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SÉRIE DIGITAL

DISCARDS FROM THE PORTUGUESE BOTTOM OTTER TRAWL OPERATING IN ICES DIVISION 27.9.a (2004-2015)

Ana Cláudia Fernandes, Nuno Prista e Manuela Azevedo

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Discards from the Portuguese bottom otter trawl operating in ICES Division 27.9.a (2004-2015)

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ABSTRACT

This document compiles the information available on discards from Portuguese vessels operating with bottom otter trawl (OTB) in the Portuguese ICES Division 27.9.a, estimated by IPMA for the period 2004-2015. These discards include species from the stocks assessed in ICES assessment Working Groups and species commercially important at national level. The samples were collected by the onboard sampling programme of the National Programme for Biological Sampling (PNAB/EU DCF), integrated in the National Data Collection Framework . The onboard sampling programme, estimation algorithms and data quality assurance procedures are described and results for two fisheries provided: the crustacean bottom otter trawl fishery (OTB_CRU) and the demersal bottom otter trawl fish fishery (OTB_DEF). Estimates of discard volume and length composition are provided for the 'year, fishery, species' combinations where they are frequently observed (≥ 30% of sampled hauls). Results show that although there's a large number of species discarded, the number of species frequently discarded is very low (~7% in OTB_CRU and ~4% in OTB_DEF). Mean number of discards per haul is calculated for all species that occurred in discards and analysis of length compositions are displayed for selected species. Analyses of the combined results indicates that a large part of the species selected for this work are either absent in discards or very rarely discarded. Indications are given on possible discarding reasons and on the discard estimation methodology to be developed for less frequent species and for other Portuguese fleet components.

Key words: Species discards, bottom otter trawl, ICES Division 27.9.a

Título – Devoluções ao mar pela frota de arrasto Portuguesa a operar na Divisão ICES 27.9.a (2004-2015)

RESUMO

Este documento reúne informação sobre as devoluções ao mar efetuadas pela frota comercial Portuguesa a operar com arrasto de fundo com portas (OTB) na Divisão ICES 27.9.a. As devoluções ao mar foram estimadas pelo IPMA, para as populações de espécies que são avaliadas em grupos de trabalho de avaliação do ICES e espécies comercialmente importantes a nível nacional. As amostras foram recolhidas pela amostragem a bordo da frota comercial, no âmbito do Programa Nacional de Amostragem Biológica (PNAB/EU DCF) entre 2004 e 2015. O plano de amostragem a bordo, os algoritmos de estimação e os procedimentos de verificação da qualidade dos dados são descritos e apresentados os resultados obtidos para as duas frotas de arrasto comercial: pescaria de arrasto de fundo dirigida a crustáceos (OTB_CRU) e pescaria de arrasto de fundo dirigida a espécies demersais (OTB_DEF). As estimativas do volume de devoluções ao mar e de distribuições de comprimentos são estimadas para a combinação ano x pescaria x espécies onde elas são frequentemente observadas (≥ 30% nos lances amostrados). Os resultados apresentados mostram que, apesar de existir um elevado número de espécies devolvidas ao mar, o número de espécies frequentemente presente naquela fração da captura é muito baixo (~7% em OTB_CRU e ~4% em OTB_DEF). O número médio de devoluções ao mar por lance é calculado para todas as espécies que foram devolvidas ao mar e a análise das distribuições de comprimentos é apresentada. A análise dos resultados indica que grande parte das espécies selecionadas para este estudo, ou não está presente nas devoluções ao mar ou poucas vezes se encontram naquela fração da captura. Por fim, são dadas indicações sobre algumas das razões possíveis para as devoluções ao mar, assim como sobre a metodologia a desenvolver para a sua estimativa nas espécies menos frequentes e de outras componentes de frota da pesca nacional.

Palavras-chave: Devoluções de espécies ao mar, arrasto de fundo com portas, Divisão ICES 27.9.a

BIBLIOGRAPHIC REFERENCE: Fernandes, A. C.; Prista N.; Azevedo. M. (2017). Discards from the Portuguese bottom otter trawl operating in ICES Division 27.9.a (2004-2015). ***Relat.Cient.Tec. do IPMA* (http//ipma.pt) nº18. 18p + Anexos**

1. Introduction

The objective of the onboard sampling programme is to estimate the composition, volume, lengths and age of catches (landings + discards) taken by the Portuguese bottom otter trawl fleet (OTB) operating in the Portuguese ICES Division 27.9.a. This fleet is generally engaged in mixed-fisheries, where a variety of species contribute to the output of the fishery. These species differ in habitat requirements and in their seasonal migration pattern, hence the species composition of catches will vary in space and time (Poos *et al.*, 2010). Consequently, also discard patterns can be highly variable due to changing economic, environmental and social factors (Catchpole *et al.*, 2005). Knowledge on the retained and discarded catch compositions of a fishery and how these vary spatially, temporally and among different fishing operations is then necessary for identifying the potential impacts of fishing on stocks assessment and ecosystems (Gray *et al.*, 2005).

The present work compiles the information on discards of near 100 taxa (species and groups) caught by the Portuguese bottom otter trawl fleets. Most of the information has been reported to ICES Working Groups (see Annex I for WG acronyms and Annex II, Table 1 for species and groups). The data presented in this work was collected by the onboard sampling programme within National Programme for Biological Sampling (PNAB/EU DCF - CR (EC) 199/2008; CD 2010/93/EU) between 2004 and 2015. The document starts with a description of the onboard sampling programme and sampling design. Then some details of the estimation algorithms and data quality assurance procedures are presented together with results on the annual frequency of occurrence in discards, number of specimens discarded at haul level, and length composition of individuals sampled in discards for the different taxa. Fishery-level estimates of discard volume and length composition are presented for the combinations (‘year, fishery, species’) where discards were frequently observed. For less frequent species summary tables of the information collected are provided that include both annual discards per haul in number and a statistical summary of total sampled lengths.

2. Onboard sampling programme

The Portuguese onboard sampling design from the National Programme for Biological Sampling (PNAB/EU DCF) is based on a quasi-random sampling of cooperative commercial vessels between 12 and 40 meters length overall. The programme started in late 2003 and comprehends the onboard sampling of several fishing métiers and fleets. These include, amongst other, bottom otter trawl, deep-water set longlines, gill and trammel nets (of various mesh sizes), beam trawl and purse seines. The bottom otter trawl fleet (OTB) is the most comprehensively sampled fleet in Portuguese waters (from late 2003 to date) with two fisheries being considered for sampling purposes: a crustacean fishery that operates cod-end mesh sizes 55-59 mm and ≥70 mm targeting deep-water rose shrimp, Norway lobster and blue whiting (OTB_CRU) and a demersal fish fishery that operates cod-end mesh size 65-69 mm and ≥70 mm and targets horse-mackerel, cephalopods and other finfish (OTB_DEF). The near totality of vessels operates on only one of the fisheries (either the crustacean or the demersal fish fishery) throughout time as they require different technical setups on the vessels. A detailed account of the characteristics in these fisheries can be found in Castro *et al.* (2007).

2.1 Sampling Design

A brief description of the sampling design follows:

Population: Lengths of fish captured by the Portuguese bottom otter trawlers operating in ICES Division 27.9.a.

Target population: Lengths of fish captured by the Portuguese bottom trawlers >12 m length overall that operate in ICES Division 27.9.a.

Study population: Lengths of fish captured by Portuguese vessels (>18 m) that operate in ICES Division 27.9.a (within species), for each fishery.

Sampling frame: List of cooperative vessels for each fleet segment/métier. Stratification type: Spatial – ports (Northwest, Southwest and South); Temporal – quarters.

Sampling effort: The number of trips to sample OTB_CRU and OTB_DEF was obtained from an initial Neyman allocation which was considered valid for the entire DCF period (OTB_CRU: 12 trips and OTB_DEF: 27 trips). Within each fishery, sampling effort distribution in space and time is proportional to effort and landings.

Primary/Secondary Sampling Unit (PSU/SSU): Vessel/Trip.

2.2 Description

2.2.1 Trip Selection

Vessel selection for trip sampling is quasi-random from within a set of cooperative vessels (Prista *et al.*, 2013). These cooperative vessels are similar to a reference fleet in that they represent quite well the fishing behavior of the fleet (Azevedo *et al.*, 2014; Fernandes *et al.*, *in prep*). Annual sampling targets are fixed for each fishery, namely 12 trips for OTB_CRU fishery and 27 trips for OTB_DEF fishery. Sampling levels attained in the 2004-2015 period are presented in Table 1 where it is noticeable that both fisheries have been extensively sampled throughout the period.

Table 1 - Sampling levels of the Portuguese onboard sampling programme in the two OTB fisheries in ICES Division 27.9.a (2004-2015). “OTB_CRU” = crustacean fishery, “OTB_DEF” = demersal fish fishery.

	Trips sampled		Hauls sampled		Fishing Hours	
Year	OTB_CRU	OTB_DEF	OTB_CRU	OTB_DEF	OTB_CRU	OTB_DEF
2004	17	24	111	125	479	315
2005	15	39	74	159	372	349
2006	7	42	30	194	133	380
2007	12	38	73	162	263	296
2008	12	34	66	128	267	254
2009	16	38	84	135	314	264
2010	16	31	103	116	375	208
2011	13	30	56	83	317	161
2012	13	31	68	60	302	130
2013	6	27	28	50	118	108
2014	10	24	42	52	167	112
2015	13	26	51	48	201	105

2.2.2 Catch sampling

The sampling protocol used in Portuguese onboard sampling of the OTB fleet is detailed in Jardim *et al.* (2011) and Prista *et al.* (2011). For both fisheries (OTB_CRU and OTB_DEF), two observers are deployed per fishing trip. Until 2010 instructions were given to observers to sample as many hauls as possible in the trip. Since 2011, haul selection was made systematically (either odd or even hauls are sampled after a random start). On each selected haul observers take a sample from the catch, sort the specimens into landed/retained[1] and discarded fraction according to crew’s criteria and register the weight and length composition. Concurrently, observers also collect auxiliary fishery-related information such as effort (e.g., fishing hours), geographic and environmental data (e.g., GPS coordinates, depth, bottom type). From 2004 to 2010 the onboard sampling protocols have suffered only minor changes and adaptations. In 2011 the size of catch samples was doubled (from 1 to 2 boxes of catch) and the within-trip selection of hauls was standardized to “at least, every other haul”.

3. Data archiving & Quality assurance procedure

Data involved in the calculation of discard estimates from Portuguese waters comes from an IPMA database (onboard sampling data) and from the Directorate General for Natural Resources, Safety and Maritime Services, DGRM (logbook, sales and VMS data). The IPMA onboard database is programmed in Oracle and contains internal routines for the detection of basic errors (e.g., errors in dates). In what concerns the OTB fleet, the database contains general trip information (vessel information, date, location, haul number, retained weight by species), along with sample information by

[1] For simplicity, “landed fraction” is used as synonym of “retained fraction”

fraction (retained, discarded) and species, namely weight, number of specimens and length composition. Quality checks involving the manual checking of (at least) 10% of annual trawl records have been routinely carried out since the beginning of the onboard sampling programme. In 2010-2011 a semi-automated R quality assurance procedure was designed and the 2004-2011 trawl data base was checked for so far undetected errors, subsequently corrected. Since then, routine quality assurance procedures include: quarterly checks using the semi-automated R routine and an annual check of 10% of the trawl records that detects observer-related biases, with only minor updates and data reviews being performed in the previous data. Fishing effort and commercial data (logbooks and landings statistics) is supplied to IPMA by DGRM on an annual basis. The 2004-2011 logbook data was based on paper logbooks and displayed increasing fleet coverage over time. However, in 2012, DGRM discontinued most of its logging of paper logbooks since these have been progressively replaced by electronic logbooks. Quality checks are also performed to the logbook information in what concerns to consistency and coherence (e.g. fishing days, number of hauls) according to the obtained knowledge on fishing patterns from vessels in each fishery.

3.1 Note on species identification

The Portuguese onboard observers are trained in using the FAO 3-alpha code list (ASFIS List of Species for Fishery Statistics Purposes: available at http://www.fao.org/fishery/collection/asfis/en, date: February 2017) to identify species and species groups during field observations. General training in species identification is provided to observers during demersal surveys, market sampling and on dedicated workshops. When onboard a commercial fishing trip, observers are requested to record fish data at the most appropriate taxonomic level based on the specimen's conservation status, on field logistics (e.g. confined space, lack of time), and their own identification expertise. The practice shows that Portuguese onboard observers are quite accurate in the identification of species assessed by ICES. The FAO 3-alpha codes, scientific and common names of species covered by this working document are near 100 species/groups and are described in Table 1 (Annex II).

4. Data analysis

The procedures used to raise discard data from samples to haul and fleet level, considering each fishery have been previously described in Jardim and Fernandes (2013) and Fernandes *et al.* (2010) following presentations and discussions in dedicated ICES Working Groups (e.g. SGPIDS, WKPICS, WKDRP). A brief account follows.

4.1 Estimates of discards (haul level)

In the OTB fleet the volume of the catch in each haul (C) is estimated as

$$C\ (haul) = WD + WL = \frac{Wd}{Wl} \times WL + WL$$

Where Wd is the weight of discards in the sample, Wl is the weight landed in the sample and WL is the total weight of landings in the haul. The volume of discards of individual species in each haul ($WD_x(haul)$) is calculated:

$$WD_x(haul) = \frac{Wd_x}{Ws} \times C$$

Where Wd_x is the weight of the discards of species x in the sample, Ws is the weight of the sample and C is the total volume of the catch in the haul.

4.2 Estimates of discards (fleet level)

The procedure generally used to raise discards from haul to fleet level in the Portuguese trawl fisheries is presented in Annex III. This procedure relies on haul level discard data (discards per hour) and effort data (fishing hours and fishing trips) derived from logbooks, sales slips and, for 2012-2015 periods, VMS (Vessel Monitoring System) data was also used. The procedure was developed for hake that is a very frequent catch of the Portuguese OTB fisheries (Jardim and Fernandes, 2013). To accurately estimate the discard volume of species with low abundance and low frequency of occurrence in the sampled hauls, a large number of non-zero observations are required. The current fleet-level discard estimation algorithm is considered sensitive to large number of zeros in the data set (Jardim *et al.*, 2011) and discard estimates are deemed not reliable when the frequency of occurrence of species is below 30%. Consequently, annual discard volumes are only routinely obtained for species discarded in ≥30% of sampled hauls. The length structure of discards at fleet level is estimated using the same raising methodology as Jardim and Fernandes (2013) but applied to the number of discarded specimens per length class.

4.3 Number of discarded specimens per species at haul level

The number of individuals discarded per species ($\boldsymbol{ND_x}$) is estimated using the same procedure as discard volume.

$$\boldsymbol{ND_x(haul)} = \frac{\boldsymbol{Nd_x}}{\boldsymbol{Ns}} \times \boldsymbol{C}$$

Where $\boldsymbol{Nd_x}$ is the number of individuals of species $\boldsymbol{x}$ in the discards fraction of the sample, $\boldsymbol{Ns}$ is the weight of the sample and C is the total volume of the catch in the haul. Mean number of specimens discarded per species and haul, including those less frequent, were calculated. For each ‘year, fishery’ combination, mean values and their standard deviation were calculated alongside maximum and minimum numbers of individuals found in hauls.

