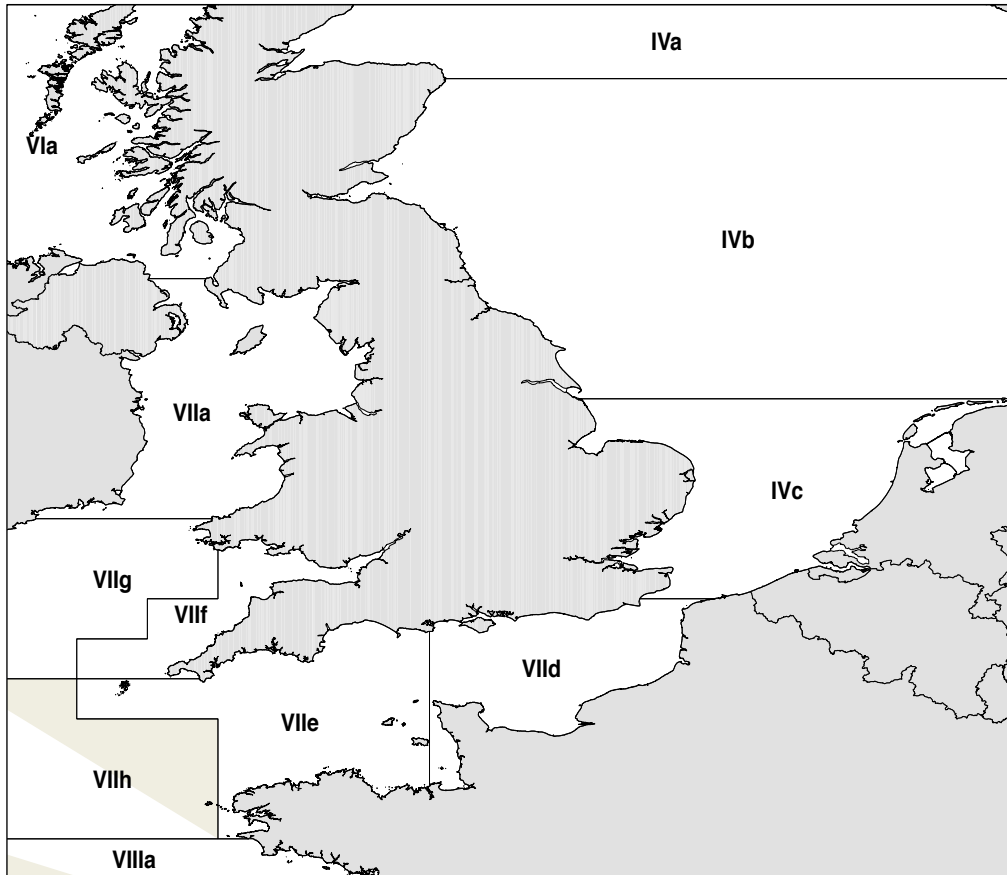
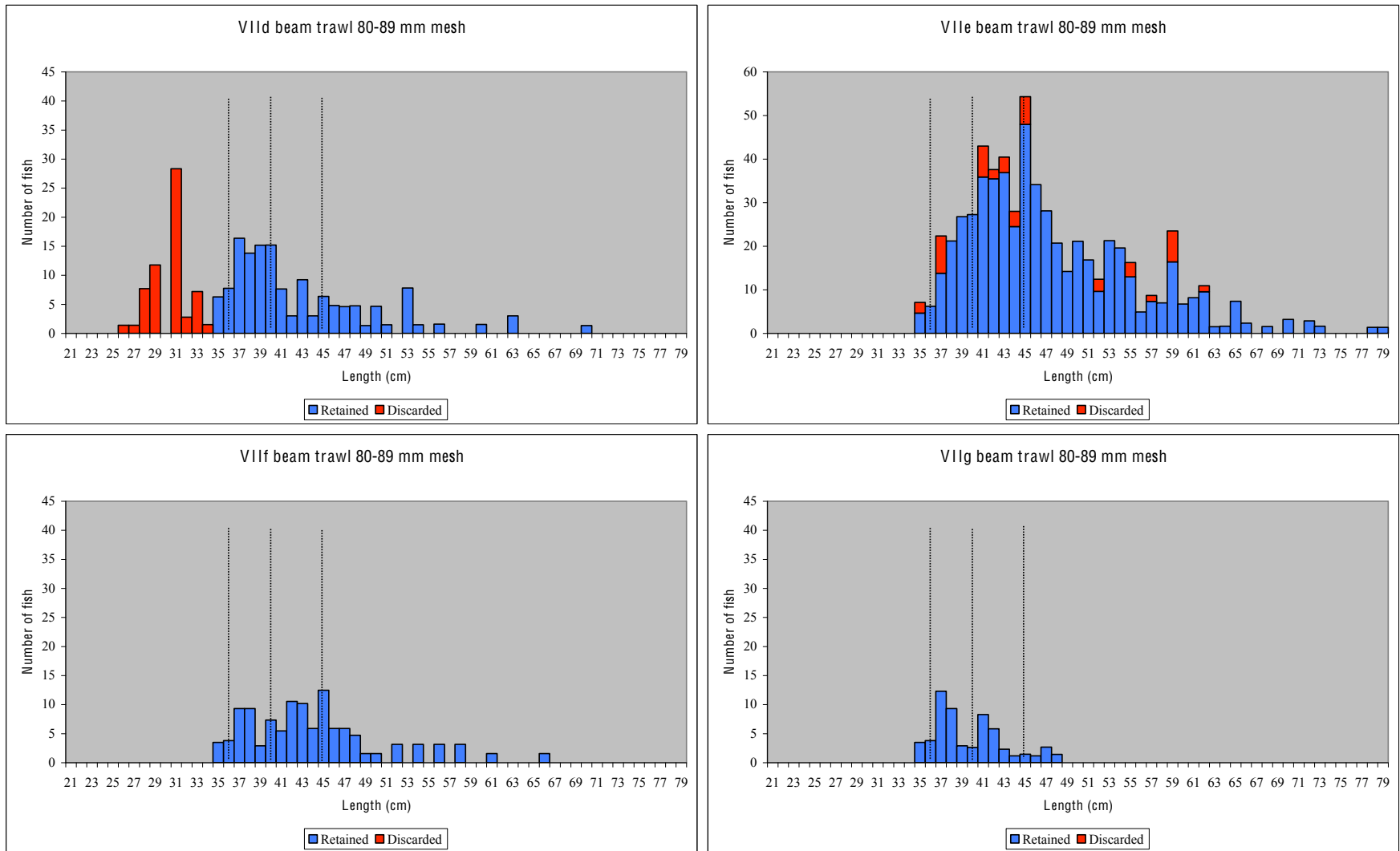
