

REPORT OF THE
Study Group on Discard and By-Catch Information

ICES Headquarters
4–7 March 2002

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1 INTRODUCTION

1.1 Participants

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Apologies were received from the Netherlands.

1.2 Terms of Reference and other requests to SGDBI

The **Study Group on Discard and By-Catch Information** [SGDBI] (Chair: J. Cotter, UK) was requested to meet for the third time at ICES Headquarters from 4–7 March 2002 to:

- a) update and amend the compilation of regional discard data to provide discard estimates in the form to be used by the relevant ICES assessment working groups;
- b) identify species, areas, and fleets where discard data are required but have not been collected, or where the type or format of data collection do not meet the requirement at a);
- c) compile by-catch and discard information for fleets that affect the species and stocks for which recovery plans are in operation (e.g. *Nephrops* fleets in the North Sea and Irish Sea);
- d) provide estimates and confidence intervals of cod and plaice discards in the different fleets in the North Sea within the period 1970 to the present.

Additionally, the ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS, 5-8 February 2002, Lisbon; ICES CM 2001/ACFM:26) made the following recommendations concerning biological sampling of discards:

- That for the purposes of international combination of maturity data the maturity stages used should be mappable to a common standard such as the IBTS maturity stages (Appendix II - IBTS Manual, ICES CM 1999/D:2);
- That the SGDBI be requested to list the planned sampling in 2002;
- That the available data should be reviewed on a regional basis to ensure that sampling coverage reflects the relative impact of each fishery in each area;
- That the SGDBI be asked to provide practical advice on the compatibility between fishery stratification used in sampling discards and commercial catch statistics;
- That countries undertaking discard sampling adhere to the sampling strategy as suggested by SGDBI;
- That the country of origin makes arrangements to sample the discards and associated landings.

A further matter, which shaped the SGDBI discussions, was a presentation of the BALTCOM database for data on discards and landings by Baltic countries. The PGCCDBS also recommended that SGDBI cooperate as follows:

DIFRES be requested to review the licensing and additional technical requirements for the use of the BALTCOM database by the international community, particularly with respect to discard data storage (and in cooperation with the SGDBI), and report back to the next PGCCDBS.

1.3 Comment on discard data compiled in 2001

The 2001 meeting of SGDBI created an archive of estimates of discarding by national fishing fleets of various types and fishing in various areas. The data were contributed by participants in the meeting and are available on www.ices.dk/reports/acfm/2001/sgdbi. Unfortunately, accessibility of the site since its creation may have been variable, and a contents list guiding users to the right data files was difficult to find. Also, few stock assessments during 2001 made use of SGDBI data because series typically only covered 2 or 3 years when at least 5 are preferred, or because the groups obtained data directly from national sources. Perhaps for these reasons, only one comment was received by members of SGDBI concerning the utility of the data on the site, namely that the significance of discard data raised to fleet level was difficult to understand without information on quantities of fish retained as well.

The group noted that quantities of fish retained – as observed at sea – may not be the same as quantities landed – as observed in markets onshore – because of:

- Sampling errors in estimates of numbers retained;
- Errors in the raising factors used to estimate retention at the fleet level (the raising factors would often be the same as those used to estimate discarding at the fleet level);
- Discarding of retained fish from the hold before return to port to increase the value of the marketable catch (high-grading);
- Non-declarations, mis-reporting, and other possible errors in the landed quantities;
- Removal of fish as payment or food for the crew.

The group felt that inclusion of quantities retained to the SGDBI site would not be a good way to help readers of SGDBI data to assess the significance of discarding because of the possible influences of these factors on comparisons between the raised discarded and retained quantities, and between the raised retained quantities and officially reported landings. We preferred instead to state the proportions of the catch of that species discarded (where "catch"=retained+discarded). In many cases, these proportions are estimated directly for the catches observed at sea without involving raising factors. The proportions could be applied during a stock assessment to raise total declared landings to total catch. They are also useful for comparing fisheries and gears with respect to discarding. Where possible, proportions of the catch discarded have therefore been added to the tables of discarding data. Whether the proportions are given in terms of numbers- or weights- and whether -at-length or -at-age depends on the data available to members of the study group.

1.4 Abbreviations

The following abbreviations may occur in this report:

AZTI Fundación AZTI Instituto Tecnológico Pesquero y Alimentario (Basque Country, Spain)

CEFAS Centre for Environment, Fisheries, and Aquaculture Science (England)

DIFRES Danish Institute for Fisheries Research

EC European Commission

EU European Union

FRS Fisheries Research Services (Scotland)

IBSCF International Baltic Scientific Committee on Fisheries

IEO Instituto Español de Oceanografía (Spain)

IFREMER Institute français de recherche pour l'exploitation de la mer

IMR (Norway)Institute of Marine Research

IMR (Sweden)	Institute of Marine Research
ISH	Institut für Seefischerei, Hamburg
MI	Marine Institute (Marine Fisheries Services Division) (Ireland)
NWWG	ICES North-Western Working Group
PGCCDBS	ICES Planning Group on Commercial Catch, Discards and Biological Sampling
RIVO	Rijksinstituut voor Visserijonderzoek (The Netherlands)
SEAFISH	Sea Fish Industry Authority (England)
WGBFAS	ICES Baltic Fisheries Assessment Working Group
WGMHSA	ICES Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine, and Anchovy
WGNEPH	ICES Working Group on <i>Nephrops</i> Stocks
WGNPBW	ICES Working Group on Northern Pelagic and Blue Whiting Fisheries
WGNSDS	ICES Working Group on the Assessment of Northern Shelf Demersal Stocks
WGNSSK	ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak
WGSSDS	ICES Working Group on the Assessment of Southern Shelf Demersal Stocks

2 T.O.R. (A): NEW DISCARD DATA IN 2002

Much data became available from EC-funded, international catch sampling projects which finished sampling in 2001 in:

- western waters and the Irish Sea (EC 98/095),
- the North Sea and Skagerrak (EC 98/097),
- the Baltic Sea and Kattegat (EC 98/024), and
- Irish waters (SAMFISH project, EC 99/099).

Participants in the 2002 meeting were able to add the following discard data to the compilation on the ICES web-site:

Sweden participated in EC 98/097. Data for cod, haddock, saithe, whiting, sole, and plaice for 2001 were added to the SGDBI web-site (Tables 4.4.1.3.1 to 4.4.6.3.3b).

The Irish discard data was produced as part of the Irish work program for the FIEFA Project (EU Study Contract 97/059) and SAMFISH Project (EU Study Contract 99/099). Raised total discards; length frequencies; numbers, mean length and mean weight-at-age are presented for 14 demersal stocks for the years 1995 to 2001. In this year's SGDBI, Ireland presented discard data for:

- 4 new stocks,
- 1999 and 2000 data revised for all stocks,
- 2001 data for all stocks.

England updated the data tables to include 1997 to 2001 results for the North Sea. These are for cod, haddock, and whiting 1997-2001 and plaice, saithe, and sole for 3rd quarter 1999-2001, plus plaice and sole from a beam trawl in the 1st quarter of 1998. The tables supplied last year were revised. In addition sampling began in the Irish Sea and English Channel in 2000/01 and this has also been presented in the data tables in the relevant sea area sections. Please note that no ageing was possible for 2001 data or for the plaice and sole data in 1998.

Spanish data for 1999 were revised, especially in relation to sampling level. Annual data for 2000 were added to the database for hake, megrim, four spot megrim, blue whiting, mackerel, and horse mackerel for Sub-areas VI and VII, and Divisions VIIIabd, VIIIc and IXa. For megrim in Sub-areas VI and VII an annual estimation of discards in weight and number was also presented. No age composition for this species in 2001 was presented because the ALK was not available at the time of the SG meeting.

New data for the Baltic and Kattegat were not added to the SGDBI web-site because they are readily available from the BALTCOM database. Various discard reports can be downloaded. The web address is: <http://ff07.dfu.min.dk/baltcom/>. A password is required to access the database. In each of the countries submitting data to the database a national contact person is assigned. He/she will administrate the extraction of data to single persons for scientific investigations. In each case each country must accept the use of national data. Relevant groups within the ICES and IBSCF community will have full access to relevant data.

Readers are referred to section 1 of the Report of SGDBI 2001 to see the terms of reference, which initiated the compilation of these data, the approaches used, and the measures of accuracy adopted.

3 T.O.R. (B): SPECIES, AREAS, AND FLEETS WHERE DISCARD DATA ARE REQUIRED BUT HAVE NOT BEEN COLLECTED, OR WHERE THE TYPE OR FORMAT OF DATA COLLECTION DO NOT MEET THE REQUIREMENT AT T.O.R. (A)

SGDBI noted that this t.o.r. will, to an extent, be taken care of by the European Commission Fisheries Data Collection Regulation 1639/2001 establishing minimum programmes for the collection of fisheries data. Chapter III.E.1b states that discards will be monitored for many commercial stocks (as listed in Appendix XII of the regulation) in order to estimate the average volume of the annual catches by weight per three-year period. Although this 'minimum programme' of sampling only refers to 'volume' of catches, it is expected that numbers-at-length will often be estimable with negligible extra cost by sea-going sampling officers. In many cases, the collection of otoliths to allow ageing of discards will also be possible. SGDBI was aware that at the beginning of 2002 some fishery laboratories had not received Commission funds advanced to national governments in order to begin this sampling programme. There was concern that trained and experienced staff might have to be dismissed in some cases unless the problem was resolved quickly. Notwithstanding the effects of the new regulation, SGDBI made the following review of the availability of discard information for ICES stock assessments. In many cases, the precision of the data is not good. We have made a few brief comments about data held by countries not represented at SGDBI.

3.1 North Sea and Skagerrak

SGDBI data files include estimates of discarding by the main towed-gear fisheries for cod, haddock, whiting, saithe, sole and plaice for 1999 and 2001, as collected by Germany, England, Denmark, and Sweden under EC project 98/097. The Netherlands and Belgium also collected data under this project. Various data from other projects going back to 1997 are also available. Extensive Scottish data for discarded haddock and whiting also exist. They are submitted to the WGNSK annually for use in the stock assessments. Denmark has data on discarding from gill net fisheries in the North Sea and Skagerrak but compilation has not yet been completed. The main deficiencies in North Sea discarding data, apart from the shortness of, and gaps in the data series, especially when numbers-at-age are required, were thought to be:

- Danish *Nephrops* fisheries in the North Sea (sampling has commenced);
- Age data for species such as lemon sole, brill, witch, turbot, etc. as specified in the EC regulation.

3.2 Baltic and Kattegat

As noted in section 2, discarding data for Baltic fisheries can be obtained from the BALTCOM database. The data were collected for all major commercial species and fisheries under EC 98/024 by all Baltic countries.

SGDBI files also include estimates for cod between 1997 and 2000.

The main deficiency identified in the Baltic data was that foreign vessels (i.e. landing outside the flag country) were poorly sampled. The main fisheries in the Kattegat (IIIa south) were currently trawl fisheries for *Nephrops*, sole, and plaice. Danish data on the *Nephrops* fisheries were about to be available on the Baltic database. Swedish data also exist on these fisheries.

3.3 Irish Sea

Data on the SGDBI web-site on cod, haddock, whiting, plaice and sole cover 1995–2001. Northern Ireland is understood to hold information about discarding of *Nephrops* and white fish, but the data could not be obtained for SGDBI 2002.

3.4 Channel and Celtic Sea

Most of the stocks in the Channel assessed by the WGSSDS have little or no discarding information. This includes stocks of sole, plaice, cod, and whiting. The Sea Fish Industry Authority undertook exploratory discard sampling from the south west of England during 2001, but otherwise England has not sampled discards in this region. Limited sampling has been begun recently by England in the Channel. Regarding the Celtic Sea, Ireland presented to the SG data on whiting and haddock for 1995-2001. There is a need for data for most remaining stocks.

3.5 West of Scotland and Ireland

SGDBI was aware that extensive Scottish discarding data exist for mixed demersal fisheries west of Scotland. Intermittent data series for discarding of hake, monk, whiting, and megrim were available in SGDBI files submitted by Spain. Ireland submitted series for the same species between 1995 and 2001.

3.6 Other Southern Shelf stocks

The main problem, as elsewhere, was intermittent sampling. Irish series were the exception. Discarding data were being used in the assessments for northern hake and megrim but results for many years were not available, casting doubt on the quality of the assessments. France provides estimates of hake discarding annually derived by modelling from RV survey results. Spanish and Irish discarding data for these species may be found in SGDBI files. Stocks from areas west of Spain and Portugal are assessed without information on discards although Spain has some information.

3.7 North western shelf

In general, the sampling information on discarding is poor. Iceland began systematic sampling of discards on commercial vessels in 2001. The programme was focussed on cod and haddock. Estimates of discarding are made by comparing length frequencies of catches at sea and commercial landings, then raising the estimated length frequency of discards by quantities landed (Pálsson 2002). Plaice, megrim, long rough dab, and witch were among the flatfish caught by otter trawls in Icelandic waters. No discarding data were available for these species. Greenland halibut fisheries conducted by Germany with 140 mm mesh were sampled by Germany. Low levels of discarding were indicated.

3.8 Deep-water species

Fisheries exploiting deep-water oceanic species may be generating high levels of discarding of certain species, but there was little direct experience of this at SGDBI. Some deep-water species are characterised by slow development to sexual maturity and/or slow growth, suggesting that discarding of large numbers of small individuals could be very hazardous to the stock.

