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**COMMISSION STAFF WORKING DOCUMENT**

**SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES**

**EVALUATION OF THE STECF/SGMOS 07-04 WORKING GROUP ON DISCARDS**

**STECF OPINION EXPRESSED DURING THE PLENARY MEETING OF 14-18  
APRIL 2008 IN HAMBURG**

This report does not necessarily reflect the view of the European Commission and in no way  
anticipates the Commission's future policy in this area

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## **1. INTRODUCTION AND BACKGROUND**

### **1.1. Discard issues across European Community fisheries**

Catch of unwanted organisms and their subsequent discarding is significant in several European fisheries, as shown in a report by STECF from November 2006.<sup>1</sup> Such practices are a wasteful use of resources and the sea. From an economic perspective it is wasteful because discarded fish is equal to lost future fishing opportunities. From a perspective of ecological sustainability it is wasteful because the catching of unwanted animals has a negative impact on the marine ecosystem without benefits to society.

In order to tackle the problem of discards in European Fisheries the European Commission has issued a "Communication on a policy to reduce unwanted by-catches and eliminate discards European fisheries"<sup>2</sup> in March 2007. The Communication aims at gradually reducing unwanted by-catch and eliminating discards in all European fisheries. The Commission therefore intends to make some concrete proposals in this respect in 2008, and has asked the Scientific, Technical and Economic Committee for Fisheries (STECF) to provide a first assessment of this approach and of current and past discarding practices in 6 fisheries (see chapter X on terms of reference).

### **1.2. Terms of Reference (ToR)**

STECF working group on discards 2007

#### Background:

In view of the progressive implementation, on a fishery by fishery basis, of the Community policy on discards<sup>3</sup> the Commission will propose in 2008 a 'roadmap' covering all European finfish and crustacean fisheries, stretching over several years. In parallel the Commission will propose, also in 2008, a specific regulation to gradually eliminate discards in a first group of fisheries. These should be fisheries which have a real discard problem and where reductions of discards can be achieved within reasonable timeframes and at acceptable costs. In the subsequent years such measures will be proposed for all other fisheries ('roadmap').

#### Description of the problem:

Starting from the known or estimated levels of unwanted catch, the regulation will set an objective corresponding to the lowest possible level of discards / unwanted catches in each fishery ("maximum acceptable level"). Like in a multi-annual plan, the regulation will fix intermediate levels per year which will be gradually lowered, thus achieving the "maximum

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<sup>1</sup>

[http://ec.europa.eu/fisheries/cfp/management\\_resources/conservation\\_measures/pdf/stecf\\_2006\\_discards\\_report.pdf](http://ec.europa.eu/fisheries/cfp/management_resources/conservation_measures/pdf/stecf_2006_discards_report.pdf)

<sup>2</sup> COM(2007)136 final

<sup>3</sup> as outlined in COM(2007)136 final ("Communication on a policy to reduce unwanted by-catches and eliminate discards in European fisheries")



acceptable level" over a span of years. The levels fixed will serve to trigger management measures such as Real time closures or obligations to move fishing grounds. Input is needed

- on the definition of the fisheries /métiers

- on the definition of the objectives

- on the economics of the fisheries

#### List of tasks:

For each of the fisheries listed below STECF is asked to advise on the following issues:

##### I. Biological information:

- Describe the fisheries in terms of fleets, gears and mesh sizes, fishing effort, total catches and catch composition, size composition, fishing grounds (ICES sub-areas and divisions, GFCM, GSA) and seasonality, focusing in particular on unwanted catches of finfish, crustaceans and other non-commercial invertebrates and on discard rates. Discards, as a whole and by relevant components, should be expressed as a percentage of the weight and numbers of the total catch.
- Identify 'métiers' in each fishery and consider if they are regulated at MS level (fishing licenses, special permits, lists of vessels, etc.), and advise if the matrices proposed for the Data Collection Regulation (SGRN 0603) are workable for the envisaged measures.
- Define a methodology to calculate "maximum acceptable levels of unwanted catch", identify such levels for the fisheries / métiers and propose a timeframe to achieve these.
- Provide quantitative information on discard rates and unwanted catch of involved 3<sup>rd</sup> country fleets.
- Provide quantitative assessment of the different factors leading to discards in each fishery / métier, such as MLS regulations, quota restrictions, high grading, market prices etc.
- Provide information on how to reduce the unwanted catches and discard rates in the fisheries / métiers listed and identify monitoring needs and research requirements.
- Provide information on data availability, representativity, reliability and fisheries coverage, and identify relevant knowledge gaps.

##### II. Economic information

- Provide information, for each fishery / métier, regarding fishing costs and first sale prices of the main species caught or discarded, if possible by grades, for the years 2004-2006.
- Provide information on the relation between first sale prices and discards and between first sale prices for substitute products (fish or other) and the volume of discards.

- c) Identify questions and tasks to be addressed in Impact assessments (biological, economic and social impacts) on the subsequent legislative proposals.

Based on the results of this work the Commission will then choose a number of fisheries for the 2008 regulation. STECF will then be asked again to provide input to the Impact Assessments.

List of fisheries:

1. Bottom trawling in the Mediterranean:
  - a. mixed trawl fisheries on the continental shelf and slope
  - b. deep water shrimps
  - c. Norway lobster
2. Bottom trawling for finfish in ICES divisions VIIefghj and area VIII
3. Flatfish fisheries in the North Sea and the Eastern channel (ICES area IV and division VIIId)
4. Flatfish fisheries in the Baltic sea (areas 21-29)
5. Pelagic fisheries in NE Atlantic North (ICES areas V, VI, XII, XIV)
6. Crustacean fisheries in the Bay of Biscay and off the Iberian peninsula (ICES divisions IXa and VIII abcd)

Throughout the report each fishery is referred to using the numeric identifier above e.g. Fishery 2 refers to 'Bottom trawling for finfish in ICES divisions VIIefghj and area VIII'.

## **2. STECF COMMENTS AND CONCLUSIONS**

### **2.1. STECF observations**

STECF reviewed the report of the SGMOS-07-04 Working Group on discards, noting that a considerable amount of information had been compiled in the short time available.

STECF notes that the terms of reference were extensive and, with the benefit of hindsight, too demanding for the time available for the Expert group meeting. As a consequence, the working group was unable adequately to address most of the tasks. Items a and b, of Biological Information on descriptions of the fisheries and identification of métiers were reasonably well addressed, but the Group was unable to provide adequate and useful information on items c – g.

It is also noted that the ToR were not helpfully organised, since questions relating to markets and how to change human behaviour were included under the heading of Biological Information.

With regard to Economic items, the group was unable to provide any comprehensive quantitative information in relation to items a and b, but made some useful suggestions with regard to item c.

In general, the quantitative information on discarding rates presented in the report is incomplete. They are presented in two ways, the mean value from sampled trips and the aggregated value over all sampled trips, in terms of weight and numbers, but not in absolute discard levels. This was not possible because the group was not able to work with landings and/or effort data for each of the fisheries identified in the call but rather just the landing data

for the sampled trip. Furthermore, the fisheries identified in the ToR for the group did not match the definitions of fisheries in the DCR.

Whilst the way in which the reported discard rates were derived is explained in the introduction to the report, the derivation of the specific values for discards and discard rates that appear in the tables associated with each of the fisheries described in the report is not adequately documented. As a result it is not clear whether they are representative of the true discard quantities and discard rates in the fisheries concerned. Further work is required on these issues.

The text associated with many of the tables presented in the report highlights the uncertainty associated with the values presented. Therefore, these estimates should only be considered as indicative of the level of discarding for those trips that were sampled and figures presented in this report may not be reliable estimates of discards for the fishery as a whole. In addition STECF is unable to objectively judge which of the estimates presented in the report can be considered reliable.

**STECF** observes that selection of fisheries for first action to reduce discarding should be based not only on scientific advice but also on the values of society.

The Sub-group has clearly had to wrestle with a number of issues relating to data availability, data quality, database problems, sampling variability and sampling coverage of the various fisheries described. The exercise has exposed valid reasons, both logical and statistical, why deriving reliable discard estimates is problematic.

## **2.2. STECF conclusions and recommendations**

It is obvious that many of the estimates of discards rates are based on very few observations and may be biased.

**STECF concludes** that the gaps in the discards data, especially in terms of discards rates for all métiers exploiting a stock, make the overall estimates of discards by species very uncertain.

**STECF concludes** that the discard estimates in the working group report should not be considered representative of the level of discarding in the fisheries identified.

**STECF** recognises that the Commission wants to move towards action, even if only on a pilot basis, on the issue of discarding.

STECF cannot say with certainty, based on empirical evidence, which fisheries are suffering the worst impacts from unwanted catches and discards. STECF can nevertheless identify several fisheries which are certain to be among the highest priority fisheries and therefore can be considered candidates for further analysis and action.

In support of the Commission's desire therefore, **STECF recommends**, that the working group meeting in June 2008 should address the important ToR questions that were not answered by this working group in relation to a few selected case study fisheries.

In order to select the case study fisheries, **STECF** has applied the following criteria:

- a) availability of data to support estimates of discarding and to inform evaluation of the causes and drivers for discarding practices
- b) geographical spread around the EU
- c) scale of discarding problem, as assessed by earlier work (rather than based on the estimates of discarding presented in this working group report)
- d) presence of existing understanding about the more obvious causes of discarding

Based on these criteria, **STECF recommends** the following case study fisheries for the June working group:

- III. 80-99mm beam trawl fisheries in the North Sea
- IV. 70-99mm otter trawl fishery in ICES divisions VIIefghj and VIIIab
- V. 70mm otter trawl fishery in ICES divisions VIIIc and IXa
- VI. 40 mm otter trawl mixed species fishery in the Mediterranean.

**STECF recommends** that the Terms of Reference for the working group should be divided into the following outline structure, in relation to each of the specific case study fisheries:

- **Data and other information** pertaining to the scale and causes of discarding; including biological, economic and technical data. Requirements for existing information and data should be agreed and data compiled in advance of the working group. It is not the intention of STECF that there should be further analysis of raw data to create estimates of discard levels in the next working group.
- **Problem analysis and definition:** identify the scale and scope of discarding (based on comprehensive empirical evidence) and identify and evaluate the causes and drivers of discarding.
- **Potential solutions:** identify and evaluate potential routes to achieving the desired state with regards to discards (the objectives of reduced / minimum discard volumes) in relation to case study fisheries.

With regard to the specific aims in relation to discard reduction, the Commission requested the STECF to establish methodologies to identify the lowest possible discard levels. STECF suggests that, for the case study fisheries, the working group should take this as the technically lowest possible level of discards within the limits of the current fleet characteristics and structure, and overall management regime. STECF notes that in the longer term, vessels and management structures could potentially be designed differently in order to achieve even further reductions in discarding.

## ANNEX

### **STECF/SGMOS-07-04 WORKING GROUP REPORT ON DISCARDS**

**Ispira, 3-7 December 2007**

This report is the opinion of the expert working group on Discards (STECF/SGMOS-07-04) and not of the Scientific, Technical and Economic Committee for Fisheries (STECF)

*This report does not necessarily reflect the view of the European Commission and in no way anticipates the Commission's future policy in this area*

### **3. ANNEX: STECF WORKING REPORT ON DISCARDS**

#### **3.1. INTRODUCTION**

#### **3.2. Discard issues across European Community fisheries**

Catch of unwanted organisms and their subsequent discarding is significant in several European fisheries, as shown in a report by STECF from November 2006.<sup>4</sup> Such practices are a wasteful use of resources and the sea. From an economic perspective it is wasteful because discarded fish is equal to lost future fishing opportunities. From a perspective of ecological sustainability it is wasteful because the catching of unwanted animals has a negative impact on the marine ecosystem without benefits to society.

In order to tackle the problem of discards in European Fisheries the European Commission has issued a "Communication on a policy to reduce unwanted by-catches and eliminate discards European fisheries"<sup>5</sup> in March 2007. The Communication aims at gradually reducing unwanted by-catch and eliminating discards in all European fisheries. The Commission therefore intends to make some concrete proposals in this respect in 2008, and has asked the Scientific, Technical and Economic Committee for Fisheries (STECF) to provide a first assessment of this approach and of current and past discarding practices in 6 fisheries (see chapter X on terms of reference).

The STECF subgroup used data collected through the Data Collection Regulation as well as other relevant data from scientific works and published studies. A list of consulted studies can be found in Annex X to this report.

#### **3.3. Terms of Reference (ToR)**

STECF working group on discards 2007

##### Background:

In view of the progressive implementation, on a fishery by fishery basis, of the Community policy on discards<sup>6</sup> the Commission will propose in 2008 a 'roadmap' covering all European finfish and crustacean fisheries, stretching over several years. In parallel the Commission will propose, also in 2008, a specific regulation to gradually eliminate discards in a first group of fisheries. These should be fisheries which have a real discard problem and where reductions of discards can be achieved within reasonable timeframes and at acceptable costs. In the subsequent years such measures will be proposed for all other fisheries ('roadmap').

##### Description of the problem:

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<sup>4</sup>

[http://ec.europa.eu/fisheries/cfp/management\\_resources/conservation\\_measures/pdf/stecf\\_2006\\_discards\\_report.pdf](http://ec.europa.eu/fisheries/cfp/management_resources/conservation_measures/pdf/stecf_2006_discards_report.pdf)

<sup>5</sup> COM(2007)136 final

<sup>6</sup> as outlined in COM(2007)136 final ("Communication on a policy to reduce unwanted by-catches and eliminate discards in European fisheries")

Starting from the known or estimated levels of unwanted catch, the regulation will set an objective corresponding to the lowest possible level of discards / unwanted catches in each fishery ("maximum acceptable level"). Like in a multi-annual plan, the regulation will fix intermediate levels per year which will be gradually lowered, thus achieving the "maximum acceptable level" over a span of years. The levels fixed will serve to trigger management measures such as Real time closures or obligations to move fishing grounds. Input is needed

- on the definition of the fisheries /métiers
- on the definition of the objectives
- on the economics of the fisheries

#### List of tasks:

For each of the fisheries listed below STECF is asked to advise on the following issues:

#### VII. Biological information:

- h) Describe the fisheries in terms of fleets, gears and mesh sizes, fishing effort, total catches and catch composition, size composition, fishing grounds (ICES sub-areas and divisions, GFCM, GSA) and seasonality, focusing in particular on unwanted catches of finfish, crustaceans and other non-commercial invertebrates and on discard rates. Discards, as a whole and by relevant components, should be expressed as a percentage of the weight and numbers of the total catch.
- i) Identify 'métiers' in each fishery and consider if they are regulated at MS level (fishing licenses, special permits, lists of vessels, etc.), and advise if the matrices proposed for the Data Collection Regulation (SGRN 0603) are workable for the envisaged measures.
- j) Define a methodology to calculate "maximum acceptable levels of unwanted catch", identify such levels for the fisheries / métiers and propose a timeframe to achieve these.
- k) Provide quantitative information on discard rates and unwanted catch of involved 3<sup>rd</sup> country fleets.
- l) Provide quantitative assessment of the different factors leading to discards in each fishery / métier, such as MLS regulations, quota restrictions, high grading, market prices etc.
- m) Provide information on how to reduce the unwanted catches and discard rates in the fisheries / métiers listed and identify monitoring needs and research requirements.
- n) Provide information on data availability, representativity, reliability and fisheries coverage, and identify relevant knowledge gaps.

#### VIII. Economic information

- a) Provide information, for each fishery / métier, regarding fishing costs and first sale prices of the main species caught or discarded, if possible by grades, for the years 2004-2006.

- b) Provide information on the relation between first sale prices and discards and between first sale prices for substitute products (fish or other) and the volume of discards.
- c) Identify questions and tasks to be addressed in Impact assessments (biological, economic and social impacts) on the subsequent legislative proposals.

Based on the results of this work the Commission will then choose a number of fisheries for the 2008 regulation. STECF will then be asked again to provide input to the Impact Assessments.

List of fisheries:

1. Bottom trawling in the Mediterranean:
  - a. mixed trawl fisheries on the continental shelf and slope
  - b. deep water shrimps
  - c. Norway lobster
2. Bottom trawling for finfish in ICES divisions VIIefghj and area VIII
3. Flatfish fisheries in the North Sea and the Eastern channel (ICES area IV and division VIId)
4. Flatfish fisheries in the Baltic sea (areas 21-29)
5. Pelagic fisheries in NE Atlantic North (ICES areas V, VI, XII, XIV)
6. Crustacean fisheries in the Bay of Biscay and off the Iberian peninsula (ICES divisions IXa and VIII abcd)

Throughout the report each fishery is referred to using the numeric identifier above e.g. Fishery 2 refers to 'Bottom trawling for finfish in ICES divisions VIIefghj and area VIII'.

### **3.4. Structure of the Report**

Chapter 5 provides a general overview of the data received by individual member state (MS) by fishery, general comments on data quality and interpretation issues. Each of the fisheries identified in the call are then considered in separate chapters (6-11). Each chapter deals specifically with ToRs I a,b,d,e, by MS and contains the following information:

- i. A general description of the fishery and key fleets involved;
- ii. A brief overview of the sampling methods used by each MS to ascertain if data from individual MS can be aggregated to a fishery level;
- iii. Information on sampling level (number of trips) by gear type and métier if appropriate;
- iv. Discard rates associated with the 'top 10' discard species, expressed as a percentage of the catch by weight and number (if available) from sampled trips;
- v. Length profiles of landed and discarded components of catches of commercially important catches, and;
- vi. An interpretation and summary of the above data



ToRs I c,f,g are dealt with individual chapters as these were felt to be either generic or due to insufficient time being available to deal with these on a fishery by fishery basis.

#### 4. SUMMARY OF DATA RECEIVED AND GENERAL COMMENTS ON QUALITY AND DETAIL

Six separate fisheries were identified in the call:

1. Bottom trawling in the Mediterranean:
  - a. mixed trawl fisheries on the continental shelf and slope
  - b. deep water shrimps
  - c. Norway lobster
2. Bottom trawling for finfish in ICES divisions VIIefghj and area VIII
3. Flatfish fisheries in the North Sea and the Eastern channel (ICES area IV and division VIId)
4. Flatfish fisheries in the Baltic sea (areas 21-29)
5. Pelagic fisheries in NE Atlantic North (ICES areas V, VI, XII, XIV)
6. Crustacean fisheries in the Bay of Biscay and off the Iberian peninsula (ICES divisions IXa and VIII abcd)

Data was received from 16 Member States (Table 2.1.1.1), a number of which provided data on more than one fishery. In general, discard data corresponding to gear type, species threshold and area was provided, but as several of the fisheries are sub-fleets and are not readily defined under the Nantes matrix, the provision of auxiliary data such as landing, effort, number of vessels was more problematic and variable. This also depended on the time series of data available at a member state level. For example, a number of new accession states that may have significant effort in some fisheries but have only recently embarked on sampling programmes under the auspices of the DCR or are currently conducting pilot data collection programmes under regulation 1543/2000. As a consequence there are a number of significant gaps in both the Baltic and Mediterranean data preventing the formation of a truly representative discard patterns in these areas.

**Table 2.1.1.1 Summary of data provided by member state for each of the fisheries.**

Country	Fishery					
	1	2	3	4	5	6
Italy	X					
Ireland		X				
Slovenia	X					
UK (England and Wales)		X	X			
UK (Scotland)					X	
France	X	X	X			X
Netherlands			X		X	
Spain <sup>1</sup>	X	X				
Greece	X					
Belgium			X			
Portugal						X
Sweden						
Germany			X		X	
Cyprus	X					
Malta	X					
Denmark			X	X		

<sup>1</sup> Spain did not provide data for fishery 5, but provided a description of the fishery

## **4.1. Data call and database issues**

### *4.1.1. The Data Call*

The purpose of this meeting was therefore to assemble data on discarding by European fisheries and use them to identify fisheries with the most serious discarding problems, including both commercial and non-commercial species. Prior to the launch of the official call for discard data a warning email (3rd October 2007) was sent to the National Correspondents. The official call was launched shortly afterwards (10th October 2007) and a deadline (11 November 2007) was set. Data was requested at a trip level (rather than aggregated across trips) to allow for estimates of variability between trips to be determined. However, as there is no legal basis for data to be provided at this level, a minority of Member States provided aggregated data. Nearly all the Member States supplied data before the start of the meeting, although only Ireland actually met the 11 November deadline and Germany and Greece were successful on the 12th. Spain did not attempt to upload data until the meeting had started.

The data were all made available (a username and password were issued) to the independent experts invited to attend the meeting on the 27th November via JRC-FISHREG's web-enabled database server. A 'reporting tool' was also set up online which was intended to allow participants to work with their individual data sets prior to the meeting to produce standardised outputs tabulating the discard rates by species, gear fishery and length frequency plots. However, due to technical problems and database problems encountered during the meeting (see section 5.1.2) the reporting tool was not available for the meeting.

### *4.1.2. Data and database issues*

As a data validation exercise, participants cross checked the raw data which had been originally uploaded onto the database with that of the database output. This uncovered a number of data errors associated with both the raw data and the database output. A number of participants noted differences in the number of valid trips reported in the database output in comparison to the original 'raw' data. This was largely due to inconsistencies with trip identification codes and species codes. These issues were resolved during the meeting. More seriously, the estimated discard rates derived from the raw data taken to the meeting by individual participants, were in some instances considerably different from the output from the database, this issue proved more problematic to resolve.

It was subsequently discovered that the discard rates calculated by comparing the landings and discard tables (for both weight and number), obtained from the database failed to include trips where species were either fully retained or discarded (null values). This resulted in considerable biases in the estimated average discard rates and was not fully resolved by the end of the meeting. It was therefore decided that it was not possible to use the data held in the database as this could lead to spurious and inaccurate data being presented. The co-chairs therefore advised participants to work only with data sets that individual participants had taken to the meeting. This meant that data submitted by member states without national participants present could not be analysed with any confidence and are therefore omitted from this report. In addition, much of the work conducted early in the meeting was considered invalid (including analysis conducted on data submitted by MS without national participant).

## **4.2. Presentation of the data and points for consideration**

The data are presented in a number of ways within this report. Discard rates aggregated across all species gives an estimate of total discards rates, including marketable and non-marketable

species. In some instances this includes all biota, while in others only species laid down in 1639/2001, therefore direct comparisons between overall discard rates (all species combined) from individual member states is not possible due to differences in sampling methodology and species sampled. Details on sampling methodology are also reported in order to determine if comparisons between member states engaged in the same fishery are possible.

Discard rates are presented in two ways. To provide an estimate of variability across trips, a mean discard rate is presented with associated coefficient of variation (CV) is given along with a pooled estimate obtained from an aggregation of summed landings and discards (by weight and number) across trips. It is important to note that the discard rates derived from each of these methods can be considerably different, particularly for species with highly variable catch/discard rates and/or few observations. The mean percentage discard rate does not consider absolute values (either by weight or number) and can be biased if high discard rates are obtained from trips with low catch rates, which are atypical. Similarly, high mean discard rates associated with non-commercial species with low catch rates will result in discard rates of 100% thus drawing the absolute average higher in comparison to discard rates derived from summed data across all hauls. Conversely, pooled data which includes trips with large landings and discards which are atypical of the underlying trend in catches can also skew the perception of the discard rates of the fishery. However, if both values are broadly in agreement, would suggest that the observed rates are reasonable reflections of the discard rates across the fishery.

Length frequency distributions of the main commercial species are presented. These are intended to aid interpretation of the principal causes of discards. From LF graphs it is possible to determine the size at which discarding occurs but the reasons for discarding must still be inferred. Comparing length distributions with minimum landing sizes indicates whether discards are associated with a mismatch between gear selectivity and minimum landing sizes (850/98) or associated with high grading and/or lack of market for 'small' fish above MLS. If most discards occur at the minimum landing size (MLS) then it is likely that the MLS regulation is most influential for fishers in selecting which parts of the catch to retain. However, where the MLS and marketable size are the same these effects cannot be separated. Similarly, when fish over the MLS are discarded, this may be because of a lack of quota or because the fish are below a marketable size that is above the MLS.

#### *4.2.1. Issues relating to fisheries identified in the call*

A number of participants noted some of the fisheries identified in the call were not consistent with the Nantes matrix (level 5). These either did not exist in practice or that very few trips corresponded to threshold criteria (e.g. flatfish fisheries in the Baltic – 20% + by weight of total catch) and are not 'true' fisheries but simply a selection of trips which meet the threshold. These trips may therefore be atypical of the underlying or average catch composition and could result in improper inferences being drawn about the gear type and area as these trips may be likely to represent a marginal level of overall activity.

Those MS with activities in the pelagic fisheries noted that the ICES areas identified in the call were in fact sub-components of a more widely distributed fishery and areas where a significant portion of the fishing activity takes place were omitted thus potentially biasing the findings. In order to redress this, both Germany and The Netherlands provided data that covered the entire spatial coverage of the fishery.

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## 5. BOTTOM TRAWLING IN THE MEDITERRANEAN

### 5.1. Description of the fisheries

#### 5.1.1. Italy

The fleet is characterised by a strong multi-specificity and multi-gear activity. The fishing sector appears highly fragmented in many regions along the coast and there are many large structural and technical differences in vessels from different geographical areas. The heterogeneity of the area, in terms of species diversity, fishing techniques and practices (seasonally varying target species, fishing practices, etc.), together with its economic structure, is quite complex.

To carry out a homogenous analysis and to harmonize the data (also for the future analysis) the Italian area has been subdivided in seven Geographical sub-areas (GSA) taking into account the GFCM/FAO division (see Alicante, 2001):

- Geographical sub-areas 9; 10 and 11 - Level IV of Appendix II Reg CE 1639/2001 (Corresponding to Division 1,3).
- Geographical sub-areas 16; 18 and 19 - Level IV of Appendix II Reg CE 1639/2001 (Corresponding to Division 2,2).

- Geographical sub-areas 17 - Level IV of Appendix II Reg CE 1639/2001 (Corresponding to Division 2,2).

### General description of the fleet

The national fleet consists of about 14.000 vessels (Table 3.1.1.1), of which more than 9,300 are less than 12 meters. The number of vessels and capacity (power and tonnage) has been decreasing since 1990 to date. Generally the Italian fishing fleet is classified into the following segments: bottom trawlers, purse seiners, midwater pair trawlers, dredges, polyvalent vessels (using a combination of passive and mobile gears), and vessels using passive gears. Small-scale fishery is the most relevant Italian fleet segment in terms of number of vessels, representing 65% of national total.

Fleet	n. Boats	GT	KW
Small scale	7010	13025.22	185854
Trawl	1215	56278.41	260511
Pair trawl	4	338	1085
Passive gear	2972	2573	234694
Dredge	597	7924	64422.31
Polyvalents	1904	59044	319711
Pelagic trawl	89	15592	42281
Purse seine for tuna	41	2873	13033

**Table 3.1.1.2 Breakdown of the Italian national fleet by gear type**

Bottom trawlers represent the most important segment of the Italian fleet in terms of production (32% of total landings). The main target species are shrimps, hakes, mullets, *Nephrops*, and cuttlefishes. For 2006 the average fishing effort is 160 and 190 fishing days/year for 12-24 and 24-40 overall length trawlers, respectively.

Traditional or Mediterranean bottom trawl (DTS) is the most widely used trawl in Italy for fishing high-quality bottom species.

The Mediterranean countries, both during RCMs meetings (Athens, 2006 and Cipro, 2007), the Kavala meeting on small scale fisheries (September, 2005), and the first PGMED (Malta, 2007), developed at Regional level the fleet-based approach proposed during the Nantes meeting (23/27 May 2005), with some adaptations related to the fleet segmentation and the fishing activities based on the Mediterranean context.

The proposed common Regional level of disaggregation, level 5, of the fishing activities is presented in Table 3.1.1.2.

Level 4 - Gear type (EU Level)	Level 5 - Fishing activity (Regional Level)
Bottom otter trawl (OTB)	Demersal species
	Mixed demersal and red shrimps
	Red shrimps

**Table 3.1.1.3 Fishing activity at a regional; level as defined for fleet based sampling**

The “demersal species” OTB fishery is widespread along all the Italian coasts; and is performed mainly on continental shelf and upper slope. The main target species are red mullets, common octopus, horned and musky octopus, European hake, deep water rose

shrimp, Norway lobster, the contribution of other species is often considerable, according to the local and regional peculiarities. This fishery is performed by a wide range of vessels, as concern overall length, tonnage and engine power.

The “mixed demersal and red shrimp” fishery concerns the activity performed on continental shelf, upper slope but also on deeper bottom (up to > 600/700 m). Each fishing trip tends to be conducted on both on the shelf and slope which can result in highly variable catches (species mix and weight) within a single trip. Main target species are the European hake, the horned octopus, the Norway lobster, the deep water rose shrimp and the two species of red shrimps (*Aristaeomorpha foliacea*, *Aristeus antennatus*).

This fishery is performed along all the Italian coasts, except in central and northern Adriatic (GSA 17 and GSA 18), where depth does not exceed 100 m.

The OTB fishery for red shrimps is a highly specialised activity performed only by vessels of some fleets located off the western coast of Italy, as well as on the Ionian Sea. This fish shows a marked seasonality, being performed mostly in spring-summer, where the better meteorological conditions allow to reach these fishing grounds. One day trips are the most common, even though some vessels can perform trips of two or three days.

Even though each fishery, above described, has a certain number of target species, an important contribution to the commercial value of the catch (more than 50% in some cases) is due to the retained by-catch. The multi-species composition of landings is a common characteristic of all the Italian selected fisheries. This is particularly true for the first two fisheries “demersal” and “mixed demersal and red shrimp”; only in the case of “red shrimps” fishery, the targets (red and purple shrimps) contribute by far to the majority of landed biomass and its associated economic value.

## Regulations

Most fishing-vessel licences allow the use of more than one fishing system, 80% of the vessels are authorized to use several fishing gears. Multi-gear vessels are generally small sized ones, characterized by limited ability in transferring between fishing areas, and dependence on seasonal availability of resources. This, together with the geographical dispersion of the fleet, spread evenly across the national coastline, determines the presence of countless technical and productive microcosms, strongly correlated to the spatial/temporal distribution of the resources.

The minimum mesh size of all bottom trawls may not be less than 40 mm (EC Regulation 1967/2006). In addition trawling activity can not be performed within 3 miles off the coast, where seabed is less than 50 m depth. Since 1988 a 30-45 days fishing closure has been implemented for all Italian trawl fleets.

Minimum landing sizes have been established for the most important commercial species, according to EC Regulation 1967/2006, which has replaced the previous EC 1626/94 Regulation.

The Italian Ministry Decree of 16/06/1998 established several no take zones where every bottom fishing activity is forbidden. This measure is targeted to protect both sensitive and essential fish habitats, with particular attention to juvenile phases of important commercial demersal species.

### 5.1.2. Slovenia

The total number of registered fishing vessels is 174. The fleet is mostly composed of small vessels, under 10 meters length overall. The bottom trawl fleet composed of 26 vessels is ranging from 9 to 29 meters. 18 of these vessels are considered as active. Length structure of the bottom trawl vessels represented over the length structure of the whole fishing fleet (source: Ministry of Agriculture, Forestry and Food, InfoRib, 13.8.2007).

Slovenian fisherman use two types of otter bottom trawls. The type “tartana” is mainly used for catching cuttlefish (*Sepia officinalis*) while type “volantina” is generally used for catching all other demersal species. Codend mesh size is 40 mm. With this mesh size the catch of musky octopus (*Eledone moschata*), the most important species, is becoming difficult due to high escapement.

The yearly landing of bottom trawlers was 120 tones in 2005 and 111 tones in 2006 (Table 3.1.2.1). The most important group of species was cephalopods with 51% and demersal fish with 43%. On the species level the most important was musky octopus (*Eledone moschata*) with 27%, whiting (*Merlangius merlangus*) with 23% and cuttlefish (*Sepia officinalis*) with 18%.

**Table 3.1.2.4 Landings of bottom trawlers in period from 1.1.2005 to 31.12.2005**

Category	Number of species	Landing weight	Percentage Share
Pelagic fish	14	8,280	3.589
Demersal fish	39	99,921	43.307
Cephalopods	6	117,660	50.995
Gasteropods and bivalvs	1	11	0.005
Crustaceans	5	4,856	2.105
Total:	65	230,728	100

The size composition has been measured as part of the monitoring programme of the Fisheries Research Institute of Slovenia as well from 2007 for the of by-catch and discard data collection regulation.

The fishing grounds for the bottom trawlers is limited to the territorial waters of the Republic of Slovenia which is on the north of fishing area 37.2.1. According the boundaries of fishing zones A and B (Decree on designation of the sea fishing area of the Republic of Slovenia, OJ RS, no 2/2006) and restrictions of the Council Regulation (EC) No 1967/2006 the sea surface available is 307,6 km<sup>2</sup>. Due to an undefined border between Republic of Slovenia and Republic of Croatia the fishing sea for bottom trawlers is about 100,9 km<sup>2</sup>. The bottom trawling activities are taking place all the year with its maximum in late summer and autumn

#### Discards

At present the data on discard is not available for period before 2007. The reason is that we started the first pilot survey of by-catch and discard data collection in 2006. The main reasons for the discard in bottom trawl fishery are: (1) unwanted species, mainly benthic organisms,



(2) undersized commercial organisms, and (3) damaged commercial organisms. Influence of market on discard is not evident for this kind of fishery. The appropriate design of bottom trawls could provide acceptable results. Some fishers have already made certain modifications to reduce the amount of unwanted species, especially benthic organisms. The unwanted catch of undersized organisms is still a problem.

The data on landings is available for the period 1982 to 2005.

Data deficiency:

- data is related to fisherman (physical or legal persons) and not to fishing vessels ;
- no data on fishing gears used;
- no data on fishing effort.

Data of the Ministry of Agriculture, Forestry and Food

The data on catch, landings, fishing effort is available for the period 2005 onward.

Data deficiency:

- short time series;
- deficient or wrong fulfilled logbooks;

Data of the Fishery Research Institute of Slovenia

The data obtained with swept area method is available for the period 1995 onward.

Data deficiency:

- use of different commercial trawls;
- small geographical area covered.

### 5.1.3. Spain

The Spanish Mediterranean fishery is widespread 2600 Km of the long line coast, with a shelf extension, between 0 and 180 m depth, estimated in about 44100 Km<sup>2</sup>. Five geographical Subareas are established: GSA\_1 Northern Alborán Sea; GSA\_2: Alborán Island; GSA\_5 Balearic Islands; GSA\_6 Northern Spain and GSA\_7 Lyon Gulf.

The fleet can be split in two main groups: Demersal fisheries, which are multispecific species objective and pelagic fisheries direct to the small pelagic species, which are monospecific species objective. The fleet is composed for the 969 trawls, 321 purse seine boats and about 5000 artisanal small scale boats (with less than 12 meters length).

The trawl fleet only allow use one fishing system. Trawl vessels are most of them between 12-24 meters length, with a small proportion of boats between 24-40 meters length. The general gear is a Bottom trawl with vertical opening from 1 to 2 meters, with a Diamond-mesh codend size of 40 mm. This general model can be modified with some technical adaptations depending on the area and geomorphologic bottom features. Fleet segmentation (Athens 2006, Malta 2007) developed at Regional level based of the approach proposed in Nantes meeting (2005), established three segments: 1-Mixed Demersal species; 2- Mixed Demersal and red shrimps species, both performed on the shelf and shelf break (upper slope) and 3- red shrimps performed in the slope up to 400 m depth. This stratification has been used as sample basis scheme although still isn't completely adopted in all Subareas.

The Principal target species for the “Mixed Demersal” and “Mixed Demersal and red shrimps” fleet segments are Red mullets (*Mullus surmuletus*, *M. barbatus*); Octopus (*Octopus vulgaris*, *Eledone cirrhosa*, *E. moschata*) Horse mackerels (*Trachurus trachurus*, *T. mediterraneus*); European hake (*Merluccius merluccius*); Monkfish (*Lophius piscatorius*) Anglerfish (*L. budegassa*); White shrimp (*Parapenaeus longirostris*) and Norway lobster

(*Nephrops norvegicus*). While for the “red shrimps” fleet segment is the red shrimp (*Aristeus antennatus*).

The multispecific composition of the capture result in a relative importance of the target species, so in the “Mixed Demersal species” and “Mixed Demersal and red shrimp” segments about 50% of the capture correspond to by-catches (other commercialised species). Whilst in the “red shrimp” fleet segment the target species, the red shrimp, represent between 50% and 90% of the total capture by trip. From the economic point of view, the red shrimp has a high importance in the trawl fishery contributing between 30 and 50% of the total incomes for the trawl fleet, although in weight their contribution is lower and between 5 and 20% depending on the areas

The trawl fleet use to do daily trips, although some few vessels can perform trips between two and four days, when the distance between the fishing grounds and port is too big. The number of hauls performed in a single daily trip is between 1 and 5. In average the number of sea days by boat is between 100 and 190 days. The fishing activity for the trawl fleet has not seasonality and is developed along the year only bad meteorological condition, technical boat performance and seasonal fishing closure limited time at sea. There is not Vessels type (length/gear characteristics) excluded of the sampling programme, although the opportunistic sampling is the actual sampling procedure and by the moment at level sampling level 4 adopted in all Subareas. The 2005 effort for the Spanish trawl fleet is given in Table 3.1.3.1.

**Table 3.1.3.5 2005 effort data for Spanish trawler fleet**

SUBAREA	YEAR	PORTS	N° VESSELS	N° TRIPS	N° TRIP/VESSEL	N° Fishing days
37.1.1	2005	48	969	96162	99	96162

Previous SGRN report (see SGRN 0611) have estimated discards for target species on annual and quarterly basis taking into account the different discard behaviour for sampled geographical Subareas. Results showed a discard rate below 10% in weight and below 20% in number for all target species. Mean Discards by trip couldn't reflect well the actual discards, since there are a lot of zero observations in the trips sampled for some areas, and for few trips appear significant discards increasing a lot the mean values than if the mean discards were estimated taking into account the proportion of samples with zero discards and the proportion of samples with discards and their corresponding landing (Table 3.1.3.2).

**Table 3.1.3.6 Spanish Discard estimates from previous studies**

Discards percentages in weight Target species 37.1.1.  
Spanish Mediterranean Division

Target species	FAO Code	% Discards
<i>M.merluccius</i>	HKE	5.2
<i>M. surmuletus</i>	MUR	0.4
<i>M. barbatus</i>	MUT	0
<i>P. erythrinus</i>	PAC	10.2
<i>L. Piscatorius</i>	MON	1.2
<i>L. budegassa</i>	ANK	7.9
<i>T. trachurus</i>	HOM	0
<i>T. mediterraneus</i>	HMM	0

<i>Aristeus antennatus</i>	ARA	0
<i>Parapenaeus longirostris</i>	DPS	0
<i>Octopus vulgaris</i>	OCC	0
<i>Eledone cirrhosa</i>	EDT	0
<i>Eledone moschata</i>	EOI	0
<i>Engraulus encrasicolus</i>	ANE	0

## Regulations

The most relevant recent EC Legislation (EC No 1967/2006) for Mediterranean shall prohibit fishing in habitats such as: Coralligenous, Maërl beds, jointly with the old Seagrass beds prohibited fishing areas, both correspond to some shelf bottoms where a part of the called Mixed Demersal Species fishery works.

To carry out these measure it is necessary to define and do the extended identification of this ecosystems and mapping all of these habitats if its wants be protected. Such habitats produce the highest discards quantities (~70%) mainly due to invertebrates and red algae.

In general, the main reason for discarding is the lack of commercial value of some caught species. The incidence of discards in species with commercial interest is low, although part of the commercial catch may also be discarded to comply with fishing regulations.

For the Deep water species fishery Legislation (EC No 1967/2006) is prohibited fishing beyond 1000 m. Discards of this fishery correspond to the lowest ( less than 30% of the catch) and correspond mainly of non-commercial fish species or undersized individuals of commercial low value species.

## Métiers/Sub-fleets

**Table 3.1.3.7 Fishing grounds and main species characterising the catch composition for the different fishing ground for the Mediterranean Trawl Fishery Spanish**

Fishing grounds	Specific composition
<150 m depth. Shelf Coralligenous or muddy bottoms	<i>Spicara</i> sp.; <i>M. surmuletus</i> + <i>M. barbatus</i> ; <i>S. canicula</i> ; <i>B. boops</i> ; <i>M. merluccius</i> ; <i>Octopus vulgaris</i> ; <i>Eledone cirrhosa</i>
150- 350 m depth. Shelf/Slope	<i>M. poutassou</i> ; <i>Decapods species</i> + <i>N. norvegicus</i> ; <i>M. merluccius</i> <i>G. melastomus</i> + <i>S. canicula</i>
> 350 m depth Slope	<i>A. antennatus</i> ; <i>Decapods species</i> ; <i>G. melastomus</i> ; <i>M. poutassou</i> <i>M. merluccius</i> ; <i>G. longipes</i>
Inner Shelf Soft red and green algae facies of sandy and gravel detritic bottoms:	Mainly between 41-76 m <i>V. volubilis</i> , <i>Phyllophora nervosa</i> , <i>Peyssonnelia</i> , <i>Codium bursa</i> , <i>Suberites domuncula</i> , <i>Spatangus purpureus</i> , <i>Astropecten</i> , <i>Turritella</i> , <i>Pecten</i> , <i>Paguridae</i>
Shelf Calcareous red algae facies of sandy and gravel detritic bottoms	Bottoms between 69-147 m <i>Lithothamnion</i> , <i>Lithophyllum</i> , <i>Laminaria rodriguezii</i> , <i>Suberites domuncula</i> , <i>Spatangus purpureus</i> , <i>Astropecten</i> , <i>Turritella</i> , <i>Pecten</i> , <i>Paguridae</i> .
Shelf Muddy-detritic	Bottoms between 139-235 m <i>Alcyonium palmatum</i> , <i>Aphrodite aculeate</i> , <i>Ophiothrix</i> , <i>Phallusia mammillata</i> , <i>Diazona violacea</i> , <i>Microcosmus</i>
Shelf-edge detritic	Bottoms between 326-444 m <i>Alcyonium palmatum</i> , <i>Echinus</i> , <i>Astropecten</i> , <i>Ophiura</i> , <i>Aporrhais</i>
Upper Slope Bottoms with large braquiopoda	Bottoms between 472-686 m <i>Gryphus vitreus</i>
Middle Slope Bathyal muddy soft bottom	Bottoms between 649-745 m s: <i>Pennatula</i> , <i>Veretillum</i> , <i>Cidaris cidaris</i> , <i>Brissopsis</i> , <i>Mesothuria</i> , <i>Aporrhais</i> , <i>Xenophora</i> , <i>Sepiolidae</i> , <i>Bathypolypus sponsalis</i> , <i>Polychaetes typhlops</i> , <i>Munida</i> , <i>Macropipus tuberculatus</i> , <i>Thenea muricata</i> .

#### 5.1.4. France

Two main groups of trawl métiers can be identified thanks to the landings: bottom trawling and pelagic trawling with obviously a variable number of vessels in each group.

The French Mediterranean otter trawlers fleet is composed of 131 vessels working under trawling licence exclusively in the Gulf of Lions (GS7), 29 small fishing units (“ganguis à panneaux”) included in the category of small scale métiers and working exclusively in the coastal waters of the Provence coast (GS7) and 10 bottom trawlers working in the coastal waters of Corsica (GS8).

All the trawlers fleet lands about 27 000 tons per year. These landings are largely dominated by pelagic species.

**Table 3.1.4.8 Métiers selected on the activity census basis**

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Activity	Gear classes	Gear groups	Gear type	Target assemblage	Mesh size and other selective devices
Fishing activity	Trawls	Bottom trawls	Bottom otter trawl [OTB]	Demersal species	?
				(...)	
"	"	"	"	"	?
"	"	"	"	"	?
"	"	"	"	"	?
"	"	"	Multi-rig otter trawl [OTT]	Demersal species	?
"	"	"	"	"	?
"	"	"	"	"	?
"	"	"	Bottom pair trawl [PTB]	Demersal species	?
"	"	"	"	"	?
"	"	"	Beam trawl [TBB]	Demersal species	?
"	"	"	"	"	?

**Table 3.1.4.9 Activity in boat-month**

MatriceDCRLevel5	<7 mètres	_7-9_ mètres	_9-12_ mètres	_12-16_ mètres	_16-24_ mètres	_24-40_ mètres
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OTB DemersalFish	5	72	77	24	501	466
OTB Molluscs					14	
OTB SmallPelagicFfish						12
TBB DemersalFish	12	48	15			

#### 5.1.5. Greece

According to the EU fleet register, the trawler fleet of Greece consists of 364 vessels. Pelagic trawls are not allowed according to Greek legislation.

Two main métiers of the bottom trawl fishery can be identified in Greece.

- e) Shelf fishery (down to 200 m) targeting: red mullets, hake, poor cod, sparids, sole, horse mackerels, anglerfish, octopuses, cuttlefish, squids and caramote prawn.
- f) Slope fishery (deeper than 200 m) targeting: hake, blue whiting, anglerfish, Norway lobster, rose shrimp, deep red shrimps.

Besides these main species the catch usually includes many other species (more than 60) and nearly all of them are landed and contribute to the income of the fishing fleets.

#### Regulations

Minimum mesh size is 40 mm stretched for all EU member state fleets in Mediterranean according to the regulation EU 1626/1994. Fishing is forbidden in depth less than 50 m or at a distance less than three miles from the coast. Fishing effort restrictions exist in term of closed period –fishing is forbidden during June to September- and in some closed gulf is forbidden all the year around.

#### 5.1.6. Cyprus

No participants from Cyprus attended the meeting so no description of the fisheries is available

#### 5.1.7. Malta

No participants from Malta attended the meeting so no description of the fisheries is available

### 5.2. Overview of discard sampling methodologies

#### 5.2.1. Italy

The first objective of the discard sampling survey has been to estimate annual discards (weight and number) for each one of the species listed in appendix XII (List of stock for landing and discards monitoring) of the implementing regulation (EC Regulation 1581/2004), of the bottom-trawl commercial fishing segment, by Geographical Sub Areas (GSA), at national level. The second objective of the survey consisted of the estimation of the length and age composition of the discarded species, listed in appendix XII EC regulation 1581/2004

The species listed are those with more than 200 tonnes each of the national annual landings (according to the Reg. CE n°1581/2004, chapter III, and section H, item d3).

### General characteristics of the sampling survey

The survey is species- and fishing technique-specific conducted, onboard commercial vessels and based on a voluntary participation of fishers.

Data on the quantities of the discarded species are thus collected directly onboard and the length composition by species recorded (on the overall or on a sample, according to the amount of the discarded quantities), in order to derive the length frequency distribution (LFD) by species and fishing day.

For those species that can be directly aged by hard structures, the age has been also estimated using the otolith reading techniques, on a sample of the discarded species.

### Target variables

The target variables to be recorded in the survey are the quantity (number and weight) of each discarded species, its length frequency distribution and age-length key (for those species that can be aged). Other associated variables have been recorded on board for providing additional information (e.g. lat-long positions).

### Sampling frame

A *two-stage stratified random scheme*, with strata represented by a combination of geographical sub-areas (GSA) and fishing segments, has been adopted since 2006. In each stratum the fishing days were the primary sampling units and the commercial fishing vessels the secondary sampling units.

The sampling units have been extracted with equal probability and without replacement using the national commercial landings database for the selection process. A Total of 303 fishing days have been sampled by at-sea observers. Table 3.2.1,1 gives the planned days at sea by GSA which amounts to 497 days for all bottom trawlers (length categories <12; 12-18; 18-24; and 24-40m).

GSA	Q1	Q2	Q3	Q4	Total
9	15	16	17	14	62
10	8	13	12	9	42
11	6	8	7	7	28
16	22	24	26	20	92
17	35	40	40	34	149
18	19	22	23	18	82
19	9	12	12	9	42
Overall total	114	135	137	111	497

Table 3.2.1.10 Proposed Italian Sampling programme for bottom trawlers by GSA region.

### 5.2.2. *Slovenia*

In 2006 the pilot survey on discard sampling has been started in Slovenia. In this pilot the discard sampling protocol and appurtenant database has been developed. At the end of the same year we also started the fieldwork sing on board observers.

#### Stratification

The stratification has been designed in such a way to cover all types of fishing gears in three-year period.

#### Data collection scheme

The main objectives of the data collection scheme are to:

- Determine target and by-catch species;
- Collect the data on the basis of catch sorting into categories made by fisherman;
- Estimate discard by species and categories.