4.4 Length frequency of discards

The length composition of species discarded in each fishery (OTB_CRU and OTB_DEF) was estimated for the 'year, species' combinations where total discards were calculated (see Section 4.2 and in Annex III). Concerning the less frequent species, the sample information of each fishery was compiled and the number of specimens measured, mean length, precision and range of lengths observed for all period (2004-2015) is given.

5. Species discards

5.1 Frequency of species occurrence

Only a small part of the species routinely reported to ICES assessment are frequently discarded (≥ 30%); most of them are completely absent in sampled hauls for both fisheries (Figure 1). Complete information on the frequency of occurrence of species (taxa) in sampled hauls from OTB_CRU and OTB_DEF fisheries is displayed in Tables 2, 3, 4 and 5 (Annex IV)

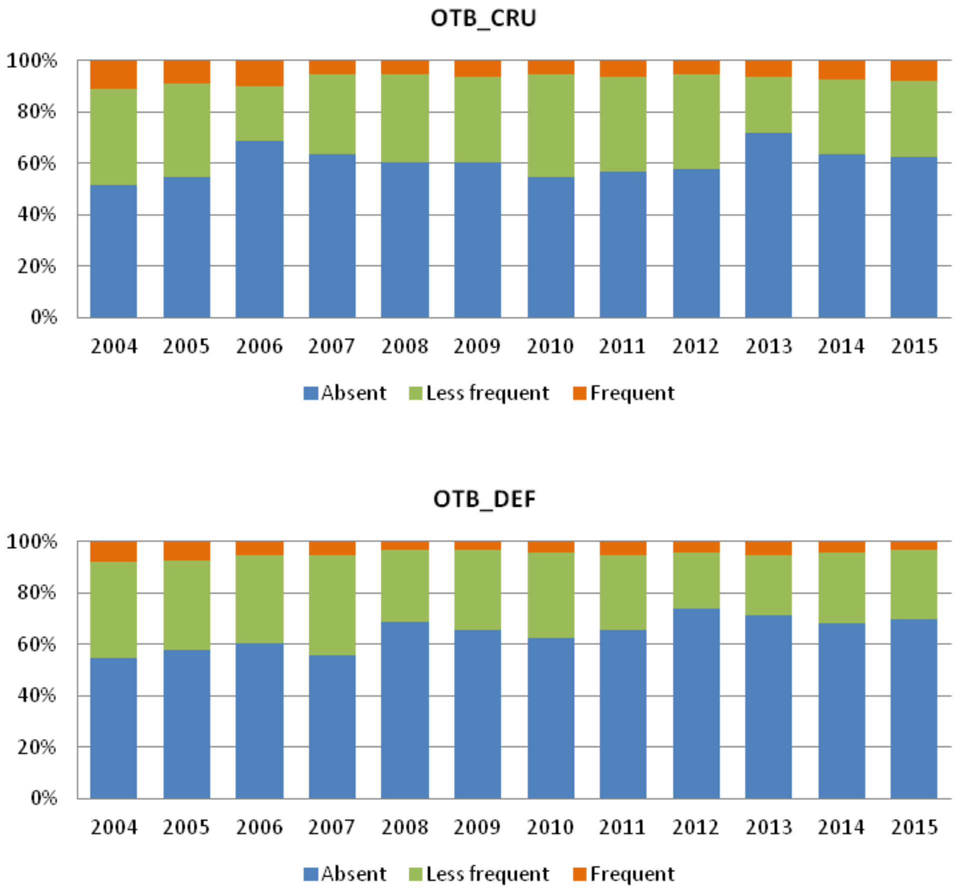


Figure 1 – Annual percentage of species according to their presence in discards for each fishery (OTB_CRU: crustaceans; OTB_DEF: demersal; Absent: no occurrence; Less frequent: occurrence <30%; Frequent: occurrence ≥30%).

5.2 Total discards

5.2.1 Discard volume

The fleet level discards for species in specific ‘year, fishery’ combination is presented in Tables 6, 7, 8 and 9 (Annex IV). Hake was the only species frequently discarded in all ‘year, fishery’ combinations and where full record of total volume of discards could be obtained. Discard fluctuated in an increasing mode until 2009 where the highest values were observed, showing a decreasing trend onwards (Figure 2(a)). The OTB_DEF fleet was the fleet responsible for most of the discarding of this species. Blue whiting and Cephalopods nei were also discarded in all years in OTB_CRU fishery. Figure 2 shows lower discards of blue whiting since 2006 and a decreasing trend for the cephalopods nei in the beginning of the time series. Species discarded in more than 8 years of the 11 years sampling period in each fishery were greater forkbeard and blackmouth catshark in OTB_CRU, and boarfish and chub mackerel in OTB_DEF (Figure 3). Discards of blackmouth catshark decreased from 2004 to 2007, remaining low (less than 100 t) in the period 2012-2013. The analysis suggests low discards of greater forkbeard (less than 50 t) with the exception of 2006, with discards around 250 t (Figure 3). Discards of chub mackerel were below 1000 t in the period 2004-2006 and increased to 2000-4000 t between 2007 and 2010. In most recent years, discards have decreased. In fact, discards were estimated at 1000 t in 2013 while discard frequency of this species was very low (< 30% occurrence) in 2012 and 2014-2015. Boarfish discards were estimated for 2004, 2006-2009 and 2012-2014, showing values mostly below 250 t.

5.2.2 **Numbers of discarded specimens per species at haul level**

Summary tables containing information of mean numbers discarded per haul in each ‘year, fishery’ combination are presented in Table 10 and Table 11 (Annex IV) for OTB_CRU fishery and OTB_DEF fishery, respectively. Tables combine information for both frequent and less frequent species in sampled hauls. They also show that the number of individuals of the less frequent species is lower than 10 per haul. A minor part of them present higher haul-level estimates indicating larger discards at haul level but their frequency of discarding in sampled hauls only rarely achieved 30% making the current total discard estimation algorithm unreliable for many ‘stock, year’ combinations.

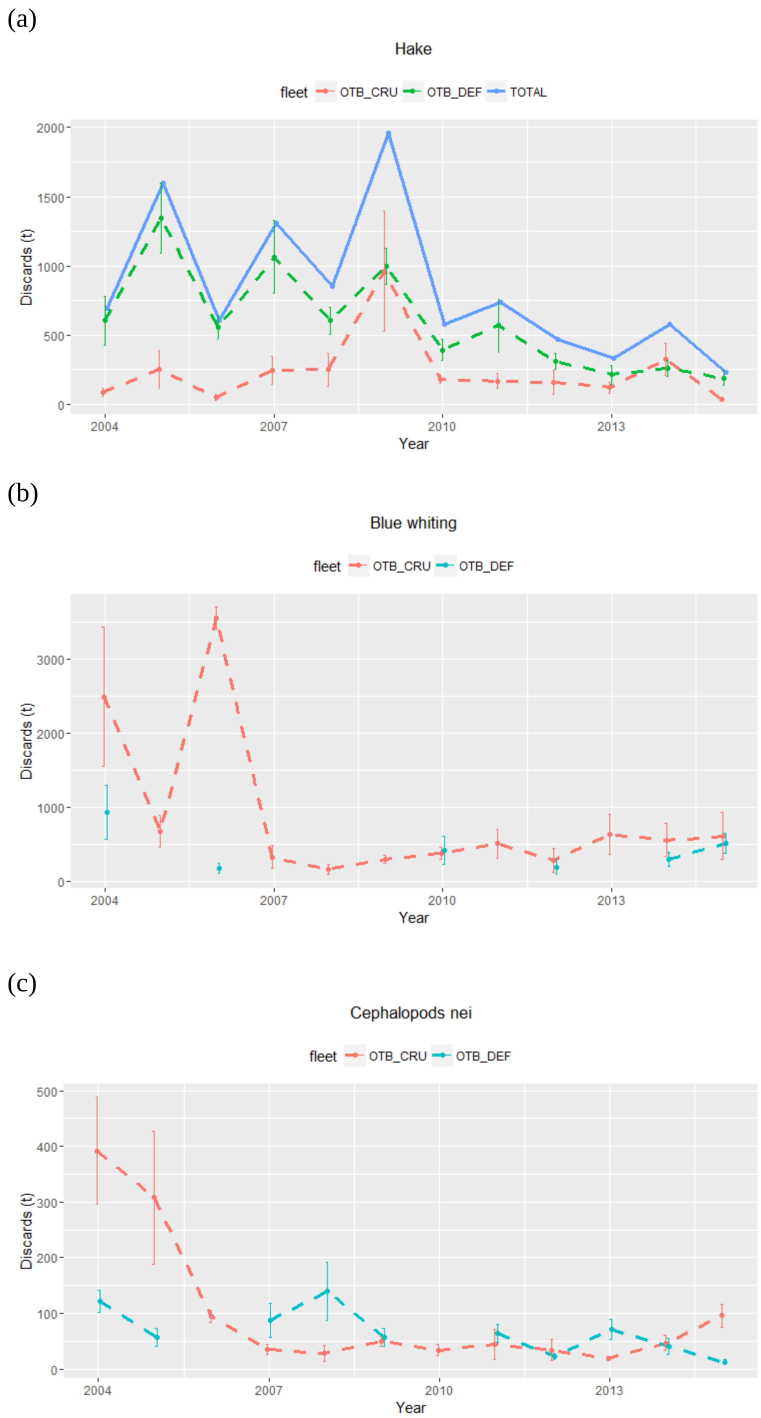


Figure 2 – Annual variation (2004-2015) in discards of hake (a), blue whiting (b) and cephalopods nei (c) (total ± SD). Discards of the two fisheries (OTB_CRU: crustaceans; OTB_DEF: demersal) are presented and, in the case of hake, includes also annual total discards for the entire OTB fleet.

(a)

(b)

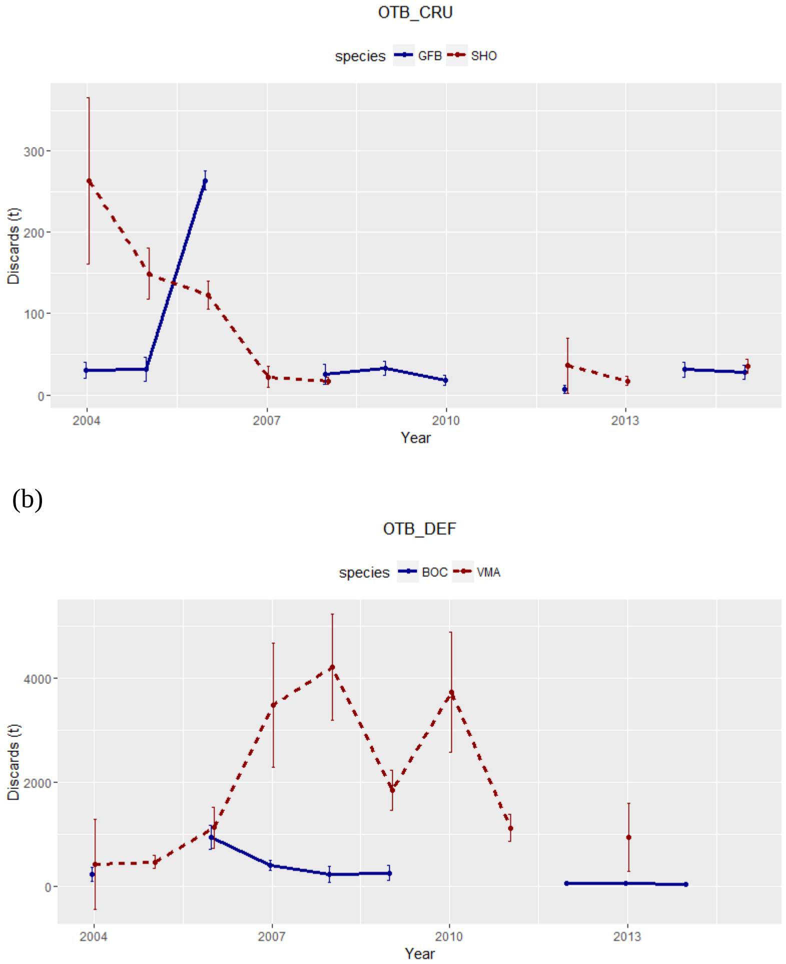


Figure 3 – Discards (total +/- SD) of greater forkbeard (GFB), blackmouth catshark (SHO), boarfish (BOC) and chub mackerel (VMA) in each fishery: OTB_CRU - crustaceans (a); OTB_DEF - demersal (b).

5.3 Length frequency of discards

The length range, mean length and standard deviation considering the studied period, is presented by species and fishery in Tables 12 and 13 (Annex IV). Figure 4 presents the annual mean length of discarded hake by fishery during the period of 2004-2015. It shows that mean length of discards has been below the Minimum Landing Size (MLS), of 27 cm, in both fisheries, indicating MLS as the main reason for discarding this species.

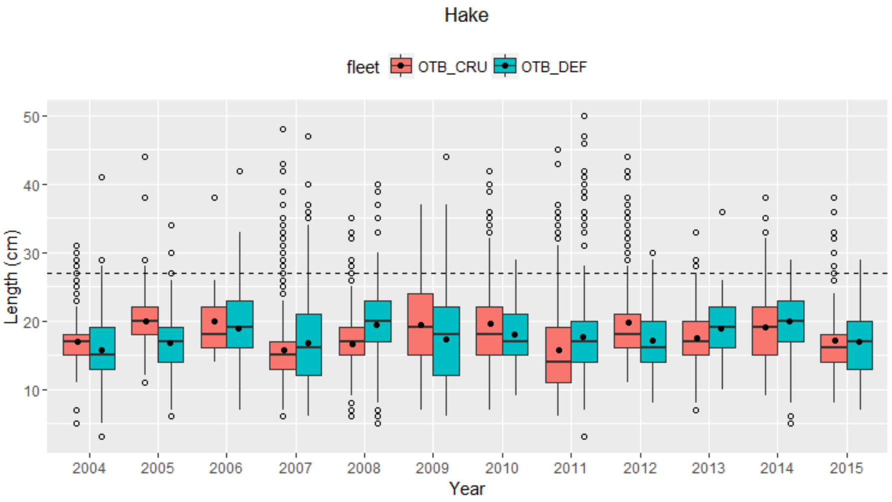
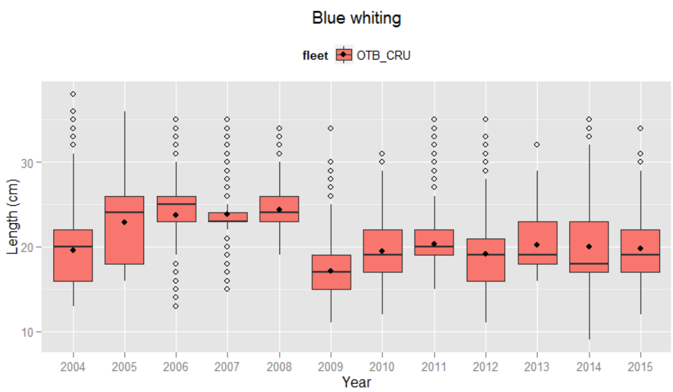


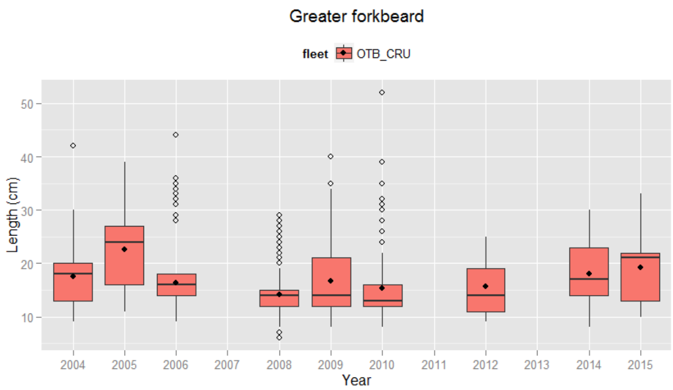
Figure 4 –Annual variation of the discarded lengths for hake by fishery (OTB_CRU: crustaceans; OTB_DEF: demersal). Black points within boxes are the mean value and the horizontal dashed line represents the MLS for hake (27 cm); open circles: observations with values differing 1 SD from the mean.