3.9 Pelagic fisheries

Pelagic fisheries have been observed relatively infrequently, e.g. by Spain, Germany, and Ireland. Discarding of pelagic fish in other fisheries has been observed. Spain has added data to the SGDBI web-site. Pelagic vessels that carry out discarding by slippage or that generate few discards may not be worth observing because the quantities and biological features of the discards cannot be measured. The cost-benefits of sending observers to sea on pelagic fishing vessels can therefore be low. Some high grading may occur.

4 T.O.R. (C): BY-CATCH AND DISCARD INFORMATION FOR FLEETS THAT AFFECT THE SPECIES AND STOCKS FOR WHICH RECOVERY PLANS ARE IN OPERATION

The objective of the European Commission's recovery plans is "to restore spawning stock biomass to levels considered by science to provide a high probability that replenishment of the stocks is not threatened" (EC COM(2001) 326). SGDBI noted in general that the discarding data raised to fleet level for large sea areas that had been assembled on the ICES\SGDBI web-site in accordance with terms of reference in 2001 and 2002 were not necessarily very helpful for assessing whether recovery plans would satisfactorily control mortalities of young fish. We therefore supplemented references to specific tables of data with additional information or data provided by study group members. SGDBI was aware of the recovery plans and made the following comments:

4.1 Hake in ICES Sub-areas III, IV, V, VI, and VII and ICES Divisions VIIIa, b, d, e (Commission Regulations 1162/2001, and 2602/2001)

The stock is referred to as Northern hake by the WGSSDS. SGDBI data tables 5.1.1.1, 5.1.1.2 (1996-2000), 5.2.2.1 (1994, 1997,1999, 2000), 5.2.2.2a (1994, 1999, 2000), and 5.2.2.3a (1994, 1999, 2000) give discarding data for hake raised to fleet level that are relevant to, but not specific to these areas. SGDBI adds the following comments:

Northern hake is caught by a number of different gears throughout its distribution area. In 1985 a set of different Fishery Units (FU) was defined by the ICES Working Group on Fisheries Units in Sub-areas VII and VIII in order to study the fishing activity related to demersal species (ICES CM 1991/Assess:24). The various fishery units include these main groups:

- Long lines
- Gill nets
- Various otter and Nephrops trawls
- Beam trawls.

Due to the critical situation of the stock a Recovery Plan was planned (Commission Regulation (EC) N° 2602/2001) with the main objective of reducing catches of juvenile hake by a general increase in mesh size of towed (and fixed) nets used to catch hake, in two closed areas where juveniles are abundant: one in Divisions VIIb, g, j (to the south and west of Ireland), the other one in Divisions VIIIa, b (in the Bay of Biscay). However, its implementation, planned to enter into force on 1 March 2002, has been recently suspended (Commission Communication D.O.C.E. L 47: 19/2/2002).

Discarding information on northern hake is only provided to this SG by Ireland and Spain and for ICES Sub-areas VI, VII and Divisions VIIIa, b, d. These data correspond to only 5 of the 16 fisheries units considered by WGSSDS and only to some of the numerous métiers included in those fishery units defined in the past (ICES, 2002). On the other hand, since 1978 France has supplied annually to the WGSSDS information on French hake discards originated by trawlers fishing in Divisions VIIIabd, but this information is not presented to the SG.

For Ireland, northern hake is a very important component in the mixed species demersal trawl fisheries in most Irish ports. Ireland has an important targeted gill-net and multi-species trawl fishery for hake all along the western shelf and in the Celtic Sea and Stanton Bank area. Ireland takes 4% of the total landings of the northern hake stock.

Irish hake discard information comprises otter trawls in Sub-areas VI and VII for 1995 until 2001. The data presented correspond only to otter trawls length frequencies (Tables 5.1.1), since gillnets were not sampled and hake are not routinely aged in Ireland. Discard sampling of the otter trawl fleet suggests that, on average, 30% of the weight of hake caught is discarded on the time-series. Approximately a quarter of these discards were landable size, mainly because hake are trawl-damaged easily and the market does not accept damaged fish. There are no apparent changes in discarding, either in quantities or structure, between the years previous to the regulation and 2001, although there was a slight decrease in the percentage of weight discarded in 2001 compared to the time-series average. Nevertheless, changes in hake discards in Div. VIIb, j, g, h may be hidden by the data from the others divisions sampled.

Northern hake is at present caught by Spain as an important component in the otter trawl fisheries focused on various demersal species or as the target species for some few directed fisheries, gillnets, longliners, and some bottom pair

trawlers with very high vertical opening (VHVO) nets. They work in three different sea areas according to the quotas availability (Bay of Biscay – Div. VIII a, b,d-, Sub-area VII and Sub-area VI).

Spanish information on Northern hake discards, available for scattered years (1994, 1999, and 2000), has been presented to this SG. Results of a recent EU Study Contract (DG XIV Ref. N° 98/095 “Monitoring of discarding and retention by trawl fisheries in Western Waters and the Irish Sea in relation to stock assessment and technical measures” (submitted to revision)) is on the basis of the discard information obtained in 1999-2000. These last results, however, were obtained before the Emergency (2001) and the Recovery Plans (March 2002) on Northern hake were planned.

Significant differences can be observed in the discard ratios and in the discard length distributions depending not only on the metier, but also on the regional fleet-based ports. In general discards coefficients of variation, in terms of numbers of fish, are high for all the fisheries; thus, the results must be taken with caution.

It is not clear that the selectivity values obtained for some metiers working in different sea areas and exploiting different species can be applied adequately to other metiers, above all when they are exploiting mixed fisheries, even if they use the same mesh size. Thus, to obtain accurate selectivity values, an *ad hoc* orientated study should be carried out in each metier (*i.e.* a determinate gear with a current fishing technology, in a specific time period, in a determinate sea area, and focused on determinate species).

Main results of the EU Study Contract on Western waters and Irish Sea Discards

i) Baka Otter Trawl fishery targeting hake, witch, Norway lobster, and megrim (with basis in Galician ports)

Effort in this metier is mainly concentrated in Divisions VIIj,k. Occasionally, when weather permits, fishing continues further north into Division VIb. This metier targets a range of species including hake, witch, Norway lobster, megrims, and both anglerfish (especially white anglerfish). Hake is the most economically important species representing around 40% of the landed value in recent years (1999-2000). Discards of hake are negligible and mostly related to difficulties in the selection of fish due to catch composition. Results indicate that the metier is appropriate for almost all species of economic importance, except for four spot megrim. Improving selection through gear modification by increasing the cod end mesh size from 80 to 100 mm would greatly affect the level of the overall retained catch.

ii) Baka Otter Trawl fishery targeting megrim, anglerfish, and hake (with basis in Galician ports)

Effort in this metier is mainly concentrated in Division VIIj,h. Vessels occasionally fish further north into Division VIb when weather permits. This metier targets a range of different species of economic importance. Relatively large numbers of hake less than 27cm (27 cm is the MLS) were discarded, compared to the total catch of this species. Nevertheless, the total number caught by this metier is very low.

Improving selection through gear modification is an economically unrealistic goal, as the selection and retention L_{50} 's of the main economic species show that an increase in cod end mesh size from 80 to 90 or 100 mm would greatly affect the level of the overall retained catch. Hake is the only species for which a change in retained catch does not have a noticeable economic impact.

iii) Baka Otter Trawl Mixed fishery in Celtic Sea (with basis in Basque ports)

Effort in this metier is mainly concentrated in ICES Divisions VIIh,j. They occasionally fish further north into Division VIIb-c. This metier targets a range of species groups, including mainly anglerfish, megrim, hake, and nephrops. Hake was just around 10% of the weight and economical value landed. No discards were observed for anglerfish, and for megrim and hake the discard rates were raised to 29 and 2%, respectively. The majority was below MLS, but also during the 4th quarter of the year 2000 all hake were discarded due to the depletion of the Spanish quota for this species in that area. The retention ogive for hake resulted around 20 cm.

It is not clear that a simple increase in mesh size would lead to a substantial benefit for the anglerfish and megrim catches (that compound around 2/3 of the catch), and especially for anglerfish that do not have MLS.

The Northern Hake Recovery Plan would diminish the catch of juvenile hake, but it would have excessive negative consequences for this metier that –it must be pointed out once again – exploits a mixed fishery. Also, the enormous amount of horse mackerel, mackerel, and blue whiting discarded would not be solved, as they are caused by market or quota restrictions.

iv) Baka Otter Trawl Mixed fishery in the Bay of Biscay (with basis in Basque ports)

Effort in this metier is mainly concentrated in ICES Divisions VIIIa,b,d. Most of the vessels operating in Div.VIIIa,b,d work also in Subarea VII and a few of them in Sub-area VI, depending on the time of the year and the quota availability. This metier extracts a very large range of species groups that in descending order of landings were in 2000: pout, red mullet, rays, wedge sole, lesser spotted dogfish, horse mackerel, hake, black anglerfish, argentine, gurnards, octopus, Mediterranean horse mackerel, white anglerfish, megrim, and squid, all of them (15) comprising 90% in weight of the total landings and also almost 90% of the total economical value. The first five species contribute to more than 50% of the total landed weight and almost 50% of the total economical value.

During the sampling period, all hake sizes were observed to be retained. The small quantities discarded (1%) were due to fish being damaged. It is known that this metier landed in the past an important amount of small fish, except in the years when hake recruitment was low, to supply, together with other foreign fleets, a market used to consuming this kind of fish.

Looking at these results and considering that this is an extremely mixed fishery without well-defined species, the positive effect of increasing the codend mesh size from 65mm to bigger sizes on the overall retained catch is not clear.

The Northern Hake Recovery Plan includes a change in the mesh size along extended areas of Divisions VIIIa,b,d. This would decrease the catch of hake juveniles and have excessive negative consequences for this metier that, as mentioned earlier, exploits a mixed fishery.

iv) Bottom Pair Trawl with VHVO nets in the Bay of Biscay (with basis in Basque ports)

Effort in this metier is mainly concentrated in ICES Division VIIIa,b,d. The great majority of the vessels are adaptations of other fishing units, namely: "Bou" and "Baka" trawls, and a few longliners. This metier began to work in 1993. Until 2001 (implementation of the Emergency Plan on Northern Hake) these pair trawls used a cod end mesh size of 75mm in waters of the Bay of Biscay. In the same time period, when these trawlers operated in Sub-area VII, the codend mesh size was changed to 80 mm.

This metier targets a range of species, including hake, Mediterranean horse mackerel, and horse mackerel comprising 85% of the catch of the fishery in this area. Hake alone contributes almost 60-70% to the total landed-sampled weight and almost 70-80% in economical value.

Discarding of hake is mostly related to MLS being established. The overall discard rate was just 5%, and only for fish smaller than MLS. The variability in the retention percentages around this length is mainly caused by variations in the vigilance of the crew sorting the fish.

For hake, an estimate of L_{50} of 25.1 cm was obtained for this study. This value was very close to that obtained by Puente (Anon., 2001), specifically for this metier during 1999, for 74 mm mesh size ($L_{50}=27.2$ cm).

For hake, the positive effect of increasing the codend mesh size from 75 mm to bigger sizes to avoid undersized fish (5%) is clear. However, this benefit would also produce a notable decrease in the rest of the hake and other species catch, with their corresponding economical detriment. In relation to other species that are at present totally discarded, the implementation of bigger mesh sizes would not reduce the proportion of discards, because they are caused by reasons other than MLS (market constriction, quota restrictions, or Spanish regulations).

The Northern Hake Recovery Plan includes a change in the mesh size (100 mm) along extended areas of Divisions VIIIa,b,d in metiers focused on hake, and this is the case of this metier in its current *modus operandi*.

References

ICES, 2002. Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks. ICES C.M. 2002 ACFM/05.

4.2 Cod in the Atlantic west of Scotland (VIa), (Commission Regulations 259/2001, 456/2001, 2056/2001)

The immediate requirement of Reg. 259/2001 was to allow as many cod as possible to spawn before the end of April 2001 when the spawning season finishes. That regulation was therefore specific to the period 14 February to 30 April

2001. It prohibited certain fishing activities likely to impact cod in a small area north west of the Orkney and Shetland Isles. Reg. 456/2001 defined new areas closed to fishing, one to the west of Orkneys and one in the Firth of Clyde. It also created derogations for certain shellfish fisheries, including *Nephrops* trawlers using 70 to 100 mm mesh. The main fisheries catching cod west of Scotland are mixed demersal. SGDBI has not yet been provided with data for discarding of cod in Division VIa, but it is understood that a survey of commercial discarding has been conducted for many years by the FRS Marine Laboratory at Aberdeen and that these data are regularly submitted to the WGNSDS. The recovery plan for cod west of Scotland was discussed in detail by the WGNSDS 2001. (SGDBI 2002 did not have discarding information to add to that discussion.)

The SGDBI only had available the discarding information revealed in the report of the WGNSDS.

Based on this the SGDBI noted, however, that cod discards in 2000 were substantially higher than in 1995-99, due to large catches of cod year class 1999 at age 1. This increase in discards appears to be larger than anticipated in view of the expected size of the 1999 year class. Thus, current trends in cod discards in the area should be closely scrutinised.

