2 Northeast Atlantic Mackerel

2.1 ICES Advice and International Management Applicable to 2014

From 2001 to 2007 the internationally agreed TACs covered most of the distribution area of the northeast Atlantic mackerel. Since 2008, no agreement has been reached among the Coastal States on the sharing of the mackerel quotas. An overview of the declared quotas and transfers for 2014, as available to WGWIDE, is given in the text table below. Total removals of mackerel are expected to be approximately 1.4 Mt in 2014, exceeding the recommended upper catch limit for 2014 by about 390 kt.

2014 quota component	Expected catch amount (t)
EU (incl. Swedish quota)	611205
- Spanish payback	-9747
- Other EU payback	-6568
Norway	279115
Russia	116700
Iceland	147721
- Iceland transfer from 2013 -> 2014	6908
Faroes	156240
Greenland	90000
Discards	4664
Total	1396238

The quota figures and transfers in the text table above were based on various national regulations, official press releases, and discard estimates.

Various international and national measures to protect mackerel are in operation throughout the mackerel catching countries. Refer to Table 2.2.4 for an overview.

2.2 The Fishery

2.2.1 Fleet Composition in 2013

A description of the fleets operated by the major mackerel catching nations is given in Table 2.2.1.

The total fleet can be considered to consist of the following components:

Freezer trawlers. These are commonly large vessels (up to 150 m) that usually operate a single mid-water pelagic trawl, although smaller vessels may also work as pair trawlers. These vessels are at sea for several weeks and sort and process the catch on board, storing the mackerel in frozen 20 kg blocks. The Dutch, German and the majority of the French and English fleets consist of these vessels which are owned and operated by a small number of Dutch companies. They fish in the North Sea, west of the UK and Ireland and also in the English Channel and further south along the western coast of France. The Russian summer fishery in subarea IIa is also prosecuted by freezer trawlers and partly the Icelandic fishery in Va and XIVb.

Purse Seiners. The majority of the Norwegian catch is taken by these vessels, targeting mackerel overwintering close to the Norwegian coastline. The largest vessels (>20m) are RSWs, storing the catch in tanks containing refrigerated seawater. Smaller purse seiners use ice to chill their catch which they take on prior to departure. A purse seine

fleet is also the most important component of the Spanish fleet. They are numerous and target mackerel early in the year close to the northern Spanish coast. These are dryhold vessels, chilling the catch with ice. Denmark also has a purse seine fleet operating in the northern North Sea.

Pelagic Trawlers. These vessels vary in size from 20-100 m and operate both individually and as pairs. The largest of the pelagic trawlers use RSW tanks for storage. Iceland, Greenland, Faroes, Scotland and Ireland all fish mackerel using pelagic trawlers. Scottish and Icelandic vessels mostly operate singly whereas Ireland and Faroes vessels tend to use pair trawls. Spain also has a significant trawler fleet which target mackerel with a demersal trawl in areas VIII and IXaN.

Lines and Jigging. Norway, England have handline fleets operating inshore in the Skagerrak (Norway) and in area VIIe/f (England) around the coast of Cornwall, where other fishing methods are not permitted. Spain also has a large artisanal handline fleet as do France and Portugal. A small proportion of the total catch reported by Scotland (IVa and IVb) and Iceland (Va) is taken by a handline fleet.

Gillnets. Gillnet fleets are operated by Norway and Spain.

2.2.2 Fleet Behaviour in 2013

The most important changes in recent years are related to the geographical expansion of the northern summer fishery (areas II, V and XIVb) and changes in southern waters due to stricter TAC compliance by Spanish authorities. Fishing in the North Sea and west of the British Isles followed a traditional pattern, targeting mackerel on their spawning migration from the Norwegian deep in the northern North Sea, westwards around the north coast of Scotland and down the west coast of Scotland and Ireland.

Fishing by Faroese vessels has increased dramatically in recent years and has shifted exclusively to pair trawling. A small proportion of the Faroese quota is granted to smaller, traditionally demersal trawlers (using pair trawls).

The Russian freezer trawler fleet operates over a wide area in Northern waters. This fleet targets herring and blue whiting in addition to mackerel. In the third quarter the Russian vessels took the bulk of their catch from the international waters of area IIa. Smaller catches were also taken further south, between the Faroes and Iceland.

Total catches from Icelandic vessels were similar to those in 2012 with the majority of the catch taken in Va in waters south and west of Iceland. There was a slight increase in catch taken from area XIVb. Also targeting mackerel in area XIVb were Greenlandic vessels. This fleet has increased its catch rapidly and in 2012 caught over 50kt of mackerel with the majority from an area 30—34 degrees west. Some small catches were taken even further west close to the Greenlandic south coast.

An agreement between Norway and EU permitting reciprocal access was negotiated after 2009 when Norwegian vessels were curtailed in catching their full quota due to an earlier than expected migration.

In 2010 Spanish authorities introduced a new TAC allocation and control regime which resulted in closure of the mackerel fishery in quarter 2 to the purse seine and artisanal fleets when the majority of their respective quotas were exhausted. As in 2013, due primarily to changes in the timing of the migration, the fishery was closed in late March in 2013. Since the turn of the century the Spanish fishery has shifted forward by approximately 30 days. In addition, part of the purse seiner fleet from the inner part of

the Bay of Biscay is using hand lines instead, mainly due to the higher market prize of this fishing method.

2.2.3 Recent Changes in Fishing Technology and Fishing Patterns

Northeast Atlantic mackerel, as a widely distributed species, is targeted by a number of different fishing métiers. Most of the fishing patterns of these métiers remained unchanged during the most recent years, although the timing of the spawning migration and geographical distribution can change from year to year and this affects the fishery in various areas.

Recent changes are notable for two areas and métiers in particular:

In 2010 the Faroese fleet switched from purse-seining in Norwegian and EU waters to pair trawling in the Faroese area. The Faroese fleet used to catch their mackerel quota in Divisions IVa and VIa during September-October with purse-seiners. However, as no agreement was obtained among the Coastal States since 2009, the mackerel quota has been taken in Faroese waters during June-October by the same fleet using pair trawls. The mackerel distribution is more scattered during summer and pair trawls seem to be effective in such circumstances.

Also targeting summer feeding mackerel, Icelandic vessels have increased effort and catch dramatically in recent years from 4kt in 2006 to approximately 150kt annually since 2011. This fishery operates over a wide area E, NE, SE, S and SW off Iceland. Since 2011 there has been less fishing activity to the north and north-east and an increase in catches taken south and west of Iceland. Greenland has reported increased catches from area XIVb since 2011.

Part of the northeast Atlantic mackerel population migrates towards the southern spawning area (ICES Division VIIIc - Cantabrian Sea) at the end of winter. Catch, survey and biological data indicate a forward shift in timing of spawning migration of the southern component of mackerel in the last decade (Punzón and Villamor 2009; Villamor *et al.*WD 2011). This temporal shift of about one month in the migration pattern of mackerel to the southern area might be linked to the fact that average temperatures in this area have been trending higher during winter-spring in the last few years.

2.2.4 Regulations and Their Effects

An overview of the major existing technical measures, TACs, effort controls and management plans are given in Table 2.2.4. Note that there may be additional existing international and national regulations that are not listed here.

Between 2010 and 2013 no Coastal State Agreement/NEAFC Agreement was in place and no overall international regulation on catch limitation was in force. In 2014 an *ad hoc* agreement was reached but only involving the EU, Faroes and Norway.

Management aimed at a fishing mortality in the range of 0.15—0.20 in the period 1998—2008. The current management plan aims at a fishing mortality in the range 0.20—0.22. The fishing mortality realised during 1998—2008 was in the range of 0.27 to 0.46. Implementation of the management plan resulted in reduced fishing mortality and increased biomass. Since 2008 catches have greatly exceeded those given by the plan.

The measures advised by ICES to protect the North Sea spawning component aim at setting the conditions for making a recovery of this component possible. Before the late 1960s, the North Sea spawning biomass of mackerel was estimated at above 3 million

tonnes. Due to overexploitation, recruitment has failed since 1969, leading to a decline in the size of this component. The North Sea spawning component has increased since 1999, but continued protection is needed as it is still considered to be very small.

The closure of the mackerel fishery in Divisions IVb,c and IIIa throughout the whole year is designed to protect the North Sea component in this area and also the juvenile western mackerel which are numerous, particularly in Division IVb,c during the second half of the year. This closure has unfortunately resulted in increased discards of mackerel in the non-directed fisheries (especially horse mackerel fisheries) in these areas as vessels at present are permitted to take only 10% of their catch as mackerel bycatch. No data on the actual amount of mackerel taken as bycatch are available, but the reported landings of mackerel in Divisions IIIa and IVb,c from 1997 onwards might seriously underestimate catches due to discarded bycatch.

The advised closure of Division IVa for fishing during the first half of the year is based on the perception that the western mackerel enter the North Sea in July/August, and stay there until December before migrating to their spawning areas. Updated observations taken in the late 1990s suggested that this return migration actually started in mid- to late February. This was believed to result in large-scale misreporting from the northern part of the North Sea (Division IVa) to Division VIa. Recent EU TAC regulations have permitted some small quotas in IIIa and IVb,c. In the same regulation it is also stated that within the limits of the quota for the western component (VI, VII, VIIIa,b,d,e, Vb (EU), IIa (non EU), XII, XIV), a certain quantity of this stock may be caught in IVa but only during the periods 1 January to 15 February and 1 September to 31 December.

In the southern area a Spanish national regulation affecting mackerel catches of Spanish fisheries has been implemented since 2010 distributing the Spanish catch quota by gear. In 2013 the different fisheries were opened at the end of February (28.37% quota for trawlers, 33.85% for purse seiners and 36.5% for artisanal fisheries and the remaining quota for the Gulf of Cadiz fisheries (0.78%) and NEAFC northern areas (0.50%)), and closed at the end of March. Nevertheless, a 7% of the assigned quota for purse seiners and artisanal fleets was left for the second half of the year. This year Spanish mackerel fishing opportunity in VIIIc and IXa was established at 17 100 mt resulting from the original quota (22 709 mt), reduced by 8 226 mt due to the scheduling payback quota due to overfishing of the mackerel quota allocated to Spain in 2010 (Commission Regulation (EU) No 165/2011), and by the addition of 2 600 mt due to the flexible quota regulation and 17 from the VIIIa,b quota.

Within the area of the southwest Mackerel Box off Cornwall in southern England only handliners are permitted to target mackerel. This area was set up at a time of high fishing effort in the area in 1981 by Council Regulation to protect juvenile mackerel, as the area is a well-known nursery. The area of the box was extended to its present size in 1989.

Additionally, there are various other national measures in operation in some of the mackerel catching countries.

A landing obligation is due to come into force in 2015 for all EU vessels. The details of this regulation remain to be finalized at the time of writing.

2.3 Catch Data

2.3.1 WG Catch Estimates

The total estimated Working Group catch for 2013 was 931732t, an increase of 39379t on the estimated catch in 2012. Catches increased substantially from 2006-2010 and have averaged 910kt since 2011. Minor revisions to earlier years were incorporated into the time series as a result of the data review carried out as part of the benchmark exercise (ICES CM 2014 / ACOM:43).

The combined 2013 TACs arising from agreements and autonomous quotas amount to 895 336t. The Working Group catch estimate (931732t) represents an overshoot of approximately 4%. The combined fishable TAC for 2014, as best ascertained by the Working Group (see Section 2.1), amounts to 1396238t.

Catches reported for 2013 and in previous Working Group reports are considered to be best estimates. In most cases, catch information comes from official logbook records. Other sources of information include catch processors. Some countries provide information on discards and slipped catch from observer programs, logbooks and compliance reports. In several countries discarding is illegal. Spanish data is based on the official data supplied by the Fisheries General Secretary (SGP) but supplemented by scientific estimates which are recorded as unallocated catch in the WG estimates (see Section 1.3.7)

The text table below gives a brief overview of the basis for the working group catch estimates.

Country	Official Log Book	Other Sources	Discard Information
Denmark	Y (landings)	Y (sale slips)	Y
Faroe1	Y (catches)	Y (coast guard)	NA
France	Y (landings)		N
Germany	Y (landings)		Y
Greenland	Y (catches)		Y
Iceland1	Y (landings)		NA
Ireland	Y (landings)		Y
Netherlands	Y (landings)	Y	Y
Norway1	Y (catches)		NA
Portugal		Y (sale slips)	Y
Russia1	Y (catches)		NA
Spain	Y	Y	Y
Sweden	Y (landings)		N
UK	Y (landings)	Y	N

[1]For these nations a discarding ban is in place such that official landings are considered to be equal to catches.

The Working Group considers that the estimates of catch are likely to be an underestimate for the following reasons:

Estimates of discarding or slipping are either not available or incomplete for most countries. Anecdotal evidence suggests that discarding and slipping can occur for a number of reasons including high-grading (fish weighing more than 600g attracts a premium price), lack of quota, storage or processing capacity and when mackerel is taken as by-catch.

Confidential information suggests substantial under-reported landings for which numerical information is not available for most countries. Recent work has indicated considerable uncertainty in true catch figures (Simmonds *et al.*2010) for the period studied.

Estimates of the magnitude and precision of unaccounted mortality suggests that, on average for the period prior to 2007, total catch related removals were equivalent to 1.7 to 3.6 times the reported catch (Simmonds *et al.*2010).

Reliance on logbook data from EU countries implies (even with 100% compliance) a precision of recorded landings of 89% from 2004 and 82% previous to this (Council Regulation (EC) Nos. 2807/83 & 2287/2003). Given that over reporting of mackerel landings is unlikely for economic reasons, the WG considers that, where based on logbook figures, the reported landings may be an underestimate of up to 18% (11% from 2004). Where inspections were not carried out there is a possibility of a 56% under reporting, without there being an obvious illegal record in the logsheets. Without information on the percentage of the landings inspected it is not possible for the Working Group to evaluate the underestimate in its figures due to this technicality. EU landings represent about 65% of the total estimated NEA mackerel catch.

The accuracy of logbooks from countries outside the EU has not been evaluated by WGWIDE. Monitoring of logbook records is the responsibility of the national control and enforcement agencies.

The total catch as estimated by the Working Group is shown in Table 2.3.1.1. It is broken down by ICES area and illustrates the development of the fishery since 1969.

Discard Estimates

With a few exceptions, estimates of discards have been provided to the Working Group for the areas VI, VII/VIIIa,b,d,e and III/IV (see Table 2.3.1.1) since 1978. Historical discard estimates were revised during the data compilation exercise undertaken for the benchmark assessment (ICES CM 2014 / ACOM:43). The Working Group considers the estimates for these areas as incomplete. In 2013 discard data for mackerel were provided by seven nations: The Netherlands, Germany, Ireland, Spain, Portugal, Greenland and Denmark. Total discards amounted to 4 664t from these nations (mainly Netherlands and Spain). The German program consisted of 2 mackerel-directed trips on pelagic freezer trawlers. The Danish discards apply only to observations from some demersal fisheries. The Irish pelagic discard program included 30 trips (for all pelagic species).

Age-disaggregated data was made available to the Working Group from Portugal, Spain and Germany indicating that the majority of discarded fish were age 0 or 1 in areas VIII and IX. In area VII, particularly in the first semester, the discarded catch consisted of a wider range of ages although 95% of the discarded catch was age 6 or younger.

Discarding of small mackerel has historically been a major problem in the mackerel fishery and was largely responsible for the introduction of the south-west mackerel box. In the years prior to 1994 there was evidence of large-scale discarding and slipping of small mackerel in the fisheries in Division IIa and Sub-area IV, mainly because of the very high prices paid for larger mackerel (>600g) for the Japanese market. This factor was put forward as a possible reason for the very low abundance of the 1991 year class in the 1993 catches. Anecdotal evidence from the fleet suggests that since 1994, discarding/slipping has been reduced in these areas.

In some of the horse mackerel directed fisheries e.g. those in Subareas VI and VII mackerel is taken as by-catch. Reports from these fisheries have suggested that discarding may be significant because of the low mackerel quota relative to the high horse mackerel quota - particularly in those fisheries carried out by freezer trawlers in the fourth quarter. The level of discards is greatly influenced by the market price and by quotas.

2.3.2 Distribution of Catches

The fishery has changed significantly in the recent past. Of the total catch in 2013, Norway accounted for the greatest proportion (18%) followed by Iceland (16%), Faroe (15%) and Scotland (14%). In the absence of an international agreement, Faroe, Greenland, Iceland and Russia declared unilateral quotas in 2013. Russia, Ireland and Greenland all had catches over 50kt with Danish, Dutch, French and Spanish catches in 2013 of greater than 20kt. Spanish catches have reduced significantly in recent years, primarily due to stricter enforcement.

In 2013, catches in the northern areas (II, V, XIV) amounted to 464 495 t, an increase of 17 293t on the 2012 catch and more than 300 000 t greater than the catch in 2009 (see Table 2.3.2.1). Faroese and Russian catches increased significantly although Norwegian catches decreased by 77kt as a greater proportion of the Norwegian quota was taken in area IVa than in 2012. The wide geographical distribution of the fishery noted in previous years has continued with large catches (69kt) now taken in area XIVb by Iceland and Greenland.

The time series of catches by country from the North Sea, Skagerrak and Kattegat (Subarea IV, Division IIIa) is given in Table 2.3.2.2. Catches in 2013 amounted to 261 254 t, an increase on 2012 corresponding to the large Norwegian catches as outlined above. Small catches were also reported in areas IIIb, c and d.

Catches in the western area (Subareas VI,VII and Divisions VIIIa,b,d and e) were slightly lower at 183 795 t and remain close to the long term average. These catches are detailed in Table 2.3.2.3.