The entire catch of a single fishing operation is considered a sample. The data collection is performed on the basis of sub-samples taken after the catch (sample) has been sorted by fishers.

Onboard observers always let the fisherman sort the catch. The only demand is not to throw away anything. According the empirical knowledge two or three steps in catch sorting on board of fishing vessels could be recognized:

1. Dividing of unsorted catch between pair vessels (optional);
2. Sorting on the basis of species
3. Sorting on the basis of size categories.

After sorting the onboard observers take samples from each of categories. Their task is to fill all required data in standard paper forms, from species composition, quantities in each category to individual measurements of fish.

### 5.2.3. *Spain*

The Spanish discard sampling programme was based on board observer commercial vessels. In all division the same sampling protocol is applied. The sampling methodology was designed to obtain data about commercial and discarded biomass by targets species (DCR requirements) as well as number and the length frequency distributions. Sampling is carried out based on random stratified sampling per Fishery Unit, by year, quarter, area (Management Unit) and gear which comprises target species. Although opportunistic sampling is the actual sampling scheme. Discards estimations in the Mediterranean it is not a mandatory requirement, and assessment are made once every three years for each fleet (trawl, artisanal, and purse seine) to assess the discard. Estimated observer coverage in Mediterranean (Spanish Division 37.1.1.) is 0.006% of total effort.

- Variables collected in onboard sampling programme:
  - TRIP INFORMATION: Observer, Year, Starting Date, Base Port, Way-out Port, Way-in Port, Fishing trip code, Vessel name, Fishing Days, Fishing Trips Days, Power (HP), Gross Recorded Tons (GRT) and Crew number.
  - HAUL INFORMATION: Haul number, Target Species, Day/Night, ICES Division and Mediterranean Management Unit, Gear, Course and Speed, Wind Course, Wind Speed, Sea State and Moon State, GMT Hour, Shooting haul time and stop trawling, Latitude and Longitude and Depth.

- Variable collected on the deck, data collection related to the fishing catch and samples:
  - DECK INFORMATION: Total Discard, Discard by species, Retained catch by species, Length Distributions by species (Retained and Discarded), Otoliths or Ilicia by species

#### 5.2.4. *France*

In its 2002 DCR programme, France proposed a pilot study designed to determine which fisheries generate significant levels of discards. Since 2003, the fleets identified in this study were monitored by on-board observers. The inspectors concentrated mainly, though not exclusively, on the species for which the discard levels are to be assessed every year. The use of onboard observers enabled an exhaustive analysis of the catch to be performed - information is therefore available on all the species listed in annexes XII and XV, at least in terms of presence/absence, population size and weight.

For North-Eastern Atlantic and Mediterranean (European seas) the protocol is referred to below. Its application remains based on the involvement of Ifremer staff (around 80 trips involving 175 man/days at sea) and the use of additional resources via sub-contracting for the longest onboard missions, involving some 300 man/days at sea (65 trips); thus the total onboard-observation effort in European seas encompassed over 145 trips involving 500 man/days at sea.

#### Mediterranean

For this coastline, discards remained at a low level due to the short length of the individuals landed and marketed. The Community framework programme does not provide for an annual estimate of discards for any species. A study carried out in 2001 using observers aboard demersal trawlers showed that 2.7 % of the hake catch was discarded, while discards of red mullet and sea bream were nil. Some discards of small pelagics (sardine and anchovy) were recorded. Under the French 2003 programme this study was to be updated, for which two onboard-observer missions per quarter were planned for the trawler segment of the fleet - these confirmed the earlier findings. Pelagic trawling, mainly concerned with sardine and anchovy, does not itself generate discards. In addition, the first observers were placed on tuna seiners to estimate the length structures of the catch (cf. module H) and study the composition of discards generated by this fishing method, which are negligible.

For European seas, since the estimate of discard volumes is based mostly on data gathered onboard working vessels, the onboard observers will be asked to sample for length the discards of the species that have to be monitored annually (cf. appendix XII) or for which, for purposes of evaluating stocks, it is important to know which portion of the catch is not kept (Norway lobster, for example), including in the Mediterranean (hake and red mullet). The sampling intensities are those laid down in appendix XV to the Regulation and based on the discard volumes in tonnes. These volumes will be calculated in 2005 under module E, which means that the intensities will be determined in real time. Otoliths will be taken for age reading from the fish sampled onboard the working vessels whose length classes are not represented in the catches. Although priority will be given to the species required to be monitored annually, information on the other species caught and discarded will be available in



the database. This extra data will be useful for preparing future programmes or revising the implementing Regulation.

#### 5.2.5. Greece

Country	Gear type	Mesh size	Vessel length	Number of Months
Greece	TBB	40mm	12-24m	19
Greece	TBB	40mm	24-40m	19

**Table 3.2.5.11 Number of sampling trips by gear type**

#### 5.2.6. Cyprus

No participants present at meeting

#### 5.2.7. Malta

No participants present at meeting

### 5.3. Discard rates by weight and number

A summary of the data obtained from Member States engaged in the bottom trawl fisheries of the Mediterranean is given in Table 3.2.7.1- 3.2.7.3.

**Table 3.2.7.12 Summary of total sampling trips (2004-2006) performed by gear type, mesh size and country**

Country	Gear type	Mesh size (mm)	Vessel length category (m)	Number of sampled trips
Italy	DTS	40	12-24	260
Italy	DTS	40	24-40	43
Spain	DTS	40	12-24	102
Spain	DTS	40	24-40	7
Greece <sup>1</sup>	TBB	40	12-24	19
Greece	TBB	40	24-40	19

<sup>1</sup> for Greece data is presented as number of months sampled, number of individual trips sampled unknown

**Table 3.2.7.13 Estimated total discard rates (all species) by weight**

Country	Gear type	Mesh size	Total trips discard weight	Total trips landings weight	Mean trip discard rate	Discard rate CV	Pooled rate
Spain	DTS	40 (all)	48618	62447	44%	190%	47%
Italy	DTS	40 (all)	1158050	72198693	NA	NA	1.6%
Greece	TBB	40	24099	67042	NA	20-29% <sup>2</sup>	26%
France	DTS	~40 (all)	4522	6227	41%	13%	42%

<sup>2</sup> Discard range presented by Greece rather than CV

**Table 3.2.7.14 Estimated total discard rates (all species) by number**

Country	Gear type	Mesh size	Total Discard number	Total Sampled Landings number	Mean discard rate	Discard rate CV	Pooled rate
Italy	DTS	40 (all)	155055438	NA	NA	NA	NA
Greece	TBB	40 (all)	1951259	NA	NA	NA	NA
Spain	DTS	40 (all)	NA	NA	NA	NA	NA
France	DTS	~40 (all)	191238	42760	82%	12%	82%

It should be stressed that the discard rates from individual member states presented in Tables 3.2.7.2 and 3.2.7.3 are **not directly comparable** due to differences in sampling design and species samples. For example, aggregated Spanish data also includes invertebrate species.

### 5.3.1. Italy

Italy presented aggregated data obtained from 303 sampled trips. The weight data (Table 3.3.1.1) are pooled across all trips therefore no estimates of variability between trips were derived. Only data relating to the number of discards by species (not landings) were presented (Table 3.3.1.2) therefore discard rates are based on catch weights only.

**Table 3.3.1.15 IT 1 DTS discard rate by species by weight (kg) and gear.**

Species	Average trip discard rate	CV	Total weight	Discard	Total Landings weight	%occ. *	Pooled trip discard rate
HKE	NA	NA	614884		14413403	NA	4%
MUT	NA	NA	361151		8235283	NA	4%
DPS	NA	NA	57182		12913322	NA	0%
PAC	NA	NA	36413		998680	NA	4%
ANK	NA	NA	34672		1024817	NA	3%
MUR	NA	NA	15193		2276088	NA	1%
MON	NA	NA	9602		1007211	NA	1%
MTS	NA	NA	9042		4824435	NA	0%
GUG	NA	NA	4320		390564	NA	1%
NEP	NA	NA	4088		4369282	NA	0%

**Table 3.3.1.16 IT 1 DTS discards by number and gear**

Species	Average trip discard rate	CV	Total Discard number	Total Landings number	%occ. *	Pooled trip discard rate
MUT	NA	NA	74543617	NA	NA	NA
HKE	NA	NA	62320401	NA	NA	NA
DPS	NA	NA	11669722	NA	NA	NA
PAC	NA	NA	1400302	NA	NA	NA
MUR	NA	NA	1133540	NA	NA	NA
MTS	NA	NA	1081501	NA	NA	NA
GUG	NA	NA	923874	NA	NA	NA
NEP	NA	NA	514200	NA	NA	NA
GUG	NA	NA	301944	NA	NA	NA
SQR	NA	NA	217744	NA	NA	NA

### 5.3.2. Slovenia

Slovenia are currently undertaking only pilot studies for the collection of discard data therefore no data is presented.

### 5.3.3. Spain

Spain presented disaggregated data obtained in 2005 from 109 sampled trips. The disaggregated weight data (Table 3.3.3.1) allowed CV to be determined as well as the percentage occurrence over all trips. No data relating to the number of landings or discards by species was presented (Table 3.3.3.2) therefore discard rates are based solely on catch weights.

**Table 3.3.3.17SP 1 DTS discards by weight (kg)r.**

Species	Average trip discard rate	CV	Sum discard weight all trips	Sum landings weight all trips	%occ. *	Pooled trip discard rate
HMM ( <i>Trachurus mediterraneus</i> )	42	3.8	714	990	25	42%
OCZ ( <i>Octopus spp.</i> )	11	7.4	400	3324	18	11%
PAC ( <i>Pagellus erythrinus</i> )	88	4.1	260	37	21	88%
HOM ( <i>Trachurus trachurus</i> )	2	4.7	220	11878	24	2%
HKE ( <i>Merluccius merluccius</i> )	17	3.4	217	1048	42	17%
MNZ ( <i>Lophius spp.</i> )	21	6.1	199	762	38	21%
PIL ( <i>Sardina pilchardus</i> )	85	6.5	123	22	9	85%
MUX ( <i>Mullus spp</i> )	1	5.4	12	1229	23	1%
DPS ( <i>Parapenaeus longirostris</i> )	1	5.3	3	279	4	1%
ARA ( <i>Aristeus antennatus</i> )	0	4.5	2	540	23	0%

**Table 3.3.3.18 SP 1 DTS discards by number.**

Species	Average trip discard rate	CV	Sum discard number all trips	Sum landings weight all trips	%occ. *	Pooled trip discard rate
HMM ( <i>Trachurus mediterraneus</i> )	NA		24738	NA	25	
HOM ( <i>Trachurus trachurus</i> )	NA		14476	NA	24	
HKE ( <i>Merluccius merluccius</i> )	NA		10827	NA	42	
PAC ( <i>Pagellus erythrinus</i> )	NA		8831	NA	21	
PIL ( <i>Sardina pilchardus</i> )	NA		5606	NA	9	
OCZ ( <i>Octopus spp.</i> )	NA		4690	NA	18	
MNZ ( <i>Lophius spp.</i> )	NA		2012	NA	38	
ARA ( <i>Aristeus antennatus</i> )	NA		884	NA	23	
MUX ( <i>Mullus spp</i> )	NA		451	NA	23	
DPS ( <i>Parapenaeus longirostris</i> )	NA		279	NA	4	

#### 5.3.3.1. Summary of Spanish Discard data

In the Spanish Mediterranean bottom-trawling fishery around 1000 trawlers operate on the continental shelf and upper slope. All trips are sampled during 2005 year. The mean discard rate was 43% by weight including target species and by-catch and includes fish, invertebrates and flora. For this reason there wasn't estimation by numbers. The CV for the whole discard rate was around 100 %. The main discard species are pandora (bream), sardine and horse

mackerel, both the Pandora and sardine are have discard rates in excess of 80% while over 40% of horse mackerel are discarded.

Discards for target species such as Red shrimp, White shrimp, mullets and *Octopus* are very low, typically less than 10% for fish species and lower for the two shrimp species (<2%). One species of the group of octopuses (*Eledone moschata*) have been one high sporadic discard (> 300 Kg) in only a sampled trip over 109 trips sampled, and it has produced the present percentage discard showing that the levels of discards have to be analysed more closely using statistical techniques that are capable of dealing with the sporadic (skewed) nature of discard observations.

Hake discard depends on the strength of recruitment and area. Very low discard rates are noted in some zones, while in the converse is true in other areas and are generally associated with high densities of sub-legal fish. Due to at sampling level it was a different coverage of these geographical Subareas, sampling discard rate can overestimate the actual discard for the whole landings. Anglerfish and Monk are and important by-catch of the trawl fleet and discards for small size and damaged fish.

In comparison to the earlier studies presented in section 6.3.1, the data presented here suggests higher discard rates for some species at least such as horse mackerel and Pandora and while for other species that data is broadly comparable with earlier studies e.g. hake, monk and anglerfish. The large differences in discard rates observed for horse mackerel and Pandora is unclear.

#### 5.3.4. France

Only 4 trips were completely sampled during years 2005-06, therefore the data should not be over interpreted. Others trips are available but were not include here because all the species were not sampled (the standard protocol plans to sample all species of fish and those commercial for molluscs and crustaceas).

The disaggregated weight data (Table 3.3.4.1) allowed CV to be determined as well as the percentage occurrence over all trips. Data relating to the number of landings and discards by species (Table 3.3.4.2) were also presented allowing discard rates to be estimated both by number and weight.

**Table 3.3.4.19FR 1 DTS Discard rate by species by weight (kg).**

Species	Average trip discard rate	CV	Total Discard weight	Total Landings weight	%occ. *	Pooled trip discard rate
PIL	100%	0%	1145	0	100	100%
MAC	23%	82%	1086	1470	100	42%
POD	55%	33%	605	605	100	50%
HOM	75%	67%	324	0	100	100%
ANE	91%	19%	232	36	100	87%
BOG	82%	44%	137	98	100	58%
PEQ	50%	141%	113	14	50	89%
HMM	96%	8%	104	12	100	90%
HKE	9%	90%	74	842	100	8%
GUG	87%	31%	73	49	100	60%

**Table 3.3.4.20FR 1 DTS discard rate by species by number.**

Species	Average trip discard rate	CV	Total Discard number	Total Landings	%occ. *	Pooled trip discard rate
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	number					
PIL	100%	0%	57848	0	100	100%
POD	66%	42%	14597	6143	75	70%
GOF	100%	0%	13739	0	75	100%
ANE	93%	16%	13695	1374	100	91%
MAC	58%	NA	12551	7920	25	61%
HOM	67%	87%	9988	6	75	100%
HMM	98%	3%	8495	332	75	96%
GUG	90%	23%	7215	2330	100	76%
DCP	100%	0%	5644	0	50	100%
OUW	100%	0%	4999	0	100	100%

#### 5.3.4.1. Summary of French discard data

The mean discard rate was 41% by weight and 82 % by numbers. The global (all species) discard rates CV is low (13 %). Globally the main discarded species are small pelagics like PIL, MAC, HOM, ANE and HMM. HKE is an important target species for this fishery, its mean discard rate is 9.4 % in weight. Others important discards in weight are POD, BOG, PEK and GUG.

#### 5.3.5. Greece

Greece presented data aggregated across months, which allowed for an estimation of variability. Landings and discard data by weight (Table 3.3.5.1) and number (Table 3.3.5.2) were presented. The total number of trips is unknown, but during the period 2004-2005, 19 months were sampled.

**Table 3.3.5.21GR 1 TBB discard rate by species by weight (kg).**

Species	Average month discard rate	CV	Sum discard weight all months	Sum landings weight all months	%occ. *	Pooled trip discard rate
HOM	55%	0.55	4091	2181	95	65%
DPS	9%	0.75	2501	22686	95	10%
JCR	100%	0.00	1365	0	47	100%
HKE	8%	0.81	1295	14099	95	8%
PIL	89%	0.24	1117	110	79	91%
IOD	100%	0.00	1031	0	84	100%
SYC	87%	0.20	947	178	95	84%
SPC	48%	0.74	873	605	79	59%
BOG	43%	0.54	818	1031	74	44%
SQM	17%	0.85	772	3996	95	16%

**Table 3.3.5.22GR 1 TBB discard rate by species by number and gear**

Species	Average month discard rate	CV	Sum discard number all months	Sum landings number all months	%occ. *	Pooled trip discard rate
DPS	9%	0.75	707568	5003115	100	12%
HOM	55%	0.55	164120	27567	100	86%
HKE	8%	0.81	106528	198561	100	35%
IOD	100%	0.00	87379	0	84	100%
MTS	45%	0.79	73198	3174	89	96%
SNS	100%	0.00	68092	0	84	100%
PIL	89%	0.24	59986	5204	84	92%
ARY	99%	0.06	54531	25	95	100%
SQM	17%	0.85	53354	65837	100	45%

#### 5.3.5.1. Summary of Greek Discard data

Discard rates (by weight) aggregated across all species remain fairly constant with a range of between 20 and 29%. Species with the highest discard rates are typically small pelagics (e.g. sardine (PIC) and horse mackerel (HOM)) or those with no commercial value (e.g. snipefish (SNS) or blue legged swimming crab (IOD)).

#### 5.3.6. *Cyprus*

Due to database problems and lack of participation from Cyprus no data are presented

#### 5.3.7. *Malta*

Due to database problems and lack of participation from Malta no data are presented

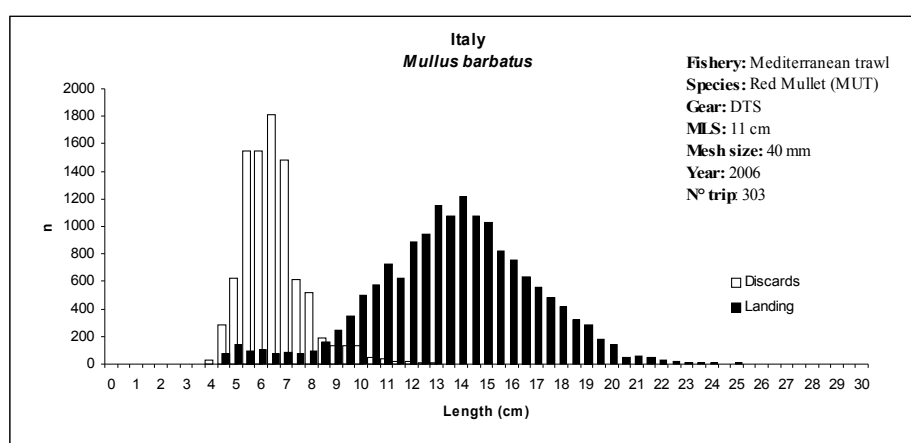
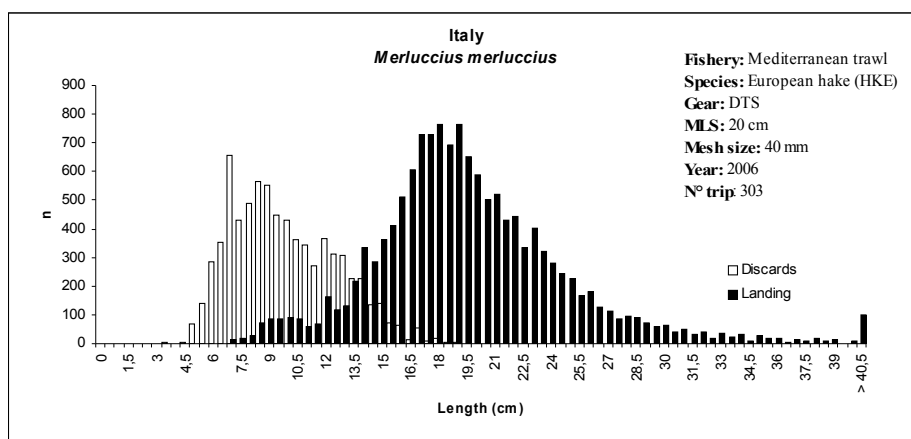
### 5.4. Length profiles of retained and discard commercial species

#### 5.4.1. *Italy*

The following analyses on the length frequency distributions have been carried out on data coming from discard and biological sampling national programs: landing size distributions came from the biological sampling, while discard size distributions came from the discard sampling program. Therefore the distribution plots should not be over interpreted due to the low sample size of discard data relative to markets samples. In the following histograms the number of sampled specimens is shown for each species.

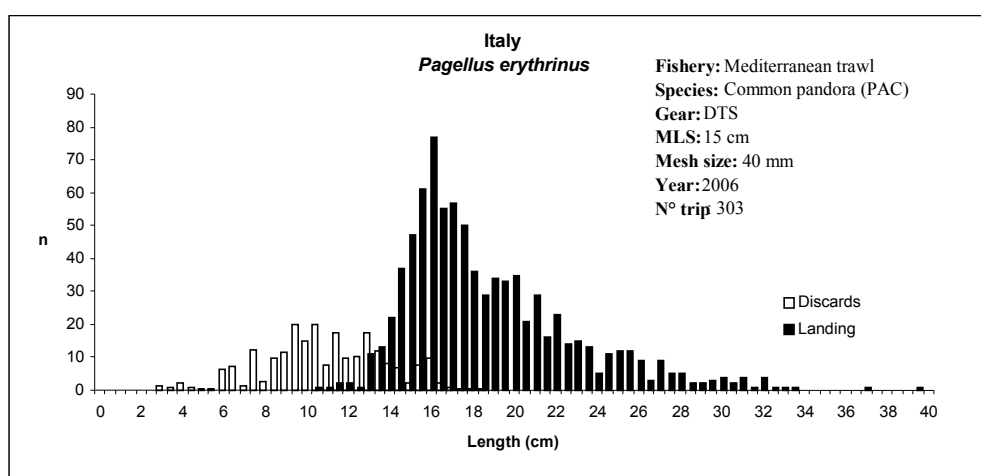
For hake (figure 5.4.1.1) discarding is associated with the retention of fish below MLS: discards are notably more important in terms of number of specimens than in weight. The discarded fraction is made up by specimens ranging from 3.5 to 23 cm TL, even if most of discards are from 7 and 16 cm TL. This is due to the presence, in particular in some Italian GSA, of important nursery areas of this species where juveniles are very abundant.

For red mullet (figure 5.4.1.2) catch is composed by specimens from 4 to 25 cm TL. Discard affects specimens from 3 to 17.5 cm TL, but most of this fraction is comprised in a narrow size range, from 5 to 8 cm TL. Also the red mullet is a clear example of discard by size; only in a few cases discard is made to damaged unmarketable specimens.



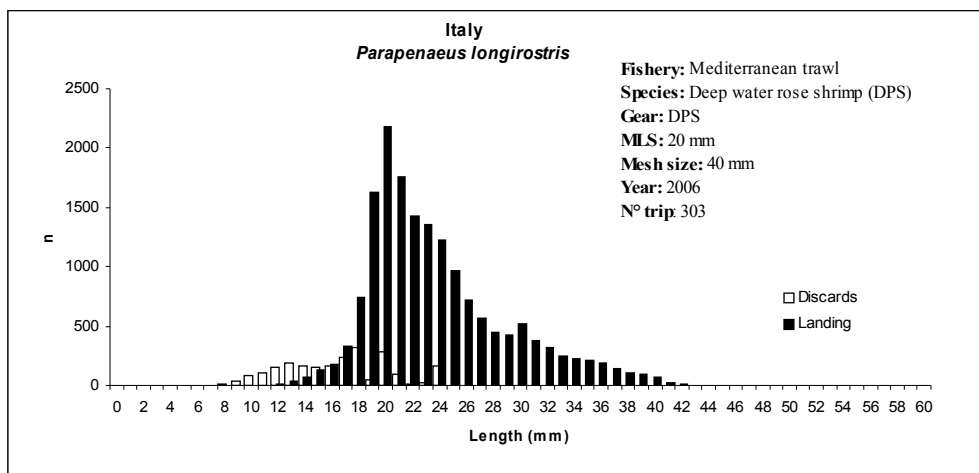
### 3.4.1.1 Length distribution of hake landings and discards

Discards are made by specimens from 2.5 to 18.5 cm TL, total catch ranges from 2.5 to 39.5 cm TL. The discard of common Pandora is a small portion of the total catch and is made by undersized specimens.



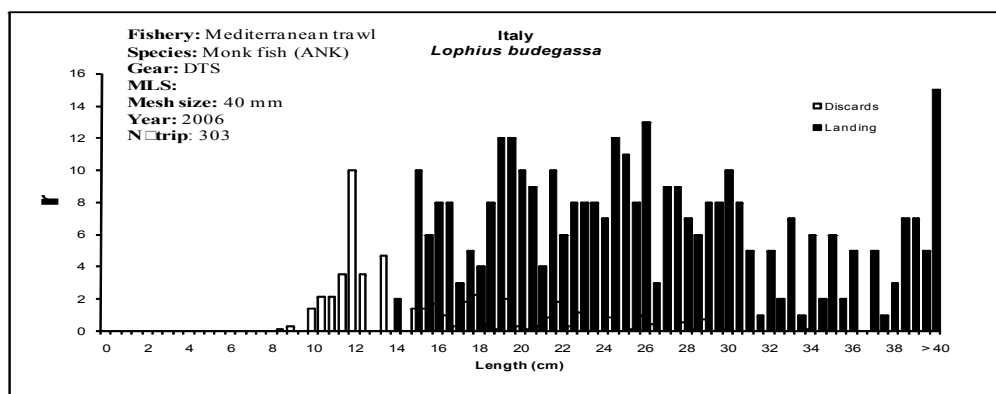
### 3.4.1.2 Length distribution of common Pandora landings and discards

The discarded fraction is made by specimens ranging from 5 to 29 mm CL. Discard is a small fraction of the total catch, which is constituted by species from 5 to 43 mm CL. As for the European hake, an important fraction of the catch is made by small size specimens, due to the presence of nursery areas of this species in several Italian GSA.



### 3.4.1.3 Length distribution of deepwater rose shrimp landings and discards

Discards are only a small portion of the total catch of rose shrimp (figure 5.4.1.3). Most of the discarded specimens are comprised from 6 to 15 cm TL; total catch affects a wide range of specimens, from 8.5 to 60 cm TL.



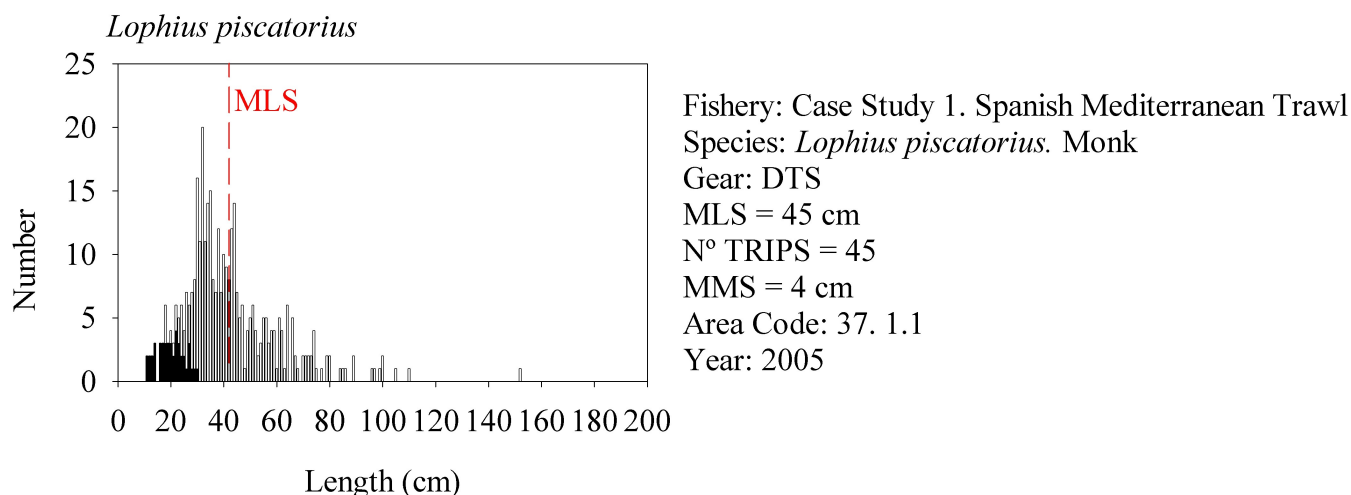
### 5.4.1.4. Length distribution of monk landings and discards

Discards are only a small portion of the total catch. Most of the discarded specimens are comprised from 6 to 15 cm TL; total catch affects a wide range of specimens, from 8.5 to 60 cm TL. Slovenia



### 5.4.2. Spain

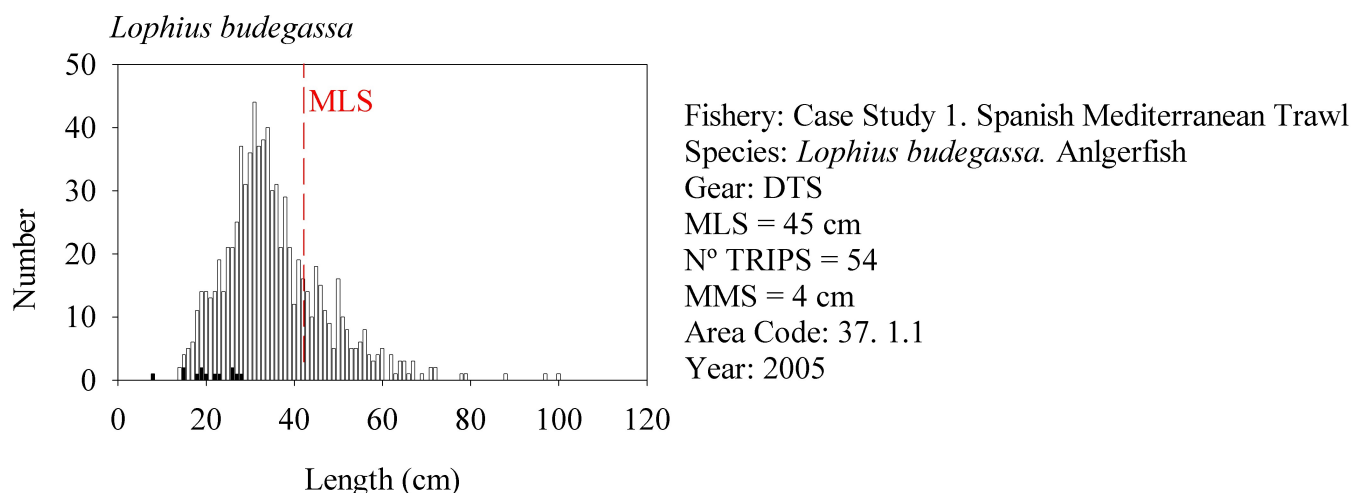
Spain presented length frequency data for seven key commercial species which allowed interpretation as to the principal causes of discards e.g. minimum landing size restrictions or high grading based on quality and/or price.



#### 3.4.2.4 Length distribution of monk (pisacatorious) landings and discards

**Selection criteria:** important by-catch

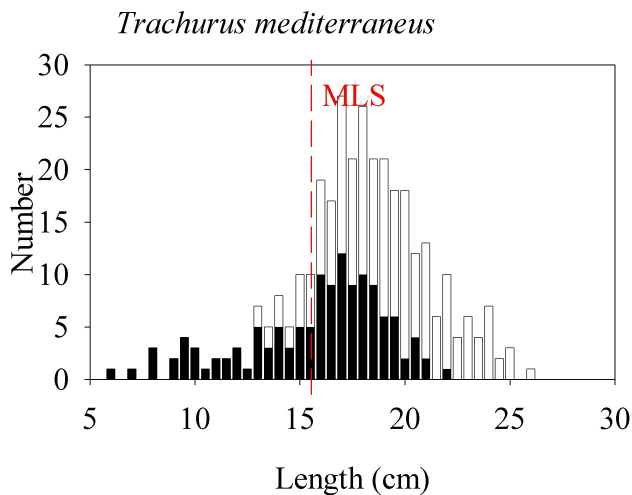
**Discards interpretation:** Discards are primarily due to the retention of monk below MLS (45cm) and market quality issues (damage etc)



#### 3.4.2.5 Length distribution of monk landings and discards

**Selection criteria:** important by-catch

**Discards interpretation:** Discards are primarily due to the retention of monk below MLS (45cm) and market quality issues (damage etc)

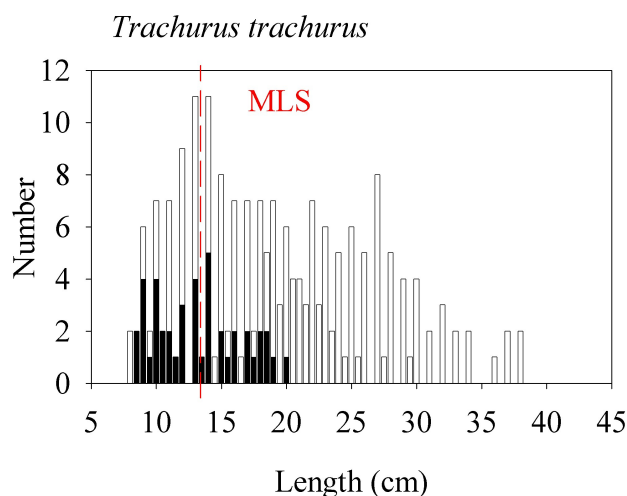


Fishery: Case Study 1. Spanish Mediterranean Trawl  
 Species: *Trachurus mediterraneus*. horse mackerel  
 Gear: DTS  
 MLS = 15 cm  
 N° TRIPS = 29  
 MMS = 4 cm  
 Area Code: 37. 1.1  
 Year: 2005

#### 3.4.2.6 Length distribution of horse mackerel landings and discards

**Selection criteria:** by-catch

**Discards interpretation:** high discards due to retention of fish below MLS and market preferences for larger individuals (market induced high grading)

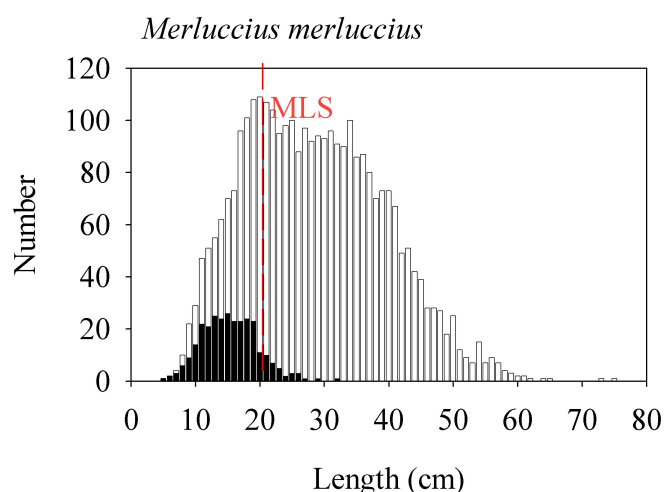


Fishery: Case Study 1. Spanish Mediterranean Trawl  
 Species: *Trachurus trachurus*. Atlantic horse mackerel  
 Gear: DTS  
 MLS = 15 cm  
 N° TRIPS = 23  
 MMS = 4 cm  
 Area Code: 37. 1.1  
 Year: 2005

#### 3.4.2.7 Length distribution of horse mackerel landings and discards

**Selection criteria:** Important by-catch

**Discards interpretation:** discards due to the retention of fish below MLS and market preferences for larger individuals (market induced high grading) .

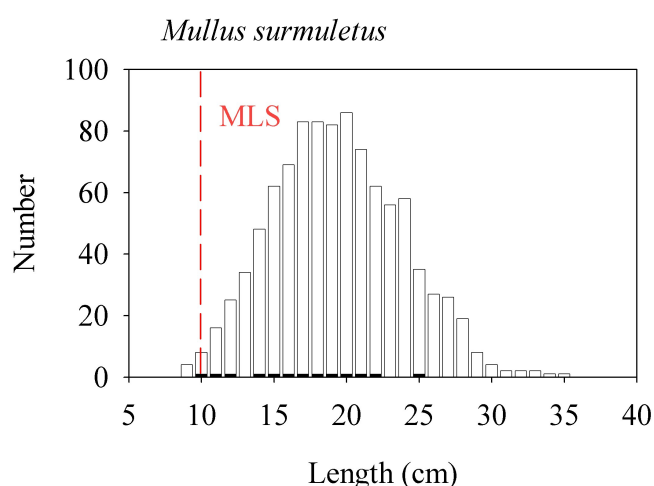


Fishery: Case Study 1. Spanish Mediterranean Trawl  
 Species: *Merluccius merluccius*. European Hake  
 Gear: DTS  
 MLS = 20 cm  
 N° TRIPS = 81  
 MMS = 4 cm  
 Area Code: 37. 1.1  
 Year: 2005

Figure 3.4.2.8 Length distribution of hake landings and discards

**Selection criteria:** Target species

**Selection criteria:** Discards associated with the retention of fish below MLS and fish of poor quality



Fishery: Case Study 1. Spanish Mediterranean Trawl  
 Species: *Mullus surmuletus*. Red mullet  
 Gear: DTS  
 MLS = 11 cm  
 N° TRIPS = 59  
 MMS = 4 cm  
 Area Code: 37. 1.1  
 Year: 2005

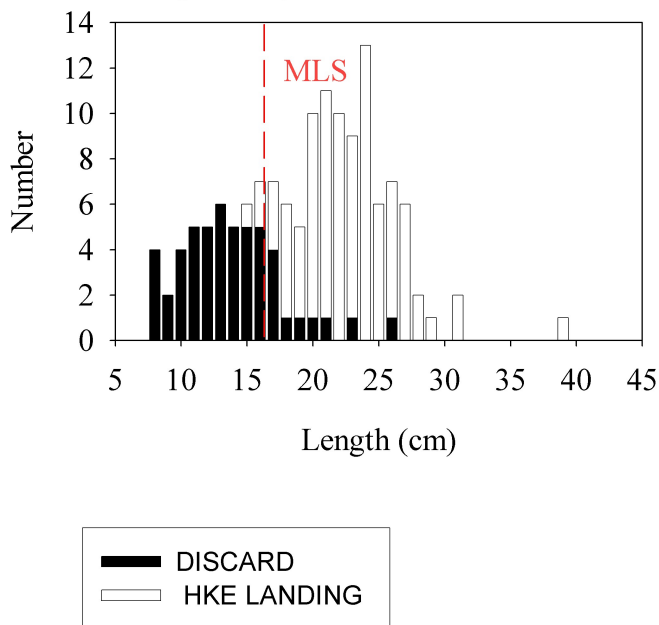
Figure 3.4.2.9 Length distribution of red mullet landings and discards

**Selection criteria:** Target species

**Interpretation :** Discards of mullet and red mullet in Spain Mediterranean quite inexistent due to the high market value. Discard damaged fish

Figure 3.4.2.10 Length distribution of common Pandora landings and discards

**Selection criteria:** by-catch



Fishery: Case Study 1. Spanish Mediterranean Trawl  
 Species: *Pagellus erythrinus*. Common Pandora  
 Gear: DTS  
 MLS = 15 cm  
 N° TRIPS = 19  
 MMS = 4 cm  
 Area Code: 37. 1.1  
 Year: 2005

**Interpretation:** Discards primarily due to retention of fish below MLS and market preference for larger individuals

#### 5.4.3. France

France presented length frequency plots for hake discards and landings. As this data is obtained from only 4 trips, it should not be over interpreted.

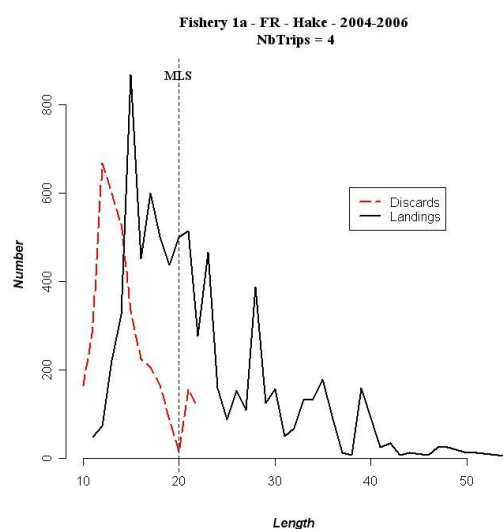


Figure 3.4.3.11 Length distribution of hake landings and discards

**Selection criteria :** Important target species.

**Interpretation :** Discards are primarily associated with retention of fish below MLS and landings of fish below MLS seem to be significant

#### 5.4.4. Greece

The length frequency distributions of the most abundant commercial species are presented. They are based on pooled data over the period 2004-2006. The fishing gear is bottom trawl and the mesh size in the cod end is 40 mm. The FAO area code in 37.2.2 (Ionian sea) and 37.3.1 (Aegean sea). The data were collected during 19 months and covers two fleet segments, vessels with lengths 12-24 m and vessels with length 24-40 m.

The modal length of the discarded hake was 12 cm whereas the landed hake was 16 cm (figure 5.4.4.1). The MLS for hake in Mediterranean is 20 cm. Market demand is the decisive factor for the discarding practice and above 70% of the fish is less than the MLS. A more detailed area, depth and season analysis could reveal more clearly, the fishing grounds where there is segregation the juveniles.

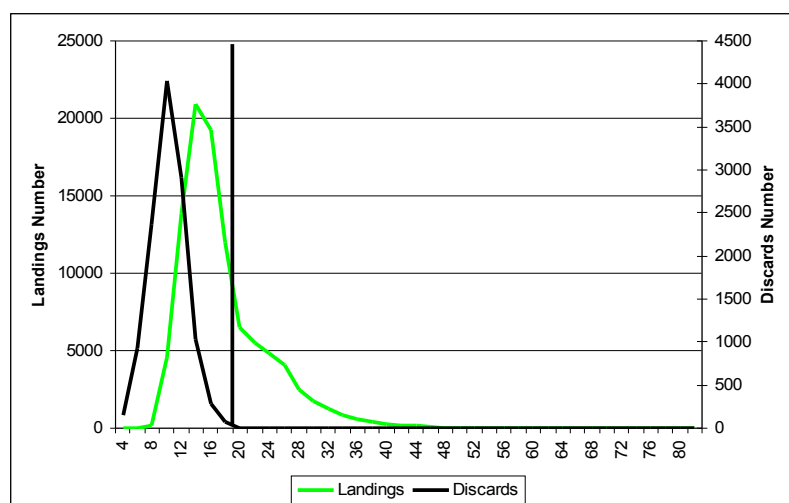


Figure 3.4.4.12 Length frequency distribution of discards and landings hake

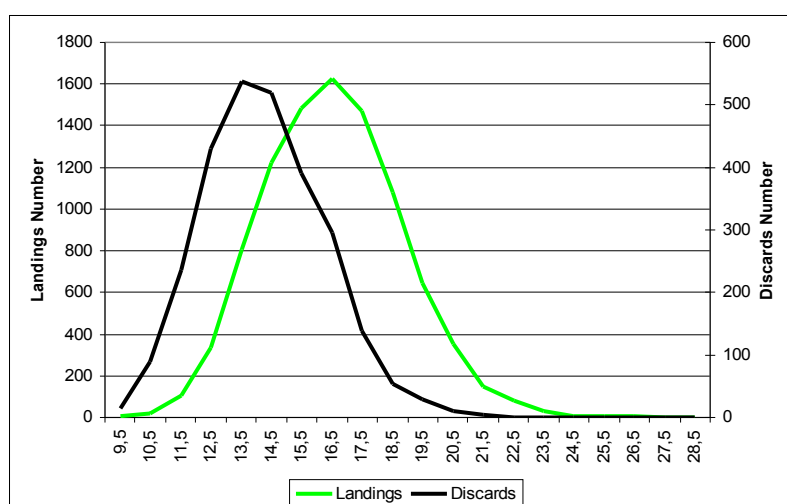
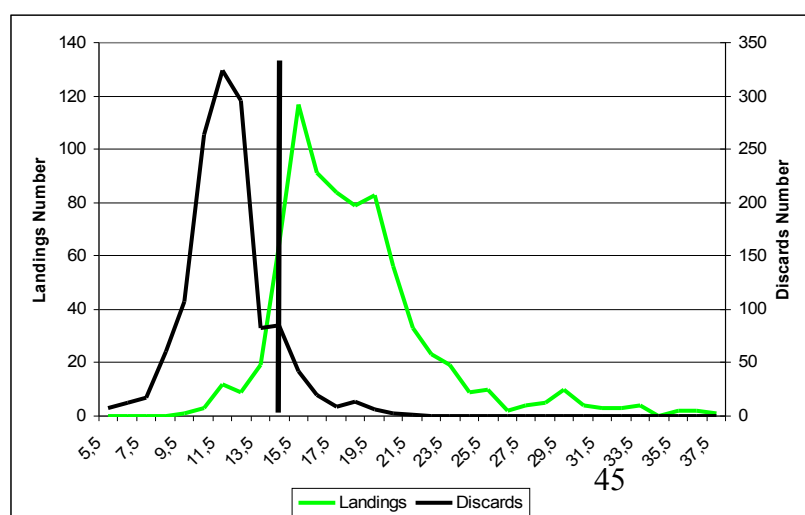


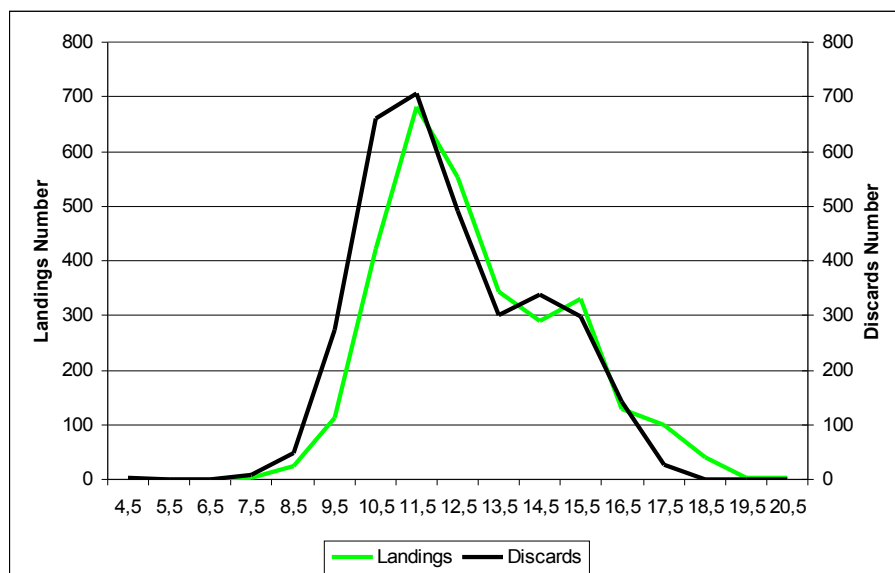
Figure 3.4.4.13 Length frequency distribution of discards and landings *Boops boops* in Greece.

There is no mesh size regulation for *Boops boops*; it is a bycatch species for bottom trawling.



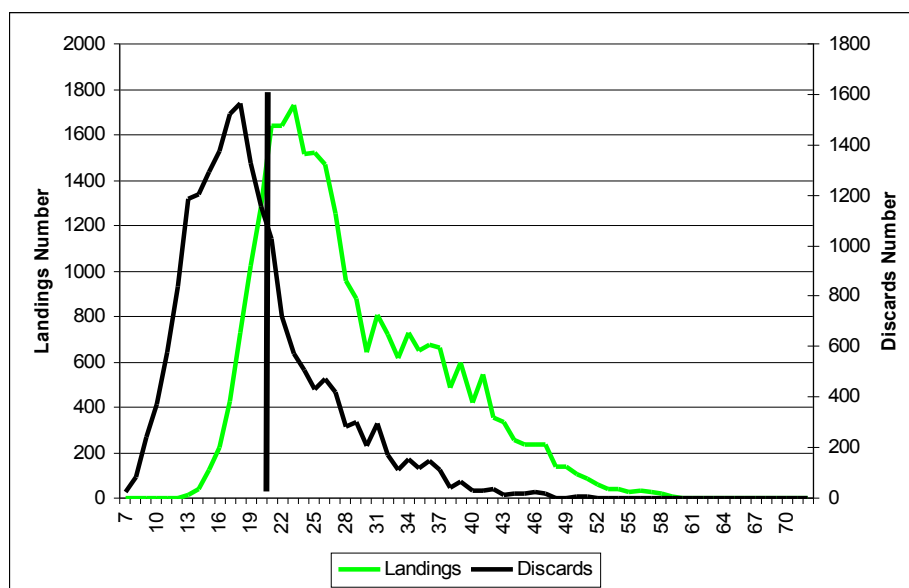
**Figure 3.4.4.14**Length frequency distribution of discards and landings horse mackerel (HOM).