4.3 Cod in the North Sea (IV), (Commission Regulations 259/2001, 2056/2001)

The immediate requirement of 259/2001 was to allow as many cod as possible to spawn before April 2001. That of 2056/2001 was to reduce catches of juvenile cod. Reg. 259/2001 closed a large area of the North Sea stretching from the north, round the east of Dogger Bank to an area west of Denmark, with an additional area between England and the Netherlands in the Southern Bight, from 14 February to 30 April 2001. Mixed demersal fisheries normally operate throughout these areas. SGDBI data tables 4.1.1.1.1 to 4.1.1.1.3c (1999), 4.2.1.1.1 to 4.2.1.1.3d (1999), 4.3.1.1.2a to b (1999), 4.4.1.1.1 to 4.4.1.1.3d (1999), 4.1.1.2.1 to 4.1.1.2.3c (2000), 4.2.1.2.1 to 4.2.1.2.3c (2000), 4.3.1.3.2a to 4.3.1.4.2c (2000), and 4.4.1.2.1 to 4.4.1.2.3e (2000) give discarding data for cod raised to fleet level that are relevant to, but not specific to the closed areas. SGDBI adds the following comments:

In general the amount of discards is dependent largely on the year-class strength. So, in absolute figures the discards of the endangered stocks like cod in recent years were minor. However, in relation to the strength of the two youngest yearclasses discarding may still be a major factor for the serious situation of the stocks. Therefore, any effective measure to protect juveniles should be applied.

The table below shows the amount of fishing effort, by gear type, that was sampled since 1997, and the numbers of discard and retained cod caught per hour sampled. This is for the English (CEFAS) sampling programme only. These data are presented as an example to discuss in relation to the cod recovery plan.

YEAR	GEAR	Hours Sampled	1 st Quarter		2 nd Quarter		3 rd Quarter		4 th Quarter	
			Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained
1997	Nephrops	38.53	20.6	1.8	-	-	-	-	46.1	13.3
	Otter	853.58	19.8	31.7	14.0	47.9	70.8	58.8	12.5	47.4
	Pair	118.40	3.0	28.0	12.7	105.4	-	-	238.5	192.5
1998	Beam	124.80	0.7	1.3	-	-	-	-	-	-
	Nephrops	103.62	36.9	8.1	-	-	-	-	0.8	5.3
	Otter	1042.49	31.2	66.3	62.4	132.8	23.0	68.7	7.0	57.9
	Pair	118.15	56.3	100.9	-	-	19.7	188.2	7.5	245.1
1999	Beam	213.35	-	-	-	-	1.4	5.2	0.4	0.7
	Nephrops	106.51	1.4	4.6	-	-	5.3	2.7	2.3	16.6
	Otter	379.93	13.6	36.4	0.0	0.0	18.2	27.3	32.9	21.4
	Seine	116.58	-	-	-	-	107.1	134.3	-	-
2000	Beam	440.87	0.2	1.7	0.6	0.7	10.5	0.1	13.7	0.6
	Nephrops	5.00	2.0	9.4	-	-	-	-	-	-
	Otter	282.73	2.0	5.7	10.4	10.3	13.5	14.0	-	-
	Pair	40.88	-	-	-	-	69.0	53.0	29.9	42.7
	Seine	167.45	-	-	-	-	0.2	0.6	-	-
2001	Beam	53.50	-	-	0.1	0.0	-	-	2.5	1.1
	Nephrops	213.28	7.7	7.6	2.1	18.6	1.9	1.9	0.5	10.9
	Otter	516.66	6.7	13.9	6.9	17.0	4.0	11.0	5.9	34.2
	Pair	85.67	-	-	16.5	33.6	-	-	76.0	113.4
	Seine	106.05	-	-	0.1	3.5	-	-	-	-

Pair trawls had the highest individual catch rates of all the gears with a maximum of >400 fish caught/hr fishing, but infrequent sampling means this cannot be explored in depth. Otter trawl was the most sampled gear type throughout all the years. Therefore to try and assess the use of discard sampling data in relation to the North Sea Cod Recovery Plan, only otter trawl data may be used. Rather than considering discards alone it was thought better to have catch rates both for discards and retained, because the recovery plans depend on the whole fishing mortality and not just the discarded part.

In 1997 the catch rates of retained and discarded cod in the otter trawl fishery ranged between about 51 fish caught (discards + retained) per hour and 130/hr. In 1998 the rates were between 64 and 195/hr, but in 1999 the range fell to about 45/hr and fell even further in 2000 and 2001 to approximately 20/hr. However, in the 4th quarter of 2001 the rate has started to rise again to 40/hr.

The English catch sampling data (discards and retained) now spans back to 1994 for cod, and this could be used to assess catches before and after cod recovery measures in the North Sea. For example, changes in codend mesh sizes could be analysed to determine if total catches and discard rates are affected or to detect the effects of changes in traditional fishing patterns due to closed areas displacing effort. All this would rely on continued sampling effort. It should also be noted that there are gaps in the data where quarters and gear types could not be sampled.

The DIFRES has collected discard data since 1995, and total discards of cod as weight percent of the species catch for the period 1995-2000 has been calculated as:

North Sea	Gear				
	Demersal trawl	Anchor Seine	Pandalus trawl	Gillnet	Beam Trawl
Discarded cod (Weight %) of total cod catch	10	6	14	3	13
Skagerrak	Gear				
	Demersal trawl	Anchor Seine	Nephrops trawl	Gillnet	Beam Trawl
Discarded cod (Weight %) of total cod catch	16	22	61	6	13

Results are based on 132 trips and 1733 hauls in the North Sea, and 81 trips and 312 hauls in Skagerrak.

As an outlook into the near future it shall be mentioned, that in the German Waddensea in 2001 a high production of young cod has been observed. Though sieve-nets were applied in the brown-shrimp fishery some discarding was unavoidable there. In September / October 2001 the young fish have left the shallow areas and entered the coastal zone without being decimated by a fishery due to the lack of any other fish concentration. These circumstances might be responsible for the survival of this perhaps rather unimportant year-class.

4.4 Cod in the Irish Sea (VIIa), (Commission Regulations 2549/2000, 300/2001, 1456/2001)

Regulation 2549/2000 states that the stock of mature cod in the Irish Sea is depleted and that greater protection of juveniles is required. The main fisheries catching cod in the Irish Sea include demersal trawls, *Nephrops* trawls, and beam trawls. The area closed to fishing in 2000 stretched across the Irish Sea in a band south of Scotland and North of Wales around the Isle of Man. Closure in 2001 was restricted to the western Irish Sea only. SGDBI has no data tables on cod in the Irish Sea partly because discard studies in that area were restricted by funds. We are aware that the Dept. of Agriculture and Rural Development of Northern Ireland has undertaken relevant sampling, but these data were not available to the 2002 meeting of SGDBI. Occasional sampling was begun in 2001 by CEFAS, Lowestoft.

The cod fishery in Div. VIIa is dominated by the UK (NI) pelagic and bottom trawl fleets and by the Irish trawl fleet, which mainly operates in the western Irish Sea. A notable feature of the Irish Sea mixed *gadoid* fishery has been the increased targeting of haddock by the traditional cod fleet operating in the western Irish Sea in the last number of years. Haddock abundance has increased substantially in the Irish Sea due to some very large year-classes. These have become the target of a directed fishery by UK (NI) and the Irish fleet. The Irish discard sampling program indicates that discarding of cod in Div. VIIa by the Irish otter trawl fleet for the years 1995 until 2001 is negligible. An assessment of the recovery plan regarding discard information is therefore not possible.

Sampling by England was first carried out during 2000 on inshore otter trawls and offshore beam trawls that were fishing in the Irish Sea to investigate the quantities of cod caught as by-catch. This was at the request of the fishing industry in response to the cod recovery measures because these fisheries claimed minimal cod catches. In 2001 additional funding by the UK government allowed more sampling to occur in the Irish Sea to help establish sampling in this area. Details of sampling and discarding are shown in the table below.

Table. Sampling effort and the numbers of cod discarded by England in the Irish Sea.

Period	Gear Type	Trips	Hauls	Towing Hours Sampled	Discarded Cod Measured	Retained Cod Measured	Total Cod caught, raised to total reported fleet effort
Q1 2000	Otter Trawl	10	33	59.17	256	32	21312
Q2 2000	Beam Trawl	1	104	120.34	193	7	4400
Q2 2000	Otter Trawl	9	33	70.38	77	16	16647
Q1 2001	Otter Trawl	2	28	173.85	40	1618	69936
Q1 2001	Nephrops Trawl	6	20	100.26	161	289	1800*
Q2 2001	Otter Trawl	3	16	68.78	93	112	40385
Q2 2001	Nephrops Trawl	2	19	96.33	178	50	2280*
Q2 2001	Seine	1	13	25.76	0	102	1326

* the officially reported effort for these quarters and gears seems to be extremely low but when rechecked was as reported.

It should be noted that fishing effort may have been lower than usual because of the restrictions of the recovery plan, which would lead to low raising factors when converting sampled cod to total fleet discarded cod.

The claims by industry that beam trawls and English inshore otter trawls catch very few cod seems to be well founded in 2000, as the quantities of cod caught are quite low. The maximum catch rate for 2000 was less than 5 cod per hour. The numbers of cod in the Irish Sea at this time were already at a very low level, so occurrence of cod in catches should also be low. If stocks were to increase then so would the quantities discarded. In addition all the trips sampled in 2000 occurred in the eastern or southern Irish Sea away from the main closed area.

In 2001 the catches of cod are all still very low although the areas being fished were different. For example, the *Nephrops* trawling all occurred in the north eastern Irish Sea off the Cumbrian coast. The one exception to this was the otter trawls in the 1st quarter 2001. One of these was fishing in the Northern Channel of the Irish Sea and this increased the catch rate of cod for this gear type to nearly 10 fish per hour. However, this is still quite a low catch rate.

To summarise, the levels of cod catches by English vessels in the Irish Sea are low and the significance of these to the Irish Sea cod recovery plan is also probably low. Only otter trawls in the mixed *gadoid* fisheries in the more northern Irish Sea waters may have an impact on the spawning stock, but from our data this is also likely to be low. The discard information has only been collected since 2000 and therefore there is no time-series yet to use to assess the cod recovery plan in this area.

4.5 Cod in the Baltic

On the implication of increased minimum mesh size and change in minimum landing size on the discard of eastern Baltic cod.

Although no recovery plan for eastern Baltic cod exists, the introduction of the so-called BACOMA window is believed to have significant influence on the catch and discard of cod in the Baltic Sea in 2002. Some rough calculations can be made to illustrate the consequences of the change in minimum mesh size and a change in minimum landing size. The calculations are made on the length distribution of cod in the trawl catches (discarded plus retained) in 2000 for the major Sub-divisions where cod are fished (SD 25 and 26). The data include all countries fishing for cod in the area. Comparing the observed length distribution in the stock with the fitted ogive for fishing mortality (fraction retained) and simulating a range of mesh sizes and fishing mortalities the text tables below express the resulting discard percentage in weight under different circumstances. By comparing the discard percentages in the WGBFAS report for 2001 (Table 3.13.5.b.4) stated for the 120 mm square mesh in the BACOMA window it could be verified that this equals approximately the discard percentage in a 150 mm diamond mesh.

Mesh size (mm)	Minimum landing size (mm)			
	350	380	410	440
120	1,8	6,8	16,6	30,2
130	0,9	4,6	13,4	27,1
140	0,4	2,5	9,2	22,1
150	0,1	1,1	5,1	15,5

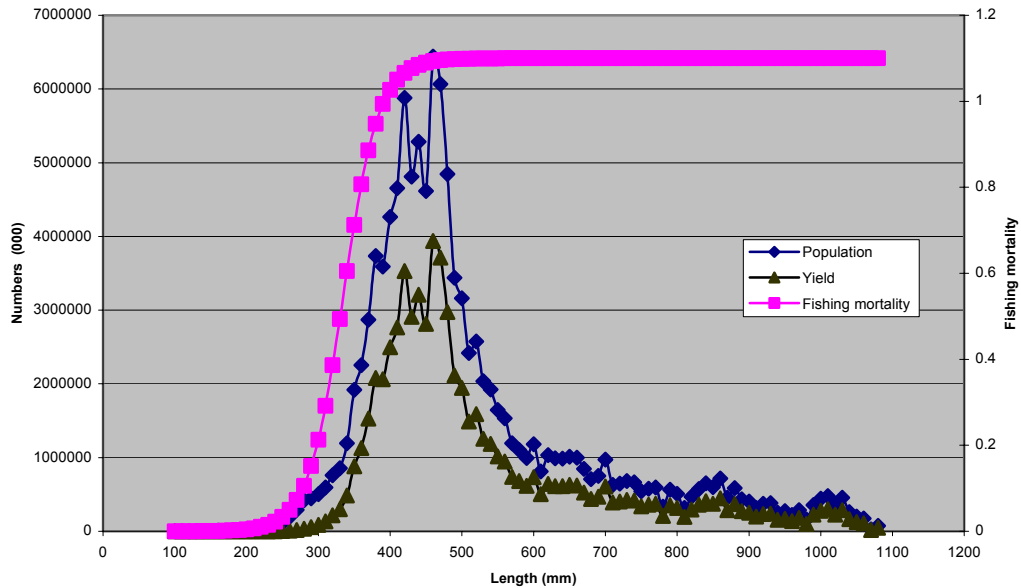
The discard percentage of cod in weight as a function of minimum landing size and minimum mesh size. The fishing mortality is assumed to be 0.6. The shaded area indicates the situation using the BACOMA window and if the fishing mortality is reduced to 0.6 as recommended.

