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Landing Obligations in EU Fisheries - part 4 (STECF-14-19)

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This report was reviewed by the STECF during its 47th plenary meeting held from 10 to 14 November 2014 in Brussels

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

Landing obligations in EU Fisheries – part 4 (STECF-14-19)

THIS REPORT WAS REVIEWED DURING THE PLENARY MEETING HELD IN BRUSSELS, BELGIUM, 10-14 NOVEMBER 2014

1.1 Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group, evaluate the findings and make any appropriate comments and recommendations.

Terms of reference given to the EWG were:

1. Review the current scientific knowledge on the survival of species covered by catch limits in demersal fisheries in the North Sea, North Western Waters and South Western waters.

2. Identify potential discard problems in demersal fisheries in these sea basins that cannot be addressed through improvements in selectivity or would lead to disproportionate costs of sorting unwanted catches on board.

3. Identify species which for quota reasons may lead to restrictions to fishing activities in these sea basins.

1.2 Observations of the STECF

The Report of the STECF EWG 14 -01 represents the findings of the fourth Expert Group meeting in a series of such meetings planned to address the implications associated with the implementation of the Landing Obligation, the provisions of which are prescribed primarily in Article 15 of the 2013 Reform of the Common Fisheries Policy (Regulation (EU) No

1380/2013 of the European Parliament and of the Council of 11 December 2013).

STECF notes that all the TORs were tackled. STECF observes how results from survival studies show that survival rates are highly variable and that direct comparisons between studies is problematic due to, different methodologies, gears, areas, seasons, etc. The EWG report also concludes that some species of rays have high (>50%) and consistent levels of survival. The rest of the species that appear in the literature could present high survival rates although the EWG report consider them as not consistent given the short observation periods.

STECF observes how the EWG report provides a list of potential (although not exhaustive) cases for de minimis exemptions based on difficulties on improving selectivity due to losses in marketable fish.

STECF observes how the group has identified the species that within the member state have higher catches that the total final quota (including swaps/banking etc.) that could be interpreted as choke species (at least at a member state level). The EWG has done this work by merging different data bases, and, due to the heterogeneity of the available information some stocks that are potential choke species for certain fisheries have not been included in the analysis. STECF observes that according to the work undertaken by the EWG there are a number of potential choke species, but that there also others for which quotas have not been fully taken

1.3 Conclusions of the STECF

The STECF concludes that EWG 14-01 has covered all the TORs of the meeting.

STECF agrees with conclusion that the EWG report provides in the report for the review of the survival literature. STECF concludes that that the rate of survival depends largely on the species concerned and on the fishery in general (including biological and environmental factors). STECF also concludes that where fish survive, the estimated rates are highly variable and that these rates are affected by experimental methodologies, gear types, areas, seasons etc., which make direct comparison between studies problematic.

In general, the studies identified show that elasmobranchs, specifically species of ray, appear to have the highest and most consistent levels of discard survival. Studies which have looked at flatfish species including plaice (*Pleuronectes platessa*) and sole (*Solea solea*) and dab (*Limanda limanda*) show variable results between species, with survival rates in the range of ~40 – 80%, although zero survival was observed in some experiments. *Nephrops* also have highly variable survival rates ranging from survival rates of 28 to 88%, but the studies showing the highest survival rates (80 and 88%) also had very short observation periods and should therefore not be considered as representative.

STECF concludes that in terms of TOR 2 the list of potential candidates to illustrate where selectivity improvements to reduce unwanted catches are likely to be problematic is adequate. Nevertheless STECF also concludes that this list of candidates is not necessarily exhaustive.

STECF concludes that the analysis provided in terms of the potential choke species is difficult to project forward, given that the new CFP and in particular the exemptions and flexibilities provided by the landing obligation produce new incentives to change fishing fleet's behavior as well as technical capabilities that will likely change the catch profiles of the fleets. STECF notes that the current excess of available quota shows that potentially there is flexibility in the system to accommodate part of the problem with choke species, although it may not imply a potential quota swap with another member state, precisely to be prevented from these technical and behavioral changes.

STECF also concludes that tables provided in annex III of the report is an estimable source of information to assess the size of the choke species problem, at least at member state level. Nevertheless STECF considers that there is some redundant information in the table provided in this annex (uptake of initial quota and landings to Initial Quota should in principle measure the same thing). STECF also concludes that the column of value is providing information on the market value (when caught and sold) of the quota that each member state has of this stock and that it is not providing any reference to nor on the potential economic consequences that the choke species could cause on the fisheries, neither on the potential swapping value of these quotas. In that sense, STECF considers useful an analysis of the economic consequences that the potential choke species will have on the performance of the fisheries, at least and as a first step, considering the same behavior and technical characteristics of the fleet observed in the past.

REPORT TO THE STECF

EXPERT WORKING GROUP ON Landing Obligation in EU Fisheries – Part 4 (EWG-14-11)

Varese, Italy, 8-12 September 2014

2 EXECUTIVE SUMMARY

The reformed CFP (EU regulation 1380/2013) requires that demersal fisheries for all TAC species will be subject to a landing obligation by 2019 at the latest. The regulation permits for a phased introduction by fisheries and/or species although this schedule has yet to be finalised by the regional groups with responsibility for drafting joint recommendations for discard plans. The basic regulation makes provision for exemptions from the landing obligation based on survivability of discarded fish and for de minimis exemptions on grounds of technical or handling difficulties. It is also recognised that a switch from a landings-based to a catch-based system which the landing obligation brings, will be particularly problematic in mixed demersal fisheries, especially where fishing opportunities for some species become exhausted quicker than others, meaning that fishing activity should cease unless tactical or technical avoidance can be achieved. EWG 14-11 has considered each of these issues to provide advice and guidance to regional groupings of Member States and the Advisory Councils in preparing joint recommendations for demersal fisheries in the North Sea, North Western Waters and South Western waters.

Survival

Research has shown that not all discards die. In some circumstances, the proportion of discarded fish that survive can be substantial. This depends on the species, the fishery and its operational characteristics e.g. gear type, tow duration as well as other technical, biological and environmental factors. Obliging fishermen to land catches of fish that would otherwise have survived the discarding process could, in some specific cases, result in adverse consequences for the stock. However, the choice to exempt a particular species based on ‘high-survival’ is a “trade-off” between the stock benefits of the continued discarding of "high" survivors and the removal of potentially strong incentives to reduce unwanted catches by allowing discarding to continue. This should also be seen in the context of future stock benefits of improvements in selectivity on *all* species caught in the fishery as well as broader ecosystem benefits.

EWG 14-11 has reviewed the latest information on survival studies and has identified a number of species where there is some scientific information showing some level of discard survival. This information is presented so as to inform regional groups on possible candidate stocks for survival exemptions. EWG 14-11 has not provided any judgement on whether or not individual studies constitute “high survival” as this is somewhat subjective and it is open to managers to decide upon. STECF has previously produced guidelines (EWG 13-23) regarding the conclusions about survival that can be drawn from the various types of survival studies as well as the trade-offs that should be considered.

In general, the studies identified show that elasmobranchs, specifically species of ray, appear to have the highest and most consistent levels of discard survival, although this will vary depending on fishery conditions and on-board handling. In general, observed survival rates of elasmobranchs under experimental conditions, are typically in excess of 50% across all gears and greater than 80% in many cases. Studies which have looked at flatfish species including plaice (*Pleuronectes platessa*) and sole (*Solea solea*) and dab (*Limanda limanda*) show variable results between species, with survival rates in the range of ~40 – 80%, although zero survival was observed in some experiments and survival of sole and dab were lower than plaice in some cases. Survival of plaice has also been shown to be length dependent, with smaller individuals showing lower survival rates than older fish. Survival was also shown to decrease during spawning periods. *Nephrops* also have highly variable survival rates ranging from survival rates of 28 to 88%, but the studies showing the highest survival rates (80 and 88%) also had very short observation periods and should therefore not be considered as representative, given that deaths were still occurring in other studies after 5 days. Studies with longer term observations show much lower survival rates (~30%) and post-discard predation is likely to be significant. Survival of cod is also highly variable (0 – 100%), but some studies have shown survival >50% of cod caught in beam trawls. The relatively high survival is thought to be due to the shallow fishing depth (<30m) and the results should not be readily extrapolated to other fisheries.

There are a number of factors that should be considered when deciding how results from these studies i.e. *observed* survival, relate to *actual* survival under normal fishing conditions. The majority of studies are based on captive experiments, where discards are observed in on-board tanks or submerged pens and are therefore the animals are not subject to the risks of post discard predation e.g. by seabirds, marine mammals, fish and crustacean, which has been shown to be substantial in some cases. With experimental induced mortality accounted for, the survival estimates from captive observation studies are therefore likely to represent overestimates of actual survival under commercial fishing operations. Managers should consider these points when deciding on which species to select for proposed exemptions based on high survival.

De minimis based on selectivity

Generally speaking, where unwanted catches of species are similar in size and exhibit similar behaviour as the target species, improving selectivity through increases in mesh size for example is likely to be difficult without resultant losses of marketable species. The Expert group has identified a number of such fisheries that regional groups may want to consider as candidates for a de minimis exemption when formulating joint recommendations for discard plans.

EWG 14-11 notes that the candidate fisheries identified in this report are based on expert judgment and the tools that are *currently* available. The landing obligation if implemented as intended, is likely to offer strong incentives for fishermen to develop new and as yet unforeseen tactical and technical adaptations, which by definition, could not beconsidered. The Expert group has also identified scenarios where species subject to a zero TAC are likely to severely impact on fishing opportunities for other species and may present significant and almost immediate choke issues. While the application of de minimis exemptions for such species may offer some small relief, given that zero TAC species are likely to be severely depleted, any catches consistent with the MSY approach are likely to be very low. Under precautionary considerations, where species subject to zero TACs have no analytical assessments, there is no basis to provide catches that are consistent with MSY. This will therefore continue to severely restrict/prevent fisheries where such species are caught.

Choke species

The EWG used historical data from 2012 submitted by Member States under the EU DCF reporting requirements to compare catches (landings plus discards) against initial and final quota allocations (which factored in swaps between MS as well as inter-annual banking and borrowing provisions). This enabled the identification of stocks where catches in 2012 were in excess of Member States' initial/final quota allocations and which therefore may present *potential* choke scenarios following the introduction of the landing obligation.

It should be noted that by necessity, the analyses are based on historic data where TACs were regulated through landings i.e. the current system (2012). This means that the results cannot be projected into the future due to uncertainties in how the landings obligation will operate in practice. In particular, it remains uncertain how exemptions that will permit some degree of discarding (high survival and de minimis) and inter-species and inter-annual quota flexibilities will be implemented. In addition, advice on future fishing opportunities will be expressed in terms of catch rather than landings and may result in "quota uplift" provided these remain consistent with the objective of reaching Fmsy for all stocks. In addition to the above flexibilities, future choke issues may be alleviated by increasing the final fishing opportunities through quota swaps between MS. However future swapping arrangements are not possible to predict given the substantial changes that moving from a landings-based to catch-based system is likely to bring.

3 INTRODUCTION

The introduction of the landing obligation in the new Common Fisheries Policy (CFP) represents a fundamental shift in the management approach to EU fisheries, switching the focus from the regulation of landings to catches as well as introducing regionalised decision-making into the management of EU fisheries.

Three STECF EWG meetings (EWG 13-23, EWG 14-01 and EWG 14-06) have considered a number of scientific and technical issues associated with some of the provisions and flexibilities contained in the landing obligation. Through these EWG meetings STECF has provided advice and guidance for the Commission, Member States and stakeholders to assist in implementation and the formulation of regional discard plans. STECF has also evaluated joint recommendations submitted by regional groupings of Member States at the July plenary meeting relating to the fisheries coming under the landing obligation from 1 January 2015 (i.e. pelagic, industrial and also salmon and cod fisheries in the Baltic).

The next timeline in the CFP relates to demersal fisheries in the North Sea, North Western Waters and South Western Waters which will come under the landing obligation by 1 January 2016. By way of preparation and to provide advice and guidance to regional groupings of Member States and the Advisory Councils in preparing joint recommendations for these fisheries, it is proposed to hold a fourth STECF EWG in September 2014. For each of these sea basins, this EWG will review information on survivability in the relevant fisheries and gears; identify specific discard problems in these fisheries that may fall under a de minimis exemption; and identify potential restrictive quotas that will lead to severe restrictions in fishing activity (i.e. choke species).

4 TERMS OF REFERENCE FOR EWG-14-11

4. Review the current scientific knowledge on the survival of species covered by catch limits in demersal fisheries in the North Sea, North Western Waters and South Western waters.

5. Identify potential discard problems in demersal fisheries in these sea basins that cannot be addressed through improvements in selectivity or would lead to disproportionate costs of sorting unwanted catches on board.

6. Identify species which for quota reasons may lead to restrictions to fishing activities in these sea basins.

4.1 Review the available knowledge on the survival of relevant species covered by catch limits in demersal fisheries in the North Sea, North Western Waters and South Western waters.

Background

Article 15 paragraph 2(b) of the regulation allows for the possibility of exemptions from the landing obligation for species for which "*scientific evidence demonstrates high survival rates, taking into account the characteristics of the gear, of the fishing practices and of the ecosystem”*.

In a previous STECF Expert Group (EWG 13-16) it was concluded that the selection of a value which constitutes “high survival” is subjective and likely to be species- and fishery-specific. The value will be based on “trade-offs” between the stock benefits of the continued discarding of fish that survive the process i.e. their contribution to biomass and resultant reduction in fishing mortality, and the potential removal of incentives to change exploitation pattern as well as how this contributes to the minimisation of waste and the elimination of discards. The STECF Expert Group (EWG 13-16) considered that avoidance of unwanted catch should be the primary focus of such considerations. Therefore, the choice of survival levels/value(s) that constitute “high survival” is a management decision and will depend on which objective (e.g. avoidance of waste improve stock sustainability; improve financial viability) is set as priority.

Article 15.4(b) notes that consideration must be given to the specific characteristics of the gear, fishing practices and of the ecosystem. Where an exemption(s) under ‘high survival’ are included in joint recommendations, the need for supportive information is specified in Article 15. The STECF Expert Group (EWG 13-17) suggested some information that would facilitate the evaluation of survivability. This was further elaborated on in a subsequent STECF expert group (EWG 14-01), including the provision of examples.

ToR 1 was addressed through the completion of the following tasks:

i. Listing all species with catch limits by region in the three management regions (NS, NWW, SWW) (see annex 1)
ii. Compiling literature from the ICES WKMEDS (Workshop on Methods to Estimate Discard Survival), review by Revill (2012) (see STECF PLEN-12-01) and most recently published material to identify discard survival estimation studies and capture basic information from each study (not presented)
iii. Present those species from task 1 for which discard survival estimates are available together with high level summaries (Table 4-3Table 4-3)
iv. Provide descriptions of most recent species and area relevant discard survival research
v. Describe those factors effecting survival (based on output from ICES WKMEDS)
vi. Implications of factors effecting survival for control of exemptions from the landing obligation under the high survival provision

vii. Implications of high survival exemptions for fully documented catches

i. Listing all species with catch limits by region in the three management regions (NS, NWW, SWW)

A full list of stocks subject to TAC limits in the three regions is provided in Section 7.1(Table 7-1 to Table 7-3)

ii. Present those species from task 1 for which discard survival estimates are available together with high level summaries

The literature compiled by ICES Workshop on Methods to Estimate Discard Survival (WKMEDS, 2014), the review by Revill (2012) and the inclusion of recently published material, generated a total of 316 references relating to the estimation of discard survival. Of these, there were 18 published studies from the European Union and one from Norway investigating 11 species which have catch limits in the management regions (North Sea, North Western Waters and South Western Waters; Table 4-1.)

Table 4-1 List of species with catch limits in NS, NWW and SWW with survival estimates and the gear type to which these relate to.

Genus/Species	Common name	Gear Type
Elasmobranch	Rays and skates	Otter and Beam Trawl, hook, gillnet
Gadus morhua	Cod	Otter and beam trawl, hook,
Glyptocephalus cynoglossus	Witch	Otter trawl
Hippoglossus hippoglossus	Atlantic halibut	Otter trawl, hook
Limanda limanda	Common dab	Otter, beam and pulse trawl,
Melanogrammus aeglefinus	Haddock	Otter trawl, hook
Merlangius merlangus	Whiting	Otter trawl
Microstomus kitt	Lemon sole	Pulse trawl
Nephrops norvegicus	Norway lobster	Otter trawl,
Platichthys flesus	Flounder	Otter and pulse trawl
Pleuronectes platessa	Plaice	Otter, beam and pulse trawl,
Pollachius virens	Saithe	Otter trawl
Psetta maxima	Turbot	Pulse trawl
Solea solea	Common sole	Otter, beam and pulse trawl
Squalus acanthias	Spurdog	Otter trawl

It is important to note that for many European fisheries-species combinations for regulated species there are no discard survival estimates available.

Table 4-3 summarises the studies that are relevant to stocks in the North Sea, North-Western Waters and South Western waters regions and for which discard survival estimates are available. The gear and location of the study, the literature reference, the time period of observation from the point of discarding and the minimum and maximum levels of survival observed in the study are also presented.

In general, the available studies (Table 4-3; Table 7-4) indicate that elasmobranchs, and in particular, species of ray, appear to have the highest and most consistent levels of discard survival. Studies which have looked at flatfish species including plaice (*Pleuronectes platessa*) and sole (*Solea solea*) as well as *Nephrops* (*Nephrops norvegicus*) show higher survival rates in general, than roundfish species, such as cod (*Gadus morhua*) and whiting (*Merlangius merlangus*) (Table 4-3).

EWG 14-11 considers that any proposals for exempting species on the basis of high survival could consider the outcomes and limitations of the studies listed in Table 7-4, and detailed in Table 4-3 plus any additional sources of information that may be available

Two general observations were made in a review by Revill (2012) (STECF PLEN 12-01), which still apply to the studies presented here. The first is that although a significant amount of data on discard survival has been published, the results vary *between* studies and that the studies were carried out under a wide range of conditions (e.g. location, fishing gear, duration of tow, deck handling, season etc.). The small sample sizes used in many studies may contribute to this variation. The second general observation is that for a given species and fishing gear there is often significant variation in the survival rates *within* individual studies and also between studies estimating species survival in similar fisheries.

There are three different experimental methods used to conduct a discard survival assessment with the aim to estimate discard survival:

- Vitality Assessment: where the vitality of the subject to be discarded is scored relative to any array of indicators (e.g. activity, reflex responses and injuries) that can be combined to produce a vitality score. Where these scores have been correlated with a likelihood of survival they can be used as a proxy for survival likelihood;

- Captive Observation: where the discarded subject is observed in captivity, to determine whether it lives or dies; and

- Tagging and Biotelemetry: where the subject to be discarded is tagged and released, and either its behaviour/physiological status is remotely monitored (via biotelemetry) to determine its post-release fate, or survival estimates are derived from the number of returned tags (see Section 6).

Before using estimates of discard survival in the context of fisheries management, consideration should be given to the limitations and potential sources of error from these different approaches. In isolation, each method has limitations which affect the conclusions which can be made (Table 4-2).

The ultimate objective of estimating discard survival in the context of the Landings Obligation is to generate an estimate that is inclusive of post-discard predation effects, and which is representative of survival of discards from the relevant management unit (fishery). Most of the studies given here meet objective 3 in Table 4-2, that is, they provide discard estimates that exclude the effects of predation and relate only to the particular characteristics of the experiment including technical, environmental and biological factors such as gear types used, weather, species condition, age etc. Therefore the survival estimates are only fully representative if the operational conditions to which the fish were exposed to during the experiments are broadly matched by the wider fleet to which an exemption may apply. This means that, if the normal or average operational condition of the fleet to which an exemption is being sought *differs* significantly from the experimental conditions then the survival estimates are unlikely to be representative. Factors such as tow duration, on board handling processes, exposure on deck, fish condition, catch composition etc. are all known to influence the chance of survival. In addition, the majority of experiments use captive methods i.e. observation tanks, and are therefore not subject to the risks post discard predation e.g. by seabirds, marine mammals, fish and crustacean and may not be subject to likely increases in disease and infection. Conversely, the experiments themselves could also present some level of experimentally induced survival, but provided that adequate controls are maintained and that control mortality is considered in the analysis, this should not be a significant issue.

Overall, he survival estimates derived from captive observation studies are therefore likely to represent over estimates of actual survival under commercial fishing operations. Managers may want to consider these points when deciding on which species to select for proposed exemptions based on high survival and to take account of the trade-offs between maintaining a strong incentive to avoid unwanted catch in the first place and the benefits that may acrue through discarding fish that have the potential to survive.

Table 4-2 An overview of possible objectives for a survival assessment and the recommended approaches

	Objective (for the selected species, variables & management unit)	Suggested approach
1	To estimate discard survival potential for particular conditions	Vitality assessment onboard commercial vessel(s), with targeted observations of the factors that affect mortality.
2	To estimate discard survival potential that is representative of the management unit	Vitality assessments onboard commercial vessels during representative range of conditions
3	To estimate discard survival rate, excluding predation, for particular conditions	Captive observation of individuals under particular conditions
4	To estimate discard survival rate, excluding predation, representative of the management unit	Vitality assessments onboard commercial vessel(s) during a representative range of conditions combined with captive observation of individuals representing the various vitality levels to generate an overall weighted-mean survival estimate
5	To estimate discard survival rate, including predation effects, for particular conditions	Tagging/biotelemetry onboard commercial vessel(s) under particular conditions
6	To estimate discard survival rate, including predation effects, representative of the management unit	Option 1: Vitality assessment onboard commercial vessel(s) during representative range of conditions combined with tagging/biotelemetry of individuals representing the various vitality levels onboard commercial vessel(s) to generate an indirect survival estimate

		Option 2: Vitality assessment onboard commercial vessel(s) during representative range of conditions combined with captive observation (to estimate short term mortality) and tagging/biotelemetry (to estimate conditional long-term mortality) of individuals representing the various vitality levels onboard commercial vessel(s) to generate an indirect survival estimate

Table 4-3 Relevant species for which discard survival estimates are available, the gear and location of the study, the literature reference, the time period of observation from the point of discarding and the minimum and maximum levels of survival observed in the study.