The modal length of the discarded horse mackerel is 15 cm and of the landings 23 cm. The MLS for horse mackerel in Mediterranean is 15 cm.



**Figure 3.4.4.15**Length frequency distribution of discards and landings *Spicara flexuosa*

There is no mesh size regulation for *Spicara flexuosa*. It is a low commercial value bycatch species for bottom trawling.



**Figure 3.4.4.16**Length frequency distribution of discards and landings for rose shrimps

An important proportion (about 32%) of specimens larger than the MLS are discarded; this could be attributed to market demand.

#### 5.4.5. *Cyprus*

No participants from Cyprus attended the meeting and due to problems with the database, no landings or discard distributions are presented

#### 5.4.6. *Malta*

No participants from Malta attended the meeting and due to problems with the database, no landings or discard distributions are presented

### 5.5. Summary of discard practices in fishery

The data (aggregated and disaggregated by species) suggests significant differences in discard rates reported by Italy in comparison to other member states. While the discard rates (by weight) were broadly comparable between France, Spain and Greece, the discard rates for a number of species reported by Italy are considerably lower than that of the other Member States. For example, Spain reports discard rates for *Pandora* spp in excess of 80% by weight, while the Italian data suggests a rate of just 4%. However, it is likely that due to sampling procedures (inclusion or exclusion of all biota), data presentation (aggregated or disaggregated) or spatial differences in the fishery direct comparisons are not possible or advisable, particularly when comparing estimates of total discard rates (all species combined). Notwithstanding, these caveats, there are a number of general points that can be made. For France, Spain and Greece, the highest discard rates for commercial species were associated with 'low value' pelagic species such as sardine and horse mackerel. The length data supplied by Spain suggests that much of the discarding was not only associated with fish being below minimum landing size (MLS) but also because of high grading, suggesting that only the larger specimens were retained for marketing purposes. Conversely, high value species such as hake, shrimp and monk/anglerfish all exhibited very low discard rates and examination of the length data suggests that a considerable proportion of the fish landed for sale were below MLS, suggesting that discarding was mainly induced by quality issues and market forces rather than any legal constraints.

## 6. BOTTOM TRAWLING FOR FINFISH IN ICES DIVISIONS VIIeFGHJ AND AREA VIII

### 6.1. Description of the Fisheries

#### 6.1.1. *Ireland*

#### **Irish Meti rs/Sub-fleets operating in VIIefghj**

There are a number of trawler fleets targeting whitefish and *Nephrops* in ICES Area VIIg.. 19 m tiers (Table 4.1.1.1) have been identified as having some potential contribution of landings associated with the fishery identified in the call OTB for finfish in ICES divisions VIIe,f,g,h,j and VIII. (from a total 48)

The *Nephrops* fishery is at its peak from March to late September. This fishery is very much dependant on a combination of the tides and the behaviour of the *Nephrops*, with many boats switching between demersal fish and *Nephrops* as conditions dictate. Irish *Nephrops* landings

in the Southern Irish Sea and the Celtic Sea have doubled since the mid 1990's. While this fishery targets *Nephrops*, there is also a bycatch of other demersal fish.

Larger trawlers (>25 m) on the south coast have mostly all switched to twin rigging for monk, fishing along the 100 fathom down through VIIb and into VIIj. The twin rigging “monk boats” associated catch are other demersal fish, mainly megrim, hake, witch, with some haddock, whiting, cod, plaice. The catch composition depends mainly on where they are targeting the monk, the deeper they go for the monk the smaller the number of other species that will be caught. The Marine Institute discard sampling shows that small quantities of whiting and haddock above the minimum size are discarded from these boats as the duration of the tows often render such fish soft and unmarketable.

Some of the large trawlers switch to fishing for *Nephrops* on the Smalls, Labadie and Porcupine grounds during the second and third quarters. This fishery is very much dependant on a combination of the tides and the behaviour of the *Nephrops*, with the boats switching between demersal fish and *Nephrops* as conditions dictate.

**Table 4.1.1.1 List of Irish métiers with activity in Fishery 2 (unpublished data).**

Métier Name	
Clean Nephrops OTB VIIg	PSCWD Small OTB VIa, VIIb, g, j
Mixed Nephrops OTB VIIg	WCHD Small OTB VIIa & VIIa, g
Nephrops OTB VIIj	PSCWD Large OTB VIIa, g, a, g
Megrim & Monkfish Small OTB VIa, VIIb, g, j	PSCWD Large OTB VIa, b, VIIb, j
Megrim & Monkfish Large OTB VIIj	LWFH Large OTB VIa, b, VIIb, c, j, k
Haddock OTB VIIg & VIIj	LWLFH Small OTB VIa, b, VIIa, b, g, j
Plaice & Ray Small OTB VIa, VIIa, b, g, j	Deepwater spp Large Single Trawl VIa, VIIb, c, j, k
Plaice & Ray Large OTB VIIa	Whiting & Haddock Small SSC VIa, VIIa, b, g, j
BSPR OTB VIa, VIIa, b, g, j	Whiting & Haddock Large SSC VIIa, b, g, j
Whiting Small OTB VIa, VIIa, b, g, j	

### 6.1.2. UK (England and Wales)

The waters off SW England and S Wales are extremely important to the UK fishing industry and provide a wide range of resources. In 2004, there were in excess of 250 vessels >10m LOA working from ports and harbours in Devon and Cornwall landing 39,000 tonnes of fish (28% of the total for England and Wales). The main bottom trawling fleets are the beam trawlers from Newlyn and Brixham, and the otter trawlers from Brixham, Looe, Newlyn and Appledore. The great majority of beam trawlers are over 24m LOA and will undertake trips lasting up to 10 days, whereas the otter trawlers are 10-15m LOA and typically do 1-day trips. Most otter trawlers, particularly those working out of Brixham, switch to scallop dredging for several months of the year depending on catch rates, prices, access to fishing grounds and quota availability. Trawling effort varies enormously within the fleet from year to year and this has to be considered in the planning of catch sampling effort.



Newlyn beamers generally concentrate effort on megrim and anglerfish in the Celtic Sea (VIIIfg) and in the Western Channel and western approaches (VIIegh). Quota for Dover sole is generally insufficient for them to target this species all year round so trips frequently consist of 1-2 days on grounds where sole fishing is good and the remainder on other diverse fisheries. Grounds off Trevose Head (VIIIf) are closed to demersal trawling in the first quarter to protect spawning fish.

Brixham beamers are much more dependent on Dover sole than the Newlyn fleet. The escalation of fuel prices has ruled out the seasonal shifts in former years to Liverpool Bay and/or the North Sea, so that effort is concentrated in the English Channel. This, and the reduction of quota, has resulted in the emergence of cuttlefish as an extremely important resource. The cuttlefish season usually runs from October/November to March/April; beamers may work western waters for megrim and anglerfish in summer months when catch rates of other species drop.

Beam trawls are usually fitted with a stone mat to enable a variety of grounds to be fished. Recently, the fishing industry has initiated several changes to the design of nets and mesh sizes to reduce discards. Initial results of fitting square mesh panels in the belly and/or square mesh cod-ends suggest there are considerable economic as well as environmental benefits to be gained.

Otter trawlers from Brixham, Plymouth and Looe target cuttlefish and squid through the winter months, only changing their fishing practices as the abundance of lemon sole increases around the beginning of February. Timing also varies with the distribution and price of cuttlefish, for example, in some years the cuttlefish can move offshore early, beyond the range of these smaller vessels. In some years, otter trawlers from Newlyn and North Devon move to Brixham to take advantage of good cuttlefish catches. A few boats may pair up to target sea bass that can occur in large numbers in winter although fuel prices and the prolonged searching associated with this fishery are disincentives. Refits normally take place in May-June when catch rates are poor, and otter trawls are replaced with scallop dredges. More recently, a large part of this fleet has dredged for 9-10 months of the year.

Otter trawling effort from Newlyn has reduced considerably in recent years as a result of quota cuts and closed areas. As with all demersal trawl fisheries in waters around SW England and S Wales, however, otter trawlers exploit a very diverse fish population. Haddock is more important to the Newlyn fleet, and John Dory appear around the Isles of Scilly in spring and summer that can provide good landings. Tighter effort restrictions on scallop dredging on inshore grounds around Scilly has led to fewer boats making the switch from otter trawling typical of boats operating from Brixham.

Vessels fishing from the north coast of Devon and Cornwall are dependent on ray through most of the year. Large hauls of sea bass are occasionally made on banky ground off S Wales during spring tides, and there is a lucrative squid fishery off Lundy Island some years in the summer. Some vessels move to Plymouth or Brixham during the winter for the cuttlefish.

### 6.1.3. *Spain*

As the resources from the Divisions VIIIc and IXa use to be managed together as an only stock, IXa information is included in fishery 2.

10 Spanish métiers are involved in fishery 2:

- Métier 1: Divisions VIIefghj – Single Bottom Trawl (OTB) - Targeting megrim and hake
- Métier 2: Divisions VIIefghj - OTB - Targeting hake
- Métier 3: Divisions VIIefghj - OTB - Targeting megrim
- Métier 4: Divisions VIIIabd (Bay of Biscay) - OTB - Mixed fishery
- Métier 5: Divisions VIIIabd (Bay of Biscay) – Pair Bottom Trawl (PTB) - Targeting hake
- Métier 6: Division VIIIc (Cantabrian Sea) – OTB - Mixed fishery
- Métier 7: Division VIIIc (Cantabrian Sea) – OTB - Targeting horse mackerel
- Métier 8: Division IXa North (Galicia) – OTB - Mixed fishery
- Métier 9: Division IXa North (Galicia) – OTB - Targeting horse mackerel
- Métier 10: Division IXa South (Cádiz) – OTB - Mixed fishery

#### Métiers 1 (VII-OTB-MEG HKE), 4 (VIIIabd-OTB-Mix) and 5 (VIIIabd-PTB-HKE)

The fleets are composed by single otter bottom trawlers “baka” (BAK) and bottom pair trawlers operating with Very High Vertical Opening nets (VHVO) (PRS). Fishing characteristics of this fleet changes according to the gear used. Hence, “baka” otter trawlers can be defined as a single vessel which trawls a “bottom net” operating in contact with the seabed. Trips last a mean of 6 days depending on the area being fished, and the haul duration is between 4 and 5 hours. These catches are generally landed in Basque ports (Ondarroa and Pasajes) and in French, Scottish and Irish ports from where the catch is transported by trucks to be sold on local Basque markets. The “baka” trawlers target different species like hake, megrim, anglerfish, squid, sharks, etc. depending on the sea area, year period and quotas they have.

On the other hand, bottom pair trawlers are composed by two vessels trawling a single very high vertical opening net (VHVO). The most common VHVO net is between 25-35 meters height and 75 to 90 meters width. The mean days for trip are 5 or 6. In this case the haul duration is longer than the otter trawls because bottom pair trawls take 7-8 hours by mean for each haul. Catches are landed at French ports (Lorient, Brest, La Rochelle...) and transported by trucks to the Basque ports (Ondarroa and Pasajes) or landed at these main Basque ports and sold on their local markets. This fleet target mainly hake (80-85% of total catch).

#### Métiers 2 (VII-OTB-HKE) and 3 (VII-OTB-MEG):

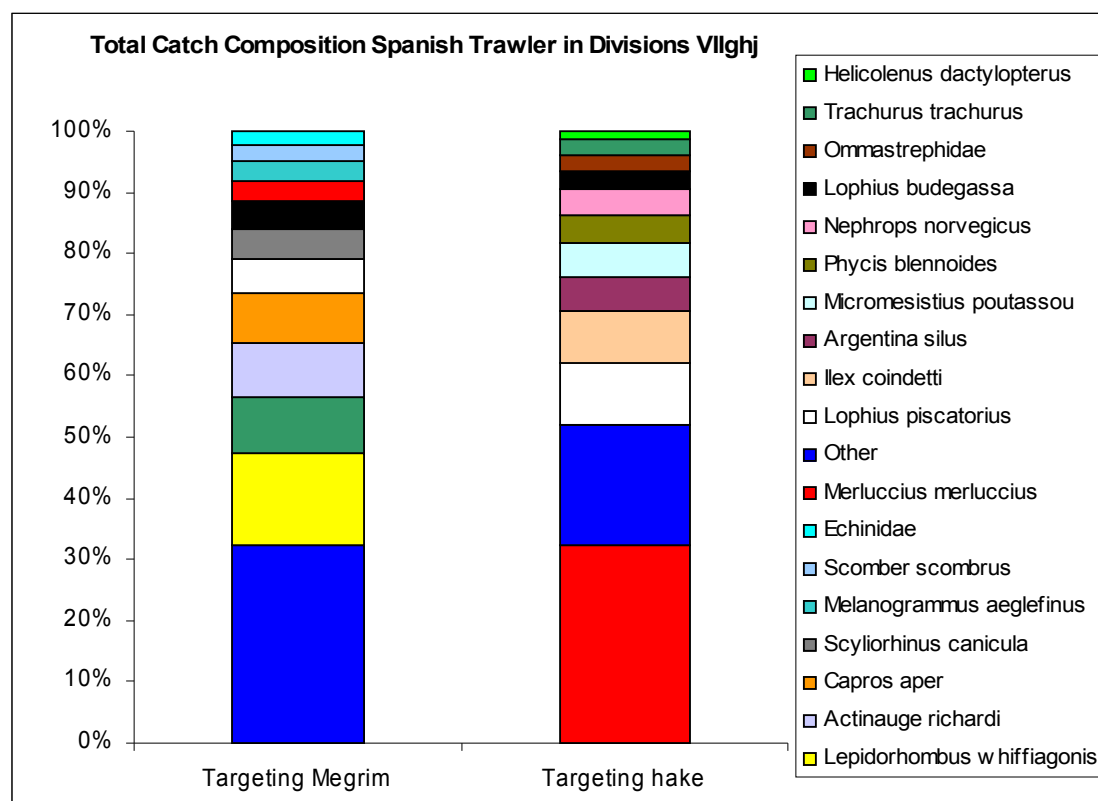
Spanish bottom trawl fleet operated only in Divisions VIIghj. During years 2003 to 2006 any hauls were realized in sampled commercial vessels principally in Divisions VIIef and few in VIIbc. The used gear is a traditional Spanish bottom otter trawler call “Baca”. Baca otter

trawls used are designed for low to medium lifts using a cod end mesh size between 80mm to 100mm depending on area and species composition. The ground gear was set for use on clean or medium ground, with or without discs. Vessel trawls had on average a fishing line length of 60-100m. Recently some vessels are used a new gear called “cuatro caras”, nevertheless they are still rare. This gear is similar to Baca but it has a four faces instead the two of the traditional Baca. Information on fishing effort in the last three years effort is presented in Table 4.1.3.1.

**Table 4.1.3.2 Effort data 2004-2006 for métier 2**

Year	Effort (Number Trips)	Effort (100 days * 100 HP)
2004	1 315	95 781
2005	1 297	91 510
2006	1 293	104 872

Two different Spanish bottom trawl métiers are actually operated in these Divisions, ones with megrim and anglerfish as most important targeted species (OTB Targeting megrim) and other with hake, anglerfish and Nephrops (OTB Targeting hake). Differences in total catches and catch and size composition are remarkable between these two métiers. In Figure 6.1.3.1 a comparison between both métiers for 2006 are shown.



**Figure 4.1.3.17Métiers 2 (VII-OTB-HKE) and 3 (VII-OTB-MEG) total catches composition per trip (2006) in Divisions VIIghj.**

Data from previous discard studies

Métier 2 (VII-OTB-HKE):

Discard and landings composition for the most valuable species for this métier were extracted from Lart et al. 2002, Table 4.1.3.2.

**Table 4.1.3.3 Estimated raised catch composition of Targeting hake fishery in Division VIIIc for year 2000.**

Species	N° Discarded (in thousand)	% Discarded	Weight Discard ed (t)	Landed Weight (t)	Retaine d €/Kg	Landed € (thousand)
European hake ( <i>Merluccius merluccius</i> )	14 835	1	10	1481	4.30	6362
Witch ( <i>Glyptocephalus cynoglossus</i> )	34	6	25	694	4.73	3283
Four spots megrim ( <i>Lepidorhombus boscii</i> )	3 612	25	85	598	4.53	2707
Norway lobster ( <i>Nephrops norvegicus</i> )	63	1	2	329	7.87	2590
White anglerfish ( <i>Lophius piscatorius</i> )	872	22	5	257	4.87	1250
Skates ( <i>Raja</i> spp.)	133		13	85	2.29	195
Megrim ( <i>Lepidorhombus whiffiagonis</i> )	349	83	55	36	4.35	155
Squid <i>Todaropsis eblanae</i>	142		104	87	1.26	110
Squid <i>Illex coindetti</i>	55		176	52	0.97	51
Black anglerfish ( <i>Lophius budegassa</i> )		63	2	8	5.10	39
Eledone cirrosa	58		17	24	1.26	30
Horse mackerel ( <i>Trachurus trachurus</i> )	na	92	98	104	0.44	5
Atlantic mackerel ( <i>Scomber scombrus</i> )	na	95	105	64	0.44	3
Poor cod ( <i>Trisopterus minutus</i> )	na	100	0.4	1	na	
Blue whiting ( <i>Micromesistius poutassou</i> )	451	100	847	0		
Dogfish ( <i>Scyliorhinus canicula</i> )	na	100	27	0		
Greater silver smelt ( <i>Argentina silus</i> )	na	100	7897	0		

Métier 3 (VII-OTB-MEG):

Discard and landings composition for the most valuable species for this métier were extracted from Lart et al. 2002, Table 4.1.3.3.

**Table 4.1.3.4 Estimated raised catch composition of Targeting megrim in Sub-areas VI-VII for year 2000.**

Species	N° Discarded (in thousand)	% Discard ed	Weight Discard ed (t)	Landed Weight	Retain ed €/Kg	Landed € (thousand)
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	(t)		)			
Megrim ( <i>Lepidorhombus whiffiagonis</i> )	32 337	48	1 924	6 391	4.44	28362
White anglerfish ( <i>Lophius piscatorius</i> )	319	19	30	2 088	6.48	13541
Black anglerfish ( <i>Lophius budegassa</i> )	252	13	22	994	8.30	8252
Witch ( <i>Glyptocephalus cynoglossus</i> )	3 567	45	391	1 271	4.45	5652
European hake ( <i>Merluccius merluccius</i> )	863	34	95	856	5.45	4665
Four spots megrim ( <i>L. boscii</i> )	7 181	57	4 275	843	4.09	3446
Norway lobster ( <i>Nephrops norvegicus</i> )	949	12	21	239	7.26	1738
Cuckoo ray ( <i>Raja naevus</i> )	8 915	92	1 548	501	2.27	1136
Octopus ( <i>Eledone cirrosa</i> )	na		217	358	1.26	451
Dogfish ( <i>Scyliorhinus canicula</i> )	9 948	99	5 558	184	0.80	147
Squid ( <i>Todaropsis eblanae</i> )	na		385	131	0.97	127
Skates ( <i>Raja spp.</i> )	na		182	41	2.60	107
Squid ( <i>Illex coindetti</i> )	na		7	30	0.97	29
Horse mackerel ( <i>Trachurus trachurus</i> )	11 264	100	5 423	27	0.42	12
Atlantic mackerel ( <i>Scomber scombrus</i> )	1 015	98	123	6	0.42	3
Whiting ( <i>Merlangius merlangus</i> )	77	87	15	2	0.67	1
Blue whiting ( <i>Micromesistius poutassou</i> )	3 530	100	844	0		
Greater silver smelt ( <i>Argentina silus</i> )	27 665	100	1 316	0		
Poor cod ( <i>Trisopterus minutus</i> )	1 996	100	200	3	na	

#### Métiers 6 (VIIIc-OTB-Mix) and 7 (VIIIc-OTB-HOM):

Effort in this métier is especially concentrated in statistical rectangles 16/E3, E7. Vessels implicated in this métier consist of a range of sizes between 21 and 30m with trips lasting from 1 to 6 days. Haul duration is generally 1 to 9 hours depending on the weather condition the species targeted or area being fished, with between 3 to 6 crewmembers sorting the catch. Catches are kept on ice and sold, most of them un-gutted, on Spanish markets. “Baca” otter trawls used are designed for low to medium lifts using a cod end mesh size of 65 mm to 70 mm. depending of catch composition. The ground gear was set for use on clean or medium ground, with a maximum discard size of 20 cm. The majority of vessels carry both clean and medium ground trawls to increase the range of grounds they can work on any given trip. Of the vessels sampled trawls had on average a fishing line length of 27m. Information on fishing effort is presented in Table 4.1.3.4.

**Table 4.1.3.5 Effort data 2004 – 2006 for métier 6**

Year	Trips	Effort (100 days * 100 HP)

2004	8 050	49 931
2005	7 766	47 355
2006	7 847	50 266

This métier targets a range of species including Atlantic mackerel, anglerfish, horse mackerel, and megrim (two species of megrim are included with same name in the landings), hake or blue whiting. Importance of mackerel is observed only in during the first half of the year. Mackerel is a species with low unit value; however it was the most economically important species. Anglerfish also have a important landed value. Megrim and horse mackerel each represented around 10% of landed value in the fishery.

Discard and landings composition for the most valuable species for this métier were extracted from Lart et al. 2002, Table 4.1.3.5.

**Table 4.1.3.6 Estimated raised catch composition of mixed fishery in Division VIIIc for year 2000.**

Species	N°	%	Weight	Landed	Retain ed	Landed
	Discarded (in thousand)	Discarde d	Discard ed (t)	Weight (t)	€/Kg	€ (thousand )
Atlantic mackerel ( <i>Scomber scombrus</i> )	14 835	19	796	5 390	0.37	2016
White anglerfish ( <i>Lophius piscatorius</i> )	34	43	2	122	8.10	986
Horse mackerel ( <i>Trachurus trachurus</i> )	3612	79	2 339	744	1.23	918
Black anglerfish ( <i>Lophius budegassa</i> )	63	17	1	85	8.10	686
Megrim ( <i>Lepidorhombus whiffiagonis</i> )	872	20	11	113	5.72	646
European hake ( <i>Merluccius merluccius</i> )	133	27	2	62	3.83	237
Four spots megrim ( <i>Lepidorhombus boscii</i> )	349	61	22	38	4.87	187
Blue whiting ( <i>Micromesistius poutassou</i> )	142	98	332	12	1.15	14
Poor cod ( <i>Trisopterus minutus</i> )	55	61	3	4	0.00	0
Gadiculus argenteus			0	0		
Dogfish ( <i>Scyliorhinus canicula</i> )	58	98	489	23		
Eledone cirrosa	na		15	23		
Polybius henslowi	na		405	0		
Illex coindetti	na		6	96		
Norway lobster ( <i>Nephrops norvegicus</i> )	451	1	0	36		
Skates ( <i>Raja spp.</i> )	na		116	46		

Todaropsis eblanae	na		0	11
Great fork beard ( <i>Phycis blenoides</i> )	240	29	4	37
Lesser silvert smelt ( <i>Argentina sphyraena</i> )	312	45	8	13
Roughnose rattai ( <i>Trachyrhynchus trachyrhynchus</i> )	0	100	18	0
Pout ( <i>Tripsopterus luscus</i> )	125	0	0	30

#### Métiers 8 (IXa North-OTB-Mix) and 9 (IXa North-OTB-HOM):

The Spanish trawl fleet is quite homogeneous and uses mainly two gears, pair trawl and bottom trawl. Actually this bottom trawl fleet is polyvalent due to an increasing percentage (dependent on ports) of vessels that carry both trawl gears. Baka Otter Trawl for mixed fishery and the “Jurelera” (High Vertical Opening) targeting horse mackerel: An increasing targeting horse mackerel effort is observed in recent years. They change depending on the species abundance or the markets forces and targeting the pelagic species listed above.

The percentage of Crustacean present in the landings is small as there are other important target species (i.e. horse mackerel, mackerel anglerfishes, megrims and blue whiting), therefore the otter trawl fishery in IXa can not be considered as a pure crustacean fishery. In recent years species as hake or Norway lobster, contributed only 5% of the total landings of the trawl fishery, this percentage used to be higher in the years prior to the 1980s. Baka Otter trawls use a cod end mesh size of 65mm. The ground gear was set for use on clean or medium ground. The gear presents a vertical opening of 1.2-1.5m and wing spread of 22-25m. (Meixide & Padín in Fonseca *et al*, 2000). Effort Information is presented in Table 4.1.3.6.

**Table 4.1.3.7 effort data 2004-2006 for métier 8**

Year	Trips	Effort (100 days * 100 HP)
2004	7657	31219
2005	5233	22345
2006	5534	27741

Discard and landings composition for the most valuable species for this métier were extracted from Lart et al. 2002, and are shown for the two different gears employed in Tables 4.1.3.7 and 4.1.3.8.

**Table 4.1.3.8 Estimated raised catch composition of métier 8 (IXa North-OTB-Mix) for year 2000.**

Species	N° Discarded (in thousand)	% Discarded	Weight Discarded (t)	Landed Weight (t)	Retained €/Kg	Landed € (thousand)
Horse mackerel ( <i>Trachurus trachurus</i> )	4 171	6	813	12 484	1.2	15 003

European hake ( <i>Merluccius merluccius</i> )	24 012	73	834	1 879	5.79	10 890
Black anglerfish ( <i>Lophius budegassa</i> )	226	25	22	751	7.43	5 576
Norway lobster ( <i>Nephrops norvegicus</i> )	105	1	3	331	15.21	5 039
Four spots megrim ( <i>Lepidorhombus boscii</i> )	17133	68	602	860	5.4	4 644
Blue whiting ( <i>Micromesistius poutassou</i> )	297 156	87	10 915	2 757	1.13	3 105
Atlantic mackerel ( <i>Scomber scombrus</i> )	1 525	3	191	7 864	0.35	2 727
Megrim ( <i>Lepidorhombus whiffiagonis</i> )	481	23	19	198	5.41	1 071
White anglerfish ( <i>Lophius piscatorius</i> )	51	66	6	98	7.44	730
<i>Illex coindetti</i>	na		246	1 501		
Poor cod ( <i>Trisopterus minutus</i> )	183	8	8	94		
Skates ( <i>Raja spp.</i> )	na		61	67		
<i>Todaropsis eblanae</i>	na		197	362		
Great fork beard ( <i>Phycis blenoides</i> )	805	75	49	64		
Lesser silvert smelt ( <i>Argentina sphyraena</i> )	3 986	87	125	21		
Pout ( <i>Trisopterus luscus</i> )	633	5	31	1 481		
<i>Gadiculus argenteus</i>	43 943		300	0		
Dogfish ( <i>Scyliorhinus canicula</i> )	3 471	97	316	41		
<i>Eledone cirrosa</i>	na		94	1 450		
<i>Polybius henslowi</i>	na		8 273	0		
Roughnose rattai ( <i>Trachyrhynchus trachyrhynchus</i> )	321	100	29	0		

**Table 4.1.3.9 Estimated raised catch composition of métier 9 (IXa North-OTB-HOM) for year 2000.**

Species	N°	%	Weight	Landed	Retain	Landed
	Discarded (in thousand)	Discard d	Discard ed (t)	Weight (t)	ed €/Kg	€ (thousand )
Horse mackerel ( <i>Trachurus trachurus</i> )	1 230	3	304	7 945	0.79	6 298
Atlantic mackerel ( <i>Scomber scombrus</i> )	4 311	42	445	1 237	0.60	742
European hake ( <i>Merluccius merluccius</i> )	782	70	56	74	5.06	376
Black anglerfish ( <i>Lophius budegassa</i> )	0	1	0	18	8.10	149
Blue whiting ( <i>Micromesistius poutassou</i> )	8 291	78	404	157	0.79	124
Four spots megrim ( <i>Lepidorhombus boscii</i> )	78	64	2	5	6.16	28
White anglerfish ( <i>Lophius piscatorius</i> )	0	0	0	2	8.10	14
Megrim ( <i>Lepidorhombus whiffiagonis</i> )	0	0	0	0	6.16	2
<i>Gadiculus argenteus</i>	46	100	1	0		



Dogfish ( <i>Scyliorhinus canicula</i> )	79	100	9	0
Eledone cirrosa	0		0	64
Illex coindetti	na		6	42
Todaropsis eblanae	na		1	12
Great fork beard ( <i>Phycis blenoides</i> )			0	0
Lesser silvert smelt ( <i>Argentina sphyraena</i> )	24	100	1	0
Roughnose rattai			0	0
( <i>Trachyrhynchus trachyrhynchus</i> )				
Polybius henslowi	na		0	0
Pout ( <i>Trisopterus luscus</i> )	43	7	3	50

Figure 6.1.3.2 shows the total catch composition per trip (2006) in both Divisions VIIIc (métiers 6 and 7) and IXa North (métiers 8 and 9).

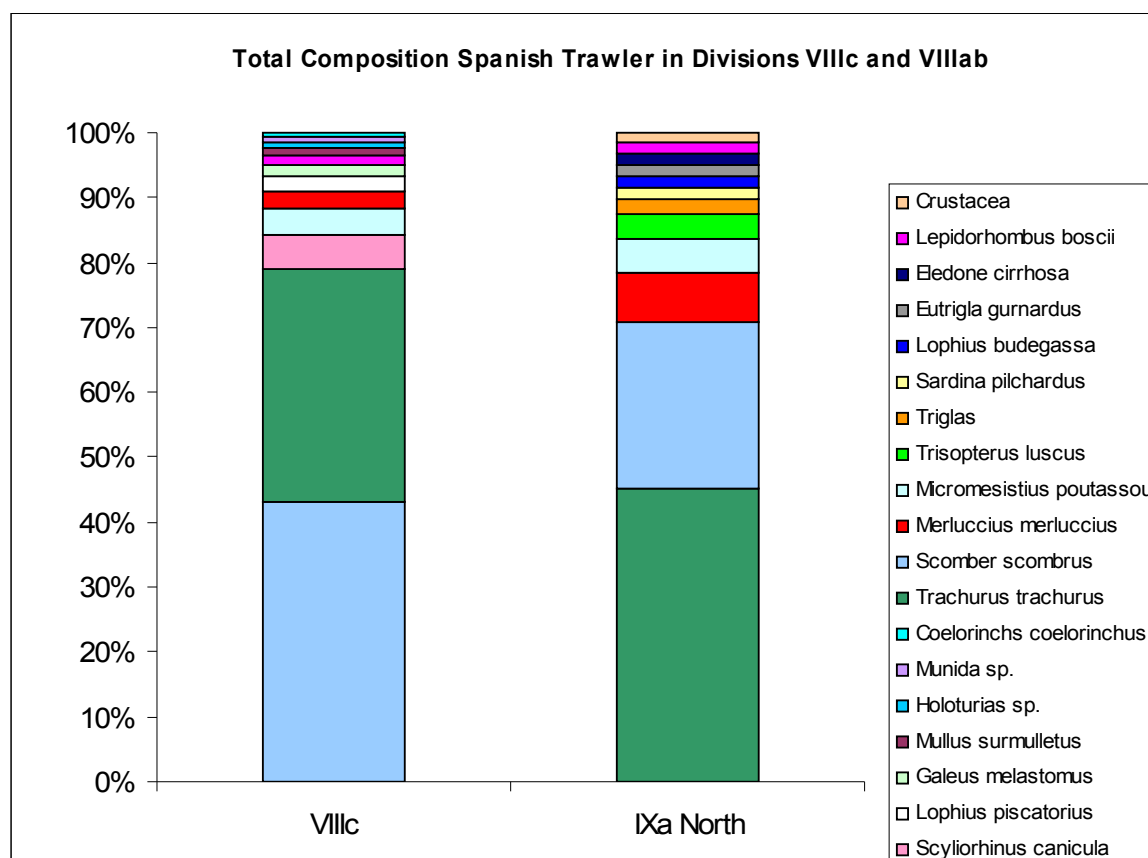


Figure 4.1.3.18 Métiers 2 (VII-OTB-HKE) and 3 (VII-OTB-MEG) total catches composition per trip (2006) in Divisions VIIghj.

#### Métier 10 (IXa South-OTB-Mix):

**Description of the fishery:** The trawl fleet is mainly composed of around 200 vessels. This fishery is considered multispecific with different target species of fishes, molluscs and crustaceans, hake, common octopus, deepwater rose shrimp and different sparids species as the mainly landed. In respect to fishing grounds within the study area, there are great extensions of sea bottoms of unconsolidated nature, such as gravel, sandy and muddy bottoms. At present, it is classified as an unique, highly multispecific métier.

**Vessel type:** Their average characteristics are about 14.5 m length, 26 HP and 214 GRT. The traditional trawl gear used is the “baca” gear with some modifications. Accordingly, the gear setting and their technical characteristics are in consonance with the technological advances of the vessels, as well as on the types of seabeds trawled and on the bio-ecological characteristics of the exploited species.

**Key regulations:** The trawl fishing regulations of the Gulf of Cadiz are found in the RD 632/1993 of May 3 (BOE nº 118). Moreover, since 2004 Annual Fishing Plans were implemented by the Spanish Administration with the objective of reducing fishing effort. Among its foremost aspects, a decrease of the number of daily fishing hours was put into practice, which obliged the vessels to rest at port during nighttimes. Furthermore, a seasonal close of 45 days during the fourth trimester of the year was applied to the whole fleet. In relation to more general aspects, a ban was applied on fishing at distances less than 6 miles from the coast (BOE nº 118) and the funnel net mesh size was fixed to 40 mm (Regulation (CEE) 3094/86; 850/98).

##### 6.1.4. *France*

The French fleet comprises of around 900 bottom trawlers working full time (around 400 boats) or part time based in ports from Cherbourg to Bayonne. The average length of boats is around 19 meters. The targeted species are mainly monkfish, rays, gadoids, pollack, cod, megrim, sole. Landings range from 65 000 – 56 000 tonnes from year 2004 to 2006., the top 10 in weight are cuttlefish, monkfish, whiting, red gurnard, haddock, pouting, squid, small spotted dogfish, merlu, Pollack. The top 10 in value is monkfish, cuttlefish, squid, whiting, sole, saint-Pierre, merlu, rouget, morue, bar.

##### Discard patterns observed in earlier studies

Some information exist on discards in a part of this fishery. Bottom trawling in area VIIef, was investigated in years 1992-93 through an European study (Morizur et al., 1996). For bottom trawling in inshore area, if the discard rate was similar for a lot of species for other species there was a high variability between fishing grounds and ports. In the offshore trawling, with duration of trip greater than five days, some species were discarded at a high discard rate (90%) : low value species (gurnards, dab, horse mackerel, haddock), and other occasional species (clupeids, and non marketable species. Other species discarded with a rate greater than 50 % are: red gurnard, pouting, plaice, whiting due to their low value on the market.

##### Regulations

In common with many fisheries, both non-pressure and pressure stock (TAC) species are targeted. Mesh size (MMS) and landing size (MLS) regulations for trawls and for nets are in accordance with EC regulation 850/98 and with difference between area 2 and area 3. There are also national market grading regulations for monkfish (<500g/landing size 34cm) and occasionally for cod.

## 6.2. Overview of discard sampling methodologies

### 6.2.1. Ireland

The Irish discard sampling programme conducted in the Celtic Sea sets out annual sampling targets based on aggregated métiers. Given the high number of métiers identified in section 7.1.1, it is necessary to make the programme tractable by aggregating a number of métiers which have similar characteristics. Temporal distribution of targets is based on fleet effort characteristics (seasonality in fisheries) and data from individual trips is binned to a particular fleet segment using post-analysis of the landings data, although vessels are selected with a high degree of *a priori* knowledge of the likely target species before commencing the sampling trip. Sampling targets for 2007 are given in Table 4.2.1.1.

Fleet segment or métier	Area	Planned sampling effort		sampling distribution			
		No. Trips	Days at sea	Q1	Q2	Q3	Q4
Nephrops Smalls	VII f,g,h	10	70	1	5	2	2
OTB 7j Demersal	VII j	10	50	2	3	3	2
OTB 7g Demersal	VII g	10	50	2	3	3	2
OTB 7b-k Hake, Monkfish, Megrim	VII b,c,j,k	8	80	2	2	2	2
Scottish Seines VII g,j Demersal Fish	VII g,j	5	20	1	2	1	1
Beam Trawl VII g,f,j,h Demersal Fish	VII g,f,j,h	5	35	1	2	1	1

Table 4.2.1.10 Irish discard sampling targets for 2007

Sampling procedures are shown below and each sea going observer is given extensive training in data collection and entry to ensure consistency and quality control. Sampling procedures are as follows:

- Once the haul has been completed, an estimation of the bulk catch is obtained. This is done either by the skipper or the observer depending on the level of experience. The bulk catch is usually estimated in 40 kg box equivalents.
- A random box (40kg) of discards is taken from every haul, and the length composition of all species present recorded
- A selection of five individuals per 1cm length group, per species is made per ICES Division, gear type and quarter is taken for ageing. Species aged are cod, whiting, haddock, plaice, sole, megrim, saithe, *L. budegassa*, *L. piscatorius* and hake.
- When all of the fish discards have been measured, the non-fish discards content of the box is estimated as a percentage of the box taken up by non-fish discards.

Non-fish discards are defined as seaweed, dead shells, stones, crabs, jelly fish, squid and rubbish. Where the fishing trip is a non-*Nephrops* fishing trip discarded prawns are also included in the Non-fish discards.

- Random length samples of the commercial catch are from the same haul and the total retained catch is recorded.

#### 6.2.2. *UK (England and Wales)*

Although catch sampling has been carried out by CEFAS since the 1990's, the present programme is steered mainly by EC Regulation 1639/2001. The sampling design is stratified to ensure coverage of gears targeting species specified in the regulations, with vessels being selected randomly and sampling effort distributed across métiers and regions in direct proportion to fishing effort recorded from the previous year.

At the start of each calendar year the days on grounds data officially reported by the English and Welsh registered fishing fleet >10m overall length (obtained from the FAD database) is grouped by gear type and port area of landing. This information is used to apportion Cefas's sampling effort. Cefas currently sample 150 days at sea per quarter. 15 days (10% of the available sampling effort) is assigned to the <10m fleet using assorted fishing gears (not pots) as they contribute approximately 10% of the total UK landings by weight. The remaining 135 days is distributed across the >10m vessels gear types and port areas according to fishing effort (days at sea).

A list of all the current English and Welsh registered fishing vessels is used to carry out a random vessel draw. Vessels are assigned a draw number and then a random number generator selects a list of vessels (approximately 300 vessels) and sampling officers then attempt to sample vessels in the order they are drawn to minimise bias. The sampling officer works down the list and selects those vessels that are active in their region that could be used to fulfil their gear-specific targets. If a vessel is unavailable or unsuitable for sampling, then the sampling officer attempts to sample the next vessel on the list. As a last resort, sampling officers can substitute a vessel when there are last minute cancellations or when there are no vessels on the draw list that satisfy métier-specific targets.

#### 6.2.3. *Spain*

In the ICES divisions the sampling is carried out along the whole year, usually deploying an observer in every month in Subarea VII. The observer programme is based on a stratified random sampling per Fishery Unit, which comprises area, gear and target species. Observers record discard by species and haul, both in weight and number. They also record location, duration of hauls, environmental variables and vessel characteristics (horse power, ship speed, etc.). Incidental catches of marine mammals and sea birds is taken when happens. When catches are sorted in fish size categories, sampling is also stratified by fish size. Vessels sampling included in the program are bigger than 12m. Many of the artisanal vessels are not included in the sampling program nevertheless the majority of them are no trawling vessels. In the ICES Division data are collected to métier level due to the high differences between discard strategies in different métiers.

- 1.- Subarea VII - OTB Targeting megrim 1.1%
- 2.- Subarea VII - OTB Targeting hake 1.1%
- 3.- Divisions VIIIabd - OTB Mixed fishery

- 4.- Division VIIIc (Cantabrian Sea) 0.5%

#### 6.2.4. France

In its 2002 DCR programme, France proposed a pilot study designed to determine which fisheries generate significant levels of discards. Since 2003, the fleets identified in this study were monitored by on-board observers. The inspectors concentrated mainly, though not exclusively, on the species for which the discard levels are to be assessed every year. The use of onboard observers enabled an exhaustive analysis of the catch to be performed - information is therefore available on all the species listed in annexes XII and XV, at least in terms of presence/absence, population size and weight.

For North-Eastern Atlantic and Mediterranean (European seas) the protocol is referred to below. Its application remains based on the involvement of Ifremer staff (around 80 trips involving 175 man/days at sea) and the use of additional resources via sub-contracting for the longest onboard missions, involving some 300 man/days at sea (65 trips); thus the total onboard-observation effort in European seas encompassed over 145 trips involving 500 man/days at sea.

#### *Atlantic – Western Channel*

In the Celtic Sea, Western Channel and Gulf of Gascony, the species most vulnerable to depopulation through discards and those on which France has decided to focus its attention are the species for which the discard estimates have been incorporated into the evaluations by the ICES working parties: hake, Norway lobster and sole:

- earlier studies of discard estimates carried out in 1985, 1991, 1997 and 1998 showed that discards of plaice and haddock by high-seas trawlers over 40 metres long operating to the west and north of the British Isles are negligible<sup>7</sup>. With their two-week-long trips, sampling these vessels is very expensive, especially in relation to the small amount of new information that any further onboard-observation missions are likely to provide.

- the studies referred to above have also shown that the same deep-sea fleets can generate significant volumes of whiting discards. However, the cost of sampling such discards to the level of precision required by the implementing Regulation has proven to be exorbitant. In 1997 Rochet *et al*<sup>8</sup> showed that even with a very significant sampling effort (26 trips, 390 days at sea), the estimates obtained of total quantities of whiting discards had a variation factor of 43 %.

Since 2006 the derogation obtained by France for certain gadoids and plaice sought by industrial trawlers (over 40 metres long) operating to the west and north of the British Isles was not reconducted and therefore they were included in the sample scheme.

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<sup>7</sup> Rochet M.J., Trenkel V. and Peronnet I, 2001. Estimation des rejets de pêche des chalutiers français en mer Celtique. Ifremer DRV/RST/RH-2001-07. 69 p.

<sup>8</sup> Rochet M.J., Trenkel V. and Peronnet I., 2002. An analysis of discards from the French trawler fleet in the Celtic Sea. ICES Journal of Marine Science, Volume 59, Issue 3, 24 p.

In addition, as in Channel East/North Sea and for the same reasons, the protocols in use do not cover vessels using dredges, pots or handlines. The same goes for certain industrial trawlers seeking deep-water species such as grenadier and emperor fish; catches by these vessels are already being monitored by onboard observers under Regulation 2347/2002, who will provide information that can also be used for the purposes of Regulation No 1639/2001.

The fleets and fishing types being monitored for discards in the Atlantic and western Channel region are:

- **Bottom trawlers below 40m**, which break down into 3 categories:
  - - Nephrops trawlers seeking mainly Norway lobster but also catching hake. This fishing type can be further divided into coastal fishing (daily trips) and longer distance fishing (trips of 2 to 3 days).
  - - Coastal trawlers seeking flatfish, Norway lobster and common shrimp in the Gulf of Gascony. Coastal trawlers make trips lasting no more than a single day.
  - - Distant-water trawlers seeking haddock, whiting, plaice and sole (in the Celtic Sea). These vessels make trips of 12 days.
- Driftnetters, which mainly seek sole and plaice, can, like lobster vessels, be divided into two categories : coastal netters making daily trips and distant-water netters making trips of 5 days.

The study strategy is similar to that used in the North Sea and Channel East. In human resources terms, this involved some 195 days at sea (140 of which were subcontracted).

Observers collect the necessary information during missions (72 trips are planned under the sampling plan) onboard working vessels practising the following fishing types: coastal Nephrops trawling, deep-sea Nephrops trawling, coastal bottom trawling, deep-sea bottom trawling, shrimp trawling, coastal driftnetting and deep-sea driftnetting.

Basic segmentation of vessels for the monitoring of discard volumes in the Atlantic North-East (MP) is given in Table 4.2.4.1.

**Table 4.2.4.11 Breakdown of French sampling targets by gear and vessel length**

Vessel length		< 12 m	12 - < 24 m	24 - < 40 m	>= 40 m
Type of fishing method					
Mobile gear	Beam trawling	Ø*	Ø	Ø	Ø
	Demersal trawling	28 trips	24 trips		NS
	Pelagic trawling and	Ø	NS**	NS	Ø
	Shellfish dredges	NS	NS	Ø	Ø
	Multipurpose	NS	NS	Ø	Ø
Passive gear	Gear using hooks	NS	NS	Ø	Ø
	Drift and passive nets	12 trips	8 trips	Ø	Ø
	Pots and traps	NS	NS	Ø	Ø

	Multipurpose	NS	NS	Ø	Ø
Multipurpose	Combining mobile and	NS	NS	Ø	Ø

\*\* : NS = not sampled

\* : Ø = not applicable

### *Sampling of discards*

For European seas, since the estimate of discard volumes is based mostly on data gathered onboard working vessels, the onboard observers will be asked to sample for length the discards of the species that have to be monitored annually (cf. appendix XII) or for which, for purposes of evaluating stocks, it is important to know which portion of the catch is not kept (Norway lobster, for example), including in the Mediterranean (hake and red mullet). The sampling intensities are those laid down in appendix XV to the Regulation and based on the discard volumes in tonnes. These volumes will be calculated in 2005 under module E, which means that the intensities will be determined in real time. Otoliths will be taken for age reading from the fish sampled onboard the working vessels whose length classes are not represented in the catches. Although priority will be given to the species required to be monitored annually, information on the other species caught and discarded will be available in the database. This extra data will be useful for preparing future programmes or revising the implementing Regulation.

### **6.3. Discard rates by weight and number**

A Summary of total sampling trips (2004-2006) performed by gear type, mesh size and country is provided in Table 4.2.4.1 and details of total discard rates by weight aggregated across all species by gear is given in Table 4.2.4.2 and by number in Table 4.2.4.3. Note that direct comparisons across member states should be avoided due to differences in sampling strategy.