Mesh size (mm)	Minimum landing size (mm)			
	350	380	410	440
120	2,0	7,2	17,1	30,8
130	1,0	5,1	14,2	27,9
140	0,4	2,8	10,1	23,3
150	0,2	1,3	5,8	16,9

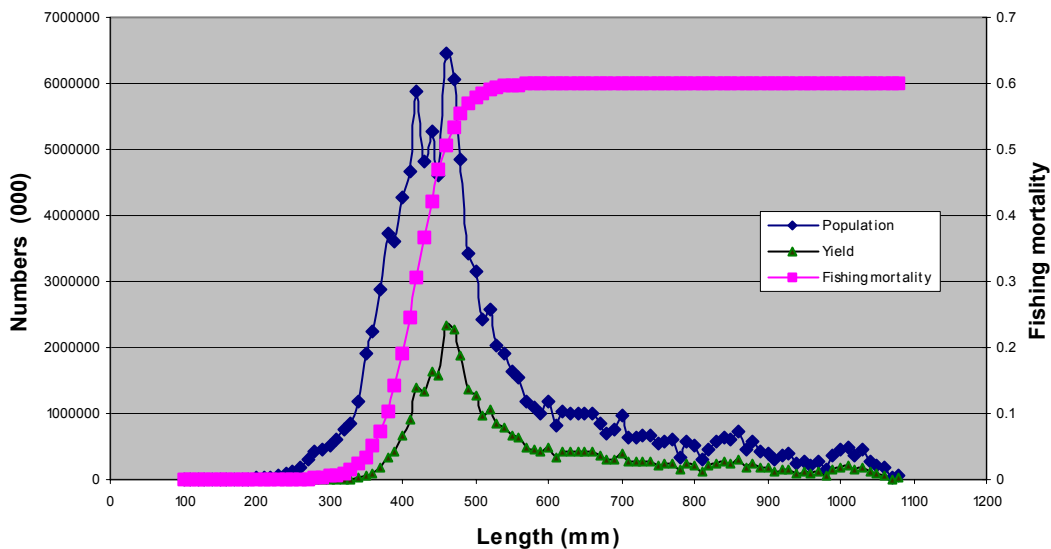
The discard percentage of cod in weight as a function of minimum landing size and minimum mesh size. The fishing mortality is assumed to be 1.1. The shaded cell indicates the situation as it was before introduction of the BACOMA window and using a fishing mortality of 1.1, as is approximately the situation in 2001.

Changing from 120 mm minimum mesh size to 150 mm (equals BACOMA 120 mm square mesh) and reducing the fishing mortality from 1.1 to 0.6 ($=F_{pa}$) will according to the calculations mean a reduction in discard percentages in weight from 2.0 to 0.1.

The text figure below shows the population length distribution, the fishing mortality and the yield as a function of the length of the cod. Two situations are described: first the situation before 1st of January 2002 where a minimum of 120 mm diamond mesh size is used and a fishing mortality of 1.1, and second the situation after 1st of January 2002 where a minimum of 150 mm diamond mesh size is used (equals BACOMA 120 mm square mesh mounted in the trawl) and a fishing mortality of 0.6 (equal F_{pa}).



Plot of length distribution of eastern cod as observed in 2000, the selection ogive for using 120 mm mesh size expressed in mortality and the yield by length group. The fishery mortality is assumed to be 1.1. This situation is supposed to reflect the situation before the BACOMA window was introduced (2001).



Plot of length distribution of eastern cod as observed in 2000, the selection ogive for using 150 mm mesh size expressed in fishing mortality and the yield by length group. The fishery mortality is assumed to be equal to $F_{pa} = 0.6$. This situation is supposed to illustrate the situation after 1st of January 2002.

Comparing the length distribution and the fishing mortality on the situation before introduction of the BACOMA window it can be seen that the mesh size actually has very little impact on the yield as the L_{50} for 120 mm diamond mesh size is well below the peak of the population length distribution. The introduction of the BACOMA window will probably lower the yield substantially as the fishing mortality on the smaller size groups is significantly smaller because of an increased L_{50} . Furthermore, it will probably make sense to increase the minimum landing size to app. 40 cm. There are no dynamics incorporated in the calculations, which describes the medium- and long-term impact introducing the BACOMA window.

5 T.O.R. (D): COD AND PLAICE DISCARDS IN THE NORTH SEA, 1970 TO PRESENT

Chapter 4 or the SGDBI data files contain fairly extensive data for cod and plaice discarded mostly by trawl and beam trawl fleets during 1997 to 2001. A sprinkling of earlier data do exist, e.g. interviews of skippers by the Fisheries Laboratory at Lowestoft during the 1960s and sampling of a limited number of vessels operating from the NE of England from 1994 and German data on cod in the German Bight in the 1980s. These data, apart from being sporadic, were collected with different methods to those used now and have unknown bias. The SGDBI did not therefore consider it would be instructive to compile them.

6 MATTERS RAISED BY PGCCDBS, 5-8 FEB 2002

Please refer to section 1.2 for the list of matters raised for the attention of SGDBI 2002.

6.1 Maturity staging

Maturity staging is not usually done during discard sampling.

6.2 Planned sampling in 2002

Sampling during 2002 will be governed by the EC Regulation 1639/2001 on Collection of Fisheries Data. Many countries have already started to sample. The specific effects of the regulation in the different countries represented at SGDBI were expected to be as follows:

England: A total of 6 to 8 observers would be employed to undertake discard sampling from the east, south, and west coasts of England and Wales. Only 3 observers were currently employed for discard sampling under a nationally (DEFRA) funded project intended to extend experience beyond trawl fisheries of the NE coast and thereby to assist with planning of national sampling under the regulation.

Ireland: 6 observers will continue to be employed to sample discards and undertake other duties. They are based at ports around the coast. The 7 most significant demersal fleets will be sampled. Species include haddock, whiting, plaice, and hake. Ireland also plans to supplement sampling required under the Regulation by estimating discarding of megrim, anglers, and *Nephrops*, three species of particular importance nationally. Fishing trips from Ireland tend to be of long duration (approximately 10 days) so that the number of fleets that can be sampled in a year is limited.

Spain: 1 observer will be employed to sample discards on trips to Sub areas VI and VII. These tend to be long trips (e.g. 16 days) so that it is expected that only 12 trips will be observed per year. 1 additional observer would be employed during 60 days for Divisions VIIIc and IXa where trips tend to be variable in length. In Divisions VIIIa,b,d 3 trips per quarter by bottom trawlers (VHVO pair trawls and/or "baka" otter trawls) would be sampled. Hake, among other species, will be sampled according to the official planning.

Sweden: 6 observers are employed. 40 trips are planned for the North Sea and Skagerrak, expected to need 104 days at sea. 88 trips are planned for the Baltic and Kattegat, expected to need 296 days at sea.

Germany: 2 observers are employed in the Baltic where there were 2 principal fisheries to be sampled. 2 or 3 observers are employed in the North Sea and North Atlantic. In addition, some observer trips are made by regular members of staff at the Institut für Seefischerei.

Denmark: 250 observer days were planned for the North Sea and Skagerrak where the 17 most significant fisheries will be sampled, and 250 for the Baltic and Kattegat where the 7 most significant fisheries will be sampled. 10 or 12 technical assistants are employed, but they will also have non sea-going duties.

Iceland: 8 fishery inspectors will be used to sample 6 fisheries mostly targeting cod and haddock. Trips were of variable length so it was not possible to say how many trips could be observed. However, it was expected that approximately 75 000 lengths would be measured for discards (and about the same for landings). The intention was to cover the main fishing areas by season.

6.3 Regional coverage of available data

This question from the PGCCDBS is similar to t.o.r. (b). Please refer to section (3) above. We would like to add that the time taken to organise and sail on fishing trips can be considerable, especially if trips are of long duration. Also, that bad weather, low fishing activities, and sometimes poor cooperation by the fishing industry and safety problems can all hinder discard sampling plans. In many countries, therefore, there are limited opportunities to deploy small numbers of observers so that "sampling coverage reflects the relative impact of each fishery in each area" as recommended by the PGCCDBS.

6.4 Stratification for sampling discards and commercial landings

Given that the primary objective of discard sampling is to improve catch estimates used for stock assessments, it would in theory be a good idea to use the same sampling strata for estimation of discards as for landings. Then, raised discards can simply be added to landings to give the total catch for that stratum. The SGDBI have attempted to approach this goal with the data tables created. Available discard estimates have been raised to 'fleet' level in order to reflect primary gear types, ICES Sub-areas and Divisions, and seasonal or annual periods.

In practice, use of these strata for sampling discards is not necessarily efficient. Firstly, quantities of fish discarded are often not proportional to quantities landed, depending on the size selectivity of the fishing gear and the availability of quota to land a species. Also, it is possible to sample the landings of several vessels during one visit to a port, but one discard sampling trip may occupy 2 or 3 weeks. Therefore, a statistically based sampling scheme would call for different sampling strata. Secondly, large numbers of sampling strata are not practical for discard sampling with small numbers of observers, as in most European countries. In many sampling periods it simply will not be possible for the observers to sample trips from each of many strata. The result is that unbiased estimation is made very difficult.

The design of sampling strata is also relevant to the raising of discard data. Raising of results for a trip to an estimate for a fleet may utilise the number of vessels in the fleet, the total effort, or the total landings. Whichever factor is selected, reliable data must be available to fit the chosen sampling strata. Raising methods were discussed in detail in SGDBI 2000. For example, a fishery with a defined gear type (or mesh size) as a sampling stratum has to have matching landings declarations.

As already noted in this report, the limited resources given to observer programmes for sampling discards means that estimates needed for stock assessments may be totally missing, or have low precision. We have noted (SGDBI, 2001, section 1.4) that accurate estimation of the precision of discarded quantities is difficult. Furthermore, the method of stock assessment most commonly used by ICES stock assessment working groups is currently XSA. This assumes that the landings- or catch-at-age matrix is known very accurately in order to decide which tuning fleets to include in the assessment, and what weighting to give them. The use of catch-at-age matrices derived by adding landings to raised discard data that are affected by substantial sampling errors appears to be a problem for the XSA method, and maybe for others as well. There may also be sampling errors in the landings-at-age matrix to take into account. A review of the use of discarding data in stock assessments (Cotter et al. 2002) is included in the final report of EC project 98/097 concerning the North Sea and Skagerrak.

SGDBI suspects that mistaken expectations exist for discard sampling. In many countries, surveys were started in the second half of the 1990s in order to learn more about the need for special technical measures to control wastage of fish in certain fisheries, particularly trawl fisheries, which are poorly selective for species and size. Nowadays, an objective of some observer programmes is to provide discard data that will improve the precision of stock assessments. Unfortunately, whilst large, highly diverse fishing fleets are being sampled by a small handful of observers faced with many practical difficulties, there is a risk that assessments will be made less accurate, not more, by the addition of the resulting raised estimates of discarding.

6.5 Sampling strategy suggested by SGDBI

SGDBI 2000 briefly considered known ways of estimating discarding but without recommending one uniform best practice. The

- high diversity of fleets in different countries,
- the different levels of information available about those fleets (vessel lists, total effort, etc.),
- the different trip lengths typical (e.g. 1 day or 30 days),
- the different observer resources (from 2 covering a long coast line, to all trips observed, as in Canada), and,
- to some extent, the different ideas on statistical theory suitable for discard surveys,

all stand in the way of a standardised, agreeable sampling scheme for discards.

6.6 Sampling discards and associated landings of national vessels landing abroad

EC regulation 1639/2001 specifies (Chapter III.H.c) that the member state on whose territory landings take place are responsible for installing sampling programmes for the biological sampling of landings. The situation is less clear for discards. The PGCCDBS recommended, "the country of origin makes arrangements to sample the discards". SGDBI finds that "country of origin" could refer to the country of landing, the country of ownership, or the country of registration of the vessel. We consider the three options for responsibility for arranging sampling of discards:

The country of landing: Observers in the country of landing often have difficulty in finding out when and where a foreign vessel will be landing. This makes scheduling of the trips with their main sampling programme for national vessels very difficult. Having successfully boarded a vessel in his/her own country, the observer may be transported to another distant country for the next landing and then be faced with an expensive return journey. The observer may have language difficulties on board. There may subsequently be difficulties obtaining data from the foreign country to permit raising of results from the sampled trip to the appropriate fleet. Alternatively, results may be sent to the foreign country for their use. Teams of observers tend to be so busy with sampling their own national vessels that they are reluctant to sample for other countries. This might be altered by making contractual arrangements, but the scheduling problem remains.

The country of ownership: Observers are likely to have to travel both to and from the country of ownership, unless the vessel is operating elsewhere. This reduces efficiency, particularly if the vessel sails without the observer, or cannot sail, e.g. due to weather or breakdown. The country of ownership may not have comprehensive lists of all the vessels owned (only those registered with them). Inclusion of all vessels in a sampling scheme may therefore be difficult. The country of ownership is likely not to have the information necessary to raise trip results to the appropriate fleet level. Observers from the country of ownership are likely to speak the same language as the crew.