Species	Common name	Gear	Location	Reference	Observation period	Min of Discard survival lower limit	Max of Discard survival rate higher limit
Elasmobranch	Other demersal elasmobranchs	Longline	Canada	Benoit and Hurlbut (2010)	2 days	96	96
Elasmobranch	Rays and skates	Otter trawl	U.K.	Enever et al. (2009)	3 days	55	55
Elasmobranch	Rays and skates	Beam trawl	U.K.	Revill et al. (2005)	2.5 days	92	100
Elasmobranch	Rays and skates	Fish trawl	Spain	Rodriguez-Cabello et al. (2005)	1 hour	78	78
Elasmobranch	Rays and skates	Gillnet	U.S.A.	Hueter et al. (2006)	Tagging	60	69
Elasmobranch	Rays and skates	Hook and line	U.S.A.	Gurshin and Szedlmayer (2004)	6 hours	90	90
Elasmobranch	Rays and skates	Otter trawl	U.K.	Enever et al. (2010)	2 days	55	67
Elasmobranch	Rays and skates	Otter trawl	U.S.A.	Mandelman and Farrington (2006)	3 days	80	100
Elasmobranch	Rays and skates	Squid trawl	Falkland Islands	Laptikhovsky (2004)	3 hours	0	71
Gadus morhua	Cod	Beam trawl ("eurocutter")	Belgium	Depestele et al. (2014)	88h	66	72
Gadus morhua	Cod	Otter trawl	Canada	Benoît et al. (2012)	14-110 hours	19	45
Gadus morhua	Cod	Otter trawl	Canada	Jean (1963)	1 hour	0	100
Gadus morhua	Cod	Hand line	Iceland	Palsson et al. (2003)	8 days	43	43
Gadus morhua	Cod	Hand line	Iceland	Palsson et al. (2003)	9 days	68	68

Species	Common name	Gear	Location	Reference	Observation period	Min of Discard survival lower limit	Max of Discard survival rate higher limit
Gadus morhua	Cod	Longlines & Jigging	U.S.A.	Milliken et al., 2009	3 days	31	100
Glyptocephalus cynoglossus	Witch	Otter trawl	Canada	Benoît et al. (2012)	14-110 hours	0	0
Hippoglossus hippoglossus	Atlantic halibut	Otter trawl	Canada	Neilson et al. (1989)	Predicted	7	89
Hippoglossus hippoglossus	Atlantic halibut	Longline	Canada	Benoit and Hurlbut (2010)	2 days	96	96
Limanda limanda	Common dab	Otter trawl	Germany	Berghahn (1990)	5 days	65	100
Limanda limanda	Common dab	Otter trawl	Germany	Kelle (1976)	7 days	1	58
Limanda limanda	Common dab	Otter trawl	North Sea	Berghahn et al. (1992)	5 days	33	100
Limanda limanda	Common dab	Pulse beam trawl	North Sea	van Marlen et al. (2013)	133-158h	33	33
Melanogrammus aeglefinus	Haddock	Otter trawl	Canada	Beamish (1966)	12 hours	22	93
Melanogrammus aeglefinus	Haddock	Otter trawl	Denmark	Hislop and Hemmings (1971)	12 days	35	88
Melanogrammus aeglefinus	Haddock	Pelagic long line	Norway	Huse and Soldal (2002)	7-11 days	47	61
Merlangius merlangus	Whiting	Otter trawl	North Sea	Berghahn et al. (1992)	5 days	0	35
Microstomus kitt	Lemon sole	Pulse beam trawl	North Sea	van Marlen et al. (2013)	133-158h	0	0
Nephrops norvegicus	Norway lobster	Otter trawl	Irish sea	Symonds and Simpson (1971)	1 hour	44	88
Nephrops norvegicus	Norway lobster	Otter trawl	Portugal	Castro et al. (2003)	5-9 days	12	60
Nephrops norvegicus	Norway lobster	Otter trawl	U.K.	Evans et al. (1994)	4 hours	21	85
Nephrops norvegicus	Norway lobster	Otter trawl	U.K.	Wileman *et al* (1999)	11-25 days	27	33

Species	Common name	Gear	Location	Reference	Observation period	Min of Discard survival lower limit	Max of Discard survival rate higher limit
Nephrops norvegicus	Norway lobster	Otter trawl	Bay of Biscay	Méhault et al (2011)	3 days	45	65
Platichthys flesus	Flounder	Otter trawl	North Sea	Berghahn et al. (1992)	5 days	34	100
Platichthys flesus	Flounder	Pulse beam trawl	North Sea	van Marlen et al. (2013)	133-158h	0	0
Pleuronectes platessa	Plaice	Beam trawl	English Channel	Revill et al. (2013)	3 days	37.3	79.6
Pleuronectes platessa	Plaice	Beam trawl ("eurocutter")	Belgium	Depestele et al. (2014)	77h	48	69
Pleuronectes platessa	Plaice	Otter trawl	Germany	Kelle (1976)	7 days	12	70
Pleuronectes platessa	Plaice	Otter trawl	North Sea	Berghahn et al. (1992)	5 days	0	100
Pleuronectes platessa	Plaice	Otter trawl	The Netherlands	van Beek et al. (1990)	3.5 days	0	48
Pleuronectes platessa	Plaice	Pulse beam trawl	North Sea	van Marlen et al. (2013)	71h; 133-158h;157h	0	80
Pleuronectes platessa	Plaice	Pulse beam trawl	North Sea	van Marlen et al. (2005)	192h	12	59
Pollachius virens	Saithe	Otter trawl	U.S.A.	Ross and Hokenson (1997)	2 hours	48	89
Psetta maxima	Turbot	Pulse beam trawl	North Sea	van Marlen et al. (2013)	133-158h	0	0
Solea solea	Sole	Otter trawl	North Sea	Berghahn et al. (1992)	5 days	71	100
Solea solea	Sole	Beam trawl	English Channel	Revill et al. (2013)	3 days	53.1	76.4
Solea solea	Sole	Beam trawl ("eurocutter")	Belgium	Depestele et al. (2014)	91h	14	29
Solea solea	Sole	Demersal trawl	Germany	Kelle (1976)	7 days	33	59
Solea solea	Sole	Demersal trawl	North Sea	Berghahn et al.	5 days	71	100

Species	Common name	Gear	Location	Reference	Observation period	Min of Discard survival lower limit	Max of Discard survival rate higher limit
				(1992)			
Solea solea	Sole	Demersal trawl	The Netherlands	van Beek et al. (1990)	3.5 days	4	37
Solea solea	Sole	Pulse beam trawl	North Sea	van Marlen et al. (2013)	36h; 72h; 133-158h; 204h	27	70
Solea solea	Sole	Pulse beam trawl	North Sea	van Marlen et al. (2005)	192h	17	54
Squalus acanthias	Spurdog	Otter trawl	U.S.A.	Mandelman and Farrington (2006)	3 days	80	100

iii. Provide descriptions of most recent species and area relevant discard survival research

There have been seven studies reported in the last six years from which discard survival estimates have been derived for species covered by catch limits caught in demersal fisheries in the North Sea, North Western Waters and South Western Waters. The outputs from these studies are included within the discard survival literature database. Additionally, summary information from these studies is presented below and relates to the following species and fisheries:

- Plaice, *Pleuronectes platessa*, caught in the English Channel beam trawl fishery
- Sole, *Solea solea*, caught in the English Channel beam trawl fishery
- Norway lobster, *Nephrops* norvegicus, caught in the Bay of Biscay otter trawl fishery
- Whiting, *Merlangius merlangus*, caught in the southern North Sea beam trawl fishery
- Sole, *Solea solea*, caught in the southern North Sea beam trawl fishery
- Plaice, *Pleuronectes platessa*, caught in the southern North Sea beam trawl fishery
- Cod, *Gadus morhua*, caught in the southern North Sea beam trawl fishery
- Rays, *Rajidae*, caught in the southern North Sea beam trawl fishery
- Thornback ray, *Raja clavata*, southern North Sea inshore trawl fishery
- Thornback ray, *Raja clavata*, southern North Sea inshore gillnet fishery
- Thornback ray, *Raja clavata*, southern North Sea inshore longline fishery
- Rays, *Leucoraja naevus*, *Raja microocellata*, *Raja brachyuran*, *Raja clavata*, caught in the Bristol Channel otter trawl fishery
- Sole, *Solea solea*, plaice, *Pleuronectes platessa*, dab, *Limanda limanda*, turbot, *Psetta maxima*, lemon sole, *Microstomus kitt*, flounder, *Platichthys flesus*, caught in the North Sea pulse beam trawl fishery

Revill, A. S., Broadhurst, M.K., and Russell B. M. 2013. Mortality of adult plaice, *Pleuronectes platessa* and sole, *Solea solea* discarded from English Channel beam trawlers. Fisheries Research 147 (2013) 320– 326

Adult plaice, *Pleuronectes platessa* and sole, *Solea solea* are frequently discarded from beam trawlers working in the western English Channel. This study aimed to quantify the immediate (survival rate immediately after gear retrieval) and short-term mortalities of such discards. During 121 deployments (hauls) by two beam trawlers alternately fishing across five consecutive months (starting January 2012), 1013 plaice (23–62 cm total length; TL) and 810 sole (23–52 cm TL) were assessed for immediate mortalities, while 120 and 90 alive individuals were subsequently monitored (along with 39 controls) in a purpose-built, onboard aquaria for three days. Immediate discard survival rates were similar among all months for sole (93- 97.7%) and most months for plaice (93.2 – 98.8 %), excluding February (survival rate 73.8 %) when individuals were in poor condition due to spawning.

Of the plaice and sole monitored in the on-board aquaria, 37.5 and 43.3 % survived. For both species, immediate and short-term survival rate always increased with increasing TL, and this relationship was statistically significant for the immediate survival of plaice in February, and for their short-term survival in the other months. The monthly ranges of mean total survival rates (±se) (accounting for control fatalities of 23.1%) were 79.6 ± 10.2 and 37.3 ± 7.3% for plaice, and 76.4 ± 10.2 and 53.1 ± 8.9% for sole. The results support avoiding targeting spawning fish and/or only discarding larger specimens as a means for reducing unaccounted fishing mortality due to quota restrictions.

	Immediate survival		Short-term survival		Total survival	Total survival
					Unadjusted	Adjusted
Plaice	%	n	%	n	%	%
February	73.8	515	27.5	40	20.3	37.3
March	93.2	207	27.5	40	25.6	47.1
April	94.3	35	-	-	-	-
May	98.8	256	57.5	40	56.8	79.6
Sole						
January	93.3	104	-	-	-	-
February	93	114	34	50	31.6	53.1
March	93.2	190	-	-	-	-
April	94	216	-	-	-	-
May	97.8	186	55	40	53.8	76.4

Méhault, S., Morandeau, F. and Dubé, B. 2011. Discarded *Nephrops* survival after trawling in the Bay of Biscay, IFREMER- Report

Also reported as:

Méhault, S., Morandeau, F., Fifas, S. 2011. Discarded *Nephrops* survival after trawling. Working document for ICES *Nephrops* working group. IFREMER Report of project PRESPO, pp. 15.

The *Nephrops* survival experiment was conducted on seven commercial vessels at various times of the fishing season in the years 2009 and 2010 on the *Nephrops* grounds of the bay of Biscay to assess the vitality of *Nephrops* before discard. 26 fishing operations were sampled. In order to cover a wide range of duration of emersion, some of them were sampled at the beginning and at the end of the sorting process. On average, samples consisted of 160 individuals. 5637 *Nephrops* were measured. 3 fishing trips were carried out on board of 2 commercial boats to assess the survival of *Nephrops* discarded alive after three days of re-immersion. 15 fishing operations were sampled, i.e. 1557 *Nephrops* were re-immerged in plastic tubes and bags for three days

The survival rate of discarded *Nephrops* was calculated from the combination of the vitality state of individuals before being discarded and the chance of living animals to survive after re-immersion. The overall survival rate was the combination of the proportion of living individuals before re-immersion and the survival rate of living individuals re-immerged. Without considering the environmental parameters, a bootstrap method indicated that the mean survival rate of discarded *Nephrops* under the observed conditions during the experiment is 50.6%. However, as a conclusion, no single value of global survival rate of discarded *Nephrops* could be defined, but a range between 45 and 65%, higher than the 30% currently assumed in the ICES stock assessment procedure.

The study indicated that discarded *Nephrops* has a relatively high potential to survive after having been thrown back at sea. However, it remains difficult to define a precise survival rate due to the large range of factors that may affect it. It should also be noted that the observation period during this study was short (3 days) meaning that the survival rates may be overestimated.

Depestele, J., Desender, M., Benoit, H.P., Polet , H. and Vincx, M. 2014 Short-term survival of discarded target fish and non-target invertebrate species in the "eurocutter" beam trawl fishery of the southern North Sea *Fisheries Research 154 (2014) 82–92*

This was an examination of discard survival in 4m beam trawl fishery using chain mats and limited haul durations in the southern North Sea. This so-called "eurocutter" fishery is carried out by beam trawlers with an engine power 221 kW and is allowed in the 6 to 12nm zone. This study obtained short-term survival estimates for "eurocutter" fishery by monitoring post-capture mortality in tank-held organisms. Survival was high to very high (>75%) for benthic invertebrates, but not for fish. All examined whiting (*Merlangius merlangus*) and pouting (*Trisopterus* sp.) died. Only 14% of sole (*Solea solea*) survived to 91 h of observation, and 48% of plaice (*Pleuronectes platessa*) to 77 h. The survival rates were higher for cod (*Gadus morhua*) (66% to 88 h) and skates (*Rajidae*) (72% to 80 h). However, mortality had not stabilized within the observation period and so the observed survival rates are likely to be overestimates of eventual survival .

Survival models were used to estimate the minimum duration of captivity required to properly evaluate short-term survival, and to investigate the role of physical injuries and other pertinent covariates in determining fish discard survival (Table 4-4). The results of this study indicate a high variability in discard survival amongst taxa and highlight that physical injuries when taken alone are a limited proxy for survival of 4m beam trawl discards and that small fish specimens have a limited chance of surviving discarding.

Table 4-4 Kaplan–Meier survival estimates with standard errors (S.E.) for six fish species held in holding tanks after commercial hauls (1.5 h) with a chain mat beam trawl. Survival of plaice and solewas also tested for short hauls, which served as a control subjects for the experiments. The number of investigated individuals, N, and number of dead organisms, N (dead), are indicated for each time interval.

Species	N	Time (h)	N (dead)	Percent survival (%)
Rajidae	141	65	34	77 (5)
	108	80	40	72 (6)
Gadus morhua	64	34	18	72 (8)
	45	88	21	66 (9)
Merlangius merlangus	76	21	76	0 (-)
Pleuronectes platessa	97	57	30	69 (7)
	88	77	41	48 (15)
Solea solea	246	64	186	29 (10)
	208	91	202	14 (25)

The survival probability for cod (32-75 cm) was considerably higher than expected (65.9% at 88 h). The limited fishing depth for catching the cod individuals may be a plausible explanation. All individuals were caught at depths between 10 and 33 m, which is expected to result in higher cod survival due to less barotrauma during capture. This re-emphasises the need to put the results from survival estimates in the context of the conditions of a specific fishery.

Ellis, J.R., Burt, G. and Cox, L. 2008. Programme 19: Thames Ray Tagging and Survival, CEFAS *Fisheries Science Partnership: 2007/08 Final Report.*

This Fisheries Science Partnership project was developed to estimate the longer-term survivorship and movements of thornback ray *Raja clavata* in the southern North Sea, using traditional tagging methods. Five vessels and seven trips were examined, to gauge differences between the various gears used by the inshore fleet and to cover wider parts of the southern North Sea.

The fish caught generally appeared in good health, with the soak/haul times typically of commercial duration (although some gillnet studies used soak times of 24 h, instead of the 30–48 h used normally). Fish caught on longlines were generally lively, and although some specimens had minor damage to the mouth and jaws, specimens with healed jaws were also seen, suggesting that fish can recover from such damage.

Of the thornback rays caught by otter trawlers 63-99%% were considered lively at the point of tagging, 1-34% were considered sluggish and 0-2% were considered dead. Visual assessment of health suggested that the two larger size categories were in better condition than smaller fish (Table 4-5).

Longline studies indicated that thornback rays were generally lively. Of the 110 thornback rays caught by a gillnetter 94.5% were considered lively at the point of tagging and six 5.5% were rated as sluggish.

In all, 4 313 elasmobranchs were tagged and released, including 4 152 thornback rays and 151 smoothhounds. Recapture rates of thornback rays up until this report was released ranged from 5.5–14.7% (2007 releases), and from 4.0–9.5% (2008 releases), confirming that there is long-term survival following discarding. However, it is not possible to yet determine what the overall rate of discard survival is from these studies.

Table 4-5 Observed condition of thornback ray immediately following capture for a long-term tagging study.

	Lively		Sluggish		Dead		Total
Gear	No.	%	No.	%	No.	%	No.
otter trawler 1	591	63.1	323	34.5	22	2.4	936
otter trawler 2	1 608	91.3	152	8.6	1	0.1	1 761
otter trawler 3	1 122	99.7	3	0.3			1 125
longline 1	104	94.5	6	5.5			110
longline 2	690	97.6	17	2.4			707
gillnetter 1	388	73.2	142	26.8			530
gillnetter 2	436	98			9	2	445

Enever, R., Catchpole, T.L., Ellis, J.R. and Grant, A. 2009. The survival of skates (*Rajidae*) caught by demersal trawlers fishing in UK waters. *Fisheries Research 97 (2009) 72–76*

The study focused on the Bristol Channel skate fishery, where on-board holding tanks were used to assess the short-term rates of survival of trawl-caught skates (*Rajidae*). Seven trips (3 to 5 days) were made during May and August 2007. In all, 32 tows were conducted in areas where the vessel would normally fish for skates. After monitoring 162 fish in specially designed on-board holding tanks for periods of up to 72 h, the overall short-term rate of survival was 55% (Table 4-6). Visual inspection of “health” at time zero was a good indicator of survival, with 79% of skates with a poor health score did not survive. Survival rates for fish of moderate health and good “health” were 84 % and 95 %, respectively. This information allows one to predict the consequences of fishing practice on discard survival using a larger dataset on fish scored for health before tagging and release.

The proportion in poor condition on capture was positively correlated with estimated codend weight, so technical modifications to fishing gear aimed at reducing unwanted by-catch were considered would increase the survival of discarded skates.

Table 4-6 Survival rates, holding duration, and mean lengths of skates held in vivier tanks from commercial tows. (from Evener *et* al, 2009)

Species	Mean Length(cm)	Mean time in tank(h)	*n*	Survival rate(%)

Leucoraja naevus	35	48	6	33
Raja microocellata	43.6	58.5	39	51
Raja brachyura	41.3	48	11	55
Raja clavata	55.4	60.6	68	59

R. Enever, R., Revill, A.S., Caslakec, R. and Grant, A. Discard mitigation increases skate survival in the Bristol Channel. Fisheries Research 102 (2010) 9–15

The study focuses at the effects of three different codends on the initial health and short-term survival of trawl-caught skate (Rajidae), using a control codend (80mm diamond mesh used as standard in the fishery) and two experimental codends (100mm diamond mesh and 100mm diamond mesh turned on the square). The study was conducted aboard a commercial trawler, using a twin-rigged demersal trawl in the Bristol Channel. Eight trips 3–5 days long were made during June and July 2009. In all, 38 tows were conducted in areas where the vessel would normally fish for skate.

Both experimental nets reduced discarded numbers of fish by app. 70%, with no commercial loss. This reduction in discards had an effect in reducing the total weight of the experimental codends by as much as 80%. 278 skate were placed in onboard holding tanks for 48 h to evaluate the survival rates of fish caught in the different codends (Table 4-7). Visual inspection of “health” at time zero was a good indicator of survival, because 86% of skate with a good health score survived. Another 1539 skate assessed for health, showed that fish caught in the control codend had the lowest proportional good health score (25%), followed by the 100mm diamond mesh codend (34%) and the 100mm square mesh codend (47%). The health of the fish caught was related to codend weight. The authors conclude that technical measures aimed at reducing discards have an additional benefit; they indirectly increase discard survival, and the benefits of mitigating discards through bycatch reduction devices may be a more powerful tool in fisheries management than previously thought.

Table 4-7. Numbers of Raja microocellata observed dead or alive after the 48 h vivier trial for the control (80mm) vs. experiment 1 (100mm diamond) and control (80mm) vs. experiment 2 (100mmsquare mesh) and the number of small-eyed skate observed with an initial health score >1 (good health). From Evener *et* al, 2010.

	Experiment 1		Experiment 2	
	80 mm	100 mm diamond	80 mm	100 mm square
Dead	30	29	32	22
Alive	39	42	39	45
Health score >1 (%)	35	30	39	42
Survived >48 h (%)	57	59	55	67

iv. Describe those factors affecting survival (based on output from ICES WKMEDS)

The ICES WKMEDS 2014 compiled a review of available literature on factors linked with measurable stress, injury or mortality of discarded fish. The outputs were categorised by conventional gear types (trawls and dredges; gillnets and traps; hook and line; longlines and jigging or pelagic seines and trawls.

There are a multitude of variables that have been demonstrated to influence discard survival rates. These have implications for the representativeness of the estimates generated and how fisheries are defined in the context of exemptions from the landing obligation under the high survival provision. The issue of defining a candidate fishery for high survival exemption for the purposes of control is dealt with in the following section. A review of factors know to influence discard survival rates is given below (ICES WKMEDS).

Operational factors

The operational factors of survival are generally connected to technical stressors induced by the fishing process. However these factors can also have a synergetic effect with several environmental and biological stressors. By tracing a fish pathway of being a) captured b) handled above the water surface, and c) released back overboard and eventually returning to its habitat, relevant technical, environmental and biological variables can be identified.

A. Capture phase

Technical stressors

The configuration of the fishing gear plays an important role in how animals are caught and interact with gear, with what components they come into contact and what the intensity of this contact is.

In trawl fisheries, the interaction starts with a stimulus by the gear such as otter boards and sweeps (Wardle, 1993), tickler chains (Van Beek et al., 1990; Kaiser and Spencer, 1995), and groundgear (for trawls) which can cause physical contact and possible injury (Chapman, 1981). Next, the animals pass through the gear towards the codend. During that process, further physical contact can occur, resulting injuries such as abrasion. The characteristics of the netting material (i.e. stiffness, yarn surface, knot thickness, mesh shape) are important in that process (Millner *et al*., 1993; Evans et al., 1994). Physical barriers in the net, such as guiding panels can inflict additional injury (Lundin *et al.* 2012). In hook and line fisheries, the design of the hook has an effect on survival (Grixti et al., 2007; Cooke and Suski, 2005) and the type of lure can be important (Arlinghaus et al., 2008). In static net fisheries the design of net is important, for example, fish are more likely to get entangled in trammel nets than in single layered gillnets (Uhlmann and Broadhurst, 2013).

A negative relationship typically exists between deployment duration and survival. The longer gears are deployed, the longer animals are exposed to the capture process, whereby crushing and injury may confound exhaustion effects. For example, both Wassenberg *et al*. (2001) and Uhlmann and Broadhurst (2007) showed that in penaeid prawn trawls, survival probabilities for discarded organisms decreased with longer tow duration (Appendix IV). In trap fisheries, discard species may be trapped and are not able to feed or move as needed

(Barber and Cobb, 2007). For hook and line fisheries, longer fighting times have been shown to increase the occurrence of sublethal effects and post-release mortalities (Tomasso et al., 1996; Meka and McCormick, 2005).

Towing speed is another technical factor, which is shown to influence discard mortality. Higher towing speeds can lead to exhaustion and increased risk of injury, due to increased likelihood and intensity of contact with the gear and other parts of the catch. The movement of the fishing gear, as determined by its designs, the nature of the seabed, depth range (Milliken *et al.,* 2009; Benoît *et al*., 2013) and currents, can affect the type and likelihood of injuries to organisms.

The **process of hauling of fishing gear on board**, the movement of parts of the fishing gear containing the catch, physical interactions with hard parts of the vessel (which can be exacerbated by poor weather conditions), the size and composition of the catch, and the time before emptying the catch affect animal vitality in the catch. The speed of hauling will also affect how quickly gases in the animal's body expand, and how it can cope with this physical change (see barotrauma below).

Environmental stressors

The **effects of temperature changes** (from ambient temperature at deeper depth to surface/air temperature) are well known for some freshwater and marine fish, where physiological stress and changes in behaviour have been observed (Brett, 1970; Fry, 1971; Schreck et al., 1997; Davis et al., 2001). A series of experiments on marine fish (Barton and Iwama, 1991; Muoneke and Childress, 1994; Ross and Hokenson, 1997) demonstrated species-specific differences in mortality associated with temperature change. Swimming performance and the ability of fish to maintain position in the net can be influenced by temperature change (Beamish, 1966; Breen et al, 2004; He and Wardle, 1988; Winger et al., 1999) and thus the likelihood of physical injury, through contact with the gear or the catch.

Over a longer time-scale, **temperature changes** may contribute to observed seasonal effects, although few studies have taken seasonality into account. Other more crucial parameters may be 'masked' by this variable, but strongly correlated to it, such as ambient temperature and spawning. Cicia et al., 2010 demonstrated significant seasonal differences in the mortality rates of skates captured between February and July, mostly associated with variations in surface temperature. Revill et al. (2013) found differences in the survival of plaice in different seasons. Mediterranean swordfish also demonstrated lower vitality during the post-spawning season compared to pre-spawning, a finding attributed to the poor health condition of the spawners (De Metrio et al., 2001; Damalas and Megalofonou, 2009).

With increasing depth, natural light levels are reduced through attenuation, which can also influence the behaviour during the capture process (Johnson, 2012). Observations and measurements of fish behaviour under conditions of low light and darkness have been carried out both in the field and in the laboratory (Batty, 1983; Olla and Davis, 1990; Ryer and Olla, 1998; Olla et al., 2000), confirming that effects of light are species-specific. In some trawl fisheries, certain fish species under low light conditions, swam less, passed along the trawl faster, and did not orient themselves to the long axis of the trawl resulting in more injury and mortality. At very low light intensities, fish do not detect an approaching net (Wardle, 1993). At the other extreme, bright surface light may cause disorientation and bleaching of sensory pigments in the eye, reducing the animals' ability to make avoidance responses if released at sea (Pascoe, 1990). For some species, short-term or permanent blindness may also occur (Frank and Widder, 1994).

Differences in salinity result in varying osmotic pressures, which requires aquatic species to regulate their body water. Marine stenohaline species (e.g. *Nephrops* norvegicus) may suffer haemodilution and rapid mass gain, even after a brief expo-sure to non-preferred salinity ranges (Harris and Ulmestrand, 2004). Another relevant environmental factor during the capture phase is water depth.. The negative effect of a change in depth on fish vitality is mainly due to the rapid decrease of hydrostatic pressure (see Biological stressors section below).

Biological stressors

Significant variation in discard mortalities has been documented not only between studies but also within studies for some species (Frick et al. 2010; Revill, 2012). In general, sedentary species and those lacking a swim bladder (e.g. flatfish, sharks and rays) have a higher likelihood of survival (Benoît et al., 2013). Several crustacean species (crabs, lobsters) and bivalve molluscs (scallops) are relatively robust and are likely to survive when discarded (Mesnil, 1996).

Fish that are captured, brought to the surface and discarded encounter depressurization (barotrauma; Stewart 2008), which can cause mortality (Campbell et al., 2010; Hochhalter and Reed, 2011; Nichol and Chilton, 2006; Rudershausen et al., 2014). The presence and type of a swimbladder is an important biological determinant of survival (Benoît et al., 2013; Rudershausen et al., 2014). The most frequently observed barotrauma symptom in fish is an overinflated or ruptured swimbladder, with associated gas release into the body cavity. However, swimbladder healing after a short period of time has been described for some species, e.g. Atlantic cod (Midling et al., 2012).

The size and structure of the swim bladder varies considerably in different teleosts; some taxa, particularly those living in the deep sea or benthic habitats have lost the swimbladder altogether (McCune and Carlson, 2004). Physoclistous (i.e. closed bladder) fish are most susceptible to the effects of barotrauma, (Broadhurst et al., 2006). Physostomous (i.e. open bladder) fish can more readily regulate the amount of gas in their swim bladders by venting it, but may be more susceptible to barotraumatic effects compared to fish lacking a gas bladder (Benoît et al., 2013). This may account for the proportionally higher survival often observed for discarded elasmobranchs and some benthic teleosts that lack closed gas bladders (Depestele et al., 2014; Enever et al., 2008; Laptikhovsky, 2004). A list of marine fish with physoclistous (closed) or physostomous (open) swimbladders is given in Benoît et al. (2013).