Table 2.3.2.4 details the catches in the southern areas (Division VIIIc and Subarea IXa) which are taken almost exclusively by Spain and Portugal. The reported catch of 22 188t is the lowest in recent times and substantially below the 52 194t and 107 748t in 2010 and 2009 respectively. The reduced catch is primarily a result of stricter TAC compliance by Spanish administrators. A new regulation in 2010 allocated quota between the fleets (trawl, purse seine and artisanal).

The distribution of catches by quarter (%) is described in the text table below:

Year	Q1	Q2	Q3	Q4	Year	Q1	Q2	Q3	Q4
1990	28	6	26	40	2002	37	5	29	28
1991	38	5	25	32	2003	36	5	22	37
1992	34	5	24	37	2004	37	6	28	29
1993	29	7	25	39	2005	46	6	25	23
1994	32	6	28	34	2006	41	5	18	36
1995	37	8	27	28	2007	34	5	21	40
1996	37	8	32	23	2008	34	4	35	27
1997	34	11	33	22	2009	38	11	31	20
1998	38	12	24	27	2010	26	5	54	15
1999	36	9	28	27	2011	22	7	54	17
2000	41	4	21	33	2012	22	6	48	24
2001	40	6	23	30	2013	19	5	52	24

The quarterly distribution of catch in 2013 is similar to 2010-2012 with the Northern summer fishery in Q3 accounting for the greatest proportion of the total catch. Fisheries in area IIa extended into quarter 4 to a greater extent than in previous years. The proportion of the catch taken in quarter 1 is the lowest in the time series.

Catches per ICES statistical rectangle are shown in Figures 2.3.2.1 to 2.3.2.4. It should be noted that these figures are a combination of official and WG catches and may not indicate the true location of the catches or represent the location of the entire stock. These data are based on catches reported by all the major catching nations and represents almost the entire WG catch.

- First quarter 2013 (178 837 t – 19%)

The distribution of catches in the first quarter is shown in Figure 2.3.2.1. The quarter 1 fishery is similar to that in previous years with the Scottish and Irish pelagic fleets targeting mackerel in VIa, VIIb and VIIj. Substantial catches are also taken by the Dutch owned freezer trawler fleet. The largest catches were taken in area VIa, as in recent years. The Spanish fisheries also take significant catches along the north coast of Spain during the first quarter.

- Second quarter 2013 (47 662 – 5%)

The distribution of catches in the second quarter is shown in Figure 2.3.2.2. The quarter 2 fishery is traditionally the smallest and this was also the case in 2013. The most significant catches occurred towards the end of the quarter in the northern areas by Icelandic, Norwegian and Russian fleets. Large catches south of Iceland, midway between Iceland and Faroe and to the southeast of Faroe were reported.

- Third quarter 2013 (482 216 – 52%)

Figure 2.3.2.3 shows the distribution of the quarter 3 catches. Large catches were taken throughout areas IIa (Russian, Norwegian vessels), IVa (Norwegian, Scottish vessels), Vb (Faroese vessels) and Va (Icelandic vessels). The fishery extended further west than in 2012 with increased catches reported in area XIVb, particularly by Greenland where catches were on a par with those from SE Iceland, north of the Faroes and around the Shetland Isles.

- Fourth quarter 2013 (223 048t – 24%)

The fourth quarter distribution of catches is shown in Figure 2.3.2.4. The summer fishery in northern waters has largely finished, with very large catches taken by Norway, Scotland and Ireland around the Shetland Isles and along the north coast of Scotland. The pattern of catches is very similar to that reported in recent years.

2.3.3 Catch-at-Age

The 2013 catches in number-at-age by quarter and ICES area are given in Table 2.3.3.1. This catch in numbers relates to a total Working Group catch of 931732t. These figures have been appended to the catch-at-age assessment table (see Table 2.6.1.1).

Age distributions of commercial catch were provided by Denmark, England, Germany, Greenland, Faroes, Iceland, Ireland, the Netherlands, Norway, Portugal, Russia, Scotland and Spain. There remain gaps in the age sampling of catches, notably for French, Swedish and Northern Irish fleets.

Catches for which there were no sampling data were converted into numbers-at-age using data from the most appropriate fleets. Accurate national fleet descriptions are required for the allocation of sample data to unsampled catches. The sampling coverage is further discussed in Section 1.3.

The percentage catch numbers-at-age by quarter and area are given in Table 2.3.3.2.

Over 75% of the catch in numbers consists of 3—7 year olds with all year classes between 2007 and 2011 contributing between 13% and 17% of the total catch by number.

In subareas VIIa,d,e,f,g and h, young mackerel (1—3 year olds) account for over half the catch by number although these areas are relatively lightly exploited. In subareas VIIIc and IXa the catch is also dominated by juvenile fish.

2.3.4 Effort and Catch per Unit Effort

The effort and catch-per-unit-effort from the commercial fleets is only provided for some fleets in the southern area.

Table 2.3.4.1 and Figure 2.3.4.1 show the fishing effort data from Spanish commercial fleets. The table includes effort from Santoña and Santander handline fleets (Sub-division VIIIc East) for which mackerel is the target species from February to May, and annual effort from A Coruna trawl fleet (Subdivision VIIIc West); however, 2013 data were not available for this last fishing fleet. Spanish fleet effort figure shows a significant decrease in 2003 due to the catastrophe of the Prestige oil spill. Hand-line fleet effort showed an increasing trend from 1993 to 1998 but since then the effort, excluding the ban due to the Prestige, shows a clear declining trend, more relevant for the Santoña fleet, which could be related with the new catch regulations.

Figure 2.3.4.2 and Table 2.3.4.2 show the CPUE corresponding to the Spanish fleets referred above. There is clear drop in the handline fleets CPUE since 2011 which could be related with the daily quota established for 2011. On the contrary the trawler fleet from A Coruña shows an increasing trend in its CPUE since 2007.

2.4 Biological Data

2.4.1 Length Composition of Catch

The mean lengths-at-age in the catch per quarter and area for 2013 are given in Table 2.4.1.1.

For the most common ages which are well sampled there is little difference to recent years. The length of juveniles is traditionally rather variable. Lengths recorded in 2013 for ages 0—2 are significantly greater than those recorded in 2012 which in turn was lower than 2011. The rapid growth of 0-group fish and the variability due to sampling is likely to be the most significant factor. In recent years, more juvenile fish have been sampled in northern waters. Previously, these fish were only caught in the southern fishery. A slight reduction in length for age 3 and above is consistent with an observed reduction in catch weight.

Length distributions of the 2013 catches were provided by England, Faeroes, Iceland, Ireland, Germany, Greenland, the Netherlands, Norway, Portugal, Russia, Scotland and Spain. The length distributions were available from most of the fishing fleets and account for over 90% of the catches. These distributions are only intended to give an indication of the size of mackerel caught by the various fleets and are used as an aid in allocating sample information to unsampled catches. Length distributions by country and fleet for 2013 catches are given in Table 2.4.1.2. They show clear differences between quarters, particularly for the Spanish, Portuguese and English fleets.

2.4.2 Weights-at-Age in the Catch and Stock

The mean weights-at-age in the catch per quarter and area for 2013 are given in Table 2.4.2.1. The trend towards lighter weights-at-age for the most age classes (except 0 to 2 years old) starting around 2005 continued in 2013 (Figure 2.4.2.1). These changes in weight-at-age are consistent with the changes noted in length in Section 2.4.1.

The WG used weights-at-age in the stock calculated as the average of the weights-at-age in the three spawning components, weighted by the relative size of each component (as estimated by the 2013 egg survey for the southern and western components and the 2011 egg survey for the North Sea component). Mean weights-at-age for the western component are estimated from Dutch, Irish and German commercial catch data combined with fish measured during the 2013 mackerel egg survey and during the Norwegian tagging survey. Only samples coming from areas and periods corresponding to spawning, as defined at the 2014 benchmark assessment (ICES CM 2014/ACOM:43) and laid out in the stock annex, were used to compute the mean weights-at-age in the western spawning component. For the North Sea spawning component, mean weights-at-age were calculated from samples of the UK and Dutch commercial catches collected from areas IVa and IVb in the second quarter. Stock weights for the southern component, are based on samples from the Portuguese and Spanish catch taken in VIIIc and IXa in the 2nd quarter of the year, combined with weights derived from data collected on the 2013 mackerel egg survey. The mean weights in the three components and in the stock in 2013 are shown in the text table below.

The decreasing trend in the weights-at-age in the catch, observed since 2005 for fish of age 3 and older, continued in 2013 (Figure 2.4.2.2).

	North Sea Component	Western Component	Southern Component	NEA Mackerel 2013
Age				Weighted mean
0				0.000
1	0.098		0.105	0.1081
2	0.139	0.150	0.133	0.146
3	0.213	0.174	0.196	0.180
4	0.272	0.241	0.263	0.247
5	0.299	0.277	0.297	0.282
6	0.340	0.318	0.323	0.320
7	0.367	0.344	0.334	0.342
8	0.433	0.375	0.355	0.372
9	0.417	0.418	0.391	0.412
10	0.536	0.433	0.456	0.442
11	0.580	0.478	0.556	0.499
12+		0.538	0.474	0.526
Component Weighting	2.86%	74.05%	23.09%	
Number of fish sampled	150	1463	1372	

[1]in the absence of data for age 1 in the western component, the mean over the last 3 years for this component was used to compute the mean weight in the stock

2.4.3 Natural Mortality and Maturity Ogive

Natural mortality is assumed to be 0.15 for all age groups and constant over time.

The maturity ogive for 2013 was calculated as the average of the ogives of the three spawning components weighted by the relative size of each component calculated as described above for the stock weights. The ogives for the North Sea and Southern components are fixed over time. For the Western component the ogive is updated every year, using maturity data from commercial catch samples collected during the first and second quarters (ICES CM 2014/ACOM:43 and stock annex). The 2013 maturity ogives for the three components and for the mackerel stock are shown in the text table below.

A trend towards later maturation (decreasing proportion mature at age 2) has been observed from the mid-2000s to 2011, followed by quite stable values over the last 3 years (Figure 2.4.3).

Age	North Sea	Western Component	Southern Component	NEA Mackerel
0	0	0	0	0
1	0	0.14	0.02	0.11
2	0.37	0.55	0.54	0.55
3	1	0.98	0.70	0.92
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12+	1	1	1	1
Component Weighting	2.86%	74.05%	23.09%	

2.5 Fishery Independent Data

2.5.1 International Mackerel Egg Survey Index

Mackerel Egg Survey in the Western and Southern areas

The ICES Working Group on Mackerel and Horse Mackerel Egg Surveys (WGMEGS) met in Reykjavik from 7–11 April 2014, chaired by Cindy van Damme (IMARES, the Netherlands) and Finlay Burns (MSS, Aberdeen, Scotland), to finalize the results of the Mackerel and Horse Mackerel Egg Survey in 2013 and to plan the North Sea Mackerel Egg Survey in 2014.

In 2013 the Faroe Islands, Iceland, Portugal, Spain, Scotland, Ireland, the Netherlands, Norway and Germany participated in the survey. Despite technical and weather problems, temporal and spatial coverage was found to be sufficient in order to deliver a reliable estimate of mackerel and horse mackerel annual egg production. The application of an alternating transect survey design enabled survey effort to be deployed over the wide spatial area, necessary due to the continued expansion of the spawning area and season. Despite fewer fecundity and atresia samples being taken than planned, good spatial and temporal distribution of the sampling was achieved, and was sufficient in providing an estimation of realized fecundity.

The estimate of total mackerel egg production was 3.12 *1015 which is an increase of 47% with respect to 2010 (2.12*1015). The analyses of potential fecundity gave a value of 1257 eggs per gram female for mackerel for the western and southern components combined. The overall prevalence of atresia as a percentage of the population was 22% and the potential fecundity lost in the spawning season was 48 eggs /g. This reduced the potential fecundity by 4%. Spawning stock biomass (SSB) for the NEA mackerel stock was estimated using the realized fecundity estimate of 1209 eggs/g female, a sex ratio of 1:1 and a raising factor of 1.08 (ICES, 1987) to convert spawning fish to total fish.

However, it was necessary to revise the 2013 results after the WGMEGS meeting due to two reasons:

1) The egg production was calculated using a formula (Mendiola et al., 2006) for the egg development rate which had not been used before and was therefore calculated inconsistently in comparison to the data points 1992 to 2010 (calculated using the egg development rate by Lockwood *et al.*(1977)).

2) In order to follow the recommendation of the 2014 benchmark workshop on mackerel (ICES CM 2014/ACOM:43) the whole time series was recalculated using a standardized calculation script which triggered some changes in the allocation of some stations in sampling periods. This new time series uses a consistent egg development equation for all surveys 1992-2013.

(see section below "Review of the egg survey data series" for further explanations).

This gave a revised estimate of spawning-stock biomass (SSB) in 2013 of 3.82 (originally 4.29) million tonnes for the western component and 1.21 (1.28) million tonnes for the southern component and a combined estimate of 5.03 (5.57) million tonnes.

Egg Survey in the North Sea

At the beginning of the year Norway decided to withdraw from the 2014 North Sea egg survey. It was not possible to find other participants for replacement leaving the Netherlands to be the sole participant in the 2014 North Sea egg survey. Unfortunately, the Dutch research vessel broke down during the survey. Therefore, the survey was called off and postponed to 2015.

Review of the egg survey data series

In 2014, WGMEGS carried out a revision of the egg production database from 1992 to date, as recommended by the 2014 WKPELA benchmark workshop (ICES CM 2014/ACOM:43). This involved checking the raw data, reviewing criteria for including or excluding data, and procedures followed to process the data, etc.

After this, between WGMEGS and WGWIDE 2014, a new time-series of egg-based SSB was produced where the 1992, 1995 and 2013 data points were revised substantially; these revisions were reviewed during WGWIDE 2014. The original 1992 estimate had not included the egg production from the southern area of the survey so it was corrected to include those data. In addition, the 1992 survey did not cover the entire distribution of the mackerel eggs. It was based on a grid covering a denoted "standard area" where transects were interrupted before reaching two consecutive zero stations. However, WGWIDE decided to retain the 1992 data point despite this shortcoming on the basis that the core of the egg distribution had been covered. The 1995 survey had covered the whole egg distribution (continuing along a transect until two zero stations are reached) and this technique was adopted as the adaptive sampling procedure for the egg survey. However, the calculation of the 1995 estimate reported originally used only data from the standard area corresponding to that used in 1992 (WGMEGS; ICES CM 1996/H:2). The estimate revised in 2014 includes data from the entire surveyed area.

The 2013 SSB estimate was revised substantially from the one presented by WGMEGS 2014 that was used in the previous assessment (for update of the 2014 advice). In the time series provided to the WGWIDE subgroup for updated mackerel advice (ICES CM 2014/ACOM:48) by WGMEGS, the 2013 SSB index was calculated by applying an egg development equation based on a publication by Mendiola *et al.*(2006), whereas for the data points 1992-2010 the Lockwood *et al.*(1977) formulation was implemented. This change in the methodology was not clearly brought to the attention of the 2014 WKPELA benchmark workshop, and only came to the attention of WGWIDE at the

2014 meeting. Changing the methodology in the middle of a time series was not considered acceptable by WGWIDE 2014. The time-series was revised by applying Mendiola's method instead of Lockwood et al.'s consistently for the calculation of all data points. This decision was made after examination of the methods and analyses presented by Mendiola *et al.*(2006) by WGMEGS. The evaluation by WGWIDE supported the WGMEGS decision. Applying Mendiola et al.´s (2006) formula gives slightly higher egg productions due to a shorter observed egg development in comparison to Lockwood *et al.*(1977).

Another reason for the revision of the 2013 SSB is due to the re-allocation of stations to different survey periods because of the required standardization of the calculation procedures. The original estimate was based on the allocation of stations to survey periods according to the initial survey plan whereas the standardized new TAEP re-calculation required all stations, and therefore egg production values, to be allocated according to the period dates as reported in the WGMEGS report for each survey.

In 2013, there was a very late amendment in the timing of one individual survey in period 3 that was undertaken in south and central Biscay during late March and early April of 2013. The survey was due to commence on the 25th March; however, the survey was moved forward at very short notice and commenced on the 22nd March. This brought the first 4 days of the survey within period 2. Due to the number of surveys and participants involved in the MEGS survey this is not an unusual event and during the subsequent analysis of the data the impact of their removal on the total annual egg production (TAEP) was assessed. The very low abundances involved meant that their contribution to the overall TAEP for 2013 was negligible (0.12%) and so in order to minimize disruption to the settled survey plan for period 3 WGMEGS retained the out-of-period stations within period 3 rather than remove them. However, the revised estimate resulted from allocating the data of this specific survey to the correct period in which they were collected. The result was that these stations were moved forward into period 2. The same stations had also been sampled by another survey early on in period 2 which had yielded very large numbers of stage 1 mackerel eggs. By incorporating these very low density stations (previously in period 3) to period 2 (because the average station production is used in each period) it significantly reduced the daily egg production values for these previously high abundance stations, resulting in an overall reduction in SSB as compared to the original estimate used in the assessment to provide the advice update in 2014. Figure 2.5.1.1 shows the reported and revised egg production curves for the Western area of the 2013 survey.

The new and old time series are shown in Figures 2.5.1.2 to 2.5.1.4 and in Table 2.5.1.1. The blue line in Figure 2.5.1.2 represents the input data used for the 2014 WGWIDE assessment.

2.5.2 Recruitment Index

A recruitment index was derived from catch data from the International Bottom Trawl Surveys (IBTS) in Q4. Full documentation can be found in Jansen *et al.*(working document to 2014 WKPELA).