**Table 4.2.4.12 Fishery 2 - overview of sampling effort by gear, mesh size and vessel category for UK, Ireland, Spain and France**

Country	Gear type	Mesh size	Vessel length	Number of sampled trips
UK	DTS	<80	12-24	4
UK	DTS	80-89	00-12	31
UK	DTS	80-89	12-24	85
UK	DTS	90-99	00-12	7
UK	DTS	90-99	12-24	7
UK	DTS	>100	12-24	3
UK	DTS	>100	24-40	1
UK	TBB	80-89	00-12	1
UK	TBB	80-89	12-24	9
UK	TBB	80-89	24-40	50
UK	TBB	>100	24-40	2
France	DTS		24-40	3
France	DTS	<80	00-12	42
France	DTS	<80	12-24	10
France	DTS	80-89	12-24	3
France	TBB	80-89	12-24	2
France	DTS	>100	00-12	1
France	DTS	>100	12-24	47
France	DTS	>100	24-40	16
France	DTS	>100	40-XX	2
Spain	DTS	70->100	24-40	84
Spain	DTS	<80	00-12	4
Spain	DTS	<80	12-24	45
Spain	DTS	<80	24-40	144

Ireland	DTS	<80	24-40	2
Ireland	DTS	80-89	10-12	3
Ireland	DTS	80-89	12-24	32
Ireland	DTS	80-89	24-40	11
Ireland	DTS	90-99	12-24	1
Ireland	DTS	90-99	24-40	1
Ireland	DTS	>100	12-24	5
Ireland	DTS	>100	24-40	2
Ireland	DTS	>100	40-xx	1

**Table 4.2.4.13 Total catches and discard rates by weight (all species combined) by members state, gear type and mesh size.**

Country	Gear type	Mesh size	Number sampled trips	Total trips discard weight	Total trips landings weight	Mean trip discard rate	Discard rate CV	Pooled discard rate
France	DTS	<80	52	14379	8934	42%	54%	62%
France	DTS	80-89	3	2472	3071	49%	45%	45%
France	DTS	>100	66	157133	273358	30%	58%	37%
France	DTS	all	121	173984	285363	36%	59%	38%
France	TBB	80-89	2	78	268	24%	18%	23%
France	TBB	all	2	78	268	24%	18%	23%
Spain*	DTS	70 - >100		277	13348553	NA	NA	NA
Spain	DTS	<80		193	1461876	NA	NA	NA
Ireland	DTS	<80	2	258	1548	65	42	14%
Ireland	DTS	80-89	46	12227	38686	59	45	24%
Ireland	DTS	90-99	2	1218	1874	62	45	39%
Ireland	DTS	>100	8	2175	5947	58	46	27%
UK (Eng+Wales)	DTS	All	138	28609	83055	21%	0-69%	26%
UK (Eng+Wales)	DTS	<80	4	621	2117	26%	14-41%	23%
UK (Eng+Wales)	DTS	80-89	116	25194	67674	22%	0-69%	27%
UK (Eng+Wales)	DTS	90-99	14	2014	7591	12%	0-50%	21%
UK (Eng+Wales)	DTS	>100	4	780	5674	11%	1-19%	12%
UK (Eng+Wales)	TBB	All	62	64652	320850	15%	1-46%	17%
UK (Eng+Wales)	TBB	80-89	60	59457	291666	15%	1-46%	17%
UK (Eng+Wales)	TBB	>100	2	5195	29184	14%	10-18%	15%

**Table 4.2.4.14 Total catches and discard rates by number (all species combined) by members state, gear type and mesh size.**

Country	Gear type	Mesh size	Number sampled trips	Total trips discard by number	Total trips landings number	Mean trip discard rate	Discard rate CV	Pooled discard rate
France	DTS	<80	52	380345	44811	67%	36%	8%
France	DTS	80-89	3	34368	11216	74%	24%	7%
France	DTS	>100	66	837524	265665	65%	32%	7%
France	DTS	all	121	1252237	321692	66%	34%	8%
France	TBB	80-89	2	962	520	68%	11%	6%
France	TBB	all	2	962	520	68%	11%	6%
Spain	DTS	70 - >100	84	11886677	NA	NA	NA	M
Spain	DTS	<80	193	1461876	NA	NA	NA	M
Ireland	DTS	all	58	1554555	NA	NA	NA	M
Ireland	DTS	<80	2	22933	NA	NA	NA	M
Ireland	DTS	80-89	46	1227018	NA	NA	NA	M
Ireland	DTS	90-99	2	120300	NA	NA	NA	M
Ireland	DTS	>100	8	184304	NA	NA	NA	M



UK (Eng+Wales)	DTS	All	138	195028	218123	39%	1-85%	4
UK (Eng+Wales)	DTS	<80	4	6140	31650	23%	10-34%	1
UK (Eng+Wales)	DTS	80-89	116	170445	159531	41%	2-83%	5
UK (Eng+Wales)	DTS	90-99	14	15247	15772	29%	1-85%	4
UK (Eng+Wales)	DTS	>100	4	3196	11170	22%	6-35%	2
UK (Eng+Wales)	TBB	All	62	432791	510943	39%	9-77%	4
UK (Eng+Wales)	TBB	80-89	60	415234	485978	39%	9-77%	4
UK (Eng+Wales)	TBB	>100	2	17557	24965	40%	36-45%	4

### 6.3.1. Ireland

Only discard and landings data by weight were presented by Ireland. Table 4.3.1.1 shows the discard rate of the top ten retained species by trip aggregated across all DTS sub-fleets.

**Table 4.3.1.15IRE 2 DTS discard rates by weight aggregated across métiers in the VIIg-j**

Species	Average discard rate	CV	Sum discard weight all trips	Sum landings weight all trips	%occ. *	Pooled trip discard rate
HAD	39	86.66%	2722	9622	100	22
WHG	24	103.06%	2719	17139	95	14
GUG	100	0.00%	728	0	76	100
RJN	100	0.00%	576	0	26	100
WHB	100	0.00%	414	0	40	100
POD	100	0.00%	403	0	47	100
LEM	50	67.08%	352	547	71	39
BRF	100	0.00%	347	0	9	100
SCL	95	22.18%	315	73	72	81
HKE	64	62.42%	252	507	79	33

1. Several Métiers Contained within this data
2. Gear type DTS (including SSC) only, TBB not sampled
3. Does not include invertebrates
4. No estimates of Nephrops discards
5. Total landings are observer estimates - not from Logbooks
6. Based on 58 "viable" trip.

Given that Ireland structures its national discard observer programme based on an analysis of logbook data to define distinct métiers (see section 7.1.1) and that this analysis identified a number of sub-fleets active in the OTB fishery in ICES area VIIj,g. It was considered informative to ascertain whether the métiers aggregated for sampling purposes demonstrated differences in discarding rates in comparison to the overall (DTS) aggregated data. Table 4.3.1.2 describes both the average and pooled discard rate by weight of 6 métiers active in the Celtic sea, three demersal (OTB and SSC) and two *Nephrops* fleets.

**Table 4.3.1.16IRE 2 DTS Breakdown of discard rates by weight by métier**

Species	Average of Discard Rate (%)	Sum of Discard Weight	Sum of Retained Weight	%Occur	Pooled trip discard rate
<b>Sub-fleet</b>	<b>OTB_VII</b>				
	<b>fg_h_NephFU20-2</b>				
WHB	100	302	0	86	100
WHG	33	219	325	100	40
POD	100	94	0	57	100
SCL	100	69	0	86	100
SYT	100	64	0	14	100
BIB	100	63	0	29	100
HAD	69	56	57	100	50
COD	9	53	607	86	8
NOP	100	45	0	57	100
HKE	78	42	54	71	44
<b>Sub-fleet</b>	<b>OTB_VIIj_DEM</b>				
HAD	12	129	1846	100	7
WHG	15	90	792	33	10
SCL	91	70	48	92	59
GUG	100	55	0	75	100
DAB	100	44	0	92	100
TTO	100	34	0	92	100
PLE	19	33	339	92	9
MEG	21	31	417	100	7
RJC	100	24	0	8	100
SKA	69	17	253	25	6
<b>Sub-fleet</b>	<b>OTB_VIIbcjk_HMM</b>				
HAD	59	364	237	100	61
BRF	100	347	0	38	100
RJN	100	110	0	46	100
MEG	24	97	398	100	20
ANK	89	82	158	62	34
SKA	100	81	0	54	100
FOR	91	75	15	54	83
RED	100	63	0	15	100
SCL	89	63	25	69	72
MON	89	61	219	69	22

Table 4.3.1.2(cont.) IRE 2 DTS Breakdown of discard rates by weight by métier

Species	Average of Discard Rate(%)	Sum of Discard Weight	Sum of Retained Weight	%Occur	Pooled trip discard rate
<b>Sub-fleet</b>	<b>OTB_VIIj_NephFU19</b>				
HAD	16	16	143	100	10
RJM	100	12	0	25	100
DGS	50	7	2	50	78
PLE	64	6	11	100	35
RJC	100	6	0	25	100
MEG	15	5	43	100	10
WHG	33	5	29	100	15
DAB	100	5	0	50	100
SCL	100	5	0	75	100
COD	64	4	5	50	44
<b>Sub-fleet</b>	<b>OTB_VIIg_Dem</b>				
HAD	24	1828	7026	100	21
WHG	17	1714	9261	100	16
GUG	100	565	0	94	100
RJN	100	363	0	38	100
LEM	46	290	460	100	39
POD	100	262	0	69	100
DAB	100	150	0	94	100
GUR	100	130	0	94	100
HKE	62	129	226	88	36
NOP	100	108	0	69	100
<b>Sub-fleet</b>	<b>SSC_VIIgj_Dem</b>				
WHG	17	658	6587	40	9
HAD	60	328	313	40	51
RJN	100	92	0	40	100
GUG	100	64	0	20	100
ARG	100	61	0	100	100
BOC	100	47	0	20	100
POD	100	33	0	20	100
HKE	56	31	159	100	16
COD	38	28	59	100	32
WHB	100	28	0	100	100

The data presented for the six métiers demonstrates that there are some significant differences in discard rates. However, it should be noted that without raising the discard data presented to a fleet or métier level (either by catch or effort), it is not possible to determine the overall levels of discards with each of the various métiers and thus determine their relative contribution to discarding associated with OTB gears. This demonstrates the need to obtain structured data from observer trips that is correlated to a meaningful fleet definition (e.g. through a métier analysis based on effort and/or catches) and that these correspond to internationally agreed fleet/métier sampling definitions (e.g. Nantes matrix level 5/6).

**Table 4.3.1.17 Relative contribution to area effort and haddock landings for 6 métiers engaged in the Celtic sea DTS fishery including average discard rates and number of trips sampled.**

Métier	% Effort contribution (days fished)	Trips Sampled	%Disc. Average	% Had landings
Bottom Otter Trawl VIIj Demersal Fish	30	12	6	39
Bottom Otter Trawl VIIf,g,h Nephrops FU20-22	24	7	50	2
Bottom Otter Trawl VIIg Demersal Fish	21	16	21	20
Scottish Seines VIIg,j Demersal Fish	11	5	52	32
Bottom Otter Trawl VIIb,c,j,k Hake, Monkfish, Megrim	11	13	60	5
Bottom Otter Trawl VIIj Nephrops FU19	3	4	10	1
All métiers	100	57	39	100

While the VIIf,g,h Nephrops fishery has high average discard rates, the overall contribution to discarding is small in comparison due to the low contribution to the landings and effort (Table 4.3.1.3). In addition the data may have a high degree of uncertainty due to low sample size. Similarly for the hake, monk and megrim directed fishery although the discard rate is high, overall contribution is relatively small due to low effort and landings. Conversely, both the OTB VIIg, and in particular the SSC VIIgj, appear to have in comparison are likely to make the highest contribution to discards. However, the SSC data should not be over interpreted as sample numbers are low (5) and haddock was only present in 2 out of these 5 trips.

### 6.3.2. UK (England and Wales)

Discard rates estimated by both weight and number for UK (England and Wales) DTS and TBB fleets operating in Fishery 2 are presented in Tables 4.3.2.1 to 4.3.2.4.

**Table 4.3.2.18ENG 2 DTS discard rates by weight (kg)**

Species	Average of Discard Rate for Sampled Trips	CV	Sum of Discard Weight	Sum of Retained Weight	% Occurrence of Species in Sampled Trips	Pooled Trip Discard Rate
CTC	22%	167%	747	19366	75%	4%
WHG	38%	86%	6742	10424	94%	39%
LEM	10%	217%	1535	8271	93%	16%
SQC	3%	408%	125	8733	92%	1%
PLE	12%	144%	2940	5426	96%	35%
DAB	67%	47%	4949	830	86%	86%
RJC	32%	124%	563	4453	43%	11%
MON	11%	234%	151	4732	71%	3%
HAD	25%	132%	2569	2129	27%	55%
HOM	80%	45%	3239	271	78%	92%

**Table 4.3.2.19ENG 2 TBB discard rates by weight (kg)**

Species	Average of Discard Rate for Sampled Trips	CV	Sum of Discard Weight	Sum of Retained Weight	% .Occur	Pooled Trip Discard Rate
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CTC	40%	101%	22810	87177	81%	21%
MON	8%	147%	6920	73701	100%	9%
MEG	14%	141%	6001	44420	55%	12%
SOL	5%	324%	941	31522	100%	3%
PLE	6%	209%	1822	23025	97%	7%
RJN	45%	79%	7576	8212	71%	48%
LEM	10%	123%	1684	9552	98%	15%
ANK	10%	213%	784	7093	65%	10%
BLL	1%	549%	126	7558	92%	2%
HAD	35%	98%	2165	3366	76%	39%

**Table 4.3.2.20ENG 2 DTS discard rates by number**

Species	Average of Discard Rate for Sampled Trips	CV	Sum of Discard Number	Sum of Retained Number	% Occur.	Pooled Trip Discard Rate
SQC	5%	279%	1703	73440	92%	2%
WHG	45%	74%	34201	26067	94%	57%
DAB	76%	42%	49192	3771	86%	93%
CTC	31%	121%	6653	32941	75%	17%
LEM	13%	183%	11740	25664	93%	31%
PLE	19%	122%	18585	16734	96%	53%
HOM	81%	43%	30331	2002	78%	94%
MUR	35%	104%	8152	7033	86%	54%
HAD	34%	111%	10914	4014	27%	73%
MAC	54%	81%	8729	1867	71%	82%
SOL	1%	447%	114	4826	81%	2%

**Table 4.3.2.21ENG 2 TBB discard rates by number**

Species	Average of Discard Rate	CV	Sum of Discard Number	Sum of Retained Number	% Occur.	Pooled Trip Discard Rate
CTC	58%	65%	164183	105039	81%	61%
MEG	29%	78%	54823	115010	55%	32%
SOL	7%	263%	3921	85408	100%	4%
MON	36%	76%	29796	37300	100%	44%
PLE	10%	182%	9867	51775	97%	16%
LEM	18%	99%	11059	26160	98%	30%
RJN	65%	57%	30783	4655	71%	87%
DAB	74%	50%	30480	2743	63%	92%
SCE	26%	107%	6541	25217	89%	21%
MUR	26%	116%	10322	13253	87%	44%

### 6.3.3. Spain

In Table 4.2.4.1 "Summary of data" the number of trips with discards observers on board between 2004 and 2006 is presented. For all these trips there are discard weights by species, for most of them there are also discard numbers by species and discard length distributions of the main species. There are landings weights by species for 187 of the 277 trips. As landings data come from logbooks, numbers are not available. Landings length distributions come from market sampling and are from a different group of trips of the discard information. Single and pair bottom trawl information were joined. "70- >100" mesh size category includes Subarea VII and Divisions VIIIabd information, while "<80" mesh size category includes Divisions VIIlc and IXa information. **It must be taken into account that there are 10 Spanish métiers in fishery 2 and provide aggregated information and an average of these métiers does not give a proper picture of the discard practices, since there are big differences between métiers (see "Fisheries description" text). Both a proper selection of few interesting study cases and species and an analysis by métier is recommended for next requests for data (see STECF-SGRN "Discarding by EU fleet" Report, October 2006).** The highest number of sampled trips is made in the segment of fleet which use a mesh size under 80 and have lengths between 24 and 40 meters because the total number of trips (sampled and not sampled) of this fleet is high along the year because the duration of the trips is short.

The information presented in Table 4.3.3.1 corresponds only to the trips (2004-2006) with information of both discards and landings weights (187 trips). Year effect has not been taken into account. INV (invertebrata) only appears in VIIIabd data. LEZ (*Lepidorhombus spp.*), SYC (*Scyliorhinus canicula*) and RJN (*Raya naevus*) data are influenced by the aggregation of species in the landings data (logbooks), for example RJN rate is 1 because RJN is not specifically identified on landing and is only reported SKA (*Raya spp.*).

**Table 4.3.3.22SP 2 DTS discard rates by weight (kg)**

Species	Average discard rate	CV	Sum discard weigh	Sum landings weight	% Occur. *	Pooled trip discard rate
HOM	37	1.16	80511	64114	11	56%
MAC	21	1.48	48878	157890	32	24%
SYC	40	0.60	47776	17937	15	73%
INV	100	-	40988	0	15	100%
HAD	87	0.10	15987	1736	1	90%
HKE	21	1.29	15353	376645	76	4%
ARU & ARG	76	0.55	7966	9259	46	46%
WHB	32	0.24	4713	27628	12	15%
RJN	100	-	1672	0	11	100%

In Table 4.3.3.1 the ten species with the higher discard weights in the sampled trips are presented. Only trips with both landings and discard information were used (187). Discard information is very detailed, with a high species identification level, nevertheless in the landings information (logbooks) non commercial and not easy identification species (invertebrates, skates, sharks, *Lophius spp.*, *Lepidorhombus spp.*, *Argentina spp.*, *Scomber spp.*, *Trachurus spp.*, etc) use to be aggregated (see STECF-SGRN "Discarding by EU fleet" Report, October 2006). It is probable that there are mismatches between the species aggregation in landings and discards and that must be taken into account when interpretations

from the Table 4.3.3.1 were made. Pelagic species (HOM, MAC) have the higher discard weight. Pooled trip discard rate was directly calculated from the total weights given in Table 4.3.3.1, neither métier nor trip nor year effects were considered. To calculate "average discard rate" only the trips where the species was presented were used, average and coefficient of variation (CV) of the trips discard rates were calculated. Métier and year effect were not considered. By both "pooled trip discard rate" and "average discard rate", the first three groups/species are invertebrates, *Raja naevus* and haddock, nevertheless the percentage of occurrence (percentage of trips in which the species is present) of these groups/species is very low. THIS IS ALL VERY WELL BUT WHAT CAN WE CONCLUDE ABOUT DISCARDING IN THIS FISHERY?

#### 6.3.4. France

Only limited data available for TBB (from three trips) is available and is presented in Tables 4.3.4.1 to 4.3.4.4.

**Table 4.3.4.23FR 2 TBB discard rates by number**

Species	Average discard rate	CV	Sum discard weight all trips	Sum landings weight all trips	%occur. *	Pooled trip discard rate
BIB	72%	55%	222	161	100	58%
LIO	100%	0%	169	0	100	100%
QSC	100%	0%	110	0	100	100%
BRB	100%	0%	97	0	100	100%
POD	100%	0%	87	0	100	100%
USB	75%	47%	42	30	100	58%
SCR	100%	NA	37	0	50	100%
ZGP	100%	NA	30	0	50	100%
SOL	8%	141%	22	122	100	15%
LYY	100%	NA	22	0	50	100%

**Table 4.3.4.24FR 2 DTS discard rates number**

Species	Average discard rate	CV	Sum discard weight all trips	Sum landings weight all trips	%occur. *	Pooled trip discard rate
BOC	100%	0%	227621	0	25	100%
GUR	90%	32%	205414	4303	48	98%
BIB	84%	37%	90107	11527	52	89%
HAD	56%	56%	60607	51687	41	54%
POD	100%	0%	59465	0	39	100%
MYV	100%	NA	54000	0	1	100%
SWM	100%	0%	47704	0	2	100%
KLO	100%	NA	41656	0	1	100%
GUG	92%	28%	34084	101	41	100%
WHG	62%	60%	32143	28801	52	53%

**Table 4.3.4.25 FR 2 TBB discard rates by weight (kg)**

Species	Average discard rate	CV	Sum discard number all trips	Sum landings number all trips	%occur. *	Pooled trip discard rate
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BIB	59%	98%	19	52	100	27%
LIO	100%	0%	11	0	100	100%
SOL	5%	141%	5	47	100	10%
USB	57%	106%	4	18	100	19%
LBS	100%	NA	4	0	50	100%
CRE	100%	NA	4	0	50	100%
SYC	4%	141%	3	78	100	4%
RJU	24%	NA	3	10	50	24%
POD	100%	0%	3	0	100	100%
SCR	100%	NA	3	0	50	100%

**Table 4.3.4.26 FR 2 DTS discard rates by weight (kg)**

Species	Average discard rate	CV	Sum discard number all trips	Sum landings number all trips	%occure.*	Pooled trip discard rate
ALH	100%	0%	38719	0	6	100%
GUR	88%	34%	21046	1781	48	92%
SYC	54%	69%	18249	7725	53	70%
HAD	39%	75%	15518	38785	41	29%
RJN	32%	94%	7604	22954	44	25%
FCX	67%	87%	7489	0	2	100%
BOC	100%	0%	7148	0	25	100%
BIB	81%	40%	6712	3317	52	67%
WHG	52%	73%	5463	12504	52	30%
KIT	100%	0%	4243	0	2	100%

NB There are 3 trips. For 2 of the trips there is a high discard without landing for FCX, for the 3rd trip there is no discards and a very low weight of landings! Average is mean of 100, 100 and 0 (66.6 %) and pooled rate is close to 100 %.

#### 6.3.4.1. Summary of French discard data

The data from TBB vessels should not be over interpreted as this was obtained from only two sampled trips and should therefore not be directly compared with data from other member states. For demersal otter trawlers (DTS) the key commercial species discarded were haddock and whiting. High discard rates for both grey and red gurnard are reported while the remainder of the species appear to be of little or no commercial value and therefore have corresponding high discard rates.

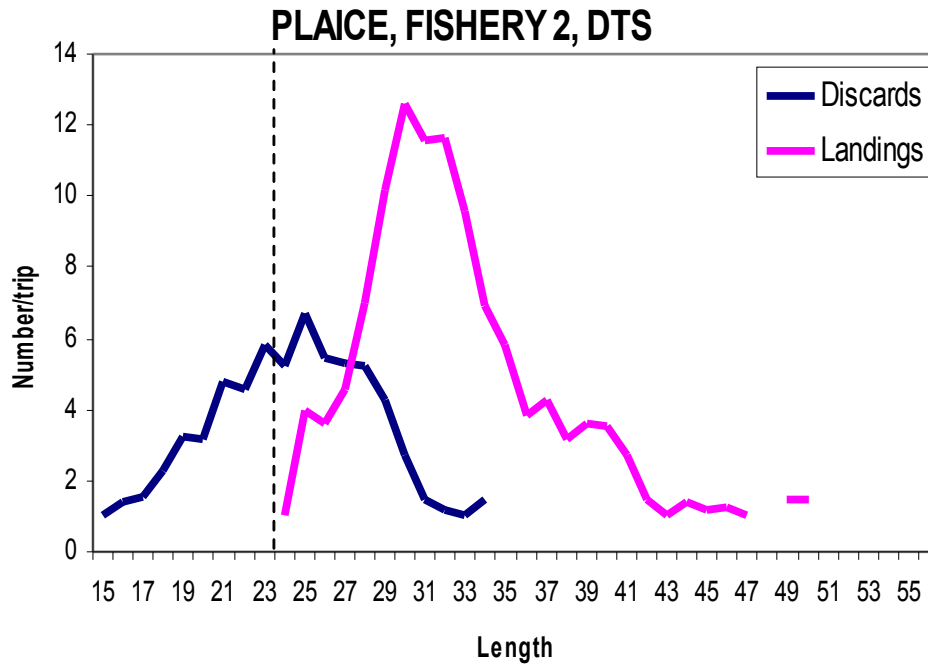
### 6.4. Length profiles of retained and discard commercial species

#### 6.4.1. Ireland

Data for a range of commercial species are shown in figures ? to ? together with a brief interpretation of the likely causes of discards..

**Figure 4.4.1.19 Length distribution of plaice landings and discards**

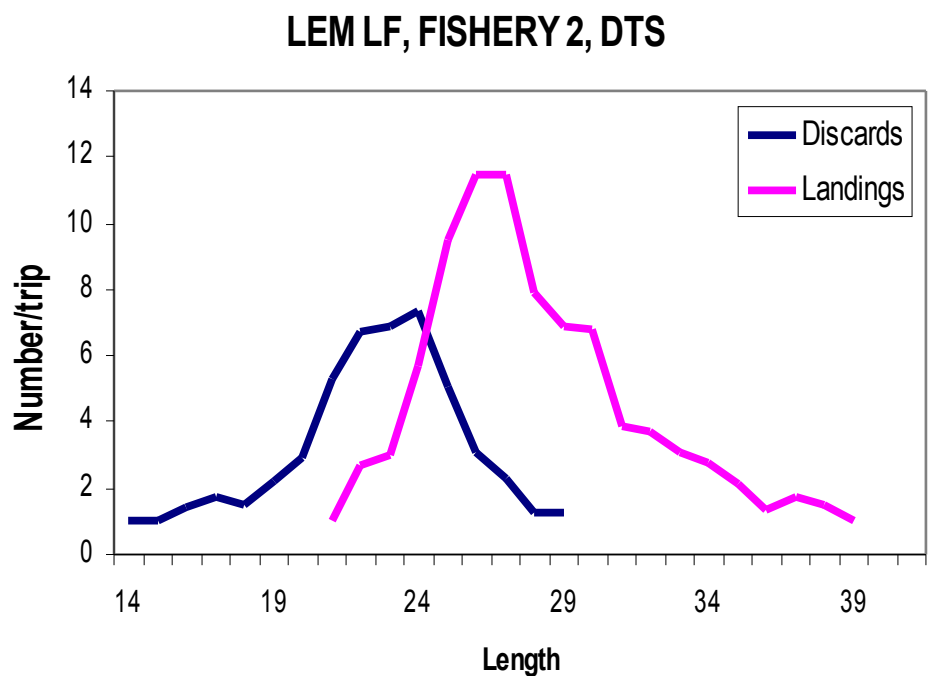




**Interpretation:**

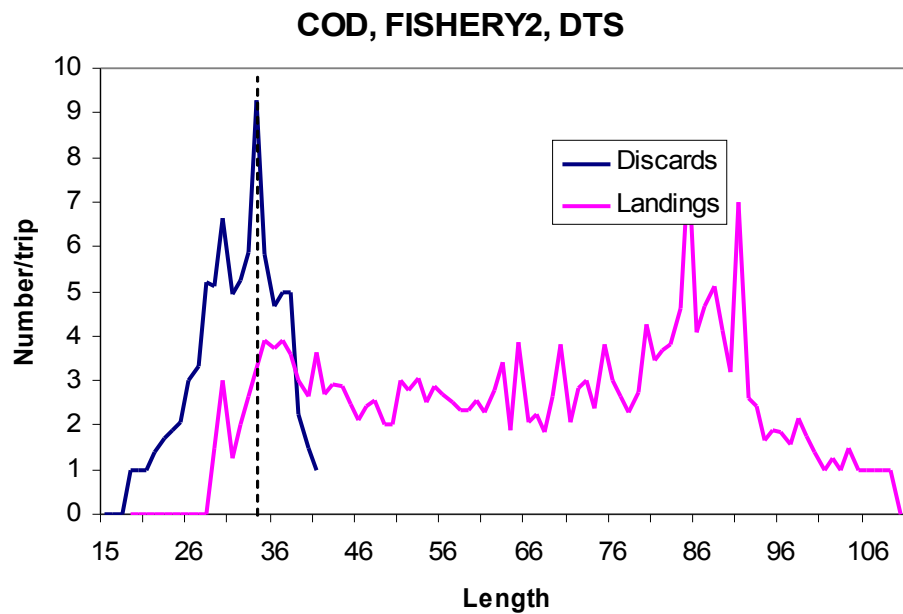
Discards due to retention of fish below MLS (22cm) and low value of plaice between MLS and ~30cm.

Figure 4.4.1.20 Length distribution of lemon sole landings and discards



**Interpretation:**

No MLS for Lemon Sole, discards a result of minimum marketable size of 180g (~25cm) (EC regulation 2406/96).

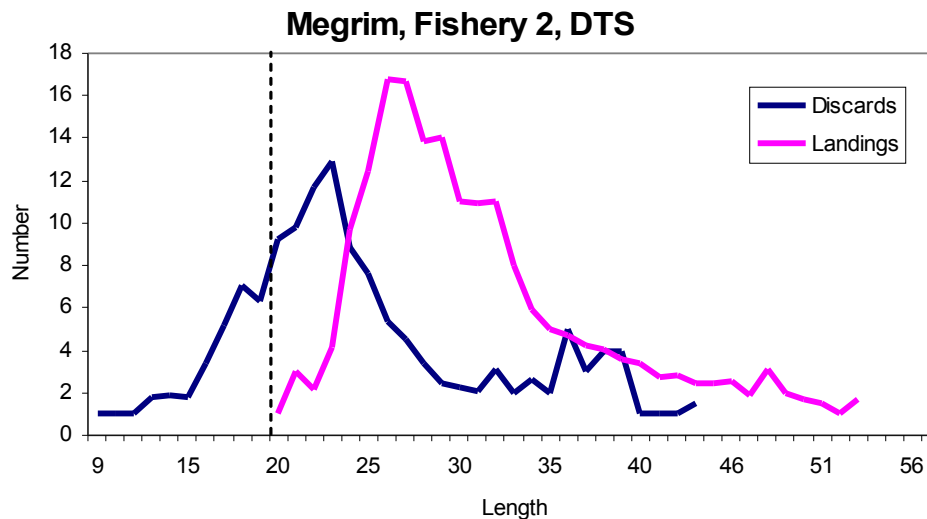


**Figure 4.4.1.21 Length distribution of cod landings and discards**

**Interpretation:**

Discards due to retention of cod below MLS with some evidence of high grading possibly due to quota restrictions or market demands

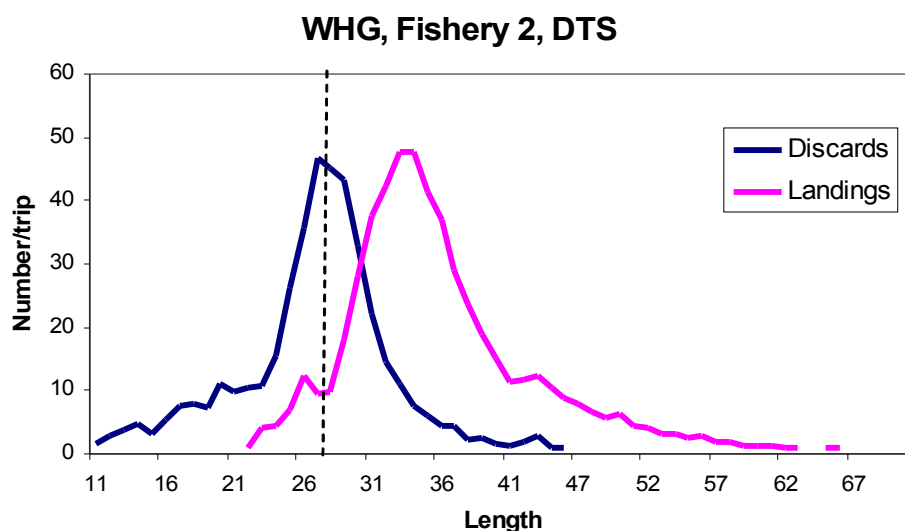
**Figure 4.4.1.22 Length distribution of megrim landings and discards**



**Interpretation:**

Discards due to retention of fish below MLS (20cm) and low value for smaller individuals above MLS (20 to ~25cm)

**Figure 4.4.1.23 Length distribution of whiting landings and discards**

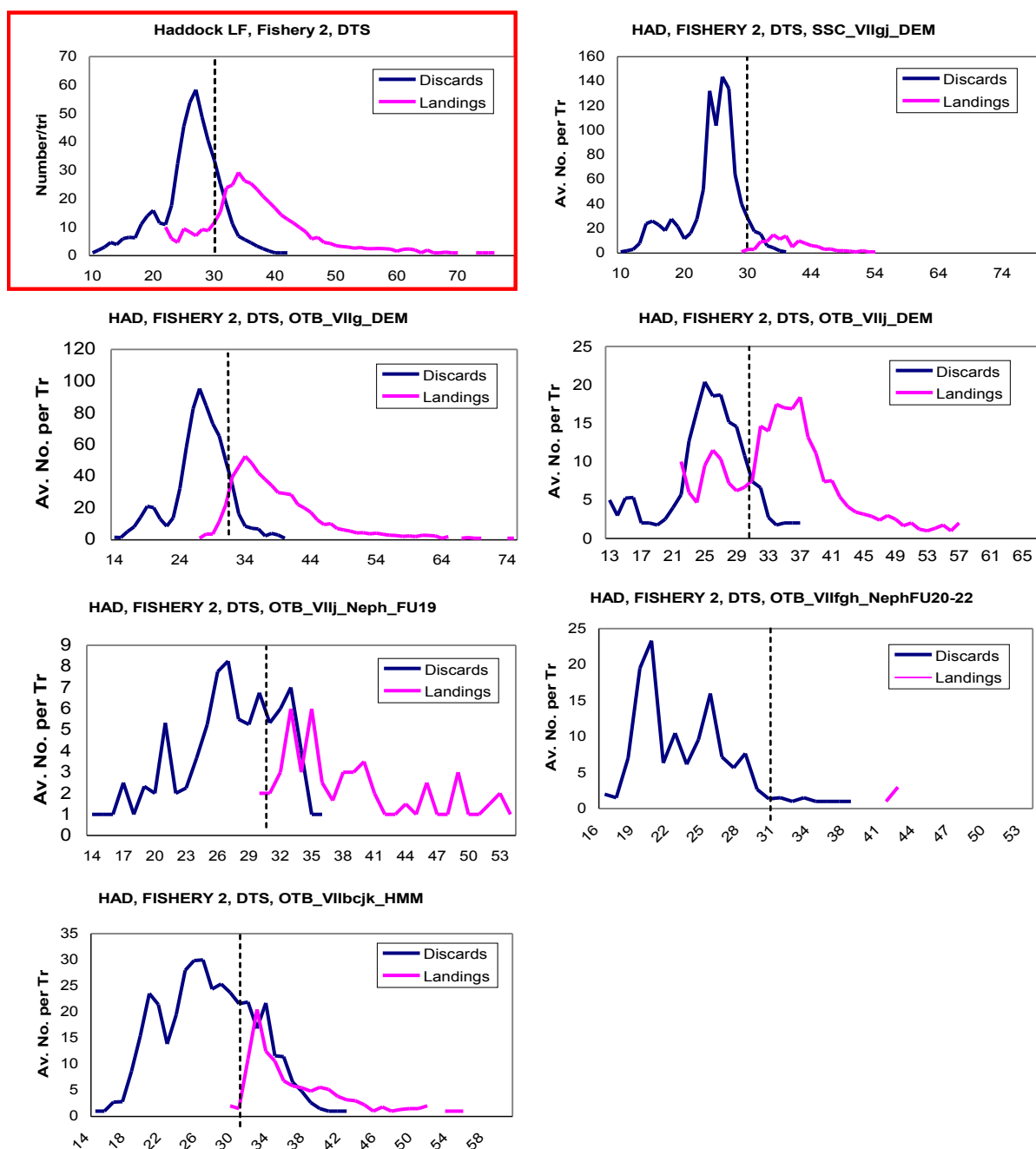


**Interpretation:**

Discards due to retention of fish below MLS (27cm) and low value of fish between MLS and ~30cm.

**Haddock Length frequency plots for individual métiers**

Figure 6.1.4.6 shows haddock discard and landings length frequency distributions for the six sub-fleets identified in section ? and is given as an example to demonstrate that discarding practices (profiles) varies between fleets and that they differ significantly from the aggregated data (highlighted in the red box in figure ?)



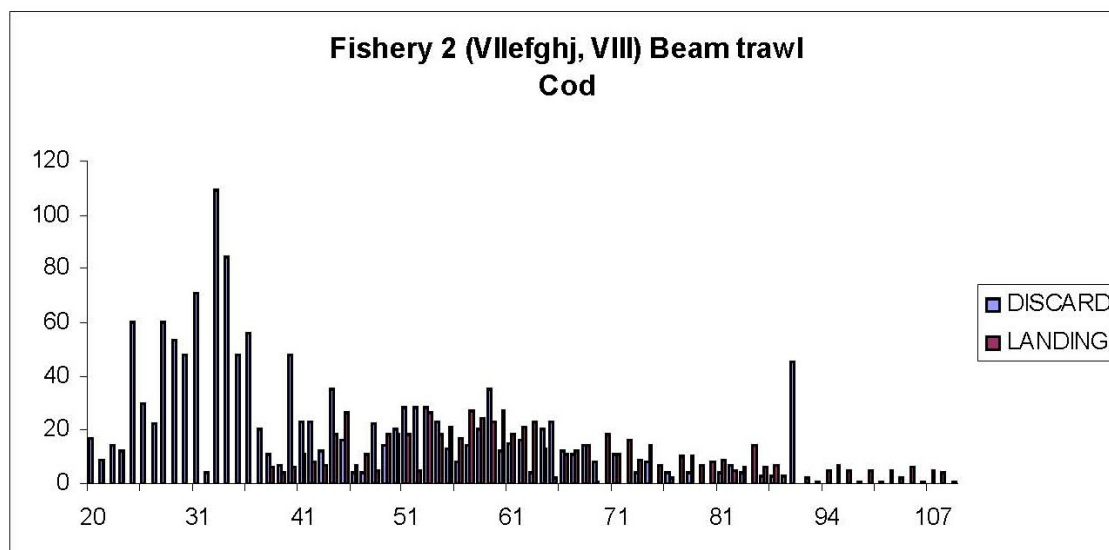
**Figure 4.4.1.24 Length distribution of haddock landings and discards by six Irish sub-fleets together with aggregated data for DTS**

In the majority of cases haddock are predominantly discarded due to the retention of fish below minimum landing size, although in almost all métiers there is evidence of discarding of haddock at or just above the MLS. However, it is evident from these plots that in the majority of métiers, the retention of fish below MLS relative to marketable fish is considerable and very high in some instances e.g. SSC VIIgj, OTB Neph FU20-22 and OTB VIIg DEM. However, as noted in section 6.3.1 the overall contribution of these fleets to total discards is dependant on the level of fishing effort and contribution to haddock landings by each individual métier.

#### 6.4.2. UK (England and Wales)

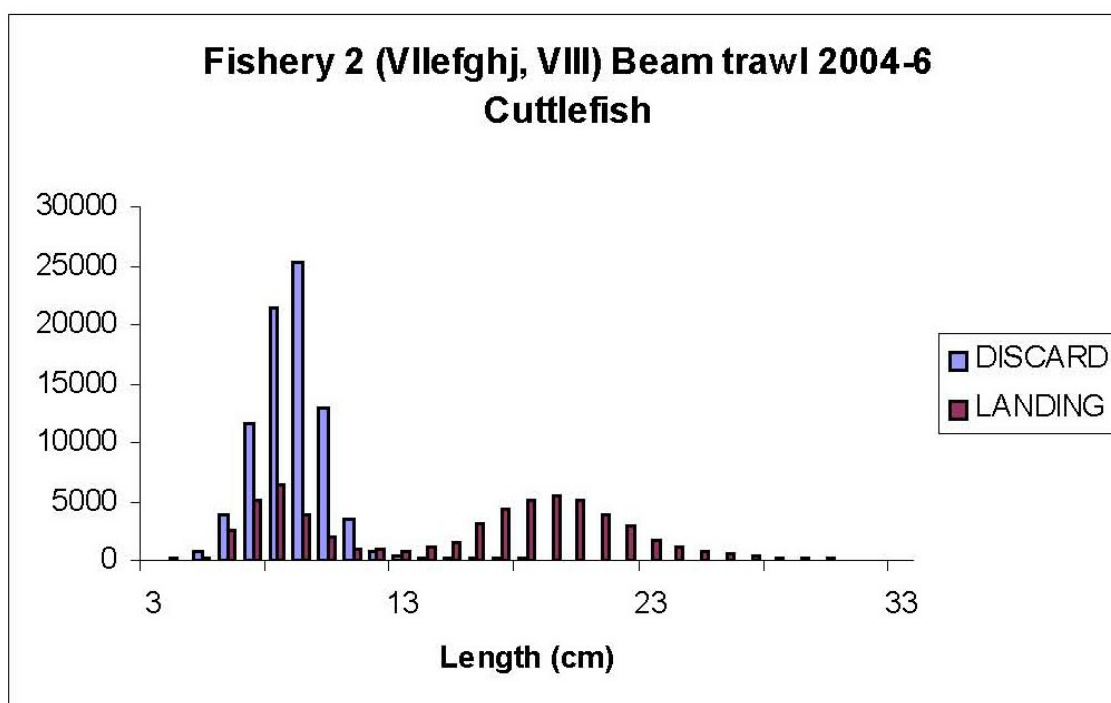
England and Wales presented length frequency distributions for two gear types TBB (8 commercial species) figures ? to ?. and OTB (5 commercial species), figures 6.4.2.1 to 6.4.2.13.

**Figure 4.4.2.25 Length distribution of cod landings and discards**



#### **Interpretation:**

Discards due to retention of fish below MLS (35cm)



**Figure 4.4.2.26 Length distribution of cuttlefish landings and discards**

#### **Interpretation:**

No pressure stock with no MLS discarding associated with lack of market for small individuals which appears to be port specific.

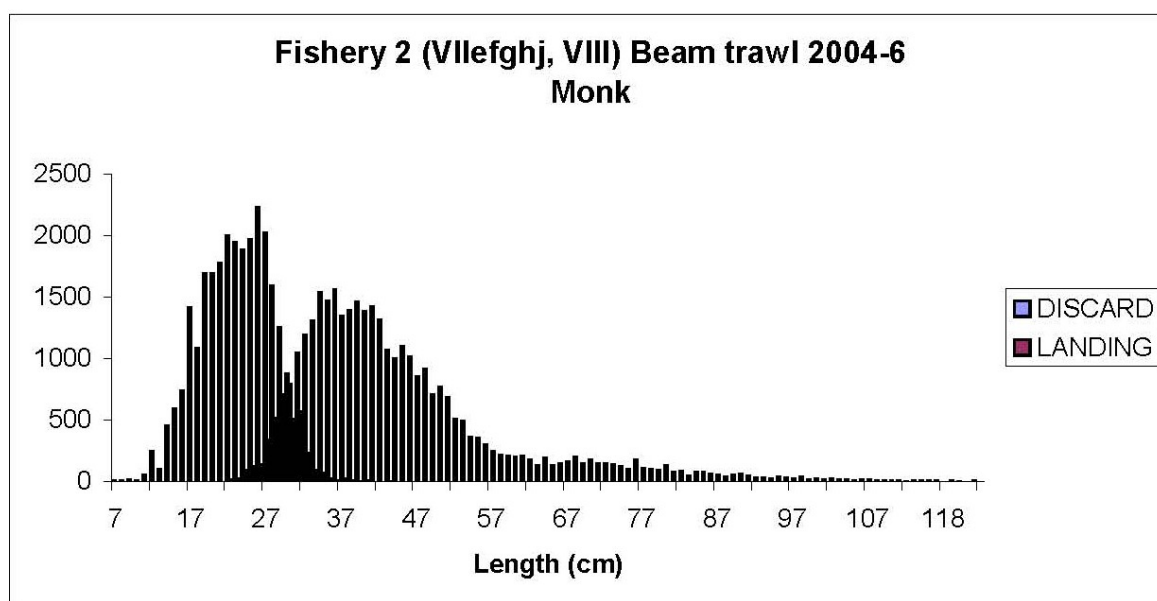


Figure 4.4.2.27 length distribution of monk landings and discards

**Interpretation:**

No MLS discards due to low market value of fish below 30cm (high grading) and minimum marketing restriction (2406/96) fixes minimum weight of 500g (~32-34cm=.

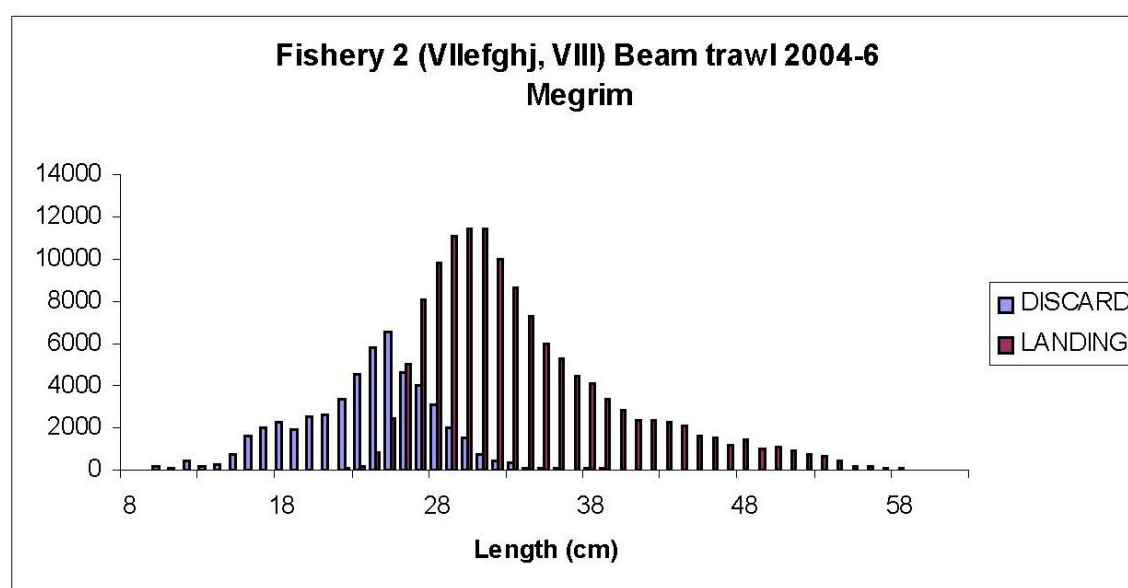


Figure 4.4.2.28 Length distribution of mergrim landings and discards

**Interpretation:**

Discards due to retention of fish below MLS (20cm) and low value and/or highgrading for smaller individuals above MLS (20 to ~30cm)

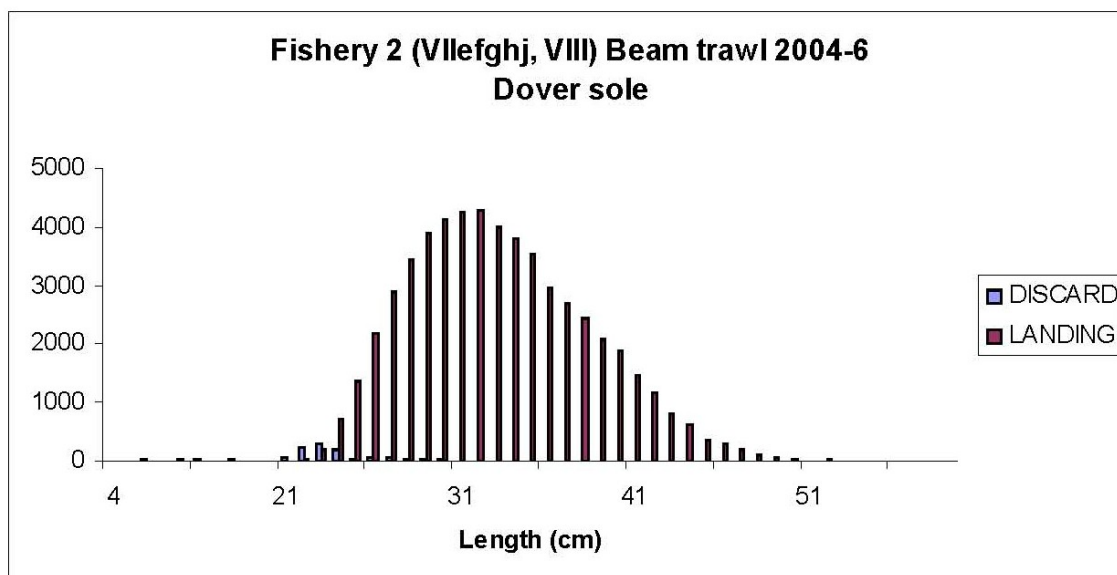


Figure 4.4.2.29 Length distribution of Dover sole landings and discards

**Interpretation:**

Very few Dover sole below MLS (24cm) retained suggesting that mesh selection is and MLS are appropriately matched for this species

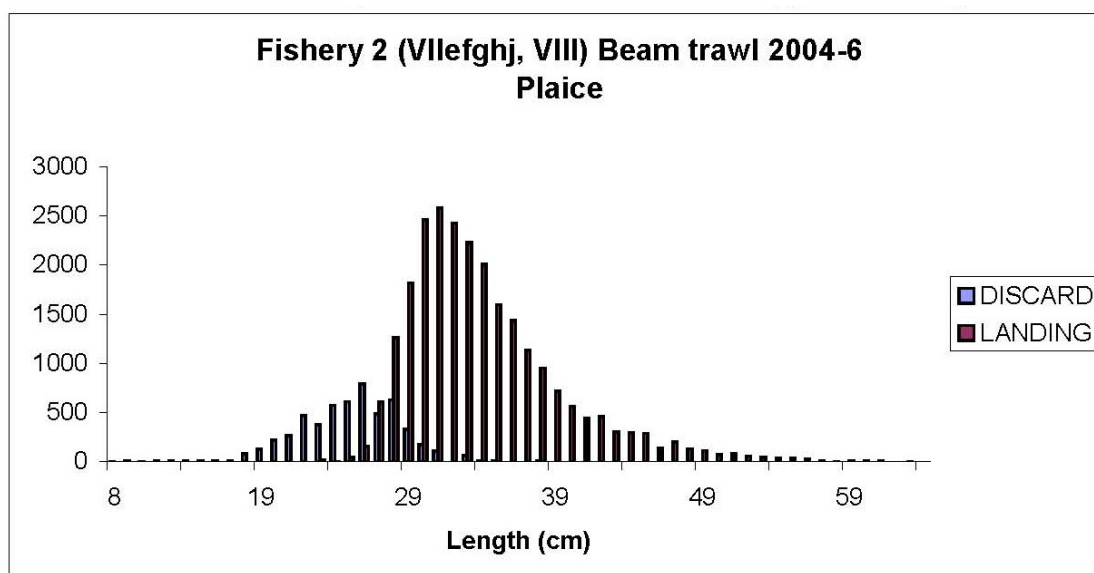


Figure 4.4.2.30 Length distribution of plaice landings and discards

**Interpretation:**

Discarding associated with retention of fish below MLS (22cm) and lack of market for fish between MLS and ~28cm.