The composition and size of the catch (Robinson et al., 1993) determine how severe the interaction between different animals in the catch will be. It influences the nature and intensity of injuries and thus the associated mortality. For example, Mandelmann and Farrington (2007) observed that larger catch volumes caused greater mortalities among discarded spurdog (*Squalus acanthias*). Moreover, the crowding density of the catch prior to release (e.g. during slipping in purse-seines) (Tenningen et al., 2012, Appendix IV), and the herding effect that may lead to exhaustion of the fish can result in lower survival (Robinson et al., 1993; de Veen, 1975; Berghahn et al., 1992; Colura and Bumguardner, 2001; Wardle, 1993). It has been suggested that abrasive objects such as spiny fish may cause scale loss among teleosts.

B. Handling phase

Technical stressors

Once the catch is brought on deck, the handling phase will influence discard survival. The path of the catch after removal from the fishing gear through the infrastructure onboard can have a major effect on the survival of fish (Berghahn et al., 1992). Different methods exist to haul individual fish on board. Whether the catch is released into a hopper, whether it is pumped or gaffed, the speed, technique and conditions of handling affect animal vitality in the catch. Since exposure to air affects survival (Castro et al., 2003), a quick sorting of the catch generally improves survival. The design of the vessel, and the skills and number of individual crew members on the processing line will therefore have an influence. De-hooking and removing from static nets is easier and faster for experienced fishers. Discards can be temporarily stored on deck, and can be released through a tube above or under the water. This can affect the exposure time to air, altered temperature and light, as well as exposure to seabird predation (Chapman, 1984).

Environmental stressors

Many aquatic organisms suffer from hypoxia during air exposure (Chapman, 1984) or during confinement. The time of air exposure is typically measured as the period between pulling the catch out of the water, until discarding back to the water. By sorting the catch in water, MacBeth et al. (2006) demonstrated that minimizing air exposure reduced discard mortality of undersized prawns. Hypoxia effects can be confounded with temperature changes to negatively affect survival (e.g. van Beek et al., 1990; Gamito and Cabral, 2003; Giomi et al., 2008; Hyvärinen et al., 2008). Irrespective of the gear type, species-specific and size-dependent tolerances to hypoxia are important biological factors in determining susceptibility to discard survival (Barber and Cobb, 2007; Gisbert and López, 2008; Stewart, 2008). Effects of air exposure may be exacerbated by simultaneous exposure to direct sunlight which can lead to heating and rapid dehydration. Exposure to wind or freezing temperature may also increase dehydration.

Biological stressors

Within species, size matters, with larger fish generally showing higher survival (Neilson et al., 1989; Sangster et al., 1996; Milliken et al., 1999). Increased sensitivity of smaller fish is attributed to greater mass-specific respiration demands (Benoît et al., 2013), to fatigue from swimming during capture (Wardle, 1993) and a reduced ability to avoid injurious contact with the gear and catch (Suuronen et al., 1995, 1996c; Sangster et al., 1996; Wileman et al., 1999; Breen et al., 2007). In addition, body core temperature increases faster in smaller fish (Davis et al., 2001; Davis and Olla, 2001, 2002); an inverse relationship between the rate of body core temperature increase and fish size has been documented (Spigarelli et al., 1977). The mechanisms behind sensitivity towards changing temperatures have not been resolved yet for many species. For example, while flatfish can be both tolerant of hypoxia and temperature change, sablefish are tolerant of hypoxia, but sensitive towards changes in temperature (M. Davis, pers. com.). Salmonids are very sensitive towards temperature changes (Gale et al., 2013), as are clupeids (Lundin et al., 2012).

As discussed above, the extent of physiological responses to air exposure is species-specific (Benoît et al., 2013). The lack of gas exchange during hypoxia triggers a cascade of metabolic products that can be measured in the haemolymph, blood and tissue (McMahon, 2001; Davis, 2002). Owing to different respiratory mechanisms, crustaceans are favourably adapted to tolerate anoxic conditions compared to teleost fish. Benoît et al. (2013) identified some biological traits such as the presence of deciduous scales, mucus production, body softness and presence of sedentary lifestyles which are indicative of hypoxia sensitivity. The degree to which such biological resilience occurs may be very specific and associated with certain biological traits (Table 7.2). To illustrate the relationship between stressors and stress responses for discarded organisms, sensitivities towards changes in anoxic conditions, temperature and water depth and their measurable responses have been listed in Table 7.2.

C. Release phase

Technical stressors

The mechanisms by which individuals are released into the water will influence survival. To reduce adverse impacts from discarding, release chutes or recovery boxes may facilitate a less stressful release process. Allowing species to re-cover prior to being released has shown to reduce predation (Farrell *et al.*, 2001).

Environmental stressors

The environment into which the individuals are discarded, and the distance from their natural habitat (displacement), will also affect survival chances. Predation rates of discarded fish also depend on variables such as the type of predators present, predator density (Cooke and Philipp, 2004) and predator avidity (Campbell, 2008). Vulnerability to predators is species- and size-specific, for example, large pelagic

Biological stressors

Successfully evading predation depends on the responsiveness of the prey (Fuiman et al., 2006). If reflex responses are impaired (e.g. reduced swimming speed, loss of orientation), then responsiveness will be reduced (Ryer, 2004; Raby et al., 2013). Injuries can affect not only a fish`s ability to evade predators (see below), but also shelter seeking and feeding abilities. Open wounds can facilitate infections by pathogens, particularly in fish already stressed by their interaction with the fishing gear. This can be a direct cause of mortality or result in an increased probability of predation.

Species Summaries

Plaice

7 relevant have been identified and these focus primarily on beam and otter trawl fisheries in the North Sea and Channel. For beam trawls, survival rates range from 37 to 79% and for otter trawls the estimates are highly variable, ranging from 0 to 100%. There is evidence showing that survival for smaller individuals is lower than for larger fish and that survival is lower during spawning periods. If plaice are considered as a candidate species for the high survival exemption, then due consideration should be given to the lower survival rates for smaller individuals (e.g. juveniles) and spawning fish.

Skates and Rays

12 relevant studies are presented covering a wide range of gear types (otter trawl, beam trawl, longlines and gillnets) covering a range of EU and international locations. In general survival rates are typically in excess of 50% across all gears and greater than 80% in many cases.

Nephrops

Data are available from 6 relevant studies relating to otter trawls. The results are highly variable ranging from survival rates of 28 to 88%, but the studies showing the highest survival rates (80 and 88%) had observation periods of 1 and 4 hours respectively and should therefore not be considered as representative given that deaths were still occurring in other studies after 5 days. *Nephrops* may also be subject to higher changes of post discard predation given that they are burrowing animals and may therefore be more prone to predation if they are unable to quickly find or recreate a burrow. It is noted that discard survival is explicitly considered in ICES assessments and is estimated to be between 15 and 25% depending on functional unit.

Dab

There are 4 relevant studies available, 3 of which relate to the otter trawl gear in the North Sea and one study relating to the electric (pulse) beam trawl. There are no studies of dab survival from the conventional beam trawl, which is associated with very high dab discard levels. The survival rates from the otter trawl studies are highly variable (1 to 100%) with no obvious" typical" value.

Cod

Survival of cod is also highly variable (0 – 100%), but studies have shown survival >50% of cod caught in beam trawls. The relatively high survival is thought to be due to the shallow fishing depth (<30m). The sample size is also small and further replication may be required to provide more robust estimates.

v. Implications of factors effecting survival for control of exemptions from the landing obligation under the high survival provision: Control and enforcement issues on high-survivability exemptions

The CFP introduces a change from a landing to a catch quotas system which represents a significant change to how fisheries control and enforcement needs to be carried out. The introduction of a landing obligation is a fundamental change to fishing operations, and hence fishery control. As recognised in STECF report 13-23 several elements of Article 15 (i.e. exemptions) are open to different interpretations and depending on how these elements are put into practice, it could result in quite diverse consequences.

The incorporation of exemptions such as high survivability and the fact that its interpretation is not well defined adds complication to the control aspects. All exemptions from the landing obligation can be a reason for legitimate discarding. As such, their implementation will add to the challenges faced in understanding the incoming obligations by fishers, and in the work of control authorities in promoting and verifying compliance. From a control perspective, clarity for what the high-survivability exemption would allow and not allow is important. Specifically, detail on how such exemptions will be interpreted and implemented within discard plans is required (i.e. clear definition of specific gears, type of vessels, and main target species in a certain fishery), as this will have a significant impact on the types of monitoring and control measures that will be required.

The enforcement tools currently available for at-sea monitoring include REM-system, control observers and at-sea monitoring with patrol vessels or aircraft. Other enforcement tools such as landings controls to check catch composition and risk analysis (cross-checks of documentation etc.) can be used as a complement to the monitoring at sea but cannot alone be used to verify that the various components of the landing obligation are complied with (i.e. exemptions such as high survivability). A full review of these control tools applied to the landing obligation including exemptions can be found in the report STECF 13-23.

Given the uncertainty it is still too early to accomplish a meaningful analysis of the control implications and consequently of the preferred control methods. From a control and enforcement perspective, it is important that this high survivability exemption is addressed so that the factors affecting compliance are taken into account when the exemptions are being defined in the discard plans. In any case, in the implementation of such exemptions, control measures shall be tailored on the basis of risk management and cost-effectiveness.

Article 15.13 of the CFP stipulates that:

"Member states shall ensure detailed and accurate documentation of all fishing trips and adequate capacity and means for the purpose of monitoring and compliance with the obligation to land all catches, inter alia such means as observers, CCTV and other. In doing so, Member States shall respect the principle of efficiency and proportionality."

A successful implementation of the landing obligation will be highly dependent on the level of compliance with the measures and the requirement to accurately document all catches. The accuracy of the documentation should therefore be set at the maximum level.

Although the regulation is clear that exemptions shall be fully recorded, this creates practical difficulties in particular on the potential for fish survival to be compromised by efforts to ensure accurate documentation. For example if a haul of pelagic fish, or a portion of a haul of fish is slipped before it is brought on-board then there will be real difficulty in estimating quantity discarded to any degree of accuracy. In the case of exemption due to high survival criteria, it forces fishermen to sort and weigh catches and this could negatively impact on the survival probability of individual fish and could potentially conflict with the desire to return fish to the water as quickly as possible. Conversely, if a portion of the fish being discarded under the high survival criteria do not survive (i.e. survival <100%), failure to adequately monitor and record the volume of fish being discarded will also bias (under)-estimates of mortality.

The current system of documentation (logbooks, landing and transport declarations, etc.) works reasonably well as a system but the reliability of the documentation currently needs improvement. Paper and electronic logbooks form the basis of self-reported catch records. Under the landing obligation MS will need to consider appropriate extension of on-board catch documentation and also the means of verifying on-board documentation. The issue for the controller of course is that even if a record of discards is available for inspection, there is no means of verification as the catch will have already been discarded (other than for vessels with REM or observers). A number of possible improvements in the current documentation system were considered in STECF report 13-23.

In the context of high survivability fisheries it is also important to note that the Control Regulation stipulates that catch shall be recorded every 24 hours, but since discarding and retention takes place at each haul, EWG 13-16 already flagged the idea that requiring haul by haul documentation should be considered as it increases the likelihood of accurate and complete documentation of catches within a landing obligation framework. This is likely to be particularly important in fisheries with exemptions for species with high survivability because the estimated proportion of discards that will not survive will need to be accounted for in stock assessments.

In the control and enforcement context, further work in risk analysis is also needed in order to analyse how the fisheries may/will evolve during the new requirement to land all catches and to evaluate how the catch documentation and control should be designed in order to meet the new requirements of the landing obligation. Means for documentation and reporting should be simple, transparent, and cost-effective and shall be based on the best available knowledge.

4.2 Identify potential discard problems in demersal fisheries in these sea basins that cannot be addressed through improvements in selectivity or would lead to disproportionate costs of sorting unwanted catches on board.

The EWG considers that the decision to seek proposals for de minimis exemptions from the landing obligation will need to be based on operational concerns regarding the practicalities of reducing unwanted catches while maintaining economic viability (EWG 17-11) or disproportionate costs associated with handling unwanted catches. Such decisions should be related to explicitly- defined fisheries and supported with quantitative supporting information, this particularly important for de minimis (and survival) exemptions.

The EWG notes that the information required to assess the potential consequences of proposals for de minimis exemptions for specific fisheries, will depend on how such fisheries are defined. Furthermore, the information to undertake such assessments will almost certainly need to be derived from existing information which has been assembled at a coarser level of aggregation than is likely to be required for specifically-defined fisheries. For example, existing information is available for broad gear-groupings used in specific large sea areas, such as those used under the current Long Term Management Plan for Cod (EC Regulation 1342/2008 e.g. TR1 - otter trawls with mesh size greater than 100mm, and TR2 - otter trawls with mesh sizes between 70 and 100mm. Fisheries may be defined at different aggregation levels such as vessels using a specific type of e.g. 120mm otter trawl, fishing in specific areas at certain times of the year targeting specific stocks. The group notes that recompiling existing information will not be a trivial task and because existing data coverage is incomplete, it may prove impossible to adequately assess the likely consequences of proposals for certain fisheries.

As the definition of fisheries is still to be decided by the Regional groups, the EWG considers this Term of Reference cannot be fully addressed. In the absence of specific fisheries definitions, it is not possible to determine a definitive list of fisheries where improvements in selectivity to reduce or eliminate unwanted catches will be difficult to achieve or whether the costs of handling unwanted catches will be disproportionate.

EWG 14-11 notes that broad fisheries definitions such as those based on gear type/mesh size grouping as used in the long term management plan for cod (EC regulation 1342/2008)) will contain a number of distinct “fisheries” each of which will have different and separate selectivity, discard and/or choke issues. Managers may want to consider how fisheries are defined particularly in light of de minimis (or high survival) exemptions given that difficulties in improving selectivity or disproportionate costs (or indeed exemptions based on high survival) are likely to be fishery-specific. This means that defining the management units to which exemptions may apply, will require more detailed definitions of “fisheries” beyond a basic definition based only on gear type and the mesh size used.

As noted by EWG 13-17, the direct impact of having the species to be included in discards plans phased in over time and possibly differentiated across individual fisheries is an important issue. A top-down categorisation will lead to the same disputes and vicious circles as in the first cod plan, where differences in effort allocations between gear groupings generated incentives to switch management units if deemed to be more attractive due to less stringent limits on effort. Such incentives could inadvertently be introduced into discard plans and result in similar unintended consequences, particularly if a given species is included in one fishery, but excluded in another. Therefore, regional groups may want to consider a bottom-up approach to ensure that the management units chosen for exemptions equate to the appropriate fishery. The definition of fisheries is particularly important when describing specific technical and/or species difficulties for the improvements in selectivity as the justification basis for de minimis (or high survival exemptions). Both de minimis and survival exemptions present specific challenges in terms of catch documentation and control. It is therefore important that the characteristics, therefore “membership” of these fisheries are clearly defined for control and monitoring purposes *inter alia* in terms of area coverage, gear types used, catch composition etc. The EWG further notes that the information required to assess the potential consequences of proposals for de minimis exemptions for specific fisheries, will depend the available catch data (landings and discards by species). EWG notes that discard estimates are based on sample data obtained through national observer programmes which typically have relatively low sampling coverage of the order of less than 1% of total effort. This means that for stocks subject to high discard rates, the high raising factors will inevitably lead to rather uncertain catch estimates.

In addressing this request, the EWG has provided information that will help inform the identification of fisheries for which there may be a credible case for seeking a de minimis exemption from the landing obligation. This is based on the present understanding of the fishery and the available expert knowledge on technical tools to mitigate unwanted catches. It is important to note that it is not possible to predict what future means may become available to reduce unwanted catches and EWG 14-11 recognises that if effectively implemented, the landing obligation will offer incentives to develop new technical and tactical solutions to offset the business impacts of retaining and landing species subject to the landing obligation with no market value e.g. catches of species <MCRS.

Table 5.12.1 from the Report of the April 2012 Plenary meeting of the STECF (STECF 12-01) was used as a starting point to identify types of demersal “fisheries” where a de minimis exemption may be appropriate. Due to the absence of proposals for the definition of demersal fisheries in these sea areas, the EWG has necessarily taken a pragmatic approach and has relied on fishery definitions on the basis of gear type, together with ancillary information on intended target species and area of operation. For example, for the TR1 vessel grouping in the

North Sea (demersal towed gears using codend mesh size of 120 mm or larger, the EWG has identified 3 different fisheries as follows:

- A mixed demersal whitefish fishery which operates primarily within the 200 m isobaths and - exploits a variety of species with haddock, cod and whiting representing the major proportion of the landed catch. We refer to this as the mixed whitefish fishery.
- A fishery primarily operating just beyond the 200m isobaths and for which saithe comprises the major component of the landed catch. We refer to this fishery as the saithe fishery.
- A mixed demersal fishery operating beyond the 200m isobath in which Anglerfish and megrim comprise a major proportion of the landed catch. We refer to this fishery as the slope fishery for anglers and megrim.

Based on the data and information currently available, the EWG considers that such an approach is likely to highlight those broad fishery groupings for which selectivity may be difficult to achieve. Whether costs of handling unwanted catches in such fisheries are disproportionate cannot be assessed at this time due to the absence of data and information at the required level of detail although in some particular cases, opinions based on expert judgment have been made.

Nevertheless given the available data and information, the EWG considers that the following broadly-defined fisheries may be candidates to illustrate where selectivity improvements to reduce unwanted catches are likely to be problematic.

Beam Trawl fisheries in the North Sea (Subarea IV)

The beam trawl fleets operating in the North Sea exploits flatfish species, mainly plaice and sole but also catches other species such as lemon sole, dab, turbot, brill as well as some gadoids. This fleet can be separated into distinct fisheries, one primarily targeting high-value sole in the southern North Sea using a minimum mesh size of 80mm; a second fishery in the central North Sea, using a mesh size of 100-119mm targeting plaice with an important by-catch of large sole and; a third fishery targeting plaice operates in the Northern North Sea with a minimum mesh size of 120mm. Under the current Long Term Management Plan for cod (EC regulation 1342/2008) these are referred to as BT2 (covering the fisheries with mesh sizes in the range 80-119mm) and BT1 (the plaice fishery with a mesh size =>120mm) respectively.

The landings and discard data submitted to the STECF by Member States under the annual catch and effort DCF data call, shows that the BT1 fleet has very low levels of discards compared to the component of the BT2 fleet which uses the smaller 80mm mesh size in order to retain the primary target species sole, on which this fleet is highly dependent. Discard levels and rates in the sole-directed fishery part of the BT2 fleet are substantial due to the smaller mesh size used and the distribution of fishing effort. Based on the landings and discard data between 2010 and 2012, on average approximately~26,000 t of plaice and 35,000 t of dab were discarded annually representing 43% and 91% of the annual plaice and dab catches respectively. Discards in the other component of the BT2 fleet fishing with 100-119mm are poorly documented but the limited information available suggest discards in this fleet segment are low.

A previous STECF Expert Group (SGMOS 08-01) was requested to evaluate the potential impacts of a phased and targeted reduction in discards for both the beam trawl fleet operating in the North Sea (and the *Nephrops* "fishery" in western waters). For the beam trawl fleet segment, this EWG concluded that with the exception of codend mesh size alterations, there are no other mechanisms currently available to provide significant reductions (from the magnitude currently observed) in plaice discards. SGMOS 08-01 simulated increases in cod-end mesh size to improve selectivity in the BT2 fleet to avoid catches of small plaice and concluded that such increases would invariably result in a substantial reduction in the catch of sole. However, STECF has previously noted that the SGMOS sub-group was not able to fully explore all possible mechanisms to reduce discarding, such as developing markets for new species or size classes, or adjusting quota management systems. The SGMOS 08-01 EWG assessed the potential economic consequences of two scenarios for codend mesh size increases for the BT2 fleet:

- An increase in codend mesh size from 80 mm to 90 mm and
- An increase in codend mesh size from 80 mm to 100 mm

In both scenarios, the decrease of sole catches (14% and 32% by weight respectively) together with a small reduction of plaice catches was shown to lead to losses in revenues to an extent that the fishery would become unviable.

Based on the results of the SGMOS 08-01 analysis above, it could be argued on economic grounds, that an increase in selectivity for plaice is difficult to achieve in the BT2 fleet operating in the North Sea. Consequently, regional groups may therefore consider it a candidate fishery for a de minims exemption to permit continued discarding of unwanted catches of plaice. If such an exemption were sought, the EWG notes that a 5% de minimis based on the average total annual catches of plaice by the BT2 fleet over the years 2010 to 2012, would equate to approximately 9,000 t of plaice discards. Assuming that the magnitude of unwanted catches of plaice by the BT 2 fleet in the North Sea continues to be of the order of 25,000 t – 30,000 t annually, this implies that 16,000 t- -21,000 t of unwanted catches of plaice would still need to be landed to comply with the landing obligation. Managers will also need to consider that exploitation levels should compatible with MSY objectives, which for stocks subject to the landing obligation will mean that to be precautionary and following the MSY-approach, total catches (landings and any discards allowed under exemptions) will need to be within the level advised by ICES.

Fisheries using gears specifically rigged to maximize the catch of *Nephrops*

Nephrops are caught in small mesh trawl fisheries (typically a mesh size of 70-80mm) in a number of regions. The use of small meshes in such fisheries has been observed to result in high discarding of unwanted species or juveniles of commercial species. Many *Nephrops* fisheries are conducted in areas or on fishing grounds where *Nephrops* make up the majority of the catch *value* in the fishery even if they do not represent the majority of the catch *weight*. Other fisheries classified as *Nephrops*-directed fisheries are essentially mixed-species fisheries as they are conducted on fishing grounds where several species co-exist and are exploited simultaneously with *Nephrops.* Such species make up a substantial proportion of the catch value on which the vessels are dependent in order to remain viable. From the perspective of the landing obligation, the primary discarding issues associated with these mixed species fisheries have been catches of undersize, juvenile species of commercial importance and in particular, whiting, haddock and plaice. In the Skagerrak, Kattegat and the

Irish Sea, by-catches of cod are an important issue given the current highly-depleted state of cod stocks in these areas.

There are a range of selective devices that have been shown to be effective at reducing the catches of some species in fisheries targeting *Nephrops*, especially gadoids. These devices include square mesh panels, large mesh panels, separator- trawls and codends, topless trawls and others (Graham and Ferro, 2003). However, the choice and deployment of such selective devices is highly dependent on the overall objective and the reliance of the particular *Nephrops* fishery on marketable by-catch species. Where the target species *Nephrops* generates the majority of revenue e.g. >90%, species selective devices such as separator grids (e.g. "Swedish grid") or panels can be effective at reducing the retention of gadoids and flatfish species to varying degrees, with effectiveness being dependent on species type and individual size. Smaller individuals still tend to have a high catch probability as they are able to pass through the bars/meshes of selection grids/panels or bypass square mesh panels, and may therefore necessitate the requirement to use other devices such as square mesh codends or increases in cod-end mesh size to reduce retention of smaller individuals. Current knowledge of these fisheries indicates that even a combination of devices will not fully eliminate unwanted by-catches such as small whiting and Norway pout. The only conceivable solution would be to increase the cod-end mesh size which will significantly catches of *Nephrops* and jeopardise the economic viability of the fishery.

Fishery using gears specifically rigged to catch *Pandalus* in the North Sea and Skagerrak

The *Pandalus* trawl fishery involves vessels from Denmark, Norway and Sweden in the north-eastern North Sea and the Skagerrak. In recent years the fishery has been concentrated in the Skagerrak and the Norwegian Deep. The minimum mesh size is 35mm and the use of sorting grids was made mandatory in the Skagerrak in 2012. To allow retention of fish bycatch (mainly cod, saithe and anglerfish), the use of a secondary size selective device e.g. large mesh tunnel or codend of 120mm square mesh is permitted in combination with the grid provided a vessel has quota for such catches, which are economically important to vessels participating in this fishery. In the North Sea the use of the grid is still optional in the *Pandalus* fishery.

The use of sorting grids in this fishery is a positive development and has almost totally eliminated discarding of fish species such as cod, saithe and anglerfish that has been a problem in the past in the *Pandalus* fishery. However, there is a residual bycatch of blue whiting and Norway pout in the fishery that cannot be solved through gear modifications (i.e. sorting grids). The only conceivable way of reducing these catches would be to increase codend mesh size but, as with the *Nephrops* and beam trawl fisheries, this would result in significant reductions in *Pandalus* catches. Therefore these residual unwanted catches may be a candidate for a de minimis exemption on the basis that selectivity would be difficult to achieve. Additionally sorting *Pandalus* from Norway pout and blue whiting would almost certainly result in disproportionate costs in terms of increased sorting times on deck. Compared to the total international catches of blue whiting and Norway pout, the catches of these species in the *Pandalus* fishery are thought be minimal.

Fisheries exploiting stocks which are subject to a Zero TAC

Within the three regions there are several examples of species that currently have zero TACs. The EWG is of the understanding in accordance with to Article 2(2) of the CFP (EU Regulation 1380/2013) that advice on future fishing opportunities for catches will be based on the maximum sustainable yield exploitation rate (F_{MSY}), which should be achieved where possible by 2015 and at the latest by 2020. In principle therefore, future fishing opportunities could be set for all stocks for which a catch forecast based on F_{MSY} can be performed.

The EWG recognises that for some stocks, a zero TAC may continue to be set even if a catch forecast can be provided; i.e. for stocks that are assessed not to be within safe biological limits (for definition, see Article 4(18) of the EU regulation 1380/2013) and for which forecast catches at F_{MSY} will in any case, be relatively low; or for stocks that require a precautionary approach to fisheries management (for definition, see Article 4(8) of the CFP). Whether low or zero TACs are set for some stocks will be largely immaterial, as both cases will inevitably be problematic for fisheries exploiting those stocks. If unwanted catches (above zero or above TAC) from such stocks cannot be avoided, it would be technically illegal to land them and under the landing obligation it would be illegal to discard them. MSs may therefore be forced to close down fisheries that take catches from such stocks unless they can utilise one or a combination of the provisions for exemption (e.g. high survivability or de minimis) or quota flexibilities (e.g. inter-annual or inter-species) provided for under Article 15 (4a and b EU regulation 1380/2013 to offset or account for such catches.