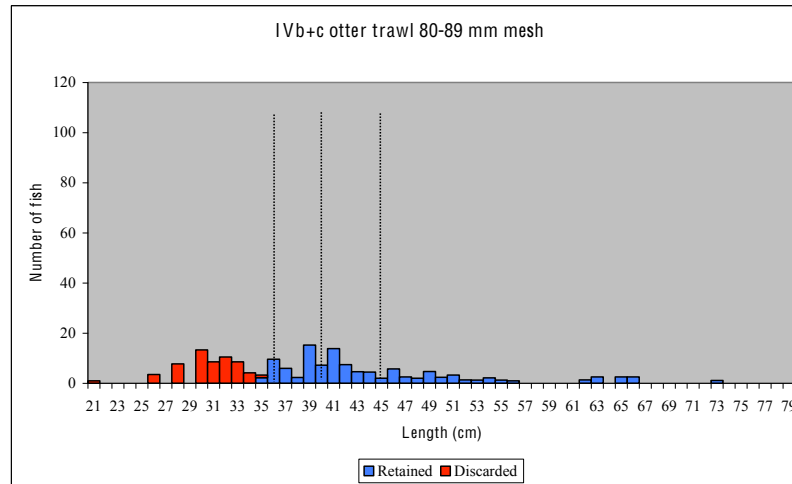