The country of registration (flag country): The flag country will have all available information about the vessel and will therefore be in the best position to schedule sampling and to raise trip results to the appropriate fleet. Transportation and language problems are likely to arise. However, contracting the country of landing to undertake the sampling and to send back the data for the trip could be practical, provided that sufficient notice is given.

6.7 Comments on the BALTCOM database

BALTCOM is an SQL database, currently located at DIFRES Charlottenlund, and distinguished from most earlier fishery data systems in being web-based and readily accessible by many people. Data are held for every haul sampled by observers at sea. SGDBI was briefly shown some of BALTCOM's impressive, modern features developed with international usage specifically in mind. Project partners may contribute data at any time provided that they pass automatic quality control tests. They may also make retrievals for assessments or other purposes independently, with considerable flexibility and a quick response. Neither uploading nor retrieval requires the time of central database staff with the benefit that costs can be kept relatively low.

SGDBI considered that BALTCOM demonstrated well the opportunities for holding discard data regionally and, in principle at least, showed a promising way forward. However, there would be a need to assess carefully how such a database could be applied to regions other than the Baltic. Possible problems are:

- Fishers may disapprove of the level of disaggregation of the data because haul by haul information might reveal the identity of a vessel to fishing competitors or to enforcement agencies, even though the name of the vessel itself is not stored. Fishers might withdraw their cooperation with sampling activities as a result.
- National sampling authorities may claim intellectual property rights over some data, or fail to contribute required information for other reasons.

- Different types of fishing vessels, discard sample surveys, and data raising methods in each region may cause significant computational problems.
- Linking of discards and landings data in one data base, if thought desirable, could raise various technical problems in each region.

Another difficulty arises from drawing boundaries between seas. For example, some North Sea fish stocks (area IV) are currently taken to include the eastern Channel (VIId), while others include the Skagerrak (IIIa). Enlarging the area served by the database would solve these problems but might create the harder problem of finding agreement on technical details of the database among many countries.

7 CONCLUDING REMARKS

This report concludes the cycle of three meetings initially proposed by ACFM. The direction of the terms of reference was to compile annual or quarterly estimates of discarding for whole fisheries (gear types) over large marine areas with the intention that they be used by ICES stock assessment working groups. SGDBI believes that the data it has compiled provide a useful resource for those needing to understand the full effects of fisheries better than can be learned from official landings statistics. It has also provided an answer to those critics who allege that discard data are too secret. The identities of fishing vessels must remain confidential because our observers sail on them through the courtesy of their owners and crew. Our agreements with them have not been breached by publishing discarding data raised to fleet level on the ICES web-site.

SGDBI is less confident that it has provided a valuable resource for improving the accuracy of stock assessments. Firstly, our data files are incomplete. Some countries hold discarding data but did not make them available to SGDBI. There can be many reasons for this, including other commitments of staff and political prohibitions emanating from the national fishing industry. We are also aware that significant resources of discarding data are provided directly to stock assessment WGs without being submitted to the SGDBI. We do not wish to criticise that practice. On the contrary, it may in fact be a more practical solution. The WG can specify precisely how it wants the data, and the submitting country does not have the expense of attending SGDBI. The down-side is that other interested people may not be able to see the data, or may not know that they exist. Also, there is no sharing of experience about discard sampling. The new BALTCOM database (section 6.7) provides another option for collating discarding data and making them widely available.

Secondly, whatever the mechanism of dissemination, there are concerns over the use of discard results collected by small numbers of observers in stock assessments. Although we have not attempted to calculate standard errors and confidence levels for our discarding estimates, our experience of the variability within fleets and of the variability caused by annual fluctuations in recruitment strongly suggests that the levels of sampling effort currently being applied in European fisheries are not providing adequate discarding information for stock assessments as currently carried out. The problems are the more significant when discarding occurs at high and variable levels, as it certainly does in several CFP fisheries.

The new EC Data Collection regulation will lead to continuation and some expansion of discard sampling practices, and offers good hope of continuity of funding for several years. We agree with the PGCCDBS that there is a need for regional planning and collaboration, perhaps with specialist groups to deal with the technical aspects of discard sampling. The pooling of data from several countries sampling the same fishery can provide statistically more precise estimates of total discarding and of proportion discarded than can be achieved by one country alone because of the larger sample sizes available. Such collaboration has been achieved recently for the North Sea under EC project 98/097, and for the Baltic and Kattegat under EC project 98/024. [SGDBI did not itself attempt to pool results internationally because of the incompleteness of the data and the substantial computing work involved; see section 1.3 of SGDBI 2001.] If discard sampling does become regionally organised, there appears to be a need for a coordinating group where technical issues and the applications of results can be discussed. The group should contain some stock assessment modelling expertise. It could also be linked to the PGCCDBS who are concerned with all aspects of data collection.

Given that European discard sampling is to continue, consideration should be given to the terms under which it is done. In most countries, excellent relations are experienced with the fishing industry. In others, sampling programmes are hindered by refusals to accept observers on vessels or by prohibitions placed on dissemination of data, e.g. to SGDBI. These events may seriously bias regional and fleet level discarding estimates. Safety of observers is another issue. In England, 5 of the vessels that have hosted observers have sunk since May 2000, yet observers may have little opportunity to assess the current safety of a vessel before boarding lest they offend the host crew. Having the right to sail is something, which should be considered carefully. It could reduce the access and safety problems but may affect

the predominantly cooperative attitude of the fishing industry, and may lead to abnormal discarding behaviour when an observer is on board.

References

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Table 4.1.2.1.3a Raised numbers, lengths and weights at age of discards, Haddock, beam trawl >79 mm, 1999.

Table 4.1.2.1.3b Raised numbers, lengths and weights at age of discards, Haddock, otter trawl , 1999.

Table 4.1.2.1.3c Raised numbers, lengths and weights at age of discards, Haddock, pair trawl , 1999.

Table 4.1.2.2.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 2000.

Table 4.1.2.2.2a Raised quarterly length distributions, Haddock, Area IVa-c, beam trawl >79 m, 2000.

Table 4.1.2.2.2b Raised quarterly length distributions, Haddock, Area IVa-c, otter trawl, 2000.

Table 4.1.2.2.2c Raised quarterly length distributions, Haddock, Area IVa-c, pair trawl, 2000.

Table 4.1.2.2.3a Raised numbers, lengths and weights at age of discards, Haddock, beam trawl >79 mm, 2000.

Table 4.1.2.2.3b Raised numbers, lengths and weights at age of discards, Haddock, otter trawl , 2000.

Table 4.1.2.2.3c Raised numbers, lengths and weights at age of discards, Haddock, pair trawl , 2000.

Table 4.1.2.3.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 2001.

Table 4.1.2.3.2a Raised quarterly length distributions, Haddock, Area IVa-c, beam trawl >79 m, 2001.

Table 4.1.2.3.2b Raised quarterly length distributions, Haddock, Area IVa-c, otter trawl, 2001.

Table 4.1.2.3.2c Raised quarterly length distributions, Haddock, Area IVa-c, pair trawl, 2001.

Table 4.1.2.3.3a Raised numbers, lengths and weights at age of discards, Haddock, beam trawl >79 mm, 2001.

Table 4.1.2.3.3b Raised numbers, lengths and weights at age of discards, Haddock, otter trawl , 2001.

Table 4.1.2.3.3c Raised numbers, lengths and weights at age of discards, Haddock, pair trawl , 2001.

Plaice, Area IV, 1999-2001, Germany:

Table 4.1.3.1.1 Raised tonnes discarded, Plaice , Area IVa-c, all gears, 1999.

Table 4.1.3.1.2a Raised quarterly length distributions, Plaice , Area IVa-c, beam trawl >79 m, 1999.

Table 4.1.3.1.2b Raised quarterly length distributions, Plaice , Area IVa-c, otter trawl, 1999.

Table 4.1.3.1.2c Raised quarterly length distributions, Plaice , Area IVa-c, pair trawl, 1999.

Table 4.1.3.1.2d Raised quarterly length distributions, Plaice , Area IVa-c, fly seine, 1999.

Table 4.1.3.1.3a Raised numbers, lengths and weights at age of discards, Plaice , beam trawl >79 mm, 1999.

Table 4.1.3.1.3b Raised numbers, lengths and weights at age of discards, Plaice , otter trawl , 1999.

Table 4.1.3.1.3c Raised numbers, lengths and weights at age of discards, Plaice , pair trawl , 1999.

Table 4.1.3.1.3d Raised numbers, lengths and weights at age of discards, Plaice , fly seine, 1999.

Table 4.1.3.2.1 Raised tonnes discarded, Plaice , Area IVa-c, all gears, 2000.

Table 4.1.3.2.2a Raised quarterly length distributions, Plaice , Area IVa-c, beam trawl >79 m, 2000.

Table 4.1.3.2.2b Raised quarterly length distributions, Plaice , Area IVa-c, otter trawl, 2000.

Table 4.1.3.2.2c Raised quarterly length distributions, Plaice , Area IVa-c, pair trawl, 2000.

Table 4.1.3.2.3a Raised numbers, lengths and weights at age of discards, Plaice , beam trawl >79 mm, 2000.

Table 4.1.3.2.3b Raised numbers, lengths and weights at age of discards, Plaice , otter trawl , 2000.

Table 4.1.3.2.3c Raised numbers, lengths and weights at age of discards, Plaice , pair trawl , 2000.

Table 4.1.3.3.1 Raised tonnes discarded, Plaice , Area IVa-c, all gears, 2001.

Table 4.1.3.3.2a Raised quarterly length distributions, Plaice , Area IVa-c, beam trawl >79 m, 2001.

Table 4.1.3.3.2b Raised quarterly length distributions, Plaice , Area IVa-c, otter trawl, 2001.

Table 4.1.3.3.2c Raised quarterly length distributions, Plaice , Area IVa-c, pair trawl, 2001.

Table 4.1.3.3.3a Raised numbers, lengths and weights at age of discards, Plaice , beam trawl >79 mm, 2001.

Table 4.1.3.3.3b Raised numbers, lengths and weights at age of discards, Plaice , otter trawl , 2001.

Table 4.1.3.3.3c Raised numbers, lengths and weights at age of discards, Plaice , pair trawl , 2001.

Saithe, Area IV, 1999-2001, Germany:

Table 4.1.4.1.1 Raised tonnes discarded, Saithe , Area IVa-c, all gears, 1999.

Table 4.1.4.1.2 Raised quarterly length distributions, Saithe, Area IVa-c, otter trawl, 1999.

Table 4.1.4.1.3 Raised numbers, lengths and weights at age of discards, Saithe, otter trawl , 1999.

Table 4.1.4.2.1 Raised tonnes discarded, Saithe , Area IVa-c, all gears, 2000.

Table 4.1.4.2.2 Raised quarterly length distributions, Saithe, Area IVa-c, otter trawl, 2000.

Table 4.1.4.2.3 Raised numbers, lengths and weights at age of discards, Saithe, otter trawl , 2000.

Table 4.1.4.3.1 Raised tonnes discarded, Saithe , Area IVa-c, all gears, 2001.

Table 4.1.4.3.2 Raised quarterly length distributions, Saithe, Area IVa-c, otter trawl, 2001.

Table 4.1.4.3.3 Raised numbers, lengths and weights at age of discards, Saithe, otter trawl , 2001.

Sole, Area IV, 1999-2001, Germany:

Table 4.1.5.1.1 Raised tonnes discarded, Sole , Area IVa-c, all gears, 1999.

Table 4.1.5.1.2a Raised quarterly length distributions, Sole , Area IVa-c, beam trawl >79 m, 1999.

Table 4.1.5.1.2b Raised quarterly length distributions, Sole , Area IVa-c, otter trawl, 1999.

Table 4.1.5.1.2c Raised quarterly length distributions, Sole , Area IVa-c, fly seine, 1999.

Table 4.1.5.1.3a Raised numbers, lengths and weights at age of discards, Sole , beam trawl >79 mm, 1999.

Table 4.1.5.1.3b Raised numbers, lengths and weights at age of discards, Sole , otter trawl , 1999.

Table 4.1.5.1.3c Raised numbers, lengths and weights at age of discards, Sole , fly seine, 1999.

Table 4.1.5.2.1 Raised tonnes discarded, Sole , Area IVa-c, all gears, 2000.

Table 4.1.5.2.2a Raised quarterly length distributions, Sole , Area IVa-c, beam trawl >79 m, 2000.

Table 4.1.5.2.2b Raised quarterly length distributions, Sole , Area IVa-c, otter trawl, 2000.

Table 4.1.5.2.3a Raised numbers, lengths and weights at age of discards, Sole , beam trawl >79 mm, 2000.

Table 4.1.5.2.3b Raised numbers, lengths and weights at age of discards, Sole , otter trawl , 2000.

Table 4.1.5.3.1 Raised tonnes discarded, Sole , Area IVa-c, all gears, 2001.

Table 4.1.5.3.2a Raised quarterly length distributions, Sole , Area IVa-c, beam trawl >79 m, 2001.

Table 4.1.5.3.2b Raised quarterly length distributions, Sole , Area IVa-c, otter trawl, 2001.

Table 4.1.5.3.2c Raised quarterly length distributions, Sole, Area IVa-c, pair trawl, 2001.

Table 4.1.5.3.3a Raised numbers, lengths and weights at age of discards, Sole , beam trawl >79 mm, 2001.

Table 4.1.5.3.3b Raised numbers, lengths and weights at age of discards, Sole , otter trawl , 2001.