Figures 5 and 6 show the annual variation of the length composition of discards in the group of species frequently discarded by OTB_CRU and OTB_DEF fisheries, respectively. Blue whiting is mainly discarded in the OTB_CRU and there is neither MLS nor by-catch limits nor quota exhausted for the species in this fishery. The length analyses indicate higher mean length in the 2005-2008 periods and lower afterwards. Blue whiting discards are due to market motives related to species and/or size low value. A new market for larger individuals emerged in the later period and highgrading in this fishery, as observed onboard, may have caused the decrease in the mean size in recent years. The motives for discarding greater forkbeard and blackmouth catshark are likely related to low market value of the small lengths (e.g mean length <20 cm for forkbeard) usually captured by the OTB_CRU fishery. In OTB_DEF fishery (Figure 6), boarfish discards were due to no commercial value of this species. In the case of chub mackerel, the MLS (20 cm) does not appear to be the main discarding reason since there are few discards below MLS. More recently (from 2013 onwards) chub mackerel has been increasingly promoted and valorized for human consumption in Portugal (DocaPesca, 2012, 2016) and also, based on anecdotal information, used as tuna feed. In fact, a decrease in the frequency of occurrence of discards of this species in the later years was observed while landings have increased, meaning that until 2013 low commercial interest could have been the main reason for discarding.

(a)



(b)



(c)

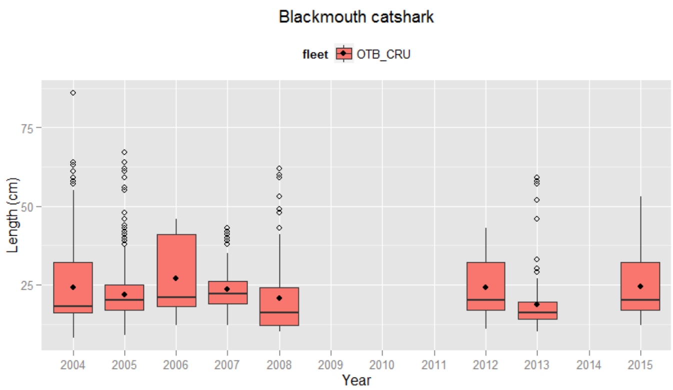
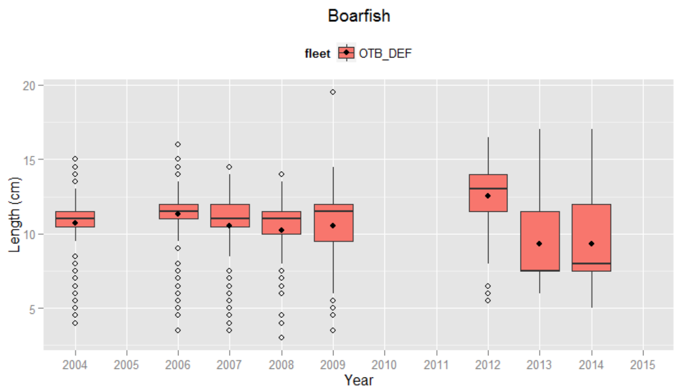


Figure 5 – Annual variation of the discarded lengths for blue whiting (a), greater forkbeard (b) and blackmouth catshark (c) in OTB_CRU (crustaceans). Dot point shows the mean and open circles the observations with values differing 1 SD from the mean.

(a)



(b)

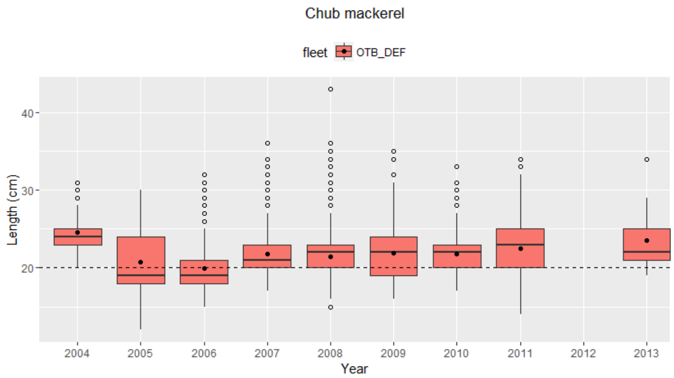


Figure 6 – Annual variation of the discarded lengths for boarfish (a) and chub mackerel (b) in OTB_DEF: demersal. Dot point shows the mean and open circles the observations with values differing 1 SD from the mean; the horizontal dashed line represents the MLS for chub mackerel (20 cm).

6. Final Remarks

The present work provides an overview of the bulk of discards estimates from the Portuguese bottom otter trawl fleet provided by IPMA to ICES assessment Working Groups. However, a larger number of species is effectively discarded by these fleets which important discards motives are presented and discussed in Fernandes *et al.* (2015) including three species with relevant catches and/or commercial importance at national level but not assessed in ICES WG. It is shown that for Portuguese vessels operating bottom otter trawl within the Portuguese ICES Division 27.9.a the discard frequency of the large majority of the species reported is low or very low. Several of the species are in fact absent from the Portuguese fishing grounds (e.g. tusk and herring), others show very low frequency of occurrence in discards. Discards estimates at fishery level are given for the frequently discarded species (≥30% in sampled hauls) in each year and fishery combination. The number of species with discards estimates at fishery level is low and only one species (hake) is so consistently discarded that estimates for the entire period and fisheries are considered reliable. Hake discards are mainly composed of small size fish and these are dumped dead overboard due to regulatory reasons, namely MLS, despite having considerable commercial value at local markets. Discards estimates for other frequent species are more fishery-specific. Analyses of discards length distribution are very important to understand the fisheries behavior and the different fishing patterns in terms of species discarded. The main reasons for discards of a number of species by the otter trawl fleet are discussed in Fernandes *et al* (2015) for the ICES Division 27.9.a where market forces and regulatory reasons (TACs, by-catch limits, MLS) were considered the main factors. Concerning discards in general, we emphasize that conclusions on the importance of discards reported for specific fisheries should always be assessed relative to a) quantitative estimates on the fisheries impacts on the sustainability of the stocks and b) quantitative discard estimates obtained from other fleets and countries exploiting the same stocks.

A discard estimation methodology for bottom trawl fleet, considering clusters of fishing trips based on spatio-temporal exploitation patterns, is currently being developed aimed to improve the precision and accuracy of the estimates of commonly discarded species (Fernandes *et al.*, in prep). Also, IPMA I.P. intends to develop a discard estimation methodology that allows reliable estimates for the less frequent ones, exploring statistical analyses for rare events.

Moreover, procedures to extend discard estimation to the multi-gear fleet components (longline, gill and trammel nets, purse seine) are being developed. For this to be concluded, fleet effort information will be of major importance because fishing trip is a too coarse unit to describe the complex fishing effort of these fleet components, and appropriate and reliable effort units like gear dimension and soaking time, number of hooks, number of pots and traps or proxies are then necessary. For such reasons, only preliminary haul-level data on these fleets has so far been submitted to ICES Assessment Groups (e.g. Prista *et al*, 2014a; Prista *et al*, 2014b).

Additionally, IPMA I.P. and DGRM are joining efforts to have an annual routine for better integration of the onboard sampling data and the effort data used in discard estimation.

7. Acknowledgements

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Annex I

List of the acronyms

TAC: Total Allowable Catch

MLS: Minimum Landing Size

VMS: Vessel Monitoring System

ICES WG: ICES Assessment Working Groups

WGDEEP: Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources

WGBIE: Working Group for the Bay of Biscay and the Iberic Waters Ecoregion

WGCEPH: Working Group on Cephalopod Fisheries and Life History

WGEF: Working Group on Elasmobranch Fishes

WGHANSA: Working Group on Southern Horse Mackerel, Anchovy and Sardine

WGWIDE: Working Group on Widely Distributed Stocks

WGNEW: Working Group on Assessment of New MoU Species (created for 2012)

WKDRP: ICES Workshop on Discard Raising Procedure (2007)

SGPIDS: Study Group Practical Implementation of Discard Sampling Plans

WKPICS: Workshop on Practical Implementation of Statistical Sound Catch Sampling Programmes

Annex II

Table 1 - Species codes and common names presented in each ICES Working Group (ICES WG) and other species assessed at national level ('OTHER').

ICES WG	Supra-specific group	3-alpha code	Species	English name	Portuguese name
WGDEEP		BSF	*Aphanopus carbo*	Black scabbardfish	Peixe-espada-preto
		ARG	*Argentina spp.*	Argentines	Argentinas
		ALF	*Beryx spp.*	Alfonsinos	Imperadores
		USK	*Brosme brosme*	Tusk	Bolota
		RNG	*Coryphaenoides rupestres*	Roundnose grenadier	Lagartixa-da-rocha
		ORY	*Hoplostethus atlanticus*	Orange roughy	Olho-de-vidro laranja
		BLI	*Molva dypterygia*	Blue ling	Maruca-azul
		LIN	*Molva molva*	Ling	Maruca
		SBR	*Pagellus bogaraveo*	Red seabream	Goraz
		GFB	*Phycis blennoides*	Greater frokbeard	Abrótea-do-alto
		TSU	*Trachyrincus scabrus*	Roughsnout grenadier	Granadeiro
WGBIE		BSS	*Dicentrarchus labrax*	European seabass	Robalo-legítimo
		GUG	*Eutrigla gurnardus*	Grey gurnard	Cabra-morena
		LDB	*Lepidorhombus boscii*	Four-spot megrim	Areeiro-de-quatro-manchas
		MEG	*Lepidorhombus whiffiagonis*	Megrim	Areeiro
		ANK	*Lophius budegassa*	Blackbellied angler	Tamboril-sovaco-preto
		MON	*Lophius piscatorius*	Anglerfish	Tamboril
		WHG	*Merlangius merlangus*	Whiting	Badejo
		HKE	*Merluccius merluccius*	European hake	Pescada-branca
		NEP	*Nephrops norvegicus*	Norway lobster	Lagostim
		PLE	*Pleuronectes platessa*	Plaice	Solha
		POL	*Pollachius pollachius*	Pollack	Juliana
		SOL	*Solea solea*	Common sole	Linguado-legítimo
WGCEPH	-	CEP	*Cephalopoda nei*	Cephalopods nei	Cefalópodes nep
	Long-finned squids	OUW	*Alloteuthis spp.*	Alloteuthis squids	Lulas bicudas
		SQC	*Loligo spp.*	Common squids	Lulas
	-	SQU	*Loliginidae, Ommastrephidae nei*	Squids nei	Lulas e potas nep
	Short-finned squids	FQX	*Histioteuthis spp.*	Histioteuthis squids	–
		SQM	*Illex coindetii*	Broadtail shortfin squid	Pota-voadora
		OMZ	*Ommastrephidae nei*	Ommastrephid squids nei	Lulas e potas
		SQE	*Todarodes sagittatus*	European flying squid	Pota-europeia
		TDQ	*Todaropsis eblanae*	Broadtail shortfin squid	Pota-costeira
	Octopuses	EOI	*Eledone cirrhosa*	Horned octopus	Polvo-cabeçudo
		EDT	*Eledone moschata*	Musky octopus	Polvo-mosqueado
		OCT	*Octopodidae nei*	Octopuses nei	Polvos
		OQD	*Octopus defilippi*	Lilliput longarm octopus	Polvo-branco-comprido
		OCC	*Octopus vulgaris*	Common octopus	Polvo-vulgar
		I_OPG	*Opistoteuthis agassizi*	–	-
	Cuttlefishes and sepiolids	ROA	*Rossia macrosoma*	Stout bobtail squid	Chopo
		EJE	*Sepia elegans*	Elegant cuttlefish	Choco-elegante
		CTC	*Sepia officinalis*	Common cuttlefish	Choco-vulgar
		IAR	*Sepia orbignyana*	Pink cuttlefish	Choco-de-cauda
		CTL	*Sepiidae, Sepiolidae nei*	Cuttlefishes, bobtail squids nei	Chocos e chopos
WGEF		GUQ	*Centrophorus squamosus*	Leafscale gulper shark	Lixa
		CYO	*Centroscymnus coelolepis*	Portuguese dogfish	Carocho
		BSK	*Cetorhinus maximus*	Basking shark	Tubarão-frade
		SCK	*Dalatias licha*	Kitefin shark	Gata
		RJB	*Dipturus batis*	Blue skate	Raia-oirega
		GAG	*Galeorhinus galeus*	Tope shark	Perna-de-moça
		SHO	*Galeus melastomus*	Blackmouth catshark	Leitão
		POR	*Lamna nasus*	Porbeagle	Tubarão-sardo

Table 1 (cont.)