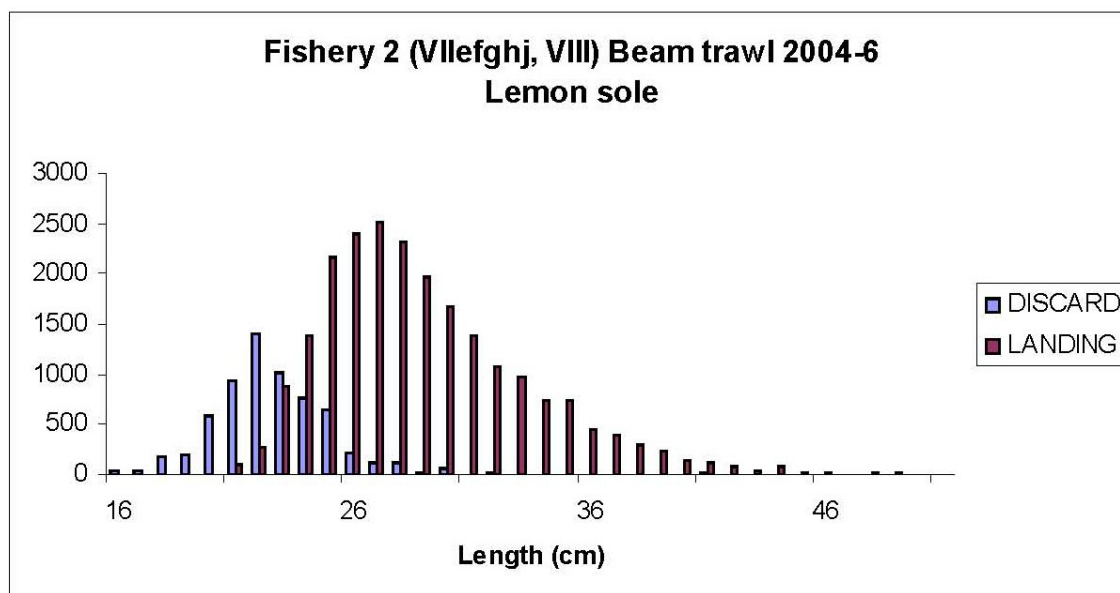


Figure 4.4.2.31 Length distribution of lemon sole landings and discards

**Interpretation:**

No MLS for Lemon Sole, discards a result of minimum marketable size of 180g (~25cm) (EC regulation 2406/96)..

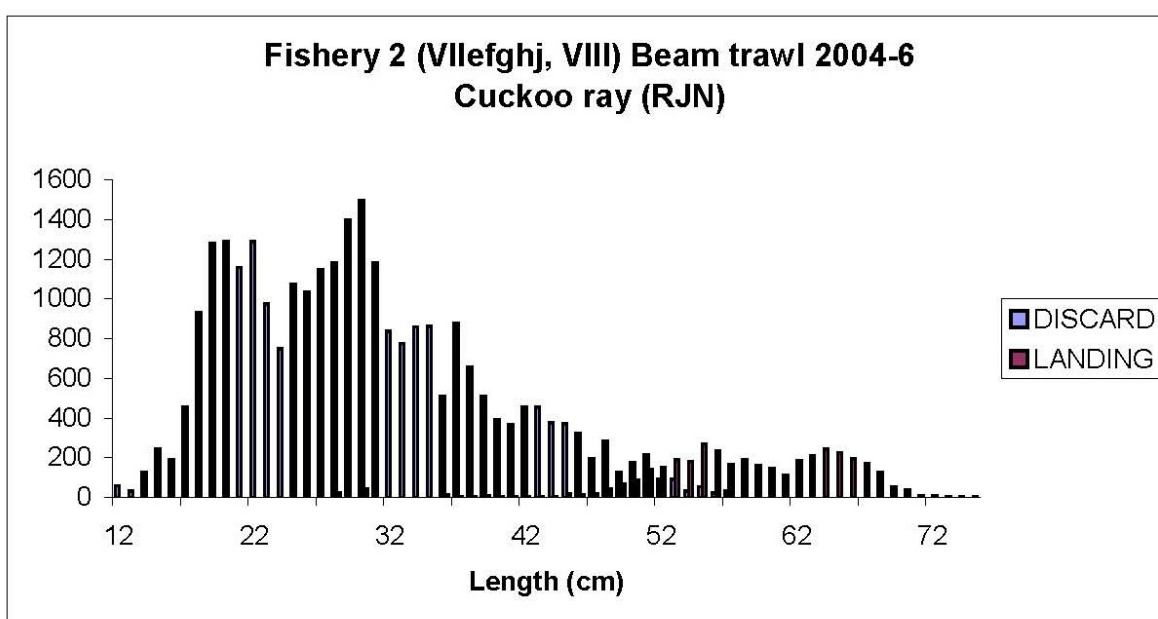
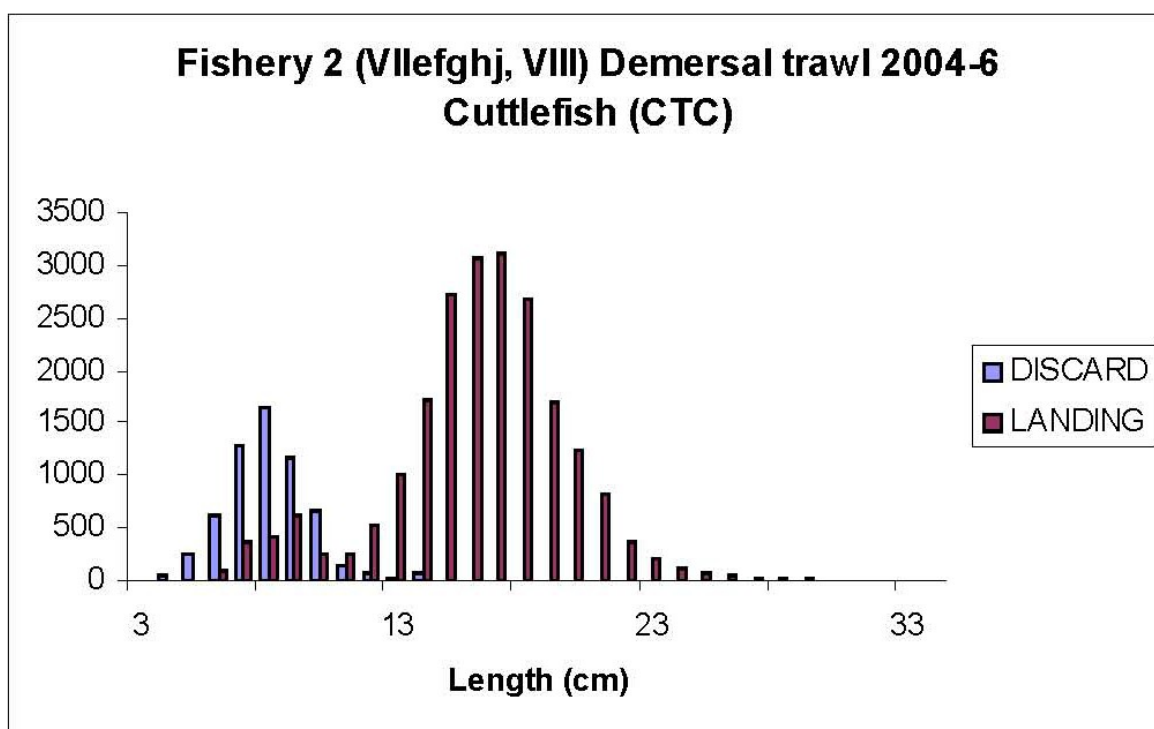


Figure 4.4.2.32 Length distribution of cuckoo ray landings and discards

**Interpretation:**

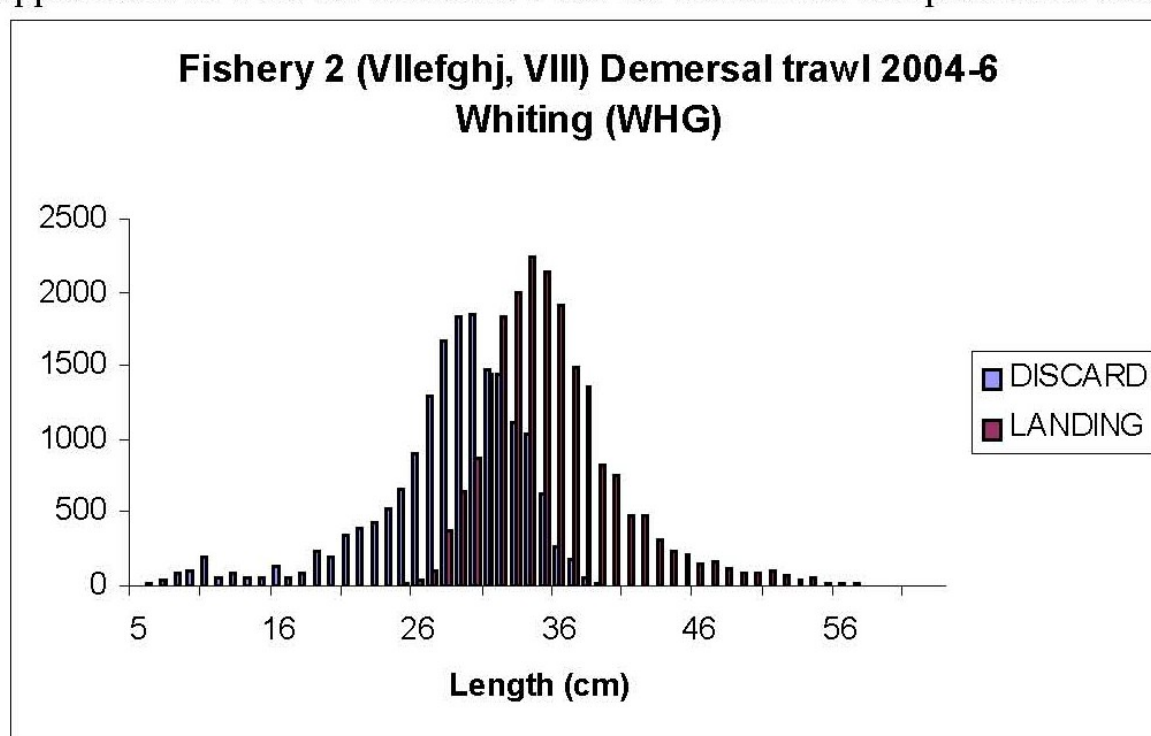
No MLS or quota restrictions for this species therefore discard pattern appears to be largely market driven





**Figure 4.4.2.33** Length distribution of cuttlefish landings and discards

No quota or MLS restrictions discarding associated with lack of market for small individuals which appears to be port specific.



**Figure 4.4.2.34** Length distribution of whiting landings and discards

**Interpretation:**

Discarding due retention of fish below MLS and low market value of fish 27cm to ~ 32cm. Information from the fishery suggests that larger individuals are discarded due to damage caused when targeting cuttlefish.

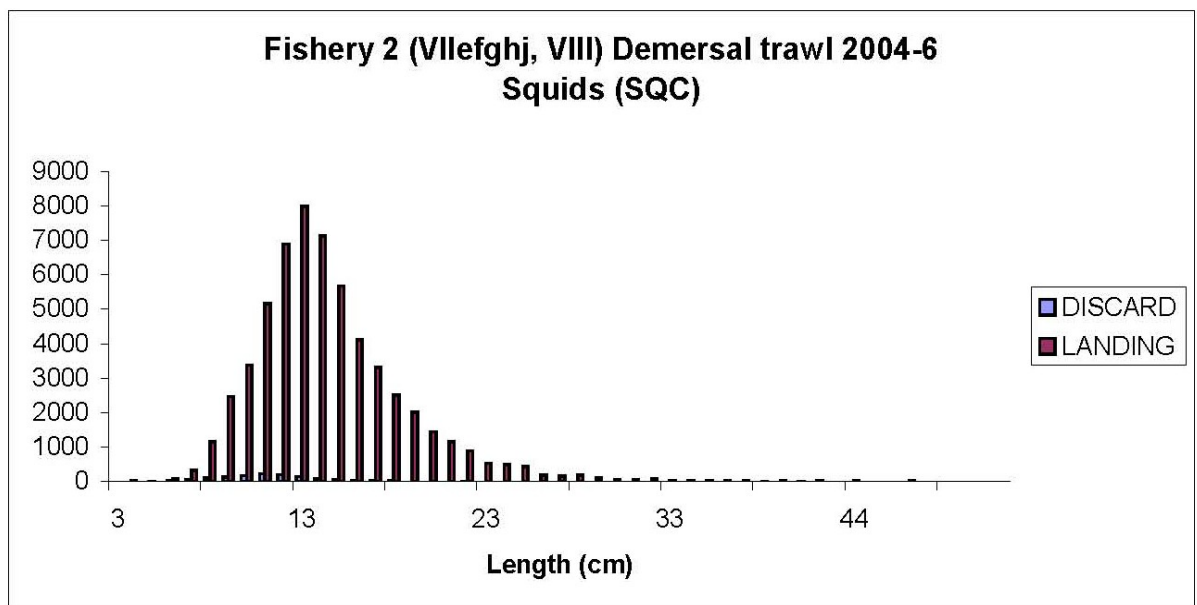


Figure 4.4.2.35 Length distribution of squid landings and discards

**Interpretation:**

No quota or MLS restriction very low discard rate suggests market for all size categories.

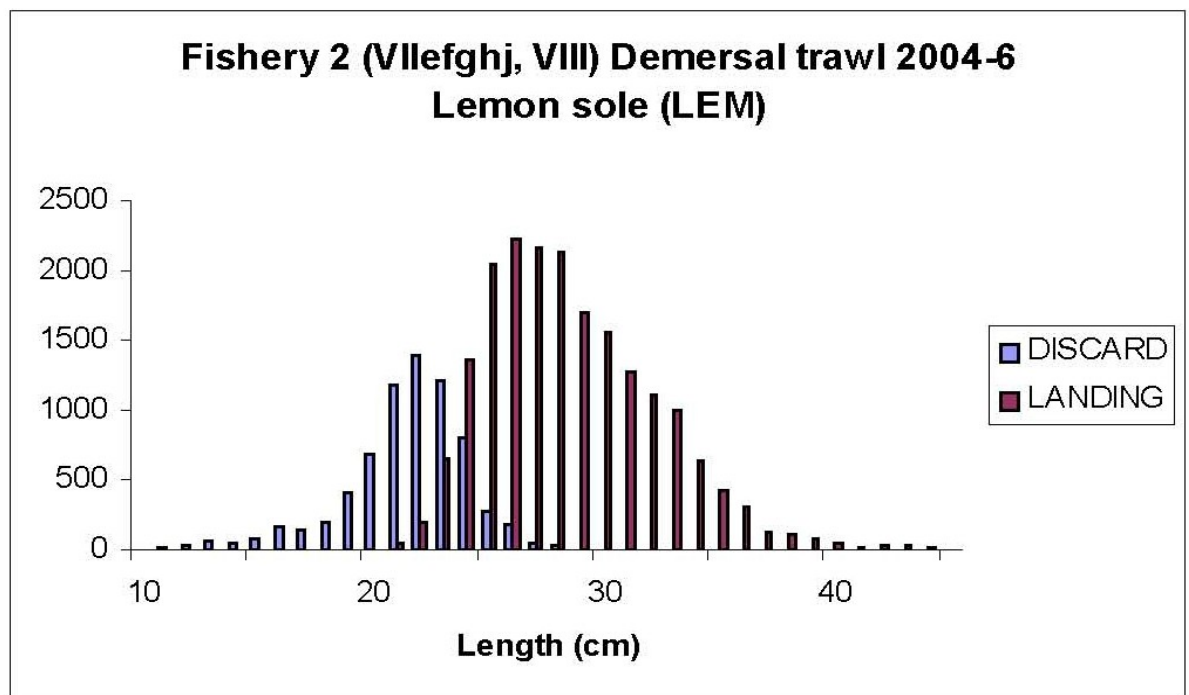
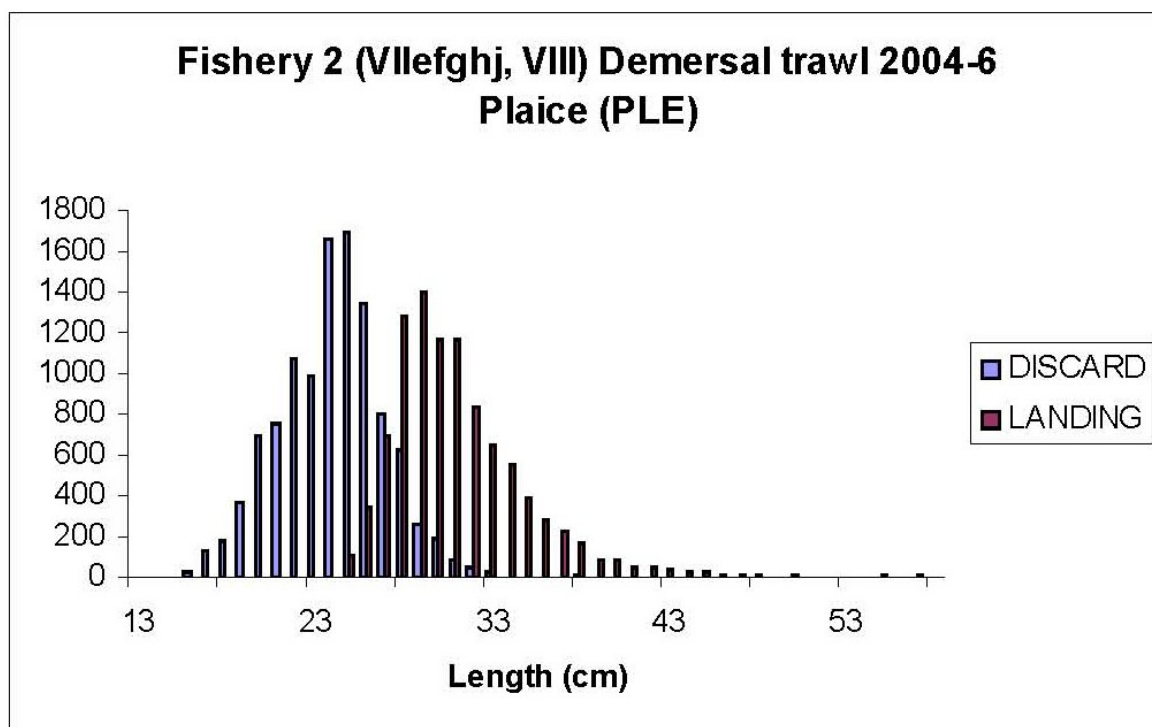


Figure 4.4.2.36 Length distribution of lemon sole landings and discards

**Interpretation:** No MLS for Lemon Sole, discards a result of minimum marketable size of 180g (~25cm) (EC regulation 2406/96).



**Figure 4.4.2.37 Length distribution of plaice landings and discards**

**Interpretation:**

Discards due to high retention of fish below MLS (22cm) and low market value for plaice at or just above MLS and/or highgrading.

6.4.3. Spain

*Data issues*

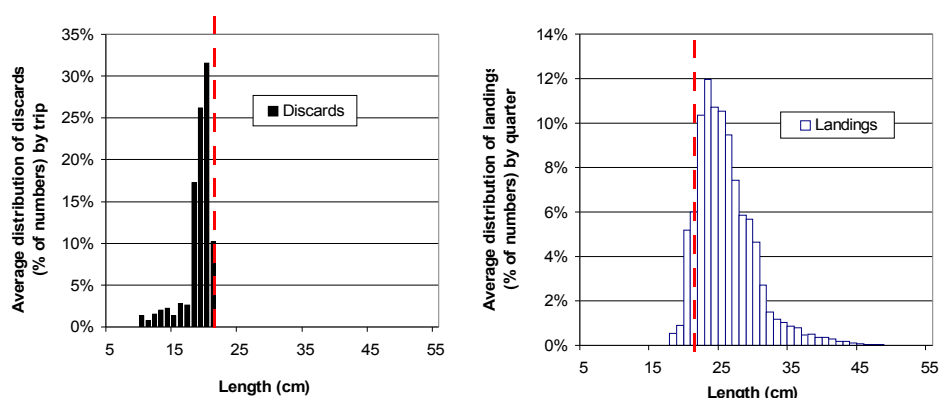
Discards and landings lengths collections present several differences: Discard lengths distributions were collected by observers on board, nevertheless landings lengths distributions were taken by samplers on port, and do not belong to the same trips than discard lengths distributions. Averages by trip of both set of data were made to make the comparison possible. As usual, sampling size of landings distributions is much wider than discards'. Moreover, in the case of the métiers VII-OTB-MEG & HKE, VIIIabd-OTB-Mix and VIIIabd-PTB-HKE, discard lengths were by trip but landings distributions were only available by quarter. So discards and landings information is presented in separated charts, having averages by trip in the case of discards and averages by quarter in the case of landings. As the magnitudes are different, relative information (percentages) is presented, that is, for example in the landings chart, each bar represents the portion of the landings in number that belongs to each length.

*Selection criteria*

Cases where minimum landing (or market) size (MLS/MMS) could be the reason of discarding (target and commercial species) were selected, for example, discards in the métiers VIIIC-OTB-HOM and IXaN-OTB-HOM use to be caused more by the high quantities of catch than by the length and were not presented. Cases in which lengths distributions are not clear probably due to the small sampling size were rejected.

**Individual Plots**

Length frequency distributions of the Spanish discard data are given in figures. It should be noted that for a number of species, it was not possible to obtain simultaneous discard and landings length data thus the data is not directly comparable.



**Figure 4.4.3.38 Length distribution for megrim landings (right plot) and discards (left plot)**

**Métier:** VII-OTB-MEG & HKE

**Species:** MEG (*L. whiffiagonis*)

**Gear:** Single Bottom Trawl

**MLS:** 20 cm

**N° trips:** 6 (discards data)

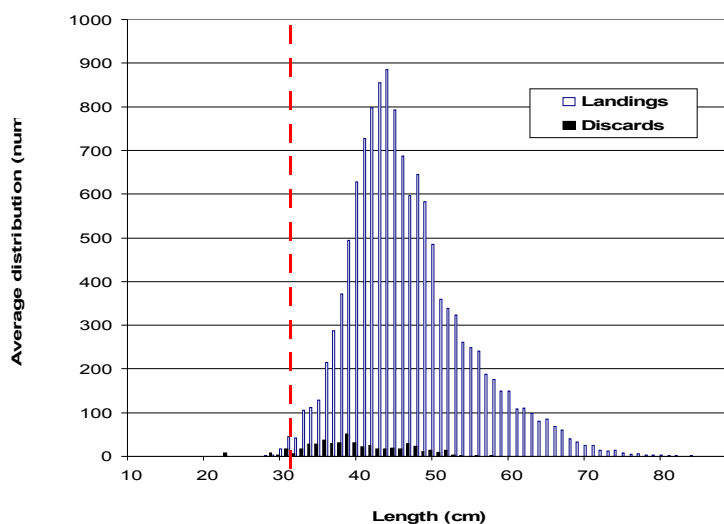
**Mesh size:** 70 - >100

**Area:** VIIefghj

**Data:** Average by trip and by quarter (05-06)

**Selection criteria:** Target species

**Interpretation:** Discards associated with the retention of fish below MLS (20cm) Note that due to data being obtained from by different sampling methods, the tow plots shown can not be compared directly.



**Figure 4.4.3.39 length distribution of hake landings and discards**

**Métier:** VII-OTB-HKE

**Species:** HKE (M. merlu.)

**Gear:** Single Bottom Tra.

**MLS:** 27 cm

**N° trips:** 10

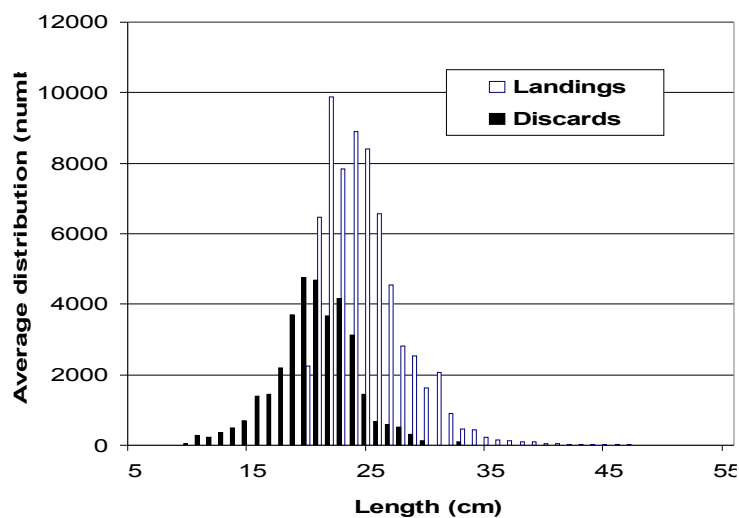
**Mesh size:** 70 - >100

**Area:** VIIefghj

**Data:** Average by trip (06)

**Selection criteria:** Target species

**Interpretation:** Selectivity matched closely with MLS, Discarding associated with quality



**Figure 4.4.3.40 Length distribution of megrim landings and discards**

**Métier:** VII-OTB-MEG

**Species:** MEG (*L. whiffia*.)

**Gear:** Single Bottom Tra.

**MLS:** 20 cm

**N° trips:** 23

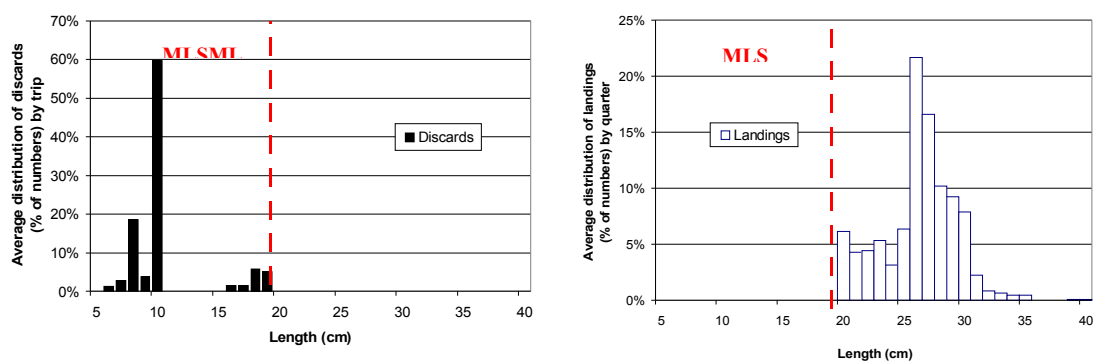
**Mesh size:** 70 - >100

**Area:** VIIefghj

**Data:** Average by trip (2006)

**Selection criteria:** Target species

**Interpretation:** Discarding primarily du to retention of megrim below MLS (20cm)



**Figure 4.4.3.41 Length distribution of megrim landings (right plot) and discards (left plot)**

**Métier:** VIIIabd-OTB-Mixed

**Species:** LEZ (*Lepidorhombus* spp)

**Gear:** Single Bottom Trawl

**MLS:** 20 cm

**N° trips:** 24 (discard sdata)

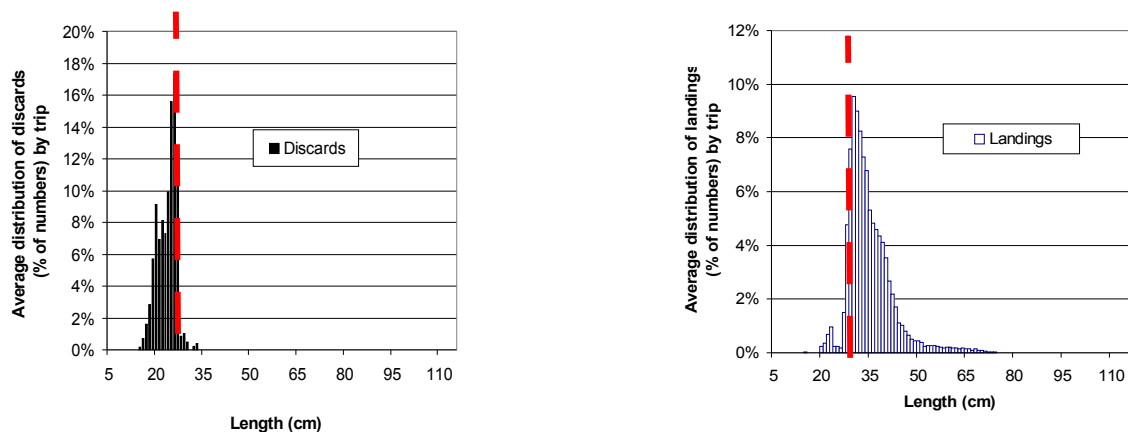
**Mesh size:** 70 - >100

**Area:** VIIIabd

**Data:** Average by trip and quarter (2005, 2006)

**Selection criteria:** Main species in landings

**Interpretation:** Discarding associated with retention of fish below MLS (20cm)

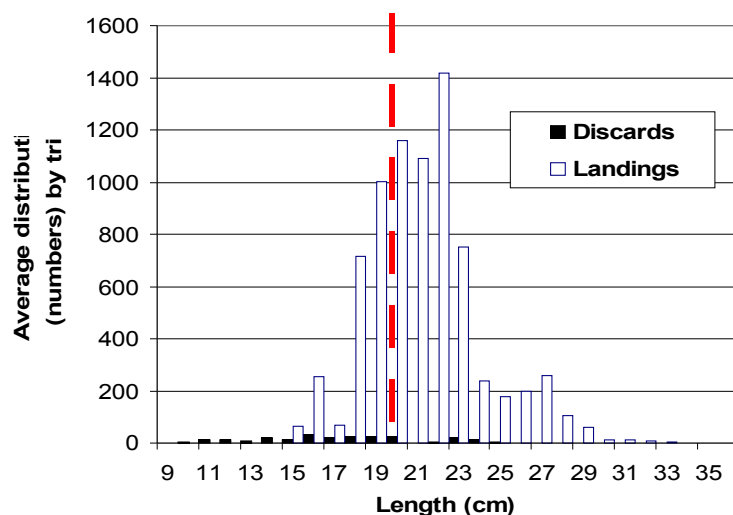


**Figure 4.4.3.42 length distribution of hake landings (right plot) and discards (left plot)**

**Métier:** VIIIabd-PTB-HKE

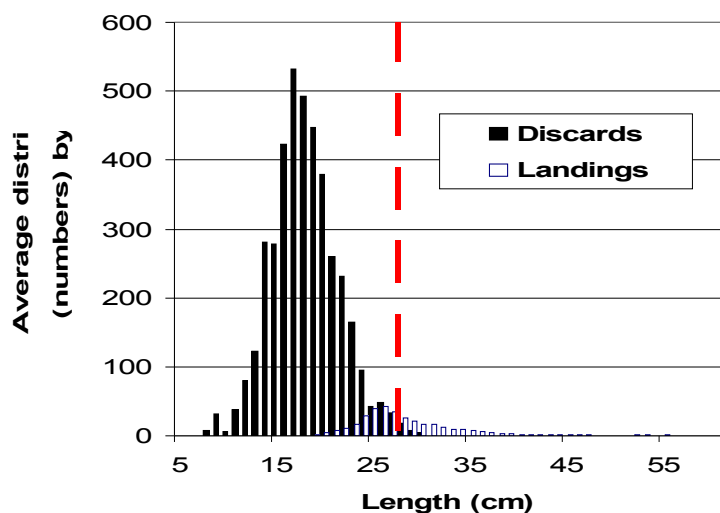
**Species:** HKE (*M.merl.*)

**Gear:** Pair Bottom Tra.  
**MLS:** 27 cm  
**N° trips:** 21 (discards data)  
**Mesh size:** 70 - >100  
**Area:** VIIIabd  
**Data:** Average by trip and quarter (2005, 2006)  
**Selection criteria:** Target species  
**Interpretation:** Discarding associated with retention of fish below MLS (27cm)



**Figure 4.4.3.43 Length distribution of four-spot megrim landings and discards**

**Métier:** VIIIc-OTB-Mixed  
**Species:** LDB (*L. bosci*)  
**Gear:** Single Bottom Trawl  
**MLS:** 20 cm  
**N° trips:** 68  
**Mesh size:** < 80  
**Area:** VIIIc  
**Data:** Average by trip (2006)  
**Selection criteria:** One of the main species of the landings  
**Interpretation:** The discard rate is very low. Discarding associated with quality (damaged fish)



**Figure 4.4.3.44 length distribution of hake landings and discards**

**Métier:** IXa N-OTB-Mixed

**Species:** HKE (M.merl.)

**Gear:** Single Bottom Trawl

**MLS:** 27 cm

**N° trips:** 21

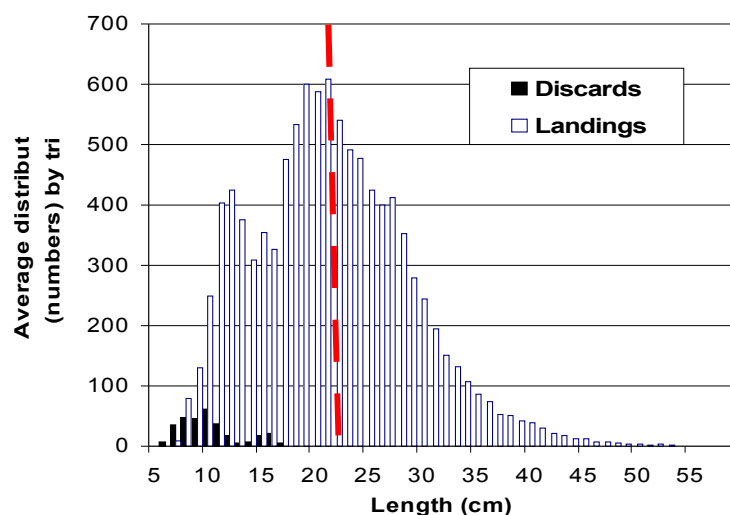
**Mesh size:** < 80

**Area:** IX a North

**Data:** Average by trip (2005 & 2006)

**Selection criteria:** One of the main species of the landings

**Interpretation:** Discarding associated with retention of fish below MLS (27cm)



**Figure 4.4.3.45 length distribution of hake landings and discards**

**Métier:** IXa S-OTB-Mix

**Species:** HKE (M.merlu)

**Gear:** Single Bottom Trawl

**MLS:** 27 cm

**N° trips:** 49

**Mesh size:** < 80

**Area:** IXa South

**Data:** Average by trip (2006)

**Selection criteria:** One of the main species of the landings

**Interpretation:** Low discard rate associated with landing of fish below MLS (27cm)

#### *General remarks*

Length (MLS=20 cm) is clearly the reason of discarding of megrim (MEG, *Lepidorhombus whiffiagonis*, and LEZ, *Lepidorhombus spp.*) in the métiers VII-OTB-MEG & HKE and VIIIabd-OTB-Mix respectively. Also hake discard (HKE, *Merluccius merluccius*) in the métier VIIIabd-PTB-HKE seems to be totally determined by length (MLS=27 cm). In the case of IXa N-OTB-Mix seems that the gear selectivity is fitted for species with MLS lower than hake's, since the bulk of the hake catch is discarded by its small size.

In other cases MLS does not seem the main cause of discarding, so only a small part of the catch under the MLS is discarded in the case of hake in IXa S-OTB-Mix and four-spots megrim (LDB, *Lepidorhombus bosci*) in VIIIc-OTB-Mix. On the other hand, part of the catch over the MLS of megrim in VII-OTB-MEG and hake in VII-OTB-HKE is rejected.



#### 6.4.4. France

France provided length data for three species figure 6.4.4.1.

Fishery n° 2 France Whiting	Fishery n° 2 France Haddock	Fishery n° 2 France Red gurnard
<p>Fishery 2 - FR - Whiting - DTS - 2004 NbTrips = 16</p>	<p>Fishery 2 - FR - Haddock - DTS - 2004-2006 NbTrips = 47</p>	<p>Fishery 2 - FR - Red gurnard - DTS - 2004-2006 NbTrips = 53</p>
<p>Fishery 2 - FR - Whiting - DTS - 2005 NbTrips = 28</p>		
<p>Fishery 2 - FR - Whiting - DTS - 2006 NbTrips = 16</p>		
<p>Peak at 30 cm in DTS 2006 is not representative but due to sampling problem (high extrapolation of one single measure)</p>		
<p><b>Interpretation</b> : some discards in the size range between MLS and MMS. Damaged fish or high grading ?</p>	<p><b>Interpretation</b> : some discards up to 40 cm &gt;MLS.</p>	<p><b>Interpretation</b> : species completely discarded because of its poor value .</p>

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Figure 4.4.4.46 Length distributions of whiting, haddock and red gurnard landings and discards

## 6.5. Summary of discard practices in fishery

Ireland, France, Spain and the UK all provided considerable data on discard rates and patterns associated with the OTB fisheries, while both France and the UK provided data from beam trawl trips. However, the French TBB data should not be over interpreted due to the low sample size (2 trips). Based on UK data only, the beam trawl fisheries exhibited high discard rates for Cuckoo rays, whiting, mackerel and horse mackerel and cuttlefish. Discarding tended to be associated with market considerations rather than quota or minimum landing size restrictions and would therefore suggest that the selectivity of the beam trawl and market demands are poorly matched to these species. The length data provided for other commercial species suggests that the retention of fish below MLS is problematic for a number of species including lemon sole, monk, megrim, plaice and cod, although the discard rates (by weight) are fairly low. In general however, it is clear that there is significant room for improving selectivity in this fishery to bring market and legal targets e.g. MLS into line with the size composition of the total catch.

Haddock is discarded in significant quantities by all four DTS fisheries and both the French and Irish data indicate that this is attributed to poor selective properties of the gear and lack of market for fish at or just above MLS. Similarly, whiting are discarded by the UK, French and Irish fleets in significant quantities and for similar reasons. This would indicate that for gadoids an improvement in selectivity could significantly reduce the level of discards. Such measures are also likely to help reduce high discard rates associated with other species such as hake (Ireland OTB and Spain area IXa). It is interesting to note the large difference in hake discarding patterns between the Spanish IXa North and IXa south, this appears to be largely associated with differences in population structure. The length data also suggest that discarding for a number of other key commercial species is high including plaice, lemon sole, megrim and for Cuckoo rays and in all cases there appears to be a lack of market for fish at or just above the MLS which would suggest that any modest increase in selectivity would not result in significant losses of market fish for these species at least.

Overall, discard rates are high for many species and the fishery is likely to benefit from improvements in selectivity. However, in order to assess the overall stock implications and the absolute level of discarding it is necessary to raise the discard rates presented here using either effort or catch data (commercial species only). The métier data presented by both Ireland and Spain demonstrates that within a particular gear category and area, **métiers** can have distinctly different discard patterns and rates. If suitable and correctly targeted mitigation methods are to be applied, then the Irish and French data demonstrated that a detailed analysis and interpretation of discard levels (overall contribution) by métier is required.

## **7. FLATFISH FISHERIES IN THE NORTH SEA AND THE EASTERN CHANNEL (ICES AREA IV AND DIVISION VIIb)**

### **7.1. Description of the Fisheries**

#### *7.1.1. UK (England and Wales)*

(Reference: Cotter, A.J.R. et al . ‘Summary of commercial marine fishing by English and Welsh vessels >10m LOA for 2004.’ Sci. Ser. Tech. Rep., Cefas Lowestoft, 134: 93pp)

Data on English fishing activity in this area is organised into three regions – NE, E and SE England. In addition, there are some vessels based in SW England that may spend a portion of the year fishing in division VIIb.

##### **North East region**

The main fisheries in the NE region are trawling in coastal waters for cod, whiting, Nephrops, and some flatfish. There is little fishing effort directed specifically at flatfish by vessels operating in this region. A variety of demersal trawl gears are used, principally, single rig otter trawls, but twin-rig and pair trawls as well. There were about 120 trawlers >10m LOA active in 2004. The Nephrops fishery is a winter fishery and many vessels change over to larger mesh trawls to target white fish in the summer, or they shift to other Nephrops grounds, e.g. off Scotland or the west coast. The majority of vessels targeting Nephrops are based in the northern part of the region centred on North Shields.

Demersal trawlers land mainly cod, haddock, whiting and saithe, but also substantial quantities of plaice, Nephrops, lemon sole, rays and squid. Nephrops trawlers land other species similar to those landed by demersal trawlers but in substantially smaller quantities. Much of the roundfish landed to the region (mainly Grimsby and Hull) are taken by distant water trawlers operating outside UK waters that are not included in the routine discard sampling programme. There is a small fleet of beam trawlers based in Grimsby that target shrimp in the Humber estuary and have not been observed.

The highest discard rates by weight for flatfish tend to occur in the Nephrops fishery.

##### **Eastern region**

The demersal fleet of some 60 vessels in the eastern region is dominated by small boats <10m LOA except at King’s Lynn where they are mostly larger and target shellfish, shrimps, and prawns. Following the demise of the offshore beam trawl fleet based in Lowestoft, beam trawl effort is carried out by small inshore boats targeting Dover sole, thornback ray and plaice using 80mm cod ends; they may switch to 22mm cod ends for shrimps and prawns in season. Most otter trawling occurs in and around the Thames estuary for Dover sole in spring and summer.

Catch sampling effort in the eastern region has been low in line with the proportion of fishing effort nationally.

##### **South Eastern region**

Again, much of the fishing effort is carried out by vessels <10m LOA. Official data indicates that fixed nets are the most actively used gears by these smaller vessels, followed some way behind by pots and traps, demersal trawls and dredges. There are only about 60 vessels >10m LOA landing to ports in the SE region using beam trawl, demersal trawl, dredge and pots and traps.

Beam trawlers target flatfish on rough ground. The majority of demersal trawlers are pair trawling for sea bass and black sea bream, or otter trawling for cod, whiting, squid and cuttlefish in season. Many vessels in this region use a variety of gears to remain profitable, e.g. in Newhaven some vessels can operate a beam trawl, a scallop dredge, an otter trawl, a bottom pair trawl, and whelk pots. Larger vessels frequently travel to other fishing grounds rather than switch gears.

As mentioned earlier, there are some larger vessels based in SW England that work grounds in division VIIId. These are Plymouth or Brixham based beam trawlers that move about the English Channel and southern North Sea depending on the availability of quota, catch rates and prices. Some scallop dredgers have tended in the past to work grounds in the eastern English Channel in winter to avoid the heavier swells and to take advantage of better meat yields.

### 7.1.2. France

It's a mixed activity using several **métiers** (Table 5.1.2.1). Around 200 bottom trawlers, 15 beam trawlers and 150 netters. Trawlers fish sole mainly in summer and netters in spring, turbot is fish by netter in summer.

**Table 5.1.2.27 French fleet breakdown as defined under the Nantes matrix.**

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	National level
Activity	Gear classes	Gear groups	Gear type	Target assemblage	Mesh size and other selective devices	
Fishing activity	Trawls	Bottom trawls	Bottom otter trawl [OTB]	<i>Demersal fish</i> (...)	80	Chalut de fond à panneaux à poissons plats (...)
"	"	"	Multi-rig otter trawl [OTT]	Demersal fish (...)	80	Chalut jumeaux à panneaux à poissons plats (...)
"	"	"	Beam trawl [TBB]	Demersal fish (...)	80	Chalut à perche à poissons plat (...)
"	Nets	Nets	Trammel net [GTR]	Demersal fish (...)	90-100-more	Trémil à poissons plats (...)
"	"	"	Set gillnet [GNS]	Demersal fish (...)	?	Filet maillant calé à poissons plats

**Table 5.1.2.28 Target species and reported landings : sole, plaice, turbot (tonnes )by North Sea sub-division by year(2004-2006)**

SPECIES	YEAR	27_4	27_4A	27_4B	27_4C	27_7D
PLE	2004			4.22	228.00	2543.20
PLE	2005		0.09	5.55	160.36	2183.19
PLE	2006	0.05	0.00	8.24	140.38	1698.20
SOL	2004			0.00	699.48	2893.07
SOL	2005			0.02	710.98	2656.92
SOL	2006		0.81	0.25	672.34	2513.15
TUR	2004			0.04	12.79	201.50
TUR	2005		0.01	0.38	13.77	212.59
TUR	2006	0.01	0.00	0.27	15.76	197.91

### 7.1.3. Netherlands

The beam trawl fishery is active the entire year through. The average duration of a trip is four to five days. The vessels are equipped with beam trawls. The nets are dragged with a speed of 6 nautical miles per hour over the bottom of the sea. Target species are valuable flat fishes like dover sole, plaice, turbot and brill. By-catch consists of other demersal fish species and benthos. The fleet can be divided in two different métiers: beam trawlers with engines larger than 300 HP (with a maximum of 2000 HP) en beam trawlers with engines smaller than 300 HP ("eurokotters"). Both métiers use 80 and 100 mm mesh-sizes. Number of vessels above 300 HP in 2006 was 107.

Quantitative information on fleets:

Fishery: Beam trawl  
 Mesh-size: 80 mm  
 Target species: Dover sole  
 HP: >300 to 2000  
 Area: IV a,b,c (27.4 a,b,c).  
 Fleet effort: Year D.A.S.  
                   2004 20,733  
                   2005 20,487  
                   2006 13,686

Fishery: Beam trawl  
 Mesh-size: 100 mm  
 Target species: Plaice  
 HP: >300  
 Area: IV a,b,c.  
 Fleet effort: Year D.A.S.

2004	527
2005	584
2006	n.a.

#### 7.1.4. *Belgium*

No Belgium participant present at the meeting to provide background information

#### 7.1.5. *Germany*

The German fleet targeting flatfish in the North Sea is consisting of different sub-fleets. Targeting predominantly sole, 7 beam trawlers with more than 300hp are operating mostly in the southern North Sea. To protect juvenile fish these trawlers are excluded from fishing in the plaice box, an area near to the coast along the Netherlands, Denmark and Germany. 150 smaller beam trawlers and other cutters (mostly using twin trawls) with less than 300hp are working in the central and southern North Sea. The beam trawlers are targeting plaice and sole while the other cutters are operating in a mixed demersal fishery. App. 20 of these cutters are so-called eurocutters with lengths just under 24m which are able to use otter trawls as well as beam trawls. All vessels work all year round.

Only four small vessels (under 24m) are targeting flatfish with gill nets. Flatfish are also caught as by-catch (under 20% of the total catch) of the brown shrimp fishery.

#### 7.1.6. *Denmark*

No description provided

### 7.2. **Overview of discard sampling methodologies**

#### 7.2.1. *UK (England and Wales)*

##### CEFAS Catch Sampling Programme

Although catch sampling has been carried out by CEFAS since the 1990's, the present programme is steered mainly by EC Regulation 1639/2001. The sampling design is stratified to ensure coverage of gears targeting species specified in the regulations, with vessels being selected randomly and sampling effort distributed across **métiers** and regions in direct proportion to fishing effort recorded from the previous year.

At the start of each calendar year the days on grounds data officially reported by the English and Welsh registered fishing fleet >10m overall length (obtained from the FAD database) is grouped by gear type and port area of landing. This information is used to apportion Cefas's sampling effort. Cefas currently sample 150 days at sea per quarter. 15 days (10% of the available sampling effort) is assigned to the <10m fleet using assorted fishing gears (not pots) as they contribute approximately 10% of the total UK landings by weight. The remaining 135 days is distributed across the >10m vessels gear types and port areas according to fishing effort (days at sea).

A list of all the current English and Welsh registered fishing vessels is used to carry out a random vessel draw. Vessels are assigned a draw number and then a random number generator selects a list of vessels (approximately 300 vessels) and sampling

officers then attempt to sample vessels in the order they are drawn to minimise bias. The sampling officer works down the list and selects those vessels that are active in their region that could be used to fulfil their gear-specific targets. If a vessel is unavailable or unsuitable for sampling, then the sampling officer attempts to sample the next vessel on the list. As a last resort, sampling officers can substitute a vessel when there are last minute cancellations or when there are no vessels on the draw list that satisfy métier-specific targets.

#### 7.2.2. *France*

In its 2002 DCR programme, France proposed a pilot study designed to determine which fisheries generate significant levels of discards. Since 2003, the fleets identified in this study were monitored by on-board observers. The inspectors concentrated mainly, though not exclusively, on the species for which the discard levels are to be assessed every year. The use of onboard observers enabled an exhaustive analysis of the catch to be performed - information is therefore available on all the species listed in annexes XII and XV, at least in terms of presence/absence, population size and weight.