Whiting, Area IV, 1999-2001, Germany:

Table 4.1.6.1.1 Raised tonnes discarded, Whiting , Area IVa-c, all gears, 1999.

Table 4.1.6.1.2a Raised quarterly length distributions, Whiting , Area IVa-c, beam trawl >79 m, 1999.

Table 4.1.6.1.2b Raised quarterly length distributions, Whiting , Area IVa-c, otter trawl, 1999.

Table 4.1.6.1.2c Raised quarterly length distributions, Whiting , Area IVa-c, pair trawl, 1999.

Table 4.1.6.1.2d Raised quarterly length distributions, Whiting , Area IVa-c, fly seine, 1999.

Table 4.1.6.1.3a Raised numbers, lengths and weights at age of discards, Whiting , beam trawl >79 mm, 1999.

Table 4.1.6.1.3b Raised numbers, lengths and weights at age of discards, Whiting , otter trawl , 1999.

Table 4.1.6.1.3c Raised numbers, lengths and weights at age of discards, Whiting , pair trawl , 1999.

Table 4.1.6.1.3d Raised numbers, lengths and weights at age of discards, Whiting , fly seine, 1999.

Table 4.1.6.2.1 Raised tonnes discarded, Whiting , Area IVa-c, all gears, 2000.

Table 4.1.6.2.2a Raised quarterly length distributions, Whiting , Area IVa-c, beam trawl >79 m, 2000.

Table 4.1.6.2.2b Raised quarterly length distributions, Whiting , Area IVa-c, otter trawl, 2000.

Table 4.1.6.2.2c Raised quarterly length distributions, Whiting , Area IVa-c, pair trawl, 2000.

Table 4.1.6.2.2d Raised quarterly length distributions, Whiting , Area IVa-c, fly seine, 2000.

Table 4.1.6.2.3a Raised numbers, lengths and weights at age of discards, Whiting , beam trawl >79 mm, 2000.

Table 4.1.6.2.3b Raised numbers, lengths and weights at age of discards, Whiting , otter trawl , 2000.

Table 4.1.6.2.3c Raised numbers, lengths and weights at age of discards, Whiting , pair trawl , 2000.

Table 4.1.6.3.1 Raised tonnes discarded, Whiting , Area IVa-c, all gears, 2001.

Table 4.1.6.3.2a Raised quarterly length distributions, Whiting , Area IVa-c, beam trawl >79 m, 2001.

Table 4.1.6.3.2b Raised quarterly length distributions, Whiting , Area IVa-c, otter trawl, 2001.

Table 4.1.6.3.2c Raised quarterly length distributions, Whiting , Area IVa-c, pair trawl, 2001.

Table 4.1.6.3.3a Raised numbers, lengths and weights at age of discards, Whiting , beam trawl >79 mm, 2001.

Table 4.1.6.3.3b Raised numbers, lengths and weights at age of discards, Whiting , otter trawl , 2001.

Table 4.1.6.3.3c Raised numbers, lengths and weights at age of discards, Whiting , pair trawl , 2001.

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Cod, Area IV, 1997-2001, England:

Table 4.2.1.1.1 Raised tonnes discarded, Cod, Area IVa-c, all gears, 1997.

Table 4.2.1.1.2a Raised quarterly length distributions of discards, Cod, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.1.1.2b Raised quarterly length distributions of discards, Cod, Area IVa-c, otter trawl, 1997.

Table 4.2.1.1.2c Raised quarterly length distribution of discards, Cod, Area IVa-c, pair trawl, 1997.

Table 4.2.1.1.3a Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.1.1.3b Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, otter trawl, 1997.

Table 4.2.1.1.3c Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, pair trawl, 1997.

Table 4.2.1.2.1 Raised tonnes discarded, Cod, Area IVa-c, all gears, 1998.

Table 4.2.1.2.2a Raised quarterly length distributions of discards, Cod, Area IVa-c, beam trawl, 1998.

Table 4.2.1.2.2b Raised quarterly length distributions of discards, Cod, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.1.2.2c Raised quarterly length distributions of discards, Cod, Area IVa-c, otter trawl, 1998.

Table 4.2.1.2.2d Raised quarterly length distributions of discards, Cod, Area IVa-c, pair trawl, 1998.

Table 4.2.1.2.3a Raised numbers, mean lengths and mean weights at age of discards, Cod, Area IVa-c, beam trawl, 1998.

Table 4.2.1.2.3b Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.1.2.3c Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, otter trawl, 1998.

Table 4.2.1.2.3d Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, pair trawl, 1998.

Table 4.2.1.3.1 Raised tonnes discarded, Cod, Area IVa-c, all gears, 1999.

Table 4.2.1.3.2a Raised quarterly length distributions of discards, Cod, Area IVa-c, beam trawl, 1999.

Table 4.2.1.3.2b Raised quarterly length distributions of discards, Cod, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.1.3.2c Raised quarterly length distribution of discards, Cod, Area IVa-c, otter trawl, 1999.

Table 4.2.1.3.2d Raised quarterly length distribution of discards, Cod, Area IVa-c, seine trawl, 1999.

Table 4.2.1.3.3a Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, beam trawl, 1999.

Table 4.2.1.3.3b Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.1.3.3c Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, otter trawl, 1999.

Table 4.2.1.3.3d Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, seine trawl, 1999.

Table 4.2.1.4.1 Raised tonnes discarded, Cod, Area IVa-c, all gears, 2000.

Table 4.2.1.4.2a Raised quarterly length distributions of discards, Cod, Area IVa-c, beam trawl, 2000.

Table 4.2.1.4.2b Raised quarterly length distributions of discards, Cod, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.1.4.2c Raised quarterly length distributions of discards, Cod, Area IVa-c, otter trawl, 2000.

Table 4.2.1.4.2d Raised quarterly length distributions of discards, Cod, Area IVa-c, pair trawl, 2000.

Table 4.2.1.4.2e Raised quarterly length distributions of discards, Cod, Area IVa-c, seine trawl, 2000.

Table 4.2.1.4.3a Raised numbers, mean lengths and mean weights at age of discards, Cod, Area IVa-c, beam trawl, 2000.

Table 4.2.1.4.3b Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.1.4.3c Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, otter trawl, 2000.

Table 4.2.1.4.3d Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, pair trawl, 2000.

Table 4.2.1.4.3e Raised numbers, lengths and weights at age of discards, Cod, Area IVa-c, seine trawl, 2000.

Table 4.2.1.5.1 Raised tonnes discarded, Cod, Area IVa-c, all gears, 2001.

Table 4.2.1.5.2a Raised quarterly length distributions of discards, Cod, Area IVa-c, beam trawl, 2001.

Table 4.2.1.5.2b Raised quarterly length distributions of discards, Cod, Area IVa-c, Nephrops trawl, 2001.

Table 4.2.1.5.2c Raised quarterly length distributions of discards, Cod, Area IVa-c, otter trawl, 2001.

Table 4.2.1.5.2d Raised quarterly length distributions of discards, Cod, Area IVa-c, pair trawl, 2001.

Table 4.2.1.5.2e Raised quarterly length distributions of discards, Cod, Area IVa-c, seine trawl, 2001.

Haddock, Area IV, 1997-2001, England:

Table 4.2.2.1.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 1997.

Table 4.2.2.1.2a Raised quarterly length distributions of discards, Haddock, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.2.1.2b Raised quarterly length distributions of discards, Haddock, Area IVa-c, otter trawl, 1997.

Table 4.2.2.1.2c Raised quarterly length distribution of discards, Haddock, Area IVa-c, pair trawl, 1997.

Table 4.2.2.1.3a Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.2.1.3b Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, otter trawl, 1997.

Table 4.2.2.1.3c Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, pair trawl, 1997.

Table 4.2.2.2.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 1998.

Table 4.2.2.2.2a Raised quarterly length distributions of discards, Haddock, Area IVa-c, beam trawl, 1998.

Table 4.2.2.2.2b Raised quarterly length distributions of discards, Haddock, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.2.2.2c Raised quarterly length distributions of discards, Haddock, Area IVa-c, otter trawl, 1998.

Table 4.2.2.2.2d Raised quarterly length distributions of discards, Haddock, Area IVa-c, pair trawl, 1998.

Table 4.2.2.2.3a Raised numbers, mean lengths and mean weights at age of discards, Haddock, Area IVa-c, beam trawl, 1998.

Table 4.2.2.2.3b Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.2.2.3c Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, otter trawl, 1998.

Table 4.2.2.2.3d Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, pair trawl, 1998.

Table 4.2.2.3.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 1999.

Table 4.2.2.3.2a Raised quarterly length distributions of discards, Haddock, Area IVa-c, beam trawl, 1999.

Table 4.2.2.3.2b Raised quarterly length distributions of discards, Haddock, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.2.3.2c Raised quarterly length distribution of discards, Haddock, Area IVa-c, otter trawl, 1999.

Table 4.2.2.3.2d Raised quarterly length distribution of discards, Haddock, Area IVa-c, seine trawl, 1999.

Table 4.2.2.3.3a Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, beam trawl, 1999.

Table 4.2.2.3.3b Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.2.3.3c Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, otter trawl, 1999.

Table 4.2.2.3.3d Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, seine trawl, 1999.

Table 4.2.2.4.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 2000.

Table 4.2.2.4.2a Raised quarterly length distributions of discards, Haddock, Area IVa-c, beam trawl, 2000.

Table 4.2.2.4.2b Raised quarterly length distributions of discards, Haddock, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.2.4.2c Raised quarterly length distributions of discards, Haddock, Area IVa-c, otter trawl, 2000.

Table 4.2.2.4.2d Raised quarterly length distributions of discards, Haddock, Area IVa-c, pair trawl, 2000.

Table 4.2.2.4.2e Raised quarterly length distributions of discards, Haddock, Area IVa-c, seine trawl, 2000.

Table 4.2.2.4.3a Raised numbers, mean lengths and mean weights at age of discards, Haddock, Area IVa-c, beam trawl, 2000.

Table 4.2.2.4.3b Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.2.4.3c Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, otter trawl, 2000.

Table 4.2.2.4.3d Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, pair trawl, 2000.

Table 4.2.2.4.3e Raised numbers, lengths and weights at age of discards, Haddock, Area IVa-c, seine trawl, 2000.

Table 4.2.2.5.1 Raised tonnes discarded, Haddock, Area IVa-c, all gears, 2001.

Table 4.2.2.5.2a Raised quarterly length distributions of discards, Haddock, Area IVa-c, beam trawl, 2001.

Table 4.2.2.5.2b Raised quarterly length distributions of discards, Haddock, Area IVa-c, Nephrops trawl, 2001.

Table 4.2.2.5.2c Raised quarterly length distributions of discards, Haddock, Area IVa-c, otter trawl, 2001.

Table 4.2.2.5.2d Raised quarterly length distributions of discards, Haddock, Area IVa-c, pair trawl, 2001.

Table 4.2.2.5.2e Raised quarterly length distributions of discards, Haddock, Area IVa-c, seine trawl, 2001.

Whiting, Area IV, 1997-2001, England:

Table 4.2.3.1.1 Raised tonnes discarded, Whiting, Area IVa-c, all gears, 1997.

Table 4.2.3.1.2a Raised quarterly length distributions of discards, Whiting, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.3.1.2b Raised quarterly length distributions of discards, Whiting, Area IVa-c, otter trawl, 1997.

Table 4.2.3.1.2c Raised quarterly length distribution of discards, Whiting, Area IVa-c, pair trawl, 1997.

Table 4.2.3.1.3a Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, Nephrops trawl, 1997.

Table 4.2.3.1.3b Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, otter trawl, 1997.

Table 4.2.3.1.3c Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, pair trawl, 1997.

Table 4.2.3.2.1 Raised tonnes discarded, Whiting, Area IVa-c, all gears, 1998.

Table 4.2.3.2.2a Raised quarterly length distributions of discards, Whiting, Area IVa-c, beam trawl, 1998.

Table 4.2.3.2.2b Raised quarterly length distributions of discards, Whiting, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.3.2.2c Raised quarterly length distributions of discards, Whiting, Area IVa-c, otter trawl, 1998.

Table 4.2.3.2.2d Raised quarterly length distributions of discards, Whiting, Area IVa-c, pair trawl, 1998.

Table 4.2.3.2.3a Raised numbers, mean lengths and mean weights at age of discards, Whiting, Area IVa-c, beam trawl, 1998.

Table 4.2.3.2.3b Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, Nephrops trawl, 1998.

Table 4.2.3.2.3c Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, otter trawl, 1998.

Table 4.2.3.2.3d Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, pair trawl, 1998.

Table 4.2.3.3.1 Raised tonnes discarded, Whiting, Area IVa-c, all gears, 1999.

Table 4.2.3.3.2a Raised quarterly length distributions of discards, Whiting, Area IVa-c, beam trawl, 1999.

Table 4.2.3.3.2b Raised quarterly length distributions of discards, Whiting, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.3.3.2c Raised quarterly length distribution of discards, Whiting, Area IVa-c, otter trawl, 1999.

Table 4.2.3.3.2d Raised quarterly length distribution of discards, Whiting, Area IVa-c, seine trawl, 1999.

Table 4.2.3.3.3a Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, beam trawl, 1999.

Table 4.2.3.3.3b Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.3.3.3c Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, otter trawl, 1999.

Table 4.2.3.3.3d Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, seine trawl, 1999.