Trawling was done by research vessels from Scotland, Ireland, England and France, collectively known as the international bottom-trawl surveys, in October–December (IBTS Q4). The surveys sample the fish community on the continental shelf and upper shelf slope. IBTS Q4 covers the shelf from Spain to Scotland, excluding the North Sea. Trawling was done at 3.5–4.0 knots. Two trawls deviated substantially from the GOV-type, namely the Spanish BAKA trawl and the Irish trawl that was used from 1998 to

2002. The BAKA trawl had a vertical opening of only 2.1–2.2 m and was fished at only 3 knots. This was substantially less suitable for catching juvenile mackerel and therefore excluded from the analysis. The Irish trawl used in 1998 to 2002 was a GOV trawl in reduced dimensions. The reduced wingspread and trawl speed was accounted for in the model.

Technical problems were encountered during the Scottish fourth quarter survey in 2013, so only approximately 30% of the hauls were taken. These hauls were evenly distributed throughout the survey area. In 2010, the Scottish survey was cancelled. Since 2011, the English survey has been discontinued and the Scottish survey has not consistently covered the area around Donegal Bay.

WGWIDE recommends that the English survey is reinstated and that the Spanish area is surveyed using a GOV-trawl.

A geostatistical log-Gaussian Cox process model (LGC) with spatio-temporal correlations was used to estimate the catch rates of mackerel recruits through space and time. The modelled catch rate surface in 2013 was mapped in Figure 2.5.2.1 (right). The recruits appeared to be distributed further south than the average distribution of the time series Figure 2.5.2.1 (left).

These catch rates were then squared and integrated over the spatial surfaces to produce annual mean catch rates. This was used in the assessment as a relative abundance index of mackerel at age 0 (recruits) – see Table 2.5.2.1 and Figure 2.5.2.2. The cohort from 2013 appears to be the most abundant in the time series. However, supplementary analysis (below) suggest that the 2013 cohort is above average, but not as large as estimated by the Q4 model.

The 2014 WKPELA benchmark workshop (ICES CM 2014 / ACOM:43) recommended further work on extending the Q4-model with data from IBTS Q1 in the North Sea and other northern areas. Further progress of this analysis was presented at the meeting. Most noteworthy was the inclusion of data from first quarter IBTS surveys to cover the important nursery areas in the northern North Sea. Furthermore, the index calculated by the LGC model was benchmarked against a swept-area index derived from the same data. This analysis suggested that the LGC approach was better at extracting the cohort abundance signal than the "raising" method. A WGWIDE subgroup reviewed the new results as described in Jansen *et al.*(under review). WGWIDE regards the LGC implementation as a valid and well documented approach. WGWIDE furthermore regards the addition of the first quarter survey data as an improvement over the version implemented during the 2014 WKPELA benchmark workshop (ICES CM 2014 / ACOM:43). However, the analysis suggested a possible difference in catchability between first and fourth quarter surveys, so this should be further explored before the new index is implemented in the assessment. The preliminary results including data from both Q4 and Q1 suggests that the 2013 cohort is above average, but not as large as estimated by the Q4 model that has been used in this year's assessment.

2.5.3 Ecosystem surveys in the Nordic Seas in July–August (IESSNS index)

Northeast Atlantic Mackerel and Ecosystems

In July-August 2014, four vessels: the chartered trawler/purse seiners M/V "Brennholm", M/V "Vendla" (Norway), M/V "Finnur Fridi" (Faroe Islands), and the research vessel R/V "Arni Friðriksson" (Iceland) participated in the joint ecosystem survey (IESSNS) in the Norwegian Sea and surrounding waters (Nøttestad *et al.*WD 2014). The five weeks of cruises from 2nd of July to 12th August 2014 are part of a long-

term project to collect updated and relevant data on abundance, distribution, aggregation, migration and ecology of northeast Atlantic mackerel and other major pelagic species. Major aims of the survey were to quantify abundance, spatio-temporal distribution, aggregation and feeding ecology of northeast Atlantic mackerel in relation to distribution of other pelagic fish species such as Norwegian spring-spawning herring, oceanographic conditions and prey communities. Opportunistic whale observations were performed on the Norwegian vessels to collect data on distribution and aggregation of marine mammals for ecologically related studies.

All vessels that participated in the IESSNS 2014 survey used the same designed pelagic sampling trawl (Multpelt 832) and similar protocol for both rigging and operation agreed upon in Hirtshals in February 2013 from the ICES WKNAMMM workshop between the industry and scientists (ICES CM 2013/SSGESST:18). The swept area methodology for abundance estimation of NEA mackerel was further developed by dedicated experiments with parallel trawling and direct comparison of mackerel trawl catches between vessels in the same areas. Trawling experiments were done with multi-beam sonar monitoring of mackerel behaviour and aggregation before and during trawling. Systematic underwater video recordings of mackerel swimming and aggregation behaviour, patchiness and catchability were also conducted both in 2013 and 2014. The 2014 WKPELA benchmark workshop (ICES CM 2014/ACOM:43) benchmarked the assessment of mackerel in the Northeast Atlantic. It was agreed during the meeting to accept the swept area methodology back to 2007. Decisions were made to include age-disaggregated indices for age group 6+ scaled by the coverage each year from the IESSNS into the assessment. Detailed studies on age disaggregated biomass estimates and exploration on how well the different year classes in the NEA mackerel stock can be followed from year to year have been analyzed and results are available in the international survey report from July-August 2014 (Nøttestad *et al.*WD 2014).

Survey tracks

The four vessels followed predetermined survey lines with pre-selected pelagic trawl stations (Figure 2.5.3.1). The cruise tracks covered several Exclusive Economic Zones (EEZs): Norwegian EEZ (including Norway mainland, Jan Mayen EEZ and Svalbard zone), EU EEZ, Faroese EEZ, Icelandic EEZ, Greenlandic EEZ, and International waters. The distance between pelagic trawl stations was approximately 50-60 nmi for all vessels. CTD stations from the surface to 500 m depth in combination with WP2 plankton net samples from the surface down to 200 m depth were taken systematically on every pelagic trawl station onboard all vessels.

Temperature

The temperatures in the Nordic Seas in July-August 2014 are considerable warmer with 1-3°C higher temperatures than the long-term average temperature during the last 20 years (Figure 2.5.3.2). The temperature in the upper layers (10m and 20m) shows warm water of Atlantic origin covering most of the survey area (Figure 2.5.3.3). Generally the temperature pattern in the survey area in 2014 was higher compared to the 2013 situation in practically all areas within the Nordic Seas. This year the coverage was extended northwards and westwards compared to last year, and the high temperature was recorded in western areas in the Irminger Sea southeast of Greenland,, where it reached 10°C. Most of the Norwegian Sea and the area south of Iceland had surface temperatures around 10-13°C, It was warmer north of Iceland and west of Jan Mayen in 2014 compared to 2013. The warm Atlantic water extended north beyond the 73 degrees in

the eastern Norwegian Sea. The temperature distribution at 50m was generally considerable colder than in the upper 20-30 m of the water column. The temperature deeper from 50 m depth and downwards was especially colder in the south-western Norwegian Sea, where the cold East Icelandic Current (EIC) and features like the Iceland-Faroe-Front (IFF) was clearly detected. In the eastern Norwegian Sea warm Atlantic water was also detected down to 400m depth. In waters deeper than 100-200m the influence of the EIC is more pronounced and extends further south into Faroese and east into Norwegian waters

Zooplankton concentrations and distribution

The average plankton biomass showed a similar situation from 8.6 g/m^2 in July-August 2013 to 8.3 g/m^2 over all stations throughout the survey area in July-August 2014 (Figure 2.5.3.4). The plankton concentrations were generally higher in the central and especially the northern part of the Norwegian Sea in 2014 compared to in 2013, whereas we found a clear decrease in plankton concentrations in Icelandic and Greenland waters in 2014 compared to in 2013. The zooplankton samples for species identification have not been examined in detail.

The increased biomass of zooplankton in the central and northern part of the Norwegian Sea in July-August 2014 is in agreement with the increase that has been observed in the zooplankton biomass in the Norwegian Sea in the May survey in 2013 after a decade with a decreasing trend in zooplankton biomass. These data need nevertheless to be treated with some care, due to various amounts of phytoplankton (phaeosystis) between years and areas in the samples influencing the total amount of zooplankton (g dry weight/m^2) which is relevant and valuable as available food for pelagic planktivorous fish such as mackerel, herring and blue whiting.

Spatial distribution of NEA mackerel

The mackerel was distributed in most of the surveyed area covering 2.45 million square kilometers, and the zero boundaries were found in most areas, although not in the west in Greenland waters where considerable catches were taken at the stations furthest in the southwestern regions of the survey, We did not cover the mackerel south of the IESSNS survey in the North Sea and west of the British Isles. The total mackerel catches (kg) taken during the joint ecosystem survey with the Multpelt 832 quantitative sampling trawl is presented in standardized rectangles in Figure 2.5.3.5. The map is showing different concentrations of mackerel from zero catch to more than 5000 kg.

Age distribution of NEA mackerel

The 2011 year class contributed to more than 32% in number followed by the abundant 2010-year classes around 21%. The 2007, 2008 and 2009 year classes were contributing with around 11% each of the total number. The previously strong 2005- and 2006 year classes contributed with only 3% and 7% of the total number, respectively (Figure 2.5.3.6).

Spatial overlap between pelagic fish species

The spatial distribution and overlap between the major pelagic fish species from the joint ecosystem survey in the Nordic Seas and surrounding coastal and offshore areas are shown in Figure 2.5.3.7. The spatiotemporal overlap between NEA mackerel and NSS herring in July-August 2014 was generally low within the covered area, nevertheless with highest overlap in the northwestern part of the Norwegian Sea (east Icelandic

area, international area and Jan Mayen waters). Herring were most densely aggregated in close relation to where we found the highest concentrations of zooplankton. Mackerel, on the other hand, were found over much larger areas and present in areas with varying zooplankton concentrations. Norwegian spring-spawning (NSS) herring was predominantly distributed in the outskirts of the Nordic Seas along the outer edges of the mackerel distribution in waters colder than 7°C.

Abundance estimation and zonal distribution of NEA mackerel

The total swept area estimate of NEA mackerel in summer 2014 was 9.0 million tonnes based with coverage of 2.41 million square kilometers in the Nordic Seas from about 58 degrees south of Cape Farwell in Greenland waters up to 76.30 degrees north and from the Norwegian coast along the Finnmark coast in the east and westwards into the Irminger Sea at the southern tip of Greenland (Figures 2.5.3.8a and 2.5.3.8b; Table 2.5.3.1).

The geographical coverage and survey effort in 2014 (2.45 mill km^2) was similar to 2013 (2.41 mill km^2) and significantly larger than in 2012 (1.5 mill km^2) and in 2010 (1.7 mill km^2). The coverage was limited to 1.1 mill km^2 in 2011 and 0.99 mill km^2 in 2007. In 2011 the northern part of the Norwegian Sea was not properly covered due to only one Norwegian vessel participating in the survey. The swept area biomass estimates of 4.8 million tonnes in 2010 and 5.1 million tonnes estimate in 2012 may be compared with the biomass estimates of 8.8 million tonnes in 2013 and 9.0 million tonnes in 2014. These abundance estimates strongly suggest that the NEA mackerel have increased significantly both in geographical distribution and abundance over the last 7 years. All these biomass estimates must be considered to be underestimations and only represent part of the stock.

Additionally, a master of science thesis has been written by Diaz (2013) entitled "schooling dynamics of summertime migrating northeast Atlantic mackerel (*Scomber scombrus*) in the Norwegian Sea using multibeam sonar", given as a WD to WGWIDE 2013. The schooling dynamics of NEA mackerel in nature is largely unknown because they lack a swimbladder, resulting in a weak acoustic signature, and therefore are difficult to detect in the summer when swimming in loose school formations. However, high frequency omnidirectional SONAR (SOund Navigation And Ranging) is capable of detecting NEA mackerel in the acoustic echosounder blind zone close to the surface. These results showed that there were regional differences in fish size, swimming speed and direction, school depth, temperature and zooplankton abundance. Mackerel were detected and caught where the temperature was above approximately 6° C. The thermocline depth had a profound influence on the depth distribution of schools throughout the Norwegian Sea during summer. NEA mackerel were consistently found shallower than 40 m depth both during day and night. The fish generally swam north except for in the SW region, coinciding well with prevailing current directions. Fish were significantly larger in the north than in the south, and plankton abundance was higher in the west than in the east. The observed school dynamics in relation to abiotic and biotic factors are explained in terms of the ecology of NEA mackerel during the summer feeding migration.

A comprehensive survey manual for the survey will be compiled in the coming months. It will be based on the methodology that has been evolved in recent years in this survey regarding the trawl and trawling procedure (e.g. Nøttestad *et al.*2012; 2013; 2014) as well as manual from the IESNS survey in May in Norwegian Sea regarding acoustic, biological sampling, zooplankton and CTD (Rybakov *et al*., WD to 2014 WGWIDE).

Intercalibration and monitoring of trawl gear (Multpelt 832)

Comparative pelagic trawl hauls were conducted between the Norwegian vessels M/V "Brennholm" and M/V "Vendla" 1-2 July 2014. The Norwegian vessels had four comparative hauls. The Norwegian vessels conducted the hauls in an area with moderate abundance of both mackerel and herring.

In recent years the pelagic trawl used in the IESSNS survey has been standardized but a standard method to monitor trawl performance has not been developed. In 2013 and 2014 international surveys, a trawl performance method was tested where trawl sensors were attached to the trawl at different locations. Performance of the pelagic trawl (Multpelt 832) was monitored at all stations on the Faroese vessel. Four pairs of fishing gear sensors recorded spread of trawl doors, under wings and trawl opening during trawling. Depth of ground rope was also reported. Recording frequency was every other second. Sensor performance was good at trawl doors and ground rope as data were recorded at all stations where as sensors at under wings and trawl opening recorded data at 70 % of stations. These results indicate trawl sensors provide a reliable method to monitor trawl performance during trawling. Detailed information on trawl performance during each haul is in Jacobsen and Olafsdottir (2013, WD to WGWIDE). Further information and results are given in the IESSNS survey report from July-August 2014 (Nøttestad *et al.*WD to 2014 WGWIDE).

Ultimate goal

The ultimate goal has been to get accepted and use this combined swept area estimate as an absolute/relative abundance index of spawning stock biomass (SSB) and possibly recruitment index, on an annual basis in the assessment of NEA mackerel after the NEA mackerel benchmark in February 2014. One of the main objectives of the IESSNS is to provide reliable and consistent age-disaggregated abundance indices of NEA mackerel. The WKPELA meeting held at ICES in Copenhagen in February 2014 benchmarked the assessment of mackerel in the Northeast Atlantic (ICES CM 2014/ACOM:43). It was agreed during the meeting to include age-disaggregated indices for age group 6+ scaled by the coverage each year from the IESSNS into the assessment – see Table 2.6.9.

The internal consistency plot for age-disaggregated year classes (see Nøttestad *et al.*WD 2014) has greatly improved since 2013, especially for younger year classes. There is now good internal consistency between year classes 1—10 years old, except between the less abundant 5 and 6 year olds providing little contrast within a narrow scale of values. The improved consistency in younger year classes for NEA mackerel in the IESSNS survey should be taken into consideration by ICES, specifically by including also younger mackerel 1—5 years of age, and not only age 6+ mackerel, into the tuning series as input on abundance of NEA mackerel to the assessment. These issues were discussed at WGWIDE 2014. It was agreed that a benchmark should be convened in 2017 to consider extending the IESSNS inputs once a longer time series is established.

A joint survey report from the 2014 Ecosystem surveys in the Nordic Seas and surrounding coastal and offshore waters from 2nd of July to 12th August (IESSNS) has been written and presented at the ICES WGWIDE meeting in Copenhagen, Denmark 26. August –1. September 2014 (Nøttestad *et al.*WD 2014)

2.5.4 Tag Recapture data

The Institute of Marine Research in Bergen has conducted tagging experiments on mackerel since 1968, both in the North Sea and to the west of Ireland during the spawning season May–June. However, only the information from mackerel tagged west of Ireland is used in the mackerel assessment, and only information on recaptures of mackerel tagged with steel-tags until 2006 (releases from 1977 to 2004). See the 2014 WKPELA benchmark workshop (ICES CM 2014 / ACOM:43) for a thorough description on how the tag-recapture information is used in the assessment.

Steel–tags

These tags have been recovered at metal detector/deflector gate systems installed at plants processing mackerel for human consumption. This system demanded a lot of manual work, paying for external personnel to stay at the plants during processing. Among the typical 50 fish deflected, the hired personal must find the tagged fish with a hand-hold detector and send the fish to IMR for analysis. This has been time consuming and expensive. Besides being used in present mackerel assessment model, the tagging data have also been used in estimates of mortality, and recently in estimation of spawning stock biomass, and further has the tagging data been valuable for understanding the migration of the mackerel (Tenningen *et al.*2011).

RFID tags

New and promising radio-frequency identification (RFID) tagging project on NEA mackerel was in 2011 initiated at the Institute of Marine Research, Bergen (IMR) in Norway. The new RFID tagging project has moved away from manual and expensive to an automatic and cost-effective scanning system.

RFID is a technology that uses radio waves to transfer data from an electronic tag, called an RFID tag, through a reader for the purpose of identifying and tracking the object.