For North-Eastern Atlantic and Mediterranean (European seas) the protocol is referred to below. Its application remains based on the involvement of Ifremer staff (around 80 trips involving 175 man/days at sea) and the use of additional resources via sub-contracting for the longest onboard missions, involving some 300 man/days at sea (65 trips); thus the total onboard-observation effort in European seas encompassed over 145 trips involving 500 man/days at sea.

##### Eastern Channel – North Sea

All the fishing types practised in the Channel/North Sea area likely to generate discards will be monitored by onboard observers. There will therefore be no monitoring of vessels fishing by dredging, pots or handlines, since these types of fishing are known for their high degree of selectivity and any discards they generate have a real chance of survival. The fishing types chosen were the following, in order of their relative importance to the region's fisheries:

Bottom trawling – distinguishing between coastal, high-seas and industrial trawlers:

- Coastal trawlers are highly opportunist, fishing for flatfish, gadoids and cephalopods. Average trip length is around 24 hours.

- High-seas trawlers (24 - 40m long) make trips of 3 - 7 days long seeking cod, whiting, plaice, mackerel, gurnards and cuttlefish. The main by-catch consists of pout, lemon sole, pollack, skate, shark and squid. This fishing type is the biggest in division VIId in terms of catch.

- Industrial trawlers (vessels over 40m), fishing for species of commercial interest such as saithe, make trips of 15 days, generally in the North Sea.

Together with bottom trawlers, driftnetters constitute the second largest component of the French small-scale fleet in the Eastern Channel area. These vessels fish mainly for flatfish and gadoids. Pelagic trawling mainly fishes mackerel and - in certain periods (November and December) - herring. By-catch consists of horse mackerel and some

gadoids. Trips are daily. Beam trawling is practised by some vessels from Normandy of less than 24 metres which mainly seek flatfish such as plaice and sole. Average trip length is 24 hours.

The strategy adopted was intended to allocate human resources (around 145 man/days at sea, two-thirds of which were sub-contracted) depending on fleet size and accessibility to vessels (vessels that volunteered to be observed, lack of an actual status of onboard observer, etc.). The programme will assess all the species that have to be assessed every year; some species listed in appendix XII will also be assessed for abundance. Results will be reported on a quarterly basis where possible. It is important to stress, however, that the studies of discards often show great variability in the final evaluations obtained.

The sampling plan drawn up for the different fleets is given below:



Basic segmentation of vessels for the monitoring of discard volumes in the Channel / North Sea (PM) is given in Table 5.2.2.1

**Table 5.2.2.29 Breakdown of French sampling strategy by gear type and vessel length**

Length of vessel		< 12 m		12 - < 24 m	24 - < 40 m	>= 40 m
Type of fishing method						
Mobile gear	Beam trawl	4 trips		Ø*	Ø	
	Demersal trawl	8 trips	8 trips	8 trips	4 trips	
	Pelagic trawl and seiners	4 trips		Ø	Ø	
	Shellfish dredges	NS**	NS	Ø	Ø	
	Multipurpose	NS	NS			
Passive gear	Gear using hooks	NS	NS	Ø	Ø	
	Drift and passive nets	16 trips		Ø	Ø	
	Pots and traps	NS	NS	Ø	Ø	
	Multipurpose	NS	NS			
Multipurpose gear	Combining mobile and passive gear	NS	NS			

\*\* : NS = not sampled

\* : Ø = not applicable

### Sampling of discards

For European seas, since the estimate of discard volumes is based mostly on data gathered onboard working vessels, the onboard observers will be asked to sample for length the discards of the species that have to be monitored annually (cf. appendix XII) or for which, for purposes of evaluating stocks, it is important to know which portion of the catch is not kept (Norway lobster, for example), including in the Mediterranean (hake and red mullet). The sampling intensities are those laid down in appendix XV to the Regulation and based on the discard volumes in tonnes. These volumes will be calculated in 2005 under module E, which means that the intensities will be determined in real time. Otoliths will be taken for age reading from the fish sampled onboard the working vessels whose length classes are not represented in the catches. Although priority will be given to the species required to be monitored annually, information on the other species caught and discarded will be available in the database. This extra data will be useful for preparing future programmes or revising the implementing Regulation.

### 7.2.3. *Netherlands*

Species sampled: All species, including benthos

Vessels type (length/gear) included in programme:

Beam trawl 80 mm mesh-size >300 HP

Otter trawl 80 mm mesh-size (included in programme since 2007)

Vessels type (length/gear) excluded in programme:

Shrimp trawl

Beam trawl 100 mm mesh-size >300 HP (1 trip was included 2004 and 2005)

Beam trawl 80 mm mesh-size <300 HP (1 trip was included 2003 and 2004)

Beam trawl < 260 HP

Small-scale coastal fisheries like: fixed gillnet, Danish seine, small twintrawlers, clam and shell fisheries.

Level to which data are collected (Nantes matrix): Level 5

How are vessels selected?

Selection of the vessels is quasi-random and based on co-operative sampling. This means that co-operation of a skipper with the project is on voluntarily basis. On forehand it is difficult to predict the sampling location, since this depends on the fishing strategy of the skipper. However vessels from different regions are selected during a quarter to obtain widespread coverage.

% of observer coverage: Beam trawl (for beam trawl over 300 HP wit 80mm mesh-size calculated as percentage in days at sea (D.A.S.).

Year	% observer
2004	0.16%
2005	0.17%
2005	0.26%

Further to the sampling carried out by IMARES to ensure compliance with the DCR there has also been a self sampling data collection programme coordinated by the Dutch Fish Product Board together with the Dutch fishing industry. Samples of plaice and cod discards and landings have been measured by fishers on 20 demersal vessels since 2004. The work conducted was presented and considered useful for inclusion in this report (see Appendix ?) and also:

Discard sampling of plaice (*Pleuronectes platessa*) and cod (*Gadus morhua*) in the North Sea by the Dutch demersal fleet from 2004 to 2006. G.M.Aarts, A.T.M. van Helmond, Institute for Marine Resources and Ecosystem Studies (IMARES), Report Number C120/07, 42 pp.

### 7.2.4. *Belgium*

No participants from Belgium attended the meeting

### 7.2.5. *Germany*

Discard data are gathered during observer trips. The target is an overall number of around 40 to 45 trips per year (all fisheries in the North Sea, North Atlantic and Baltic Sea, based on the number of staff available).

Observers onboard take numbers, sample weights and length measurements of all fish species landed and discarded. These include marketable and non-marketable species. Otolith sampling and individual weightings are only carried out on fish species of which stocks are assessed. Invertebrates are only sampled if they are landed (e.g. Nephrops), otherwise their fraction according to the total catch is only roughly estimated.

Vessels included in the programme:

- Beam trawlers >300hp, >40m length, 80mm mesh size targeting sole
- Beam trawlers <300hp, 12 to 24m/24 to 40m, 80mm targeting plaice/sole
- Otter trawlers 12 to 24m, 80mm targeting plaice/mixed
- Otter trawlers over 24m, 90 to 100mm targeting plaice/mixed
- Gill netters 12 to 24m, 96 to 100mm targeting sole

Vessels excluded in the programme:

- Vessels operating with Danish seines
- Brown shrimp trawlers

Level to which data are collected (Nantes matrix): Level 5

How are vessels selected?

The present status of a sampler on board of a fishing vessel is still a guest status. The possibility for biological sampling depends on the hospitality of ship owners and companies and on a positive understanding towards the observers. This leads to the present situation where a true random sampling of the North Sea beam trawl, otter trawl and gill net fleet is yet not possible.

% Observer coverage: Below 1% of the flatfish fishery in the North Sea (by fishing hours)

#### 7.2.6. *Denmark*

The sampling on board commercial fishing vessels is performed in a close co-operation with The Danish fishermen's Organisation ("Danmarks Fiskeriforening"). Employees from DIFRES are participating on regular commercial fishing trips as observers.

The sampling is stratified on quarter, area (North Sea, Skagerrak, Kattegat and Subdivisions in the Baltic Sea (SD 22-27)) and on fisheries (Nantes matrix, level5) fisheries. Only fisheries showing significant discard pattern (demonstrated by previous pilot programmes) are sampled. Tables 5.2.6.1 and 5.2.6.2 gives the fisheries sampled during the period 2003 -06 for the two areas.

Quarter	All
Month	All
Country	DEN
Rectangle	All
Sampling Type	Sea

Number of hals/sets sampled		Year				
Area	Fishery Ivl 6	2003	2004	2005	2006	Grand Total
3AN	OTB_CRU_32_0_0	4				4
	OTB_CRU_90_0_0		4		4	8
	OTB_DEF_35_0_0			2		2
	OTB_DEF_80_0_0	2				2
	OTB_DEF_90_0_0		4		1	5
	OTT_CRU_70_2_35	4	3	2		9
	OTT_CRU_90_0_0	1	17	17	35	70
	OTT_DEF_90_0_0	12	10	5	14	41
	SDN_DEF_90_0_0	14	22	11	13	60
3AN Total		37	60	37	67	201
3AS	OTB_CRU_90_0_0				3	3
	OTB_DEF_105_1_110				1	1
	OTB_DEF_90_0_0			2		2
	OTT_CRU_90_0_0			24	9	33
	OTT_DEF_90_0_0			1	9	10
	SDN_DEF_90_0_0			6		6
3AS Total				33	22	55
4A	OTB_CRU_32_0_0	5				5
	OTT_CRU_100_0_0		30	25	15	70
	OTT_CRU_80_0_0			3		3
	OTT_DEF_100_0_0	23	4	10	18	55
	TBB_DEF_100_0_0	12				12
4A Total		40	34	38	33	145
4B	GNS_DEF_120_0_0				2	2
	OTB_CRU_80_0_0			3		3
	OTB_DEF_100_0_0		3			3
	OTB_DEF_70_0_0			1		1
	OTT_CRU_100_0_0			2	1	3
	OTT_CRU_80_0_0	39	8			47
	OTT_DEF_100_0_0	7	22	10	31	70
	SDN_DEF_100_0_0	11		16	13	40
	TBB_DEF_100_0_0	2				2
4B Total		59	33	32	47	171
Grand Total		136	127	140	169	572

Table 5.2.6.30 Breakdown of Danish sampling strategy for the period 2004-2006 for North Sea and Skagerrak sub-divisions

Quarter	All
Month	All
Country	DEN
Rectangle	All
Sampling	Sea

Samples		Year			
Area	Fishery lvl 6	2004	2005	2006	Grand Total
22	OTB_DEF_105_1_110	24	23	20	67
	OTB_DEF_90_0_0		3		3
	SDN_DEF_105_1_110	15			15
22 Total		39	26	20	85
23	OTT_DEF_105_1_110			2	2
	PTB_DEF_105_1_110		1		1
23 Total			1	2	3
24	OTB_DEF_105_1_110	11	12	28	51
	OTB_DEF_90_0_0		2		2
	OTT_DEF_105_1_110			8	8
	PTB_DEF_105_1_110	14	4	2	20
	SDN_DEF_105_1_110	8			8
24 Total		33	18	38	89
25	OTB_DEF_105_1_110	23	26	23	72
	OTM_DEF_105_1_110		2		2
	OTT_DEF_105_1_110			9	9
25 Total		23	28	32	83

**Table 5.2.6.31 Breakdown of Danish sampling strategy for the period 2004-2006 for Baltic sub-divisions**

The sampling effort is distributed on the strata according to the present fishing activity in the commercial fishery in each stratum. Initially, a preliminary schedule based on landings in each stratum in the previous year is prepared. During quarterly meetings with the Fishermen's Organisation the present activity in the commercial fishery is monitored. This is done by continuously consulting updated landing statistics and by inquiries made to central landing sites. Possible deviations from the previous year are revealed and the initially sampling scheme is adjusted accordingly. The sampling is done from vessels registered in all major harbours in Denmark. This procedure assures that the sampling reflects the fishery and that the results are consistent to the landings.

The sampling is done on haul basis. All relevant information is recorded from a number of hauls on each fishing trip. Otoliths are collected from the discard of all commercial important species. In order to assure that the age distributions sampled reflect the landings, the collecting of otoliths are spread out over the whole period. 1 or 2 otoliths are collected from each length group on each fishing trip.

The vessels selected for sampling are selected from a list of vessels which are known to be willing to take observers onboard. The list is constantly updated adding new vessels or black listing others who refuse to take observers onboard.

The quality assurance is made in two steps. Step 1: each individual trip is evaluated together with representatives from the Fishermen Association looking at species distribution, catch amount and fishing area. If these are found representative for the fishery the trip is accepted. In total, only around 10 trips have been rejected in the period from 1995 to 2006. Second step: It is checked if the trips sampled in each

métier (Nantes matrix level 5) cover the fishery in relation to period and fishing ground. Only strata which fulfil the criteria will be published and used for discard estimation.

### **7.3. Discard rates by weight and number**

A summary of the data obtained from Member States engaged in the flatfish fisheries in the North Sea and the Eastern channel (ICES area IV and division VIId) is given in Table 5.2.6.1.

**Table 5.2.6.32 Summary of total sampling trips (2004-2006) performed by gear type, mesh size and country for flatfish fisheries in the North Sea and the Eastern channel (ICES area IV and division VIIId)**

Country	Gear type	Mesh size	Vessel length	Number of sampled trips
Germany	TBB	80-89	VL1224	7
Germany	TBB	80-89	VL2440	3
Germany	TBB	80-89	VL40XX	5
Germany	DTS	80-89	VL1224	3
Germany	DTS	80-89	VL2440	3
Germany	DTS	90-99	VL1224	2
Germany	DTS	100-125	VL1224	1
Germany	DTS	100-125	VL2440	1
Germany	DFN	90-99	VL1224	1
Germany	DFN	100-125	VL1224	1
<b>Germany total</b>				<b>27</b>
Denmark	DTS			14
Denmark	PGO			1
<b>Denmark total</b>				<b>15</b>
France	DTS		VL0012	2
France	DTS	<80	VL0012	1
France	DTS	80-89	VL0012	10
France	DTS	80-89	VL1224	6
France	TBB	80-89	VL1224	4
France	DFN	90-99	VL0012	5
France	DFN	90-99	VL1224	3
France	DFN	100-124	VL0012	7
France	DFN	100-124	VL1224	3
France	DFN	>125	VL0012	1
<b>France total</b>				<b>42</b>
The Netherlands	TBB	80-89	VL1224	26
The Netherlands	TBB	100+	VL1224	2
<b>The Netherlands total</b>				<b>28</b>
UK	DFN	90-99	VL0012	7
UK	DFN	100-125	VL0012	12
UK	DFN	>125	VL0012	4
UK	DTS	80-89	VL0012	2
UK	DTS	80-89	VL1224	14
UK	DTS	90-99	VL1224	2
UK	DTS	100-125	VL0012	1
UK	DTS	100-125	VL1224	14
UK	DTS	100-125	VL2440	5
UK	TBB	80-89	VL1224	9
UK	TBB	100-125	VL2440	2
UK	TBB	100-125	VL40XX	1
<b>UK total</b>				<b>73</b>
<b>TOTAL</b>				<b>185</b>

### 7.3.1. UK (England and Wales)

**Table 5.3.1.33 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

Species	Av. discard rate	CV	Sum discard (kg)	Sum landings (kg)	% occur.	Pooled discard rate
<b>DFN (n=23)</b>						
SOL	9%	1.19	59	1076	43%	5%
COD	9%	1.66	14	236	61%	5%
TUR	1%	1.73	2	166	13%	1%
BLL	4%	1.15	8	117	48%	6%
RJC	33%	0.58	28	67	30%	30%
BSS	14%	1.51	7	56	35%	11%
WHG	46%	0.69	39	22	57%	64%
DAB	98%	0.07	31	2	48%	94%
POL	0%	na	0	28	9%	0%
MON	13%	1.41	5	16	9%	23%
<b>DTS (n=36)</b>						
POK	27%	1.44	2409	64103	45%	4%
COD	14%	1.26	2872	27741	87%	9%
PLE	28%	0.83	4229	13653	97%	24%
WHG	36%	0.96	3266	14432	97%	18%
HAD	21%	1.25	2795	10078	63%	22%
POL	14%	2.52	45	10051	37%	0%
LIN	21%	1.74	45	9294	37%	0%
LEM	14%	1.53	980	7718	89%	11%
RJC	14%	1.68	930	6991	50%	12%
MON	1%	2.53	27	5462	45%	0%
<b>TBB (n=12)</b>						
PLE	29%	0.86	10175	41973	100%	20%
DAB	84%	0.21	12174	2286	100%	84%
SOL	6%	1.02	759	8324	100%	8%
LEM	16%	0.86	1185	5100	94%	19%
COD	21%	1.34	439	1513	94%	22%
CTC	32%	1.48	694	1188	63%	37%
HAD	3%	0.89	81	1520	19%	5%
RJC	34%	0.84	437	794	88%	35%
TUR	2%	3.50	1	859	88%	0%
BLL	7%	2.44	25	817	88%	3%



**Table 5.3.1.34 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

Species	Av. discard rate	CV	Sum discard No.	Sum retained No.	% occur.	Pooled discard rate
<b>DFN (n=23)</b>						
SOL	16%	0.6	611	3646	43%	14%
WHG	61%	0.5	287	78	57%	79%
CRE	35%	1.6	37	225	13%	14%
BLL	10%	1.2	41	208	48%	16%
DAB	99%	0.0	222	9	48%	96%
COD	19%	1.0	23	147	61%	14%
RJC	63%	0.4	81	45	30%	64%
TUR	2%	1.7	4	98	13%	4%
BSS	21%	1.5	15	44	35%	25%
MAC	76%	0.5	30	17	26%	64%
<b>DTS (n=36)</b>						
WHG	42%	0.8	19733	54974	97%	26%
PLE	41%	0.7	25571	39628	97%	39%
DAB	80%	0.4	45640	3848	89%	92%
POK	31%	1.3	3037	33633	45%	8%
LEM	20%	1.3	6671	24884	89%	21%
COD	28%	1.0	8801	18342	87%	32%
HAD	30%	0.9	8917	15288	63%	37%
NEP	50%	1.0	2862	14128	29%	17%
RJR	99%	0.0	7447	485	53%	94%
SOL	3%	2.5	667	5873	55%	10%
<b>TBB (n=12)</b>						
PLE	45%	0.6	56755	101993	100%	36%
DAB	92%	0.1	130121	11347	100%	92%
SOL	11%	1.0	6946	33495	100%	17%
LEM	27%	0.7	8907	17821	94%	33%
CTC	35%	1.4	4798	5414	63%	47%
CRE	90%	0.3	8754	118	100%	99%
SCE	28%	1.3	840	3555	44%	19%
WHG	78%	0.4	3148	861	81%	79%
RJC	63%	0.5	2759	600	88%	82%
HAD	5%	0.9	247	2812	19%	8%

### 7.3.2. France

**Table 5.3.2.35 Summary of total discard rates by trip and by number, split by gear type and mesh size**

Gear type	Mesh size	Number sampled trips	Total Sampled Discard weight	Total Sampled Landings weight	Mean discard rate	Discard rate CV
DFN	90-99	8	540	2736	22%	79%
DFN	100-124	10	2287	2538	48%	53%
DFN	>125	1	50	53	49%	NA
DFN	all	19	2877	5326	37%	67%
DTS	<80	1	216	186	54%	NA
DTS	80-89	16	6793	4898	57%	37%
DTS	all	17	7009	5085	57%	36%
TBB	80-89	4	879	1027	36%	89%
TBB	all	4	879	1027	36%	89%

**Table 5.3.2.36 Summary of total discard rates by trip and by weight, split by gear type and mesh size**

Gear type	Mesh size	Number sampled trips	Total Sampled Discard number	Total Sampled Landings number	Mean discard rate	Discard rate CV
DFN	90-99	8	2101	8328	24%	53%
DFN	100-124	10	7150	6597	53%	44%
DFN	>125	1	60	39	61%	NA
DFN	all	19	9311	14964	41%	57%
DTS	<80	1	2295	964	70%	NA
DTS	80-89	16	85816	19400	74%	25%
DTS	all	17	88111	20364	74%	24%
TBB	80-89	4	41803	2613	74%	25%
TBB	all	4	41803	2613	74%	25%

**Table 5.3.2.37 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

Species	Av. discard rate	CV	Sum discard (kg)	Sum landings (kg)	%occur	Pooled trip discard rate
<b>TBB (n=4)</b>						
MYV	100%	0%	284	0	50	100%
STH	100%	NA	263	0	25	100%
SCR	100%	0%	89	0	100	100%
LIO	100%	1%	76	1	100	99%
BIB	31%	149%	41	206	100	17%
QSC	100%	0%	29	0	50	100%
CTC	23%	117%	16	35	100	32%
POD	100%	0%	15	0	75	100%
CRE	84%	32%	13	5	75	72%
LYY	100%	0%	10	0	100	100%
<b>DTS (n=19)</b>						
DAB	56%	50%	1548	1559	100	50%
QSC	100%	0%	1118	0	42	100%
PLE	32%	80%	937	1103	100	46%
BIB	90%	18%	788	81	100	91%
SCR	98%	5%	714	5	68	99%
LIO	95%	10%	492	18	42	96%
LYY	100%	0%	313	0	100	100%
WHG	40%	102%	306	228	84	57%
SOL	15%	123%	284	1185	100	19%
SCE	100%	0%	261	0	47	100%
<b>DFN (n=19)</b>						
SCR	89%	19%	2147	131	84	94%
CRE	97%	6%	186	8	89	96%
PLE	22%	131%	138	709	95	16%
DAB	58%	63%	78	81	84	49%
SYC	11%	148%	72	575	58	11%
BIB	70%	52%	66	124	84	35%
SOL	3%	197%	28	2707	95	1%
FLE	40%	123%	22	130	42	15%
QSC	100%	NA	18	0	5	100%
SDS	52%	98%	18	62	53	22%

**Table 5.3.2.38 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

Species	Av. discard rate	CV	Sum discard No.	Sum landings No.	%occur	Pooled trip discard rate
<b>TBB (n=4)</b>						
MYV	100%	0%	32868	0	50	100%
STH	100%	NA	3487	0	25	100%
LIO	100%	0%	1500	8	100	99%
QSC	100%	0%	1043	0	50	100%
POD	100%	0%	898	0	75	100%
BIB	49%	74%	580	681	100	46%
SCR	100%	0%	359	0	100	100%
CTC	47%	68%	270	152	100	64%
LYY	100%	0%	211	0	100	100%
KIT	100%	NA	109	0	25	100%
<b>DTS (n=19)</b>						
QSC	100%	0%	32448	0	42	100%
DAB	70%	39%	16694	6329	100	73%
BIB	94%	14%	8572	224	100	97%
PLE	48%	61%	7543	3161	100	70%
LIO	98%	5%	6303	128	42	98%
LYY	100%	0%	6097	0	100	100%
SOL	21%	113%	2888	6716	100	30%
CTC	51%	88%	2553	1101	89	70%
WHG	45%	94%	2303	960	84	71%
HOM	91%	19%	2045	391	42	84%
<b>DFN (n=19)</b>						
SCR	91%	15%	4821	184	84	96%
PLE	29%	108%	1032	1584	95	39%
QSC	100%	NA	900	0	5	100%
DAB	65%	50%	688	362	84	66%
CRE	97%	6%	424	19	89	96%
BIB	79%	38%	415	318	84	57%
SOL	5%	181%	200	9259	95	2%
CRG	100%	NA	149	0	5	100%
SYC	12%	151%	110	854	58	11%
FLE	42%	118%	77	425	42	15%

In the flatfish fishery of Eastern Channel and southern North sea, 42 French trips with three different gears (demersal trawl, beam trawl and fixed nets) were sampled. In the 19 trips of fixed nets with three different mesh size ranges, the discard rate was 37 %

with a high CV (67%). The discard rate by weight was observed lower in the 90-99 mm mesh sizes fixed nets than in the 100-124 mm nets but the CV was higher in the shorter mesh size class. For the four trips of beam trawl, the discard rate was 36% with a very high CV. For the demersal trawls (17 trips) the discard rate obtained was found high (57 %) compared to the two other gears. However the discard rate by numbers was high for beam trawlers and demersal trawls (73%) compared to fixed nets (41 %). It seems that the discards in beam trawl concern mainly small size fish.

For sole, the main target species of these fishery, bottom trawl give an average discard rate (15.2 %) instead 2.8 % for the nets. SCR is globally the first species discarded in weight and this come from the netting activity (89.2 %). Others important discards rate come from bottom trawl with DAB and PLE.

### 7.3.3. Netherlands

**Table 5.3.3.39 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

Species	Av. Discard rate	CV	Sum discard (kg)	Sum landings (kg)	%occur.	Pooled trip discard rate
DAB	94%	8%	125638	6778	100%	95%
PLE	53%	43%	106667	103880	100%	51%
MSF	100%	0%	4410	0	100%	100%
GSM	100%	0%	1168	0	92%	100%
LYY	100%	0%	4724	0	96%	100%
GUG	100%	0%	4529	0	100%	100%
WHG	97%	16%	3265	134	96%	96%
SOL	16%	120%	6430	38756	92%	14%
GUU	100%	0%	1789	0	69%	100%
SPR	100%	0%	133	0	54%	100%

**Table 5.3.3.40 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

Species	Av. discard rate	CV	Sum discard No.	Sum landings No.	%occur.	Pooled trip discard rate
DAB	98%	3%	2493316	43034	100%	98%
PLE	77%	28%	1541577	324652	100%	83%
MSF	100%	0%	306747	0	100%	100%
GSM	100%	0%	225656	0	92%	100%
LYY	100%	0%	120728	0	96%	100%
GUG	100%	0%	91793	0	100%	100%
WHG	98%	12%	75802	586	96%	99%
SOL	28%	72%	70828	190623	92%	27%
GUU	100%	0%	22694	0	69%	100%
SPR	100%	0%	16723	0	54%	100%

Also see fishing industry coordinated self-sampling results Appendix 19.3?

### 7.3.4. Belgium

**Table 5.3.4.41 Summary of total discard rates by trip and by weight, split by gear type and mesh size**

Gear type	Mesh size	Number sampled trips	Total Sampled Discard weight	Total Sampled Landings weight	Discard rate
TBB	80	17	20613	76045	21%
	120	1	6970	38673	15%

**Table 5.3.4.42 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type (see note of caution below)\***

Species	Av. discard rate	CV	Sum of discard (kg)	Sum landings (kg)	% Occur.	Pooled Discard Rate
TBB						
PLE	20	1	8322	56668	100%	13%
COD	32	1	7194	13633	100%	35%
SOL	8	1	1489	13270	100%	10%
SKA	0	3	32	7353	83%	0%
LEM	9	1	435	6451	100%	6%
DAB	49	0	6498	5180	100%	56%
BLL	0	3	16	2135	100%	1%
TUR	1	3	12	2106	100%	1%
GUX	15	1	420	2042	94%	17%
WHG	55	0	2211	1488	100%	60%

*\*As there was no representative from Belgium present at the meeting, the data presented in Table 5.3.4.2 are based on extractions from the JRC database and have not been checked against the original data file. Given the database issues identified in section 7.3.4.1, these data should not be over interpreted, as they have not been quality checked.*

### 7.3.5. Germany

Overall 27 (2004 to 2006: Beam trawl 15 trips, otter trawl 10 trips, gill nets 2 trips)

Mean discard rate by weight by trip: 61% (CV 0.7)

Mean discard rate by numbers by trip: 85% (CV 0.7)

In the beam trawl and otter trawl fishery as well as the gill net fishery, plaice and dab are the most discarded species, both by weight and numbers. Their share on the total discard is approx. 50% by weight and by numbers, respectively. The shares of all other species are much lower, highest values for single species are only reaching less than 5%.

**Table 5.3.5.43 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

Species	Av. discard rate	CV	Sum discard (kg)	Sum landings (kg)	%occur	Pooled trip discard rate
TBB (n=15)						
PLE	55		50345	31032	100%	62
DAB	82		44473	8031	100%	85
STH	100		6633	0	100%	100
WHG	94		4816	588	100%	89
SRA	92		4411	55	87%	99
GSM	100		2451	0	100%	100
COD	28		1928	944	93%	67
SOL	7		1529	14544	80%	10
LYY	100		1500	0	53%	100
RJR	20		1139	323	67%	78
DTS (n=10)						
DAB	84		41946	6988	100%	86
PLE	40		29855	46480	100%	39
SRA	78		9701	1692	90%	85
RJR	100		2583	13	50%	99
NEP	66		1653	1563	40%	51
PLA	99		1346	27	80%	98
STH	100		828		20%	100
WHG	72		668	118	90%	85
HOM	61		454	116	40%	80
LYY	100		244	0	100%	100
DFN (n=2)						
DAB	75		2098	347	100%	86
PLE	52		243	406	100%	37
SOL	5		173	4238	100%	4
WHG	100		116	0	100%	100
SRA	100		40	0	50%	100
CRE	100		24		50%	100
SDV	100		11		50%	100
RJR	67		10	3	100%	77
SYC	100		6	0	50%	100
ENQ	100		4	0	100%	100

**Table 5.3.5.44 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

Species	Av. discard rate	CV	Sum discard No.	Sum landings No.	%occur.	Pooled trip discard rate
TBB (n=15)						
DAB	92		44908	815263	100%	95
PLE	81		91163	674090	100%	88



GSM	100	0	199822	100%	100
WHG	98	1739	60154	100%	97
SRA	99	142	56878	87%	100
SOL	27	64634	56756	100%	47
COD	61	484	47287	93%	99
LYY	100	0	42639	80%	100
FLE	21	9322	13749	53%	60
GUU	76	2936	8691	67%	75
DTS (n=10)					
DAB	94	603300	40395	100%	94
PLE	61	249212	154761	100%	62
SRA	94	96489	4630	90%	95
PLA	100	23402	97	80%	100
RJR	100	6499	0	50%	100
LYY	100	6243	0	100%	100
WHG	75	4850	469	90%	91
GUU	19	4028	1261	80%	76
HOM	71	3610	290	40%	93
NEP	20	2194	2977	40%	42
DFN (n=2)					
DAB	83	25432	1798	100%	93
PLE	63	2131	2372	100%	47
SOL	11	1712	17229	100%	9
WHG	100	1162	0	100%	100
SRA	100	421	0	50%	100
ENQ	100	177	0	100%	100
GSM	100	126	0	50%	100
BIB	100	19		50%	100
RJR	50	8	3	100%	73
LCM	100	8	0	50%	100

### 7.3.6. Denmark

**Table 5.3.6.45 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

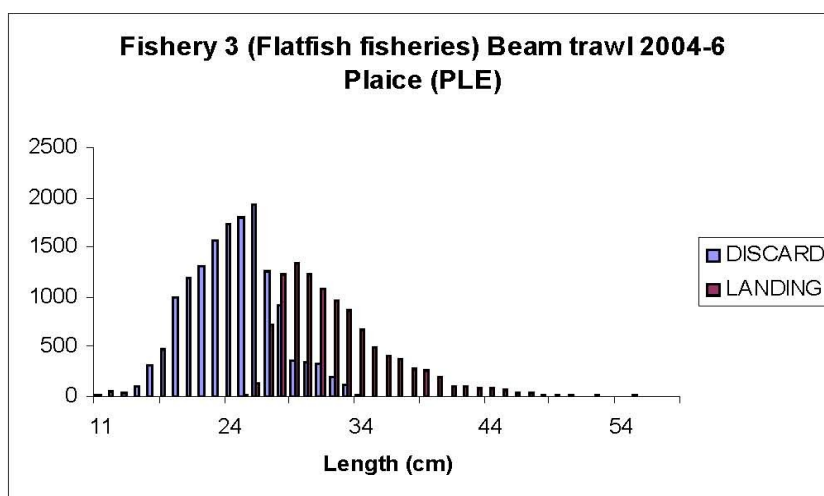
Species	Av. discard rate	CV	Sum discard (kg)	Sum landings (kg)	%occ.	Pooled trip discard
DTS (n=14)						
RJR	100%	0%	19321	0	79	100%
PLE	8%	169%	2316	32075	100	7%
DAB	51%	62%	2146	2776	100	44%
GUG	100%	0%	1627	0	100	100%
COD	23%	135%	553	2293	100	19%
HAD	19%	130%	464	616	86	43%
LEM	1%	115%	74	5204	86	1%
MON	2%	181%	16	596	57	3%
WIT	19%	346%	12	1699	86	1%
TUR	3%	179%	5	466	100	1%
PTS (n=1)						
CRE	100%	NA	13	0	100	100%
PLE	9%	NA	6	60	100	9%
DAB	46%	NA	6	7	100	46%
MXJ	100%	NA	1	0	100	100%

**Table 5.3.6.46 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

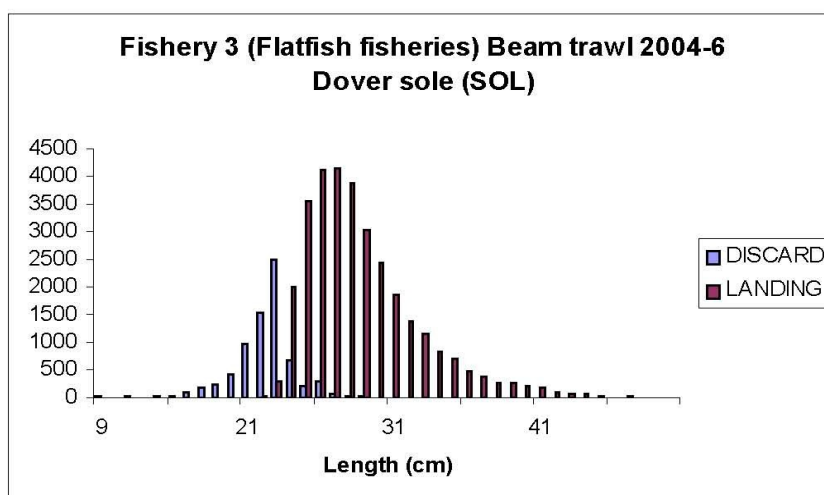
Species	Av. discard rate	CV	Sum discard No.	Sum landings No.	%occ.	Pooled trip discard rate
DTS (n=14)						
RJR	100%	0%	53339	0	79	100%
DAB	65%	52%	30413	12438	100	71%
PLE	13%	151%	14456	93164	100	13%
GUG	100%	0%	12210	0	100	100%
HAD	29%	110%	1343	1054	86	56%
COD	40%	81%	1045	742	100	58%
LEM	2%	100%	474	12327	86	4%
WIT	2%	240%	135	4007	86	3%
MON	8%	182%	38	279	57	12%
TUR	8%	199%	13	311	100	4%
PTS (n=1)						
DAB	64%	NA	38	21	100	64%
PLE	16%	NA	27	137	100	16%
MXJ	100%	NA	3	0	100	100%
COD	100%	NA	1	0	100	100%

## 7.4. Length profiles of retained and discard commercial species

### 7.4.1. UK (England and Wales)

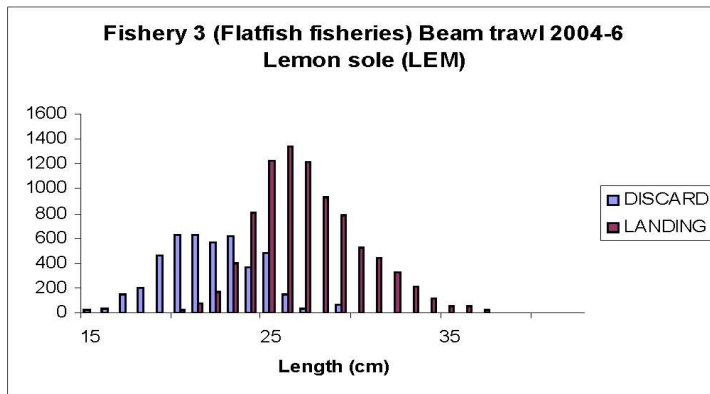


Discards of plaice consisted predominantly of those below the minimum landing size (27cm).

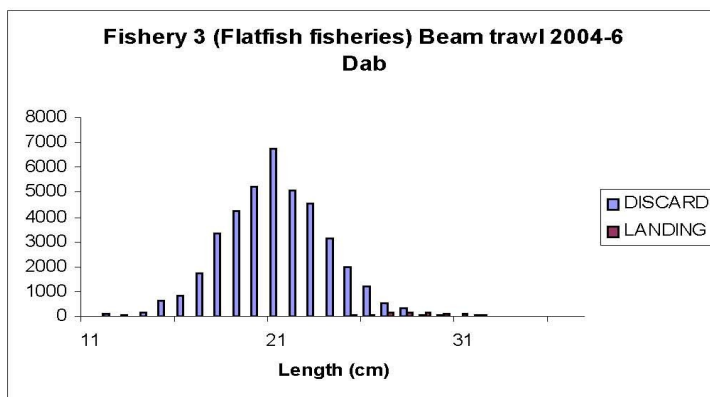


The minimum landing size for Dover sole is 24cm and there is a fairly sharp cut-off at this size for retained fish.

Figure 5.4.1.47 Length distribution of plaice and Dover sole landings and discards

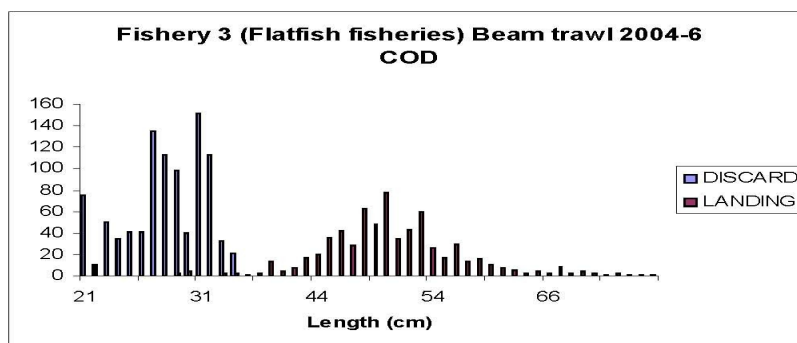


There is no minimum landing size for lemon sole but there is little demand for individuals below about 24cm total length.



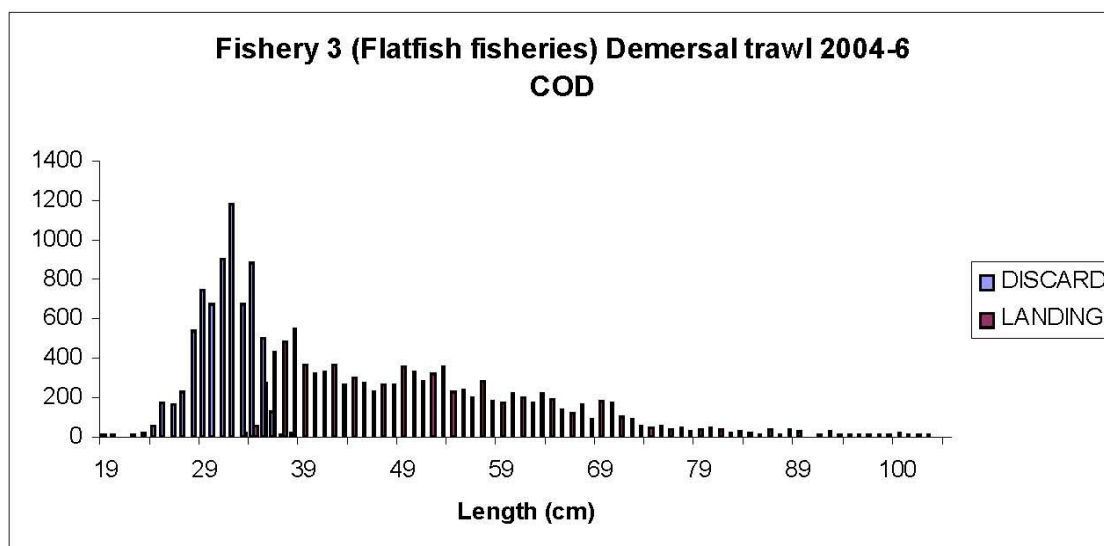
Dab is of very low value on UK markets and only the few fish longer than about 27cm are worth retaining.

Figure 5.4.1.48 Length distribution of lemon sole and dab landings and discards

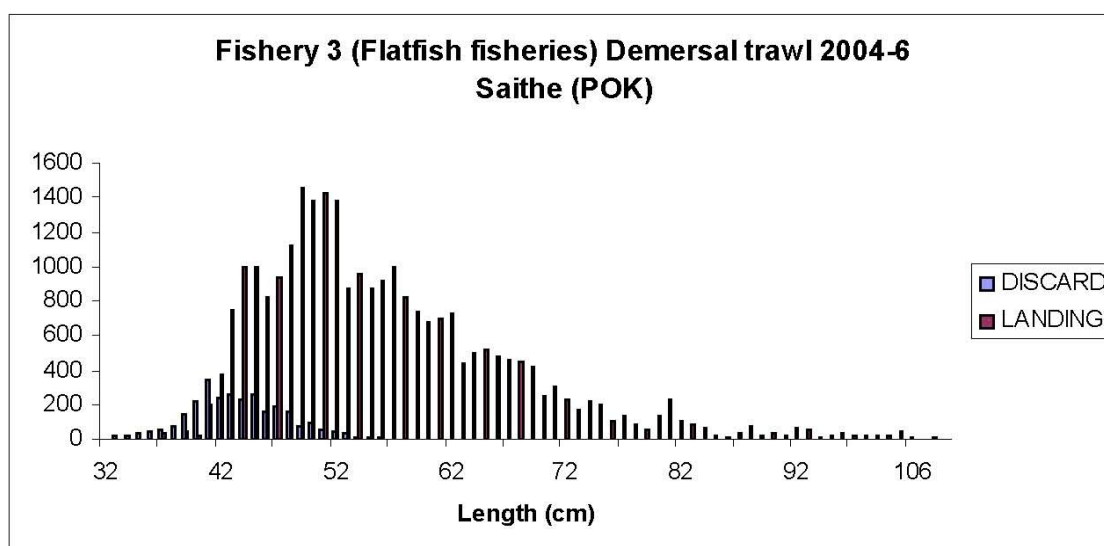


Discards of cod consisted almost entirely of those below the minimum landing size (35cm).

Figure 5.4.1.49 Length distributions of cod landings and discards

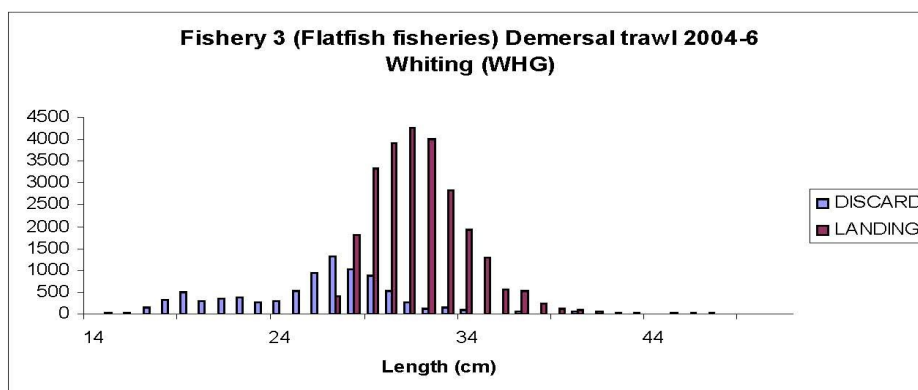


Discards of cod consisted almost entirely of those below the minimum landing size (35cm).



Saithe is a moderately low value species but it is also a quota species. The value of the catch is maximised by discarding fish below about 50cm even though the minimum landing size is 35cm. Even so, the volume of discards is fairly low suggesting either that the mesh sizes employed are quite effective in minimising catches of small fish, or that fishermen know when and where small fish are likely to be encountered and can avoid them.

**Figure 5.4.1.50 Length distribution of cod and saithe landings and discards**



Fish are not landed below the minimum landing size (27cm). Some fish above the MLS are discarded as some crews cannot be bothered to handle smaller grades that fetch a low price.

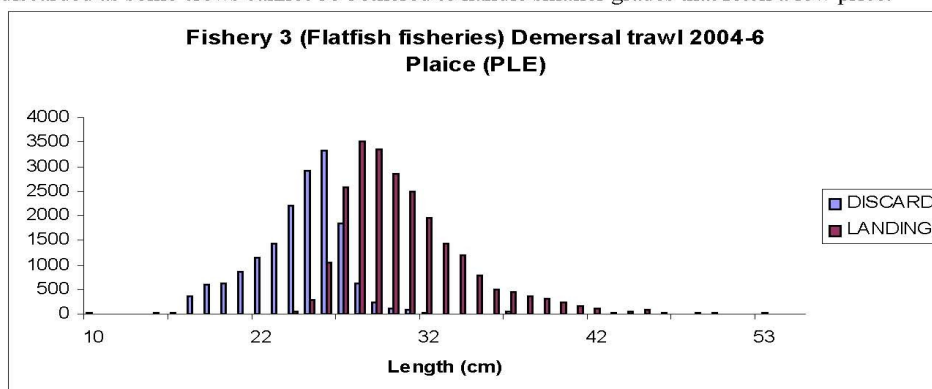
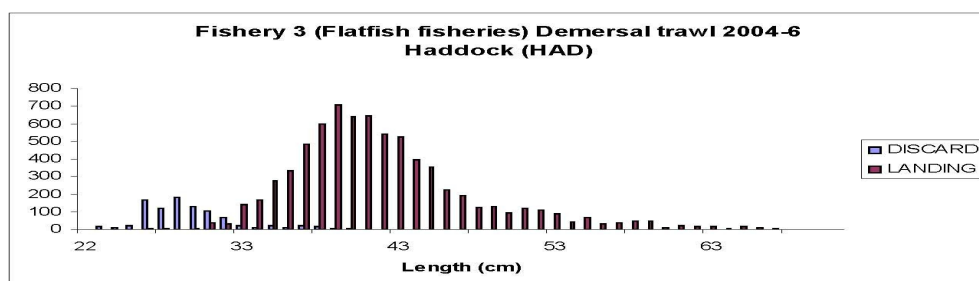


Figure 5.4.1.51 Length distribution of whiting and plaice landings and discards



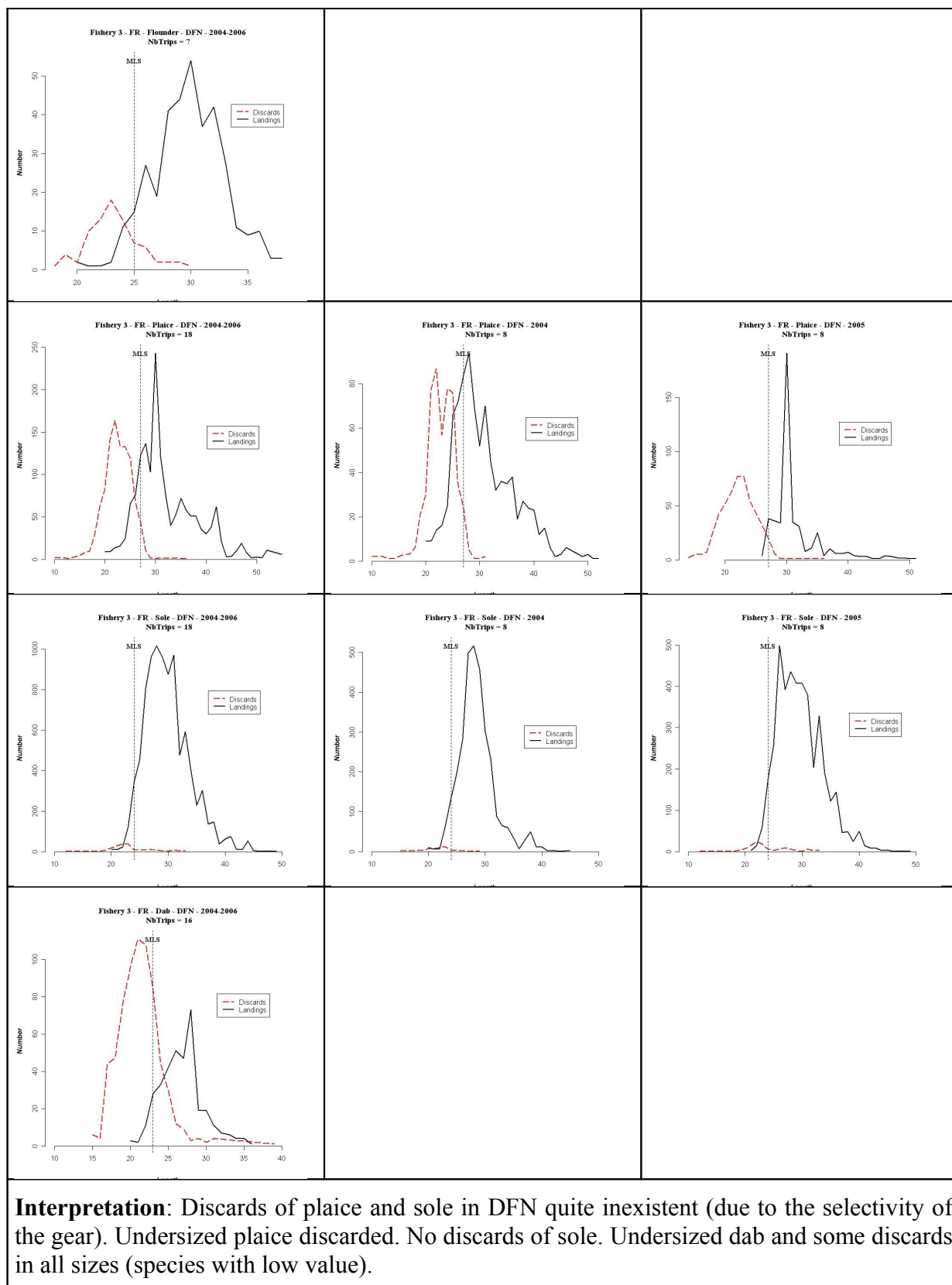
The minimum landing size for haddock is 30cm and there is a fairly well defined cut-off at this size for retained fish.