In such cases the use of the inter-species flexibility is unlikely to be an option as the recipient stock needs to be within safe biological limits which will not be the case for a species with a zero TAC. If the provisions for exemption under Article 15(8) cannot be applied, then MS may seek a de minimis exemption (Article 15(5)(c)) on the basis that increasing selectivity to avoid such catches is technically very difficult or that costs of handling are disproportionate. However, even if a de minimis exemption for some fisheries is granted, the total catch of stocks under a zero or low TAC should not exceed the catch corresponding to MSY criteria, which *de facto* would be low, if the stated objectives of Article 2(2) are to be achieved. Hence, early closures of fisheries that take catches from stocks under a zero or low TAC, are unlikely to be avoided through de minimis exemptions from the landing obligation.

Examples of zero TAC such zero TAC species include the following:

Cod in VIa (West of Scotland).

Cod are caught in most mixed demersal fisheries in the West of Scotland area. Currently there is a zero TAC although vessels are permitted to land catches of cod provided that such catches do not exceed 1.5% of the live weight of the total catch retained on board per fishing trip (1.5% bycatch allowance). Despite the zero TAC, catches of cod in these fisheries in recent years have been high, typically between 1,000 and 1,500 tonnes. The EWG recognises that it would be technically very difficult to improve selectivity to reduce the catches of cod without leading to high losses of other marketable catches and creating economic difficulties for the fleets involved. O'Neill et al, 2014; Kynoch et al, 2011 and Campbell 2010 all noted substantial reductions in marketable species including monkfish, saithe, ling and megrim in the mixed species shelf and slope fishery when using technical modifications to reduce catches of cod. Avoiding such catches spatially and temporally may represent a partial solution but it is likely that it will be impossible to avoid some catches of cod especially in the mixed demersal fisheries in the northern part of the area. Furthermore, the scale of reduction in other marketable species may mean that from an economic perspective, adoption of any currently-established technical and tactical solutions may render the fisheries unviable.

Therefore it would appear that the mixed demersal fisheries operating in VIa and which take catches of cod, could be candidates for de minimis exemptions on the grounds that selectivity is difficult to achieve. However, taking into account the arguments above in relation to stocks under low or zero TACs, it is highly unlikely that the total catch of cod that could be discarded under a de minimis provision would alleviate the key problem faced by the fisheries in that catch levels would still remain well in excess of any advised MSY catch. In practice, this means that early closure of the fisheries is likely even with a de minimis provision to discard catches of cod.

To illustrate the potential magnitude of the problem facing the mixed demersal fisheries in VIa, the EWG notes that for 2015, the ICES MSY-based catch forecast for cod in VIa is 38 t, which compares with estimated catches for 2014 of 1529 t. If these were the values relating to 2016 when the landing obligation comes into force, the EWG understands that to comply with Article 2(2) of the CFP, this would imply a de minimis catch volume of no greater than 38 t. Furthermore, ICES advice for 2015 is for no directed fisheries and that by-catch and discards should be minimized.

Deepsea sharks

A range of deep sea shark species are caught in trawl (fisheries in areas VI, VII and VIII targeting mixed deep sea species, anglerfish, megrim and saithe), gillnet (fisheries in areas IV, VI, VII, VIII catching anglerfish) and longline fisheries (fisheries in areas VIII, IX targeting black scabbard). Currently such catches are discarded due to the zero TAC in place. There are currently no known ways of mitigating such catches in deepwater fisheries and given the depths at which these fisheries take place, with regard to deep water sharks, it is unlikely they would survive when discarded. In such cases, regional groups may wish to consider a de minimis exemption to cover these catches and limit the potential choke of the fishery. However, EWG 14-11 notes that for Kitefin shark (*Dalatias licha*) in the Northeast Atlantic, ICES advises on the basis of the precautionary approach that no targeted fisheries should be permitted unless there are reliable estimates of current exploitation rates and sufficient data to assess productivity and there should be no fisheries unless there is evidence that this will be sustainable. For this species there is no analytical assessment or F_{MSY} reference point. It is therefore unclear how to estimate what an appropriate de minims volume could be in practice and therefore at which level of catch fisheries taking Kitefin shark would be required to cease activity. The current ICES advice for Portuguese dogfish (*Centroscymnus coelolepis*) in the Northeast Atlantic is that there should be no catches of Portuguese dogfish. Like Kitefin shark, there is no analytical assessment or F_{MSY} reference point for this species. Following the ICES advice for Portuguese dogfish in the strictest sense would mean that any fishery with by-catches of this species would be required to cease fishing unless such by-catches could be avoided. Furthermore, any de minimis volume would be inconsistent with the current ICES advice.

SWW trawl fishery for rose shrimp and Nephrops

This fishery is primarily carried out by Portuguese trawlers using a codend mesh size of 55-59 mm to exploit rose shrimp (*Parapenaeus longirostris*) and >=70mm codend mesh to exploit *Nephrops* in Division IXa. Both gears may be used on the same fishing trip provided the catch composition requirements identified in Regulation (EC) 850/98 are met. Rose shrimp and *Nephrops* have different but overlapping depth distributions. Rose shrimp occurs between 100 m and 350 m depth, whereas *Nephrops* is distributed from 200 to 800 meters (ICES WGHMM, 2013). Blue whiting (*Micromesistius poutassou*) is also a major component of the catch in this fishery. A high number of species are caught. Some of these non-target species have an important economic return/revenue, including hake (*Merluccius merluccius*) and anglerfish (*Lophius spp*.). Discards of *Nephrops* are considered negligible (*Nephrops* ICES advice, 2014), whereas the discard rates for these bycatch species can be high (Borges *et al*, 2000). Low-commercial (or no value) of unwanted species include blue whiting, and boarfish (*Capros aper*). All boarfish are currently discarded. Undersized unwanted catches (i.e. catches of individuals less than the existing MLSs) include hake (MLS = 24 cm). Some species are also frequently discarded due to the catch composition rules (by-catch restrictions) including horse mackerels (*Trachurus trachurus, Trachurus picturatus and Scomber colias*). It is noted that since Borges *et al*, 2000 was published, boarfish are now subject to TAC regulations and therefore under the landing obligation, any catches must be landed and counted against quota. However, boarfish are routinely discarded as the species has little commercial value unless landed in large quantities via directed pelagic fisheries and several MS have no quota entitlement. Under this circumstance, inter-species quota flexibilities or quota swaps between MS may be required to alleviate this species as a potential choke.

To mitigate by-catch and reduce discards, various gear-based measures (ie sorting grid) have been tested for the Portuguese fleet (Campos et al., 2003; Campos and Fonseca 2004, Fonseca et al., 2005, 2007). Fonseca et al (2005) concluded that while there was significant reductions in the retention of the non-commercial by-catch, losses of *Nephrops,* rose shrimp and other commercially valuable non-targeted catch made the use of such devices economically unviable. None of the gear measures tested have been adopted in this fishery due to the potential losses in revenue arising through selectivity improvements designed to reduce unwanted catches. If this fishery were to be considered as a candidate for a de minimis exemption based on the losses of shrimp and *Nephrops*, then a more detailed economic analysis should be undertaken to demonstrate the economic difficulty associated with such losses e.g. using the break- even indicator approached described in EWG 13-17.

General comments

The section above provides a list of potential or candidate cases for de minimis exemptions based on difficulties in improving selectivity due to losses in marketable fish. The list is by no means exhaustive and only focusses on where technical modifications to gear would represent economic difficulty and does not consider that tactical measures such as avoiding particular areas my actually present economically viable means to reduce unwanted catch.

4.3 Carry out a qualitative analysis to develop a provisional list of fisheries in which for TAC or quota reasons (e.g. low or zero fishing opportunities) for one or other species, the fishing activities may be negatively impacted in the sea basins mentioned in 1 above.

The STECF EWG carried out a study to link catches with quotas based on existing and available information, using 2012 as the reference year.

2012 was chosen as this is the most recent year for which both the landing and discard data as supplied annually by Member States under the EU DCF data call was available.

A number of data sets have been gathered and linked to the extent possible:

1. Dataset 1 is the landings and discards by gear (effort regulated and non-regulated), member state, species, ICES areas and management areas related to the effort management regimes. The data are supplied annually by Member States under the EC DCF data call for the evaluation of the fishing effort regimes (*STECF effort database).*

   Importantly, the data used in the present exercise could not be based on the most recent file from EWG 13-13, because the standard outputs of the effort database are not displayed by ICES areas (which links to the TAC areas), but by Effort management area (from the effort regimes – cod plan, western channel sole plan etc). Consequently, the present analysis was based on the dataset compiled and used by STECF EWG 13-16 (Landings Obligation part 1), which already includes the conversion from effort management areas to TAC management areas. The dataset is available at http://stecf.jrc.ec.europa.eu/web/stecf/ewg1316

2. Dataset 2 includes data relating to initial and adapted quotas, taken from the EU Commission's Fisheries Data Exchange System (*FIDES database*). FIDES is a database for submission, storage and retrieval of fishery data from EU MS. In addition to information on quotas, it contains landings data and also information relating to fishing "stops" put in place by MS when quotas are exhausted. This dataset is accessible by individual national administrations and the European Union.

3. Dataset 3 is information on average first sale price by species, gear and MS derived from the data supplied annually by Member States under the obligation for DCF Fleet Economic data (Economic *database*).

These three databases build on different fields, which are not always compatible with each other, and therefore, a number of conversions and aggregations had to be performed in order to:

- Translate each TAC area for each species into the corresponding subset of ICES areas (see point 1 above). Translate each gear from effort database into the corresponding subset of gears from the economic database. This implies a number of assumptions regarding the average price by gear, since (i) gears from the effort database can be further split over mesh sizes – for example TR1, TR2 and OTTER are all linked to OTB gear; and (ii) reciprocally, several gears from economic database can be aggregated into gears from the effort database – for example the gears SSC, SDN, SPR and SB are all linked to DEM_SEINE gears.
- Ensure that the species codes are consistent across the three datasets

Many important data issues were flagged up during these steps that can impact the quality of information available for some species or fleets, for example:

- Many strata in the effort database still do not include discards, if member states did not submit data. This can also be the case for important fisheries, and this limits greatly the accuracy of the results compiled here for some species and member states. A number of quotas are mixed for two species, typically for flatfishes in the North Sea
- For some species such brill, lemon sole + witch flounder, dab + flounder TACs are combined, but for these three quotas, information is incomplete in the effort database and therefore not included in the analysis:
  - Some of the stocks are missing. Brill (BLL) is not in the species list requested in the effort data call, so a number of countries have not provided data for that species, including some of the main fishing nations for that species
  - The Effort database requests flounder under the code FLX, and not FLE. Some countries have therefore omitted this species in the effort database.
- The data call requests that all ray species are aggregated under a single code for all species (RAJ). Since 2008 it has been compulsory to report information by species (RJB, RJC, RJE, RJH, RJI, RJM, RJN, RJR) in logbooks, but not all countries have uploaded their information according to these species, so the information actually available is very heterogeneous preventing any detailed analysis for these species which are expected to be important choke species.

  <u>Consequently, skates and rays, brill, flounder, turbot, lemon sole, witch and dab have not been included in the analysis. EWG 14-11 notes that for several MS, these species may represent particular choke issues.</u>

The combination of the three datasets generated a single file with the following headers:

- TAC area;
- Member State;
- Species;
- Gear;
- ICES area;
- Initial quota;
- Final quota (post swaps/banking/borrowing);
- Catches;
- Discards;
- Landings and;
- Average price per kg.

While data relating to the value of individual species has been extracted, due to time constraints no analysis was undertaken. However, it would be particularly useful to use these data in future to assess the economic consequences of choke species and to assess how this could be used in understanding and developing strategies to minimise revenue losses following implementation of the landing obligation.

The file was populated for the year 2012, and included all TACs for the species available in the STECF Effort database: Anchovy, Anglerfish, Argentine, Blue Whiting, Cod, Dab, Haddock, Hake, Herring, Horse mackerel, Lemon sole, Ling, Mackerel, Megrim, *Nephrops*, Norway Pout, Plaice, Saithe, Salmon, Skates and Rays, Sole, Spurdog, Whiting. However, some species were subsequently removed from the results compiled and displayed (pelagic species, dab, Norway Pout, Salmon, Skates and rays). These were removed because of incomplete or incomparable data between Member States (see comment above on skates and rays, dab, flounder etc)

As a first broad brush approach to potential choke species, EWG 14-11 compiled a suite of simple ratios and indicators relating the 2012 quotas with the realised catches for that year at Member State*species*TAC area. These indicators where:

- Final quota/initial quota : A value >1 indicates that the MS had increased its initial allocation during the year through swaps or banking and borrowing
- Landings/initial quota: A value >1 indicates that the MS's initial quota was not sufficient to cover realised landings in 2012; a value <1 indicates where landings were less than their initial quota allocation
- Landings/final quota : A value<1 indicates that the MS acquired more additional quota (through swaps etc) than their actual landings
- Catch/initial quota, with catch as landings+discards summed over all gears and ICES areas within the TAC area. A value>1 is the primary choke species indicator, suggesting that the initial quota available in 2012 would not have been sufficient to account for the estimated catch in 2012 if they had all to be landed.
- Catch minus initial quota expressed in tonnes.

Summary plots of these indicators were produced for each Member State (In conclusion, it has only been possible to identify a list of *potential* choke stocks at a national level. Given the uncertainties on how the landing obligation will be implemented, the information presented can only be used to flag issues that Member States may want to consider with regard to the implementation of the landing obligation and the impact on fleet activity in future.

Figure 4.3-1 to Figure 4.3-11). All information is presented in relative terms (ratio of realized catches to quota), regardless of the actual size of the quota and/or of the value of the fishery. Corresponding numbers in absolute values (tonnes and euros) are found in Table 7-5 to Table 7-14, section 7.3). The display of the ratios in Figures 4.3.1 – 4.3.10 was capped at 8 on the y-axis to avoid the figures being scaled down by large values (high estimated discards ratios and/or ratios between small numbers (small quotas stocks)). It is noted that for several stocks/Member States the discrepancy between fishing opportunities and catch were well in excess of the cap (8 x). The actual levels are provided in the individual Member States tables (Table 7-5 to Table 7-14, section 7.3).

It is important to note that the plots do not include information on circumstances where an individual MS has zero final quota for a given species or where a species is subject to a zero TAC e.g. spurdog or cod in VIa. Where individual MS have reported catch for these species, this would have given an infinite estimate for all of the indicators given that each of them are based on the ratio of catch divided by the initial or final quota. This information can be found in Table 7-5 to Table 7-14, section 7.3) and are identified as “NA” values. This is restricted to spurdog, cod in VIa and Deepwater sharks.

The tables and figures presented below are intended to highlight *potential* choke species by Member State to permit focus on particular problem stocks. This could include for example the introduction of targeted tactical and/or technical mitigation tools such as improvements in gear design to reduce catch rates of problem specie. The data presented in the tables can also be used to indicate the level of catch reductions required, for example if the catches of a given species were four times the available quota, then catches of that species in 2012 would have needed to have been 25% of the realised levels if premature cessation of fishing was to be avoided. However, there are a number of important considerations and limitations in the analysis presented.

By necessity, the data and analysis is based on a period where TACs were regulated through landings i.e. the current system. This means that the results cannot be translated into the future due to uncertainties in how the landings obligation will operate in practice.

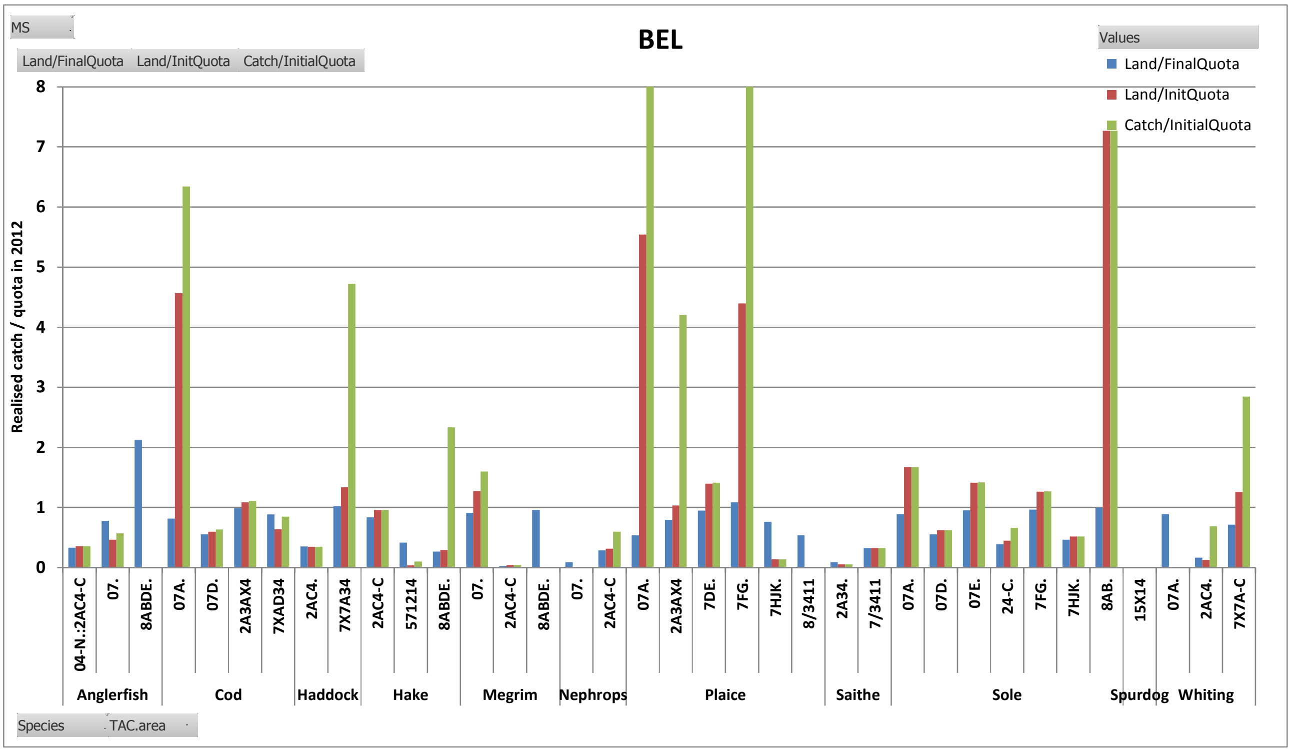
In particular, Article 15 provides a number of exemptions that will permit some degree of discarding in cases of demonstrated high survival of discarded catch or according to the conditions of the de minimis provisions (Articles 15.5 (b) and (c)). Article 15.8 allows for between species flexibility, meaning that where a Member State has no quota available or where quotas have been exhausted, underutilised quota from another stock can be used to cover over-quota catches up to a maximum of 9%, assuming that the ‘recipient’ stock which has no quota available is within safe biological limits. In addition, Article 16.2 notes that the change from fixing fishing opportunities that reflect landings to fixing fishing opportunities that reflect catches will be taken into consideration. In practice this may mean that there will be some level of “quota uplift” that will be based on some as yet, undefined degree on the current level of discarding.

While in reality, some of the choke issues may have been partially alleviated through swaps between Member States. The EWG chose not to present the ratio of catch/final quota as it is not possible to predict the level of liquidity in the swap system that may arise following the introduction of the landing obligation as Member States may be more inclined to retain quota allocations as security to minimise the risk of choke of their national fleets. However these data are available in Table 7-5 to Table 7-14 (section 7.3).

The analysis and data is presented at a national level although the ToR specifically asks the EWG to identify a provisional list of *fisheries*. It hasn't been possible to do this at this level due to (i) difficulties in drawing comparisons between MSs quota management systems i.e. how quotas as distributed between fisheries/fleets etc (ii) lack of information on how the quota management units are defined and operated and (iii) and lack of information on both landings and discards by species by management unit.

In conclusion, it has only been possible to identify a list of *potential* choke stocks at a national level. Given the uncertainties on how the landing obligation will be implemented, the information presented can only be used to flag issues that Member States may want to consider with regard to the implementation of the landing obligation and the impact on fleet activity in future.

Figure 4.3-1 Example - Ratios of landings and catch to initial and final quota allocations for Belgium



The blue bars indicate the ratio of actual landings to actual quota (final quota in 2012). For a number of stocks, ratios are close to 1, indicating a high uptake of the quota and a good balance between landings and final fishing opportunities at the country level. But some quotas were not taken up (blue bars well below 1).

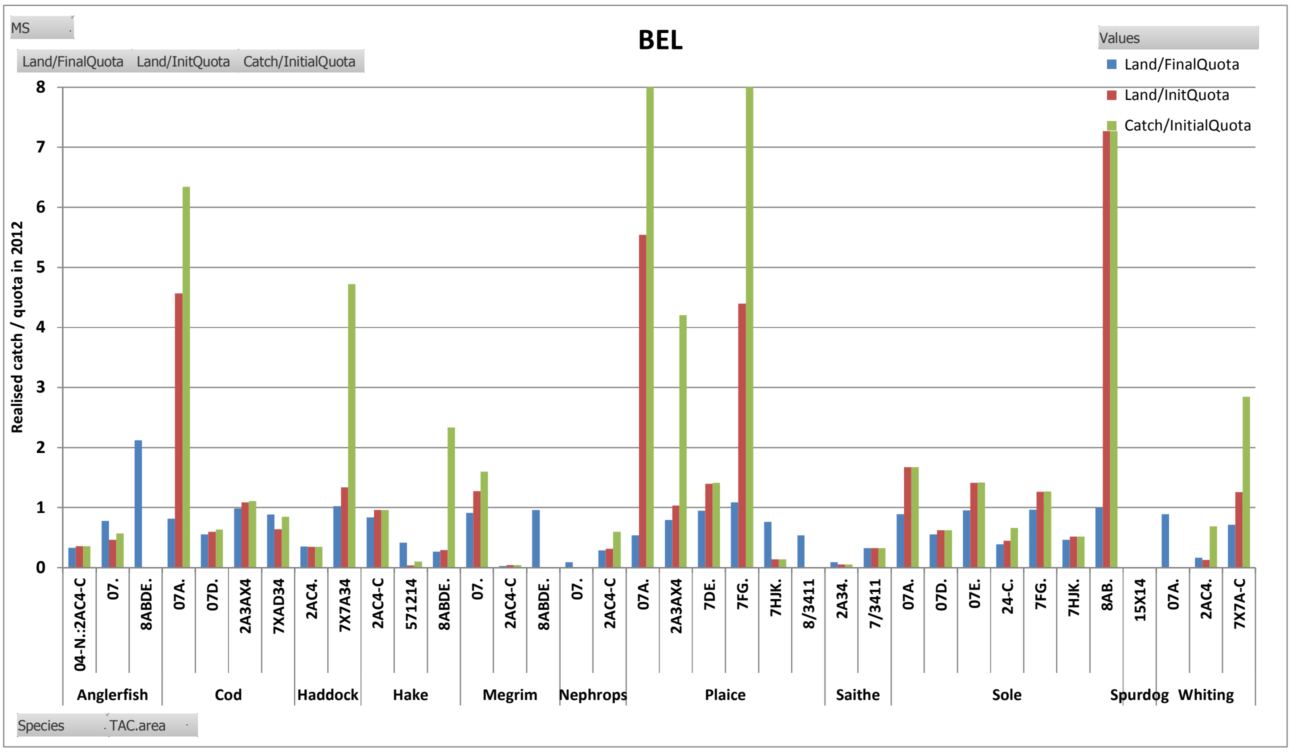
The comparison between the red and the blue bars indicate the dependency of the MS to acquire more quota to cover its landings. A red bar above 1 indicates that the realised landings were greater than the MSs initial quota allocation as derived through relative stability. For example for cod in 7A, the realised landings were more than 4 times the initial quota, but less than the final quota (blue bars) after acquiring additional quota amounting to more than 5 times the initial allocation. A similar situation was observed for other stocks in 7A (plaice, sole and whiting), indicating that Belgium was dependent on quota banking, borrowing and swaps to maintain its activity in this area in 2012. Conversely, cod quota in area 7XAD34 and Anglerfish in area 07 were traded away (red bar below blue bar).

Finally, the green bars illustrate the mismatch between catches (landings + estimated discards) and the initial quota allocation in 2012. Any green bar above 1 indicates that the 2012 initial quota would not have been sufficient to account for the realised catches if they had been subject to the landing obligation, and is therefore the primary indicator for potential choke effects. Note however, that the quota allocations in 2012 relate to landings, but under the landing obligation, the Expert Group understands that the quotas would have been expressed in terms of catch so the discrepancy between catch and quota would in principle have been less than indicated.

Green bars that are much higher than red bars illustrate high discards fisheries (according to the data available in the STECF effort database), while green bars at the size of red bars indicate fisheries either with low discards or with no available discard data, but it is not possible to identify which is the case.

For each Member state key issues are identified under each figure which highlights the stocks where catches are not in line with the initial/final quota allocations. Each stock is considered to be either in excess (1 to 2 times initial or final quota) or well in excess (catches >2 times the initial/final quota).