The RFID-project run by the Institute of Marine Research (IMR) in Bergen, Norway is now fully operational and 8 Norwegian factories have installed the scanners, where RFID tagged mackerel are automatically recaptured and updated in the central database in Bergen over GRPS. In the EU, one scanner is installed in Denmark, five scanners in Scotland and three in Ireland. In the North Atlantic one scanner is installed on the Faroe Islands and one on Iceland. In addition Icelandic processors are considering installing two more systems. The industry will have to provide additional data about catches screened through the RFID systems, such as total catch weight, position of catch (ICES rectangle), mean weight in catch etc. Regular biological sampling of the catches landed at these factories is also needed. Altogether, these data are essential for the estimation of numbers screened per year class, which is needed as input to the tag data-table currently used in the SAM-assessment for steel tags. Not all European RFID-systems have been up and running but it is the ambition to have them all ready for the 2014 mackerel autumn fishery.

During the period 2011—2014 as many as 160000 mackerel has been tagged with the new tags and 247 of these tags have recaptured. There is a web-based software solution that is used to track the different systems, import data on catch information, and biological sampling data of released fish and screened catches. Based on this information the system can estimate numbers released and screened by year class in a known biomass landed, which is used to estimate abundance by year class and totally.

The major aim for the RFID program is to expand the tagging time series by including these data in the assessment model for NEA mackerel, at latest during the next benchmark, possibly in 2017. The tag data format will be the same as the one already included in the 2014 benchmark with steel tags, but treated as a different time series.

2.5.5 Other surveys

2.5.5.1 International Ecosystem survey in the Norwegian Sea (IESNS)

In recent years an increasing amount of mackerel has been observed in the Norwegian Sea during the combined survey in May targeting herring and blue whiting. The edge of the distribution has also been found progressively further north and west. However, the mackerel was mainly found in the eastern part of the survey area up to 67°N in May 2014, with few exceptions at western stations further south. This distribution is comparable to the May surveys in 2012 and 2013. It should be noted, however, that the sampling may not provide a representative picture of mackerel distribution because of its vertical distribution and relatively low trawling speed (Rybakov *et al.*WD to 2014 WGWIDE).

2.5.5.2 Acoustic estimates of mackerel in the Iberian Peninsula and Bay of Biscay (PELACUS)

PELACUS 0314 was carried out on board R/V Miguel Oliver from 12th March to 6th April. The methodology was similar to that of the previous surveys (see Carrera and Riveiro, WD for further details). Survey design consisted in a grid with systematic parallel transects with random start, separated by 8 nm, perpendicular to the coastline, covering the continental shelf from 40 to 1000 m depth and from Portuguese-Spanish border to the Spanish-French one. (Figure 2.5.5.2.1). The backscattering acoustic energy from marine organisms is measured continuously during daylight using 18, 38, 120 and 200 kHz transducers previously calibrated according to the standard procedures. Pelagic trawls are carried out whenever possible to help identify the species (and size classes) that reflect the acoustic energy. For this purpose a series of TS length relationship are used as shown in Table 2.5.5.2.1. In the case of boarfish, two different TS length relationships were used, one corresponding to the historical value (b20=-72.6 dB) and the other corresponding to the recent estimation made by Fässler *et al.*(2013) (b20=-66.2 dB) A continuous underwater fish egg sampler with an internal water intake located at 5 m depth is used to sample the composition of the ichthyoplankton while trained observers record marine mammal, seabird, floating litter and vessel presence and abundance. At night, data on the hydrography and hydrodynamics of the water masses are collected via the deployment of rosettes and conductivity, temperature and depth sensors. Information on the composition, distribution and biomass of phytoplankton and zooplankton is derived from the analyses of samples taken by plankton nets.

A total of 3260 nautical miles were covered, 1075 of them corresponding to the survey track. Weather conditions were good along the survey period, except 5 days just in the middle of the survey, in coincidence with the change of part of the crew and the scientific staff. In the western areas (i.e. IXa-N) Sea Surface Temperature ranged from 13.18º to 22.27ºC, with a mean value of 14.13º (median, 14.07º). In the same way SSS, ranged from 28.28 to 36.31 ppm (mean 33.70 and median 33.91 ppm), with a strong correlation with longitude, being waters less salted and warmer close to the coast due to the river flows. Fluorescence ranged from 0.84 to 2.75 (mean 1.20, median , 1.12). In the northern areas (VIIIc) temperature ranged from 12.58º to 14.92ºC (mean, 13.26º, median 13.18º)

being 0.75º colder than that of the western area. In addition, salinity ranged from 31.64 to 36.04 ppm (mean 35.23, median 35.34 ppm), thus water was saltier than in the western area. Fluorescence ranged from 0.94 to 3.63 (mean 1,64, median 1.52).

A total of 52 fishing station were performed (Figure 2.5.5.2.2). Mackerel was the most abundant fish species (34% of the total catch in number) and was also present in the 88% of the fishing hauls and mainly occurred in the Cantabrian Sea although some adults together with juveniles has been caught in IXa-N and VIIIc-west. In these areas mean length was around 24 cm, without significant differences in length distribution (Kolmogorov Smirnov test) whilst in the Cantabrian Sea mean length increased up to 35cm, thus spawners, with slight differences but significant in both mean length and length distribution between those hauls performed in shallower waters (<140 m depth) and those located close to the shelf edge.

Total mackerel biomass estimate was 811 462 tonnes, corresponding to 1 725 million fish (Table 2.5.5.2.2 and 2.5.5.2.3), 47 % higher than the previous year (244 809 t corresponding to 1 725 million fish). As in previous year juveniles were mainly located in the western part (VIIIc-w and IXaN), where age group 1 accounted for the 83% of total fish number and the 63% of the total biomass. In the Cantabrian Sea (VIIIc-East), where the bulk of the population was located (97% of the fish number and 99% of the total biomass), age groups 4, 5 and 6 accounted for the 65% of the total biomass. On the other hand, age group 2 only represents the 1% of the total abundance. This result is consistent with that obtained the previous year when the strength of age class 1 was weak (Figure 2.5.5.2.3).

During this years survey, mackerel mainly occurred in a subsurface layer, located at around 50 m depth. Besides it showed very strong diving reactions especially when marine mammals (mainly common dolphin) were present. Besides, it showed rapid ascendant movements from the sea bottom (Figure 2.5.5.2.4).

On the other hand, the times series of mackerel stomach contents (1999-2014) has been presented this year. Data came from the biological samples obtained in different trawls hauls during PELACUS (i.e. only day time data). Figure 2.5.5.2.5 shows the percentage of non empty stomachs. 75% of stomachs analyzed, ranging from to 56 to 92%, were full or partial full. Main prey has varied along time series, but copepods and mackerel eggs were the most important preys in number along the time series. In volume, three periods can be distinguished; from 2001 to 2004 salps accounted for around 54% of the stomach volume; 2006 to 2011 when copepods accounted for the 40% of the total stomach volume, reaching the maximum in 2009 and then showing a continuous declining trend; and since 2011 when crustacean became more important (Euphausiacea, Mysidacea, Decapoda, both adult and larvae) (Figure 2.5.5.2.6)

2.6 Stock Assessment

NEA Mackerel was classed as an update assessment this year. The final assessment was carried out by fitting the state-space assessment model SAM (Nielsen and Berg, 2014) using the web interface on stockassessment.org (assessment name: NEA-Mac-WGWIDE-2014-V2) following the settings defined by the 2014 benchmark assessment (ICES CM 2014/ACOM: 43) and described in the Stock Annex. The assessment model is fitted to catch-at-age data for ages 0 to 12 (plus group) for the period 1980 to 2013 (with a strong down-weighting of the catches for the period 1980—1999) and three surveys: 1) the SSB estimates from the triennial Mackerel Egg survey (every three year in the period 1992—2013), 2) the recruitment index from the western Europe shelves IBTS Q4 surveys (1998–2013) and 3) the abundance estimates for ages 6 to 11 from the

IESSNS survey (2007 and 2010–2014). The model also incorporates tagging-recapture data from the Norwegian tagging program (for fish recaptured between 1980 and 2005).

The new data used in this assessment compared to the previous assessment carried out in May 2014 for the update of the 2014 ICES advice (ICES CM 2014/ACOM:48) were:

- Revision of the entire egg survey SSB time series (see Section 2.5.1).
- Addition of the year 2013 in the IBTS recruitment index
- Addition of the year 2014 data in the IESSNS indices
- Addition of the 2013 catch-at-age, weights-at-age in the catch and in the stock and maturity ogive, proportions of natural and fishing mortality occurring before spawning.

Input parameters and configurations are summarized in Table 2.6.1. The input data are given in Tables 2.6.2 to 2.6.9. Given the size of the data base (1700 lines) the tagging data are not presented in this report, but are available on stockassessment.org in the data section. Model outputs are given in table 2.6.10—13.

2.6.1 Model diagnostics

The estimated parameters for the final model and their uncertainty estimates are shown in Table 2.6.10. The model gives a good fit to the catch data (lowest observation variance). Among the surveys, the egg survey has the lowest observation variance (best fit). The IESSNS survey and the recruitment index both have a higher observation variance. CVs on the observation variances are usually large (from 18 to 33%). The catchability of the egg survey is 1.47, significantly larger than 1, which implies that the assessment considers the egg survey index to be an overestimate. The uncertainty on the estimated catchabilities is higher for the recruitment index and for the IESSNS indices and lower for the egg survey index. Post-release survival for tagged fish is estimated at 38.3% with a low associated CV.

There are few strong correlations between the fitted parameters (Figure 2.6.1.1). The only exception is the negative correlation between the random walk variance for the fishing mortalities and the observation variance of the catches (i.e. stable F with large residuals to the catches vs. variable F with good fit to the catches). Otherwise, the majority of the other parameters appear independent of each other, which is an encouraging sign.

Residuals for the catches did not show any temporal pattern (Figure 2.6.1.2). Residuals for ages 0 and 1 are larger than for subsequent ages 2 to 6. Residuals for ages 7 to 12 are also larger than for ages 2 to 6. This suggest that decoupling the observation variance of the catches (for example by grouping age 0 and 1, ages 2 to 6 and ages 7 and older) could have been more appropriate. However, exploratory runs showed that such a configuration resulted in a more unstable model. Residuals for the surveys are given in Figures 2.6.1.3 to 2.6.1.5. Residuals for the egg survey show a slight temporal pattern with positive residuals in the period 1995—2001 and negative residuals since 2010. The model estimates a steeper increase in the SSB in the recent years than what is indicated by the egg survey. Residuals to the recruitment index also indicate that the model consistently overestimates the recruitment compared to the index during the period 2006 to 2010 while the index suggests higher recruitment than the model for the years 2004, 2005 and 2013. The data used to compute the recruitment index does not fully cover all nursery areas of mackerel. This may be an explanation for the pattern observed in the residuals (e.g. gradual change in the contribution of the nursery

grounds in relation to the total recruitment). Residuals for the IESSNS indices were in general small, except for the year 2007 where large negative residuals were observed for most ages; and in 2010 and 2011 for age 11 (Figure 2.6.1.5). The spatial coverage of the IESSNS in 2007 was quite small compared to the subsequent years, which might explain this year effect.

Residuals for the tag recaptures do not show any temporal or age pattern (Figure 2.6.1.6).

2.6.2 State of the Stock

The stock summary is presented in Figure 2.6.2.1 and Table 2.6.11. The spawning stock biomass is estimated to have varied between 2 million tonnes in the late 1990s and early 2000s and 4.5 million tonnes in 2011. SSB remains stable in the most recent years. The fishing mortality has been declining since the mid-2000s and seems to have stabilized at around 0.22 in the recent years. The recruitment time series from the assessment shows a clear increasing trend since the late 1990s in which two very large year classes (2 to 3 times the average) are superimposed (2002 and 2006). The 2010 year class appears to be large compared to the long term average. The model indicates that the 2011 and 2012 recruitments are very large (similar to the 2002 year-class). There is insufficient information to estimate accurately the size of the 2013 year class.

There is some indication of changes in the selectivity of the fishery over the last 20 years (Figure 2.6.2.2). In the year 1990, the fishery seems to have exerted a high fishing mortality on the fish 7 years and older. This changed gradually until 2000, when the fishing mortality on younger ages (5- and 6-year-olds) increased compared to the older fish. In the following years, the selectivity pattern changed again towards a lower fishing mortality on the age-classes younger than 7 years until 2008. Finally, in the recent years, the fishing mortality on younger ages (4 to 7) increased again compared to the older ages.

2.6.3 Quality of the assessment

Large confidence intervals are associated with the SSB in the years before 1992. This results from the absence of information from the egg survey index, the downgrading of the information from the catches and the assessment being only driven by the tagging data and natural mortality in the early period. The confidence intervals become narrower from the early 1990s to the mid-2000s, corresponding to the period where information is available from the egg survey index, the tagging data and (partially) catches. The uncertainty increases again in the recent years, for the period when the IESSNS indices are introduced, and where no tagging data are available and where catches are not providing sufficient information of the most recent year classes. The SSB estimate for 2013 is estimated with a precision of +/- 25% (Figures 2.6.2.1 and 2.6.2.3). There is generally also a large uncertainty on the fishing mortality, especially before 1995. The estimate of F_{bar} in 2013 has a precision of +/- 33%. The uncertainty on the recruitment is high for the years before 1998 (precision of on average +/- 55%). The precision improves slightly for the years for which the recruitment index is available (+/- 45%) except for the last estimated recruitment (+/- 63%).

Given the short length of the IESSNS time series, the retrospective analysis could not be carried out for more than 4 years (Figure 2.6.2.4). There is no systematic retrospective pattern observed for the SSB. Removing one or two years (2013 and 2012) of data had almost no effect on the estimated SSB. Removing 3 and 4 years (2011 and 2010) affected the perception of SSB for the year 2009 and 2010 but did not affect the earlier

years. A retrospective pattern is however observed for the fishing mortality. The value of F_{bar} is systematically revised upward for the inclusion of each additional year of data. The magnitude of this revision is small, and well within the confidence intervals of F_{bar}. The revision however is not limited to the most recent year, but affects all estimates since 2005.

Removing 3 or 4 years of data leaves only 3 and 2 data points to estimate the catchability of the IESSNS, respectively, which considerably increases the uncertainty on this parameter. In this situation, the IESSNS has a much lower influence on the assessment and the output is comparable to the run that leaves out the IESSNS (Figure 3.6.4.5.2 in the 2014 WKPELA benchmark workshop (ICES CM 2014/ACOM: 43)). The short length of the IESSNS time series is, therefore, a source of instability in the assessment. However, this is not the most likely explanation for the retrospective pattern observed in the fishing mortality. This pattern was already observed in the past (see e.g. ICES CM 2012/ACOM:15) when the assessment was run with ICA and included only the egg survey as a tuning index.

2.7 Short term forecast

The short-term forecast provides estimates of SSB and catch in 2015 and 2016, given assumption of the current year's (also called intermediate year) catch and a range of management options for the catch in 2015.

All procedures used this year follow those used in the benchmark of 2014 as described in the Stock Annex.

2.7.1 Intermediate year catch estimation

Estimation of catch in the intermediate year (2014) is based on declared quotas as shown in the text table below. Modifications of the total of the declared quotas in 2014 come from: inter-annual transfer of quotas not fished in 2013, discards and quota payback.

The detailed calculations of intermediate year catch for the short-term forecast (STF) are provided in the text tables below.

Estimation of 2014 catch	Tonnes	Reference
EU quota	611205	Coastal state agreement, 12 Mar 2014
Spanish payback	-9747	European Council Regulation 2011/165
EU quota deductions	-6568	EC press release 11/8 2014
Norwegian quota	279115	Coastal state agreement, 12 Mar 2014
Russian quota	116700	Estimate from Russian WGWIDE members
Discards	4664	Previous years estimate
Icelandic quota	147721	Ministry of Industries and Innovation: Press release 16 April 2014. No. 376/2014.
Inter-annual quota transfer 2013->2014 (IS)	6908	Fisheries Directory webpage
Faroese quota	156240	Coastal state agreement, 12 Mar 2014
Greenland quota	90000	Estimate from Greenland institute of Natural Resources
Total expected catch (incl. discard)	1396238	

WGWIDE assumes that the entire TAC will be taken by EU and Norway. However, the Coastal States agreement (12 Mar 2014) allows for a 10 % transfer to 2015 (also known as "banking"). This option may become relevant in 2014, due to the reduced

export opportunities after the export ban to Russia was implemented. This unusual situation in the mackerel market economy has brought forward discussions of whether an extraordinary amount of transfer could be approved. Forecast scenarios were therefore run assuming 0, 10 and 20 % quota transfer by EU and Norway.

2.7.2 Initial abundances at age

The recruitment estimate at age 0 from the assessment in the terminal assessment year (2013) was considered too uncertain to be used, because this year class has not yet fully recruited into the fishery. The last recruitment estimate was therefore replaced by predictions from the RCT3 software (Shepherd, 1997). The RCT3 software evaluates the historical performance of the IBTS recruitment index, by performing a linear regression between the index and the SAM estimates over the period 1998 to 2012. The prediction of recruitment in 2013 is then calculated as a weighted mean of the IBTS index in 2013 and a time tapered geometric mean of the SAM estimates from 1990 to 2012. Note that the 2014 WKPELA benchmark workshop (ICES CM 2014/ACOM: 43) used another year range of SAM estimates (1998 to present), however, WGWIDE included the entire time series from 1990. WKPELA's argument for truncating the time series of recruit estimates was that the productivity of the stock may be different in recent years than in the early 1990s. However, this is already accounted for by using a time tapered geometric mean where the latest years are given more weight. The difference between these two approaches is minor (0.5 %).

The log(index) from IBTS in 2013 was 16.45, substantially higher than the time tapered geometric mean (15.50) from 1990—2012. RCT3 calculated the weighted mean to be 15.90 (8 064 mill). The weighting factors were 0.43 for the IBTS index and 0.57 for the time tapered geometric mean, given the historical performance of the IBTS index. RCT 3 output is given in Table 2.7.2.1.