Figure 5.4.1.52 Length distribution of haddock landings and discards

#### 7.4.2. France

Figure 5.4.2.53 Length distribution of flounder, dab, plaice and sole landings and discards

Gear DFN	Gear DFN	Gear DFN
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**Figure 5.4.2.54** Landings and discards length distributions by gear, species, year and mesh size for French length data

Gear DTS	DTS split by year Sole	DFN split by mesh size Sole
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<p><b>Fishery 3 - FR - Dab - DTS - 2004-2006</b> NbTrips = 15</p>	<p><b>Fishery 3 - FR - Sole - DTS - 2004</b> NbTrips = 4</p>	<p><b>Fishery 3 - FR - Sole - DFN - 2004-2006 - Mesh 90</b> NbTrips = 8</p>
<p><b>Fishery 3 - FR - Plaice - DTS - 2004-2006</b> NbTrips = 15</p>	<p><b>Fishery 3 - FR - Sole - DTS - 2005</b> NbTrips = 8</p>	<p><b>Fishery 3 - FR - Sole - DFN - 2004-2006 - Mesh 100</b> NbTrips = 8</p>
<p><b>Fishery 3 - FR - Whiting - DTS - 2004-2006</b> NbTrips = 10</p>	<p><b>Fishery 3 – FR – Sole – DTS – 2006</b></p> <p>No data fit for use</p>	<p><b>Fishery 3 - FR - Sole - DFN - 2004-2006 - Mesh 110</b> NbTrips = 2</p>
	<p><b>Fishery 3 - FR - Sole - DTS - 2004-2006</b> NbTrips = 15</p>	<p><b>Fishery 3 - FR - Sole - DFN - 2004-2006</b> NbTrips = 18</p>
<p><b>Interpretation:</b></p> <p>High discards. No market for small grade whiting. Undersize plaice discarded. No market for small size dabs.</p>	<p><b>Interpretation:</b></p> <p>Discards ratio can be high depending on the growth and strength of recruitment in relation with MLS (variability between years).</p>	<p><b>Interpretation:</b> No high discards due to the selection of gears whatever the mesh size. Strong influence of mesh size on the size range selected in fixed nets with mesh size between 90 and 110 mm.</p>



### 7.4.3. Netherlands

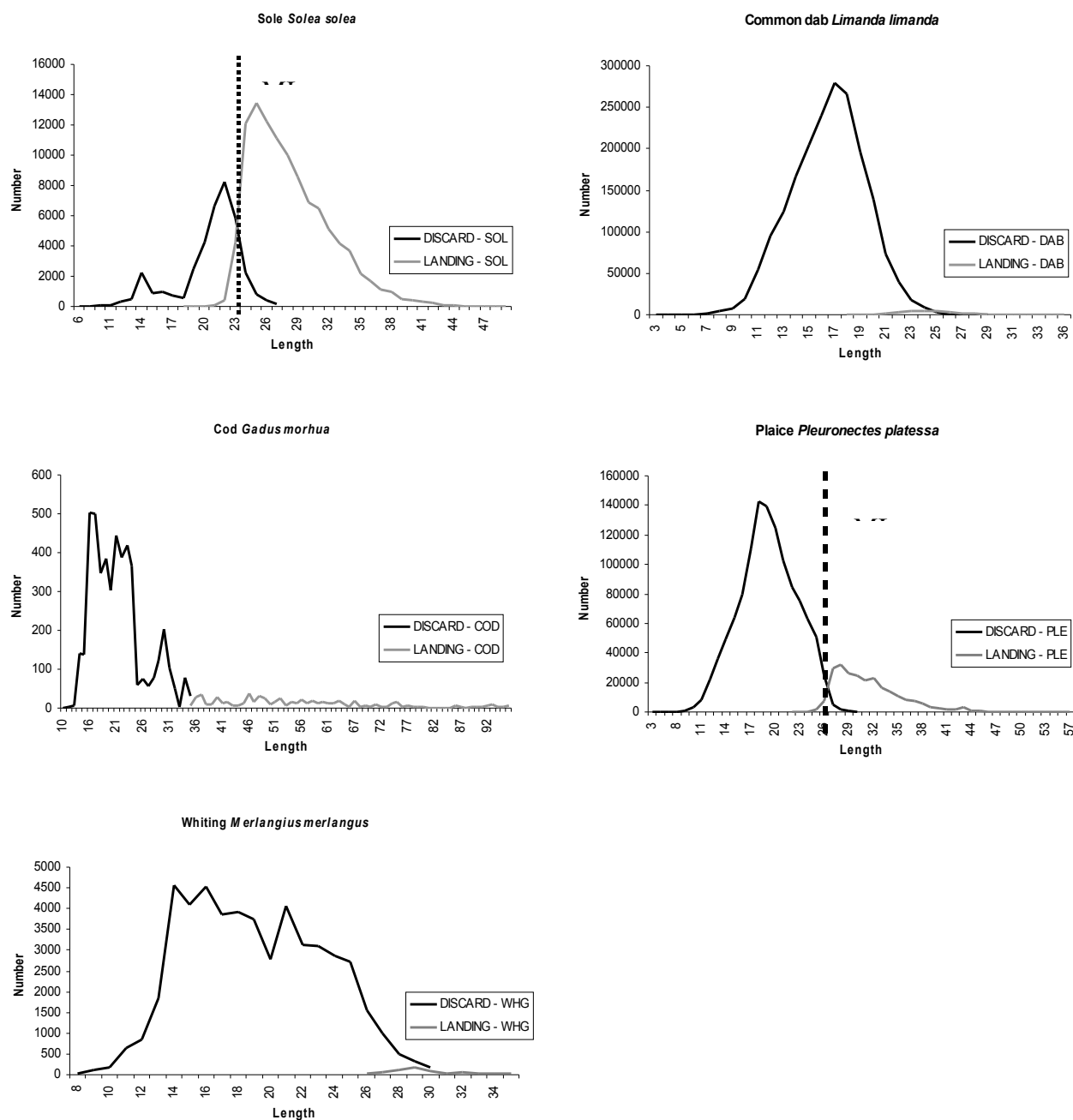


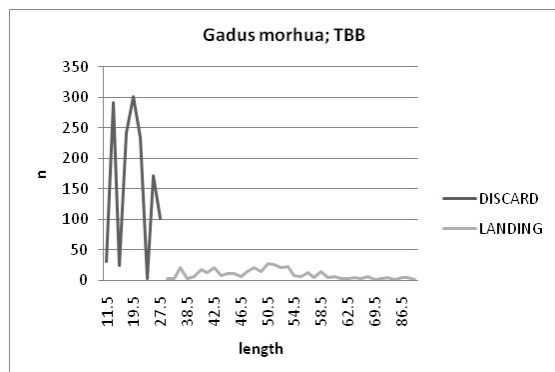
Figure 5.4.3.55 Length distributions of sole, dab, cod, plaice and whiting landings and discards

### 7.4.4. Belgium

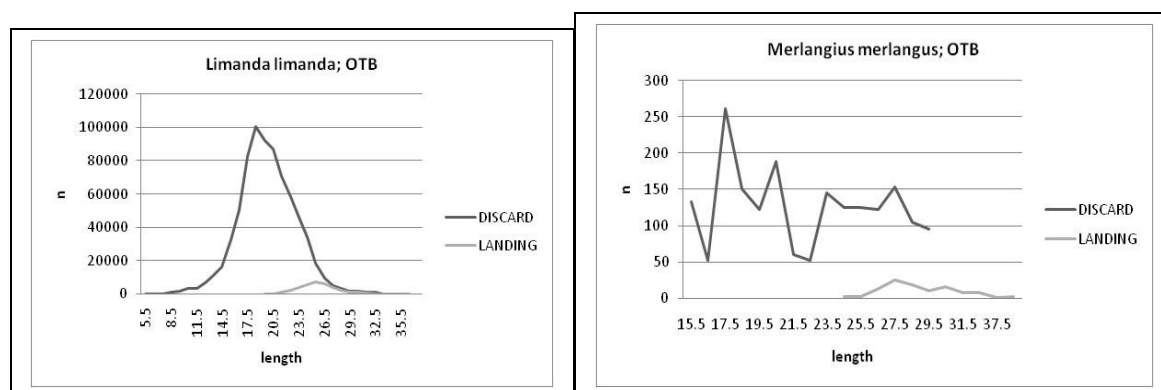
Due to ongoing database problems, no length based data is presented for Belgium

#### 7.4.5. Germany

**Figure 5.4.5.56 Flatfish fishery; length frequencies of four selected species in the beam trawl fishery (Combined data of 15 observer trips, 2004 – 2006)**



**Figure 5.4.5.57 Flatfish fishery; length frequencies of five selected species in the otter trawl fishery (Combined data of 10 observer trips, 2004 – 2006)**



Number of evaluated trips (2005 and 2006): Beam trawl 11 trips; Otter trawl 7 trips; Gill net: 1 trip (therefore no length frequencies provided)

**Plaice:** The minimum landing length for North Sea plaice is 27cm, leading to a discarding of all smaller fish. The overlapping of the discard and landings curves can be explained by the inexact sorting of the fishermen.

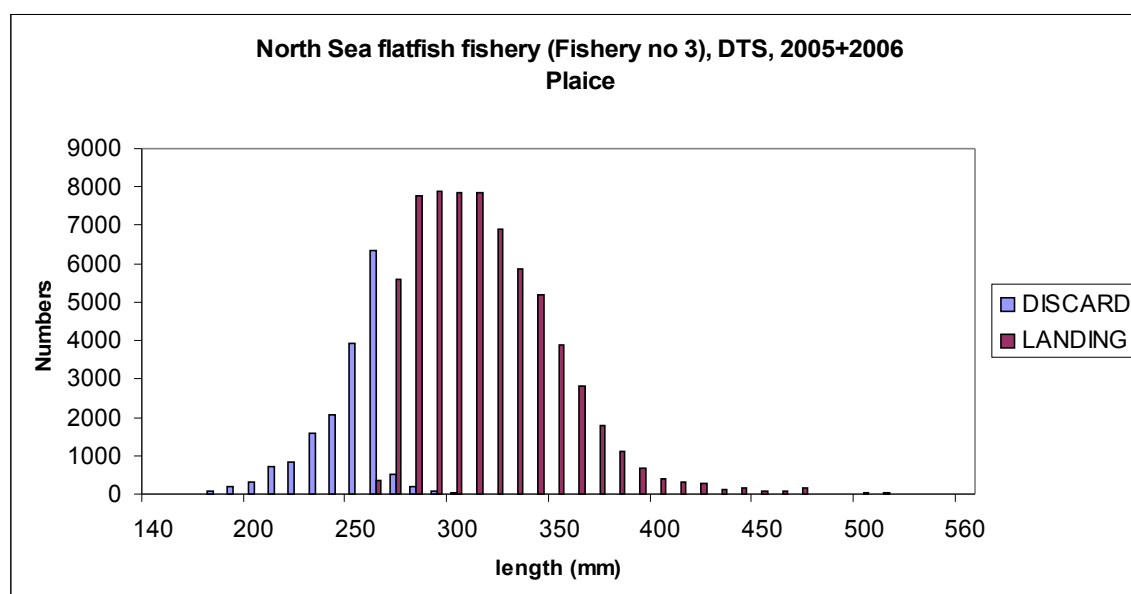
**Dab:** There is no minimum landings length for dab in place. The discarding practice can be explained by the low market value of dab. Only a few bigger individuals are landed.

**Sole in the beam trawl:** The minimum landing length for sole is 24cm, leading to a discarding of all smaller fish. Due to the high market value, the boundary between landings and discards is sharp.

**Whiting:** The minimum landing size for whiting is 27cm. The discarding practice is indistinct; some discarding of bigger fish as well as the retaining of smaller fish can be observed. This can only be explained by individual different behaviours of the fishermen.

**Cod:** The minimum landing size for cod is 35cm, leading to a discarding of all smaller fish. Due to the high market value, no overlapping of the landings and discards curves occurs.

#### 7.4.6. Denmark



**Figure 5.4.6.58 Length distribution of plaice landings and discards**

## **7.5. Summary of discard practices in fishery**

The member states that provided information on this fishery and the number of trips sampled by each were UK (73), France (42), The Netherlands (28), Belgium (unknown), Germany (27) and Denmark (15).

In the UK there are ~240 vessels using a variety of gears that catch flatfish species mostly as by-catch, however, a small number of beam trawlers working on the south coast and some static netters actually target flatfish for at least some part of the year. In France there are ~15 beam trawlers, ~200 demersal trawlers and 150 netters some of which target flatfish for some of the year. The Dutch fleet comprises of two components, beam trawlers <300 Hp and >300Hp. In 2006 there were 107 beam trawlers >300 Hp. The Dutch fleet targets flatfish all year round in particular plaice (PLE) and sole (SOL). In Germany there are seven beam trawlers >300Hp, and ~150 smaller beam and demersal trawlers which target flatfish (SOL, PLE). There is also a small fleet of four gill-netters targeting flatfish. There was no information provided on the Belgian or Danish fleets.

All countries sample all fish species caught by commercial vessels. The following information relates to fish species that are commonly caught and discarded by these fleets (see 8.3). PLE, DAB, WHG and SOL are frequently caught and discarded by vessels operating in this fishery. The range of mean discard rate by number by trip for drift netters was 29-63% for PLE (France and Germany), 61-100% for WHG (UK and Germany), 65-99% for DAB and 5-16% for SOL (UK, France and Germany). For the demersal trawlers, the range of mean discard rates (by trip and by number) for UK, France, Germany and Denmark was 13-61% for PLE, 36-75% for WHG and 65-94% for DAB. For beam trawlers mean discard rates ranged from 13-81% for PLE, 78-98% for WHG, 65-98% for DAB and 11-27% for SOL. The French sampled beam trawl vessels illustrated a different catch composition to other countries, although the number of sampled trips was low (n=4).

Length-frequency (LF) graphs of selected commercial species indicated some possible reasons for discarding (section 8.4). From LF graphs it was possible to determine the size at which discarding occurs but the reasons for discarding must still be inferred. If most discards occur at the minimum landing size (MLS) then it is likely that the MLS regulation is most influential for fishers in selecting which parts of the catch to retain. However, where the MLS and marketable size are the same, these effects cannot be separated. Similarly, when fish over the MLS are discarded, this may be because of a lack of quota or because the fish are below a marketable size that is above the MLS.

The drift nets demonstrate relatively good selection. Discards of PLE and SOL are low, which are generally discarded below the MLS. There are some discards of DAB in all sizes due to the absence of a consistent market for this species. For demersal trawlers, the selectivity of the trawls towards different species was highly variable. In the UK, vessels use nets that are relative selective towards HAD, POK and WHG. Larger numbers of fish under the MLS are caught for COD and PLE, which are discarded.

Large numbers of PLE below the MLS were caught and discarded by the vessels sampled by France and Germany but not by Denmark and UK. It is possible that these vessels were working with different mesh sizes or in areas with a different population structure of PLE. Large numbers of WHG and DAB above the MLS were discarded, this was considered to be due to the absence of a market for these fish. The strong influence on the strength of

recruitment and growth on discard rates was also demonstrated (8.4.2) whereby the presence of larger numbers of SOL below the MLS led to higher levels of discarding in 2005 than in 2006.

Overall it was considered that discard rates were high for species commonly caught in this fishery due to the combined effects of the MLS and the selectivity of the gear. It was suggested that some fishing gears were tuned to catch sole, which had low a discard rate, but this led to the retention of large quantities of unwanted catches of other species. For WHG and DAB there was evidence that discarding also resulted from the absence of a market for these fish.

## 8. FLATFISH FISHERIES IN THE BALTIC SEA (AREAS 21-29)

### 8.1. Description of the Fisheries

Only limited data were received for this ‘fishery’. It was noted by a number of participants and from email correspondence with national laboratories that the definition of ‘flatfish fisheries in the Baltic’ is not reflected in practice and that any data that could be provided would be from trips that would be atypical of actual fishing practice. Both Denmark and Sweden (by correspondence) noted that it was likely that any data received would be from either *Nephrops* or cod target fisheries which had incidentally caught more than 20% flatfish as a by-catch. It was therefore stressed to avoid drawing incorrect assumptions or conclusions about discarding patterns associated with DTS vessels operating in the Baltic that this data should not be over interpreted.

#### 8.1.1. Denmark

### 8.2. Overview of discard sampling methodologies

#### 8.2.1. See section 8.2.6

### 8.3. Discard rates by weight and number

#### 8.3.1. Denmark

Figure 6.3.1.59 DK 4 discard rates by weight (kg)

Species	Average discard rate	CV	Sum discard weight all trips	Sum landings weight all trips	%occur.	Pooled trip discard rate
DTS (n=61)						
FLE	31%	105%	11970	28596	98	30%
PLE	56%	58%	3341	2565	98	57%
COD	12%	164%	2862	30277	92	9%
DAB	NA	NA	2078	1275	69	62%
TUR	NA	NA	149	128	74	54%
PLA	NA	NA	97		25	100%
RJR	100%	0%	47		18	100%
WHG	NA	NA	20	48	43	29%
BLL	NA	NA	19	44	34	30%

SOL	NA	NA	0	114	23	0%
PTS (n=1)						
COD	5%	NA	146	2858	100	5%
FLE	24%	NA	218	697	100	24%
MAC	100%	NA	4		100	100%
WHG	100%	NA	2		100	100%

**Figure 6.3.1.60 DK 4 Discard rates by number**

Species	Average discard rate	CV	Sum discard number all trips	Sum landings number all trips	%occ.	Pooled trip discard rate
DTS (n=61)						
FLE	34%	91%	39578	86161	98	31%
DAB	70%	27%	22404	5597	69	80%
PLE	64%	43%	17658	8556	98	67%
COD	23%	106%	11675	33644	92	26%
PLA	100%	0%	983	0	25	100%
TUR	62%	59%	475	162	74	75%
WHG	83%	39%	260	63	43	80%
BLL	60%	64%	112	56	34	67%
RJR	100%	0%	72		18	100%
SOL	7%	374%	1	330	23	0%
PTS (n=1)						
COD	12%	NA	423	3124	100	12%
FLE	28%	NA	953	2423	100	28%
MAC	100%	NA	4		100	100%
WHG	100%	NA	4		100	100%

## 8.4. Length profiles of retained and discard commercial species

### 8.4.1. Denmark

## 8.5. Summary of discard practices in fishery

It was considered that due to the concerns highlighted in section 8.1 and the low level of coverage (data from only one member state). Its not possible to draw any firm conclusions from the data presented and to do so would likely result in improper inferences being made regarding discarding practices associated with demersal trawling activity in this area.

## 9. PELAGIC FISHERIES IN NE ATLANTIC NORTH (ICES AREAS V, VI, XII, XIV)

### 9.1. Description of the Fisheries

#### 9.1.1. Netherlands

The Dutch fleet of freezer trawlers fishing in the North East Atlantic targets pelagic species: herring (*Clupea harengus*), horse mackerel (*Trachurus trachurus*), mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*), greater argentine (*Argentina silus*) and pilchard (*Sardina pilchardus*). Herring has been a relatively constant part of the Dutch pelagic landings since 1990. In the early 1990s, the landings were dominated by horse mackerel whereas in the latter part of the 1990s an increase in blue whiting was observed. The fishing

areas differ by season and to a lesser extent by year. Differences are due to changes in the behaviour of the fish or to changes in the market situation. Since the fishing companies concentrate on different markets and have different quota shares, the fleet is usually spread over a number of different areas. The most important fishing grounds are situated on the continental slope west of the British Isles, in the Channel, along the British east coast and in the northern North Sea. The trawls used are big pelagic nets with a 40 mm mesh-size in the cod-end. Sonar is used to allocate shoals of fish, which makes this fishery very effective in targeting fish. Number of Dutch vessels in 2006 was 13.

Fishery:	Pelagic trawler
Mesh-size:	40 mm (cod-end)
Target species:	Herring, Horse mackerel, Blue whiting, Mackerel
HP:	3600 - 11000
Area:	II, IV, V, VI, VII, VIII

#### 9.1.2. *UK (Scotland)*

The Scottish pelagic fleet is as described in recent ICES reports (WGMHSA 2007; HAWG 2006, 2007). Pelagic species in ICES sub area VIa are exploited by the Scottish pelagic trawl fleet, operating singly or occasionally as a pair team, with refrigerated seawater tanks (RSW), and consisting of vessels greater than 40m in length. In Q3, these vessels target herring, mostly in the northern North Sea, but also in the northern part of VIa (N), depending on the distribution of herring. The same vessels fish for mackerel throughout sub-area VIa at the end of Q4 and throughout Q1. This fleet now operates almost exclusively with 45mm midwater trawls but many vessels could deploy purse seines.

Additionally, this fleet occasionally targets horse mackerel, blue whiting and argentines in VIa, as market conditions and fishing opportunities dictate. Vessels land their catches into ports in Scotland, Norway or continental Europe.

#### Discards

Information is collected by observers from Fisheries Research Services (FRS) on discards from the Scottish pelagic fleet operating in sub area VIa during Q3, when it is targeting herring, and Q1, when it is targeting mackerel. The impression of observers is that the main reason for discarding is when a mixed catch is obtained, e.g. herring through mackerel or mackerel through herring. The main discard practice is “slipping” where having made a catch, it is inspected and then let it go without being taken aboard. It is not possible to collect information on the composition or volume of slipped catches. There are occasional reports of “high grading”, although this practice is considered to be rare.

#### 9.1.3. *Germany*

Pelagic fishery in the NE Atlantic North in ICES Sub-areas V, VI, XII, and XIV (Category 5 of the discard call):

During 2004 to 2006, the fleet targeting pelagic fish species consisted of four freezer trawlers larger than 80m targeting small pelagic fish species and 3 factory trawlers with approx. 60m length targeting pelagic redfish.

The freezer trawler fleet mostly operates around the British Isles. During the first quarter, the vessels predominantly target mackerel in ICES Divisions IVa, VIa, VIIb, VIIj. The horse

mackerel directed fishery takes place in VIIh, VIIe, VIIa in the last quarter of the year. The fleet also participates in the North Sea and Atlanto-scandian Herring fishery in IVa,b, VIaN and II in the third quarter and in VIIh in winter. Some vessels also target blue whiting in V, VI, VII in the first and second quarter. Irregularly redfish, argentinies, sardines and anchovies are targeted as well. With the decrease in the North Sea herring fishery in 2006 the fleet is recently changing its behaviour.

The pelagic redfish fishery is starting in ICES division XIVb in April, fishing in depths of approx. 800m. In July, the fishery is migrating into NAFO areas (1F, 2H, 2J) targeting redfish in depths of approx. 250 to 400m.

#### 9.1.4. *Spain*

There is a Spanish pelagic fishery of oceanic redfish (*Sebastes mentella* Travin) in the North Atlantic (ICES Div. XII, XIV and NAFO Div. 1F, 2J). Spanish pelagic fishery of redfish in the ICES areas XII and XIV and in the NAFO Division 1F, 2J showed a significant seasonal pattern in terms of its geographical and depth distribution. The fishing season occurs mainly during the 2nd and 3rd quarter of every year. In the second quarter the fleet works in the area XIV, between the Greenland and Iceland EEZs, in depths greater than 500 meters. In third quarter the fleet moves toward the south west to the ICES Division XII and NAFO Division 1F and depth of hauls is less than 500 meters.

The Spanish fleet began to exploit this resource with in the second semester of 1995. In 2006, the fishery was conducted by 11 vessels. All are large freezers with less than 15 years old and with great freezing capacity and all vessels were equipped with Gloria-type pelagic trawls with a vertical opening of 90-120 meters and a mesh size of 100 mm. in the cod end.

Most of the effort is carried out in the XIV area and less in the XII one, but this is not distributed equally in the different quarters, the quarters with more percentage of effort are with difference the second and the third. In third quarter the fleet moves toward the southwest to the ICES Division XII and NAFO Division 1F.

The fishery in NAFO area 1F is quite similar to that one carry out in ICES Division XII, in particularly in the characteristics of the hauls (depth, duration, time, etc) and in the catches (distributions of sizes, sex ratios, etc), because this reasons, the presence of an unique population widely distributed in both fishery areas is suggested.

## 9.2. **Overview of discard sampling methodologies**

### 9.2.1. *Netherlands*

Species sampled: All species

Vessels type (length/gear) included in programme:

Pelagic freeze-trawlers - 40 mm mesh-size; 80-125m LOA

Level to which data are collected (Nantes matrix): level 5

How are vessels selected?

Selection of the vessels is quasi-random and based on co-operative sampling. This means that co-operation of a skipper with the project is on voluntarily basis. It is



difficult to predict the areas in which sampling will occur, since this depends on the fishing strategy of the skipper. However vessels from different regions are selected during a quarter to obtain widespread coverage.

Percentage observer coverage:

Pelagic freeze-trawlers

Year	% observer	Number of Trips
2004	3.92	153
2005	7.41	162
2006	8.05	149

There is no information on ‘slipped catches’.

### 9.2.2. UK (Scotland)

In pelagic fisheries in areas VIa, detailed data is collected by FRS on discards of herring and mackerel caught by the Scottish pelagic trawl fleet, and to a lesser extent on all other species caught by this fleet. This fishery is prosecuted exclusively by large pelagic trawlers (40m+), fishing for herring, mackerel, horse mackerel, blue whiting and argentine. Discard observers operate only on vessels targeting herring in Q3 and mackerel in Q1. Data are collected to level 5 of the Nantes métier matrix (small pelagic fish).

For each haul a sub-sample is obtained from the catch. For herring, two baskets are taken, and for mackerel, three or four baskets. Length frequencies are obtained for all species within a sample, and weights of any by-catch in a sample are also obtained if possible for raising to catch level. Otoliths are taken from herring and mackerel for aging purposes.

There is no information presented on ‘slipped catches’.

Percentage Coverage:

	Herring (Q3)			Mackerel (Q1 & Q4)		
	No. Trips	No. Sampled	% Coverage	No. Trips	No. Sampled	% Coverage
2004	50	-	-	247	4	1.6
2005	44	-	-	227	4	1.8
2006	34	4	11.8	87	7	4.6

Quantitative information on sampling:

Feature Sampled	Description
Area Sampled	VIa
Length Classes	VL40XX
Gear Type	PTS
Mesh Size	45mm

Species Targeted	HER, HOM, MAC, WHB
Species Landed	ARU, HER, HOM, MAC, WHB
Discard Information	HER, MAC

### 9.2.3. *German*

#### Pelagic fishery in the NE Atlantic North

Vessels included in the programme:

Pelagic freezer trawlers 86 to 125m, 40mm targeting mackerel, horse mackerel, herring, blue whiting depending on season

Factory vessels >60m, >100mm targeting pelagic redfish

Vessels excluded in the programme: none

Level to which data are collected (Nantes matrix): Level 5

How are vessels selected?

The present status of a sampler on board of a fishing vessel is still a guest status. The possibility for biological sampling depends on the hospitality of ship owners and companies and on a positive understanding towards the observers.

The pelagic trawler fleet consisted of 7 vessels (4 freezer trawler, 3 factory trawler), of which 4 to 5 vessels are observed on a regular basis.

% of observer coverage: approx. 30% of the pelagic fishery in the NE Atlantic North (by fishing hours).

#### Deficiencies

No information on slippage included in the discard data of the pelagic fisheries. Slippage is a discarding practice when the entire catch is released before it is being transported into the processing pond. This practice is believed to take place in the international pelagic fishery. The main reasons for slippage are quota limitations, illegal size and mixture with unmarketable bycatch. Quantifying such discards by observers is extremely difficult.

### 9.3. **Discard rates by weight and number**

#### 9.3.1. *Netherlands*

For pelagic fisheries in NE Atlantic North (ICES area V, VI, XII and XIV) (fishery number 5) the formal data request of the Commission was not considered representative for the pelagic fisheries of the Netherlands, Germany and Scotland.

Activities in areas XII and XIV are mainly pelagic redfish fisheries of Spain and Germany, with hardly any or no discarding. The divisions V and VI are only a small part of the fishing areas of the pelagic freezer trawler fleet of the Netherlands, Scotland and Germany. Due to the fact that only a few trips or just parts of trips are included in the dataset, discard data from these areas was deemed to be unrepresentative of these fisheries.

The fishing activities of these fisheries takes place on a much larger scale than described in the original call for data and is also focussed on seasonally target species. Division and selection based on ICES areas is, therefore, not an appropriate way to analyse these discard data, a better way to analyse the data, on trip level, is to based it on target species or the complete fishery on a yearly basis.

The discarding practice is mostly driven by the season (target species). The requested data/area is was probably only representative for blue whiting, since this is clearly the target species in this incomplete dataset. Total landings of the other species are low, which results in high discard rates. For a comprehensive analysis see: working document Dickey-Collas, M. & Van Helmond, A.T.M. and working document Ulleweit, J & Panten,K. of the Mackerel working group WGMHSA 2007 (ICES WGHMHSa report 2007; ICES CM 2007/ACFM: 31).

Consequently, the data presented in this report (Table 7.3.1.1), represents all the areas in which the there is fishing activity by this fleet and not the areas specified in the original call. All attendees of the meeting and EU Commission representatives agreed this action.

**Table 7.3.1.47 Discard rates (%) for all sampled trips for all species discarded by number (Pelagic freeze-trawlers - 40 mm mesh-size; 80-125m LOA; areas II, IV, V, VI, VII, VIII), weight in tonnes.**

	2004			2005			2006			2002-06		
	Landings	Discards	Discard rate %	Landings	Discards	Discard rate %	Landings	Discards	Discard rate %	Landings	Discards	Discard rate %
Blue whiting	4054	154	4%	7306	292	4%	12571	283	2%	23931	729	3%
Herring	5704	184	3%	12510	321	3%	7881	270	3%	26095	775	3%
Horse mackerel	2765	87	3%	5506	118	2%	6139	100	2%	14410	305	2%
Mackerel	1227	315	20%	1197	1495	56%	4855	1201	20%	7279	3010	29%
Pilchard	58	52	47%	33	28	46%	0	79	100%	91	159	64%
Greater argentine	29	20	40%	969	0	0%	176	18	9%	1174	38	3%
Total	13836	811	6%	27527	2418	8%	31633	2052	6%	72997	5281	7%

### 9.3.2. UK (Scotland)

**Table 7.3.2.48 Discard rates (%) for all sampled trips (n=15) for all sampled species discarded by weight, for Scottish Pelagic fisheries in ICES Areas V, VI, XII & XIV, weight in kg.**

Species	Gear type	Mean Discard weight	Mean Landings weight	Mean discard rate
MAC	PTS	38340	448800	8%
HER	PTS	26635	338938	7%

**Table 7.3.2.49 Discard rates (%) for all sampled trips for all sampled species discarded by number, for Scottish Pelagic fisheries in ICES Areas V, VI, XII & XIV.**

Species	Gear type	Mean Discard weight	Mean Landings weight	Mean discard rate
MAC	PTS	134338	1283271	9%
HER	PTS	139014	1616523	8%

Data not available for 2004

CV not available due to quarterly aggregation

### 9.3.3. Germany

The data presented in this report, represents all the areas in which there is fishing activity by the German pelagic fleet and not the areas specified in the original call (see Netherlands 'Discards rates by weight and number' 10.3.1).

**Table 7.3.3.50 Discard rates (%) for all sampled trips (n=19) for all sampled species discarded by weight, for pelagic fisheries directed on mackerel, horse mackerel, herring and blue whiting in II, IV, V, VI, VII and VIII (2004-06), weight in tonnes.**

Species	Gear	Overall Discard weight	Overall Landings weight	Overall Discard rate
Herring	PTS	689	17266	4%
Mackerel	PTS	443	6729	6%
Horse mackerel	PTS	109	4651	2%
Blue whiting	PTS	94	5737	2%
Other	PTS	41	0	100%
Pilchard	PTS	37	11	77%
Greater argentine	PTS	2	133	2%

Overall 25 trips were sampled in the pelagic fishery within the selected category for pelagic fisheries in NE Atlantic North (ICES area V, VI, XII and XIV).

19 trips directed on mackerel, horse mackerel, herring and blue whiting in II, IV, V, VI, VII and VIII were evaluated, the mean discard rate by weight was 3.9% (all trips, species and years combined). No calculations on discard ranges and discard rates by numbers were carried out. The most discarded species is herring with overall 689t (all three years combined leading to a 4% discard rate), followed by mackerel with overall 443t (6% discard rate) and horse mackerel with 109t (2% discard rate).

A further six trips on pelagic redfish in XII and XIV were evaluated. With landings of 3169 tonnes and an observed discard of only 25kg, the discard rate is 0.

#### 9.3.4. Spain

Discard of *Sebastes mentella* are (Table 7.3.4.1) composed often of parasite fish by *Sphyrion lumpi*. The discards quantities vary annually, existing years in those that practically anything is not discarded and other where the discards it can represent 6% of total catches (2003). This variability can also be observed by Division; in 2004 the discarded percentage is much larger in the Divisions XII, 1F and 2J.

In Division XIV, this variability can be due to that the percentage of discards does not depend directly on parasite fish by *Sphyrion lumpi*, but it is related with the haul catch. When the haul catch is very much the fish is discarded under worse conditions by the lack of time to elaborate the whole catch. When the catches are between the standard values there is enough time to elaborate the whole fish, even the one infected, and there is not discards. In Divisions XII, 1F and 2J the discards rates are more related with parasite fish.

	XIV	XII	1F	2J	Total
<b>2000</b>	0,03%	0,00%	0,00%		0,03%
<b>2001</b>	0,00%	1,14%	0,00%	0,00%	0,33%
<b>2002</b>	0,23%	0,00%			0,22%
<b>2003</b>	6,39%				6,39%
<b>2004</b>	0,25%	10,38%	8,29%	7,75%	1,36%
<b>2005</b>	0.00%	0.81%	0.83%		0.22%
<b>2006</b>	0.00%				0.00%

**Table 7.3.4.51 Redfish discards percentage of the total catches of the Spanish fleet by year and Division (2000-2006)**

#### 9.4. Length profiles of retained and discard commercial species

No length data for this fishery was presented to the sub-group.

#### 9.4.1. *Netherlands*

#### 9.4.2. *UK (Scotland)*

#### 9.4.3. *Germany*

### 9.5. **Summary of discard practices in fishery**

The Member States of Germany, The Netherlands and UK (Scotland) provided data for this fishery by. The data relate to the samples taken on DE and NL pelagic vessels working in all areas in which the fishery operates. There are 13 freezer trawlers in the Dutch fleet, and 4 freezer trawlers and 3 factory vessels in the German fleet. There are 26 RSW equipped pelagic trawlers in the Scottish fleet. The target species are HER, MAC, HOM and WHB (the German factory vessels target Redfish). Discard rates were low for all fleets and vary between 2-4% for WHB, 2-3% for HOM, 4-8% for HER and 6-20% for MAC. There was no data available on the discarding practice of slipping, which was considered to account for the majority of discarding.

In pelagic fisheries discarding occurs in a sporadic way compared to demersal fisheries. This is because the nature of pelagic fishing is to pursue schooling fish, creating hauls with low diversity of species and sizes and consequently often extreme fluctuation in discard rates (100% or null discards). Extreme discards occur especially during 'slippage' events, when the entire catch is released. Main reasons for 'slipping' are daily or total quota limitations, illegal size and mixture with unmarketable bycatch. Quantifying such discards at a population level is extremely difficult as they vary considerably between years, seasons, species targeted and geographical region. Discard estimates of pelagic species from pelagic fisheries and demersal fisheries have been published by several authors. Discard percentages of pelagic species from demersal fisheries were estimated between 3% to 7% (Borges et al., 2005) of the total catch in weight, while from pelagic fisheries were estimated between 3% to 17% (Pierce et al. 2002; Hofstede and Dickey-Collas 2006, Dickey-Collas and van Helmond 2007, Ulleweit & Panten 2007).

## 10. **CRUSTACEAN FISHERIES IN THE BAY OF BISCAY AND OFF THE IBERIAN PENINSULA (ICES DIVISIONS IXA AND VIII ABCD)**

### 10.1. **Description of the Fisheries**

#### 10.1.1. *France*

*Nephrops* in Bay of Biscay is exploited almost exclusively by one single métier of French trawlers. The general features of the *Nephrops* fishery in the Bay of Biscay, as described in several ICES report (WGHMM, 2006, 2007). This fleet generates an average annual turnover close to 80 million euro. *Nephrops* landings correspond to 40% of this turnover (32 million euro in 2005), but this amount varies strongly from one unit to another. The proportion of the turnover involving *Nephrops* is even higher in the northern part of the fishery (southern Brittany) while vessels of regions outside Brittany are more multi-purpose and target alternatively *Nephrops* (around dawn and dusk) and finfish during the same trip. Two thirds of the *Nephrops* trawlers (151 vessels) are concentrated in southern Brittany. The total amount of vessels operating

on Nephrops in area VIIIa,b is around 200 vessels . There is a national license in this fishery.

The intensity of *Nephrops* directed fishing varies during the year according to the seasonal variations of the accessibility of targeted species which is higher in spring and summer: more than 70% of the total landings of *Nephrops* (average of 1987-2006) take place during the 2nd and 3rd quarters. Also, very low quantities are landed in January even if the contribution of winter months has increased in recent years.

A mesh size of 70 mm is fixed by EC regulation. And a 100 mm mesh size is required in the *Hake* box. Since 2006, it should be noted that *Nephrops* trawlers are allowed to fish in the hake box with the current mesh size of 70 mm once they have adopted a square mesh panel of 100 mm. Several tests on gear modifications have been done to improve gear selectivity by using grids and square mesh panel (ASGG project & Necessity project).

This *Nephrops* fishery is a trawl fishery and *Nephrops* are sold alive on the market. Landings were estimated for the years 2004, 2005 and 2006 respectively to 3285, 3689 and 3430 tonnes (Fifas, 2007) .

### **Discards in earlier studies**

Discards are known to be high in the *Nephrops* trawl fishery. Around of 50 % of the catch weight is discarded. The main problem of discards in this fishery is due to juveniles of the target species and also to some juveniles of hake as the *Nephrops* grounds are also a hake nursery area. The main discarded fish species are however horsemackerel and blue whiting. Discards of *Nephrops* represent most of the catches of the smallest individuals as indicated by the available data (ICES/WHMM 2007). The average weight of discards per year in the period 1987-2006 (with derivation biases already stated by ICES/WGHMM 2006) is about 1660 t whereas discard estimates of the recent sampled years (2003-2006) reached a higher level of 2850 t. This change in the amount of discards could be the consequence of the restriction of individual quotas, the strength of the recent recruitments, the change in the MLS (which tends to increase the discards), although the change in the selectivity should tend to reduce the discards. The relative contribution of each of these three factors remains unknown.

For the years 2004-2006, the *Nephrops* discards were estimated to 220-480 millions of individuals which represents more than 60 % of the catch in number (Fifas, 2007). A correlation exists for *Nephrops* between discards and landings. The survival rate of *Nephrops* discards used by ICES is 30 %, value which was established in the Bay of Biscay and Celtic Sea by Morizur *et al.* (1982) . The survival rate of *Nephrops* escaping through meshes was also established to 70 % by the same authors.

Several tests on gear modifications have been done through ASGG project & Necessity project to improve gear selectivity by using grids and square mesh panel (Morandeau *et al.*, 2006).

The flexible grid with a 13 mm bar spacing proves to be a solution to improve *Nephrops* selectivity, but not hake or fish discards selectivity in the conditions of the trials. In any case, the combination of a grid and a square mesh panel on the top of the



baitings is efficient to reduce undersize commercial individuals (Nephrops and hake) and discards (mainly horse mackerel and blue whiting), if we consider the results achieved with square mesh panel as part of the ASCGG programme.

Considering the results obtained with side escape square mesh panels, it is presumable that the square mesh panel effect may be improved by extending it to the top of the extension, in order to avoid Nephrops losses on the sides and to increase fish selection. In this case, a good prospect would be to combine the extended square mesh panel on the top of the extension (in addition to the existing one on the top of the baitings) with a Nephrops grid as described on the following schemes.

### **Regulation**

TAC set every year; national Licences with a limitation number of vessels fixed each year (250 vessels in year 2006); mesh size for trawls= 70mm (100mm in the hake box); MLS = 70 mm LT (20 mm CL) ; MMS = 90mm set by producers organization since end 2005 ; previous MMS = 85 mm).

According to a recent French regulation (24 January 2007; JO 26/01/2007, text 41) any increase of MLS for TAC species or/and species concerned with an European MLS can only be taken by the ministry.

#### *10.1.2. Portugal*

No participant from Portugal present.

### **10.2. Overview of discard sampling methodologies**

#### *10.2.1. France*

Since 2003, discards have been estimated from French sampling catches programme on board Nephrops trawlers. The sampling scheme is 36 trips/year for costal activity (VIIIa,b) and 8-12 trips/year for offshore activity (Celtic sea). In WGHMM reports, discards for sampled fishing trips are raised to the fleet level by multiplying the total number of fishing trips. This total number of trips is usually not known and needs to be estimated, which can be done using the number of auction hall sales, when boats conduct daily trips, which is the case in the northern part of the fishery, but not in the southern one. Discard sampling from the southern part of the fishery started in 2005 and should improve accuracy of estimators in the future. Nevertheless, the sampling level remains low and at present, the data cannot be used this year by WG.

So in the series of discards data provided for this SGMOS meeting the sampling scheme applied in 2004 was different from those used in 2005-2006.

#### *10.2.2. Portugal*

No participant from Portugal present

### **10.3. Discard rates by weight and number**

#### *10.3.1. France*

**Table 8.3.1.52 Breakdown of sampling trips by France (no data provided by other member states)**

Country	Gear type	Mesh size	Vessel length	Number of Trips
France	DTS	-	VL1224	6
France	DTS	70-79	VL0012	8
France	DTS	70-79	VL1224	96
France	DTS	80-89	VL0012	1
France	DTS	80-89	VL1224	7
France	DTS	90-99	VL0012	1
France	DTS	90-99	VL1224	2
France total				121

**Table 8.3.1.53 Total discard rates by weight (aggregated species) presented by France**

Gear type	Mesh size	Number trips	Total Discard (kg)	Total Landings (kg)	Mean discard rate	Discard rate CV
DTS	<80	104	43144	32018	56%	25%
DTS	80-89	8	1961	2131	48%	29%
DTS	>90	3	829	630	57%	15%
DTS	all	115	45934	34780	55%	25%

**Table 8.3.1.54 Total discard rates by number (aggregated species) presented by France**

Gear type	Mesh size	Number trips	Total Discard No.	Total Landings No.	Mean discard rate	Discard rate CV
DTS	<80	104	2456256	807421	72%	18%
DTS	80-89	8	114543	42138	72%	10%
DTS	>90	3	60451	22372	73%	8%
DTS	all	115	2631250	871931	72%	17%

**Table 8.3.1.55 Discard rates (%) for all sampled trips for top ten species discarded by weight, split by gear type**

Species	Gear type	Mean Discard Rate	CV	Discard Weight	landed Weight	% Occur. rate	Pooled discard
NEP	DTS	42%	42%	14083	17534	100	45%
HKE	DTS	64%	37%	9141	3392	100	73%
HOM	DTS	89%	31%	4558	1209	78	79%
WHB	DTS	100%	0%	4540	0	86	100%
POD	DTS	100%	2%	3733	18	98	100%
LOQ	DTS	95%	16%	3028	675	100	82%
LYY	DTS	100%	3%	1496	2	160	100%
ARY	DTS	100%	0%	1024	0	77	100%
SYC	DTS	36%	100%	884	2377	92	27%
BIB	DTS	34%	107%	846	814	91	51%

**Table 8.3.1.56 Discard rates (%) for all sampled trips for top ten species discarded by number, split by gear type**

Species	Gear type	Mean Discard Rate	CV	Discard Number	Landed Number	% Occur.	Pooled Discard rate discard
NEP	DTS	61%	29%	1715735	829867	100	67%
LOQ	DTS	96%	11%	345659	33387	100	91%
HKE	DTS	89%	17%	223355	12440	100	95%
POD	DTS	100%	0%	133292	47	98	100%
WHB	DTS	100%	0%	61050	0	86	100%
LYY	DTS	100%	4%	50093	128	100	100%
ARY	DTS	100%	0%	42573	0	77	100%
HOM	DTS	92%	25%	41422	5062	78	89%
LEF	DTS	100%	0%	16408	0	26	100%
FGX	DTS	100%	0%	13996	0	55	100%

### 10.3.2. Portugal

Due to database problems no Portuguese data is presented

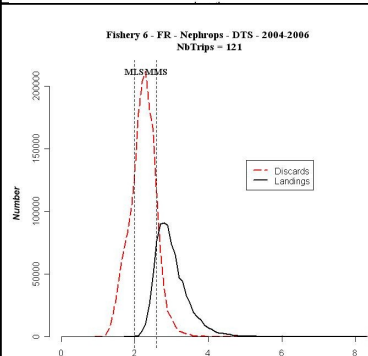
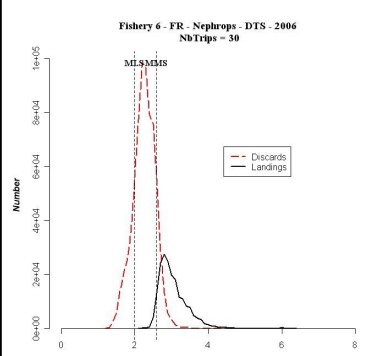
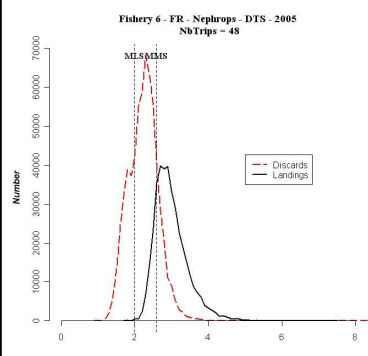
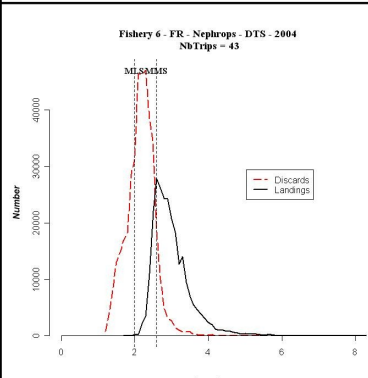
## 10.4. Length profiles of retained and discard commercial species

### 10.4.1. France

**Figure 8.4.1.61 Length distributions of Nephrops and hake by landing and discards**

Fishery n° 6 - France	Fishery n° 6 - France
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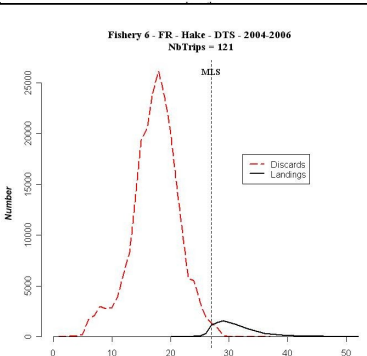
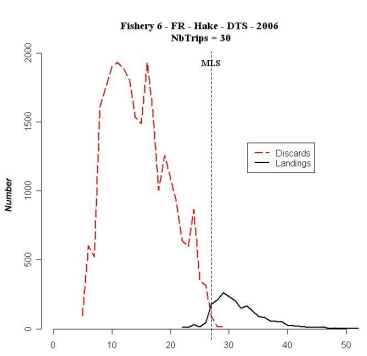
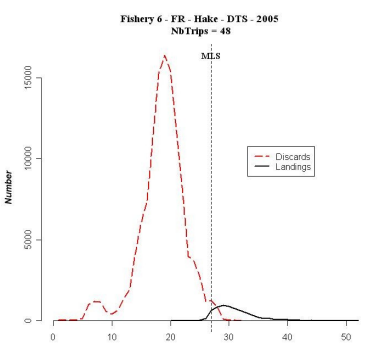
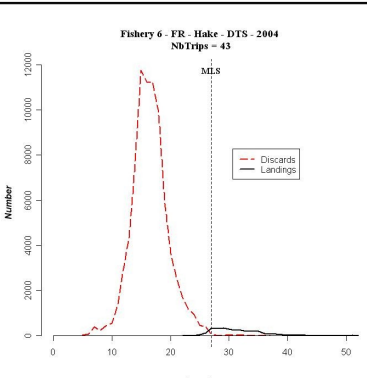
Nephrops



**Selection criteria :** Nephrops is the target species.

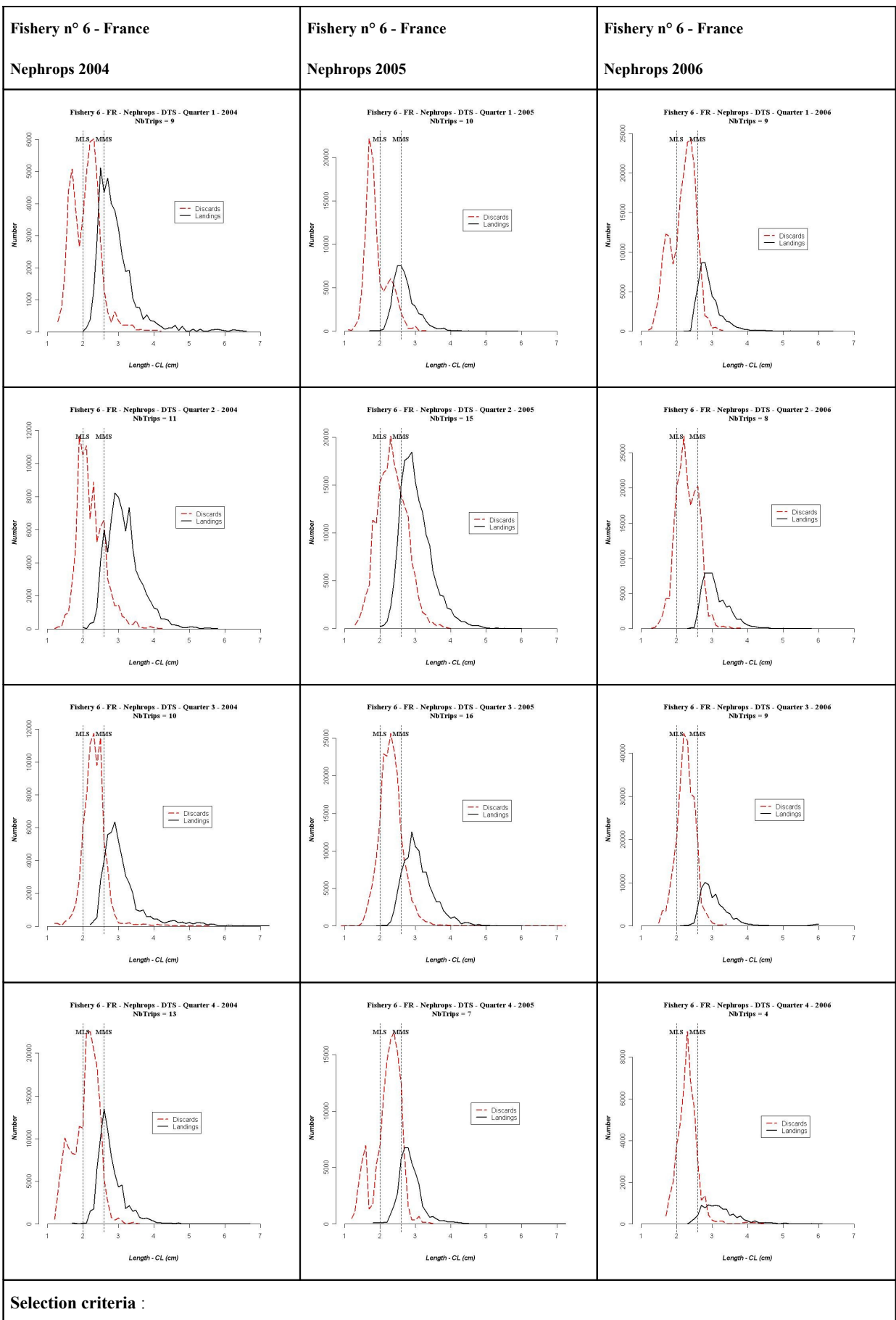
**Interpretation :** Important discards. The greatest part of the discards is inside the MLS-MMS range. No strong difference between quarters. Recruitment effect on discards in quarter 2.