Table 4.2.3.4.1 Raised tonnes discarded, Whiting, Area IVa-c, all gears, 2000.

Table 4.2.3.4.2a Raised quarterly length distributions of discards, Whiting, Area IVa-c, beam trawl, 2000.

Table 4.2.3.4.2b Raised quarterly length distributions of discards, Whiting, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.3.4.2c Raised quarterly length distributions of discards, Whiting, Area IVa-c, otter trawl, 2000.

Table 4.2.3.4.2d Raised quarterly length distributions of discards, Whiting, Area IVa-c, pair trawl, 2000.

Table 4.2.3.4.2e Raised quarterly length distributions of discards, Whiting, Area IVa-c, seine trawl, 2000.

Table 4.2.3.4.3a Raised numbers, mean lengths and mean weights at age of discards, Whiting, Area IVa-c, beam trawl, 2000.

Table 4.2.3.4.3b Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.3.4.3c Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, otter trawl, 2000.

Table 4.2.3.4.3d Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, pair trawl, 2000.

Table 4.2.3.4.3e Raised numbers, lengths and weights at age of discards, Whiting, Area IVa-c, seine trawl, 2000.

Table 4.2.3.5.1 Raised tonnes discarded, Whiting, Area IVa-c, all gears, 2001.

Table 4.2.3.5.2a Raised quarterly length distributions of discards, Whiting, Area IVa-c, beam trawl, 2001.

Table 4.2.3.5.2b Raised quarterly length distributions of discards, Whiting, Area IVa-c, Nephrops trawl, 2001.

Table 4.2.3.5.2c Raised quarterly length distributions of discards, Whiting, Area IVa-c, otter trawl, 2001.

Table 4.2.3.5.2d Raised quarterly length distributions of discards, Whiting, Area IVa-c, pair trawl, 2001.

Sole, Area IV, 1998-2001, England:

Table 4.2.4.1.1 Raised tonnes discarded, Sole, Area IVa-c, all gears, 1998.

Table 4.2.4.1.2a Raised quarterly length distributions of discards, Sole, Area IVa-c, Beam trawl, 1998.

Table 4.2.4.2.1 Raised tonnes discarded, Sole, Area IVa-c, all gears, 1999.

Table 4.2.4.2.2a Raised quarterly length distributions of discards, Sole, Area IVa-c, beam trawl, 1999.

Table 4.2.3.2.3a Raised numbers, mean lengths and mean weights at age of discards, Sole, Area IVa-c, beam trawl, 1999.

Table 4.2.4.3.1 Raised tonnes discarded, Sole, Area IVa-c, all gears, 2000.

Table 4.2.4.3.2a Raised quarterly length distributions of discards, Sole, Area IVa-c, beam trawl, 2000.

Table 4.2.4.3.2b Raised quarterly length distributions of discards, Sole, Area IVa-c, Otter trawl, 2000.

Table 4.2.4.3.3a Raised numbers, lengths and weights at age of discards, Sole, Area IVa-c, beam trawl, 2000.

Table 4.2.4.3.3b Raised numbers, lengths and weights at age of discards, Sole, Area IVa-c, Otter trawl, 2000.

Table 4.2.4.4.1 Raised tonnes discarded, Sole, Area IVa-c, all gears, 2001.

Table 4.2.4.4.2a Raised quarterly length distributions of discards, Sole, Area IVa-c, beam trawl, 2001.

Table 4.2.4.4.2b Raised quarterly length distributions of discards, Sole, Area IVa-c, Nephrops trawl, 2001.

Table 4.2.4.4.2c Raised quarterly length distributions of discards, Sole, Area IVa-c, otter trawl, 2001.

Saithe, Area IV, 1998-2001, England:

Table 4.2.5.1.1 Raised tonnes discarded, Saithe, Area IVa-c, all gears, 1999.

Table 4.2.5.1.2a Raised quarterly length distributions of discards, Saithe, Area IVa-c, Beam trawl, 1999.
No Saithe age table included due to low numbers caught

Table 4.2.5.2.1 Raised tonnes discarded, Saithe, Area IVa-c, all gears, 2000.

Table 4.2.5.2.2a Raised quarterly length distributions of discards, Saithe, Area IVa-c, Beam trawl, 2000.

Table 4.2.5.2.3a Raised numbers, mean lengths and mean weights at age of discards, Saithe, Area IVa-c, beam trawl, 2000.

Table 4.2.5.3.1 Raised tonnes discarded, Saithe, Area IVa-c, all gears, 2001.

Table 4.2.5.3.2a Raised quarterly length distributions of discards, Saithe, Area IVa-c, Beam trawl, 2001.

Plaice, Area IV, 1998-2001, England:

Table 4.2.6.1.1 Raised tonnes discarded, Plaice, Area IVa-c, all gears, 1998.

Table 4.2.6.1.2a Raised quarterly length distributions of discards, Plaice, Area IVa-c, Beam trawl, 1998.

Table 4.2.6.2.1 Raised tonnes discarded, Plaice, Area IVa-c, all gears, 1999.

Table 4.2.6.2.2a Raised quarterly length distributions of discards, Plaice, Area IVa-c, beam trawl, 1999.

Table 4.2.6.2.2b Raised quarterly length distributions of discards, Plaice, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.6.2.2c Raised quarterly length distributions of discards, Plaice, Area IVa-c, otter trawl, 1999.

Table 4.2.6.2.2d Raised quarterly length distributions of discards, Plaice, Area IVa-c, seine trawl, 1999.

Table 4.2.6.2.3a Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, beam trawl, 1999.

Table 4.2.6.2.3b Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, Nephrops trawl, 1999.

Table 4.2.6.2.3c Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, otter trawl, 1999.

Table 4.2.6.2.3d Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, seine trawl, 1999.

Table 4.2.6.3.1 Raised tonnes discarded, Plaice, Area IVa-c, all gears, 2000.

Table 4.2.6.3.2a Raised quarterly length distributions of discards, Plaice, Area IVa-c, beam trawl, 2000.

Table 4.2.6.3.2b Raised quarterly length distributions of discards, Plaice, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.6.3.2c Raised quarterly length distributions of discards, Plaice, Area IVa-c, otter trawl, 2000.

Table 4.2.6.3.2d Raised quarterly length distributions of discards, Plaice, Area IVa-c, pair trawl, 2000.

Table 4.2.6.3.2e Raised quarterly length distributions of discards, Plaice, Area IVa-c, seine trawl, 2000.

Table 4.2.6.3.3a Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, beam trawl, 2000.

Table 4.2.6.3.3b Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, Nephrops trawl, 2000.

Table 4.2.6.3.3c Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, otter trawl, 2000.

Table 4.2.6.3.3d Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, pair trawl, 2000.

Table 4.2.6.3.3e Raised numbers, mean lengths and mean weights at age of discards, Plaice male and females, Area IVa-c, seine trawl, 2000.

Table 4.2.6.4.1 Raised tonnes discarded, Plaice, Area IVa-c, all gears, 2001.

Table 4.2.6.4.2a Raised quarterly length distributions of discards, Plaice, Area IVa-c, beam trawl, 2001.

Table 4.2.6.4.2b Raised quarterly length distributions of discards, Plaice, Area IVa-c, Nephrops trawl, 2001.

Table 4.2.6.4.2c Raised quarterly length distributions of discards, Plaice, Area IVa-c, otter trawl, 2001.

Table 4.2.6.4.2d Raised quarterly length distributions of discards, Plaice, Area IVa-c, pair trawl, 2001.

Table 4.2.6.4.2e Raised quarterly length distributions of discards, Plaice, Area IVa-c, seine trawl, 2001.

4.3 Denmark

Cod, Areas IIIa & IV, 1999-2001, Denmark:

Table 4.3.1.1.2a Raised quarterly length distributions of discards, Cod, Area IIIa, Anchor seine, 1999.

Table 4.3.1.1.2b Raised quarterly length distributions of discards, Cod, Area IIIa, Nephrops trawl, 1999.

Table 4.3.1.2.2a Raised quarterly length distributions of discards, Cod, Area IIIa, Anchor seine, 2000.

Table 4.3.1.2.2b Raised quarterly length distributions of discards, Cod, Area IIIa, Beam trawl, 2000.

Table 4.3.1.2.2c Raised quarterly length distributions of discards, Cod, Area IIIa, Otter trawl, 2000.

Table 4.3.1.2.2d Raised quarterly length distributions of discards, Cod, Area IIIa, Nephrops trawl, 2000.

Table 4.3.1.3.2a Raised quarterly length distributions of discards, Cod, Area IV, Otter trawl, 1999.

Table 4.3.1.3.2b Raised quarterly length distributions of discards, Cod, Area IV, Anchor seine, 1999.

Table 4.3.1.4.2a Raised quarterly length distributions of discards, Cod, Area IV, Beam trawl, 2000.

Table 4.3.1.4.2b Raised quarterly length distributions of discards, Cod, Area IV, Otter trawl, 2000.

Table 4.3.1.4.2c Raised quarterly length distributions of discards, Cod, Area IV, Anchor seine, 2000.

Table 4.3.1.5.2a Unraised and raised quarterly length distributions of discards, Cod, Area IIIa, Nephrops trawl, 2001.

Table 4.3.1.5.2b Unraised and raised quarterly length distributions of discards, Cod, Area IIIa, Otter trawl, 2001.

Table 4.3.1.6.2a Unraised and raised quarterly length distributions of discards, Cod, Area IV, Otter trawl, 2001.

Table 4.3.1.6.2b Unraised and raised quarterly length distributions of discards, Cod, Area IV, Beam trawl, 2001.

Table 4.3.1.6.2c Unraised and raised quarterly length distributions of discards, Cod, Area IV, Anchor seine, 2001.

Haddock, IIIa & IV, 1999-2001, Denmark:

Table 4.3.2.1.2a Raised quarterly length distributions of discards, Haddock, Area IIIa, Anchor seine, 1999.

Table 4.3.2.1.2b Raised quarterly length distributions of discards, Haddock, Area IIIa, Nephrops trawl, 1999.

Table 4.3.2.2.2a Raised quarterly length distributions of discards, Haddock, Area IIIa, Nephrops trawl, 2000.

Table 4.3.2.2.2b Raised quarterly length distributions of discards, Haddock, Area IIIa, Otter trawl, 2000.

Table 4.3.2.3.2a Raised quarterly length distributions of discards, Haddock, Area IV, Otter trawl, 1999.

Table 4.3.2.3.2b Raised quarterly length distributions of discards, Haddock, Area IV, Anchor seine, 1999.

Table 4.3.2.4.2a Raised quarterly length distributions of discards, Haddock, Area IV, Otter trawl, 2000.

Table 4.3.2.4.2b Raised quarterly length distributions of discards, Haddock, Area IV, Beam trawl, 2000.

Table 4.3.2.4.2c Raised quarterly length distributions of discards, Haddock, Area IV, Anchor seine, 2000.

Table 4.3.2.5.2a Unraised and raised quarterly length distributions of discards, Haddock, Area IIIa, Nephrops trawl, 2001.

Table 4.3.2.5.2b Unraised and raised quarterly length distributions of discards, Haddock, Area IIIa, Otter trawl, 2001.

Table 4.3.2.6.2a Unraised and raised quarterly length distributions of discards, Haddock, Area IV, Anchor seine, 2001.

Table 4.3.2.6.2b Unraised and raised quarterly length distributions of discards, Haddock, Area IV, Otter trawl, 2001.

Table 4.3.2.6.2c Unraised and raised quarterly length distributions of discards, Haddock, Area IV, Beam trawl, 2001.

Plaice, IIIa & IV, 1999-2001, Denmark:

Table 4.3.3.1.2a Raised quarterly length distributions of discards, Plaice, Area IIIa, Anchor seine, 1999.

Table 4.3.3.1.2b Raised quarterly length distributions of discards, Plaice, Area IIIa, Otter trawl, 1999.

Table 4.3.3.2.2a Raised quarterly length distributions of discards, Plaice, Area IIIa, Nephrops trawl, 2000.

Table 4.3.3.2.2b Raised quarterly length distributions of discards, Plaice, Area IIIa, Anchor seine, 2000.

Table 4.3.3.2.2c Raised quarterly length distributions of discards, Plaice, Area IIIa, Beam trawl, 2000.

Table 4.3.3.2.2d Raised quarterly length distributions of discards, Plaice, Area IIIa, Otter trawl, 2000.

Table 4.3.3.3.2a Raised quarterly length distributions of discards, Plaice, Area IV, Otter trawl, 1999.

Table 4.3.3.3.2b Raised quarterly length distributions of discards, Plaice, Area IV, Anchor seine, 1999.

Table 4.3.3.4.2b Raised quarterly length distributions of discards, Plaice, Area IV, Beam trawl, 2000.

Table 4.3.3.4.2c Raised quarterly length distributions of discards, Plaice, Area IV, Anchor seine, 2000.

Table 4.3.3.5.2a Unraised and raised quarterly length distributions of discards, Plaice, Area IIIa, Nephrops trawl, 2001.

Table 4.3.3.5.2b Unraised and raised quarterly length distributions of discards, Plaice, Area IIIa, Otter trawl, 2001.

Table 4.3.3.6.2a Unraised and raised quarterly length distributions of discards, Plaice, Area IV, Anchor seine, 2001.

Table 4.3.3.6.2b Unraised and raised quarterly length distributions of discards, Plaice, Area IV, Otter trawl, 2001.