2.7.3 Short term forecast

A deterministic short-term forecast was calculated using FLR. Table 2.7.3.1 lists the input data and Tables 2.7.3.2 and 2.7.3.3 provide projections for various fishing mortality multipliers and catch constraints in 2015.

Assuming catches for 2014 of 1 396 kt (0% banking by EU and Norway), F was estimated at 0.32 and SSB at 4.61 Mt in 2014. If catches in 2015 equal the catch in 2014, F is expected to increase to 0.36 in 2015 with a corresponding reduction in SSB to 3.84 Mt in spring 2016, assuming an F of 0.36 again in 2016.

Exploitation in 2015 at FMSY (0.25) will yield catches of 1 017 kt. If the target F range (0.20 to 0.22) in management plan is followed, then the yield in 2015 will be between 831 kt and 906 kt.

Forecasts were also performed assuming inter-annual quota transfer ("banking") from 2014 to 2015 by EU and Norway of 10 and 20%. For these forecasts, the amount of catches "banked" in 2014 was discounted from the intermediate year catch used as a constraint on the first year of the forecast. The corresponding intermediate year catches and quantities banked can be found in Tables 2.7.3.4 and 2.7.3.5, with the output of the forecast. The "advice" catches were then calculated for a range of management options for 2015, with corresponding "advice" F and SSB values. The amounts banked were then added to the "advice" catches and the forecast was run a second time using realised 2015 catches as a constraint for the year 2015 to estimate the effective F in 2015 and the realised SSB values. The underlying assumption is that the amounts banked in 2014 will not be taken into account in the calculation of the TAC advice for 2015, and that

they will be added *a posteriori* to the TAC, resulting *de facto* in F values higher than the ones used as a basis to set the TAC.

Results in Tables 2.7.3.4 and 2.7.3.5 show that for an advice TAC for 2015 given based on the management plan target F=0.22, the effective fishing mortality after addition of the amounts banked in 2014 would be 0.27. In general, banking in 2014 would result in lower F in 2014, but equally high F in 2015 (as for the catches). It would only result in marginal difference in the 2015 and 2016 SSB (maximum difference of 4% observed for the 2016 SSB for the constant catch scenario and 20% banking).

2.8 Biological Reference Points

Following the ICES guidelines, the 2014 WKPELA benchmark workshop (ICES CM 2014/ACOM:43) set new reference points for NEA mackerel. The new values are listed in Table 2.8.1, and their technical bases are described below.

2.8.1 Precautionary reference points

B_{lim} - There is no evidence of significant reduction in recruitment at low SSB within the time series hence the previous basis for B_{lim} was retained. B_{lim} is taken as B_{loss}, the lowest estimate of spawning stock biomass from the revised assessment. This was estimated to have occurred in 2002; B_{loss} = 1 840 000 t.

F_{lim} - F_{lim} is derived from B_{lim} and is determined as the F that on average would bring the stock to B_{lim}; F_{lim} = 0.39.

B_{pa} - The ICES basis for advice requires that a precautionary safety margin incorporating the uncertainty in actual stock estimates leads to a precautionary reference point B_{pa}, which is a biomass reference point with a high probability of being above B_{lim}. B_{pa} was calculated as $B_{lim} * \exp(1.645\sigma)$ where $\sigma = 0.15$ (the estimate of uncertainty associated with the spawning biomass as estimated in the 2013 assessment in the most recent year (2012)); B_{pa} = 2 350 000t.

F_{pa} - F_{pa} is derived from B_{pa} and is determined as the F that on average would bring the stock to B_{pa}; F_{pa} = 0.26.

2.8.2 MSY reference points

The ICES MSY framework specifies a target fishing mortality, F_{MSY}, which, over the long term, maximises yield, and also a spawning biomass, MSY $B_{trigger}$, below which target fishing mortality is reduced linearly relative to the SSB $B_{trigger}$ ratio.

Following the ICES guidelines (ICES CM 2013/ACOM:37), WKPELA found that F=0.25 would be an appropriate F_{MSY} target as on average it resulted in the highest mean yields with a low risk of reducing the spawning biomass below B_{lim}.

The ICES basis for advice notes that, in general, F_{MSY} should be lower than F_{pa}, and MSY $B_{trigger}$ should be equal to or higher than B_{pa}. ICES WKMSYREF2 (ICES CM 2014/ACOM:47) highlighted that the values of F_{MSY} should be checked using stochastic simulation to ensure that expected errors in the advice do not result in >5% probability of SSB< B_{lim}.

Given the combination of changes described above it is to be expected that the current management plan fishing mortality target range will still be precautionary, and ICES can continue to provide advice under this plan. However, the current management plan $B_{trigger}$ is below the revised B_{pa} therefore it would not be precautionary. The man-

agement plan is in the process of being re-evaluated and should provide the appropriate combination of $B_{trigger}$ and fishing mortality range consistent with the precautionary approach.

2.9 Comparison with previous assessment and forecast

The last available assessment was carried out in spring 2014 to update the ICES advice for 2014. This assessment was based on catch data going up to 2012 (ICES CM 2014/ACOM:48). The new 2014 WGWIDE assessment gives a revised perception of the stock (text table below and Figure 2.9.1). The differences in the 2012 TSB and SSB estimates between the previous and the present assessments are small. The 2012 fishing mortality estimate has been revised upwards.

	TSB 2012	SSB 2012	F4-8 2012
2014 advice update assessment	5677 kt	4408 kt	0.190
2014 WGWIDE assessment	5548 kt	4181 kt	0.213
% difference	-2%	-5%	12%

A comparison of the model parameters estimated is given in Table 2.6.10. Parameter values (and their CVs) are quite similar to the previous assessment. The main differences are found in the observation variances, which have increased, except for the IBTS recruitment index which is now fitted better in the model. These changes are however not significant considering the uncertainty on these parameters. The only parameter significantly different is the catchability of the egg survey. This can be explained by the revision of the egg survey time series. The revised index being consistently higher than the old one, this explains the increase in the survey catchability.

The uncertainty on the SSB and F_{bar4-8} for the last year in the assessment is very similar to the previous assessment.

The prediction of mackerel catch for 2013 used for the short-term forecast in the 2014 advice update assessment was 895 kt, about 37 kt (4%) lower than the 2013 catch reported in 2014 used in the present assessment (text table below). Most of this difference is explained by the actual overcatch of the 2013 quotas (69 kt) being larger than the estimate from the 2013 WGWIDE (7kt). The anticipated 2013 discards (15 kt) used in the previous forecast were substantially higher that the 2013 discards reported in 2014 (5kt).

The new assessment produced an estimate of the SSB in 2013 of 4.3Mt, which is 2.5% lower than the forecast estimate. The fishing mortality F_{bar4-8} for 2013 estimated this year is 13% higher than the value estimated by the short term forecast in the previous assessment. Most of these discrepancies can be explained by the revision of the perception of the stock described above.

	Catch (2013)	SSB (2013)	F4–8(2013)
2014 advice update assessment	895 kt	4408 Mt	0.188
2014 WGWIDE assessment	932 kt	4300 Mt	0.217
% difference	3.97%	-2.51%	13.36%

2.10 Management Considerations

The stock assessment for NE Atlantic mackerel was benchmarked in 2014 (ICES CM 2014/ACOM:43). This led to a revised perception of the stock compared to the last assessment of the stock in 2012. SSB from the 2014 assessment is now estimated to have varied between 2 million tonnes in the late 1990s and early 2000s and 4.5 million tonnes in 2011; this compares to 1.6 and 3 million tonnes over the same period in the 2012 assessment.

Despite the changes in the stock assessment, the current Management Plan fishing mortality target range is still considered to be precautionary, and ICES can continue to provide advice under this plan. However, it may no longer result in a long-term maximisation of the yield. The Management Plan will be re-evaluated in late 2014 and should provide the appropriate combination of $B_{trigger}$ and fishing mortality range consistent with the precautionary approach and MSY objectives.

In 2014, as in all years since 2008, unilateral quotas have been set, which together are higher than the TAC indicated by the Management Plan. The updated scientific advice for 2014 was for an upper catch limit of 1.011 Mt. The agreed Coastal States decision, between EU, Norway and Faroes, was 1.24 Mt (equivalent to F=0.28). However, in addition to these figures, Greenland declared a catch limit of 100000 tonnes in its waters, Iceland a catch limit of 147721 tonnes for its fisheries and Russia 102211 tonnes for its fisheries. The WG estimate of removals in 2014, taking into account payback and deductions, is ~1.4 Mt, 38% higher than the upper bound of the scientific advice, corresponding to a fishing mortality of F=0.32. ICES notes that both the agreed TAC and the sum of the declared catch limits exceed the advised fishing mortality based on FMSY (FMSY = 0.25) as well as the precautionary limit for F (Fpa = 0.26).

2.11 Ecosystem considerations

An overview of the main ecosystem drivers possibly affecting the different life-stages of Northeast Atlantic mackerel and relevant observations are given in the Stock Annex. The discussion here is limited to recent features of relevance.

A forward shift in timing of spawning migration from April to March has been indicated during the last decade (Punzón and Villamor 2009). In winter 2011—2012 the timing of the spawning migration was even more pronounced in the Cantabrian Sea from early January to February compared to March and April just some years before. This suggested a temporal shift of about two months, with an earlier spawning migration pattern of mackerel into the southern area in winter 2012 compared to earlier times, which might be linked to increased temperatures during winter and spring in the last few years. However, the triennial egg survey in 2013 showed that the peak of spawning in the Cantabrian Sea was later than in both 2007 and 2010.

Measuring available planktonic food and actual feeding of mackerel is a crucial task for improved understanding of mackerel ecology. Measurements show plankton concentrations in May in the Norwegian Sea have been increasing since the lowest level in 2009—2010 over the time series since 1996, and are currently at a similar level as before the decrease (Nottestad *et al.*, 2014 WD to WGWIDE). Moreover, in coherence with the

IESNS in May 2014, increased densities of plankton were found in the central and particularly northern part of the Norwegian Sea in July-August 2014, whereas there was a marked decrease in plankton concentrations in Iceland and Greenland water (Nøttestad *et al*., 2014 WD to WGWIDE).

A large spatial expansion of the mackerel stock has been measured by systematic and standardized pelagic trawling in the Nordic Seas in summers from 2007—2014 (Nøttestad *et al.*2014 WD to WGWIDE). Simultaneously to this expansion, the summer surface temperatures have been high in the Nordic Seas (Hughes *et al.*2011; Nøttestad *et al*., 2012; 2013; 2014 WDs to WGWIDE). The sea surface temperature anomaly (SSTA) for July 2014 showed that the temperatures in the Nordic Seas were about 1—3°C above long-term mean over the last 20 years. More or less the entire Northeast Atlantic Ocean including the Norwegian Sea was significantly warmer compared to the long-term average. The high surface temperatures observed in the Nordic Seas during summer in recent years, especially in 2014, have largely increased the potential feeding habitat for mackerel within their preferred "comfort" zone of above 6-7°C.

In the southern part of the distribution area mackerel overlap with chub mackerel (Scomber colias), the landing have increased from the 1990s to the 2000s (Table 2.11.1), if this reflect an increase in abundance, increased interspecific competition with mackerel is possible.

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Table 2.2.1. 2013 Mackerel fleet composition of major mackerel catching nations.

Country	Len (m)	Engine power (hp)	Gear	Storage	No vessels
Denmark	57-63	4077-8188	Trawl	Tank	5
	57-77	2475-6689	Purse Seine	Tank	6
Faroe Islands	49-69	2400-4000kw	Purse Seine/Trawl	RSW	4
	70-79	3900-8000kw	Purse Seine/Trawl	RSW	5
	68-90	3200-6000kw	Trawl	Freezer	2
	<50		Trawl		30
France			Pelagic Trawl	Dry Hold	9
			Pelagic Trawl	Freezer	3
Germany	90-140	3800-12000	Single Midwater Trawl	Freezer	4
Greenland	50-65	2991-5017	Pelagic Trawl	Freezer	4
	55-75	4076-7600	Pelagic Trawl	Freezer/RSW	12
	75-95	7192-8048	Pelagic Trawl	Freezer/RSW	5
	95-115	4351-8049	Pelagic Trawl	Freezer	3
	115-125	3600-7831	Pelagic Trawl	Freezer	3
Iceland	51-60	2502-4079	Single Midwater Trawl	RSW, Freezer	6
	61-70	2000-7507	Single Midwater Trawl	RSW, Freezer	17
	71-80	3200-11257	Single Midwater Trawl	RSW, Freezer	12
	>80	8051	Single Midwater Trawl	Freezer	1
Ireland	16-37	171-1119	Midwater Trawl	Dryhold	4
	48-71	1007-3460	Midwater Trawl	RSW	9
	22-37	368-1119	Pair Midwater Trawl	Dryhold	20
	27-65	256-1499	Pair Midwater Trawl	RSW	14
Netherlands	55	2125	Pair Midwater Trawl	Freezer	1
	88-145	4400-10455	Single Midwater Trawl	Freezer	9
Norway	>27		Purse Seine		80
	21-27		Purse Seine		17
	<21		Purse Seine		164
			Trawler		21
			Handline/Gillnet		155
Portugal	10-20		Trawl	Freezer	2
	20-30		Trawl	Freezer	7
	30-40		Trawl	Freezer	5
	0-10		Trawl	Other	259
	10-20		Trawl	Other	68
	20-30		Trawl	Other	60
	30-40		Trawl	Other	29

	0-10		Purse Seine	Other	79
	10-20		Purse Seine	Other	103
	20-30		Purse Seine	Other	79
Spain	18-24	147-294.3	Trawl	Dryhold	2
	24-40	161.9-529.8	Trawl	Dryhold	57
	0-10	33.8	Purse Seine	Dryhold	1
	10-12	33.8-106.7	Purse Seine	Dryhold	113
	12-18	20.6-241.4	Purse Seine	Dryhold	119
	18-24	69.9-397.4	Purse Seine	Dryhold	2
	24-40	139.8-809.4	Purse Seine	Dryhold	3
	0-10	4.4-73.6	Handline	Dryhold	81
	10-12	11.8-117.7	Handline	Dryhold	113
	12-18	17.7-167.8	Handline	Dryhold	119
	18-24	161.9-184.0	Handline	Dryhold	2
	24-40	232.5-331.1	Handline	Dryhold	3
	0-10	27.2-73.6	Gillnet	Dryhold	3
	10-12	20.6-117.7	Gillnet	Dryhold	16
	12-18	29.4-241.4	Gillnet	Dryhold	44
	18-24	110.4-397.4	Gillnet	Dryhold	23
	24-40	128.8-809.4	Gillnet	Dryhold	6

Table 2.2.4. Overview of major existing regulations on mackerel catches

Technical measure	National/International level	Specification	Note
Catch limitation	Coastal States/NEAFC	2010, 2011, 2012: not agreed	
Management plan	European (EU, NO)	If SSB >= 2.200.000t, F = 0.2 to 0.22 If SSB is between 1.670.000t and 2.200.000t, F = 0.22 * SSB/2.200.000 TAC should not be changed more than 20% If SSB < 1.670.000t, parties shall decide on a TAC which is less than that arising from the calculation above	
Minimum size (North Sea)	European (EU, NO, Fo)	30cm in the North Sea	
Minimum size (all areas except North Sea)	European (EU, FO)	20cm in all areas except North Sea	10% undersized allowed
Minimum size	National (NO)	30cm in all areas	
Catch limitation	European (EU, NO, FO)	Within the limits of the quota for the western component (VI,VII, VIIIabde, Vb(EC), IIa(nonEC), XII, XIV), a certain quantity may be taken from IVa but only during the periods 1 January to 15 February and 1 October to 31 December.	
Area closure	National (UK)	South-West Mackerel Box off Cornwall	except where the weight of the mackerel does not exceed 15 % by liveweight of the total quantities of mackerel and other marine organisms onboard which have been caught in this area
Area limitations	National (IS)	Pelagic trawl fishery only allowed outside of 200m depth contours around Iceland and/or 12 nm from the coast.	
Quota adaptation	European (EU)	Reducing of Spanish mackerel quota with a scheduled payback until 2015 following the exceeding of fishing opportunities in 2010	

Technical measure	National/International level	Specification	Note
National catch limitations by gear, semester and area	National (ES)	30.5% of the Spanish national quota is assigned for the trawl fishery, 27.7% for purse seiners and 34.6% for the artisanal fishery	90,6 % of the Spanish national quota should be caught in ICES Div, IXa N and VIIIc. Besides, a 30.5% is assigned to the trawler fleet (8 tm as maximum daily catch per vessel), 27.7% to purse seiner (8 tm as maximum daily catch per vessel) and 34.6% to the artisanal fleet (2.3 tm as maximum daily catch per vessel); for all of them, a 7% of the catches should be kept for the second half of the year.
High-grading ban	European (EU)	High-grading (discarding fish of lower commercial value due to limited space on board) is banned in European water	
Discard prohibition	National (NO, IS, FO)	All discarding is prohibited for Norwegian, Icelandic and Faroese vessels	

Table 2.3.1.1. NE Atlantic Mackerel. Catches by area (t). Discards not estimated prior to 1978 (data submitted by Working Group members).