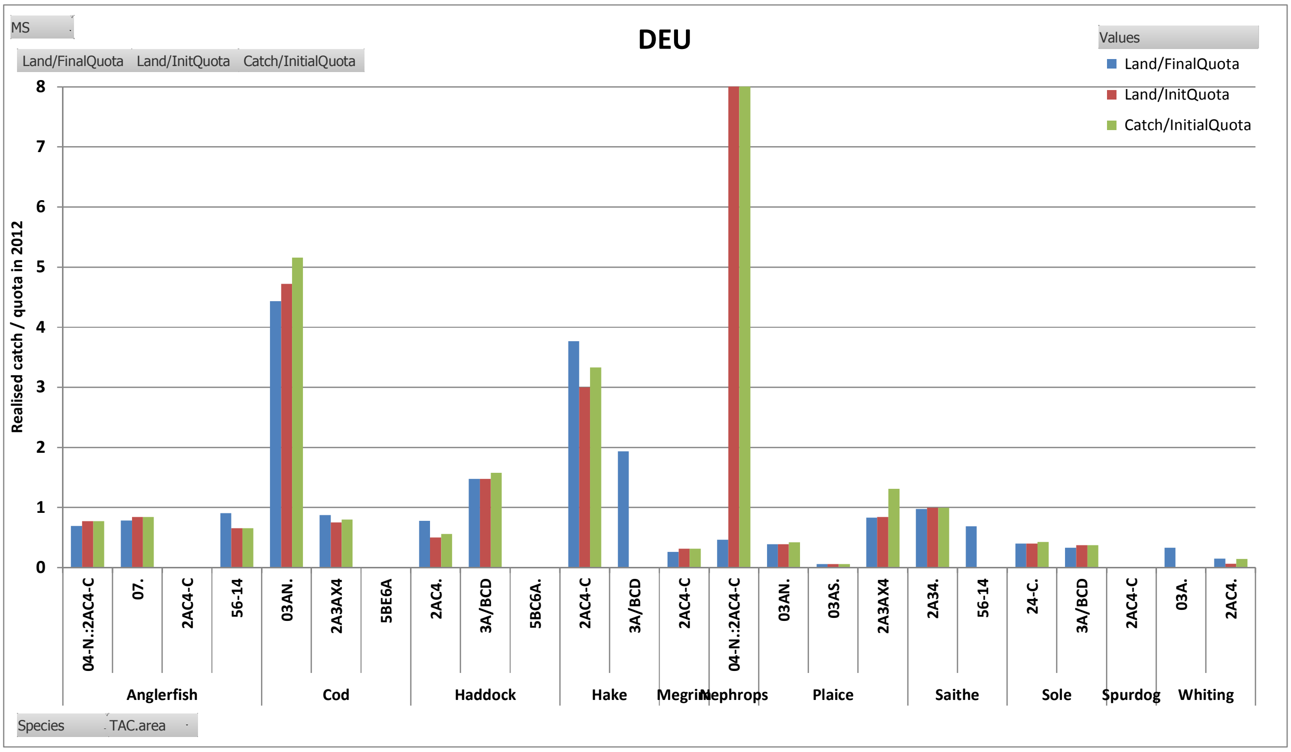
Figure 4.3-2 Ratios of landings and catch to initial and final quota allocations for Belgium



Key points

- Cod catches in VIIa were well in excess of the initial quota
- Plaice catches in VIIfg and VIIa are well in excess of initial quota
- Sole catches in VIII are well in excess of initial quota
- Anglerfish catches in VII are well in excess of final quota
- Whiting catches in VIIe-k are well in excess of initial quota

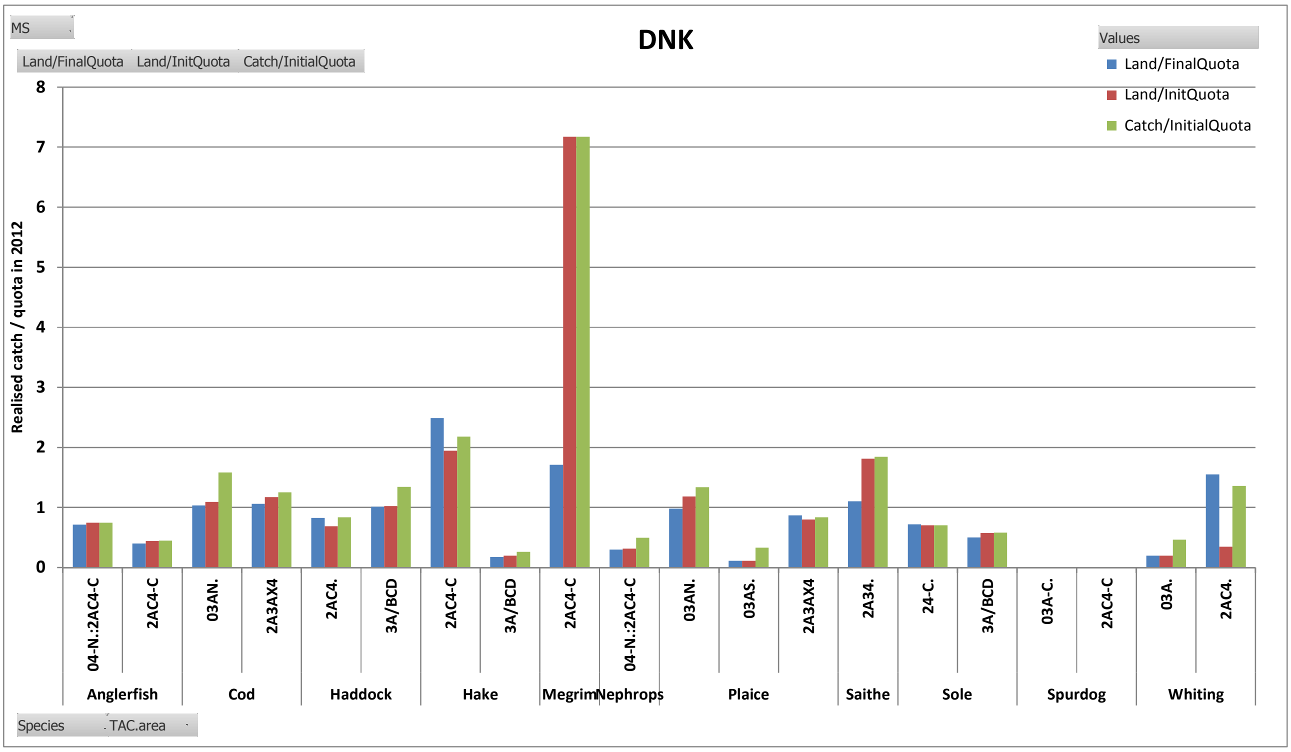
Figure 4.3-3 Ratios of landings and catch to initial and final quota allocations for Germany



Key points

- Cod catches in IIIa are well in excess of initial and final quota
- Nephrops catches in IV are well in excess of initial quota although the final quota was able to cover all catches although quota/catches are small
- Hake catches in IV are well in excess of initial and final quota

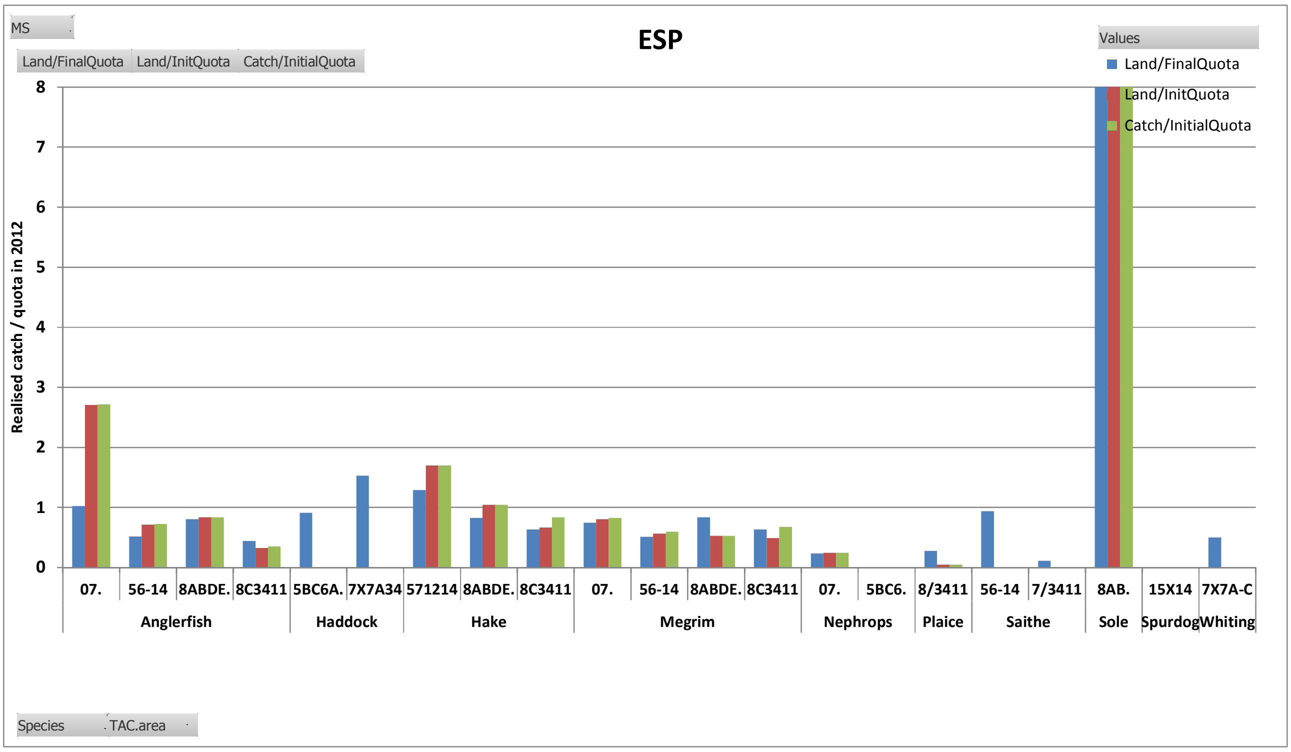
Figure 4.3-4 Ratios of landings and catch to initial and final quota allocations for Denmark



Key points

- Cod catches in IV and IIIa are in excess of initial quota and final quota
- Megrim catches in IV are above the initial and final quota although catches are low
- Hake catches in IV are in excess of initial and final quota and the initial quota is higher than the final quota
- Haddock catches in IIIa are in excess of the initial and final quota
- Saithe catches in IV are in excess of initial and final quota

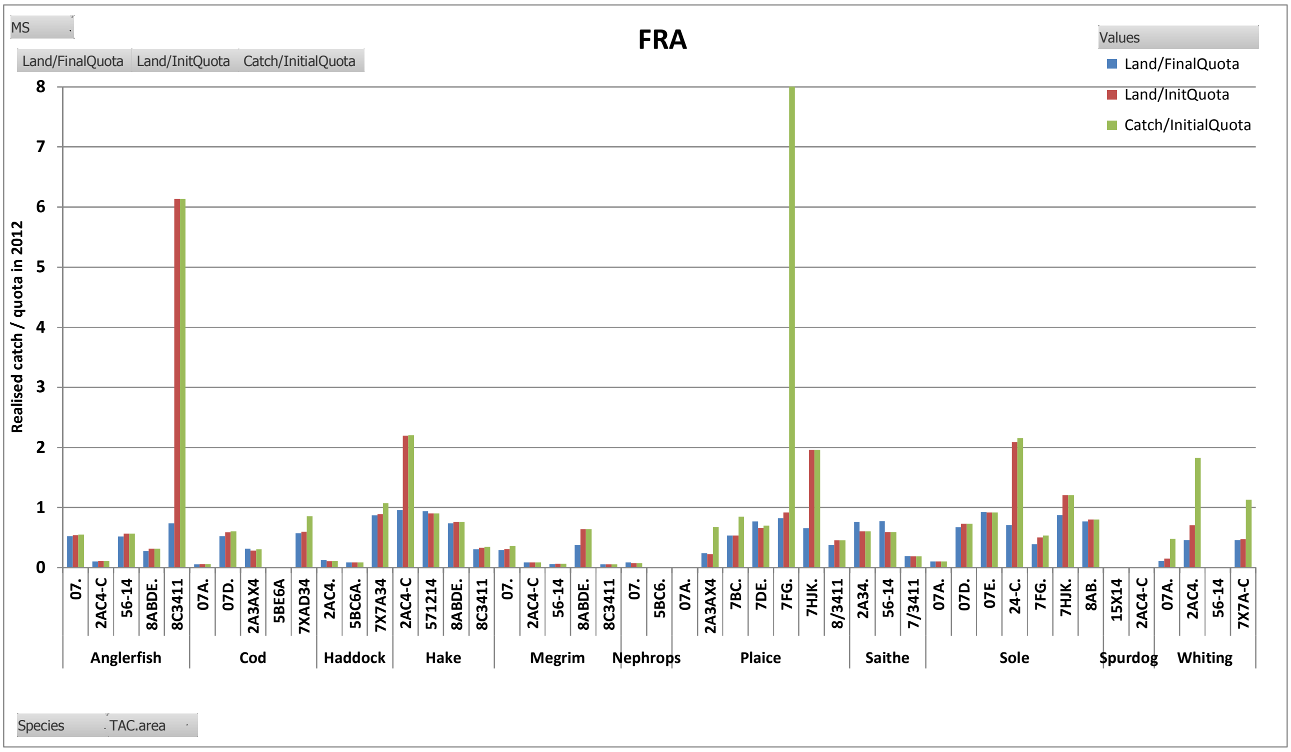
Figure 4.3-5 Ratios of landings and catch to initial and final quota allocations for Spain



Key points

- There is a general paucity in the available catch data which inhibit a detailed analysis
- Anglerfish catches in VII are well in excess of the initial and final quota
- Haddock catches are in excess of the initial quota (zero) and final quota (see **Error! Reference source not found.**, Annex III)
- Sole catches in VIIab are well in excess of the initial quota and in excess of the final quota

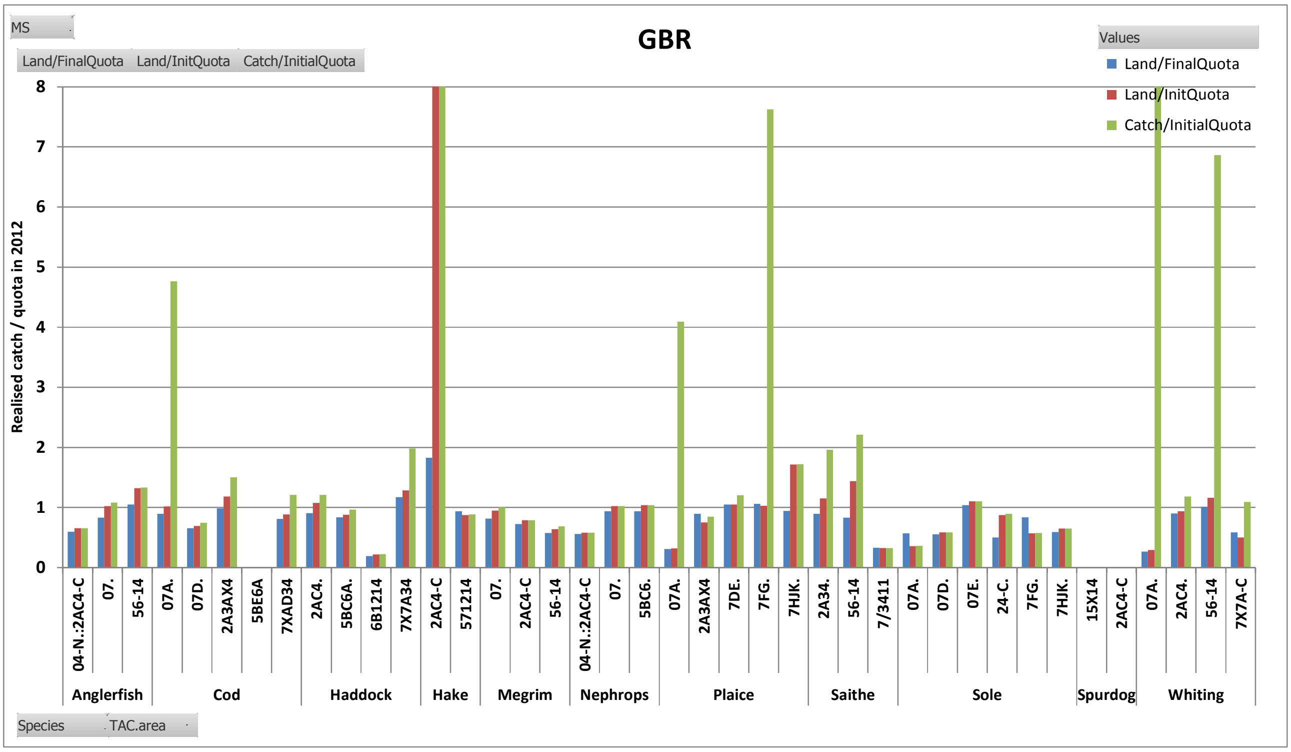
Figure 4.3-6 Ratios of landings and catch to initial and final quota allocations for France



Key points

- In many cases catches are broadly in line with initial quota
- Catches of hake in IV are well in excess of the initial quota but aligned to the final quota
- Catches of plaice in VIIfg are well in excess of initial and final quota
- Cathces of plaice in VIIhjk are in excess of the initial quota but lower than the final quota
- Catches of anglerfish in VIII are well in excess of initial quota but less than the final quota

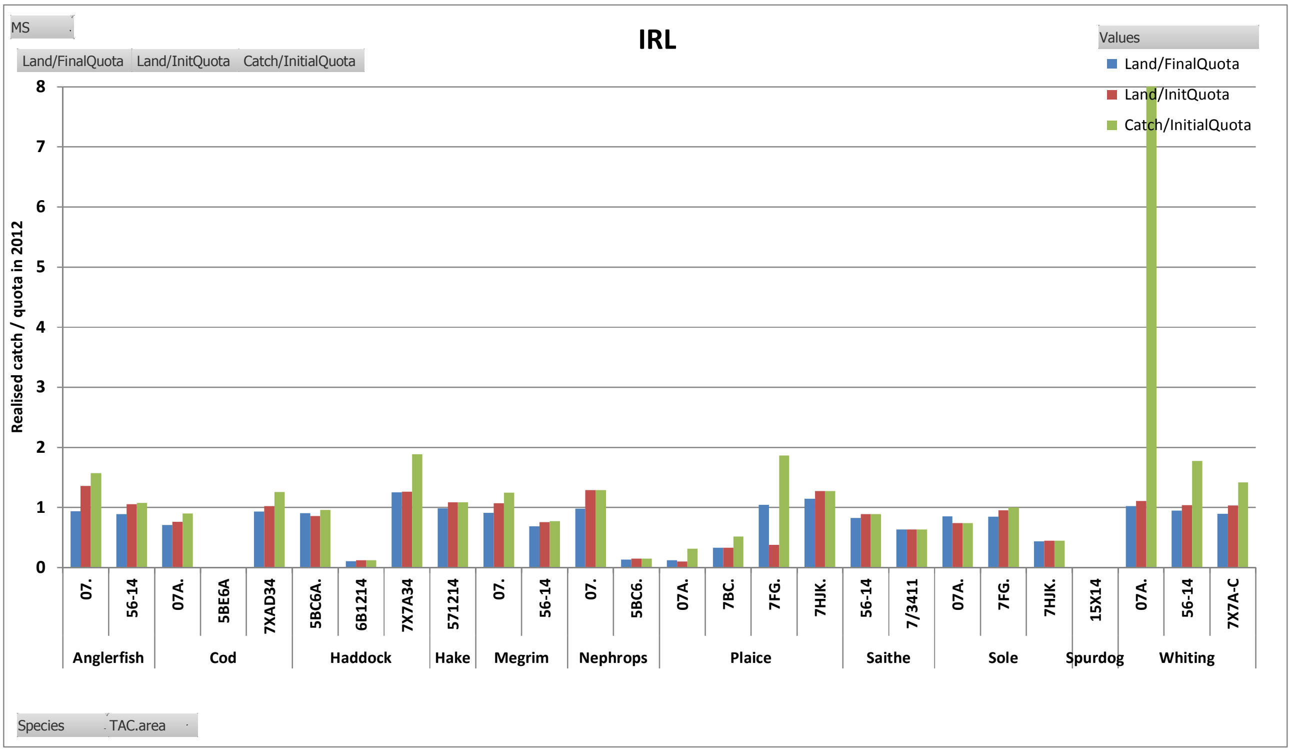
Figure 4.3-7 Ratios of landings and catch to initial and final quota allocations for Great Britain



Key points

- In many cases catches are broadly in line with initial quota
- Catches of cod in VIIa are well in excess of initial and final quota
- Catches of cod in IV are in excess of initial and final quota
- Caches of cod in VIIe-k are in excess of initial and final quota
- Catches of haddock in IV are in excess of initial quota but aligned with final quota
- Catches of cod in VIa are well in excess of the initial quota (zero TAC)
- Catches of whiting in VIIa are well in excess of initial and final quota
- Catches of whiting in VI are well in excess of initial and final quota
- Catches of hake in IV are well in excess of initial and final quota
- Catches of saithe in IVare in excess of initial and final quota
- Catches of saithe in VI are well in excess of initial quota and in excess of final quota
- Catches of plaice in VIIa are well in excess of initial and final quota
- Catches of plaice in VIIfg are well in excess of initial and final quota

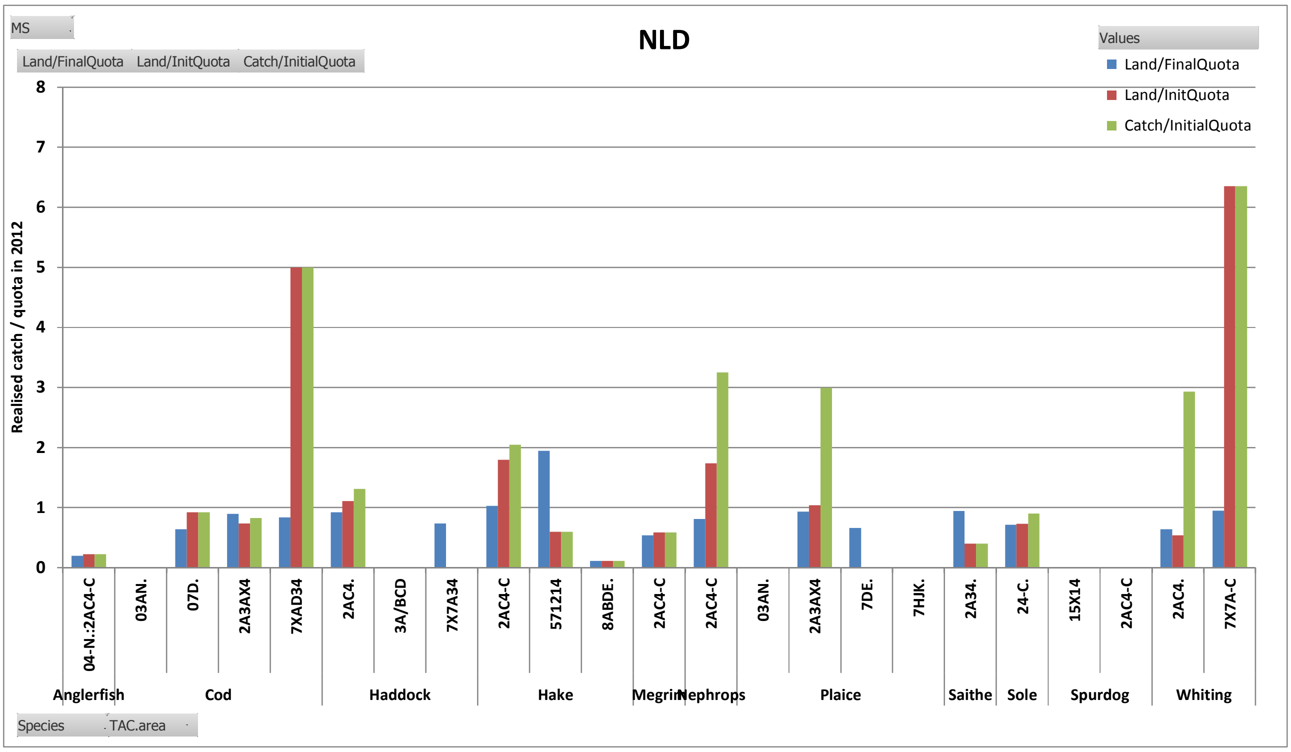
Figure 4.3-8 Ratios of landings and catch to initial and final quota allocations for Ireland



Key Points

- In many cases catches are broadly in line with initial quota
- Catches of anglerfish in VII are in excess and broadly in line with final quota
- Catches of cod in VIIe-k are in excess of initial and final quota
- Catches of haddock in VIIb-k are in excess of initial and final quota
- Catches of megrim in VII are in excess of initial and broadly in line with final quota
- Catches of nephrops in VII are in excess of initial quota and in line with final quota
- Catches of plaice in VIIfg are in excess of initial quota and well in excess of final quota which is lower than the initial quota
- Catches of plaice in VIIhjk are in excess of initial quota and broadly in line with final quota
- Catches of whiting in VIIa are well in excess of initial and final quota
- Catches of whiting in VI are in excess of initial and final quota
- Catches of whiting in VIIe-k are in excess of initial and final quota