WGEF (cont.)		RJN	*Leucoraja naevus*	Cuckoo ray	Raia-de-dois-olhos
		SDS	*Mustelus asterias*	Starry smoothound	–
		SMD	*Mustelus mustelus*	Smooth-hound	Cação-liso
		RJH	*Raja brachyura*	Blonde ray	Raia-pontuada
		RJC	*Raja clavata*	Cuckoo ray	Raia-lenga
		RJM	*Raja montagui*	Spotted ray	Raia-manchada
		RJU	*Raja undulata*	Undulate ray	Raia-curva
		RJA	*Rostroraja alba*	White skate	Raia-tairoga
		SYC	*Scyliorhinus canicula*	Small-spotted catshark	Pata-roxa
		DGS	*Squalus acanthias*	Picked dogfish	Galhudo-malhado
		DGZ	*Squalus spp.*	Dogfishes nei	Esqualídeos
		AGN	*Squatina squatina*	Angel shark	–
	RAJ (Rajidae nei)	RJY	*Raja fyllae*	Round ray	–
		RJO	*Dipturus oxyrhinchus*	Longnosed skate	Raia-bicuda
		RJI	*Leucoraja circularis*	Sandy ray	Raia-de-São-Pedro
		RJE	*Raja microocellata*	Small-eyed ray	Raia-zimbreira
		JAI	*Raja miraletus*	Brown ray	Raia-de-quatro-olhos
		SKA	*Raja spp.*	Raja rays nei	Raias
	SRX (Rajiformes nei)	MYL	*Myliobatis aquila*	Common eagle ray	Ratão-águia
		PLS	*Pteroplatytrygon violacea*	Pelagic stingray	Uge-violácea
		TTR	*Torpedo marmorata*	Marbled electric ray	Tremelga-marmoreada
		TTO	*Torpedo nobiliana*	Electric ray	Tremelga-negra
		TOE	*Torpedo spp.*	Torpedo rays	Tremelgas
		TTV	*Torpedo torpedo*	Common torpedo	Tremelga-de-olhos
	I_PWS (Pelagic sharks nei)	SMA	*Isurus oxyrinchus*	Shortfin mako	Tubarão-anequim
		BSH	*Prionace glauca*	Blue shark	Tintureira
	DWS (Deep-water sharks nei)	DWS	–	Deep-water sharks nei	Tubarões de profundidade
		GUP	*Centrophorus granulosus*	Gulper shark	Barroso
		CYP	*Centroscymnus crepidater*	Longnose velvet dogfish	Sapata-preta
		CYY	*Centroscymnus cryptacanthus*	Shortnose velvet dogfish	Xara-preta-de-natura
		HXC	*Chlamydoselachus anguineus*	Frilled shark	–
		DCA	*Deania calcea*	Birdbeak dogfish	Sapata-branca
		SDU	*Deania profundorum*	Arrowhead dogfish	Sapata-flecha
		SHL	*Etmopterus spp.*	Lantern sharks nei	Lixinhas-da-fundura
		SYR	*Scymnodon ringens*	Knifetooth dogfish	Arreganhada
WGHANSA		ANE	*Engraulis encrasicolus*	Anchovy	Biqueirão
		HOM	*Trachurus trachurus*	Horse mackerel	Carapau-branco
		PIL	*Sardina pilchardus*	Sardine	Sardinha
WGWIDE		BOC	*Capros aper*	Boarfish	Mini-saia
		HER	*Clupea harengus*	Atlantic herring	Arenque
		MAC	*Scomber scombrus*	Atlantic mackerel	Sarda
		WHB	*Micromesistius poutassou*	Blue whiting	Verdinho
WGNEW		GUR	*Chelidonichthys cuculus*	Red gurnard	Cabra-vermelha
		GUU	*Chelidonichthys lucernus*	Tub gurnard	Cabra-cabaço
		MUR	*Mullus surmuletus*	Striped red mullet	Salmonete-legítimo
OTHER		VMA	*Scomber colias*	Chub mackerel	Cavala
		BIB	*Trisopterus luscus*	Pouting	Faneca
		JAA	*Trachurus picturatus*	Blue jack mackerel	Carapau-negrão

Annex III

The discard raising procedure presented is adapted from Jardim and Fernandes (2013).

Let D be discards in weight (kg), T fishing effort (hours), Y discards per unit effort (kg/hour) and P the trip duration (days). The following indexes are used: i=1, … ,N for fishing trips, j=1, … , J for fleets, h for sampled hauls and s=1, … , S for trip days. Small caps represent sampled quantities, while capitals represent population quantities.

Step 0) Computation of discards in weight (d_{ijs}) and fishing time (t_{ijs}) by trip (i) and fleet (j)

$$d_{ijs} = \sum_{h=1}^{h_{ijs}} d_{ijhs}$$

$$t_{ijs} = \sum_{h=1}^{h_{ijs}} t_{ijhs}$$

Step 1) Estimation of discards in weight per hour by fleet

$$\hat{y}_{js} = \frac{\sum_{i=1}^{n_{js}} d_{ijs}}{\sum_{i=1}^{n_{js}} t_{ijs}}$$

with variance

$$var(\hat{y}_{js}) = \frac{\sum_{i=1}^{n_{js}} \left(d_{ijs} - \bar{d}_{js}\right)^2}{\left(\sum_{i=1}^{n_{js}} t_{ijs}\right)^2 (n_{js} - 1)}$$

Step 2) Estimation of the total discards

$$\hat{d} = \sum_{j=1}^{J} \sum_{s=1}^{S} \frac{T_{js} \times P_{js}}{N_{js}} \hat{y}_{js}$$

with variance

$$var(\hat{d}) = \sum_{j=1}^{J} \sum_{s=1}^{S} \left(\frac{T_{js} \times P_{js}}{N_{js}}\right)^2 var(\hat{y}_{js})$$

Annex IV

Table 2 - Frequency of occurrence (%) of species in the discards of hauls sampled in the OTB_CRU fishery (2004-2015). See Table 1 for species codes; “--” indicates no occurrence; bold numbers indicate frequency of occurrence ≥30%.

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGDEEP	BSF	6	1	--	--	--	--	--	--	--	--	--	4
	ARG	1	4	13	14	3	7	2	4	3	--	--	2
	ALF	1	--	13	--	--	--	--	2	--	--	--	--
	USK	--	--	--	--	--	--	--	--	--	--	--	--
	RNG	1	1	3	4	--	--	--	2	--	--	--	--
	ORY	1	--	--	1	2	--	--	--	--	--	--	4
	BLI	--	--	--	--	--	--	--	--	--	--	--	--
	LIN	--	--	--	--	--	--	--	--	--	--	--	--
	SBR	--	--	--	1	--	--	1	--	1	--	--	--
	GFB	**30**	**42**	**57**	26	**64**	**31**	**32**	25	**35**	29	**36**	**51**
	TSU	1	5	3	--	3	--	1	--	3	--	5	--
WGBIE	BSS	--	--	--	--	--	--	--	--	--	--	--	--
	GUG	--	--	--	--	--	--	--	--	--	--	--	--
	LDB	13	3	**30**	16	5	11	7	2	16	14	21	27
	MEG	--	--	--	--	--	2	1	--	1	--	5	4
	ANK	--	3	--	3	6	4	8	--	--	--	2	2
	MON	1	3	3	--	5	6	7	2	1	--	--	6
	WHG	--	--	--	--	--	--	--	--	--	--	--	--
	HKE	**42**	**57**	**50**	**77**	**85**	**76**	**74**	**79**	**60**	**79**	**81**	**69**
	NEP	**31**	**47**	23	14	27	6	13	14	25	**32**	14	22
	PLE	--	--	--	--	--	--	--	--	--	--	--	--
	POL	--	--	--	--	--	--	--	--	--	--	--	--
	SOL	--	--	--	--	--	--	--	--	--	--	--	--
WGCEPH	OUW	16	4	--	5	11	10	3	12	3	25	2	2
	SQC	--	1	--	--	2	--	3	2	--	--	--	--
	FQX	1	1	--	--	--	--	--	--	--	--	--	--
	SQM	8	16	3	4	2	1	10	14	3	--	2	--
	OMZ	--	1	--	--	--	--	--	2	--	--	--	--
	SQE	4	1	--	--	2	--	--	--	3	--	2	--
	TDQ	26	15	--	1	2	--	2	14	--	4	5	--
	EOI	**59**	**46**	**40**	21	12	8	10	14	16	11	29	**57**
	EDT	4	7	13	3	2	2	9	12	1	4	10	4
	OCT	--	--	--	--	--	--	--	5	1	--	--	4
	OQD	1	--	--	--	--	--	--	--	--	--	--	--
	OCC	2	1	--	--	9	4	2	4	4	11	2	2
	I_OPG	3	--	--	--	--	--	--	--	--	--	--	--
	ROA	26	28	**37**	26	20	**31**	13	7	16	29	17	8
	EJE	11	7	7	4	6	5	4	5	1	--	--	--
	CTC	2	1	--	1	2	1	3	2	4	7	--	--
	IAR	8	--	3	--	2	7	5	4	1	--	--	--
	CTL	13	1	3	4	3	4	3	2	1	7	5	10
WGEF	GUQ	--	--	--	--	--	1	--	--	--	--	5	4
	CYO	--	--	--	--	--	--	--	--	--	7	--	--
	BSK	--	--	--	--	--	--	--	--	--	--	--	--
	SCK	--	1	--	--	--	1	--	--	--	--	--	--
	RJB	--	--	--	--	--	--	--	--	--	--	--	--
	GAG	1	1	--	--	--	--	--	--	--	--	--	--
	SHO	**56**	**51**	**50**	**37**	**36**	25	24	27	**46**	**46**	29	**55**
	POR	--	--	--	--	--	--	--	--	--	--	--	--
	RJN	2	--	--	--	--	1	1	--	--	--	--	--
	SDS	--	--	--	--	--	--	--	--	--	--	--	--
	SMD	--	--	--	1	--	--	--	--	--	--	--	--
	RJH	1	--	--	--	2	--	--	2	--	--	--	--
	RJC	1	4	--	1	3	1	3	4	--	--	2	--
	RJM	--	--	--	--	--	2	1	--	--	--	--	--
	RJU	--	--	--	--	--	--	--	--	--	--	--	--
	RJA	--	--	--	--	--	--	--	--	--	--	--	--
	SYC	23	19	7	26	12	23	**31**	**48**	19	7	**36**	25
	DGS	--	--	--	--	--	--	--	--	--	--	--	--
	DGZ	--	--	--	--	--	--	--	--	--	--	--	--
	AGN	--	--	--	--	--	--	--	--	--	--	--	--
	MYL	--	--	--	--	--	--	--	--	--	--	--	--
	PLS	1	--	--	--	--	--	--	--	--	--	--	--
	TTR	--	--	--	1	--	--	--	--	--	--	--	--
	TTO	1	--	--	--	--	--	--	--	--	--	--	--
	TOE	--	--	--	--	--	--	--	--	3	--	--	--
	TTV	--	--	3	--	--	--	1	--	1	--	2	--
	SMA	--	--	--	--	--	--	--	--	--	--	--	--
	BSH	--	--	--	--	--	--	--	--	--	--	--	--
	GUP	--	--	--	--	--	--	1	--	1	--	2	4
	CYP	--	--	--	--	--	--	--	--	--	--	--	--
	CYY	--	--	--	--	--	--	--	--	--	--	--	--
	HXC	--	--	--	--	--	--	--	--	--	--	--	--

Table 2 (cont.)

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGEF (cont.)	DCA	5	5	3	4	8	2	2	2	4	18	7	2
	SDU	--	--	--	--	--	--	--	2	--	--	2	2
	SHL	**32**	23	**37**	22	15	8	11	23	29	7	12	16
	SYR	4	1	--	--	--	1	--	--	1	--	--	--
WGHANSA	ANE	--	--	13	4	--	--	--	7	--	--	--	--
	HOM	2	8	7	8	11	17	24	25	9	7	**36**	**31**
	PIL	1	--	--	--	--	--	--	--	--	--	--	--
WGWIDE	BOC	**32**	16	**47**	**34**	17	**57**	29	**39**	**32**	**36**	**40**	25
	HER	--	--	--	--	--	--	--	--	--	--	--	--
	MAC	10	11	10	22	18	1	4	25	22	18	2	12
	WHB	**83**	**86**	**73**	**68**	**56**	**67**	**84**	**91**	**72**	**93**	**60**	**82**
WGNEW	GUR	--	--	--	--	--	--	--	--	--	4	--	--
	GUU	--	--	3	--	--	--	--	--	--	--	--	--
	MUR	--	--	--	--	--	--	4	4	--	--	--	--
OTHER	VMA	10	11	10	22	18	1	4	25	22	18	2	12
	BIB	1	--	--	--	--	--	--	--	--	--	--	--
	JAA	--	5	**33**	**37**	**39**	**31**	**51**	**43**	15	18	**36**	27

Table 3 - Frequency of discarding (%) of supra-specif taxa in the hauls sampled from the OTB_CRU fishery (2004-2015). See Table 1 for species groupings; "--" indicates no occurrence; bold numbers indicate frequency of occurrence ≥30%.

ICES WG	Supra-specific group	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH	Long-finned squids	--	16	5	--	5	12	10	6	14	3	25	2	2
	Squids	SQU	--	--	--	--	--	--	5	2	3	--	2	6
	Short-finned squids	--	**36**	**31**	3	5	5	1	12	25	6	4	7	--
	Octopuses	--	**64**	**50**	**53**	23	23	14	18	**32**	24	25	**40**	**63**
	Cuttlefishes and sepiolods	--	**41**	**38**	**47**	**33**	29	**42**	24	16	25	**36**	21	18
	Cephalopoda nei	CEP	**77**	**74**	**67**	**52**	**50**	**54**	**49**	**48**	**47**	**57**	**52**	**75**
WGEF	Rajidae nei	RAJ	**5**	**7**	**7**	**1**	3	**1**	1	2	1	**4**	5	--
	Rajiformes nei	SRX	2	--	3	1	--	--	1	--	4	--	2	2
	Pelagic sharks nei	I_PWS	--	--	--	--	--	--	--	--	--	--	--	--
	Deep-water sharks nei	DWS	**37**	28	**40**	25	18	11	12	23	**35**	25	19	24

Table 4 - Frequency of occurrence (%) of species in the discards of hauls sampled in the OTB_DEF fishery (2004-2015). See Table 1 for species codes; "--" indicates no occurrence; bold numbers indicate frequency of occurrence ≥30%.

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGDEEP	BSF	2	1	2	--	--	--	--	--	--	--	--	--
	ARG	**36**	**31**	**32**	**31**	17	22	12	**34**	15	24	2	17
	ALF	--	--	--	--	--	--	--	--	--	--	--	--
	USK	--	--	--	--	--	--	--	--	--	--	--	--
	RNG	--	--	--	--	--	--	--	--	--	--	--	--
	ORY	--	--	--	--	--	--	--	--	--	--	--	--
	BLI	--	--	--	--	--	--	--	--	--	--	--	--
	LIN	--	--	--	--	--	--	--	--	--	--	--	--
	SBR	--	--	1	1	--	--	--	--	--	--	--	--
	GFB	5	--	2	1	--	4	2	--	--	2	--	2
	TSU	--	--	1	--	--	--	--	--	--	--	--	--
WGBIE	BSS	--	--	--	--	--	--	--	--	--	--	--	--
	GUG	--	1	--	1	2	3	1	--	5	--	6	2
	LDB	3	--	9	6	2	4	3	10	3	10	10	8
	MEG	2	--	1	--	--	--	--	1	--	2	--	2
	ANK	--	1	--	--	--	1	1	2	--	--	--	--
	MON	1	1	1	1	--	1	3	--	--	--	--	--
	WHG	--	--	--	1	--	--	--	--	--	--	--	--
	HKE	**64**	**78**	**74**	**82**	**78**	**89**	**72**	**71**	**87**	**62**	**81**	**58**
	NEP	--	1	--	1	--	--	--	--	--	--	--	--
	PLE	--	--	--	--	--	--	--	--	--	--	--	--
	POL	--	--	--	--	--	--	--	--	--	--	2	--
	SOL	--	1	--	--	--	--	--	--	2	--	--	--
WGCEPH	OUW	**46**	**45**	18	9	24	19	12	22	20	20	12	12
	SQC	4	2	--	1	--	--	2	7	2	20	2	2

Table 4 (cont.)