Figure 2.1: Map of the UK showing the ICES Divisions mentioned in the text.

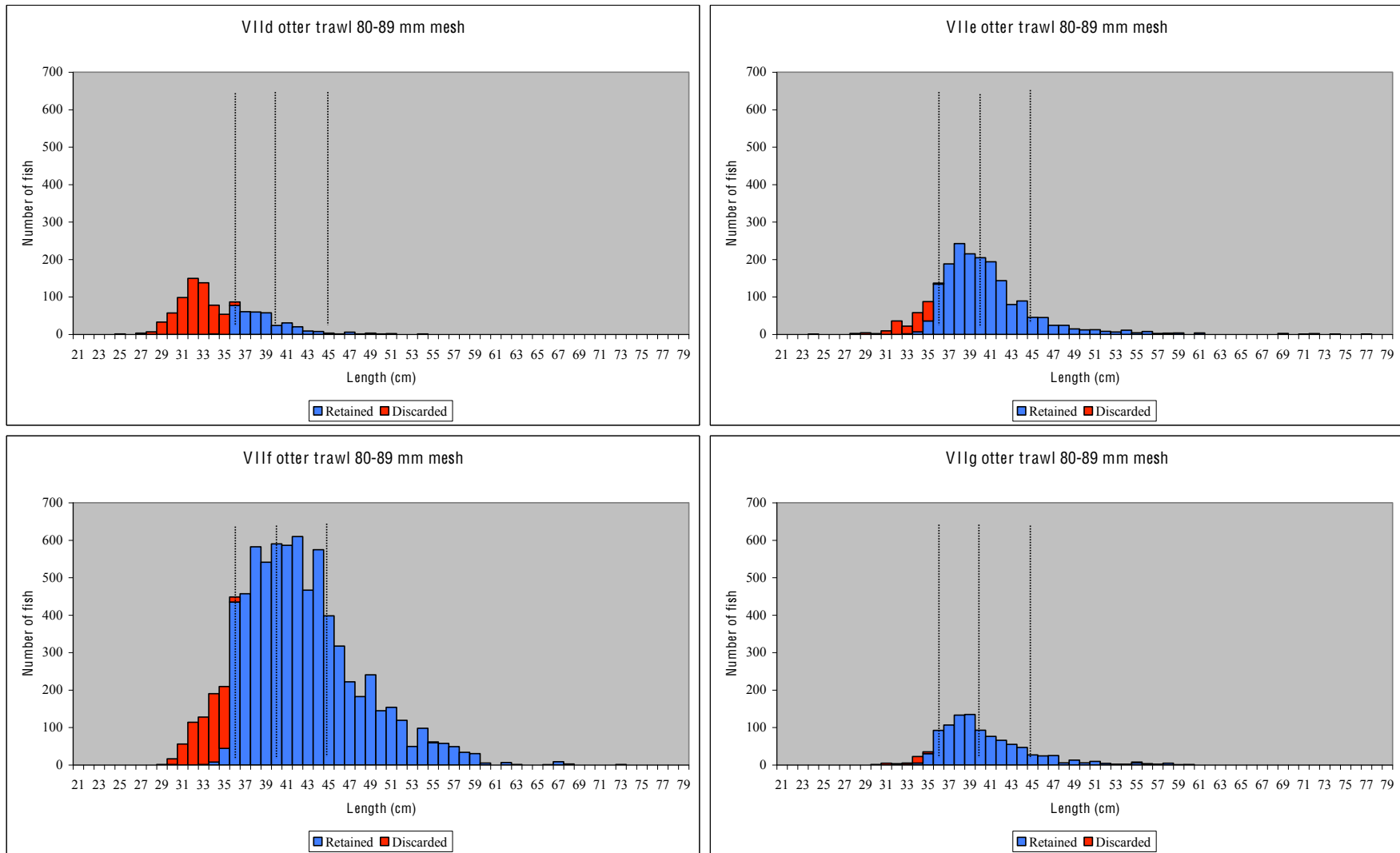




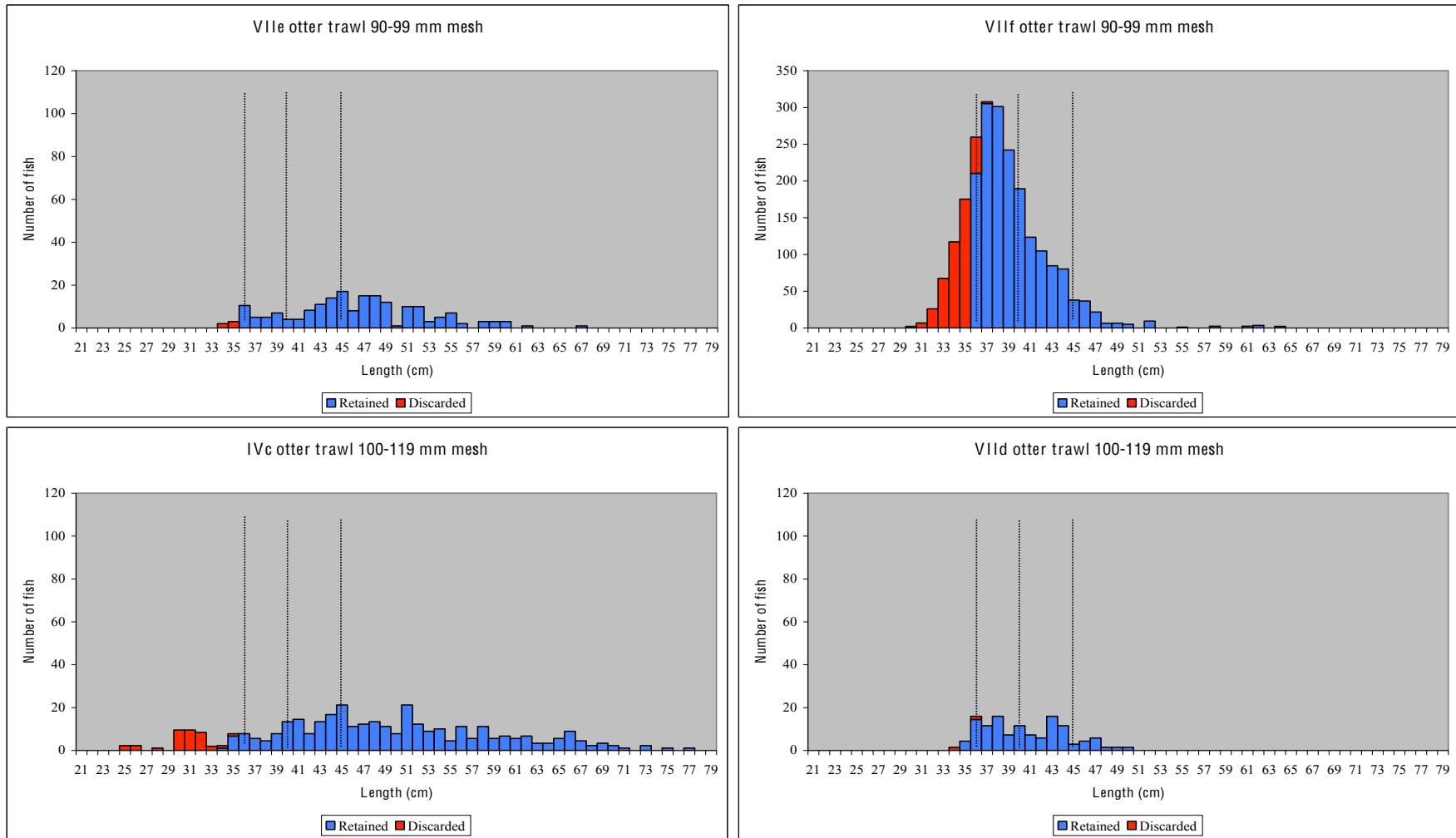
**Figure 2.2.** Trip-raised length-frequency plots of retained and discarded bass caught by beam trawlers using 80-89 mm mesh gear, sampled in ICES Divisions VIIId, VIIe, VIIf and VIIg, between 2002 and 2008. Vertical lines indicate 36cm (present MLS), 40cm and 45cm.