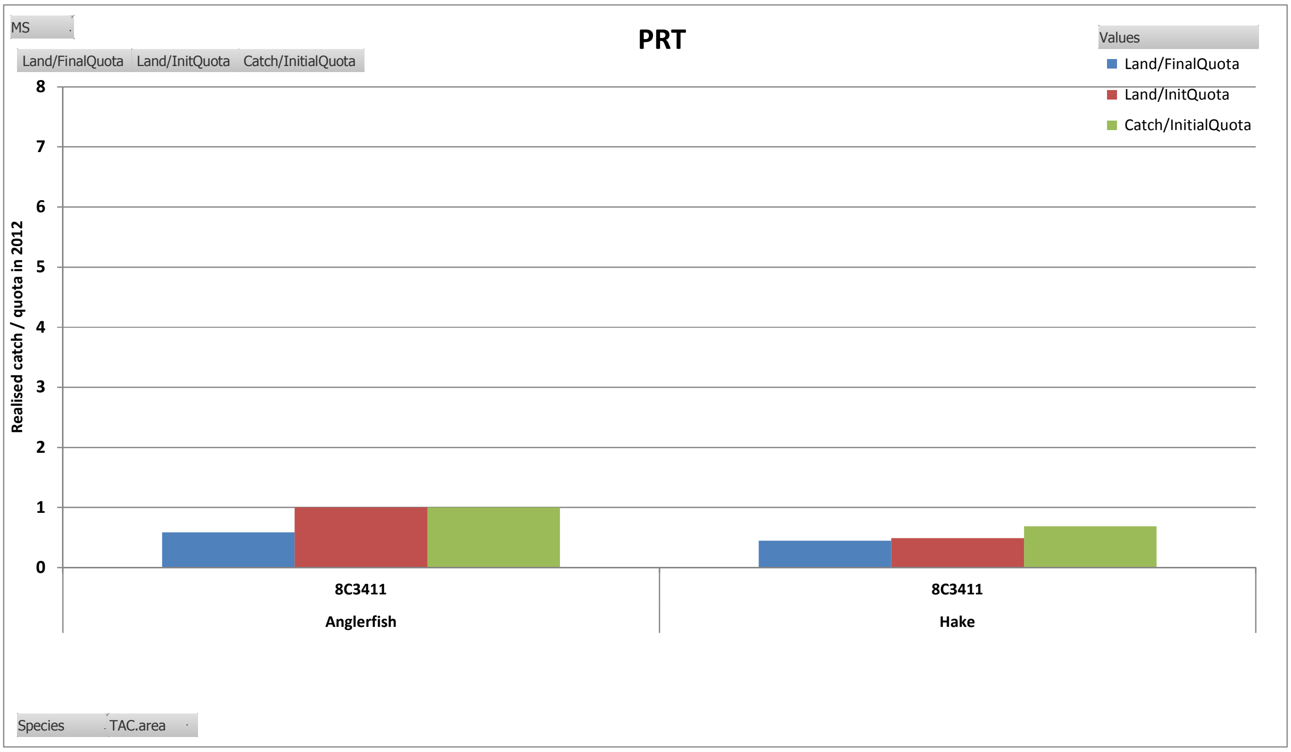
Figure 4.3-9 Ratios of landings and catch to initial and final quota allocations for the Netherlands



Key Points

- Catches of cod in VIIe-k are well in excess of initial quota and in line with final quota although quota/catches are small
- Catches of haddock in IV are in excess of initial quota and broadly in line with final quota
- Catches of hake in IV are in excess of initial quota
- Catches of Nephrops in IV are well in excess of initial quota and in excess of final quota
- Catches of plaice in in IV are well in excess of initial and final quota
- Catches of whiting in IV are well in excess of initial and final quota
- Catches of whiting in VIIe-k are well in excess of initial quota but below final quota

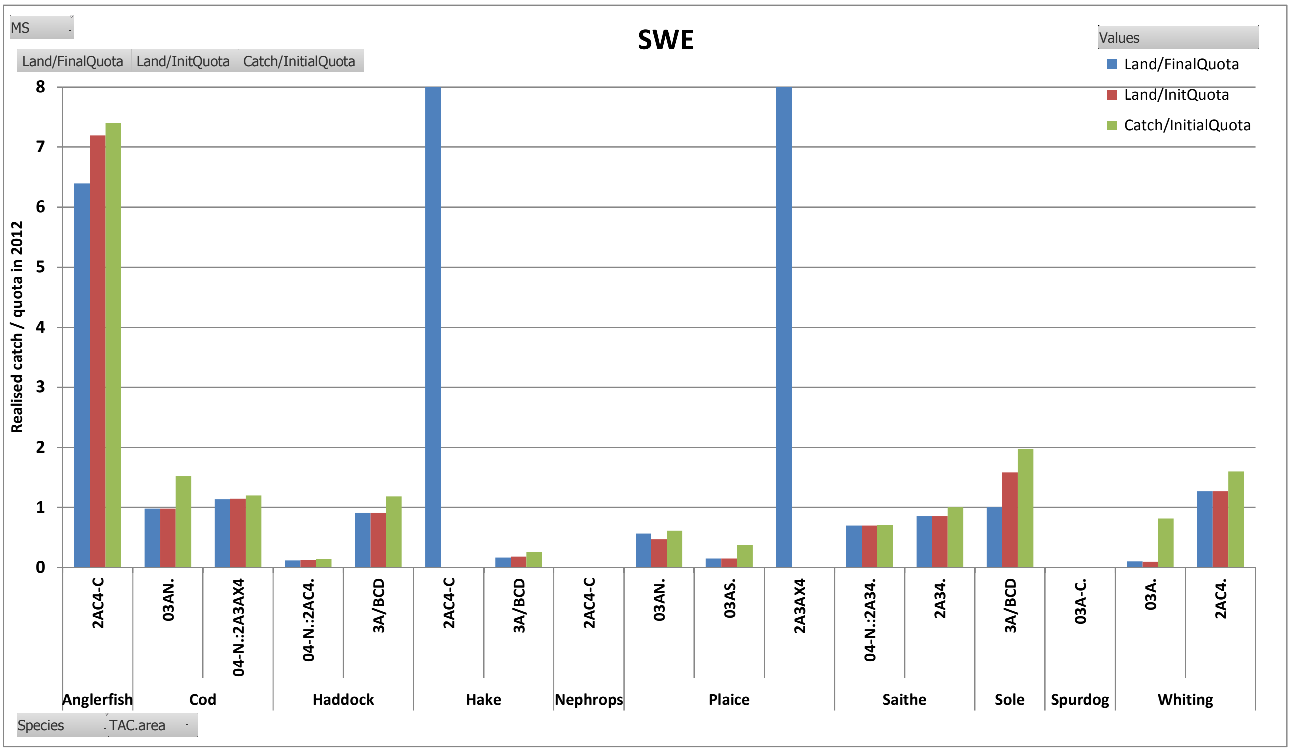
Figure 4.3-10 Ratios of landings and catch to initial and final quota allocations for Portugal



Key points

- Portugal has only two quota species of concern in South Western Waters
- Catches of both anglerfish and hake are in line with initial quota and well below final quota

Figure 4.3-11 Ratios of landings and catch to initial and final quota allocations for Sweden



Key Points

- Catches of anglerfish in IV are well in excess of initial and final quota although quota/catches are small
- Catches of cod in IIIa are in excess of initial and final quota
- Catches of sole in IIIa are in excess of initial quota but broadly in line with final quota

5 CONCLUSIONS

Survival

Research has shown that not all discards die and in some cases, the proportion of discarded fish that survive can be substantial. The rate of survival depends largely on the species concerned, the fishery and other technical, biological and environmental factors. Obliging fishermen to land catches of fish that would otherwise have survived the discarding process could, in some specific cases, result in negative consequences for the stock. The choice to exempt a particular species is a “trade-off” between the stock benefits of the continued discarding of "high" survivors and the potential removal of incentives to change exploitation pattern by allowing discarding to continue. However, this should also be seen in the context of future stock benefits of improvements in selectivity on *all* species caught in the fishery as well as broader ecosystem benefits.

In general terms, the survivability of fish subjected to the process of capture and subsequent discarding is low. Species that have swim bladders in particular suffer from barotraumas (pressure injuries) due to ruptured swim bladders and therefore have a lower probability of survival compared to species that don’t possess swim bladders e.g. flatfish species such as plaice and sole. The results from survival studies show that where fish do survive, the survival rate estimates are highly variable and can range from 0 to 100% for individual species, even within the same experiment. Direct comparisons between studies is problematic due to differences in experimental methodologies, gear types, areas seasons etc making it difficult to provide robust estimates of expected survival rates. Higher survival rates are normally associated with reduced exposure time, including shorter tow durations and where individuals are returned to the water quickly. Observation period is also highly variable and this also precludes meaningful comparisons between captive experiments due to substantial differences in observation period. Several studies have shown that while the majority of deaths occur in the first few days, animals do continue for die over several days (5-10) after initial discarding. This means that studies where the observation period is short the actual mortality level is likely to be significantly underestimated and therefore such studies should not be over interpreted or relied upon.

In general, the studies identified show that elasmobranchs, specifically species of ray, have the highest and most consistent levels of discard survival. In general survival rates are typically in excess of 50% across all gears and greater than 80% in many cases. Studies which have looked at flatfish species including plaice (*Pleuronectes platessa*) and sole (*Solea solea*) and dab (*Limanda limanda*) show variable results between species, with plaice exhibiting higher (~40 – 80%) levels than sole and dab. Survival of plaice has also been shown to be length dependent, with smaller individuals showing lower survival rates than older fish. Survival was also shown to decrease during spawning periods. *Nephrops* (*Nephrops norvegicus*) also have highly variable survival rates ranging from survival rates of 28 to 88%, but the studies showing the highest survival rates (80 and 88%) also had very short observation periods and should therefore not be considered as representative given that deaths were still occurring in other studies after 5 days. Studies with longer term observations show much lower survival rates (~30%) and post-discard predation is likely to be significant. Survival of cod is also highly variable (0 – 100%), but studies have shown survival >50% of cod caught in beam trawls. The relatively high survival is thought to be due to the shallow fishing depth (<30m).

To quantify survival rates and to understand the factors that may influence survival e.g. physical injury, stress etc, many experiments use captive conditions where animals are monitored in tanks or pens. While this provides a sound scientific approach, it protects discarded animals from potential predators (sea birds, marine mammals, other fish etc) that they may otherwise have encountered post discarding. The capture and discarding process is likely to result in a range of injuries and other traumas e.g. oxygen depletion, elevated stress, infection and disease that may severely limit an individual's ability to evade predation in the wild. Therefore, with experimental induced mortality accounted for, the survival estimates from captive observation studies are therefore likely to represent over estimates of actual survival.

Managers therefore need to take account of the points above when considering species for survival exemptions and when determining whether survival can be deemed to be high.

Survival experiments try to emulate normal deck sorting and discard practices and captive survival rates are reflective of these (given the caveats above). For species lacking swim bladders, discard survival could be further enhanced through improved on-deck handling and other operational changes such are reduced towing times. Any changes in fishing practices that reduce handling time and exposure to air are likely improve survival chances and could be considered as an integral part of management approaches to reduce fishing mortality.

De minimis and selectivity

Current management has shaped fishing business to operate in a system where the capture and discarding of unwanted catch has limited impact on the costs of individual business. The switch to a management system where all catches of species subject to the landing must now be deducted from fishing opportunities. This means that the cost of catching unwanted fish (e.g. <minimum size) must be borne by individual businesses. If implemented as intended, the landing obligation is expected to offer incentives for individual business to improve selectivity in order to avoid catches.

Where the morphology (size) and behaviour of wanted and unwanted species are similar, adjustments in the technical characteristics of the fishing gear e.g. mesh size, may result in a reduction in the catches of both species categories and may prove economically difficult to achieve. Similarly, tactical measures to avoid unwanted catches through spatial and temporal changes in fishing activity may also prove inadequate to reduce or eliminate unwanted catches. Hence in such cases, regional groups may wish to make a case for de minimis exemptions. However, it is not possible to predict future technical and tactical avoidance strategies that may emerge and similarly to fully identify all fisheries where technical difficulties to improve selectivity may remain.

The list of "fisheries" presented by in this report is based on expert review of *potential* fisheries definitions and on *current* knowledge of technical (gear) options to reduce unwanted catches. In some cases, tactical (spatial/temporal) avoidance may be possible, but this is not considered here due to a lack of fine scale information.

The fishery definitions presented may not match those currently being considered by regional groups and therefore may not be of specific relevance to the joint recommendations presently being drafted. The EWG considers that that fisheries should be explicitly defined, particularly where species are to be included or excluded from the landing obligation based on specificities of fisheries or where de minimis or survival exemptions are intended to apply to a particular sub-division of a fleet.

Zero TAC stocks, such as deepwater sharks, spurdog and cod in VIa are likely to present significant and immediate chokes for certain fisheries. Where assessments are available, catches consistent with the MSY objectives may offer some very limited fishing opportunities for species currently under a zero TAC but are unlikely to be sufficient to allow for any significant fishing activity for many fleets. For stocks subject to a zero TAC without analytical assessments i.e. no MSY advised catch, zero TACs will present major challenges in those fisheries where catches from such stocks occur.

Choke species

By necessity, the choke analyses presented is based on historic (2012) catch and quota data and due to the changes being introduced through the new CFP including inter-species flexibilities, de minimis and survival exemptions, potential quota uplift and not least the landing obligation itself, makes it difficult to project this analysis forward. They do however, demonstrate that for all Member States and for a number of primary and secondary (by-catch) stocks, catches in 2012 were well in excess of the available quota, and for some stocks, this was the case even after quota swaps andbanking and borrowing.

It is important not to over-interpret the results as the data and analyses relate to a period where TACs were regulated through landings i.e. the current system. This means that the results cannot be translated into the future due to uncertainties in how the landings obligation will operate in practice. In particular, the new CFP provides a number of flexibilities that will permit some degree of discarding through high survival and de minimis exemptions and allows for between species flexibility. In addition, the change from fixing fishing opportunities that reflect landings to fixing fishing opportunities that reflect catches will need to be taken into consideration. In practice this may mean that there will be some level of "quota uplift" that will be based on some as yet, undefined degree on the current level of discarding.

Although the flexibilities provided for in the reformed CFP and the quota uplift associated with a shift from a landings limit to a catch limit may mitigate some of the catch-quota mismatches identified in this report in future, the requirement to fish at levels consistent with the MSY and PA may mean that many of the potential choke species identified here will still remain. This is likely to be particularly acute and obvious for species that have very low or zero TACs.

It should be noted that certain species are omitted from the analysis and some of these may also present significant choke issues e.g. dab, skates and rays etc.

The analysis presented is intended to flag potential issues to allow stakeholders to consider the tools available to reduce catch rates of these species so as to minimise risk of choking fisheries prematurely i.e. when fishing opportunities for other species remain.

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7 ANNEXES

7.1 Annex I Stocks managed under TAC in the North Sea, North Western Waters and South Western waters

The following section identifies the stocks which are managed under catch limits (TACs) in the South Western, North western and North Sea regions and will therefore be subject to the landing obligation. The EWG notes that presently it is unclear as to the stock specific timeframe for introduction under the regional discard bans but that all stocks listed below will be subject to the landing obligation by 2019.

Table 7-1 Species with catch limits relevant to the South Western Waters management region

Common name	**Species name**	**Area**	**ICES area**
Anglerfish	*Lophius piscatorius and Lophius budegassa*		VII, VIII a, b, d, e
Anglerfish	*Lophius piscatorius and Lophius budegassa*		VIIIa,b,d,e
Anglerfish	*Lophius piscatorius and Lophius budegassa*		VIIIc, IX, X
Common sole	*Solea solea*	West of Scotland, Faroes, Azores, Greenland	VI, Vb, XII, XIV
Haddock	*Melanogrammus aeglefinus*		IX, X
Hake	*Merluccius merluccius*		VIIIc, IX and X
Ling	*Molva molva*		IX, X
Norway lobster	*Nephrops norvegicus*	Bay of Biscay	FU 23 and FU 24, VIIIa,b
Norway lobster	*Nephrops norvegicus*		Fu 25 and 31, VIIIc
Norway lobster	*Nephrops norvegicus*		VIIId,e
Norway lobster	*Nephrops norvegicus*		IX and X

Common name	Species name	Area	ICES area
Other Demersal elasmobranches			VIII, IX and X
Plaice	*Pleuronectes platessa*		VIII, IX and X
Pollack	*Pollachius pollachius*	Bay of Biscay and Iberian waters	
Porbeagle	*Lamna nasus*	All areas	
Rays and skates			VIII and IX
Rays and skates			X, XII, and XIV
Saithe	*Pollachius virens*		VII, VIII, IX, X
Sole	*Solea solea*	Bay of Biscay	VIIIa,b
Sole	*Solea solea*		VIIIcde, IX, X
Spurdog	*Squalus acanthias*	all areas	I, V, VI, VII, VIII, XII, XIV
Whiting	*Merlangius merlangus*		VIII, IX and X
Whiting	*Merlangius merlangus*		IX, X
Species regulated by the deep-sea regulation			

Common name	**Species name**	**Area**	**ICES area**
Deep-sea sharks[1]	*misc*	Bay of Biscay, Portuguese coast	VIII, IX
Black scabbardfish	*Aphanaopus carbo*	Bay of Biscay, Portuguese coast	VIII, IX, X
Alfonsinos	*Beryx spp.*	Bay of Biscay, Portuguese coast	VIII, IX, X, XII, XIV
Roundnose grenadier	*Coryphaenoides rupestris*	Bay of Biscay, Portuguese coast	VIII, IX, X, XII, XIV
Orange roughy	*Hoplostethus atlanticus*	Bay of Biscay, Portuguese coast	VIII, IX, X, XII, XIV
Red seabream	*Pagellus bogaraveo*	Bay of Biscay, Portuguese coast	VIII, IX
Greater forkbeard	*Phycis blennoides*	Bay of Biscay, Portuguese coast	VIII, IX

[1] According to Council Regulation No 1262/2012 of 20 December 2012 fixing for 2013 and 2014 the fishing opportunities for EU vessels for certain deep-sea fish stocks, 'deep-sea sharks' means: deep-water catsharks (*Apristurus* spp.), frilled shark (*Chlamydoselachus anguineus*), gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*), portuguese dogfish (*Centroscymnus coelolepis*), longnose velvet dogfish (*Centroscymnus crepidater*), black dogfish (*Centroscyllium fabricii*), birdbeak dogfish (*Deania calcea*), kitefin shark (*Dalatias licha*), greater lanternshark (*Etmopterus princeps*), velvet belly (*Etmopterus spinax*), blackmouth catshark/blackmouth dogfish (*Galeus melastomus*), mouse catshark (*Galeus murinus*), bluntnose six-gill shark (*Hexanchus griseus*), sailfin roughshark/sharpback shark (*Oxynotus paradoxus*), knifetooth dogfish (*Scymnodon ringens*), and greenland shark (*Somniosus microcephalus*).

Table 7-2 Species with catch limits relevant to the North Western Waters management region

Common name	**Species name**	**Area name**	**ICES area**
Anglerfish	*Lophius piscatorius & Lophius budegassa*	West of Scotland	IIIa, Vb, IV, VI, XII, XIV
Anglerfish	*Lophius piscatorius & Lophius budegassa*	Western waters	VII, VIIIa,b,d,e
Atlantic halibut	*Hippoglossus hippoglossus*	Faroes, Iceland, Greenland	V, XIV
Blue ling	*Molva dypterygia*	all areas	Vb, VI, VII
Cod	*Gadus morhua*	West of Scotland	VIa
Cod	*Gadus morhua*	Rockall	VIb
Cod	*Gadus morhua*	Irish sea	VIIa
Cod	*Gadus morhua*	Western waters	VIIe-k
Greater silver smelt	*Argentina silus*	all areas	V, VI, VII
Greenland halibut	*Reinhartius hippoglossoides*	all areas	
Grendardiers	*Macrourus spp.*	Greenland	V, XIV
Haddock	*Melanogrammus aeglefinus*	West of Scotland	VIa
Haddock	*Melanogrammus aeglefinus*	Rockall	VIb
Haddock	*Melanogrammus aeglefinus*	Irish Sea	VIIa

Common name	**Species name**	**Area name**	**ICES area**
Haddock	*Melanogrammus aeglefinus*	Celtic Sea and West of Ireland	VIIb-K
Hake	*Merluccius merluccius*	Western waters	IIIa, IV, VI, VIII, VIIIa,b,d
Ling	*Molva molva*	all areas	V, VI, VII, VIII
Megrim	*Lepidorhombus whiffiagonis & Lepidorhombus boscii*	West of Scotland and Rockall	VI
Megrim	*Lepidorhombus whiffiagonis*	North Sea, Faroes, West of Scotland, North Azores, Greenland	IVa, Vb, VI, XII, XIV
Megrim	*Lepidorhombus whiffiagonis & Lepidorhombus boscii*	Western waters	VII, VIIIa,b,d,e
Norway lobster	*Nephrops norvegicus*	North Minch	FU 11
Norway lobster	*Nephrops norvegicus*	South Minch	FU 12
Norway lobster	*Nephrops norvegicus*	Firth of Clyde (incl. Sound of Jura)	FU 13
Norway lobster	*Nephrops norvegicus*	Porcupine Bank	FU 16 (VIIb,c,j,k)
Norway lobster	*Nephrops norvegicus*	Aran Grounds	FU 17 (VIIb)
Norway lobster	*Nephrops norvegicus*	Irish Sea East	FU 14 (VIIa)
Norway lobster	*Nephrops norvegicus*	Irish Sea West	FU 15 (VIIa)
Norway lobster	*Nephrops norvegicus*	SW and SE Ireland	FU 19 (VIIg,j)

Common name	**Species name**	**Area name**	**ICES area**
Norway lobster	*Nephrops norvegicus*	Celtic Sea	FU 20, FU 21
Norway lobster	*Nephrops norvegicus*	Celtic Sea (the Smalls)	FU 22
Norway pout	*Trisopterus esmarki*	West of Scotland	VIa
other demersal elasmobranchs	*misc*	all areas	VI, VII
other demersal elasmobranchs	*misc*	all areas	VI, VII
Plaice	*Pleuronectes platessa*	Faroes, West of Scotland, North Azores, Greenland	Vb, VI, XII, XIV
Plaice	*Pleuronectes platessa*	West of Scotland and Rockall	VI
Plaice	*Pleuronectes platessa*	Irish Sea	VIIa
Plaice	*Pleuronectes platessa*	Celtic Sea	VIIf,g
Plaice	*Pleuronectes platessa*	Western English Channel	VIIe
Plaice	*Pleuronectes platessa*	Little sole, Great sole, West great sole	VIIh,j,k
Plaice	*Pleuronectes platessa*	West of Ireland, Porcupine bank	VIIb,c
Pollack	*Pollachius pollachius*	Western waters	
Porbeagle	*Lamna nasus*	all areas	
Rays and Skates	*misc*	all areas	VI, VII
Saithe	*Pollachius virens*	West of Scotland	VI

Common name	Species name	Area name	ICES area
Saithe	*Pollachius virens*	Faroes, West of Scotland, North Azores, Greenland	Vb, VI, XII, XIV
Saithe	*Pollachius virens*	Irish Sea, Bay of Biscay, Portugal, Azores	VII, VIII, IX, X
Sole	*Solea solea*	Little sole, Great sole, West great sole	VIIh,j,k
Sole	*Solea solea*	West of Ireland, Porcupine bank	VIIb,c
Sole	*Solea solea*	Faroes, West of Scotland, North Azores, Greenland	Vb, VI, XII, XIV
Sole	*Solea solea*	Irish Sea	VIIa
Sole	*Solea solea*	Celtic Sea	VIIf,g
Sole	*Solea solea*	Western English Channel	VIIe
Spurdog	*Squalus acanthias*	all areas	I, V, VI, VII, VIII, XII, XIV
Tusk	*Brosme brosme*	all areas	V, VI, VII
Whiting	*Merlangius merlangus*	West of Scotland	VIa
Whiting	*Merlangius merlangus*	Rockall	VIb
Whiting	*Merlangius merlangus*	Irish Sea	VIIa
Whiting	*Merlangius merlangus*	Celtic Sea and West of Ireland	VIIb-K

Common name	**Species name**	**Area name**	**ICES area**
Species regulated by the deep-sea regulation			
Deep-sea sharks[2]	*misc*	all areas	VI, VII
Black scabbardfish	*Aphanaopus carbo*	all areas	VI, VII
Alfonsinos	*Beryx spp.*	all areas	VI, VII
Roundnose grenadier	*Coryphaenoides rupestris*	all areas	VI, VII
Orange roughy	*Hoplostethus atlanticus*	all areas	VI, VII
Red seabream	*Pagellus bogaraveo*	all areas	VI, VII
Greater forkbeard	*Phycis blennoides*	all areas	VI, VII

[2] According to Council Regulation No 1262/2012 of 20 December 2012 fixing for 2013 and 2014 the fishing opportunities for EU vessels for certain deep-sea fish stocks, 'deep-sea sharks' means: deep-water catsharks (*Apristurus* spp.), frilled shark (*Chlamydoselachus anguineus*), gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*), portuguese dogfish (*Centroscymnus coelolepis*), longnose velvet dogfish (*Centroscymnus crepidater*), black dogfish (*Centroscyllium fabricii*), birdbeak dogfish (*Deania calcea*), kitefin shark (*Dalatias licha*), greater lanternshark (*Etmopterus princeps*), velvet belly (*Etmopterus spinax*), blackmouth catshark/blackmouth dogfish (*Galeus melastomus*), mouse catshark (*Galeus murinus*), bluntnose six-gill shark (*Hexanchus griseus*), sailfin roughshark/sharpback shark (*Oxynotus paradoxus*), knifetooth dogfish (*Scymnodon ringens*), and greenland shark (*Somniosus microcephalus*).