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH (cont.)	FQX	--	--	--	--	--	--	--	--	--	--	--	--
	SQM	13	4	--	1	1	--	--	2	--	2	--	--
	OMZ	--	--	--	--	--	--	--	--	--	--	--	--
	SQE	1	--	--	--	--	--	--	--	--	--	--	--
	TDQ	6	3	--	1	--	--	--	--	2	--	8	--
	EOI	17	16	8	5	4	9	8	5	3	2	4	6
	EDT	1	2	1	4	2	1	2	2	2	--	--	--
	OCT	--	--	--	1	--	--	--	1	--	--	--	--
	OQD	--	--	--	--	--	--	--	1	--	--	--	--
	OCC	1	6	4	6	20	10	2	11	12	16	8	6
	I_OPG	--	--	--	--	--	--	--	--	--	--	--	--
	ROA	1	4	1	4	2	1	--	--	--	--	4	2
	EJE	19	19	7	9	12	11	3	7	--	--	--	--
	CTC	1	3	2	1	2	3	1	--	--	2	2	2
	IAR	14	5	1	2	5	8	1	--	3	2	--	--
	CTL	5	--	1	1	--	--	2	4	--	--	--	--
WGEF	GUQ	--	--	--	--	--	--	--	--	--	--	--	--
	CYO	--	--	--	--	--	--	--	--	--	--	--	--
	BSK	--	--	--	--	--	--	--	--	--	--	--	--
	SCK	--	--	--	--	--	--	--	--	--	--	--	--
	RJB	--	--	--	--	--	--	--	--	--	--	--	--
	GAG	--	--	--	--	--	--	--	--	--	--	--	--
	SHO	6	2	4	3	2	1	2	--	--	2	--	2
	POR	--	--	--	--	--	--	--	--	--	--	--	--
	RJN	1	1	3	2	2	--	--	--	--	--	4	--
	SDS	--	--	--	--	--	--	--	--	--	--	--	--
	SMD	--	--	--	--	--	--	--	--	--	--	--	--
	RJH	3	1	3	1	--	--	1	--	--	2	--	--
	RJC	8	3	5	10	5	5	6	12	3	6	10	6
	RJM	1	1	2	1	2	1	2	2	--	2	--	--
	RJU	--	--	--	1	--	1	--	--	--	--	--	--
	RJA	--	--	--	--	--	--	--	--	--	--	--	--
	SYC	22	21	20	19	27	18	21	**42**	23	20	**42**	17
	DGS	--	--	--	--	--	--	--	--	--	--	--	--
	DGZ	--	--	--	--	--	--	--	--	--	--	--	--
	AGN	--	--	--	--	--	--	--	--	--	--	--	--
	MYL	--	--	--	--	--	--	--	--	--	--	--	--
	PLS	--	--	--	--	--	--	--	--	--	--	--	--
	TTR	--	--	--	--	--	--	--	--	--	--	--	--
	TTO	--	--	--	--	--	--	--	--	--	--	--	--
	TOE	--	--	--	--	--	--	--	--	--	--	--	--
	TTV	--	--	--	--	--	--	--	--	--	--	--	--
	SMA	--	--	--	--	--	--	--	--	--	--	--	--
	BSH	--	--	--	--	--	--	--	--	--	--	--	--
	GUP	--	--	--	--	--	--	--	--	--	--	--	--
	CYP	--	--	--	--	--	--	--	--	--	--	--	--
	CYY	--	--	--	--	--	--	--	--	--	--	--	--
	HXC	--	--	--	--	--	--	--	--	--	--	--	--
	DCA	1	--	--	--	--	--	--	--	--	--	--	--
	SDU	--	--	--	--	--	--	--	--	--	--	--	--
	SHL	2	3	1	--	--	1	--	--	--	--	--	--
	SYR	--	--	--	--	--	--	--	--	--	--	--	--
WGHANSA	ANE	9	10	10	16	9	10	8	17	2	4	6	2
	HOM	8	**32**	13	4	10	11	16	5	13	14	17	6
	PIL	**46**	**43**	27	20	24	20	**41**	**30**	15	22	12	10
WGWIDE	BOC	**33**	26	**52**	**46**	**42**	**47**	27	25	**47**	**34**	**40**	21
	HER	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	MAC	22	18	17	**31**	20	23	22	29	**37**	**44**	29	10
	WHB	**44**	26	**35**	26	15	19	**37**	18	**33**	22	**42**	**62**

Table 4 (cont.)

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGNEW	GUR	23	12	5	2	8	5	5	8	15	**30**	25	10
	GUU	2	1	6	2	7	2	3	7	--	--	10	2
	MUR	--	--	--	1	--	--	1	1	--	--	--	--
OTHER	VMA	**38**	**36**	**45**	**69**	**75**	**70**	**67**	**71**	23	**44**	12	10
	BIB	15	13	4	1	11	6	8	11	22	**30**	10	21
	JAA	5	23	**80**	**79**	**59**	**52**	**35**	**40**	27	**60**	**35**	15

Table 5 - Frequency of discarding (%) of supra-specic taxa in the hauls sampled from the OTB_DEF fishery (2004-2015). See Table 1 for species groupings; "--" indicates no occurrence; bold numbers indicate frequency of occurrence ≥30%.

ICES WG	Supra-specific group	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH	Long-finned squids	--	**48**	**47**	18	10	24	19	14	29	22	28	13	15
	Squids	SQU	2	--	--	--	--	--	2	8	3	--	8	6
	Short-finned squids	--	17	8	--	2	1	--	--	2	2	2	8	--
	Octopuses	--	18	21	12	15	24	20	11	19	17	18	12	12
	Cuttlefishes and sepiolods	--	29	26	10	15	17	18	5	11	3	4	6	4
	Cephalopoda nei	CEP	**66**	**59**	29	**31**	**48**	**38**	25	**53**	**33**	**40**	**40**	**33**
WGEF	Rajidae nei	RAJ	2	1	1	--	--	--	2	--	2	--	8	2
	Rajiformes nei	SRX	--	--	--	--	--	--	--	--	--	--	--	--
	Pelagic sharks nei	I_PWS	--	--	--	--	--	--	--	--	--	--	--	--
	Deep-water sharks nei	DWS	2	3	1	--	--	1	--	--	--	--	--	--

Table 6 - Volume (in metric tons) and CVs (%, in brackets) of species in the OTB_CRU fishery (2004-2015). See Table 1 for species codes; "(a)" = low frequency of occurrence.

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGDEEP	BSF	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)
	ARG	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)
	ALF	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	RNG	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	ORY	(a)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SBR	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)
	GFB	**30 (33%)**	**31 (48%)**	**264 (5%)**	(a)	**25 (50%)**	**33 (25%)**	**18 (31%)**	(a)	**7 (63%)**	(a)	**31 (31%)**	**28 (30%)**
	TSU	(a)	(a)	(a)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)
WGBIE	LDB	(a)	(a)		(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	MEG	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	(a)	0 (0%)	(a)	(a)
	ANK	0 (0%)	(a)	0 (0%)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)
	MON	(a)	(a)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)
	HKE	**87 (31%)**	**253 (54%)**	**51 (45%)**	**247 (40%)**	**251 (48%)**	**962 (45%)**	**183 (15%)**	**169 (32%)**	**159 (53%)**	**121 (33%)**	**323 (36%)**	**35 (34%)**
	NEP	**10 (46%)**	**27 (53%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	**3 (54%)**	(a)	(a)
WGCEPH	OUW	(a)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)
	SQC	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	FQX	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SQM	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	(a)	0 (0%)
	OMZ	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SQE	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)
	TDQ	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)
	EOI	**277 (32%)**	**99 (38%)**	**45 (10%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	**89 (29%)**
	EDT	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	OCT	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	(a)
	OQD	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	OCC	(a)	(a)	0 (0%)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	I_OPG	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	ROA	(a)	(a)	**26 (7%)**	(a)	(a)	**16 (52%)**	(a)	(a)	(a)	(a)	(a)	(a)
	EJE	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)
	CTC	(a)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)
	IAR	(a)	0 (0%)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)
	CTL	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
WGEF	GUQ	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)
	CYO	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)
	SCK	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	GAG	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SHO	**263 (39%)**	**150 (21%)**	**123 (14%)**	**22 (59%)**	**17 (27%)**	(a)	(a)	(a)	**36 (94%)**	**17 (32%)**	(a)	**35 (23%)**
	RJN	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SMD	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	RJH	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	RJC	(a)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)
	RJM	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SYC	(a)	(a)	(a)	(a)	(a)	(a)	**30 (29%)**	**49 (40%)**	(a)	(a)	**72 (38%)**	(a)
	PLS	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	TTR	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	TTO	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	TOE	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)
	TTV	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)
	GUP	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)
	DCA	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)
	SDU	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)
	SHL	**42 (40%)**	(a)	**321 (5%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	SYR	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)

Table 6 (cont.) -

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGHANSA	ANE	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	HOM	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	**113 (41%)**	**37 (52%)**
	PIL	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WGWIDE	BOC	**25 (43%)**	(a)	**73 (30%)**	**89 (66%)**	(a)	**166 (35%)**	(a)	**9 (36%)**	**32 (85%)**	**3 (66%)**	**75 (59%)**	(a)
	MAC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	WHB	**2491 (38%)**	**676 (33%)**	**3558 (4%)**	**324 (48%)**	**161 (41%)**	**291 (18%)**	**376 (22%)**	**507 (39%)**	**278 (60%)**	**633 (43%)**	**554 (40%)**	**608 (52%)**
WGNEW	GUR	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)
	GUU	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	MUR	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
OTHER	VMA	(a)	(a)	(a)	(a)	**25 (27%)**	(a)	**33 (46%)**	**52 (39%)**	(a)	(a)	(a)	(a)
	BIB	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	JAA	0 (0%)	(a)	**112 (43%)**	**49 (55%)**	**93 (30%)**	**427 (2%)**	**177 (39%)**	**113 (66%)**	(a)	(a)	**42 (32%)**	(a)

Table 7 - Volume (in metric tons) and CVs (%, in brackets) of supra-specic taxa in the OTB_CRU fishery (2004-2015). See Table 1 for species codes; "--" indicates no occurrence, "(a)" = low frequency of occurrence.

ICES WG	Supra-specific group	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH	Long-finned squids	--	(a)	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	Squids	SQU	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	(a)	0 (0%)	(a)	(a)
	Short-finned squids	--	**23 (32%)**	**59 (37%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)
	Octopuses	--	**341 (26%)**	**117 (26%)**	**57 (15%)**	(a)	(a)	(a)	(a)	**24 (50%)**	(a)	(a)	**39 (33%)**	**89 (24%)**
	Cuttlefishes and sepiolods	--	**16 (32%)**	**16 (58%)**	**34 (23%)**	**3 (40%)**	(a)	**14 (20%)**	(a)	(a)	(a)	**2 (23%)**	(a)	(a)
	Cephalopoda nei	CEP	**392 (25%)**	**308 (39%)**	**94 (11%)**	**35 (28%)**	**28 (50%)**	**49 (18%)**	**34 (29%)**	**44 (61%)**	**34 (55%)**	**19 (19%)**	**46 (29%)**	**96 (21%)**
WGEF	Rajidae nei	RAJ	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(0%)
	Rajiformes nei	SRX	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	(a)	0 (0%)	(a)	(a)
	Deep-water sharks nei	DWS	**82 (45%)**	(a)	**321 (5%)**	(a)	(a)	(a)	(a)	(a)	**20 (75%)**	(a)	(a)	(a)

Table 8 – Volume (in metric tons) and CVs (%, in brackets) of species in the OTB_DEF fishery (2004-2015). See Table 1 for species codes; "(a)" = low frequency of occurrence.

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGDEEP	BSF	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	ARG	**59 (30%)**	**33 (23%)**	**23 (20%)**	**47 (28%)**	(a)	(a)	(a)	**15 (25%)**	(a)	(a)	(a)	(a)
	SBR	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	GFB	(a)	0 (0%)	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)
	TSU	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WGBIE	GUG	0 (0%)	(a)	0 (0%)	(a)	(a)	(a)	(a)	0 (0%)	(a)	0 (0%)	(a)	(a)
	LDB	(a)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	MEG	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)
	ANK	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	MON	(a)	(a)	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	WHG	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	HKE	**604 (29%)**	**1346 (19%)**	**557 (15%)**	**1065 (25%)**	**605 (16%)**	**997 (13%)**	**393 (20%)**	**570 (34%)**	**312 (18%)**	**214 (31%)**	**259 (23%)**	**216 (28%)**
	NEP	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	POL	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)
	SOL	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)
WGCEPH	OUW	**81 (43%)**	**36 (20%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	SQC	(a)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	(a)	(a)	(a)	(a)	(a)
	SQM	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)
	SQE	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	TDQ	(a)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)
	EOI	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	EDT	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)
	OCT	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 8 (cont.)

ICES WG	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH (cont.)	OQD	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	OCC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	ROA	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)
	EJE	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	CTC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	(a)	(a)
	IAR	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)
	CTL	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WGEF	SHO	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)
	RJN	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)
	RJH	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)
	RJC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	RJM	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)
	RJU	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SYC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	**111 (24%)**	(a)	(a)	**68 (24%)**	(a)
	DCA	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	SHL	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WGHANSA	ANE	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	HOM	(a)	**61 (30%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	PIL	**588 (29%)**	**295 (22%)**	(a)	(a)	(a)	(a)	**434 (19%)**	**119 (36%)**	(a)	(a)	(a)	(a)
WGWIDE	BOC	**222 (58%)**	(a)	**938 (24%)**	**394 (24%)**	**225 (66%)**	**252 (60%)**	(a)	(a)	**48 (28%)**	**42 (37%)**	**36 (44%)**	(a)
	MAC	(a)	(a)	(a)	**815 (61%)**	(a)	(a)	(a)	(a)	**482 (65%)**	**617 (60%)**	(a)	(a)
	WHB	**933 (39%)**	(a)	**170 (37%)**	(a)	(a)	(a)	**418 (45%)**	(a)	**191 (56%)**	(a)	**292 (33%)**	**508 (26%)**
WGNEW	GUR	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	**29 (36%)**	(a)	(a)
	GUU	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	(a)
	MUR	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
OTHER	VMA	**413 (210%)**	**463 (27%)**	**1122 (35%)**	**3476 (34%)**	**4212 (24%)**	**1844 (21%)**	**3727 (31%)**	**1113 (23%)**	(a)	**936 (70%)**	(a)	(a)
	BIB	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	20 (44%)	(a)	(a)
	JAA	(a)	(a)	**5047 (23%)**	**9386 (15%)**	**2844 (42%)**	**1917 (37%)**	**2982 (39%)**	**375 (42%)**	(a)	**305 (30%)**	**34 (47%)**	(a)

Table 9 - Volume (in metric tons) and CVs (%, in brackets) of species in the OTB_DEF fishery (2004-2015). See Table 1 for species codes; "(a)" = low frequency of occurrence.