Year	Subarea VI			Subarea VII and Divisions VIIIabde			Subareas III and IV			Subareas I,II,V and XIV			Divisions VIIIc and IXa			Total		
	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch
1969	4800		4800	47404		47404	739175		739175	7		7	42526		42526	833912		833912
1970	3900		3900	72822		72822	322451		322451	163		163	70172		70172	469508		469508
1971	10200		10200	89745		89745	243673		243673	358		358	32942		32942	376918		376918
1972	13000		13000	130280		130280	188599		188599	88		88	29262		29262	361229		361229
1973	52200		52200	144807		144807	326519		326519	21600		21600	25967		25967	571093		571093
1974	64100		64100	207665		207665	298391		298391	6800		6800	30630		30630	607586		607586
1975	64800		64800	395995		395995	263062		263062	34700		34700	25457		25457	784014		784014
1976	67800		67800	420920		420920	305709		305709	10500		10500	23306		23306	828235		828235
1977	74800		74800	259100		259100	259531		259531	1400		1400	25416		25416	620247		620247
1978	151700	15100	166800	355500	35500	391000	148817		148817	4200		4200	25909		25909	686126	50600	736726
1979	203300	20300	223600	398000	39800	437800	152323	500	152823	7000		7000	21932		21932	782555	60600	843155
1980	218700	6000	224700	386100	15600	401700	87931		87931	8300		8300	12280		12280	713311	21600	734911
1981	335100	2500	337600	274300	39800	314100	64172	3216	67388	18700		18700	16688		16688	708960	45516	754476
1982	340400	4100	344500	257800	20800	278600	35033	450	35483	37600		37600	21076		21076	691909	25350	717259
1983	320500	2300	322800	235000	9000	244000	40889	96	40985	49000		49000	14853		14853	660242	11396	671638
1984	306100	1600	307700	161400	10500	171900	43696	202	43898	98222		98222	20208		20208	629626	12302	641928
1985	388140	2735	390875	75043	1800	76843	46790	3656	50446	78000		78000	18111		18111	606084	8191	614275
1986	104100		104100	128499		128499	236309	7431	243740	101000		101000	24789		24789	594697	7431	602128
1987	183700		183700	100300		100300	290829	10789	301618	47000		47000	22187		22187	644016	10789	654805
1988	115600	3100	118700	75600	2700	78300	308550	29766	338316	120404		120404	24772		24772	644926	35566	680492

Year	Subarea VI			Subarea VII and Divisions VIIIabde			Subareas III and IV			Subareas I,II,V and XIV		Divisions VIIIc and IXa		Total		
1989	121300	2600	123900	72900	2300	75200	279410	2190	281600	90488	90488	18321	18321	582419	7090	589509
1990	114800	5800	120600	56300	5500	61800	300800	4300	305100	118700	118700	21311	21311	611911	15600	627511

Table 2.3.1.1. NE Atlantic Mackerel. Catches by area (t). Continued.

Year	Subarea VI			Subarea VII and Divisions VIIIabde			Subareas III and IV			Subareas III,V and XIV			Divisions VIIIc and IXa			Total		
	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch
1991	109500	10700	120200	50500	12800	63300	358700	7200	365900	97800		97800	20683		20683	637183	30700	667883
1992	141906	9620	151526	72153	12400	84553	364184	2980	367164	139062		139062	18046		18046	735351	25000	760351
1993	133497	2670	136167	99828	12790	112618	387838	2720	390558	165973		165973	19720		19720	806856	18180	825036
1994	134338	1390	135728	113088	2830	115918	471247	1150	472397	72309		72309	25043		25043	816025	5370	821395
1995	145626	74	145700	117883	6917	124800	321474	730	322204	135496		135496	27600		27600	748079	7721	755800
1996	129895	255	130150	73351	9773	83124	211451	1387	212838	103376		103376	34123		34123	552196	11415	563611
1997	65044	2240	67284	114719	13817	128536	226680	2807	229487	103598		103598	40708		40708	550749	18864	569613
1998	110141	71	110212	105181	3206	108387	264947	4735	269682	134219		134219	44164		44164	658652	8012	666664
1999	116362		116362	94290		94290	313014		313014	72848		72848	43796		43796	640311		640311
2000	187595	1	187595	115566	1918	117484	285567	165	304898	92557		92557	36074		36074	736524	2084	738608
2001	143142	83	143142	142890	1081	143971	327200	24	339971	67097		67097	43198		43198	736274	1188	737462
2002	136847	12931	149778	102484	2260	104744	375708	8583	394878	73929		73929	49576		49576	749131	23774	772905
2003	135690	1399	137089	90356	5712	96068	354109	11785	365894	53883		53883	25823	531	26354	659831	19427	679288
2004	134033	1705	134738	103703	5991	109694	306040	11329	317369	62913	9	62922	34840	928	35769	640529	19962	660491
2005	79960	8201	88162	90278	12158	102436	249741	4633	254374	54129		54129	49618	796	50414	523726	25788	549514
2006	88077	6081	94158	66209	8642	74851	200929	8263	209192	46716		46716	52751	3607	56358	454587	26594	481181
2007	110788	2450	113238	71235	7727	78962	253013	4195	257208	72891		72891	62834	1072	63906	570762	15444	586206
2008	76358	21889	98247	73954	5462	79416	227252	8862	236113	148669	112	148781	59859	750	60609	586090	37075	623165
2009	135468	3927	139395	88287	2921	91208	226928	8120	235049	163604		163604	107747	966	108713	722035	15934	737969
2010	106732	2904	109636	104128	4614	108741	246818	883	247700	355725	5	355729	49068	4640	53708	862470	13045	875515

Year	Subarea VI			Subarea VII and Divisions VIIIabde			Subareas III and IV			Subareas III,V and XIV			Divisions VIIIc and IXa			Total		
2011	160756	1836	162592	51098	5317	56415	301746	1906	303652	398132	28	398160	24036	1807	25843	935767	10894	946661
2012	121114	952	122067	65728	9532	75261	218400	1046	219446	447207		447207	24941	3431	28372	877390	14963	892353
2013	132062	273	132335	49871	1589	51460	260921	333	261254	464481	13	464495	19732	2455	22188	927067	4664	931732

Table 2.3.2.1. NE Atlantic Mackerel. Catch (t) in the Norwegian Sea (IIa) and Area V 1984–2013 (Data submitted by Working Group members).

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Denmark	11787	7610	1653	3133	4265	6433	6800	1098	251	
Estonia									216	
Faroe Islands	137				22	1247	3100	5793	3347	1167
France		16				11		23	6	6
Germany Fed. Rep.			99		380					
Germany Dem. Rep.			16	292		2409				
Iceland										
Ireland										
Latvia									100	4700
Lithuania										
Netherlands										
Norway	82005	61065	85400	25000	86400	68300	77200	76760	91900	100500
Poland										
Sweden										
United Kingdom			2131	157	1413		400	514	802	
USSR/Russia	4293	9405	11813	18604	27924	12088	28900	13361	42440	49600
Misreported (IVa)										
Misreported (VIa)										
Misreported (Ukn)										
Unallocated										
Discards										
Total	98222	78096	101112	47186	120404	90488	118700	97819	139062	165973

Table 2.3.2.1. NE Atlantic Mackerel. Catch (t) in the Norwegian Sea (IIa) and Area V 1984–2013. Continued.

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Denmark		4746	3198	37	2090	106	1375	7	1	
Estonia	3302	1925	3741	4422	7356	3595	2673	219		
Faroe Islands	6258	9032	2965	5777	2716	3011	5546	3272	4730	
France	5	5		270						
Germany										
Greenland			1							
Iceland			92	925	357				53	122
Ireland						100				495
Latvia	1508	389	233							
Lithuania							2085			
Netherlands			561			661			569	44
Norway	141114	93315	47992	41000	54477	53821	31778	21971	22670	125481
Poland				22						
Sweden								8		
United Kingdom	1706	194	48	938	199	662		54	665	692
Russia	28041	44537	44545	50207	67201	51003	491001	41566	45811	40026
Misreported (IVa)	-109625	-18647			-177	-40011				
Misreported (VIa)						-100				
Misreported (Ukn)									-570	
Unallocated										-44
Discards										
Total	72309	135496	103376	103598	134219	72848	92557	67097	73929	53883

Table 2.3.2.1. NE Atlantic Mackerel. Catch (t) in the Norwegian Sea (IIa) and Area V 1984–2013. Continued.

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Denmark							4845	269		391
Estonia										13671
Faroe Islands	650	30		278	123	2992	66312	121499	107198	142976
France	2	1						2		197
Germany				7					101	74
Greenland								621	52841	527831
Iceland		363	4222	36706	112286	1161601	1210081	1592631	1492821	1512351
Ireland	471							90		
Latvia										
Lithuania										
Netherlands	34	2393		10	72		90	178	5	1
Norway	10295	13244	8914	493	3474	3038	104858	43168	110741	33817
Poland										
Sweden									4	825
United Kingdom	2493				4					2
Russia	49489	40491	33580	35408	32728	414141	58613	73601	74587	80812
Misreported (IVa)										
Misreported (VIa)										
Misreported (Ukn)	-553									
Unallocated	32	-2393		-10	-18					
Discards	9				112		5	28		131
Total	62922	54129	46716	72891	148781	163604	355729	398160	447202	464495

1 – includes catches in I, XII and XIVb

Table 2.3.2.2. NE Atlantic Mackerel. Catch (t) in the North Sea, Skagerrak and Kattegat (Sub-area IV and IIIa) 1988-2013 (Data submitted by Working Group members).

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Belgium	20	37		125	102	191	351	106	62	114
Denmark	32588	26831	29000	38834	41719	42502	47852	30891	24057	21934
Estonia					400					
Faroe Islands		2685	5900	5338		11408	11027	17883	13886	32882
France	1806	2200	1600	2362	956	1480	1570	1599	1316	1532
Germany Fed. Rep.	177	6312	3500	4173	4610	4940	1497	712	542	213
Iceland										
Ireland		8880	12800	13000	13136	13206	9032	5607	5280	280
Latvia					211					
Netherlands	2564	7343	13700	4591	6547	7770	3637	1275	1996	951
Norway	59750	81400	74500	102350	115700	112700	114428	108890	88444	96300
Poland										
Romania							2903			
Sweden	1003	6601	6400	4227	5100	5934	7099	6285	5307	4714
United Kingdom	1002	38660	30800	36917	35137	41010	27479	21609	18545	19204
USSR (Russia from 1990)										3525
Misreported (IIa)							109625	18647		
Misreported (VIa)	180000	92000	126000	130000	127000	146697	134765	106987	51781	73523
Misreported (Unknown)										
Unallocated	29630	6461	-3400	16758	13566			983	236	1102
Discards	29776	2190	4300	7200	2980	2720	1150	730	1387	2807
Total	338316	281600	305100	365875	367164	390558	472397	322204	212839	229487

Table 2.3.2.2. NE Atlantic Mackerel. Catch (t) in the North Sea, Skagerrak and Kattegat (Sub-area IV and IIIa) 1988-2013. Continued.

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	20071
Belgium	125	177	146	97	22	2	4	1	3	1
Denmark	25326	29353	27720	21680	343751	275081	25665	232121	242191	252171
Estonia										
Faroe Islands	4832	4370	10614	18751	12548	11754	11705	9739	12008	11818
France	1908	2056	1588	1981	2152	1467	1538	1004	285	7549
Germany	423	473	78	4514	3902	4859	4515	4442	2389	5383
Iceland		357								
Ireland	145	11293	9956	10284	20715	17145	18901	15605	4125	13337
Latvia										
Netherlands	1373	2819	2262	2441	11044	6784	6366	3915	4093	5973
Norway	103700	106917	142320	158401	161621	150858	147068	106434	113079	131191
Poland								109		
Romania										
Sweden	5146	5233	49941	5090	52321	4450	4437	3204	3209	38581
United Kingdom	19755	32396	58282	52988	61781	67083	62932	37118	28628	46264
Russia	635	345	1672	1				4		
Misreported (IIa)		40000								
Misreported (VIa)	98432	59882	8591	39024	49918	62928	23692	37911	8719	
Misreported (Ukn)										
Unallocated	3147	17344	34761	24873	22985	-730	-783	7043	171	2421
Discards	4753		1912	24	8583	11785	11329	4633	8263	4195
Total	269700	313015	304896	339970	394878	365894	317369	254374	209192	257208

Table 2.3.2.2. NE Atlantic Mackerel. Catch (t) in the North Sea, Skagerrak and Kattegat (Subarea IV and IIIa) 1988-2013. Continued.

Country	2008	2009	2010	2011	2012	2013
Belgium	2	3	27	21	39	62
Denmark	26716	23491	36552	32800	36492	31924
Estonia						
Faroe Islands	7627	6648	4639	543	432	25
France	490	1493	686	1416	5736	1788
Germany	4668	5158	25621	52911	4560	5755
Iceland						
Ireland	11628	12901	14639	15810	20422	13523
Latvia						
Netherlands	1980	2039	1300	9881	6018	4863
Norway	114102	118070	129064	162878	64181	130056
Poland						
Romania						
Sweden	36641	73031	34291	32481	4560	2081
United Kingdom	37055	47863	52563	69858	75959	70840
Russia			696			4
Misreported (IIa)						
Misreported (VIa)	17280	1959				
Misreported (Ukn)						
Unallocated	2039	-629	660			
Discards	8862	8120	883	1906	1046	333
Total	236111	235049	247700	303652	219446	261254

[1]-**includes small catches in IIIb,c,d**

Table 2.3.2.3. NE Atlantic Mackerel. Catch (t) in the Western area (Sub-areas VI and VII and Divisions VIIIa,b,d,e) 1985–2013 (Data submitted by Working Group members).

Country	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgium										
Denmark	400	300	100		1000		1573	194		2239
Estonia										
Faroe Islands	9900	1400	7100	2600	1100	1000				4283
France	7400	11200	11100	8900	12700	17400	4095		2350	9998
Germany	11800	7700	13300	15900	16200	18100	10364	9109	8296	25011
Guernsey										
Ireland	91400	74500	89500	85800	61100	61500	17138	21952	23776	79996
Isle of Man										
Jersey										
Lithuania										
Netherlands	37000	58900	31700	26100	24000	24500	64827	76313	81773	40698
Norway	24300	21000	21600	17300	700		29156	32365	44600	2552
Poland									600	
Spain				1500	1400	400	4020	2764	3162	4126
United Kingdom	205900	156300	200700	208400	149100	162700	162588	196890	215265	208656
Misreported (Area IVa)		-148000	-117000	-180000	-92000	-126000	-130000	-127000	-146697	-134765

Misreported (Unknown)										
Unallocated	75100	49299	26000	4700	18900	11500	-3802	1472		4632
Discards	4500			5800	4900	11300	23550	22020	15660	4220
Total	467700	232599	284100	197000	199100	182400	183509	236079	248785	251646

Table 2.3.2.3. NE Atlantic Mackerel. Catch (t) in the Western area (Sub-areas VI and VII and Divisions VIIIa,b,d,e) 1985–2013. Continued.

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium										1
Denmark	1143	1271			552	82	835		113	
Estonia	361									
Faroe Islands	4284		24481	3681	4239	4863	2161	2490	2260	674
France	10178	14347	19114	15927	14311	17857	18975	19726	21213	18549
Germany	23703	15685	15161	20989	19476	22901	20793	22630	19200	18730
Guernsey										
Ireland	72927	49033	52849	66505	48282	61277	60168	51457	49715	41730
Isle of Man										
Jersey										
Lithuania										
Netherlands	34514	34203	22749	28790	25141	30123	33654	21831	23640	21132
Norway			223							
Poland										
Spain	4509	2271	7842	3340	4120	4500	4063	3483		

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
United Kingdom	190344	127612	128836	165994	127094	126620	139589	131599	167246	149346
Misreported (Area IVa)	-106987	-51781	-73523	-98255	-59982	-3775	-39024	-43339	-62928	-23139
Misreported (Unknown)										
Unallocated	28245	10603	4577	8351	21652	31564	37952	27558	5587	9714
Discards	6991	10028	16057	3277		1920	1164	15191	7111	7696
Total	270212	213272	196110	218599	204885	297932	280553	252620	233157	244432

Table 2.3.2.3. NE Atlantic Mackerel. Catch (t) in the Western area (Sub-areas VI and VII and Divisions VIIIa,b,d,e) 1985–2013. Continued.

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Belgium					1	2			
Denmark			6	10		48	2889	8	903
Estonia									
Faroe Islands		59	1333	3539	4421	36	8		
France	15182	14625	12434	14944	16464	10301	11304	14448	12438
Germany	14598	14219	12831	10834	17545	16493	18792	14277	15102
Guernsey		10					10	5	9
Ireland	30082	36539	35923	33132	48155	43355	45696	42627	42988
Isle of Man						14	11	11	8
Jersey	9	8	6	7	8	6	7	8	8

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Lithuania		95	7				23		
Netherlands	18819	20064	18261	17920	20900	21699	18336	19794	16295
Norway			7	3948	121	30	2019	1101	734
Poland	461	1368	978						
Russia						1			
Spain	4795	4048	2772	7327	8462	6532	1257	773	635
United Kingdom	115586	67187	87424	768821	109147	107840	111103	93775	92957
Misreported (Area IVa)	-37911	-8719		-17280	-1959				
Misreported (Unknown)									
Unallocated	13412	4783	10042	-952	490	4503	399	16	-144
Discards	20359	14723	10177	27351	6848	7518	7153	10485	1862
Total	190597	169009	192201	177662	230603	218377	219007	197327	183795

Table 2.3.2.4. NE Atlantic Mackerel. Catch (t) in Divisions VIIIc and IXa, 1977–2013 (Data submitted by Working Group members).