Table 7-3 Species with catch limits relevant to the North Sea management region

Common name	**Species name**	**Area name**	**ICES area**
Anglerfish	*Lophius piscatorius*	Norway, North Sea	IIa, IV, IIIa
Blue ling	*Molva dypterygia*	Faroes	Vb
Blue ling	*Molva dypterygia*	Norway, North Sea, Skagerrak-Kattegat	II, III, IV
Brill	*Scopthalmus rhombus*	North Sea	IV
Cod	*Gadus morgua*	Kattegat	IIIa
Cod	*Gadus morgua*	North Sea	IIa, IIIa Skaggerrak, IV and VIId
Common dab	*Limanda limanda*	Norway, North Sea	IIa, IV
Common sole	*Solea solea*	Skagerrak and Kattegat	IIIa
Common sole	*Solea solea*	Norway, North Sea	IIa, IV
Common sole	*Solea solea*	West of Scotland, Faroes, Azores, Greenland	VI, Vb, XII, XIV
Dab	*Limanda limanda*	Norway, North Sea	IIa, IV
Flounder	*Platichthys flesus*	Norway, North Sea	IIa, IV
Flounder	*Platichthys flesus*	Norway, North Sea	IIa, IV
Greater silver smelt	*Argentina silus*	North Sea, Kattegat/Skagerrak	III, IV

Common name	**Species name**	**Area name**	**ICES area**
Greenland halibut	*Reinhardtius hippoglossoides*	Norway, North Sea, Faroes, West of Scotland and Rockall	IIa, IV, Vb, VI
Haddock	*Melanogrammus aeglefinus*	Norway, North Sea, Skagerrak-Kattegat	IIa, IV, IIIa
Hake	*Merluccius merluccius*	Skagerrak and Kattegat	IIIa
Hake	*Merluccius merluccius*	Norway, North Sea	IIa, IV
Lemon sole	*Microstomus kitt*	North Sea	IV
Ling	*Molva molva*	Faroes	Vb
Ling	*Molva molva*	Norway, North Sea, Skagerrak-Kattegat	II, III, IV
Megrim	*Lepidorhombus whiffiagonis*	Norway, North Sea	IIa, IV
Northern shrimp	*Pandalus borealis*	Fladen ground	IVa
Northern shrimp	*Pandalus borealis*	Skagerrak and Norwegian deeps	IIIa, IVa east
Northern shrimp	*Pandalus borealis*	North Sea	IV
Norway lobster	*Nephrops norvegicus*	Skaggerrak and Kattegat	IIIa
Norway lobster	*Nephrops norvegicus*	Botney Gut	FU 5
Norway lobster	*Nephrops norvegicus*	Farn deep	FU 6
Norway lobster	*Nephrops norvegicus*	Fladen ground	FU 7 (IVa)
Norway lobster	*Nephrops norvegicus*	Firth of Forth	FU 8

Common name	**Species name**	**Area name**	**ICES area**
Norway lobster	*Nephrops norvegicus*	Norway Firth	FU 9
Norway lobster	*Nephrops norvegicus*	Noup	FU 10
Norway lobster	*Nephrops norvegicus*	Norwegian deep	FU 32 (IVa)
Norway lobster	*Nephrops norvegicus*	Horns deep	FU 33
Norway lobster	*Nephrops norvegicus*	Devil's hole	FU 34
Norway pout	*Trisopterus esmarki*	Norway, North Sea, Skagerrak-Kattegat	IIa, IIIa, IV
Plaice	*Pleuronectes platessa*	Kattegat	IIIa
Plaice	*Pleuronectes platessa*	Skagerrak	IIIa
Plaice	*Pleuronectes platessa*	North Sea	IV
Plaice	*Pleuronectes platessa*	Eastern English Channel	VIId
Pollack	*Pollachius pollachius*	North Sea, Kattegat/Skagerrak	IV, IIIa
Porbeagle	*Lamna nasus*	All areas	
Rays and skates	*misc*	Norway, North Sea, Skagerrak-Kattegat	IIa, IIIa, IV
Saithe	*Pollachius virens*	Norway, North Sea	IV
Saithe	*Pollachius virens*	West of Scotland	VI
Sole	*Solea solea*	Skagerrak and Kattegat	IIIa

Common name	Species name	Area name	ICES area
Sole	*Solea solea*	Eastern English Channel	VIId
Spurdog	*Squalus acanthias*	Norway, North Sea	IIa, IV
Spurdog	*Squalus acanthias*	Skagerrak and Kattegat	IIIa
Turbot	*Psetta maxima*	Skagerrak and Kattegat	IIIa
Turbot	*Psetta maxima*	North Sea	IV
Tusk	*Brosme brosme*	Norway, North Sea	IV
Whiting	*Merlangius merlangus*	Skagerrak and Kattegat	IIIa
Whiting	*Merlangius merlangus*	North Sea, Eastern Channel	IV, VIId
Witch	*Glyptocephalus cynoglossus*	North Sea	IV
Species regulated by the deep-sea regulation			
Black scabbardfish	*Aphanaopus carbo*	North Sea, Kattegat/Skagerrak	III, IV
Alfonsinos	*Beryx spp.*	North Sea, Kattegat/Skagerrak	III, IV
Roundnose grenadier	*Coryphaenoides rupestris*	Norway, North Sea, Kattegat/Skagerrak	II, III, IV
Orange roughy	*Hoplostethus atlanticus*	Norway, North Sea, Kattegat/Skagerrak	II, III, IV
Greater forkbeard	*Phycis blennoides*	Norway, North Sea, Kattegat/Skagerrak	II, III, IV

7.2 Annex II Full references for survival experiments

Table 7-4 Full references for Table 4-3

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7.3 Annex III Stock specific data on landings, catch, initial and final quota, value and uptake rates by Member State

Table 7-5 Stock specific data on landings, catch, initial and final quota, value and uptake rates for belgium

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
BEL	Anglerfish	04-N.:2AC4-C	9.19	369	399	132	0	132	1.08	0.36	0.36	-237	1213	0.36	0.00	0.33	0.00	0.03
BEL	Anglerfish	07.	9.22	2835	1688	1315	306	1621	0.60	0.48	0.57	-1214	12126	0.46	0.11	0.78	0.18	-0.32
BEL	Anglerfish	8ABDE.	9.18	NA	95	201	33	234	NA	NA	NA	NA	1848	NA	NA	2.12	0.35	NA
BEL	Cod	07A.	3.07	5	28	23	9	32	5.60	4.58	6.34	27	70	4.57	1.78	0.82	0.32	3.75
BEL	Cod	07D.	3.09	66	71	39	2	42	1.08	0.60	0.63	-24	122	0.60	0.03	0.55	0.03	0.04
BEL	Cod	2A3AX4	3.07	782	861	851	16	867	1.10	1.10	1.11	85	2612	1.09	0.02	0.99	0.02	0.10
BEL	Cod	7XAD34	3.13	449	327	289	91	380	0.73	0.64	0.85	-69	904	0.64	0.20	0.88	0.28	-0.24
BEL	Haddock	2AC4.	1.39	224	219	78	0	78	0.98	0.35	0.35	-146	108	0.35	0.00	0.35	0.00	-0.01
BEL	Haddock	7X7A34	1.45	185	243	248	625	873	1.31	1.27	4.72	688	360	1.34	3.38	1.02	2.57	0.32
BEL	Hake	2AC4-C	2.16	28	32	27	0	27	1.14	0.97	0.96	-1	58	0.96	0.00	0.84	0.00	0.12
BEL	Hake	571214	2.18	284	23	10	20	29	0.08	0.03	0.10	-255	21	0.03	0.07	0.41	0.86	-0.38
BEL	Hake	8ABDE.	2.20	9	10	3	18	21	1.11	0.29	2.33	12	6	0.29	2.04	0.26	1.84	0.03
BEL	Mackerel	2CX14-	1.37	0	54	1	0	1	NA	NA	NA	1	1	NA	NA	0.02	0.00	NA
BEL	Megrim	07.	NA	470	659	599	154	752	1.40	1.28	1.60	282	NA	1.27	0.33	0.91	0.23	0.37
BEL	Megrim	2AC4-C	NA	6	9	0	0	0	1.50	0.03	0.04	-6	NA	0.04	0.00	0.03	0.00	0.01
BEL	Megrim	8ABDE.	NA	NA	8	8	2	10	NA	NA	NA	NA	NA	NA	NA	0.96	0.28	NA
BEL	Nephrops	07.	5.58	0	72	7	0	7	NA	NA	NA	7	36	NA	NA	0.09	0.00	NA
BEL	Nephrops	2AC4-C	5.59	1147	1268	364	321	685	1.11	0.32	0.60	-462	2035	0.32	0.28	0.29	0.25	0.03
BEL	Plaice	07A.	1.34	42	433	233	192	425	10.31	5.61	10.11	383	313	5.55	4.57	0.54	0.44	5.01
BEL	Plaice	2A3AX4	1.34	4874	6320	5023	15456	20479	1.30	1.03	4.20	15605	6713	1.03	3.17	0.79	2.45	0.24
BEL	Plaice	7DE.	1.34	828	1216	1156	13	1169	1.47	1.41	1.41	341	1552	1.40	0.02	0.95	0.01	0.45
BEL	Plaice	7FG.	1.34	46	185.9	202	353	555	4.04	4.41	12.06	509	270	4.40	7.66	1.09	1.90	3.31
BEL	Plaice	7HJK.	1.35	11	2	2	0	2	0.18	0.13	0.14	-9	2	0.14	0.00	0.76	0.00	-0.62
BEL	Plaice	8/3411	1.35	NA	5	3	0	3	NA	NA	NA	NA	4	NA	NA	0.54	0.00	NA
BEL	Saithe	2A34.	2.16	27	17	2	0	2	0.63	0.05	0.06	-25	3	0.06	0.00	0.09	0.00	-0.03
BEL	Saithe	7/3411	2.08	6	6	2	0	2	1.00	0.30	0.33	-4	4	0.33	0.00	0.33	0.00	0.00
BEL	Sole	07A.	10.19	131	246	219	0	219	1.88	1.69	1.67	88	2235	1.67	0.00	0.89	0.00	0.78
BEL	Sole	07D.	10.18	1502	1689	935	0	935	1.12	0.63	0.62	-567	9524	0.62	0.00	0.55	0.00	0.07
BEL	Sole	07E.	10.41	27	40	38	0	38	1.48	1.39	1.42	11	398	1.41	0.00	0.95	0.00	0.46
BEL	Sole	24-C.	10.31	1346	1558	602	284	886	1.16	0.45	0.66	-460	6213	0.45	0.21	0.39	0.18	0.06
BEL	Sole	7FG.	10.23	663	867.9	838	4	842	1.31	1.27	1.27	179	8575	1.26	0.01	0.97	0.00	0.30
BEL	Sole	7HJK.	10.14	35	39	18	0	18	1.11	0.52	0.52	-17	183	0.52	0.00	0.46	0.00	0.05
BEL	Sole	8AB.	10.14	53	386	385	0	385	7.28	7.27	7.27	332	3906	7.27	0.00	1.00	0.00	6.27
BEL	Spurdog	15X14	2.67	0	0	0	0	0	NA	NA	NA	0	0	NA	NA	NA	NA	NA
BEL	Whiting	07A.	1.22	0	5	4	20	24	NA	NA	NA	24	5	NA	NA	0.89	3.97	NA
BEL	Whiting	2AC4.	1.24	337	267	44	188	232	0.79	0.13	0.69	-105	54	0.13	0.56	0.16	0.71	-0.03
BEL	Whiting	7X7A-C	1.28	186	326	234	296	530	1.75	1.27	2.85	344	298	1.26	1.59	0.72	0.91	0.54

Table 7-6 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Germany

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
DEU	Anglerfish	04-N.:2AC4-C	3.09	367	409	283	0	283	1.11	0.75	0.77	-84	875	0.77	0.00	0.69	0.00	0.08
DEU	Anglerfish	07.	3.00	316	339	266	0	266	1.07	0.85	0.84	-50	799	0.84	0.00	0.78	0.00	0.06
DEU	Anglerfish	2AC4-C	3.98	349	386	1	0	1	1.11	0.75	0.00	-348	4	0.00	0.00	0.00	0.00	0.00
DEU	Anglerfish	56-14	3.00	213	154	140	0	140	0.72	0.67	0.65	-74	419	0.65	0.00	0.91	0.00	-0.25
DEU	Cod	03AN.	1.65	76	80.9	359	33	392	1.06	1.01	5.16	316	593	4.72	0.44	4.43	0.41	0.29
DEU	Cod	2A3AX4	1.59	2850	2437.38	2134	144	2279	0.86	0.38	0.80	-571	3396	0.75	0.05	0.88	0.06	-0.13
DEU	Cod	5BE6A	1.56	0	0	0	0	0	NA	NA	NA	0	0	NA	NA	NA	NA	NA
DEU	Haddock	2AC4.	1.29	979	630	492	53	544	0.64	0.31	0.56	-435	633	0.50	0.05	0.78	0.08	-0.28
DEU	Haddock	3A/BCD	1.29	123	123	181	13	194	1.00	0.96	1.58	71	234	1.47	0.10	1.47	0.10	0.00
DEU	Haddock	5BC6A.	1.29	8	8	0	0	0	1.00	0.01	0.01	-8	0	0.01	0.00	0.01	0.00	0.00
DEU	Hake	2AC4-C	1.99	128	102	384	42	426	0.80	0.79	3.33	298	765	3.00	0.33	3.77	0.41	-0.76
DEU	Hake	3A/BCD	2.02	0	3	6	0	6	NA	NA	NA	6	12	NA	NA	1.94	0.00	NA
DEU	Mackerel	2A34.	NA	439	961	13	0	13	2.19	1.94	0.03	-426	NA	0.03	0.00	0.01	0.00	0.02
DEU	Mackerel	2CX14-	NA	16487	17778.3	14598	501	15099	1.08	0.79	0.92	-1388	NA	0.89	0.03	0.82	0.03	0.06
DEU	Megrim	2AC4-C	NA	5	6	2	0	2	1.20	0.29	0.31	-3	NA	0.31	0.00	0.26	0.00	0.05
DEU	Nephrops	04-N.:2AC4-C	5.18	18	837.5	387	302	689	46.53	21.43	38.28	671	2005	21.50	16.79	0.46	0.36	21.03
DEU	Plaice	03AN.	1.23	32	32	12	1	13	1.00	0.30	0.42	-19	15	0.39	0.03	0.39	0.03	0.00
DEU	Plaice	03AS.	1.27	20	20	1	0	1	1.00	0.06	0.06	-19	2	0.06	0.00	0.06	0.00	0.00
DEU	Plaice	2A3AX4	1.28	4569	4618.8	3837	2146	5983	1.01	0.84	1.31	1414	4915	0.84	0.47	0.83	0.46	0.01
DEU	Saithe	2A34.	1.20	8241	8403	8205	8	8214	1.02	0.98	1.00	-27	9856	1.00	0.00	0.98	0.00	0.02
DEU	Saithe	56-14	1.20	0	12.7	9	0	9	NA	NA	NA	9	10	NA	NA	0.69	0.00	NA
DEU	Sole	24-C.	9.52	1077	1075	427	31	458	1.00	0.41	0.43	-619	4063	0.40	0.03	0.40	0.03	0.00
DEU	Sole	3A/BCD	9.42	30	34	11	0	11	1.13	0.40	0.38	-19	106	0.38	0.00	0.33	0.00	0.04
DEU	Spurdog	2AC4-C	2.33	0	0	1	0	1	NA	NA	NA	1	2	NA	NA	NA	NA	NA
DEU	Whiting	03A.	0.49	0	2	1	1	2	NA	NA	NA	2	0	NA	NA	0.33	0.50	NA
DEU	Whiting	2AC4.	0.49	379	164	24	31	55	0.43	0.04	0.14	-324	12	0.06	0.08	0.15	0.19	-0.08

Table 7-7 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Denmark

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
DNK	Anglerfish	04-N.:2AC4-C	NA	1866	1947	1387	9	1395	1.04	0.60	0.75	-471	NA	0.74	0.00	0.71	0.00	0.03
DNK	Anglerfish	2AC4-C	NA	714	789	316	1	317	1.11	0.39	0.44	-397	NA	0.44	0.00	0.40	0.00	0.04
DNK	Cod	03AN.	1.65	3026	3193.66	3307	1485	4792	1.06	1.05	1.58	1766	5445	1.09	0.49	1.04	0.47	0.06
DNK	Cod	2A3AX4	1.63	4495	4952.92	5264	369	5633	1.10	0.50	1.25	1138	8577	1.17	0.08	1.06	0.07	0.11
DNK	Haddock	2AC4.	1.22	1539	1284.8	1059	226	1286	0.83	0.29	0.84	-253	1296	0.69	0.15	0.82	0.18	-0.14
DNK	Haddock	3A/BCD	1.22	1943	1956	1984	622	2607	1.01	0.99	1.34	664	2426	1.02	0.32	1.01	0.32	0.01
DNK	Hake	2AC4-C	1.88	1119	875	2177	261	2438	0.78	0.82	2.18	1319	4095	1.95	0.23	2.49	0.30	-0.54
DNK	Hake	3A/BCD	1.88	1531	1698	302	100	402	1.11	0.20	0.26	-1129	568	0.20	0.07	0.18	0.06	0.02
DNK	Mackerel	2CX14-	0.99	0	7628	8	0	8	Inf	Inf	Inf	8	8	NA	NA	0.00	0.00	NA
DNK	Megrim	2AC4-C	NA	5	21	36	0	36	4.20	2.73	7.17	31	NA	7.17	0.00	1.71	0.00	5.46
DNK	Nephrops	04-N.:2AC4-C	7.78	2282	2419	724	407	1131	1.06	0.32	0.50	-1151	5632	0.32	0.18	0.30	0.17	0.02
DNK	Plaice	03AN.	1.32	6189	7484	7328	960	8288	1.21	1.15	1.34	2099	9680	1.18	0.16	0.98	0.13	0.20
DNK	Plaice	03AS.	1.31	1769	1769	198	386	584	1.00	0.11	0.33	-1185	260	0.11	0.22	0.11	0.22	0.00
DNK	Plaice	2A3AX4	1.32	15840	14559	12654	588	13242	0.92	0.51	0.84	-2598	16657	0.80	0.04	0.87	0.04	-0.07
DNK	Saithe	2A34.	1.43	3263	5362	5919	105	6024	1.64	1.58	1.85	2761	8437	1.81	0.03	1.10	0.02	0.71
DNK	Sole	24-C.	10.63	615	601	432	0	432	0.98	0.68	0.70	-183	4589	0.70	0.00	0.72	0.00	-0.02
DNK	Sole	3A/BCD	10.50	512	589	294	3	297	1.15	0.63	0.58	-215	3089	0.57	0.01	0.50	0.00	0.08
DNK	Spurdog	03A-C.	1.97	0	0	12	7	19	NA	NA	NA	19	23	NA	NA	NA	NA	NA
DNK	Spurdog	2AC4-C	1.97	0	0	19	0	19	NA	NA	NA	19	38	NA	NA	NA	NA	NA
DNK	Whiting	03A.	0.30	929	929	182	249	431	1.00	0.03	0.46	-498	55	0.20	0.27	0.20	0.27	0.00
DNK	Whiting	2AC4.	0.38	1458	326.4	506	1471	1976	0.22	0.06	1.36	518	194	0.35	1.01	1.55	4.51	-1.20

Table 7-8 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Spain

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
ESP	Anglerfish	07.	NA	1126	2974	3047	11	3058	2.64	2.25	2.72	1932	NA	2.71	0.01	1.02	0.00	1.68
ESP	Anglerfish	56-14	NA	199	275	142	2	144	1.38	0.54	0.72	-55	NA	0.71	0.01	0.52	0.01	0.20
ESP	Anglerfish	8ABDE.	NA	1252	1304	1049	0	1049	1.04	0.72	0.84	-203	NA	0.84	0.00	0.80	0.00	0.03
ESP	Anglerfish	8C3411	NA	2750	2036.92	899	66	966	0.74	0.58	0.35	-1784	NA	0.33	0.02	0.44	0.03	-0.11
ESP	Haddock	5BC6A.	NA	0	14.27	13	4	17	NA	NA	NA	17	NA	NA	NA	0.91	0.28	NA
ESP	Haddock	7X7A34	NA	0	106	162	2	164	NA	NA	NA	164	NA	NA	NA	1.53	0.02	NA
ESP	Hake	571214	NA	9109	12034.1	15508	0	15508	1.32	1.36	1.70	6399	NA	1.70	0.00	1.29	0.00	0.41
ESP	Hake	8ABDE.	NA	6341	8005	6635	0	6635	1.26	0.96	1.05	294	NA	1.05	0.00	0.83	0.00	0.22
ESP	Hake	8C3411	NA	7870	8312	5244	1343	6587	1.06	0.74	0.84	-1283	NA	0.67	0.17	0.63	0.16	0.04
ESP	Mackerel	2CX14-	NA	18	22	707	0	707	1.22	0.89	39.27	689	NA	39.27	0.00	32.13	0.00	7.14
ESP	Megrim	07.	NA	5216	5599	4190	128	4318	1.07	0.69	0.83	-898	NA	0.80	0.02	0.75	0.02	0.05
ESP	Megrim	56-14	NA	385	424	217	12	229	1.10	0.54	0.60	-156	NA	0.56	0.03	0.51	0.03	0.05
ESP	Megrim	8ABDE.	NA	950	601	501	0	501	0.63	0.44	0.53	-449	NA	0.53	0.00	0.83	0.00	-0.31
ESP	Megrim	8C3411	NA	1121	877.7	553	204	757	0.78	0.59	0.68	-364	NA	0.49	0.18	0.63	0.23	-0.14
ESP	Nephrops	07.	NA	1306	1374.8	318	0	318	1.05	0.22	0.24	-988	NA	0.24	0.00	0.23	0.00	0.01
ESP	Nephrops	5BC6.	NA	29	32	0	0	0	1.10	0.00	0.00	-29	NA	0.00	0.00	0.00	0.00	0.00
ESP	Plaice	8/3411	NA	66	11	3	0	3	0.17	0.06	0.05	-63	NA	0.05	0.00	0.27	0.00	-0.23
ESP	Saithe	56-14	NA	0	13	12	0	12	NA	NA	NA	12	NA	NA	NA	0.94	0.00	NA
ESP	Saithe	7/3411	NA	0	9	1	0	1	NA	NA	NA	1	NA	NA	NA	0.11	0.00	NA
ESP	Sole	8AB.	NA	10	9.47	173	0	173	0.95	1.13	17.25	163	NA	17.25	0.00	18.22	0.00	-0.97
ESP	Spurdog	15X14	NA	0	0	3	0	3	NA	NA	NA	3	NA	NA	NA	NA	NA	NA
ESP	Whiting	7X7A-C	NA	0	12	6	0	6	NA	NA	NA	6	NA	NA	NA	0.50	0.00	NA

Table 7-9 Stock specific data on landings, catch, initial and final quota, value and uptake rates for France