ICES WG	Supra-specific group	3-alpha code	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WGCEPH	Long-finned squids	--	**121 (31%)**	**39 (19%)**	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	Squids	SQU	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	(a)	(a)	(a)	0 (0%)	(a)	(a)
	Short-finned squids	--	(a)	(a)	0 (0%)	(a)	(a)	0 (0%)	0 (0%)	(a)	(a)	(a)	(a)	0 (0%)
	Octopuses	--	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	Cuttlefishes and sepiolods	--	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
	Cephalopoda nei	CEP	**121 (16%)**	**57 (28%)**	(a)	**87 (35%)**	**140 (37%)**	**57 (28%)**	(a)	**64 (25%)**	**22 (26%)**	**72 (25%)**	**41 (36%)**	**12 (39%)**
WGEF	Rajidae nei	RAJ	(a)	(a)	(a)	0 (0%)	0 (0%)	0 (0%)	(a)	0 (0%)	(a)	0 (0%)	(a)	(a)
	Deep-water sharks nei	DWS	(a)	(a)	(a)	0 (0%)	0 (0%)	(a)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 10 – Discards (in number of specimens per haul) of species in the OTB_CRU fishery (2004-2015). See Table 1 for species codes; "---" indicates no occurrence.

	ARG		ANE		ANK		BIB		BOC		BSF		CTC		CTL	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	---	---	---	---	0.0 (0.4)	0-4	60.7 (167.4)	0-1097	60.7 (167.4)	0-1097	0.4 (3)	0-31	7.5 (34.1)	0-334
2005	---	---	---	---	0.8 (5)	0-31	---	---	127.4 (590.8)	0-4386	127.4 (590.8)	0-4386	0.5 (4.1)	0.35	1.3 (10.8)	0-93
2006	---	---	17.5 (68.7)	0-378	---	---	---	---	169.1 (387.6)	0-1838	169.1 (387.6)	0-1838	---	---	7.1 (38.2)	0-213
2007	---	---	7 (47.8)	0-401	1 (6)	0-38	---	---	687.1 (3507.4)	0-29593	687.1 (3507.4)	0-29593	1.3 (10.7)	0-92	0.9 (5.2)	0-33
2008	---	---	---	---	2.2 (9.2)	0-54	---	---	86.2 (602.6)	0-4936	86.2 (602.6)	0-4936	0.4 (2.9)	0-23	0.7 (4.2)	0-26
2009	---	---	---	---	2.6 (13.5)	0-89	---	---	306.5 (595.2)	0-2965	306.5 (595.2)	0-2965	1.3 (11.4)	0-105	---	---
2010	---	---	---	---	2.6 (12.4)	0-103	---	---	114 (385.1)	0-3082	114 (385.1)	0-3082	3.1 (20)	0-177	4.7 (41)	0-416
2011	---	---	5.3 (23.9)	0-155	---	---	---	---	74.9 (166.1)	0-776	74.9 (166.1)	0-776	2.4 (18)	0-136	0.4 (3)	0-22
2012	1.4 (3.4)	0-29	---	---	---	---	---	---	77.6 (245.1)	0-1624	77.6 (245.1)	0-1624	1.1 (5.7)	0-40	1 (8.2)	0-68
2013	---	---	---	---	---	---	---	---	24.9 (70.8)	0-333	24.9 (70.8)	0-333	1 (3.8)	0-16	3.6 (18.6)	0-100
2014	---	---	---	---	0.4 (2.6)	0-17	---	---	261.2 () 922.6	0-5805	261.2 (922.6)	0-5805	---	---	11.9 (76.3)	0-500
2015	---	---	---	---	0.6 (4.4)	0-32	---	---	34.9 (202.5)	0-1464	34.9 (202.5)	0-1464	---	---	3.3 (13.8)	0-76

	CYO		DCA		EDT		EJE		EOI		GAG		GFB		GUP	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	1.7 (8.7)	0-59	3.5 (27.4)	0-274	5.3 (25.4)	0-231	93.8 (149.2)	0-779	2.3 (24.5)	0-259	56.1 (239.2)	0-2216	---	---
2005	---	---	2.7 (16.9)	0-144	6.1 (26.4)	0-183	2.5 (10.2)	0-62	28.3 (58.9)	0-387	0.8 (7.3)	0-63	29.5 (80)	0-599	---	---
2006	---	---	0.4 (2.2)	0-13	10.3 (28.6)	0-126	18.9 (78.4)	0-415	11.2 (20)	0-87	---	---	180.8 (812.3)	0-4550	---	---
2007	---	---	1.2 (6.9)	0-56	5.1 (39.9)	0-342	1.4 (7.6)	0-52	12.9 (41.8)	0-318	---	---	61.7 (407)	0-3500	---	---
2008	---	---	2.3 (8.4)	0-44	0.2 (1.8)	0.15	2 (10.3)	0-77	5.6 (23.9)	0-186	---	---	94.4 (148.6)	0-823	---	---
2009	---	---	2.1 (16.1)	0-146	1.1 (7.2)	0-53	3.3 (16.5)	0-119	4 (16)	0-117	---	---	27.9 (65.8)	0-421	---	---
2010	---	---	2.1 (17.5)	0-175	5.3 (26.1)-	0-224	2.1 (13.1)	0-96	4.6 (18.5)	0-141	---	---	43.9 (134.1)	0-912	0.4 (3.8)	0-39
2011	---	---	1.2 (8.7)	0-66	7.9 (24.4)	0-136	2.7 (13)	0-74	5.6 (15.8)	0-75	---	---	13.1 (33.5)	0-203	---	---
2012	---	---	6.2 (41)	0-336	1.5 (12.4)	0-103	0.4 (3.1)	0-26	8.9 (29.8)	0-203	---	---	23.3 (44.9)	214	0.2 (1.4)	0-12
2013	1.6 (5.7)	0-25	9.5 (21)	0-70	1.3 (6.6)	0-35	---	---	2.6 (7.9)	0-32	---	---	13.6 (30.2)	0-119	---	---
2014	---	---	5.6 (23)	0-134	6.8 (23.5)	0-106	---	---	17.3 (35.6)	0-147	---	---	71.1 (139.7)	0-601	0.5 (3.4)	0-22
2015	---	---	0.1 (1)	0-7	1.4 (7.6)	0-51	---	---	33.4 (56.4)	0-262	---	---	107.3 (488)	0-3527	5.5 (34.9)	0-250

	GUQ		GUR		GUU		HKE		HOM		IAR		JAA		JAI	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	---	---	---	---	133.8 (412.7)	0-3655	0.4 (3.1)	0-31	12.1 (78.8)	0-795	---	---	---	---
2005	---	---	---	---	---	---	474.4 (1121.7)	0-6260	9.7 (49)	0-387	---	---	2.1 (9.6)	0-61	0.1 (1)	0-9
2006	---	---	---	---	1.2 (6.5)	0-36	69.8 (142.3)	0-656	2.5 (9.3)	0-38	4.6 (24.8)	0-138	334.2 (804.7)	0-2697	---	---
2007	---	---	---	---	---	---	885.9 (1791.3)	0-12921	33.6 (205.1)	0-1710	---	---	77.6 (309.5)	0-2144	---	---
2008	---	---	---	---	---	---	932.9 (3285.2)	0-19743	20.8 (80)	0-513	0.2 (2)	0-16	110.7 (244.8)	0-1444	---	---
2009	0.7 (6.8)	0-62	---	---	---	---	885.9 (1669.3)	0-9106	257.9 (1523.8)	0-13544	1.8 (7)	0-40	98.7 (229.5)	0-1417	---	---
2010	---	---	---	---	---	---	411.2 (883.8)	0-6841	74.9 (237.3)	0-1471	3 (16.2)	0-112	283.1 (1149)	0-10400	---	---
2011	---	---	---	---	---	---	303.3 (614.7)	0-3966	66.7 (178.6)	0-885	1 (5.7)	0-42	189.2 (646.9)	0-4435	---	---
2012	---	---	---	---	---	---	159 (274.6)	0-1268	8.1 (29.5)	0-155	0.9 (7.4)	0-62	11.4 (40.8)	0-270	---	---
2013	---	---	0.2 (0.9)	0-5	---	---	317.6 (580.3)	0-2258	34.2 (159.5)	0-857	---	---	8.6 (27.3)	0-143	---	---
2014	0.8 (3.5)	0-19	---	---	---	---	715.2 (1014.2)	0-4583	135.9 (393.1)	0-2333	---	---	105.4 (417.7)	0-2667	---	---
2015	0.7 (3.7)	0-26	---	---	---	---	122.5 (288.2)	0-1909	28.1 (72.9)	0-445	---	---	58.2 (228.1)	0-1583	---	---

Table 10 (cont.)

year	LDB Mean (sd)	LDB range	MAC Mean (sd)	MAC range	MEG Mean (sd)	MEG range	MON Mean (sd)	MON range	MUR Mean (sd)	MUR range	NEP Mean (sd)	NEP range	OCC Mean (sd)	OCC range	OCT Mean (sd)	OCT range
2004	24.5 (129.5)	0-1251	21 (169.9)	0-1788	---	---	0.1 (0.9)	0-9	---	---	44.2 (150.8)	0-1175	0.7 (5.8)	0-57	---	---
2005	9.1 (63.7)	0-535	28.3 (181.8)	0-1556	---	---	1 (6.2)	0-41	---	---	251.5 (638.3)	0-3548	0.4 (3.6)	0-31	---	---
2006	118.2 (466.1)	0-2600	6.5 (20.3)	0-88	---	---	0.4 (2.2)	0-13	---	---	26.9 (81.2)	0-379	---	---	---	---
2007	47.2 (298.1)	0-2546	205.8 (851.3)	0-6014	---	---	---	---	---	---	5.2 (14.7)	0-84	---	---	---	---
2008	17 (134)	0-1097	14.6 (42.3)	0-243	---	---	1.3 (6.1)	0-38	---	---	27.5 (111.8)	0-885	4.1 (15.8)	0-92	---	---
2009	17.4 (76.7)	0-604	1.4 (12.7)	0-117	0.4 (3.4)	0-32	4.7 (20.8)	0-126	---	---	3.9 (18.3)	0-131	3.8 (27.7)	0-252	---	---
2010	3.3 (13.6)	0-81	1.2 (7.6)	0-73	0.3 (3.2)	0-33	3.5 (15.8)	0-104	2.5 (14.7)	0-131	10.3 (38)	0-275	0.7 (5)	0-47	---	---
2011	0.9 (6.4)	0-48	56.5 (167.3)	0-990	---	---	0.7 (5.5)	0-42	0.9 (5.1)	0-37	5.3 (16.4)	0-106	0.8 (4.2)	0-24	0.9 (4.1)	0-28
2012	9.1 (35.7)	0-214	42.2 (160.9)	0-1225	0.4 (3.1)	0-26	0.5 (4.4)	0-37	---	---	69.8 (235.8)	0-1565	0.7 (3.3)	0-19	0.5 (4)	0-33
2013	6.1 (24.2)	0-130	6.4 (24.8)	0-132	---	---	---	---	---	---	13.8 (38)	0-194	1.5 (5.5)	0-27	---	---
2014	17.3 (48.3)	0-245	0.6 (3.7)	0-25	2.8 (13.6)	0-83	---	---	---	---	6.8 (20.1)	0-98	0.6 (3.7)	0-24	---	---
2015	11 (25.4)	0-117	12.9 (48)	0-275	3.2 (18.6)	0-131	1.3 (6.4)	0-44	---	---	20.3 (56.7)	0-279	0.4 (2.9)	0-21	1.4 (8.2)	0-58

year	OMZ Mean (sd)	OMZ range	OQD Mean (sd)	OQD range	ORY Mean (sd)	ORY range	OUW Mean (sd)	OUW range	PIL Mean (sd)	PIL range	PLS Mean (sd)	PLS range	RJC Mean (sd)	RJC range	RJH Mean (sd)	RJH range
2004	---	---	0.2 (1.6)	0-17	0.1 (1)	0-11	---	---	0.1 (1.5)	0-16	1.1 (11.4)	0-120	0.1 (1.1)	0-11	0.5 (5.4)	0-57
2005	---	---	---	---	---	---	---	---	---	---	---	---	0.7 (3.7)	0-26	---	---
2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2007	---	---	---	---	1.9 (16.2)	0.139	---	---	---	---	---	---	0.4 (3.8)	0-33	---	---
2008	---	---	---	---	0.3 (2.8)	0-23	---	---	---	---	---	---	0.8 (4.6)	0-35	0.5 (4.3)	0-35
2009	---	---	---	---	---	---	---	---	---	---	---	---	3 (27.4)	0-252	---	---
2010	---	---	---	---	---	---	---	---	---	---	---	---	5.4 (33.4)	0-272	---	---
2011	0.2 (1.4)	0-10	---	---	---	---	---	---	---	---	---	---	7.1 (41.9)	0-305	1.4 (10.1)	0-76
2012	---	---	---	---	---	---	2.5 (15.5)	0-119	---	---	---	---	---	---	---	---
2013	---	---	---	---	---	---	19.2 (66)	0-344	---	---	---	---	---	---	---	---
2014	---	---	---	---	---	---	2 (12.6)	0-83	---	---	---	---	0.5 (3.3)	0-22	---	---
2015	---	---	---	---	1.9 (9.5)	0-49	1.8 (12.7)	0-92	---	---	---	---	---	---	---	---

year	RJI Mean (sd)	RJI range	RJM Mean (sd)	RJM range	RJN Mean (sd)	RJN range	RJO Mean (sd)	RJO range	RJY Mean (sd)	RJY range	RNG Mean (sd)	RNG range	ROA Mean (sd)	ROA range	SBR Mean (sd)	SBR range
2004	0.5 (3.8)	0-38	---	---	0.3 (2.2)	0-23	---	---	1.1 (11.2)	0-119	0.7 (7.1)	0-75	17.3 (43)	0-284	---	---
2005	1.6 (10)	0-72	---	---	---	---	0.2 (2.1)	0-18	---	---	0.2 (2)	0-17	39 (132.8)	0-1085	---	---
2006	---	---	---	---	---	---	---	---	---	---	1.2 (6.6)	0-37	37.7 (117.1)	0-650	---	---
2007	---	---	---	---	---	---	0.5 (3)	0-21	---	---	7 (53)	0-454	19.9 (48.8)	0-276	0.3 (2.5)	0-21
2008	---	---	---	---	---	---	---	---	0.5 (4.3)	0-35	---	---	16.8 (70.1)	0-548	---	---
2009	---	---	2.3 (14.9)	0-105	0.1 (1.1)	0-10	---	---	---	---	---	---	25.7 (76.3)	0-635	---	---
2010	---	---	0.2 (2.3)	0-24	0.9-(8.9)	0-91	---	---	---	---	---	---	27.8 (225.7)	0-2294	0.5 (4.8)	0-49
2011	---	---	---	---	---	---	---	---	---	---	0.4 (2.9)	0-22	1.6 (6.2)	0-35	---	---
2012	---	---	---	---	---	---	0.5 (4.1)	0-34	---	---	---	---	13.6 (55.7)	0-410	0.4 (3.5)	0-29
2013	---	---	---	---	---	---	---	---	---	---	---	---	19.2 (52.4)	0-270	---	---
2014	---	---	---	---	---	---	---	---	---	---	---	---	12 (33.7)	0-158	---	---
2015	---	---	---	---	---	---	---	---	---	---	---	---	2 (6.9)	0-31	---	---

Table 10 (cont.)