Table 4.3.3.6.2c Unraised and raised quarterly length distributions of discards, Plaice, Area IV, Beam trawl, 2001.

4.4 Sweden

Cod, Areas IIIa & IV, 1999-2001, Sweden:

Table 4.4.1.1.1 Raised tonnes discarded, Cod, Area IIIa & IV, all gears, 1999.

Table 4.4.1.1.2a Raised quarterly length distributions of discards, Cod, Area IIIa & IV, otter trawl, 1999.

Table 4.4.1.1.2b Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Nephrops trawl, 1999.

Table 4.4.1.1.2c Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Shrimp trawl, 1999.

Table 4.4.1.1.2d Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Pair trawl, 1999.

Table 4.4.1.1.3a Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Otter trawl, 1999.

Table 4.4.1.1.3b Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Nephrops trawl, 1999.

Table 4.4.1.1.3c Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Shrimp trawl, 1999.

Table 4.4.1.1.3d Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Pair trawl, 1999.

Table 4.4.1.2.1 Raised tonnes discarded, Cod, Area IIIa & IV, all gears, 2000.

Table 4.4.1.2.2a Raised quarterly length distributions of discards, Cod, Area IIIa & IV, otter trawl, 2000.

Table 4.4.1.2.2b Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Nephrops trawl, 2000.

Table 4.4.1.2.2c Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Shrimp trawl, 2000.

Table 4.4.1.2.2d Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Pair trawl, 2000.

Table 4.4.1.2.2e Raised quarterly length distributions of discards, Cod, Area IIIa & IV, Danish seines, 2000.

Table 4.4.1.2.3a Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Otter trawl, 2000.

Table 4.4.1.2.3b Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Nephrops trawl, 2000.

Table 4.4.1.2.3c Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Shrimp trawl, 2000.

Table 4.4.1.2.3d Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Pair trawl, 2000.

Table 4.4.1.2.3e Raised numbers, lengths and weights at age of discards, Cod, Area IIIa & IV, Danish seines, 2000.

Table 4.4.1.3.1 Raised tonnes discarded, Cod, Area IIIa, all gears, 2001.

Table 4.4.1.3.2a Raised quarterly length distributions of discards, Cod, Area IIIa, Nephrops trawl, 2001.

Table 4.4.1.3.2b Raised quarterly length distributions of discards, Cod, Area IIIa, otter trawl, 2001.

Table 4.4.1.3.3a Raised numbers, lengths and weights at age of discards, Cod, Area IIIa, Nephrops trawl, 2001.

Table 4.4.1.3.3b Raised numbers, lengths and weights at age of discards, Cod, Area IIIa, otter trawl, 2001.

Haddock, Areas IIIa, 2001, Sweden:

Table 4.4.2.3.1 Raised tonnes discarded, Haddock, Area IIIa, all gears, 2001.

Table 4.4.2.3.2a Raised quarterly length distributions of discards, Haddock, Area IIIa, Nephrops trawl, 2001.

Table 4.4.2.3.2b Raised quarterly length distributions of discards, Haddock, Area IIIa, otter trawl, 2001.

Table 4.4.2.3.3a Raised numbers, lengths and weights at age of discards, Haddock, Area IIIa, Nephrops trawl, 2001.

Table 4.4.2.3.3b Raised numbers, lengths and weights at age of discards, Haddock, Area IIIa, otter trawl, 2001.

Plaice, Areas IIIa, 2001, Sweden:

Table 4.4.3.3.1 Raised tonnes discarded, Plaice, Area IIIa, all gears, 2001.

Table 4.4.3.3.2a Raised quarterly length distributions of discards, Plaice, Area IIIa, Nephrops trawl, 2001.

Table 4.4.3.3.2b Raised quarterly length distributions of discards, Plaice, Area IIIa, otter trawl, 2001.

Table 4.4.3.3.3a Raised numbers, lengths and weights at age of discards, Plaice, Area IIIa, Nephrops trawl, 2001.

Table 4.4.3.3.3b Raised numbers, lengths and weights at age of discards, Plaice, Area IIIa, otter trawl, 2001.

Saithe, Areas IIIa, 2001, Sweden:

Table 4.4.4.3.1 Raised tonnes discarded, Saithe, Area IIIa, all gears, 2001.

Table 4.4.4.3.2a Raised quarterly length distributions of discards, Saithe, Area IIIa, Nephrops trawl, 2001.

Table 4.4.4.3.2b Raised quarterly length distributions of discards, Saithe, Area IIIa, otter trawl, 2001.

Table 4.4.4.3.3a Raised numbers, lengths and weights at age of discards, Saithe, Area IIIa, Nephrops trawl, 2001.

Table 4.4.4.3.3b Raised numbers, lengths and weights at age of discards, Saithe, Area IIIa, otter trawl, 2001.

Sole, Areas IIIa, 2001, Sweden:

Table 4.4.5.3.1 Raised tonnes discarded, Sole, Area IIIa, all gears, 2001.

Table 4.4.5.3.2a Raised quarterly length distributions of discards, Sole, Area IIIa, Nephrops trawl, 2001.

Table 4.4.5.3.2b Raised quarterly length distributions of discards, Sole, Area IIIa, otter trawl, 2001.

Whiting, Areas IIIa, 2001, Sweden:

Table 4.4.6.3.1 Raised tonnes discarded, Whiting, Area IIIa, all gears, 2001.

Table 4.4.6.3.2a Raised quarterly length distributions of discards, Whiting, Area IIIa, Nephrops trawl, 2001.

Table 4.4.6.3.2b Raised quarterly length distributions of discards, Whiting, Area IIIa, otter trawl, 2001.

Table 4.4.6.3.3a Raised numbers, lengths and weights at age of discards, Whiting, Area IIIa, Nephrops trawl, 2001.

Table 4.4.6.3.3b Raised numbers, lengths and weights at age of discards, Whiting, Area IIIa, otter trawl, 2001.

5 SOUTHERN SHELF

5.1 Ireland

Hake, Megrim, Whiting, Areas VI & VII, Ireland:

Table 5.1.1.1. Raised tonnes discarded, Hake, Areas VI & VII, 1995-2001.

Table 5.1.1.2. Raised annual length distributions of discards, Hake, Areas VI & VII, otter trawl, 1995-2001.

Table 5.1.2.1. Raised tonnes discarded, Megrim, Area VII, 1995-2001.

Table 5.1.2.2. Raised annual length distributions of discards, Megrim, Area VII, otter trawl, 1995-2001.

Table 5.1.2.3. Raised numbers, lengths and weights at age of discards, Megrim, Area VII, otter trawl, 1995-2000.

Table 5.1.3.1. Raised tonnes discarded, Anglerfish, Area VII, 1995-2001.

Table 5.1.3.2. Raised annual length distributions of discards, Anglerfish, Area VII, 1995-2002.

Table 5.1.4.1a. Raised tonnes discarded, Whiting, Areas VIIb,c, 1995-2001.

Table 5.1.4.2a. Raised annual length distributions of discards, Whiting, Area VIIb,c, Otter trawl, 1995-2001.

Table 5.1.4.3a. Raised numbers, lengths and weights at age of discards, Whiting, Area VIIb,c, 1995-2000.

Table 5.1.4.1b. Raised tonnes discarded, Whiting, Areas VIIe-k, 1995-2001.

Table 5.1.4.2b. Raised annual length distributions of discards, Whiting, Areas VIIe-k, otter trawl, 1995-2001.

Table 5.1.4.3b. Raised numbers, lengths and weights at age of discards, Whiting, Areas VIIe-k, otter trawl, 1995-2000.

5.2 Spain

Hake, Megrim, Four spot Megrim, Areas VI, VII, VIII & IX, Spain:

Table 5.2.1.1. Raised tonnes discarded, Megrim, Areas VI & VII, VIIIabd, and VIIIc & IXa, 1994, 1997, 1999-2001.

Table 5.2.1.2a. Raised annual length distributions of discards, Megrim, Areas VI, VII & VIIIabd, Bottom trawls, 1994, 1999-2001.

Table 5.2.1.2b. Raised annual length distribution of discards, Megrim, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 5.2.1.3a. Raised numbers, lengths and weights at age of discards, Megrin, Areas VI, VII, & VIIIabd, Bottom trawls, 1994, 1997, 1999, 2000.

Table 5.2.1.3b. Raised numbers, lengths and weights at age of discards, Megrin, Areas VIIIc & IXa, trawls, 1997.

Table 5.2.2.1. Raised tonnes discarded, Hake, Areas VI, VII, VIIIabd, and VIIIc & IXa, bottom trawls, 1994, 1997, 1999, 2000

Table 5.2.2.2a. Raised annual length distributions of discards, Hake, Areas VI, VII & VIIIabd, Bottom trawls, 1994, 1999, 2000.

Table 5.2.2.2b. Raised annual length distributions of discards, Hake, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 5.2.2.3a. Raised numbers, lengths and weights at age of discards, Hake, Areas VI, VII & VIIIabd, Bottom trawls, 1994, 1999, 2000.

Table 5.2.2.3b. Raised numbers, lengths and weights at age of discards, Hake, Areas VIIIc & IXa, trawls, 1994, 1997, 1999, 2000.

Table 5.2.3.1. Raised tonnes discarded, Four Spot Megrin, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 5.2.3.2. Raised annual length distributions of discards, Four Spot Megrin, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 5.2.3.3. Raised numbers, lengths and weights at age of discards, Four Spot Megrin, Areas VIIIc & IXa, trawls, 1994, 1997, 1999, 2000.

5.3 England

Area VIIId-e, 2001, England:

Table 5.3.1.1.1 Raised tonnes discarded, Whiting, Area VIIId-e, all gears, 2001.

Table 5.3.1.1.2a Raised quarterly length distributions of discards, Whiting, Area VIIId-e, Midwater pair trawl, 2001.

Table 5.3.1.1.2b Raised quarterly length distributions of discards, Whiting, Area VIIId-e, otter trawl, 2001.

6 NORTH WESTERN SHELF

6.1 Iceland

Haddock, Area V, 1988-2000:

Table 6.1.1. Raised annual length distributions of discards, Haddock, Area V, Long line, 2001.

Table 6.1.2. Raised annual length distributions of discards, Haddock, Area V, Danish seine, 2001.

Table 6.1.3. Raised annual length distributions of discards, Haddock, Area V, bottom trawl, 1988-2000.

Table 6.1.4. Raised annual length distributions of discards, Haddock, Area V, bottom trawl, 2001.

Cod, Area V, 2001:

Table 6.2.1. Raised annual length distributions of discards, Cod, Area V, long line, 2001.

Table 6.2.2. Raised annual length distributions of discards, Cod, Area V, Danish seine, 2001.

Table 6.2.3. Raised annual length distributions of discards, Cod, Area V, Bottom trawl, 2001.

Table 6.2.4. Raised annual length distributions of discards, Cod, Area V, Gill net, 2001.

7 NORTHERN PELAGIC AND BLUE WHITING WORKING GROUP

7.1 Spain

Blue Whiting, Areas VIII & IX, 1994, 1997, 1999, 2000:

Table 7.1.1. Raised tonnes discarded, Blue whiting, Areas VI, VII, VIIIabd, VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 7.1.2. Raised annual length distributions of discards, Blue whiting, Areas VI & VII, Bottom trawls, 2000.

Table 7.1.3. Raised annual length distributions of discards, Blue whiting, Areas VIIIabd, Bottom trawls, 2000.

Table 7.1.4. Raised annual length distributions of discards, Blue whiting, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 7.1.5. Raised numbers, lengths and weights at age of discards, Blue whiting, Areas. VIIIc & IXa, Trawls, 1994, 1997, 1999, 2000.

8 WORKING GROUP ON MACKEREL, HORSE MACKEREL, SARDINE AND ANCHOVY

8.1 Spain

Mackerel & Horse Mackerel, Areas VI, VII, VIII & IX, 1994-2000:

Table 8.1.1.1. Raised tonnes discarded, Mackerel, Areas VI, VII, VIIIc, VIIIabd, & IXa, Bottom trawls, 1994-2000.

Table 8.1.1.2. Raised annual length distribution of discards, Mackerel, Areas VI, VII & VIIIabd, Bottom trawls, 2000.

Table 8.1.1.3. Raised annual length distribution of discards, Mackerel, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 8.1.1.4. Raised numbers, lengths and weights at age of discards, Mackerel, Areas VI, VII & VIIIabd, Bottom trawls, 2000.

Table 8.1.1.5. Raised numbers, lengths and weights at age of discards, Mackerel, Areas VIIIc & IXa, Bottom trawls, 1997, 1999, 2000.

Table 8.1.2.1. Raised tonnes discarded, Horse mackerel, Areas VI, VII, VIIIc & IXa, Bottom trawls, 1994-2000.

Table 8.1.2.2. Raised annual length distribution of discards, Horse mackerel, Areas VI, VII, VIIIabd, Bottom trawls, 2000.

Table 8.1.2.3. Raised annual length distributions of discards, Horse mackerel, Areas VIIIc & IXa, Bottom trawls, 1994, 1997, 1999, 2000.

Table 8.1.2.4. Raised numbers, lengths and weights at age of discards, Horse mackerel, Areas VI, VII & VIIIabc, Bottom trawls, 2000.

Table 8.1.2.5. Raised numbers, lengths and weights at age of discards, Horse mackerel, Areas VIIIc & IXa, Bottom trawls, 1997, 1999, 2000.