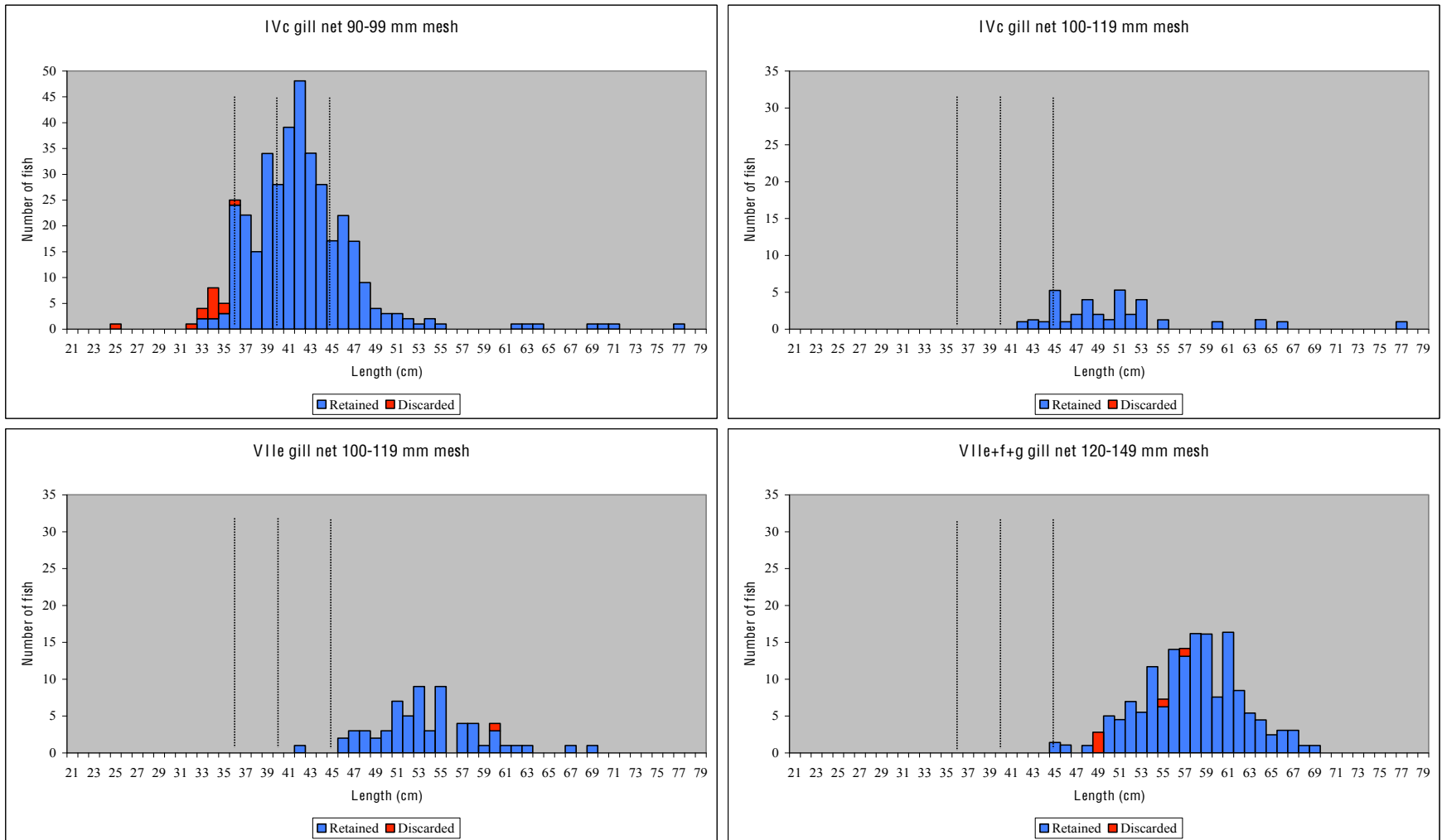
**Figure 2.3.** Trip-raised length-frequency plots of retained and discarded bass caught by otter trawlers using 80-89 mm mesh gear, sampled in ICES Divisions IVb+c, between 2002 and 2008. Vertical lines indicate 36cm (present MLS), 40cm and 45cm.