	SCK		SDU		SHL		SHO		SOL		SQC		SQE		SQM	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	---	---	---	---	213.7 (800.6)	0-7777	---	---	---	---	2.9 (26.1)	0-275	1.3 (5.1)	0-34
2005	1.1 (9.8)	0-84	---	---	---	---	191.5 (341.4)	0-1496	---	---	---	---	0.4 (3.8)	0-33	4.7 (12.8)	0-67
2006	---	---	---	---	---	---	245.8 (929.4)	0-5200	---	---	---	---	---	---	2.9 (15.7)	0-88
2007	---	---	---	---	---	---	98.8 (385.4)	0-3182	---	---	---	---	---	---	0.6 (3.1)	0-18
2008	---	---	---	---	---	---	26.1 (61.2)	0-347	---	---	---	---	0.2 (1.4)	0-12	0.3 (2.6)	0-22
2009	0.7 (6.7)	0-61	---	---	---	---	20.1 (47.3)	0-263	---	---	---	---	---	---	0.6 (5.4)	0-50
2010	---	---	---	---	0.8 (8)	0-81	44.8 (131.5)	0-830	---	---	0.2 (2.5)	0-26	---	---	5 (21.7)	0-181
2011	---	---	0.8 (5.8)	0-43	---	---	24.5 (60.6)	0-267	---	---	0.2 (1.7)	0-13	---	---	20.1 (69.7)	0-402
2012	---	---	---	---	0.8 (4.9)	0-37	72.5 (124)	0-552	---	---	---	---	0.5 (2.9)	0-18	0.3 (1.7)	0-11
2013	---	---	---	---	---	---	53.6 (146)	0-769	---	---	---	---	---	---	---	---
2014	---	---	5.9 (37.8)	0-247	20.7 (126.5)	0-828	183.1 (599.9)	0-3207	---	---	---	---	0.8 (5.4)	0-35	1.5 (9.3)	0-61
2015	---	---	1.9 (13.6)	0-98	3.3 (23.4)	0-168	44.2 (96.8)	0-633	0.1 (1)	0-7	---	---	---	---	---	---

	SQU		SYC		SYR		TDQ		TOE		TSU		TTO		TTR	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	12.2 (31.5)	0-182	3.7 (32.2)	0-337	10.8 (26)	0-179	---	---	3 (31.9)	0-337	0.1 (0.6)	0-7	---	---
2005	---	---	14.3 (42.5)	0-268	0.9 (7.7)	0-67	9.6 (34.6)	0-207	---	---	2.8 (13.9)	0-85	---	---	---	---
2006	---	---	17.8 (88.4)	0-492	---	---	---	---	---	---	1.7 (8.9)	0-50	---	---	---	---
2007	---	---	22 (54.1)	0-311	---	---	0.3 (2.2)	0-19	---	---	---	---	---	---	0.5 (3.8)	0-33
2008	---	---	5.7 (17.6)	0-81	---	---	0.3 (2.3)	0-19	---	---	1.4 (9)	0-71	---	---	---	---
2009	---	---	25.5 (76.3)	0-518	0.5 (4.5)	0-41	---	---	---	---	---	---	---	---	---	---
2010	8.9 (54.7)	0-518	28.6 (86.5)	0-789	---	---	1.3 (9.5)	0-77	---	---	0.4 (3.8)	0-39	---	---	---	---
2011	0.3 (2.3)	0-17	43.8 (116)	0-839	---	---	11.1 (41.4)	0-229	---	---	---	---	---	---	---	---
2012	0.7 (4)	0-28	12.7 (49.5)	0-351	0.1 (1.2)	0-10	---	---	0.8 (4.6)	0-30	1 (6.5)	0-52	---	---	---	---
2013	---	---	5.3 (20)	0-95	---	---	0.6 (2.9)	0-16	---	---	---	---	---	---	---	---
2014	0.5 (3.2)	0-21	47.2 (129.7)	0-750	---	---	7 (37.8)	0-244	---	---	2.3 (11.6)	0-73	---	---	---	---
2015	3.2 (17.6)	0-125	9.3 (22.3)	0-131	---	---	---	---	---	---	---	---	---	---	1 (7.1)	0-51

	TTV		VMA		WHB	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	---	---	7.2 (37)	0-358	2473.4 (5364.2)	0-35768
2005	---	---	7.7 (46)	0-387	701.6 (1410.7)	0-7420
2006	1.4 (7.5)	0-42	50.2 (210)	0-1148	1538.3 (3274.2)	0-16250
2007	---	---	50.4 (302.3)	0-2573	784.3 (2078.2)	0-12410
2008	---	---	30.2 (62.2)	0-305	260.3 (518.6)	0-3910
2009	---	---	10.4 (42.6)	0-283	528.5 (1074.5)	0-6961
2010	0.2 (1.9)	0-20	46.7 (150.7)	0-1333	974.6 (1709.3)	0-13290
2011	---	---	55.3 (201.3)	0-1299	1063.1 (1569.6)	0-6559
2012	0.2 (1.3)	0-11	14.3 (53.2)	0-312	499.7 (1243.6)	0-8274
2013	---	---	6.7 (25.7)	0-125	1859.1 (4522.6)	0-23331
2014	0.6 (3.8)	0-25	14.6 (66.1)	0-432	844.4 (1339)	0-5222
2015	---	---	14 (49.6)	0-333	1153.7 (1691.8)	0-9938

Table 11 - Discards (in number of specimens per haul) of species in the OTB_DEF fishery (2004-2015). See Table 1 for species codes; "---" indicates no occurrence.

	ANE		ANK		ARG		BIB		BOC		BSF		CTC		CTL	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	13.2 (106.2)	0-1184	---	---	---	---	28.7 (109.4)	0-822	531.8 (3175.8)	0-32590	0.4 (3.6)	0-37	0.3 (3.2)	0-37	4 (24.4)	0-199
2005	13.6 (57.6)	0-416	0.1 (1.5)	0-20	---	---	12.4 (46.9)	0-454	148 (588.1)	0-5782	1 (10.1)	0-121	0.5 (4.1)	0-44	---	---
2006	12.5 (51.9)	0-546	---	---	---	---	1.8 (10.8)	0-121	1310.8 (3926.1)	0-34733	0.9 (8.3)	0-109	1.5 (10.8)	0-101	1.4 (19.5)	0-273
2007	102 (598.3)	0-6443	---	---	---	---	1.2 (13.3)	0-168	613.6 (3112.3)	0-37181	---	---	1.4 (13)	0-140	0.4 (4.5)	0-58
2008	5.4 (21.4)	0-169	---	---	---	---	287.2 (1058.7)	0-5737	598.6 (2364.3)	0-23407	---	---	1.1 (9.4)	0-94	---	---
2009	17.1 (70.2)	0-493	0.6 (6.3)	0-73	---	---	352.9 (2249.1)	0-19539	621.1 (2940.8)	0-30655	---	---	4.3 (34.5)	0-387	---	---
2010	14.4 (49)	0-223	0.3 (3.3)	0-37	---	---	12.3 (51.6)	0-429	130.5 (441.2)	0-3186	---	---	0.1 (1.6)	0-18	0.8 (7.7)	0-85
2011	28.6 (105.2)	0-782	0.6 (4.1)	0-29	---	---	12.7 (65.4)	0-569	177.3 (642.1)	0-3640	---	---	---	---	1 (5.7)	0-42
2012	0.1 (0.7)	0-6	---	---	0.2 (1.7)	0-14	39.1 (125.9)	0-714	126.4 (573.3)	0-4431	---	---	---	---	---	---
2013	1.1 (5.3)	0-31	---	---	---	---	45.0 (113.1)	0-523	156.5 (646.6)	0-4309	---	---	0.8 (5.5)	0-39	---	---
2014	14.3 (84.2)	0-603	---	---	---	---	12.3 (66.5)	0-477	384.4 (1723.5)	0-12379	---	---	1.1 (8.2)	0-60	---	---
2015	1.2 (8)	0-56	---	---	1.9 (12.9)	0-90	334.7 (2029.7)	0-14216	224.8 (928)	0-6303	---	---	0.2 (1.3)	0-9	---	---

	DCA		EDT		EJE		EOI		GFB		GUG		GUR		GUU	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	0.1 (0.8)	0-9	0.2 (2.3)	0-26	11.2 (30.1)	0-152	7.4 (24.5)	0-185	2.4 (12.3)	0-106	---	---	---	---	1.7 (14.3)	0-156
2005	---	---	0.5 (4.5)	0-52	22.1 (62.3)	0-381	7.1 (20)	0-101	---	---	0.2 (2.5)	0-31	---	---	5.4 (65.2)	0-825
2006	---	---	0.3 (3.5)	0-41	4.4 (20.5)	0-185	3.2 (12.7)	0-89	1.6 (12.7)	0-140	---	---	---	---	3 (14.9)	0-115
2007	---	---	1.8 (9.9)	0-83	4.9 (21.9)	0-189	2.1 (11.2)	0-88	0.3 (2.5)	0-25	0.2 (2.6)	0-33	---	---	1.5 (15.7)	0-198
2008	---	---	0.8 (8)	0-89	9.1 (30.5)	0.231	2.7 (13.8)	0-103	---	---	3.9 (33.4)	0-268	---	---	17.5 (123.1)	0-1066
2009	---	---	0.5 (4.4)	0-49	25.5 (167.6)	0-1869	6.7 (28.5)	0-231	1.5 (10.2)	0-106	2.8 (17.8)	0-160	2.7 (14.2)	0-112	0.3 (2.1)	0-19
2010	---	---	0.8 (7.6)	0-82	1.1 (7.4)	0-64	5.3 (27.2)	0-256	0.5 (3.9)	0-36	1.3 (14.1)	0-158	5.3 (33)	0-286	0.8 (5.2)	0-51
2011	---	---	0.4 (2.4)	0-19	2.3 (11)	0-84	1.5 (7.3)	0-52	---	---	---	---	4.6 (22)	0-184	5.6 (27.9)	0-213
2012	---	---	0.2 (1.5)	0-12	---	---	1.2 (7.2)	0-54	---	---	2.3 (14.2)	0-110	25 (111.1)	0-709	---	---
2013	---	---	---	---	---	---	0.1 (0.4)	0-3	0.1 (0.4)	0-3	---	---	59.7 (230.3)	0-1593	---	---
2014	---	---	---	---	---	---	2.7 (14)	0-87	---	---	2.7 (11.3)	0-56	19.2 (42.7)	0-155	11.1 (43.4)	0-230
2015	---	---	---	---	---	---	3.2 (13.8)	0-80	0.4 (2.8)	0-20	6.1 (41.7)	0-292	4.9 (17.2)	0-85	0.4 (2.7)	0-19

	HKE		HOM		IAR		JAA		JAI		LDB		MAC		MEG	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	430.2 (1383.4)	0-13307	8.3 (42.6)	0-409	6.8 (26.5)	0-199	3.3 (20.5)	0-204	1.4 (8.9)	0-90	2.1 (15.7)	0-129	43.4 (136.6)	0-850	0.4 (3.8)	0-42
2005	837 (1660.1)	0-12202	950.2 (6979.9)	0-83224	3.6 (19.5)	0-148	267.9 (1432.7)	0-12866	0.1 (1.5)	0-19			29.7 (135.4)	0-1308	---	---
2006	364.5 (639.7)	0-5934	16.1 (90)	0-1115	0.1 (1.6)	0-22	4911.4 (22874.2)	0-299819	2.2 (15.5)	0-186	24 (115.3)	0-1023	65.4 (385.5)	0-4080	0.1 (1.4)	0-20
2007	607.4 (1520.4)	0-15621	4.5 (39.7)	0-495	2.3 (19.2)	0-174	4244 (8645.6)	0-58721	1.1 (8.6)	0-93	4.8 (22.6)	0-173	437.5 (1930.7)	0-16744	---	---
2008	459 (1246.2)	0-11752	14.2 (67.2)	0-652	3.1 (19.1)	0-154	1597 (5669)	0-40546	---	---	1.1 (7.7)	0-77	103.7 (558.2)	0-4650	---	---
2009	1394.5 (4607.4)	0-44321	32.8 (179.3)	0-1743	10.5 (63.7)	0-606	861.8 (2169.4)	0-12946	0.1 (1.1)	0-13	4.2 (23.3)	0-190	193.3 (957.5)	0-7960	---	---
2010	362.2 (617)	0-5049	40.8 (217)	0-2216	0.9 (9.5)	0-107	1416.6 (4870.5)	0-43755	0.7 (5)	0-43	5.3 (46.4)	0-509	288.5 (1307.8)	0-7425	---	---
2011	427.1 (780)	0-4520	8.6 (57)	0-498	---	---	184.2 (694.9)	0-5605	---	---	5.7 (20)	0-122	299.3 (2213.1)	0-20150	1.3 (12)	0-110
2012	575.2 (1267)	0-7795	4.7 (20.3)	0-147	0.2 (1.1)	0-7	150.1 (697.2)	0-4386	---	---	4.6 (33.2)	0-259	1020.4 (5406.9)	0-40388	---	---
2013	193.1 (423.5)	0-2555	273.4 (1799)	0-12859	0.3 (2.4)	0-17	456.8 (1069.2)	0-5303	---	---	12.7 (54.8)	0-328	597.7 (2683.7)	0-18836	0.6 (4.4)	0-31
2014	340.2 (625.7)	0-2538	36.7 (162.5)	0-1144	---	---	66.1 (190)	0-999	2.9 (11.4)	0-65	6.5 (22.2)	0-119	1425.7 (6607.5)	0-40787	---	---
2015	365 (774.7)	0-4274	3.2 (15.4)	0-100	---	---	282.7 (1439.4)	0-9927	---	---	7.6 (28.6)		9.4 (35.8)	0-171	1 (7)	0-49

Table 11 (cont.)