Country	Div	1977	1978	1979	1980	1981	1982	1983	1984	1985
France	VIIIc									
Poland	IXa	8								
Portugal	IXa	1743	1555	1071	1929	3108	3018	2239	2250	4178
Spain	VIIIc	19852	18543	15013	11316	12834	15621	10390	13852	11810
Spain	IXa	2935	6221	6280	2719	2111	2437	2224	4206	2123
USSR	IXa	2879	189	111						
Total	IXa	7565	7965	7462	4648	5219	5455	4463	6456	6301
Total		27417	26508	22475	15964	18053	21076	14853	20308	18111

Country	Div	1986	1987	1988	1989	1990	1991	1992	1993	1994
France	VIIIc									
Poland	IXa									
Portugal	IXa	6419	5714	4388	3112	3819	2789	3576	2015	2158
Spain	VIIIc	16533	15982	16844	13446	16086	16940	12043	16675	21246
Spain	IXa	1837	491	3540	1763	1406	1051	2427	1027	1741
USSR	IXa									
Total	IXa	8256	6205	7928	4875	5225	3840	6003	3042	3899
Total		24789	22187	24772	18321	21311	20780	18046	19719	25045

Country	Div	1995	1996	1997	1998	1999	2000	2001	2002	2003
France	VIIIc									226
Poland	IXa									
Portugal	IXa	2893	3023	2080	2897	2002	2253	3119	2934	2749
Spain	VIIIc	23631	28386	35015	36174	37631	30061	38205	38703	17384
Spain	IXa	1025	2714	3613	5093	4164	3760	1874	7938	5464
Discards	VIIIc									531
Discards	IXa	3918	5737	5693	7990	6165	6013			
Total	IXa	27549	34123	40708	44164	43796	36074	4993	10873	8213
Total								43198	49575	26354

Table 2.3.2.4. NE Atlantic Mackerel. Catch (t) in Divisions VIIIc and IXa, 1977–2013 (D94ata submitted by Working Group members). Continued..

Country	Div	2004	2005	2006	2007	2008	2009	2010	2011	2012
France	VIIIc	177	151	43	55	168	383	392	44	283
Poland	IXa									
Portugal	IXa	2289	1509	2620	2605	2381	1753	2363	962	824
Spain	VIIIc			43063	53401	50455	91043	38858	14709	17768
Spain	IXa			7025	6773	6855	14569	7347	2759	845
Discards	VIIIc	928	391	3606	156	73	725	4408	563	2187
Discards	IXa		405	1	916	677	241	232	1245	1244
Unallocated	VIIIc	28429	42851						4691	4144
Unallocated	IXa	3946	5107					108	871	1076
Total	IXa	6234	7021	9646	10293	9913	16562	10049	5836	3989

Total		35768	50414	56358	63906	60609	108713	53708	25843	28372

Country	Div	2013
France	VIIIc	220
Poland	IXa	
Portugal	IXa	254
Spain	VIIIc	14617
Spain	IXa	1162
Discards	VIIIc	1428
Discards	IXa	1027
Unallocated	VIIIc	-573
Unallocated	IXa	4053
Total	IXa	6497
Total		22188

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013.

Quarters 1-4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							30.83	2259.26
1	14.18	0.05	0.13	0.19	4510.25	703.88	81.16	6633.01
2	143.07	0.35	1.38	1.47	96795.89	2160.72	1478.62	5201.75
3	362.29	0.28	1.16	1.17	184334.54	1175.84	314.18	3296.03
4	293.39	0.04	0.19	0.19	91991.97	542.26	0.57	2527.60
5	348.83	0.03	0.09	0.11	120107.89	516.82	0.20	1044.42
6	238.71	0.03	0.09	0.11	106602.70	468.65	77.80	922.83
7	195.03	0.01	0.06	0.05	79088.42	207.68	0.19	831.31
8	72.49	0.01	0.05	0.05	38093.59	72.98	0.19	417.25
9	46.11				19517.42	22.75		321.56
10	16.63				5855.13	31.31		220.14
11	0.39				3362.29	4.37		47.03
12	3.72				1644.76	1.21		135.07
13	0.39				124.88	0.19		72.07
14					85.49	0.18		
15+					0.00			125.90
SOP	650.4	0.2	0.7	0.7	259953.2	1352.7	465.9	5705.2
Cth	649.6	0.2	0.7	0.7	258791.2	1346.4	465.6	5632.4
SOP%	99.9%	100.0%	100.0%	100.0%	99.6%	99.5%	99.9%	98.7%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0.09	0.45	0.03	2054.73	23.39		2045.53	3.22	
1	46.45	55.34	13.91	728.70	844.43	18.74	302.46	408.91	
2	54.90	106.80	38.94	729.82	513.54	48.17	217.85	1353.57	
3	31.25	531.11	37.12	692.22	282.93	17.09	211.68	3435.68	0.00
4	14.83	4261.23	139.21	432.12	138.27	11.83	134.80	4189.19	0.00
5	19.10	8463.41	200.53	250.09	39.42	6.68	128.55	7040.58	0.00
6	15.68	14979.08	321.98	156.84	16.66	9.11	231.33	12018.30	0.00
7	14.62	13920.81	281.00	122.61	27.27	11.36	98.89	12755.09	0.01
8	8.29	4077.49	77.04	76.73	12.52	4.93	36.78	3922.10	0.00
9	4.47	3507.81	52.77	31.36	6.35	3.75	29.67	2177.19	0.00
10	1.49	710.92	0.23	66.49	6.19	1.44	1.52	375.00	0.00
11	0.48	419.63	3.89	0.79	4.98	0.72	0.78	764.37	0.00
12	0.23	0.82		0.31		0.19	0.17	19.58	0.00
13	0.12	52.63			0.53				
14	0.04						0.03	14.97	
15+	0.01	24.97		14.01	0.22				
SOP	54.4	19062.4	407.4	1038.0	339.8	31.2	512.3	15999.5	0.0
Cth	54.4	19140.1	409.4	1019.9	339.2	29.9	500.2	16205.9	0.0
SOP%	100.0%	100.4%	100.5%	98.3%	99.8%	95.9%	97.6%	101.3%	104.0%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarters 1-4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		0.02	1951.61	0.00	0.12		2093.95	278.81	451.09
1	1281.72	165.23	7123.53	152.18	18.95		1927.78	6485.04	1382.86
2	1417.45	653.71	2920.84	245.47	193.62	0.00	929.38	6967.20	1169.62
3	826.32	385.37	262.99	831.75	119.26	0.11	63.66	1408.48	231.07
4	1248.38	1174.98	211.24	3282.06	64.43	0.26	70.03	315.36	102.02
5	1529.98	2563.64	182.92	7929.64	127.71	0.68	69.76	465.08	48.50
6	893.73	3083.11	113.07	11082.10	303.54	1.67	88.13	789.54	343.95
7	652.21	2887.12	80.49	10380.33	357.68	3.37	41.94	746.51	211.83
8	539.55	1837.58	34.41	4515.44	250.76	1.60	40.82	549.06	212.18
9	468.34	1507.97	11.64	1178.98	104.49	1.06	32.26	304.25	234.34
10	411.02	752.69	8.45	845.17	96.38	0.55	13.04	272.13	219.24
11	0.19	208.65	2.70	248.95	46.59	0.25	6.70	146.93	137.61
12	0.26	260.46	1.22	80.50	37.74	0.09	1.30	133.85	134.13
13	0.20	197.47					0.65		
14									
15+									
SOP	2466.5	5682.9	1280.5	13617.3	573.0	3.5	873.8	4418.6	1166.9
Cth	2455.6	5669.3	1427.8	13680.6	583.1	3.7	873.1	4447.8	1175.9
SOP%	99.6%	99.8%	111.5%	100.5%	101.8%	103.6%	99.9%	100.7%	100.8%

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	Total
0			132.12				0.00		11325.24
1	217.57		13079.87	0.12	771.13	9.60	0.11		46977.47
2	18873.60	0.04	58547.98	11809.64	8722.14	53.53	19.61	4808.69	226179.35
3	57012.41	0.75	56285.16	35456.43	22068.55	80.05	89.09	60234.54	430080.58
4	78733.91	3.23	76092.96	18851.57	31998.60	48.15	63.19	25342.26	342280.30
5	99272.54	3.29	66158.05	21490.72	64354.75	71.98	64.84	34746.76	437247.56
6	94687.80	2.32	45639.71	25040.57	78132.46	53.99	69.88	24834.28	421219.72
7	85440.95	2.73	19839.47	20406.71	70855.26	51.07	47.08	18829.22	338388.36
8	65046.02	3.03	7020.89	10762.40	47712.68	16.88	19.17	7289.92	192724.91
9	51050.30	2.96	4023.81	6633.95	20141.65	6.96	12.20	7290.35	118726.72
10	22613.95	1.50	1064.94	3260.23	8928.20	3.09	1.75	474.67	46253.48
11	8473.72	0.61	263.74	1079.76	3699.16	0.51	1.74	4.26	18931.79
12	5703.24	0.32	268.54	959.07	1596.13	0.51	0.00		10983.39
13	3356.32	0.21	2.09	502.02	250.36	0.51			4560.62
14	910.30	0.04	1.05	137.80	308.99				1458.88
15+	143.89	0.01		1.61	542.57				853.19
SOP	216620.4	7.8	129244.9	49315.2	131430.3	128.9	132.0	69154.3	931690.7
Cth	216643.0	7.8	129245.0	49312.6	132205.9	128.9	132.0	69154.3	931732.3
SOP%	100.0%	100.0%	100.0%	100.0%	100.6%	100.0%	100.0%	100.0%	100.0%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 1

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	0.86			0.10	0.06	0.08	0.02	6.87
2	1.89			0.22	0.23	0.17	0.17	145.12
3	0.69			0.08	0.59	0.06	0.04	432.69
4	0.17			0.02	1.53	0.02	0.00	353.24
5	0.34			0.04	3.21	0.03	0.01	158.40
6	0.34			0.04	4.36	0.03	0.01	157.63
7					4.79			144.84
8					3.91			83.60
9					1.20			59.11
10					0.53			36.87
11					0.24			10.55
12					0.11			15.28
13					0.10			5.00
14					0.01			
15+					0.00			27.98
SOP	0.7			0.1	8.3	0.1	0.1	525.9
Cth	0.7			0.1	8.3	0.1	0.1	524.6
SOP%	100.0%			100.0%	100.2%	100.0%	100.0%	99.7%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	0.01	6.83	13.65	1.16	0.01	17.06	78.50	399.31	
2	0.37	51.83	37.07	7.39	23.66	46.33	213.56	1316.44	
3	0.39	508.17	35.29	180.45	19.61	16.07	206.97	3384.86	
4	0.14	4239.78	133.70	160.89	8.86	9.91	125.49	4091.39	
5	0.15	8427.74	197.09	127.43	3.84	2.85	121.92	6926.90	
6	0.13	14926.58	317.51	75.11	3.01	2.17	221.29	11812.06	
7	0.05	13859.39	275.90	59.89	1.29	1.63	86.22	12384.00	
8	0.01	4051.71	75.00	24.26	1.12	0.54	30.93	3727.38	
9	0.06	3486.42	52.00	9.30	4.42	0.12	26.69	2061.27	
10	0.01	704.56	0.03	42.86	1.12	0.01	0.30	313.43	
11	0.01	416.26	3.83		0.37	0.02	0.31	739.09	
12							0.02	10.32	
13		52.59							
14							0.03	14.91	
15+		24.97		9.30	0.16				
SOP	0.3	18951.8	397.0	252.0	13.6	17.9	276.0	15538.0	
Cth	0.3	19029.1	400.9	252.5	13.6	16.4	281.0	15736.7	
SOP%	99.6%	100.4%	101.0%	100.2%	100.1%	91.5%	101.8%	101.3%	

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 1

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							520.26		
1		0.00	6751.16	149.29	2.22		542.82	3.77	419.13
2		4.46	2232.10	215.72	171.88	0.00	319.70	147.55	166.07
3	150.82	48.58	110.77	715.52	109.24	0.01	17.06	127.54	39.70
4	603.27	944.82	61.28	2901.45	51.41	0.12	22.24	61.52	5.61
5	1055.72	2319.33	35.75	7177.80	113.45	0.19	35.88	169.28	0.34
6	603.27	2820.50	31.78	10249.84	293.36	0.46	43.77	399.55	0.80
7	452.45	2670.66	27.57	9685.93	351.24	0.63	25.16	494.61	1.00
8	301.64	1658.80	14.95	4251.82	246.95	0.12	28.80	317.64	0.64
9	301.64	1387.07	6.63	1111.23	103.33	0.10	23.17	66.81	0.13
10	301.64	689.36	5.04	805.56	95.83	0.01	10.31	60.50	0.12
11		185.54	1.68	236.22	46.44	0.03	5.08	14.16	0.03
12		239.16	0.86	79.18	37.68		0.78	4.81	0.01
13		183.54					0.57		
14									
15+									
SOP	1084.2	4876.9	814.3	12497.9	542.9	0.6	276.7	582.8	45.3
Cth	1084.2	4909.2	952.9	12559.5	552.7	0.6	276.1	585.4	48.0
SOP%	100.0%	100.7%	117.0%	100.5%	101.8%	101.7%	99.8%	100.4%	106.1%

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	Total
0									520.26
1				0.00	18.48				8411.40
2				0.63	4263.73				9366.32
3				1.60	15155.57				21262.37
4				0.92	28103.21				41880.98
5				1.58	58467.90				85347.17
6				2.14	73605.04				115570.78
7				2.42	66581.78				107111.46
8				1.29	46243.04				61064.14
9				0.39	19518.46				28219.56
10				0.13	8665.03				11733.26
11				0.05	3651.03				5310.94
12				0.05	1549.17				1937.43
13				0.00	211.08				452.89
14				0.00	308.97				323.92
15+				0.04	539.73				602.18
SOP				3.7	120642.6				177349.5
Cth				3.7	121417.2				178653.9
SOP%				99.9%	100.6%				100.7%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 2

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	7.66	0.04	0.07	0.03	48.64	653.76	62.06	23.77
2	45.68	0.08	0.16	0.07	224.12	1763.01	1179.38	506.36
3	130.26	0.03	0.06	0.03	141.64	782.32	249.82	1531.05
4	96.21	0.01	0.01	0.01	157.77	194.77	0.30	1256.58
5	141.66	0.01	0.03	0.01	183.64	274.09	0.10	561.84
6	109.78	0.01	0.03	0.01	239.43	266.59	62.06	559.14
7	95.22				355.31	32.50	0.10	516.23
8	36.10				274.08	13.16	0.10	296.12
9	23.01				67.09	0.86		213.86
10	8.20				36.60	2.75		134.68
11	0.19				11.30			36.48
12	1.86				8.02			55.21
13	0.19				10.78			18.49
14					0.11			
15+								97.92
SOP	259.2	0.0	0.1	0.0	649.1	729.0	368.7	1875.8
Cth	258.4	0.0	0.1	0.0	649.1	725.2	368.7	1871.0
SOP%	99.7%	100.0%	100.0%	100.0%	100.0%	99.5%	100.0%	99.7%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	0.64			11.43	17.43				
2	4.09	0.19	0.37	70.94	111.93		0.56	5.89	
3	3.78	1.94	1.57	151.06	93.45	0.06	3.25	41.01	0.00
4	1.42	13.94	5.26	96.63	24.20	1.16	8.33	92.40	0.00
5	1.50	23.81	3.44	72.04	5.91	2.66	5.70	109.72	0.00
6	1.61	37.47	4.47	40.11	4.45	4.24	7.87	201.57	0.00
7	1.37	32.54	5.10	43.13	5.50	3.73	7.93	367.48	0.01
8	0.91	8.84	2.04	17.60	1.12	1.02	3.17	191.89	0.00
9	0.37	9.94	0.77	8.16	0.87	1.46	1.28	114.65	0.00
10	0.18	1.18	0.19	23.63	1.16	0.25	0.29	61.04	0.00
11	0.08	1.31	0.07	0.79		0.23	0.10	24.97	0.00
12	0.02			0.31		0.01	0.00	9.18	0.00
13	0.02				0.53				
14	0.01							0.05	
15+	0.00			4.71	0.05				
SOP	4.1	49.7	9.8	169.7	44.8	5.7	13.6	443.4	0.0
Cth	4.1	49.0	8.0	170.1	44.3	5.7	13.1	450.9	0.0
SOP%	100.0%	98.6%	81.8%	100.3%	99.0%	100.2%	95.9%	101.7%	104.0%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 2

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							538.09		
1			48.53	0.00	0.00		476.66	37.68	43.67
2			110.98	0.96	0.00		216.47	109.88	220.29
3	54.42	3.66	63.62	37.29	0.07	0.08	23.22	20.81	134.37
4	217.92	27.63	112.80	163.31	0.35	0.11	25.63	15.87	68.30
5	382.05	107.29	121.66	467.61	1.47	0.40	17.47	29.95	29.26
6	219.62	189.24	71.52	697.15	2.84	0.99	20.97	287.93	297.69
7	164.34	192.00	50.83	615.74	3.02	2.24	9.33	199.66	206.71
8	110.29	159.66	17.44	218.17	1.57	1.21	6.90	200.34	208.11
9	109.92	115.70	4.88	44.61	0.42	0.79	5.36	225.03	233.88
10	109.38	60.07	3.39	26.57	0.34	0.44	1.63	210.80	219.10
11	0.19	21.52	1.02	6.60	0.11	0.18	0.89	132.36	137.57
12	0.26	21.30	0.36	1.33	0.06	0.07	0.38	129.04	134.12
13	0.20	13.93							
14									
15+									
SOP	394.5	355.8	154.1	744.2	3.4	2.4	219.4	694.0	769.6
Cth	394.5	360.1	155.9	746.7	3.4	2.5	219.3	699.6	773.4
SOP%	100.0%	101.2%	101.1%	100.3%	100.5%	104.0%	100.0%	100.8%	100.5%