Hake



**Selection criteria :** a finfish species highly concerned with that crustacean fishery.

**Interpretation :** Very high discard rate due to the presence of juvenile hakes. The feature of a hake nursery area overlapping with a Nephrops area.



**Interpretation :** Discards are due to the poor selectivity of trawls for a crustacean species. High quantities in numbers for length between MLS and MMS are discarded. Sorting is changing with the season and some individuals greater than MMS are discarded in quarter 2.

**Figure 8.4.1.62 Length distribution of Nephrops landings and discards by quarter and by year**

#### 10.4.2. Portugal

Due to database problems, no Portuguese data are presented.

### 10.5. Summary of discard practices in fishery

France and Portugal provided data for this fishery. Only data from France are presented. The French data relate to the Nephrops fishery in the Bay of Biscay, which consists of one métier. Discards in this fishery are predominantly made up of NEP, WHB, HKE, HOM and POD. Mean discard rates by number by trip are 100% for POD and WHB, 92% for HOM, 89% for HKE and 61% for NEP. The overall discard rate by number for the vessels sampled in this fishery was 72%.

The length frequency data provide an indication for the reasons for discarding. For Nephrops discarding occurs below the marketable size, there is no discernable difference between quarters, but there is an indication of a recruitment effect on discards, whereby discarding is higher with higher recruitment (11.4.1). Hake discards are at a high level due to the retention by the trawls of large number of juvenile hake below the MLS. This is a feature of a hake nursery area overlapping with a Nephrops fishing area.

#### 11. DEFINE A METHODOLOGY TO CALCULATE "MAXIMUM ACCEPTABLE LEVELS OF UNWANTED CATCH", IDENTIFY SUCH LEVELS FOR THE FISHERIES / MÉTIERS AND PROPOSE A TIMEFRAME TO ACHIEVE THESE (ToR I.C.).

The group did not see themselves able to progress on this item because it first of all is recognized as apolitical question and secondly because the time did not allow a suitable thorough discussion.

#### 12. PROVIDE QUANTITATIVE INFORMATION ON DISCARD RATES AND UNWANTED CATCH OF INVOLVED 3<sup>RD</sup> COUNTRY FLEETS (ToR I.D.)

No 3<sup>rd</sup> country data were available at the meeting, but it was mentioned that Turkey together with Morocco and Russia have sampling schemes which are likely to be able to provide information about discard, discard rates and other relevant information.

#### 13. PROVIDE INFORMATION ON HOW TO REDUCE THE UNWANTED CATCHES AND DISCARD RATES IN THE FISHERIES / MÉTIERS LISTED AND IDENTIFY MONITORING NEEDS AND RESEARCH REQUIREMENTS (ToR I.F.)

Searching for solutions, it is important to realize the differences between different areas. The size distribution of species caught in each fishery in the NS and in the Mediterranean is very different. In the North Sea the size distribution of the species in most fisheries is much more homogeneous than what is the case in the Mediterranean where a fishery generally is targeting a mixture of species having very different

optimal length for harvesting. This means that where a increase in mesh size will solve much of the problem of discard of under sized fish in the NS this is not a usable solution in the Mediterranean because this would prevent the fishermen to catch valuable species which optimally is caught in a much smaller size or they simply do not grow to a size where they can be retained by the net.

There are a number of gear-based measures that have been developed to reduce the capture of unwanted fish, many of which as part of EU funded projects (e.g. DEGREE, NECESSITY, RECOVERY). A review of Working Group for Fishing Technology and Fish behaviour (WGFTFB) and relevant EU project documents was considered necessary to ascertain more detailed information on gear-based. The WGFTFB recommends that the protocol used to evaluate the efficacy of technical measures in the Crangon fishery, developed by Cefas, be considered as a template/guidance with respect to conducting similar evaluations in other fisheries. A summary of this method was presented and an abstract is given in appendix?

## **14. ECONOMIC INFORMATION (ToR II)**

### **14.1. The economics of discarding**

The economics of discarding has been reviewed in the fisheries literature, an example being Pascoe (1997). This brief summarises issues raised by Pascoe 1997. Fishermen are rational economic actors (under the assumption that they maximise profits) and they fish on a “portfolio of species” in that their gear is not fully selective. There is a realisation that rationale economic actors will be faced with decisions as to which fish to land, in terms of: size, market demand and regulations. In mixed fisheries the ability to target with a multi-species fishery is limited since fishers with over-quota species will either have to discard or land it illegally. They thus fish subject to the following constraints:

- Quota restrictions (by-catch restrictions) in fisheries with TAC
- Mesh restrictions (and choice of exact characteristics of gear)
- Size limits (market and/or biological)
- Legislation to report landed catch (not estimates of discards)
- Hold capacity
- Weather and stock density (affecting catch rates)
- Size of their the fishing operation

There are costs associated with discarding, either costs associated with forgone income or externalities in that discarding in one fleet will have an impact on another (thus a fishers optimal discards may not equal the socially optimal discards). Some discarding may be socially optimal (see for example Arnason, 1994; 1996). There are cases where management strategies may in fact increase discarding, for example, a minimum landing size restriction (based on biological studies) may increase discarding depending on the selectivity of the gear. To complement this, there are various approaches to decreasing discarding, such as:

- Technical measures (but can lead to reductions in revenue)
- Administrative (limited application – ban discards)

- Economic (implement programs to potentially reduce discarding – ITQs)

### ***Models of discarding***

#### *Price related:*

These models are based on assumptions that the fishery is unregulated; thus discarding is mostly a function of price. Arnason (1994; 1996) was able to specify a *discard function* related to grade of fish of several forms. The *discard function* is a function of the cost of landing, the cost of discarding and the prices of the different grades. The analysis can be expanded to include the selectivity of the gear and the choice of gear by the fishermen. That is, they discard more fish if the cost of discarding is less than the cost of changing the gear.

#### *Capacity related:*

Capacity constrained discard models make the assumption that capacity is limited in that hold size places a constraint on amount that can be retained (e.g. Anderson, 1994). In this case the amount discarded is a function of the price difference between species (because the shadow value of discarding one species is related to the net benefits of landing only the high value species). That is, if discarding occurs the benefits are reduced as they need to fish longer to acquire more fish (with greater costs), as well as the costs associated with discarding. The actual amount discarded in this situation varies trip-by-trip as it depends on the catch rates and the exact composition of each haul.

#### *Effort related:*

Vestergaard (1996) presents a discard model based on the premise that there are *days-at-sea* restrictions. The lower value species are discarded when the costs of discarding (which includes cost to dispose, cost to catch more and time lost) is less than the net price difference between the species as they have to land to maximise the value of their catch for the trip (which is limited). There are two impacts: first, this may reduce discards in the short-run as overall effort as been reduced; and second it may reduce high-grading as there is a restriction on their time and their opportunity cost of time has increased.

#### *Output related:*

Three scenarios can be considered in terms of discard models of fisheries that are restricted in terms of their outputs:

1. TRIP LIMITS (on output): There will be an increase in discards if species overlap and there is a restriction on one or both species (Sampson, 1994).
2. INDIVIDUAL QUOTA (IQs): The prediction as to the effects of IQs is variable as it depends on the time in the season and how the IQs are administrated:
  - at the beginning of the season, the situation approximates an unregulated fishery (see Arnason, 1994; 1996)



- at the end of the season, IQs for species that have been reached approximate the prediction made by discard models of trip limits (no more quota).

3. INDIVIDUAL TRANSFERABLE QUOTAS (ITQs): in ITQ regulated fisheries, discard models predict that fishermen will discard if the price of quota is greater than the net price received (plus the cost of discarding which includes the opportunity cost of discarding and the cost of discarding). High-grading could be factor which decreases or increases depending in the choice of gear and the costs associated with modification to gear (as well as the price of quota) (see Vestergaard, 1996; Arnason, 1996).

## References

- Anderson, L.G. 1994. An economic analysis of highgrading in ITQ fisheries regulation programs. *Marine Resource Economics* 9(3): 209-226.
- Arnason, R. 1994. On Catch Discarding in Fisheries. *Marine Resource Economics* 9: 189-207.
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- Pascoe, S. 1997. Bycatch management and the economics of discarding. FAO Fisheries Technical Paper. No. 370. Rome, FAO. 1997. 137p
- Sampson, D.B. 1994. Fishing Tactics in a Two-Species Fisheries Model: The Bio-economics of By-catch and Discarding. *Can. J. Fish. Aquat. Sci.* 51: 2688-2694.
- Vestergaard, N. 1996. Discard behaviour, highgrading and regulation: the case of the Greenland shrimp fishery. *Marine Resource Economics* 11(4): 247-266.

## 14.2. General Comments on economic support for meeting

The new STECF economic subgroup agreed on a new procedure for subgroup meetings in the winter plenary in November 2007. Every meeting will be covered at least by one economist from the STECF to follow the work and to make sure that economic questions will be integrated in the work. The plan for this subgroup meeting was to integrate economic information's on the six specific fisheries in the analysis and to provide ideas how to proceed in future impact assessments of specific measures to reduce discards. Unfortunately, economic experts familiar with the data collection and experts on the specific fisheries haven't attended the meeting. Only an economist from the STECF was able to attend two days, but without specific knowledge of the data availability and the data on the specific fisheries covered in this meeting. There should be further work on the economic part after it is

clear which specific biological information's on the six fisheries are available and to combine them with economic information's available for these fisheries.

- a) Provide information, for each fishery / métier, regarding fishing costs and first sale prices of the main species caught or discarded, if possible by grades, for the years 2004-2006.

MS provided information on the discard species, the discard weight, landings weight of the discard species (if parts of the catch were landed) and landings value on a trip level as requested by the DCR. With the landings weight and the landings value a calculation of first sales prices is possible. This information is necessary to calculate the upper level of the economic losses from discarding on this specific trip. The discards are often the undersized individuals with a usually lower price on the market (if there is a market) than the sellable catch. Therefore the same amount of sellable catch would be normally of higher value. The following example illustrates possible results from these kinds of calculations. German data on the flatfish fishery on plaice in the North Sea is used to compare six trips between 2004 and 2006.

Table II.1: Discard value for six trips of German vessels targeting plaice in the North Sea

Year/Month	Mesh Size (beam trawl)	Discard weight in kg	Landings weight in kg (Discard species)	Landings value in €	Discard value in €
2005/05	80 mm	4894.3	5749.5	10907.38	9300
2005/06	100 mm	1830.2	3154.5	6521.30	3800
2006/06	80 mm	1547.6	6345.1	13126.74	3200
2006/06	80 mm	1512.5	3095.1	6541.80	3190
2006/06	80 mm	2583.0	6547.7	12115.86	4779
2006/11	80 mm	2283.5	999.4	2145.71	4910

The real losses for fishermen are with the foregone future income from discarding undersized fish. So the real discard value is higher than the rough estimate here suggests.

In the case of a similarity between target and discard species the data provided allow the calculation of sales prices for the target species.

Table II.2: Possibility to calculate first sale prices with available landings data

Discard species	Landings weight	Landings value	Discard value	First sale prices
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	(Discard species)	(Discard species)		
Plaice	999.4 kg	2145.71 €	4.910 €	2,15 €

If there is no market for undersized fish and in case of a discard ban, the fish can only be sold for a very low price (for fishmeal production). This leads to an increase in effort related, variable costs because of the space necessary to store the bycatch and the price difference to the marketable part of the catch. If it is possible to sell the undersized fish on the regular market it may influence the first sales prices because of increased supply.

A further detailed investigation is only possible for the next meeting with more detailed information's on the six fisheries. Average fishing costs for some of the fleet segments may be available via the AERs for the years 2004 to 2006 but it was not possible to evaluate this during the meeting.

- b) Provide information on the relation between first sale prices and discards and between first sale prices for substitute products (fish or other) and the volume of discards.

There was no data available during the meeting to allow for a real investigation in this area. Nevertheless, it is possible to provide some general thoughts on these issues discussed in the literature (e.g. Arnason 1994, Pascoe 1997). In many cases there are price differences for different sizes of fish. For fishermen it is some kind of cost-benefit analysis to keep a smaller sized fish on board or discard it for a larger fish. If it is more beneficial to go for larger individuals fishermen will discard the smaller ones above minimum landings size and normally sellable. Usually the larger individuals results in higher revenue because of higher prices but also because of more kg per storage volume. Additional costs to fish on for larger individuals are a disincentive to highgrade. But in many cases costs are covered especially in mixed fisheries because of other target species. Therefore price differences are usually leading to an incentive for discarding (in further catches of other target species are bycatch of larger individuals of the non-target/discard species).

A second incentive for highgrading in mixed fisheries is price difference between species. If in a mixed fishery on two species one is much more valuable than the other fishermen discard the lower valued species to have more storage space for the higher valued. They will also discard non-commercial species because of a negative revenue in case of landing (work, storage blocked for commercial species, low prices if landed (only usable for fish meal) etc.).

- c) Identify questions and tasks to be addressed in Impact assessments (biological, economic and social impacts) on the subsequent legislative proposals.

## Economics

From a general point of view we can separate two areas to deal with in impact assessments or in the debate on a different discard policy: There are direct costs of measures for the fishing company's to avoid discards and there are market or non-market values related to discards.

### *Costs for companies*

The two cost categories, fixed and variable, will be affected differently in case of measures to reduce discard as far as a complete discard ban. These measures will have no direct influence on the fixed costs which have to be covered in any case (interest, capital costs etc.). This is only different where a change in fishing methods is requested which makes it necessary to investment in new vessels or long-living equipment (like new devices on board for longlines instead of bottom trawls).

The effort related costs may change significantly by introducing certain measures. To illustrate possible data requirements to calculate possible costs changes Table II.3 below, from the Communication on Discards (EU-Commission 2007) is expanded by adding categories from the AER and DCR to be possibly looked at in impact assessments.

Table II.3: Examples for categories from the AER for IAs in case of introduction of measures

Effects/Options	Adapt current CFP plus suppl. measures	Discard ban as a stand alone measure	Discard ban plus supplementary measures	Possible affected accounting categories covered in the AER
Economic impacts	Loss of future yield as resources wasted and thus lower income to fishermen  (...)	Significant cost increases for fishermen in the short term  (...)	Short term costs increases less significant due to by-catch reducing measures  (...)	Short term  Revenues /income (storage of bycatch, catch composition)  Fuel costs (leaving fishing grounds, closed areas etc.)  Crew Share (change in catch composition, value of landings)  Long term  Revenues/income (positive effects on stocks, other fisheries)  Fuel costs (adaptation to measures, change of fishing grounds)

One reasonable approach is to set a specific target for the reduction of discards (e.g. from 20% to 5%) and leave it to the industry what measures they want to introduce to reach the goal. But beforehand it might be useful to give the industry an idea about the possible outcome of measures by providing information's on possible impacts on the fleet from certain measures. The economic calculations may be conducted with an analysis of different scenarios (realtime closures, improvement of gear selectivity, closed seasons, change the

minimum landings sizes, incentives to land discards, discard ban etc.). Afterwards there may be a cost-effective way to reach the goal with one or a mix of few measures.

#### *Costs for society*

There are some other concerns in case of high bycatch and discard rates when it comes to non-commercial species. For fishermen they will have a very low value if they have to land them (only usable for fish meal). But there may be some non-market values. In case of eco-labelling the reduction of bycatch is one important category in the assessment. Consumers are willing to pay more for the certified fish to avoid certain external effect of fishing on the ecosystem. In agriculture it is usual to pay farmers to provide ecological services in agri-environmental schemes (species protection, reduce loads of nutrients in streams etc.). It is more complicated in fisheries because of a lack of clear property rights for the fishing sector. Nevertheless possible compensation programs for the fishing sector in case of an introduction of measures may be evaluated to set positive incentives for the fishing sector in the future.

#### References

Arnason, R. 1994. On catch discarding in fisheries. *Marine Resource Economics* 9 (3): 189 – 207.

EU-Commission 2007. Communication from the Commission to the Council and European parliament. A policy to reduce unwanted by-catches and eliminate discards in European fisheries. SEC (2007) 380, Brussels.

Pascoe, S. 1997. Bycatch management and the economics of discarding. *FAO Technical Paper* 370. Rome: FAO.

## **15. GENERAL COMMENTS AND CONCLUSIONS**

Some of the fisheries identified in the call (fishery 1, 4, 5 & 6) are not consistent with the Nantes matrix and do not represent any ‘true’ target fisheries or simply a sub-component of larger fisheries. In some cases the catch data submitted was obtained from trips that are atypical of the underlying trend and potentially represent only a small fraction of a wider or different target fishery. In such cases, this is likely to lead to incorrect inferences being drawn about the discard rates associated with these gear types and areas.

The analysis is based on simple un-weighted pooling of data from trips fulfilling the criteria. This could lead to false conclusions as the fisheries may consist of more than one sampling strata (more than one fishery sampled) is therefore not possible to derive correct proper weighting because non-raised figures were requested.

Discard rates of many species are high in almost all the fisheries investigated by the study group and all the demersal fisheries could be considered as having serious or significant discard problems. The three main causes of discarding are the lack of market opportunities (including small individuals of commercial species), the retention of fish below minimum landing size and the retention of fish below marketable size. It was also demonstrated that levels of recruitment and growth rates could have a significant effect on discard patterns.

Due to differences in sampling design, it is unadvisable to directly compare the absolute discard rates (aggregated across species) between member states engaged in the same fishery. However, in many instances (with some distinct exceptions) the species-specific discard rates in each of the fisheries are broadly similar for the same gear type irrespective of nationality.

Data presented in the report demonstrates that both discard rates and patterns can be métier specific and that these can vary considerably. Métier-specific discard information is presented for only two member states, but the demonstrated variation between métiers is likely to be reflected across all of the fisheries examined. Therefore, in order to provide a more precise view of discard rates and patterns and provide a sound basis for estimating overall discard levels, it is necessary to define specific métiers and to adopt a sampling strategy which is structured to sample these or, for pragmatic reasons, a rational aggregation of individual métiers.

To have a significant impact in reducing discard levels there is a clear need to improve the selectivity of fishing gears used. While increases in minimum mesh size are likely to result in significant reductions in many cases, the multi-species nature (and the relationship between MLS and selectivity) may result in significant losses of some marketable species. A brief summary of the main technological developments (other than mesh size increase) which have shown to improve selectivity of trawls is provided but it is recognised that mitigation measures will be particular to each fishery. These fishery specific solutions should give due consideration to the relationship between MLS, MMS and market demands and involve the participation of the fishing industry to ensure their utility.

A number of studies have demonstrated that the discard mortality rates are species specific. While the majority of studies which have focussed on determining the mortality of discarded gadoids have shown very high rates, those which have focussed on species without gas bladders have demonstrated lower mortality rates. Revill *et al* (2005) estimated the discard mortality rate of lesser spotted dogfish caught in commercial beam trawls (TBB) to be less than 2%, which is comparable with other studies. Discard mortality rates lower than 50% have also been reported for plaice and sole (Berghahn *et al* 1992). Therefore the overall mortality associated with discarding implied by the total discard biomass may, in some cases, significantly overestimate the true mortality.

## **16. FURTHER RESEARCH**

To obtain a more detailed and precise picture of discard patterns and levels, discard data from individual trips should be assigned to métiers or sub-fleets if previously defined. The relative contribution to overall discard levels from each métier should then be quantified and contrasted with estimates from aggregated data.

Input from fishers should be sought in order to ascertain the reasons behind discard practices, particularly for commercial species above legal minimum size. This will help define whether such discards are a result of market considerations or quota restrictions in mixed-species fisheries.

Currently, there are a number of industry initiatives for the collection discard data (self-sampling programmes). Such programmes have the potential to greatly improve

the precision of discard estimates. However, it is necessary to develop validation techniques to compare data from self-sampling programmes with those collected under auspices of the DCR.

The information presented in this report should not be viewed in isolation, but contrasted with results obtained from previous studies. In order to obtain as precise a picture of discard rates and patterns in each of the fisheries and the level of variability, a fishery by fishery review of discard levels should be conducted. While the authors attempted that in this report, time constraints limited the extent to which this could be carried out.

Input from economists is necessary for defining the economic costs associated with potential future lost revenue associated with discarding and critically, for the development of future impact assessments tools for the evaluation of management options to reduce discarding levels. Development of a bio-economic and technical evaluation tool is necessary to support managers to evaluate the short to medium term impacts of discard plans, their impact on commercial fisheries and stock development.

## **17. RECOMMENDATIONS**

Sufficient time should be provided between the issuing of the initial call for data and the timing of any future sub-group tasked with the analysis and interpretation of high volumes of discard data. The process should include sufficient time for validation of database outputs and to rectify errors associated with the raw input data and/or the database output well in advance of the sub-group meeting.

Future interpretations of discard data would benefit from the development of reporting tool capable of producing standardised output tables and plots of results from pre-defined database queries. Such a reporting tool should be developed for future sub-group meetings as this will free up considerable time which would be better spent interpreting the data.

## **18. ACKNOWLEDGEMENTS**

## **19. REFERENCES**

## **20. APPENDIX**

### **20.1. Evaluating the efficacy of technical measures**

The following research conducted at Cefas was considered relevant to the issue of introducing and evaluating the performance of technical measures designed to

Evaluating the efficacy of technical measures – a case study of selection device legislation in the UK Crangon crangon (brown shrimp) fishery

Tom L. Catchpole, Andrew S. Revill, James Innes, and Sean Pascoe

Bycatch reduction devices are being introduced into a wide range of fisheries, with shrimp and prawn fisheries particularly targeted owing to the heavy discarding common in these fisheries. Although studies are often undertaken to estimate the impact of a technical measure on the fishery before implementation, rarely have the impacts been assessed *ex post*. Here, the efficacy of the UK legislation pertaining to the use of sievenets in the North Sea Crangon crangon fishery is assessed. Three impacts were evaluated: on fisher behaviour (social), on the level of bycatch (biological), and on vessel profitability (economic). An apparent high level of compliance by skippers was identified despite a low level of enforcement. The estimated reduction in fleet productivity following the introduction of the legislation was 14%, equalling the mean loss of Crangon landings when using sievenets calculated from catch comparison trawls. Sievenets did reduce the unnecessary capture of unwanted marine organisms, but were least effective at reducing 0-group plaice, which make up the largest component of the bycatch. Clearly the legislation has had an effect in the desired direction, but it does not address sufficiently the bycatch issue in the Crangon fishery.

This study has illustrated some of the tools required to evaluate comprehensively technical measures that have been introduced. Of particular value was the collection of comparable and consistent data prior to and following the introduction of the legislation. The social data clearly illustrated the uptake of the technical measure. The consistent methods used in the gear trials allowed a direct comparison of the actual and the predicted performance of the technical measure. However, the study was limited to the UK, so definitive conclusions relating to any EU-wide technical measure on fish stocks could not be made. We conclude that future evaluations of the efficacy of technical measures would benefit from utilizing social, biological, and economic data collected before and after implementation, from all fisheries to which the legislation applies, and using consistent methods.

A full report has been accepted for publication in the ICES Journal of Marine Research



**20.2. Table 18.2.1 Examples of gear-based mitigation measures known to reduce discards of species demonstrated to have high discard rates**

	Notes	Example references
<b>Square mesh panels/windows</b> Already implemented for several EU fisheries but recent work indicates that performance can be substantially improved (see references)	Reduces capture of undersized fish of species including WHG, HAD, COD, HKE, HOM, MAC, POL, POK, WHB	<ul style="list-style-type: none"> <li>○ Arkley, K., Dunlin, G., 2002. Improving the selectivity in towed gears - Further investigations into the use of low diameter twines for the construction of square mesh panels, Sea Fish Industry Authority, Hull, Seafish Report SR544.</li> <li>○ Campos, A., Fonseca, P., Wileman, D., 1996. Experiments with sorting panels and square mesh windows in the Portuguese crustacean fishery, ICES CM 1996/B:15.</li> <li>○ Revill et al 2007. Recent work to improve the efficacy of square-mesh panels used in a North Sea <i>Nephrops norvegicus</i> fishery. Fisheries Research, 85, 335-341.</li> </ul>
<b>Square mesh codends</b> Square or meshes turned 90 degrees remain open during trawling providing more opportunity for small fish to escape	Increase escape of small specimens for species including PLE, GUR, LEM, HKE, DAB, PLE, WHG, BIB, POD	<ul style="list-style-type: none"> <li>○ Ulmestrand, M., Valdemarsen, J.W., unpubl. An assessment of square mesh codends as a conservation strategy in the Skagerrak/Kattegat <i>Nephrops</i> fishery, Institute of Marine Research - Sweden, Lysekil.</li> <li>○ Madsen, N., Moth-Poulsen, T., 1994. Measurement of the selectivity of <i>Nephrops</i> and demersal roundfish species in conventional and square mesh panel codends in the northern North Sea, ICES 1994/B:14.</li> <li>○ Revill, A et al 2007. Programme 22: Reducing discards: Square-mesh codends in combination with square-mesh release panels (SW beam trawl fisheries). Fisheries Science Partnership: 2007/08, Final Report, Cefas.</li> </ul>
<b>Separator trawl</b> Utilising the difference in species behaviour during the fishing process whereby some rise within the trawl	Separate rising fish (e.g. HAD, WHG, WHB, HOM) from groundfish (e.g. NEP, COD, PLE, MON)	<ul style="list-style-type: none"> <li>○ Graham, N., Fryer, R.J., 2006. Separation of fish from <i>Nephrops norvegicus</i> into a two tier cod-end using a selection grid. Fisheries Research In press.</li> <li>○ Campos, A, Fonseca P. 2004. Separator panels and square mesh windows for bycatch reduction in the crustacean trawl fishery off the Algarve. Fisheries Research, 69, 147-156.</li> <li>○ Rihan, D.J., McDonnell, J., 2003. Protecting Spawning Cod in the Irish Sea through the use of Inclined Separator Panels in <i>Nephrops</i> Trawls, ICES CM2003/Z:02.</li> </ul>
<b>Selection grids to retain small species</b> For use in fisheries in which the target species is smaller than the bycatch species e.g. in NEP and NOP fisheries	Unwanted catches of all species can be reduced depending on size (e.g. WHG, COD, HAD, WHB)	<ul style="list-style-type: none"> <li>○ Catchpole, T.L, et al 2006. An assessment of the Swedish grid and square mesh codend in the English (Farn Deep) <i>Nephrops</i> fishery Fisheries Research, 81, 118-125</li> <li>○ Kvalsvik, K. et al 2006. Grid selection in the North Sea industrial trawl fishery for Norway pout: Efficient size selection reduces bycatch. Fisheries Research, 75, 248-263.</li> <li>○ Fonseca, P et al 2005. Using a modified Nordmore grid for bycatch reduction in the Portuguese crustacean fishery. Fisheries Research, 71, 223-239.</li> </ul>
<b>Selection grids to retain large specimens</b> Grids used to provide an escape route	Species tested using this method include NEP, MON, MAC,	<ul style="list-style-type: none"> <li>○ Loaec, H et al 2006. Engineering development of flexible selectivity grids for <i>Nephrops</i>. Fisheries Research, 79, 210-218</li> <li>○ Sarda, F et al 2006. The use of a square mesh codend and sorting grids to reduce catches</li> </ul>

for small specimens	HER, HOM	of young fish and improve sustainability in a multispecies bottom trawl fishery in the Mediterranean. Scientia Marina , 70, 347-353.
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### 20.3. Dutch self-sampling programme

Abstract taken from:

Discard sampling of plaice (*Pleuronectes platessa*) and cod (*Gadus morhua*) in the North Sea by the Dutch demersal fleet from 2004 to 2006. G.M.Aarts, A.T.M. van Helmond, Institute for Marine Resources and Ecosystem Studies (IMARES), Report Number C120/07, 42 pp.

Since 2002, Wageningen IMARES samples discards of the Dutch demersal (beamtrawl) fishery following the EC Data Collection Regulations (DCR) 1543/2000 and 1639/2001. In response to concerns about quality issues of these discard data, the Dutch Fish Product Board together with the Dutch fishing industry started its own plaice discards program in 2004. Fishermen on about 20 demersal vessels take samples of plaice and cod discards and landings. Previous analysis of the Product Board's dataset provided evidence for clear trends in time, spatial patterns, and differences between gears and individual vessels. Furthermore, it was pointed out that the IMARES program estimates higher discard percentages for plaice than the self-sampling program. The Dutch Fish Product Board requested IMARES to analyze the data of the discard sampling program of the Dutch flatfish industry of 2006, including previous period (2004D2005) and additional length records of cod and plaice, and to answer the following questions:

1. Was the Product Board sampling program (2004D2006) statistically sufficient to obtain a good estimate of mean discard fractions?
2. How do the discard estimates of the self-sampling program and the DCR program of IMARES compare?
3. What are the spatial and temporal patterns in discard fractions during the period 2004D2006?
4. What is the effect of environmental and gear specific variables on the discard fraction?
5. Do the data of the self-sampling program meet the quality standard set for international stock assessments by the European Commission, like ICES WGNSSK?

Based on maximum likelihood estimation, the estimated discards fractions (volume) based on the Product Board surveys for 2004, 2005 and 2006 are 0.29, 0.28, and 0.39. Estimates for the IMARES surveys in these years are systematically higher 0.35, 0.44 and 0.55, respectively. The mean discard fraction estimated by the Product Board has smaller standard errors than the IMARES estimates in both 2004 and 2005. However, for 2006 the mean discard fraction of IMARES is slightly more precise than the estimate made by the Product Board. In 2006 the Product Board also initiated a discard sampling program for cod. Current discard fraction estimates based on weight, volume and length measurements were 0.065, 0.074 and 0.183, respectively. Even though the estimates differ substantially between the different methods used, it nevertheless provides a first indication of the level of cod discards. Results based on the PV data shows that discard fraction decreases further away from the Dutch coast. Close to shore, in the northern part of the Netherlands, discard percentages can be as high as 60%, while in the most northern regions of the North Sea, discard percentages are only a few percent. Temporal patterns reveal clear seasonal peaks, with the discard levels in September being twice those observed in late December. Also after correcting for these spatial and temporal effects, IMARES estimates are systematically higher than the Product Board estimates. With some minor adaptations (see the recommendations) the current Product Board's program set up could, in theory, provide the age-structured data similar to those currently be used by international stock assessments. But first it is vital to assess and validate the accuracy of the data and clarify the difference between the two sampling programs. The most important contribution of the data collected by Product Board and analyzing its properties, is that it provides a fundamental insight into plaice and cod discards and which processes play an important role. It acts as a different reference point, which leads to a critical review of the current way the data is collected by IMARES. Although this study did not

lead us to suspect that the current IMARES estimates are inaccurate, the continuation of the comparison of methods (see next section 4.4) that is initiated by this Product Board discards sampling program may shed light on how accurate the current estimates of both sampling programs really are.

#### **20.4. Declaration of experts interest**

Note: The STECF members (Norman Graham and Ralf Doering) are not done here. Instead they can be found on the STECF website.

ANNEX I

Scientific, Technical and Economic Committee for Fisheries (STECF)  
DECLARATION of COMMITMENT

**Name:** Neil Campbell

**Position:** Senior Data Analyst, Fisheries Research Services

External expert ☐

I undertake to:

1. act independently in the public interest of the European Union and to make complete declarations of any direct or indirect interests that might be considered prejudicial to my independence.
2. to attend meetings regularly.

Done at 11.15

on 27.11.2007

Signature



## ANNEX II

### DECLARATION of INTERESTS (to be filled in by STECF external experts)

Name: Neil Campbell

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*I work for an agency of a member state administration which carries out scientific research and provides advice on fishery related matters.*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

**ANNEX III**

**Scientific, Technical and Economic Committee for Fisheries (STECF)  
DECLARATION CONCERNING CONFIDENTIALITY**

**Name:** Neil Campbell

**Position:** Senior Data Analyst, Fisheries Research Services

Invited expert ☐

I hereby declare that I am aware of my obligation to respect confidentiality. I know that I am obliged not to divulge information acquired as a result of the work of the Committee, or one of its Working groups.

I am aware that when informed that an agenda item is confidential in accordance with Article 14 (2) of Commission Decision 2005/629/EC only members of the STECF and Commission representative shall be present at that working group..

I shall also respect the confidential nature of the scientific opinions expressed by members of the Committee or the external experts during discussions in Committee or in working groups.

I undertake not disclose such information even after my participation in the work of the STECF has ceased.

I undertake also to destroy any information and document I have received under the clause of confidentiality.

Done at 11.15 on 27.11.2007

Signature



Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

**Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at 11.15 on 27.11.2007

Signature

---

<sup>3</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.



**ANNEX I**

**Scientific, Technical and Economic Committee for Fisheries (STECF)  
DECLARATION of COMMITMENT**

**Name:** Aloysius Theodorus Maria (Edwin) van Helmond

**Position:** External expert

I undertake to:

1. act independently in the public interest of the European Union and to make complete declarations of any direct or indirect interests that might be considered prejudicial to my independence.
2. to attend meetings regularly.

Done at 5/12/07 on JRC Ispra

Signature

A handwritten signature in black ink, consisting of a stylized, cursive script that appears to be 'A. van Helmond'.

## ANNEX II

### DECLARATION of INTERESTS (to be filled in by STECF external experts)

Name: Aloysius Theodorus Maria (Edwin) van Helmond

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

Employment (Project manager Discards in the Netherlands).

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

*none*

Interests deriving from the professional activities of the applicant or his/her close family members:

*none*

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

### ANNEX III

#### Scientific, Technical and Economic Committee for Fisheries (STECF) DECLARATION CONCERNING CONFIDENTIALITY

**Name:** Aloysius Theodorus Maria (Edwin) van Helmond

**Position:** Invited expert

I hereby declare that I am aware of my obligation to respect confidentiality. I know that I am obliged not to divulge information acquired as a result of the work of the Committee, or one of its Working groups.

I am aware that when informed that an agenda item is confidential in accordance with Article 14 (2) of Commission Decision 2005/629/EC only members of the STECF and Commission representative shall be present at that working group..

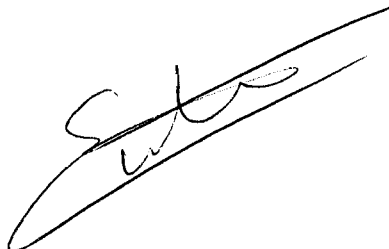
I shall also respect the confidential nature of the scientific opinions expressed by members of the Committee or the external experts during discussions in Committee or in working groups.

I undertake not disclose such information even after my participation in the work of the STECF has ceased.

I undertake also to destroy any information and document I have received under the clause of confidentiality.

Done at 05/12/07 on JRC Ispra

Signature



Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

none

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

none

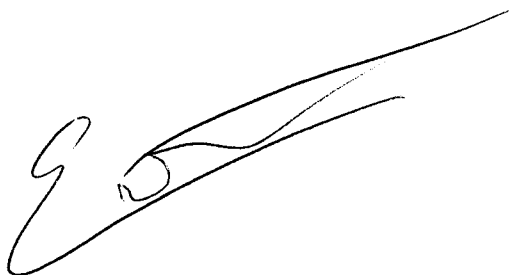
**Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at 05/12/07 on JRC Ispra

Signature



<sup>3</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: *ULLEWEIT, JENS*

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*employed by a marine research institute*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or an other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

### Declaration

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>3</sup> See previous footnote 1: a special interest could, in particular, consist in any prior activity concerning the subject of the question.

Done at JRC on 4/12/07

Signature

A handwritten signature in black ink, appearing to be "J. Alan" followed by a stylized flourish.

# EXPERTS'

DECLARATION OF COMMITMENT

DECLARATION CONCERNING CONFIDENTIALITY

DECLARATION OF INTERESTS



ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: **THOMAS CATCHULE**

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

**PUBLIC RESEARCH INSTITUTE**

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

**NA**

Interests deriving from the professional activities of the applicant or his/her close family members:

**NA**

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.10.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job: university, institute, public service, enterprise,
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

NA

Interests deriving from the professional activities of the applicant or his/her close family members:

NA

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

NA

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NA

#### **Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnote (1): special interest could, in particular, comprise any prior activity concerning the subject of the question.

Done at

on

5/11/07

Signature

A handwritten signature in cursive script, appearing to read "E. J. [unclear]".

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: **JAMES ROBERTS**

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

NONE

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NONE

Interests deriving from the professional activities of the applicant or his/her close family members:

NONE

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2015, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

NONE

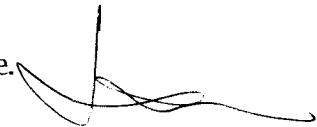
Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NONE

#### Declaration

I declare that the information provided above is true and complete.



I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

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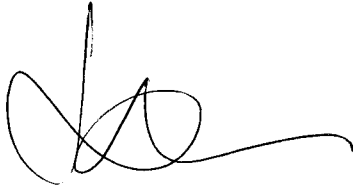
<sup>3</sup> See previous footnote 1: a special interest could, in particular, consist of any prior activity concerning the subject of the question.

Done at

on

06/12/2007

Signature

A handwritten signature in black ink, consisting of a large, stylized 'A' or 'K' shape followed by a horizontal line extending to the right.

ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: *Mathieu Menzèreaud*

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*I'm working at Ifremer (Plat-en-Bassin, France). I've been involved in the datasets preparation to answer the EU call for data.*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, (20.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise,
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

#### **Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnote 1. A special interest could, in particular, consist in any prior activity concerning the subject of the question.



Done at *Ispra* on 4/12/2007.

Signature

A handwritten signature in black ink, appearing to be 'M. J. D.' with a large, sweeping flourish extending from the bottom right.

## ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: Robert Forster

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

Employed by CEFAS

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NONE

Interests deriving from the professional activities of the applicant or his/her close family members:

NONE

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.10.2005, p.23.

<sup>2</sup> Interests which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

NONE

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

NONE

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NONE

#### Declaration

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity or holding the subject of the question.

Done at 15.45 on 4/12/07  
JRC, ISRA

Signature 

## ANNEX II

### DECLARATION of INTERESTS (to be filled in by STECF external experts)

Name: **PAOLO CARRENTIEM**

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

**PRIVATE RESEARCH INSTITUTE  
ITALY**

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

**none**

Interests deriving from the professional activities of the applicant or his/her close family members:

**none**

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise),
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

none

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

none

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

none

#### Declaration

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>1</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>1</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

Done at 5/12/2007 on

Signature

Handwritten signature: H. A. G. L.

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: *Henrik Degel*

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*Fulltime employed at DIFRES, Denmark*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

*None*

Interests deriving from the professional activities of the applicant or his/her close family members:

*None*

<sup>1</sup> OJ L 225, 31.08.2005, p.14 as corrected by OJ L 316, 02.12.2005, p.21

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.



Interests deriving from the professional activities of the applicant or his/her close family members:

None

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

None

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

None

#### **Declaration**

I declare that the information provided above is true and complete.

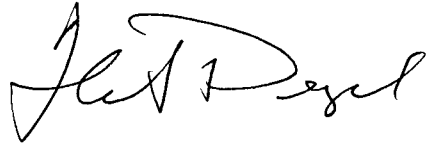
I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnote 1: a special interest would, in particular, covered a any prior act (by concerning the subject of the question.

Done at JRC on 5/12-2007

Signature

A handwritten signature in black ink, appearing to read "J. A. Deyel". The signature is written in a cursive style with a large, sweeping initial "J" and a distinct "Deyel" at the end.

ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: *ISABEL GONZÁLEZ HERZAIZ*

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*None*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

*None*

Interests deriving from the professional activities of the applicant or his/her close family members:

*None*

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.21.

<sup>2</sup> Links which could be considered inter-ests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

None

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

None

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

None

#### Declaration

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>3</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

Done at Ispra on 6 /12/07

A handwritten signature in black ink, appearing to be 'J. H.' or similar, with a long horizontal stroke extending to the right.

Signature

ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: ANA CARBONEU QUETLAS

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise);
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

#### **Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnote 1: a special interest could, in particular, comprise any point of view concerning the subject of the question.

Done at ISPR on 6/12/2007

A handwritten signature in black ink, appearing to be "A. CW", written over a horizontal line.

Signature



**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name:

PAOLO SARTOR

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

PRIVATE FISHERY RESEARCH INSTITUTE

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NO

Interests deriving from the professional activities of the applicant or his/her close family members:

NO

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.20.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise,
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion on at the request of a company, public service, Member State administration, non-governmental organization, governmental organization, etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

#### **Declaration**

I declare that the information provided above is true and complete.

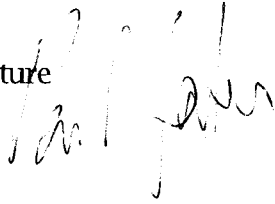
I shall immediately and explicitly inform the STECF of any specific interest<sup>2</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>2</sup> See previous footnotes: a special interest could, in particular, consist in my prior activity concerning the subject of the question.

Done at ISRA on 5/12/07

Signature

A handwritten signature in black ink, appearing to be "M. J. [unclear]", written over the printed word "Signature".

## ANNEX II

### DECLARATION of INTERESTS (to be filled in by STECF external experts)

Name: *MORIZ JR Yoon*

☒ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*having carried out scientific research and provided an expert opinion to public services*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

**Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at *Brest* on *30/11/07*

Signature



---

<sup>3</sup> See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: *Tetard Alain*

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

*I work as researcher in a public institute (Ifremer) in France. Since 2004 I'am involved in the coordination of the French observation at sea program with DCR*

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2015, p.13.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

#### **Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>3</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>3</sup> See previous footnote 1: a special interest could, in particular, arise prior to or concerning the subject of the question.

Done at Petten on 29-11-07

Signature

P. H. J. H. J.



## ANNEX II

### DECLARATION of INTERESTS (to be filled in by STECF external experts)

Name: **GRANT COURSE**

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

**FULL TIME EMPLOYED BY CEFAS**

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

**NONE**

Interests deriving from the professional activities of the applicant or his/her close family members:

**NONE**

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 22.12.2005, p.21.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise,
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization, etc.

NONE

Interests deriving from the professional activities of the applicant or his/her close family members:

NONE

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

NONE

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NONE

#### **Declaration**

I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest<sup>1</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>1</sup> See previous form(s) if a special interest exists, in particular, regarding any prior activity concerning the subject of the question.

Done at JRC  
LSRA on 04/12/07 : 1545

Signature

EL

**DECLARATION of INTERESTS**  
(to be filled in by STECF external experts)

Name: **BOJAN MARČETA**

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August, 2005 establishing a Scientific, Technical and Economic Committee for Fisheries<sup>1</sup>, I hereby notify the Commission that I have the following economic or ethical interests<sup>2</sup> which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

**FISHERY RESEARCH INSTITUTE OF SLOVENIA**

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

<sup>1</sup> OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

<sup>2</sup> Links which could be considered interests might include:

- one's job (university, institute, public service, enterprise,
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Interests deriving from the professional activities of the applicant or his/her close family members:

/

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

/

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

/

#### Declaration

I declare that the information provided above is true and complete.

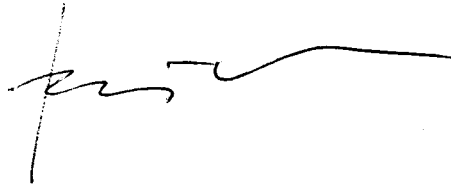
I shall immediately and explicitly inform the STECF of any specific interest<sup>1</sup> concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

---

<sup>1</sup> See paragraph 4 of Annex I: a special interest could, for example, arise from any other activity concerning the subject of the question.

Done at ISPR A on 5.12.2007

Signature

A handwritten signature in black ink, consisting of a vertical line on the left, a horizontal line crossing it, and a long, sweeping horizontal line extending to the right.