year	MON Mean (sd)	MON range	MUR Mean (sd)	MUR range	NEP Mean (sd)	NEP range	OCC Mean (sd)	OCC range	OCT Mean (sd)	OCT range	OQD Mean (sd)	OQD range	OUW Mean (sd)	OUW range	PIL Mean (sd)	PIL range
2004	0.2 (2.2)	0-25	---	---	---	---	0.9 (10.1)	0-114	---	---	---	---	---	---	301.8 (895.4)	0-7009
2005	0.3 (3.5)	0-44	---	---	1.4 (17.1)	0-216	1.8 (8.5)	0-65	---	---	---	---	---	---	222.4 (576.3)	0-5242
2006	0.4 (5)	0-70	---	---	---	---	1.9 (11.4)	0-123	---	---	---	---	---	---	572.2 (3660.7)	0-48376
2007	0.3 (3.1)	0-35	0.3 (3.8)	0-49	0.1 (1)	0-12	13.5 (142.7)	0-1817	0.7 (8.7)	0-111	---	---	---	---	131.1 (740)	0-8832
2008	---	---	---	---	---	---	20 (66.7)	0-455	---	---	---	---	---	---	231.7 (832.7)	0-5821
2009	2.7 (22.6)	0-211	---	---	---	---	11.9 (58)	0-592	---	---	---	---	---	---	76.7 (415.9)	0-4607
2010	0.6 (3.8)	0-31	0.6 (6.6)	0-74	---	---	1.6 (13.9)	0-147	---	---	---	---	---	---	471 (1156.4)	0-7906
2011	---	---	0.9 (7.8)	0-71	---	---	4.5 (15.3)	0-83	0.1 (1.2)	0-11	0.1 (0.9)	0-8	---	---	171.4 (521.4)	0-3399
2012	---	---	---	---	---	---	3.5 (14.8)	0-102	---	---	---	---	119.9 (819.2)	0-6379	114.3 (784.7)	0-6131
2013	---	---	---	---	---	---	6.6 (16.8)	0-70	---	---	---	---	37.7 (228.7)	0-1628	130.4 (508.5)	0-2880
2014	---	---	---	---	---	---	3.3 (13.1)	0-77	---	---	---	---	1.4 (9.8)	0-72	247.5 (1654)	0-12052
2015	---	---	---	---	---	---	0.9 (3.4)	0-16	---	---	---	---	4.6 (22.9)	0-141	6.4 (20.8)	0-110

year	POL Mean (sd)	POL range	RJC Mean (sd)	RJC range	RJE Mean (sd)	RJE range	RJH Mean (sd)	RJH range	RJM Mean (sd)	RJM range	RJN Mean (sd)	RJN range	RJO Mean (sd)	RJO range	RJU Mean (sd)	RJU range
2004	---	---	3.3 (15.2)	0-129	---	---	1.3 (7.5)	0-54	0.1 (1.6)	0-18	0.3 (3.1)	0-35	---	---	---	---
2005	---	---	0.6 (4.3)	0-40	0.2 (2.3)	0-29	0.4 (3.6)	0-33	0.3 (2.6)	0-29	0.2 (2.5)	0-32	---	---	---	---
2006	---	---	2.7 (14.9)	0-155	---	---	1.3 (10.3)	0-109	0.4 (3.2)	0-29	1.2 (8.8)	0-103	---	---	---	---
2007	---	---	4.8 (18.6)	0-141	---	---	0.1 (0.7)	0-8	0.1 (1.3)	0-16	0.8 (7.2)	0-82	---	---	0.1 (0.8)	0-10
2008	---	---	2.1 (10.7)	0-82	---	---	---	---	1.6 (11.7)	0-113	2.3 (18.5)	0-160	---	---	---	---
2009	---	---	1.4 (7.4)	0-71	---	---	---	---	0.2 (2)	0-19	---	---	---	---	0.2 (1.8)	0-21
2010	---	---	2.8 (13.7)	0-107	---	---	0.2 (2.7)	0-31	0.7 (6)	0-64	---	---	0.1 ()1.1	0-12	---	---
2011	---	---	3.5 (11.8)	0-83	---	---	---	---	0.6 (3.8)	0-29	---	---	---	---	---	---
2012	---	---	1.2 (7.3)	0-54	---	---	---	---	---	---	---	---	---	---	---	---
2013	---	---	1.9 (8.7)	0-55	---	---	0.4 (2.9)	0-21	0.7 (4.9)	0-35	---	---	---	---	---	---
2014	3.2 (22.9)	0-165	3.6 (14)	0-91	---	---	---	---	---	---	2.4 (12)	0-65	---	---	---	---
2015	---	---	1.9 (10.5)	0-73	---	---	---	---	---	---			---	---	---	---

year	ROA Mean (sd)	ROA range	SBR Mean (sd)	SBR range	SHO Mean (sd)	SHO range	SOL Mean (sd)	SOL range	SQC Mean (sd)	SQC range	SQE Mean (sd)	SQE range	SQM Mean (sd)	SQM range	SQU Mean (sd)	SQU range
2004	0.3 (3.6)	0-41	---	---	14.4 (82.9)	0-812	---	---	7.6 (83.6)	0-939	1.2 (13.9)	0-156	7.7 (26.2)	0-188	0.4 (4.5)	0-50
2005	3.3 (20.3)	0-216	---	---	8.1 (73.9)	0-963	0.4 (3.3)	0-35	---	---	---	---	2.6 (23.3)	0-290	---	---
2006	0.3 (3.3)	0-36	0.5 (5.3)	0-72	1.8 (10.1)	0-109	---	---	---	---	---	---	---	---	---	---
2007	1.8 (9.9)	0-73	0.3 (2.5)	0-24	2.1 (13.7)	0-115	---	---	0.1 (1.6)	0-21	---	---	0.5 (4.7)	0-58	---	---
2008	0.3 (2.2)	0-23	---	---	0.7 (6.5)	0-68	---	---	---	---	---	---	0.2 (2.1)	0-23	---	---
2009	0.4 (5.1)	0-60	---	---	2.7 (27.8)	0-321	---	---	---	---	---	---	---	---	---	---
2010	---	---	---	---	5.7 (57.1)	0-637	---	---	0.8 (6.5)	0-63	---	---	---	---	0.8 (6.4)	0-64
2011	---	---	---	---	---	---	---	---	3.7 (17.3)	0-122	---	---	0.7 (4.7)	0-36	8.3 (48.4)	0-432
2012	---	---	---	---	---	---	0.9 (6.9)	0-54	2.2 (16.6)	0.130	---	---	---	---	1.5 (10.9)	0-85
2013	---	---	---	---	0.6 (4.1)	0-29	---	---	9.8 (35.9)	0-220	---	---	0.8 (5.4)	0-38	---	---
2014	1.2 (6)	0-37	---	---	---	---	---	---	---	---	---	---	---	---	13.7 (77.9)	0-563
2015	1 (7)	0-49	---	---	3.1 (21)	0-147	---	---	---	---	---	---	---	---	13.9 (83.9)	0-584

Table 11 (cont.)

	SYC		TDQ		TSU		VMA		WHB		WHG	
year	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range	Mean (sd)	range
2004	12.1 (33.7)	0-207	6.1 (37.4)	0-388	---	---	266.8 (953.7)	0-8032	929.1 (3794.4)	0-29195	---	---
2005	14 (59.3)	0-698	1.9 (17.4)	0-216	---	---	353.4 (1404)	0-12236	487.4 (2340.3)	0-17469	---	---
2006	16 (61.7)	0-734	---	---	0.1 (1.8)	0-25	1015.5 (3564.9)	0-24688	434.9 (2528.6)	0-27962	---	---
2007	17.6 (55.6)	0-380	0.7 (8.7)	0-111	---	---	1218.7 (3073.8)	0-26405	248.8 (1159.1)	0-12833	0.1 (1.8)	0-23
2008	23.7 (59.4)	0-422	---	---	---	---	2091 (4838)	0-34187	26.6 (83.2)	0-479	---	---
2009	15.3 (42)	0-266	---	---	---	---	1395.8 (4595.5)	0-36464	619.2 (2996.7)	0-24880	---	---
2010	12.7 (39.1)	0-335	---	---	---	---	4127.9 (9210.3)	0-37845	1133.4 (4367.7)	0-31342	---	---
2011	36.7 (76.6)	0-547	---	---	---	---	614.7 (1191.6)	0-5613	233.5 (706.3)	0-3616	---	---
2012	8.6 (20.2)	0-102	0.2 (1.8)	0-14	---	---	314.6 (896.8)	0-4633	459.3 (1648.7)	0-11832	---	---
2013	17.5 (46)	0-231	---	---	---	---	375.1 (980.2)	0-5405	519 (2281.1)	0-12290	---	---
2014	34.5 (66.5)	0-282	8.9 (45.7)	0-324	---	---	10 (50)	0-359	774.2 (3357.1)	0-22728	---	---
2015	13.4 (38)	0-179	---	---	---	---	49.7 (238.2)	0-1590	1141.7 (2085.4)	0-11520	---	---

Table 12 – Summary of onboard sampled species lengths from discards in the OTB_CRU fishery, during the period 2004-2015; in bold, number of measured individuals (n) above 200; SD: Standard Deviation See Table 1 for species codes.

ICES WG	3-alpha code	n	Mean	SD	Range
WGDEEP	BSF	20	56.2	13.8	30-87
	RNG	15	7.0	4.6	4-23
	ORY	11	8.2	1.8	5-12
	SBR	4	21.5	2.4	20-25
	GFB	**966**	**17.3**	**7.0**	**6-67**
	TSU	17	11.1	9.7	2.5-42
WGBIE	LDB	415	13.3	4.8	4-77
	MEG	11	11.0	2.5	7-15
	ANK	23	23.5	10.8	5-44
	MON	24	22.7	16.7	5-70
	HKE	**8880**	**18.1**	**5.2**	**4-48**
	NEP	**1535**	26.1	4.1	9-70
	SOL	1	14.0	--	14
WGCEPH	OUW	2	5.5	0.7	5-6
	SQC	2	12.0	11.3	4-20
	SQM	77	15.7	8.5	4.5-40.5
	OMZ	1	27.0	--	27
	SQE	13	15.8	10.7	3.5-30
	TDQ	106	9.5	4.9	2.5-29
	EOI	**787**	8.0	2.2	2-22.5
	EDT	98	7.5	2.0	3.5-11.5
	OQD	1	10	--	10
	OCC	27	9.4	3	4-15.5
	ROA	**279**	**4.0**	**2.2**	**0.5-25**
	EJE	84	4.8	0.8	3-7
	CTC	19	5.2	2.0	1.5-10
	IAR	62	5.5	1.6	2.5-12.5
WGEF	GUQ	7	32.0	6.5	20-39
	CYO	4	39.3	8.5	35-52
	SCK	2	51.5	3.5	49-54
	GAG	8	17.3	4.6	13-25
	SHO	**2185**	**23.5**	**10.5**	**5-86**
	RJN	6	13.3	2.6	9-16
	SMD	1	48.0	--	48
	RJH	3	18.3	7.6	13-27
	RJC	23	21.5	8.7	12-44
	RJM	3	33.0	11.5	24-46
	SYC	**467**	**29.3**	**12.4**	**4-60**
	RJY	5	20.3	7.9	14-32
	RJO	4	22.3	3.8	19-26
	RJI	9	20.6	6.8	12-32
	JAI	1	12.0	--	12
	PLS	3	35.7	8.1	27-43
	TTR	2	43.0	31.1	21-65
	TTO	1	29.0	--	29
	TTV	4	26.8	1.7	25-29
	GUP	6	44.8	41.9	17-127
	DCA	101	32.2	10.6	17-90
	SDU	5	28.4	2.2	25-31
	SHL	23	11.3	8.4	2.5-24
	SYR	10	42.7	14.9	11.5-62
WGHANSA	ANE	47	15.0	1.3	12-17.5
	HOM	**658**	**27.1**	**4.6**	**5-40**
	PIL	1	20.0	--	20
WGWIDE	BOC	**3240**	**11.3**	**1.4**	**1.5-15.5**
	MAC	**632**	**21.8**	**3.0**	**14-33**
	WHB	**21591**	**20.7**	**4.2**	**9-38**
WGNEW	GUR	1	15.0	--	15
	GUU	1	22.0	--	22
	MUR	7	23.1	3.0	20-28
OTHER	BIB	2	24.5	0.7	24-25
	JAA	**1394**	**22.3**	**5.2**	**11-45**
	VMA	**420**	**25.0**	**3.7**	**16-42**

Table 13 - Summary of onboard sampled species lengths from discards in the OTB_DEF fishery, during the period 2004-2015; in bold, number of measured individuals (n) above 200; SD: Standard Deviation. See Table 1 for species codes.

ICES WG	3-alpha code	n	Mean	SD	Range
WGDEEP	BSF	10	56.1	13.0	40-79
	ARG	2	15.5	0.7	15-16
	SBR	6	17.5	2.6	15-21
	GFB	39	19.9	6.7	9-32
	TSU	1	13.0	--	13
WGBIE	GUG	53	17.5	3.7	11-27
	LDB	196	14.2	3.7	7-31
	MEG	10	16.9	3.3	12-22
	ANK	6	31.7	14.1	15-52
	MON	10	31.6	19.4	11-80
	WHG	1	19.0	--	19
	HKE	**19424**	**17.1**	**5.2**	**3-50**
	POL	6	9.7	0.8	9-11
	SOL	4	17.5	8.8	10-30
WGCEPH	SQM	49	10.6	3.7	5-29
	SQE	4	10.9	2.5	7.5-13
	TDQ	31	9.4	5.3	3.5-34
	EOI	135	6.7	2.2	3-15
	EDT	23	6.7	1.2	5-9.5
	OQD	1	5.5	--	5.5
	OCC	141	7.9	2.3	2.5-13
	ROA	27	3.6	1.2	1-5.5
	EJE	**336**	**4.0**	**1.3**	**1.5-16.5**
	CTC	37	4.5	1.7	1.5-10
	IAR	104	5.3	1.6	2.5-12.5
WGEF	SHO	118	28.7	9.2	15-45
	RJN	17	37.0	9.8	19-51
	RJH	20	35.4	10.5	20-60
	RJC	99	31.3	8.6	17-55
	RJM	20	33.2	9.0	13-50
	RJU	2	18.0	5.7	14-22
	SYC	**695**	**34.2**	**7.8**	**8-54**
	RJO	1	46.0	--	46
	RJE	1	23.0	--	23
	JAI	29	31.9	8.7	12-51
	DCA	1	49.0	--	49
WGHANSA	ANE	**483**	**15.0**	**1.8**	**1.5-18.5**
	HOM	**3597**	**10.9**	**3.3**	**5-36**
	PIL	**7443**	**18.5**	**2.1**	**7.5-25**
WGWIDE	BOC	**12648**	**11.0**	**1.5**	**3-19.5**
	MAC	**4231**	**21.7**	**2.7**	**11-42**
	WHB	**14880**	**17.1**	**2.6**	**5-33**
WGNEW	GUR	186	17.9	4.3	10-31
	GUU	133	14.7	5.2	4-27
	MUR	4	17.0	3.9	12-21
OTHER	BIB	**2559**	**11.9**	**2.6**	**4-26**
	JAA	**25219**	**18.2**	**3.4**	**4-42**
	VMA	**20849**	**21.3**	**2.8**	**12-43**

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