**Figure 2.4.** Trip-raised length-frequency plots of retained and discarded bass caught by otter trawlers using 80-89 mm mesh gear, sampled in ICES Divisions VIId, VIle, VIIf, and VIlg, between 2002 and 2008. Vertical lines indicate 36cm (present MLS), 40cm and 45cm.



**Figure 2.5.** Trip-raised length-frequency plots of retained and discarded bass caught by otter trawlers using 90-99 mm mesh gear in ICES Divisions VIIe and VIIf and by otter trawlers using 100-119 mm mesh gear in ICES Divisions IVc and VIId, between 2002 and 2008. Vertical lines indicate 36cm (present MLS), 40cm and 45cm.



**Figure 2.6.** Trip-raised length-frequency plots of retained and discarded bass caught by gill netters using 90-99 mm mesh gear in ICES Division IVc, 100-119 mm mesh in ICES Divisions IVc and VIIe, and 120-149 mm mesh gear in ICES Divisions VIIe+f+g, between 2002 and 2008. Vertical lines indicate 36cm (present MLS), 40cm and 45cm.

### 3. Bass discards in commercial trawling trips where bass is specified by the skipper as one of the target species for the trip.

#### Data and method

To provide estimates for bass-directed trips, Cefas observer trips since 2003 were filtered to only include trips where the skipper recorded bass as one of the target species. This could only be done for trawls, as there were too few observer trips on vessels using gillnets and no trips were carried out on vessels using lines.

The spread of sampling effort across the overall English fleet means that small sub-sets of the fleet such as bass-directed trawling will be infrequently sampled. Hence the number of observed bass-directed trawl trips has been very small and patchy (Table 3.1). As catch rates and discarding are extremely variable from trip to trip, it is difficult to interpret individual trip data and it is normal to derive information on fleet discarding by combining data over sampled trips. Given the very small number of observed bass-directed trips, analyses have been conducted by combining trips across years for each area, and combining over all areas and years.

**Table 3.1.** Numbers of commercial trawl fishing trips with Cefas observers, where the skipper recorded that bass was one of the target species.

Gear type	Area	2003	2004	2005	2006	2007	2008	2009	2010	Total
Otter trawl	North Sea IV b,c		1		1				1	3
	Eastern Channel VIId		1	2				1	1	5
	Western Channel VIle	3	1		1	1			1	7
	Celtic Sea VIIfg	2	1		1	2	5	6		17
Midwater pair trawl	Western Channel VIle				1	1				2

#### Results

Only two bass-directed midwater trawl trips have been observed since 2003, in the western Channel. The predominant catch was bass, and only 1% of the catch weight of bass was discarded (Table 3.2).

The main recorded catch during the 32 otter trawl trips observed by Cefas since 2003, in which bass was included in the recorded target species, was in fact skates, rays and dogfish. Bass was the next ranked species, and 6% of the bass catch was discarded (Table 3.2).

Broken down by region, the discard rate for bass varied from 1 – 6% in the North Sea, western Channel and Celtic Sea but reached 27% in the five sampled trips in the eastern Channel due to the smaller size of bass caught there.

#### Discussion

Overall, the discard rate for bass-directed trips was lower than for all the sampled trips where bass was caught, although in some areas (e.g. the Celtic Sea - VIIf&g) there was no clear difference (compare Tables 2.1 and 3.2).

**Table 3.2.** Total estimated retained and discarded catch (kg) of bass, for bass-directed trawling trips sampled by Cefas observers in 2003-2010.

Geartype	Trip details		Catch (kg)			
	ICES DIVISION	No. trips observed	retained	discarded	Total	% discarded
Midwater pair trawl	7e	2	115	1	117	1
Otter trawl	IV b,c	3	396	4	401	1
	7d	5	68	25	93	27
	7e	7	153	3	156	2
	VIII.f,g	17	882	60	942	6
Otter trawl	All divisions	32	1499	93	1592	6

## References

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