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
FRA	Anglerfish	07.	NA	18191	18835	9804	167	9971	1.04	0.72	0.55	-8220	NA	0.54	0.01	0.52	0.01	0.02
FRA	Anglerfish	2AC4-C	NA	66	72	7	0	7	1.09	0.25	0.11	-59	NA	0.11	0.00	0.10	0.00	0.01
FRA	Anglerfish	56-14	NA	2293	2516	1300	1	1301	1.10	0.72	0.57	-992	NA	0.57	0.00	0.52	0.00	0.05
FRA	Anglerfish	8ABDE.	NA	6968	7786	2170	0	2170	1.12	0.80	0.31	-4798	NA	0.31	0.00	0.28	0.00	0.03
FRA	Anglerfish	8C3411	NA	3	25	18	0	18	8.33	5.50	6.14	15	NA	6.14	0.00	0.74	0.00	5.40
FRA	Cod	07A.	2.59	14	16	1	0	1	1.14	0.07	0.06	-13	2	0.06	0.00	0.05	0.00	0.01
FRA	Cod	07D.	2.71	1295	1444	755	28	783	1.12	0.68	0.60	-512	2047	0.58	0.02	0.52	0.02	0.06
FRA	Cod	2A3AX4	2.67	966	871	274	20	294	0.90	0.38	0.30	-672	732	0.28	0.02	0.31	0.02	-0.03
FRA	Cod	5BE6A	2.59	0	0	4	4	8	NA	NA	NA	8	10	NA	NA	NA	NA	NA
FRA	Cod	7XAD34	2.61	7357	7671	4383	1915	6298	1.04	0.73	0.86	-1059	11432	0.60	0.26	0.57	0.25	0.02
FRA	Haddock	2AC4.	1.08	1707	1467	184	6	190	0.86	0.10	0.11	-1517	199	0.11	0.00	0.13	0.00	-0.02
FRA	Haddock	5BC6A.	1.12	332	331	29	0	29	1.00	0.10	0.09	-303	32	0.09	0.00	0.09	0.00	0.00
FRA	Haddock	7X7A34	1.08	11096	11357	9873	1981	11854	1.02	1.07	1.07	758	10672	0.89	0.18	0.87	0.17	0.02
FRA	Hake	2AC4-C	2.44	248	567.5	544	2	546	2.29	1.58	2.20	298	1329	2.19	0.01	0.96	0.00	1.23
FRA	Hake	571214	2.37	14067	13474	12633	6	12639	0.96	0.86	0.90	-1428	29954	0.90	0.00	0.94	0.00	-0.04
FRA	Hake	8ABDE.	2.33	14241	14830	10887	0	10887	1.04	0.86	0.76	-3354	25331	0.76	0.00	0.73	0.00	0.03
FRA	Hake	8C3411	2.34	756	827	250	11	261	1.09	0.28	0.35	-495	584	0.33	0.01	0.30	0.01	0.03
FRA	Mackerel	2A34.	2.25	1326	1932	0	0	0	1.46	1.30	0.00	-1326	0	0.00	0.00	0.00	0.00	0.00
FRA	Mackerel	2CX14-	0.68	10993	19447	12718	2808	15526	1.77	1.22	1.41	4533	8645	1.16	0.26	0.65	0.14	0.50
FRA	Megrim	07.	NA	6329	6688	1956	319	2275	1.06	0.42	0.36	-4054	NA	0.31	0.05	0.29	0.05	0.02
FRA	Megrim	2AC4-C	NA	30	32	3	0	3	1.07	0.16	0.09	-27	NA	0.09	0.00	0.08	0.00	0.01
FRA	Megrim	56-14	NA	1501	1646	96	0	96	1.10	0.08	0.06	-1405	NA	0.06	0.00	0.06	0.00	0.01
FRA	Megrim	8ABDE.	NA	766	1287	490	0	490	1.68	1.03	0.64	-276	NA	0.64	0.00	0.38	0.00	0.26
FRA	Megrim	8C3411	NA	56	61	3	0	3	1.09	0.06	0.06	-53	NA	0.06	0.00	0.05	0.00	0.00
FRA	Nephrops	07.	10.42	5291	4416	376	0	376	0.83	0.10	0.07	-4915	3923	0.07	0.00	0.09	0.00	-0.01
FRA	Nephrops	5BC6.	10.40	114	127	0	0	0	1.11	0.00	0.00	-114	3	0.00	0.00	0.00	0.00	0.00
FRA	Plaice	07A.	1.31	18	20	0	0	0	1.11	0.00	0.00	-18	0	0.00	0.00	0.00	0.00	0.00
FRA	Plaice	2A3AX4	1.31	914	854	206	411	617	0.93	0.30	0.68	-297	271	0.23	0.45	0.24	0.48	-0.02
FRA	Plaice	7BC.	1.31	16	16	9	5	14	1.00	0.58	0.85	-2	11	0.53	0.31	0.53	0.31	0.00
FRA	Plaice	7DE.	1.33	2761	2381	1823	100	1923	0.86	0.80	0.70	-838	2420	0.66	0.04	0.77	0.04	-0.11
FRA	Plaice	7FG.	1.31	83	92.5	76	622	698	1.11	0.97	8.41	615	100	0.92	7.49	0.82	6.72	0.09
FRA	Plaice	7HJK.	1.32	22	66	43	0	43	3.00	2.80	1.96	21	57	1.96	0.00	0.65	0.00	1.31
FRA	Plaice	8/3411	1.42	263	313	119	0	119	1.19	0.70	0.45	-144	168	0.45	0.00	0.38	0.00	0.07
FRA	Saithe	2A34.	1.27	19395	15370	11660	0	11660	0.79	0.76	0.60	-7735	14756	0.60	0.00	0.76	0.00	-0.16
FRA	Saithe	56-14	1.23	3878	2970	2296	0	2296	0.77	0.68	0.59	-1582	2823	0.59	0.00	0.77	0.00	-0.18
FRA	Saithe	7/3411	1.26	1375	1366	260	0	260	0.99	0.24	0.19	-1115	329	0.19	0.00	0.19	0.00	0.00
FRA	Sole	07A.	11.43	2	2	0	0	0	1.00	0.10	0.10	-2	2	0.10	0.00	0.10	0.00	0.00
FRA	Sole	07D.	11.17	3005	3286	2194	1	2195	1.09	0.84	0.73	-810	24499	0.73	0.00	0.67	0.00	0.06
FRA	Sole	07E.	12.03	293	289	268	0	268	0.99	0.89	0.91	-25	3224	0.91	0.00	0.93	0.00	-0.01
FRA	Sole	24-C.	11.14	269	791	562	17	579	2.94	2.35	2.15	310	6256	2.09	0.06	0.71	0.02	1.38
FRA	Sole	7FG.	11.53	66	85	33	2	35	1.29	0.73	0.53	-31	382	0.50	0.03	0.39	0.02	0.11
FRA	Sole	7HJK.	11.48	71	98	85	0	85	1.38	1.20	1.20	14	982	1.20	0.00	0.87	0.00	0.33
FRA	Sole	8AB.	11.40	3895	4077	3122	0	3122	1.05	0.95	0.80	-773	35580	0.80	0.00	0.77	0.00	0.04
FRA	Spurdog	15X14	1.90	0	0	43	0	43	NA	NA	NA	43	81	NA	NA	NA	NA	NA
FRA	Spurdog	2AC4-C	1.72	0	0	1	0	1	NA	NA	NA	1	2	NA	NA	NA	NA	NA
FRA	Whiting	07A.	1.42	3	4	0	1	1	1.33	1.23	0.48	-2	1	0.15	0.33	0.11	0.25	0.04
FRA	Whiting	2AC4.	1.42	2191	3352	1540	2460	4000	1.53	0.88	1.83	1809	2183	0.70	1.12	0.46	0.73	0.24
FRA	Whiting	56-14	1.45	37	40	0	0	0	1.08	0.01	0.01	-37	1	0.01	0.00	0.01	0.00	0.00
FRA	Whiting	7X7A-C	1.43	11431	11899	5443	7479	12922	1.04	0.59	1.13	1491	7775	0.48	0.65	0.46	0.63	0.02

Table 7-10 Stock specific data on landings, catch, initial and final quota, value and uptake rates for the UK

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
GBR	Anglerfish	04-N.:2AC4-C	4.14	7724	8461	5058	1	5059	1.10	0.64	0.66	-2665	20947	0.65	0.00	0.60	0.00	0.06
GBR	Anglerfish	07.	4.01	5517	6814.55	5661	305	5966	1.24	0.97	1.08	449	22688	1.03	0.06	0.83	0.04	0.20
GBR	Anglerfish	56-14	4.13	1595	2011	2112	12	2124	1.26	1.05	1.33	529	8728	1.32	0.01	1.05	0.01	0.27
GBR	Cod	07A.	1.62	109	124	111	409	520	1.14	1.01	4.77	411	180	1.02	3.75	0.90	3.29	0.12
GBR	Cod	07D.	2.18	143	151.5	99	8	107	1.06	0.68	0.75	-36	216	0.69	0.05	0.65	0.05	0.04
GBR	Cod	2A3AX4	1.65	10311	12336.2	12190	3285	15475	1.20	0.96	1.50	5164	20101	1.18	0.32	0.99	0.27	0.19
GBR	Cod	5BE6A	1.60	0	0	137	956	1093	NA	NA	NA	1093	219	NA	NA	NA	NA	NA
GBR	Cod	7XAD34	2.27	793	865	699	262	961	1.09	0.87	1.21	168	1589	0.88	0.33	0.81	0.30	0.07
GBR	Haddock	2AC4.	1.29	25386	30248.8	27361	3272	30633	1.19	0.90	1.21	5247	35326	1.08	0.13	0.90	0.11	0.17
GBR	Haddock	5BC6A.	1.29	4683	4935	4123	407	4530	1.05	0.86	0.97	-153	5330	0.88	0.09	0.84	0.08	0.04
GBR	Haddock	6B1214	1.31	2660	3008	577	21	598	1.13	0.22	0.22	-2062	758	0.22	0.01	0.19	0.01	0.03
GBR	Haddock	7X7A34	1.33	1665	1822	2140	1155	3295	1.09	1.14	1.98	1630	2843	1.29	0.69	1.17	0.63	0.11
GBR	Hake	2AC4-C	2.10	348	1839.8	3361	2341	5702	5.29	5.22	16.39	5354	7073	9.66	6.73	1.83	1.27	7.83
GBR	Hake	571214	2.97	5553	5186.9	4850	46	4896	0.93	0.86	0.88	-657	14409	0.87	0.01	0.94	0.01	-0.06
GBR	Mackerel	2CX14-	1.14	151132	182513.5	93781	5667	99448	1.21	0.62	0.66	-51684	106717	0.62	0.04	0.51	0.03	0.11
GBR	Megrim	07.	NA	2492	2887.5	2361	149	2510	1.16	0.87	1.01	18	NA	0.95	0.06	0.82	0.05	0.13
GBR	Megrim	2AC4-C	NA	1775	1936	1397	0	1397	1.09	0.78	0.79	-378	NA	0.79	0.00	0.72	0.00	0.07
GBR	Megrim	56-14	NA	1062	1173	679	50	729	1.10	0.63	0.69	-333	NA	0.64	0.05	0.58	0.04	0.06
GBR	Nephrops	04-N.:2AC4-C	3.95	19058	19915.5	11063	31	11094	1.04	0.56	0.58	-7964	43755	0.58	0.00	0.56	0.00	0.02
GBR	Nephrops	07.	3.89	7137	7766.2	7285	0	7285	1.09	1.00	1.02	148	28366	1.02	0.00	0.94	0.00	0.08
GBR	Nephrops	5BC6.	4.54	13758	15261	14278	0	14278	1.11	1.01	1.04	520	64773	1.04	0.00	0.94	0.00	0.10
GBR	Plaice	07A.	1.52	491	506	157	1851	2008	1.03	0.32	4.09	1517	239	0.32	3.77	0.31	3.66	0.01
GBR	Plaice	2A3AX4	1.62	22542	18943	16946	2121	19066	0.84	0.73	0.85	-3476	27375	0.75	0.09	0.89	0.11	-0.14
GBR	Plaice	7DE.	1.60	1473	1473.4	1542	231	1773	1.00	1.00	1.20	300	2473	1.05	0.16	1.05	0.16	0.00
GBR	Plaice	7FG.	1.64	43	41.6	44	284	328	0.97	1.02	7.62	285	72	1.03	6.60	1.06	6.82	-0.03
GBR	Plaice	7HJK.	1.69	22	40	38	0	38	1.82	1.70	1.72	16	64	1.72	0.00	0.94	0.00	0.77
GBR	Saithe	2A34.	1.27	6318	8139	7287	5116	12403	1.29	1.18	1.96	6085	9270	1.15	0.81	0.90	0.63	0.26
GBR	Saithe	56-14	1.27	3154	5468.3	4549	2438	6987	1.73	1.43	2.22	3833	5790	1.44	0.77	0.83	0.45	0.61
GBR	Saithe	7/3411	1.31	446	441	146	0	146	0.99	0.33	0.33	-300	191	0.33	0.00	0.33	0.00	0.00
GBR	Sole	07A.	9.33	59	37	21	0	21	0.63	0.35	0.36	-38	197	0.36	0.01	0.57	0.01	-0.21
GBR	Sole	07D.	8.77	1073	1132	627	0	627	1.05	0.57	0.58	-446	5500	0.58	0.00	0.55	0.00	0.03
GBR	Sole	07E.	10.51	457	484.8	503	1	504	1.06	1.00	1.10	47	5286	1.10	0.00	1.04	0.00	0.06
GBR	Sole	24-C.	9.81	692	1217	606	13	620	1.76	0.84	0.90	-72	5948	0.88	0.02	0.50	0.01	0.38
GBR	Sole	7FG.	11.39	298	204.1	170	1	171	0.68	0.57	0.57	-127	1941	0.57	0.00	0.83	0.00	-0.26
GBR	Sole	7HJK.	11.89	71	78	46	0	46	1.10	0.65	0.65	-25	549	0.65	0.00	0.59	0.00	0.06
GBR	Spurdog	15X14	1.15	0	0	3	0	3	NA	NA	NA	3	3	NA	NA	NA	NA	NA
GBR	Spurdog	2AC4-C	1.27	0	0	0	0	0	NA	NA	NA	0	0	NA	NA	NA	NA	NA
GBR	Whiting	07A.	0.87	34	37	10	447	457	1.09	0.31	13.44	423	9	0.29	13.15	0.27	12.08	0.02
GBR	Whiting	2AC4.	1.25	10539	10934.6	9880	2568	12447	1.04	0.86	1.18	1908	12394	0.94	0.24	0.90	0.23	0.03
GBR	Whiting	56-14	1.25	176	202	204	1004	1208	1.15	1.16	6.86	1032	256	1.16	5.70	1.01	4.97	0.15
GBR	Whiting	7X7A-C	1.21	2045	1750	1023	1213	2236	0.86	0.48	1.09	191	1233	0.50	0.59	0.58	0.69	-0.08

Table 7-11 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Ireland

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
IRL	Anglerfish	07.	3.47	2325	3371	3152	500	3652	1.45	1.40	1.57	1327	10934	1.36	0.21	0.93	0.15	0.42
IRL	Anglerfish	56-14	3.40	518	613	546	13	559	1.18	1.06	1.08	41	1857	1.05	0.03	0.89	0.02	0.16
IRL	Cod	07A.	1.81	251	271	191	36	227	1.08	0.77	0.90	-24	346	0.76	0.14	0.71	0.13	0.06
IRL	Cod	5BE6A	1.80	0	0	18	10	28	NA	NA	NA	28	32	NA	NA	NA	NA	NA
IRL	Cod	7XAD34	1.84	1459	1597	1490	346	1836	1.09	1.02	1.26	377	2738	1.02	0.24	0.93	0.22	0.09
IRL	Haddock	5BC6A.	1.18	985	932	845	99	944	0.95	0.86	0.96	-41	995	0.86	0.10	0.91	0.11	-0.05
IRL	Haddock	6B1214	1.23	260	294	31	0	31	1.13	0.12	0.12	-229	38	0.12	0.00	0.11	0.00	0.01
IRL	Haddock	7X7A34	1.25	3699	3745	4685	2297	6982	1.01	1.12	1.89	3283	5840	1.27	0.62	1.25	0.61	0.02
IRL	Hake	571214	2.06	1704	1873	1848	1	1849	1.10	1.09	1.09	145	3805	1.08	0.00	0.99	0.00	0.10
IRL	Mackerel	2CX14-	0.95	54956	63917.6	42358	2850	45208	1.16	0.79	0.82	-9748	40283	0.77	0.05	0.66	0.04	0.11
IRL	Megrim	07.	NA	2878	3384	3082	509	3591	1.18	1.08	1.25	713	NA	1.07	0.18	0.91	0.15	0.16
IRL	Megrim	56-14	NA	439	483	333	7	340	1.10	0.76	0.78	-99	NA	0.76	0.02	0.69	0.02	0.07
IRL	Nephrops	07.	4.58	8025	10533.8	10337	0	10337	1.31	1.23	1.29	2312	47372	1.29	0.00	0.98	0.00	0.31
IRL	Nephrops	5BC6.	4.59	190	211	28	0	28	1.11	0.15	0.15	-162	131	0.15	0.00	0.13	0.00	0.01
IRL	Plaice	07A.	1.78	1063	848	106	232	337	0.80	0.10	0.32	-726	188	0.10	0.22	0.12	0.27	-0.03
IRL	Plaice	7BC.	1.59	62	62	20	12	32	1.00	0.33	0.52	-30	33	0.33	0.19	0.33	0.19	0.00
IRL	Plaice	7FG.	1.76	197	72	75	292	367	0.37	0.39	1.86	170	132	0.38	1.48	1.05	4.06	-0.66
IRL	Plaice	7HJK.	1.73	77	86	98	0	98	1.12	1.29	1.28	21	170	1.28	0.00	1.14	0.00	0.13
IRL	Saithe	56-14	1.20	407	440	364	0	364	1.08	0.89	0.89	-43	438	0.89	0.00	0.83	0.00	0.07
IRL	Saithe	7/3411	1.09	1516	1516	964	0	964	1.00	0.65	0.64	-552	1052	0.64	0.00	0.64	0.00	0.00
IRL	Sole	07A.	11.64	67	58	50	0	50	0.87	0.77	0.74	-17	577	0.74	0.00	0.86	0.00	-0.11
IRL	Sole	7FG.	9.96	33	37	31	2	33	1.12	0.99	1.00	0	313	0.95	0.05	0.85	0.04	0.10
IRL	Sole	7HJK.	8.75	190	194	84	0	84	1.02	0.45	0.44	-106	737	0.44	0.00	0.43	0.00	0.01
IRL	Spurdog	15X14	1.60	0	0	44	0	44	NA	NA	NA	44	70	NA	NA	NA	NA	NA
IRL	Whiting	07A.	1.24	52	56	57	451	509	1.08	1.10	9.78	457	71	1.10	8.67	1.03	8.05	0.08
IRL	Whiting	56-14	1.23	92	101	96	67	163	1.10	1.04	1.77	71	118	1.04	0.73	0.95	0.67	0.09
IRL	Whiting	7X7A-C	1.32	5298	6102	5457	2057	7513	1.15	1.10	1.42	2215	7191	1.03	0.39	0.89	0.34	0.14

Table 7-12 Stock specific data on landings, catch, initial and final quota, value and uptake rates for the Netherlands

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
NLD	Anglerfish	04-N.:2AC4-C	2.02	261	297	59	0	59	1.14	0.22	0.23	-202	119	0.23	0.00	0.20	0.00	0.03
NLD	Cod	03AN.	NA	19	0	0	0	0	0.00	0.00	0.00	-19	NA	0.00	0.00	NA	NA	NA
NLD	Cod	07D.	2.21	39	56.5	36	0	36	1.45	1.01	0.92	-3	79	0.92	0.00	0.64	0.00	0.29
NLD	Cod	2A3AX4	2.26	2540	2089	1873	226	2099	0.82	0.76	0.83	-441	4226	0.74	0.09	0.90	0.11	-0.16
NLD	Cod	7XAD34	2.57	1	6	5	0	5	6.00	5.17	5.00	4	13	5.00	0.00	0.83	0.00	4.17
NLD	Haddock	2AC4.	1.38	168	202	186	34	220	1.20	1.13	1.31	52	257	1.11	0.20	0.92	0.17	0.19
NLD	Haddock	3A/BCD	NA	2	0	0	0	0	0.00	0.00	0.00	-2	NA	0.00	0.00	NA	NA	NA
NLD	Haddock	7X7A34	1.41	0	90	66	0	66	NA	NA	NA	66	93	NA	NA	0.73	0.00	NA
NLD	Hake	2AC4-C	0.77	64	112	115	16	131	1.75	1.75	2.05	67	88	1.80	0.25	1.03	0.14	0.77
NLD	Hake	571214	0.33	183	56	109	0	109	0.31	0.60	0.60	-74	36	0.60	0.00	1.95	0.00	-1.35
NLD	Hake	8ABDE.	0.33	18	18	2	0	2	1.00	0.08	0.11	-16	1	0.11	0.00	0.11	0.00	0.00
NLD	Mackerel	2A34.	0.53	1335	1685	4	8	12	1.26	0.80	0.01	-1323	2	0.00	0.01	0.00	0.00	0.00
NLD	Mackerel	2CX14-	0.54	24043	24896.2	19759	3721	23480	1.04	0.92	0.98	-563	10693	0.82	0.15	0.79	0.15	0.03
NLD	Megrim	2AC4-C	NA	24	26	14	0	14	1.08	0.63	0.58	-10	NA	0.58	0.00	0.54	0.00	0.04
NLD	Nephrops	2AC4-C	6.80	590	1265	1024	894	1918	2.14	1.73	3.25	1328	6961	1.74	1.52	0.81	0.71	0.93
NLD	Plaice	03AN.	1.36	1190	0	10	0	10	0.00	0.00	0.01	-1180	14	0.01	0.00	NA	NA	NA
NLD	Plaice	2A3AX4	1.36	30462	33906	31609	59645	91254	1.11	1.06	3.00	60792	43096	1.04	1.96	0.93	1.76	0.11
NLD	Plaice	7DE.	1.36	0	65	43	0	43	NA	NA	NA	43	58	NA	NA	0.66	0.00	NA
NLD	Plaice	7HJK.	NA	44	0	0	0	0	0.00	0.00	0.00	-44	NA	0.00	0.00	NA	NA	NA
NLD	Saithe	2A34.	2.05	82	35	33	0	33	0.43	0.41	0.40	-49	68	0.40	0.00	0.94	0.00	-0.54
NLD	Sole	24-C.	9.26	12151	12465	8873	2084	10957	1.03	0.75	0.90	-1194	82202	0.73	0.17	0.71	0.17	0.02
NLD	Spurdog	15X14	2.27	0	0	2	0	2	NA	NA	NA	2	5	NA	NA	NA	NA	NA
NLD	Spurdog	2AC4-C	2.37	0	0	1	0	1	NA	NA	NA	1	2	NA	NA	NA	NA	NA
NLD	Whiting	2AC4.	1.25	843	703	451	2020	2471	0.83	0.54	2.93	1628	564	0.53	2.40	0.64	2.87	-0.11
NLD	Whiting	7X7A-C	1.25	93	624	591	0	591	6.71	6.15	6.35	498	736	6.35	0.00	0.95	0.00	5.41

Table 7-13 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Portugal

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
PRT	Anglerfish	8C3411	1.75	547	934.35	549	1	550	1.71	1.48	1.01	3	959	1.00	0.00	0.59	0.00	0.42
PRT	Hake	8C3411	2.57	3673	4020	1803	716	2519	1.09	0.72	0.69	-1154	4626	0.49	0.19	0.45	0.18	0.04

Table 7-14 Stock specific data on landings, catch, initial and final quota, value and uptake rates for Sweden

MS	Species	TAC.area	ValuePerKg(EURO)	InitQuota	FinalQuota	LANDINGS	DISCARDS	CATCH	FinalQuota/InitQuota	UptakeInitQuota	Catch/InitQuota	Catch-InitQuota(t)	Value ('000 EURO)	Land/InitQuota	Disc/InitQuota	Land/FinalQuota	Disc/FinalQuota	Land/(Final-Initial)
SWE	Anglerfish	2AC4-C	NA	8	9	58	2	59	1.13	0.06	7.41	51	NA	7.19	0.21	6.39	0.19	0.80
SWE	Cod	03AN.	1.51	530	530	520	285	805	1.00	0.98	1.52	275	784	0.98	0.54	0.98	0.54	0.00
SWE	Cod	04-N.:2A3AX4	1.52	412	416	471	24	495	1.01	0.99	1.20	83	717	1.14	0.06	1.13	0.06	0.01
SWE	Haddock	04-N.:2AC4.	1.93	862	875	103	16	119	1.02	0.12	0.14	-743	199	0.12	0.02	0.12	0.02	0.00
SWE	Haddock	3A/BCD	1.91	229	229	209	62	270	1.00	0.92	1.18	41	399	0.91	0.27	0.91	0.27	0.00
SWE	Hake	2AC4-C	2.64	0	0.8	33	5	38	NA	NA	NA	38	86	NA	NA	40.65	6.25	NA
SWE	Hake	3A/BCD	2.61	130	144	24	10	34	1.11	0.19	0.26	-96	62	0.18	0.08	0.16	0.07	0.02
SWE	Mackerel	2A34.	0.96	4001	4727	4	0	4	1.18	1.12	0.00	-3997	4	0.00	0.00	0.00	0.00	0.00
SWE	Nephrops	2AC4-C	11.59	0	0	1	0	1	NA	NA	NA	1	8	NA	NA	NA	NA	NA
SWE	Plaice	03AN.	2.04	332	275	155	48	203	0.83	0.46	0.61	-129	317	0.47	0.14	0.56	0.17	-0.10
SWE	Plaice	03AS.	2.06	199	199	29	45	74	1.00	0.15	0.37	-125	60	0.15	0.22	0.15	0.22	0.00
SWE	Plaice	2A3AX4	2.15	0	0.2	5	1	6	NA	NA	NA	6	11	NA	NA	24.96	5.00	NA
SWE	Saithe	04-N.:2A34.	1.54	1328	1328	922	10	932	1.00	0.98	0.70	-396	1417	0.69	0.01	0.69	0.01	0.00
SWE	Saithe	2A34.	1.54	448	448	383	66	449	1.00	0.98	1.00	1	589	0.85	0.15	0.85	0.15	0.00
SWE	Sole	3A/BCD	10.46	19	30	30	8	38	1.58	1.56	1.98	19	314	1.58	0.40	1.00	0.25	0.58
SWE	Spurdog	03A-C.	NA	0	0	0	24	24	NA	NA	NA	24	NA	NA	NA	NA	NA	NA
SWE	Whiting	03A.	1.22	99	97	10	71	81	0.98	0.11	0.82	-18	12	0.10	0.72	0.10	0.73	0.00
SWE	Whiting	2AC4.	1.21	3	3	4	1	5	1.00	0.00	1.60	2	5	1.27	0.33	1.27	0.33	0.00

8 CONTACT DETAILS OF STECF MEMBERS AND EWG-14-11 LIST OF PARTICIPANTS

1 - Information on STECF members and invited experts' affiliations is displayed for information only. In some instances the details given below for STECF members may differ from that provided in Commission COMMISSION DECISION of 27 October 2010 on the appointment of members of the STECF (2010/C 292/04) as some members' employment details may have changed or have been subject to organisational changes in their main place of employment. In any case, as outlined in Article 13 of the Commission Decision (2005/629/EU and 2010/74/EU) on STECF, Members of the STECF, invited experts, and JRC experts shall act independently of Member States or stakeholders. In the context of the STECF work, the committee members and other experts do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members and invited experts make declarations of commitment (yearly for STECF members) to act independently in the public interest of the European Union. STECF members and experts also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information: http://stecf.jrc.ec.europa.eu/adm-declarations

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9 LIST OF BACKGROUND DOCUMENTS

Background documents are published on the meeting's web site on:

https://stecf.jrc.ec.europa.eu/web/stecf/ewg1411

List of background documents:

1. EWG-14-11 – Doc 1 - Declarations of invited and JRC experts (see also section 7 of this report – List of participants)

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Abstract

The Expert Working Group meeting of the Scientific, Technical and Economic Committee for Fisheries EWG-14-11 on Landing obligation in EU fisheries – part 4 - was held from 8-12 September 2014 in Varese, Italy. The report was reviewed and endorsed by the STECF during its plenary meeting held from 10 to 14 November 2014 in Brussels (Belgium).

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

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