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	Total
0									538.09
1	216.13			0.11					1648.31
2	1696.67		1454.55	6340.09	2.95		19.12	46.83	14131.64
3	4212.45		6652.04	21942.60	10.25		88.67	217.22	36592.08
4	6506.33		4704.01	7876.73	6.11		62.59	153.31	21890.00
5	6101.24		4862.89	6131.88	21.28		64.33	157.59	19882.54
6	7298.16		5254.76	7531.67	19.94		69.54	170.30	23671.17
7	8304.07		3553.24	6269.51	23.29		46.94	114.95	21222.01
8	6421.11		1462.92	2114.77	14.14		19.12	46.82	11848.71
9	1504.81		932.16	981.64	9.03		12.17	29.79	4652.51
10	942.69		140.10	681.32	3.32		1.74	4.26	2675.30
11	275.08		131.62	416.47	1.22		1.74	4.26	1206.34
12	151.00		4.30	165.46	0.67				682.95
13	211.00		2.09	0.09	0.01				257.33
14			1.05	0.01	0.02				1.24
15+				1.03	2.84				106.55
SOP	15350.1		9906.9	13936.4	39.8		131.0	320.9	47645.2
Cth	15351.1		9907.0	13931.6	39.8		131.0	320.9	47654.7
SOP%	100.0%		100.0%	100.0%	100.1%		100.0%	100.0%	100.0%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 3

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								79.70
1	5.15	0.01	0.05	0.05	1664.13	48.10	15.04	4584.36
2	85.39	0.27	1.20	1.18	8968.55	340.70	285.90	3250.73
3	223.89	0.25	1.09	1.07	28649.87	292.06	60.99	916.75
4	190.60	0.04	0.16	0.16	19356.52	269.69	0.16	550.90
5	204.04	0.01	0.05	0.05	33784.26	164.05	0.05	212.07
6	127.48	0.01	0.05	0.05	28169.57	135.20	15.04	124.01
7	99.63	0.01	0.05	0.05	25471.83	142.09	0.05	92.96
8	36.40	0.01	0.05	0.05	9740.30	41.47	0.05	24.60
9	23.11				6226.65	14.09		25.05
10	8.43				2181.55	26.39		25.05
11	0.19				52.38	0.06		
12	1.86				504.26	0.53		44.29
13	0.19				52.38	0.06		25.05
14								
15+								
SOP	380.8	0.1	0.6	0.6	61155.6	464.5	89.5	2086.6
Cth	380.8	0.1	0.6	0.6	61161.3	464.5	89.5	2051.2
SOP%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	98.3%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0.05				4.32				
1	44.19		0.24	359.53	684.77	1.32	0.24	3.35	
2	42.67		1.44	402.34	292.08	1.46	1.44	20.32	
3	15.69	0.91	0.24	186.79	132.52	0.85	0.41	6.00	
4	6.46	1.25	0.24	78.38	85.89	0.74	0.47	5.15	
5	7.34	4.45		27.82	22.30	1.15	0.83	3.77	
6	6.35	11.06		17.95	6.21	2.70	2.07	4.67	
7	6.03	25.11		9.16	17.68	6.00	4.70	3.61	
8	5.00	13.59		18.34	7.73	3.36	2.54	2.64	
9	3.07	8.82		9.65	0.41	2.16	1.65	1.08	
10	0.87	4.95			3.10	1.18	0.93	0.53	
11	0.33	2.01			3.66	0.48	0.38	0.31	
12	0.14	0.78				0.19	0.15	0.07	
13	0.03								
14	0.03							0.01	
15+	0.01								
SOP	31.9	26.9	0.6	231.7	227.0	7.4	5.5	13.6	
Cth	31.9	28.0	0.5	230.5	226.8	7.7	5.7	13.7	
SOP%	100.1%	104.0%	85.4%	99.5%	99.9%	103.3%	103.7%	100.8%	

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 3

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		0.02	680.22	0.00	0.12		598.25	72.60	444.72
1	1030.33	0.39	36.23	2.07	15.79		547.68	5466.54	881.82
2	1139.44	5.96	106.90	18.76	19.02		275.14	5930.01	743.75
3	499.27	16.42	60.23	47.72	7.39	0.01	21.65	1152.57	51.82
4	343.40	42.43	36.89	128.72	7.95	0.02	20.16	231.54	27.91
5	74.12	52.21	25.51	167.53	7.20	0.06	15.40	262.56	18.79
6	56.94	27.80	9.78	79.99	4.56	0.16	21.19	101.27	45.43
7	28.47	15.01	2.09	46.26	1.89	0.35	7.01	51.86	4.11
8	102.59	10.29	2.03	26.73	1.33	0.19	5.04	30.76	3.42
9	45.65	5.10	0.13	13.41	0.34	0.12	3.72	12.19	0.32
10		3.27	0.03	7.46	0.08	0.07	1.09	0.69	0.02
11		1.60		3.46	0.02	0.03	0.73	0.34	0.01
12						0.01	0.13		
13							0.08		
14									
15+									
SOP	794.0	74.3	96.4	221.7	18.3	0.4	244.9	2774.9	336.3
Cth	785.3	61.3	100.0	221.1	18.5	0.4	244.9	2793.2	338.5
SOP%	98.9%	82.4%	103.8%	99.7%	101.0%	104.0%	100.0%	100.7%	100.7%

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	Total
0			132.12				0.00		2012.11
1			13079.87		1.07		0.11		28472.44
2	17090.18	0.01	57075.80	5468.92	5.98		0.48	4761.85	106337.87
3	52429.27	0.52	49544.97	13402.11	8.94		0.42	60017.32	207750.02
4	70743.47	3.08	71212.63	10643.55	5.38		0.60	25188.95	199183.52
5	89808.48	2.80	60907.28	14586.40	8.04		0.51	34589.16	234958.32
6	81452.69	1.90	40032.33	15414.44	6.03		0.34	24663.97	190541.25
7	75052.10	2.22	15986.51	11271.60	5.70		0.13	18714.27	147068.55
8	58278.18	2.76	5416.92	6664.15	1.89		0.05	7243.10	87685.55
9	48048.15	2.80	3038.76	4440.58	0.78		0.03	7260.56	69188.35
10	21665.86	1.46	924.84	1587.67	0.35		0.01	470.41	26916.27
11	8194.40	0.60	132.12	442.99	0.06		0.00		8836.14
12	5519.02	0.29	264.24	573.32	0.06		0.00		6909.33
13	3145.30	0.20		281.68	0.06				3505.02
14	910.12	0.04		137.80					1048.00
15+	143.89	0.01		0.54					144.46
SOP	195151.0	6.9	118667.0	30291.4	14.4		1.0	68833.4	482249.3
Cth	195170.6	6.9	118667.0	30294.1	14.4		1.0	68833.4	482244.1
SOP%	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							30.83	2179.56
1	0.51		0.00		2797.42	1.94	4.04	2018.01
2	10.11		0.02		87602.98	56.84	13.17	1299.54
3	7.45		0.01		155542.43	101.41	3.34	415.55
4	6.41		0.01		72476.15	77.79	0.11	366.87
5	2.78		0.00		86136.78	78.65	0.04	112.11
6	1.11		0.00		78189.35	66.82	0.69	82.05
7	0.19		0.00		53256.49	33.09	0.04	77.27
8					28075.30	18.34	0.04	12.93
9					13222.48	7.80		23.54
10					3636.46	2.17		23.54
11					3298.36	4.31		
12					1132.38	0.68		20.29
13					61.63	0.13		23.54
14					85.36	0.18		
15+								
SOP	9.7		0.0		198140.2	159.1	7.5	1216.9
Cth	9.7		0.0		196972.4	156.6	7.3	1185.5
SOP%	100.4%		100.4%		99.4%	98.4%	96.6%	97.4%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0.03	0.45	0.03	2054.73	19.07		2045.53	3.22	
1	1.62	48.51	0.02	356.57	142.22	0.36	223.73	6.24	
2	7.77	54.78	0.06	249.15	85.87	0.38	2.30	10.91	
3	11.38	20.10	0.03	173.91	37.34	0.11	1.06	3.81	
4	6.81	6.26		96.22	19.31	0.02	0.52	0.25	
5	10.11	7.41		22.80	7.37	0.02	0.10	0.19	
6	7.58	3.98		23.68	2.99	0.00	0.09		
7	7.16	3.76		10.43	2.80	0.00	0.05		
8	2.37	3.35		16.54	2.55	0.02	0.14	0.19	
9	0.98	2.62		4.25	0.65	0.02	0.05	0.19	
10	0.43	0.23			0.81	0.00			
11	0.07	0.04			0.95	0.00			
12	0.07	0.04				0.00			
13	0.07	0.04							
14									
15+									
SOP	18.2	34.0	0.0	384.7	54.5	0.2	217.2	4.5	
Cth	18.2	34.0	0.0	366.8	54.6	0.2	200.4	4.6	
SOP%	100.0%	99.9%	88.0%	95.3%	100.1%	100.0%	92.3%	101.7%	

Table 2.3.3.1. NE Atlantic Mackerel. Catch numbers ('000s) -at-age by area for 2013 (cont)

Quarter 4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0			1271.39	0.00			437.35	206.21	6.37
1	251.39	164.84	287.62	0.81	0.94		360.62	977.06	38.25
2	278.01	643.28	470.86	10.02	2.72		118.07	779.75	39.51
3	121.82	316.71	28.37	31.21	2.57	0.01	1.73	107.57	5.18
4	83.79	160.09	0.27	88.59	4.72	0.01	2.00	6.43	0.20
5	18.08	84.83		116.70	5.60	0.03	1.01	3.28	0.10
6	13.89	45.57		55.11	2.79	0.06	2.20	0.79	0.02
7	6.95	9.44		32.41	1.53	0.14	0.43	0.38	0.01
8	25.03	8.83		18.72	0.91	0.08	0.08	0.32	0.01
9	11.14	0.10		9.72	0.39	0.05	0.01	0.22	0.01
10				5.58	0.12	0.03	0.00	0.14	0.00
11				2.67	0.01	0.01	0.00	0.07	0.00
12						0.00	0.00		
13							0.00		
14									
15+									
SOP	193.7	375.7	215.7	153.5	8.4	0.2	132.8	366.8	15.8
Cth	191.6	338.7	219.0	153.3	8.5	0.2	132.8	369.6	15.9
SOP%	98.9%	90.1%	101.5%	99.8%	100.3%	104.0%	100.0%	100.7%	100.9%

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	Total
0									8254.78
1	1.44				751.58	9.60			8445.32
2	86.75	0.04	17.63		4449.48	53.53			96343.52
3	370.68	0.23	88.15	110.12	6893.78	80.05			164476.10
4	1484.10	0.15	176.31	330.37	3883.91	48.15			79325.80
5	3362.81	0.49	387.88	770.86	5857.53	71.98			97059.53
6	5936.95	0.42	352.62	2092.32	4501.45	53.99			91436.52
7	2084.78	0.51	299.72	2863.18	4244.49	51.07			62986.33
8	346.73	0.27	141.05	1982.20	1453.62	16.88			32126.50
9	1497.34	0.16	52.89	1211.35	613.39	6.96			16666.30
10	5.40	0.03		991.10	259.51	3.09			4928.65
11	4.23	0.01		220.24	46.85	0.51			3578.36
12	33.22	0.03		220.24	46.23	0.51			1453.68
13	0.02	0.00		220.24	39.21	0.51			345.38
14	0.19	0.00							85.73
15+	0.00	0.00							0.00
SOP	6119.3	0.9	671.0	5083.7	10733.4	128.9			224446.7
Cth	6121.3	0.9	671.0	5083.2	10734.5	128.9			223179.6
SOP%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			99.4%

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5%.

Quarters 1-4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							2%	9%
1	1%	6%	4%	6%	1%	12%	4%	28%
2	8%	44%	44%	44%	13%	37%	75%	22%
3	21%	35%	37%	35%	25%	20%	16%	14%
4	17%	6%	6%	6%	12%	9%	0%	11%
5	20%	3%	3%	3%	16%	9%	0%	4%
6	14%	3%	3%	3%	14%	8%	4%	4%
7	11%	2%	2%	2%	11%	4%	0%	3%
8	4%	2%	2%	2%	5%	1%	0%	2%
9	3%				3%	0%		1%
10	1%				1%	1%		1%
11	0%				0%	0%		0%
12	0%				0%	0%		1%
13	0%				0%	0%		0%
14					0%	0%		
15+					0%			1%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0%	0%	0%	38%	1%		59%	0%	
1	22%	0%	1%	14%	44%	14%	9%	1%	
2	26%	0%	3%	14%	27%	36%	6%	3%	
3	15%	1%	3%	13%	15%	13%	6%	7%	1%
4	7%	8%	12%	8%	7%	9%	4%	9%	2%
5	9%	17%	17%	5%	2%	5%	4%	15%	6%
6	7%	29%	28%	3%	1%	7%	7%	25%	15%
7	7%	27%	24%	2%	1%	8%	3%	26%	34%
8	4%	8%	7%	1%	1%	4%	1%	8%	19%
9	2%	7%	5%	1%	0%	3%	1%	4%	12%
10	1%	1%	0%	1%	0%	1%	0%	1%	7%
11	0%	1%	0%	0%	0%	1%	0%	2%	3%
12	0%	0%		0%		0%	0%	0%	1%
13	0%	0%			0%				
14	0%						0%	0%	
15+	0%	0%		0%	0%				

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarters 1-4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		0%	15%	0%	0%		39%	1%	9%
1	14%	1%	55%	0%	1%		36%	34%	28%
2	15%	4%	23%	1%	11%	0%	17%	37%	24%
3	9%	2%	2%	2%	7%	1%	1%	7%	5%
4	13%	7%	2%	8%	4%	3%	1%	2%	2%
5	17%	16%	1%	19%	7%	7%	1%	2%	1%
6	10%	20%	1%	27%	18%	17%	2%	4%	7%
7	7%	18%	1%	25%	21%	35%	1%	4%	4%
8	6%	12%	0%	11%	15%	17%	1%	3%	4%
9	5%	10%	0%	3%	6%	11%	1%	2%	5%
10	4%	5%	0%	2%	6%	6%	0%	1%	4%
11	0%	1%	0%	1%	3%	3%	0%	1%	3%
12	0%	2%	0%	0%	2%	1%	0%	1%	3%
13	0%	1%					0%		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0			0%				0%		0%
1	0%		4%	0%	0%	2%	0%		2%
2	3%	0%	17%	8%	2%	13%	5%	3%	9%
3	10%	4%	16%	23%	6%	20%	23%	33%	16%
4	13%	15%	22%	12%	9%	12%	16%	14%	13%
5	17%	16%	19%	14%	18%	18%	17%	19%	17%
6	16%	11%	13%	16%	22%	14%	18%	14%	16%
7	14%	13%	6%	13%	20%	13%	12%	10%	13%
8	11%	14%	2%	7%	13%	4%	5%	4%	7%
9	9%	14%	1%	4%	6%	2%	3%	4%	4%
10	4%	7%	0%	2%	2%	1%	0%	0%	2%
11	1%	3%	0%	1%	1%	0%	0%	0%	1%
12	1%	1%	0%	1%	0%	0%	0%		0%
13	1%	1%	0%	0%	0%	0%			0%
14	0%	0%	0%	0%	0%				0%
15+	0%	0%		0%	0%				0%

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 1

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	20%			20%	0%	20%	9%	0%
2	44%			44%	1%	44%	65%	9%
3	16%			16%	3%	16%	16%	26%
4	4%			4%	7%	4%	1%	22%
5	8%			8%	15%	8%	3%	10%
6	8%			8%	21%	8%	5%	10%
7					23%			9%
8					19%			5%
9					6%			4%
10					3%			2%
11					1%			1%
12					1%			1%
13					0%			0%
14					0%			
15+					0%			2%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	1%	0%	1%	0%	0%	18%	7%	1%	
2	28%	0%	3%	1%	35%	48%	19%	3%	
3	30%	1%	3%	26%	29%	17%	19%	7%	
4	11%	8%	12%	23%	13%	10%	11%	9%	
5	12%	17%	17%	18%	6%	3%	11%	15%	
6	10%	29%	28%	11%	4%	2%	20%	25%	
7	4%	27%	24%	9%	2%	2%	8%	26%	
8	1%	8%	7%	3%	2%	1%	3%	8%	
9	4%	7%	5%	1%	7%	0%	2%	4%	
10	0%	1%	0%	6%	2%	0%	0%	1%	
11	0%	1%	0%		1%	0%	0%	2%	
12							0%	0%	
13		0%							
14							0%	0%	
15+		0%		1%	0%				

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 1

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							33%		
1		0%	73%	0%	0%		34%	0%	66%
2		0%	24%	1%	11%	0%	20%	8%	26%
3	4%	0%	1%	2%	7%	1%	1%	7%	6%
4	16%	7%	1%	8%	3%	7%	1%	3%	1%
5	28%	18%	0%	19%	7%	11%	2%	9%	0%
6	16%	21%	0%	27%	18%	27%	3%	21%	0%
7	12%	20%	0%	26%	22%	38%	2%	26%	0%
8	8%	13%	0%	11%	15%	7%	2%	17%	0%
9	8%	11%	0%	3%	6%	6%	1%	4%	0%
10	8%	5%	0%	2%	6%	1%	1%	3%	0%
11		1%	0%	1%	3%	2%	0%	1%	0%
12		2%	0%	0%	2%		0%	0%	0%
13		1%					0%		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									0%
1				0%	0%				2%
2				6%	1%				2%
3				14%	5%				4%
4				8%	9%				8%
5				14%	18%				17%
6				19%	23%				23%
7				22%	20%				21%
8				11%	14%				12%
9				3%	6%				6%
10				1%	3%				2%
11				0%	1%				1%
12				0%	0%				0%
13				0%	0%				0%
14				0%	0%				0%
15+				0%	0%				0%

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 2

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	1%	20%	20%	20%	3%	16%	4%	0%
2	7%	44%	44%	44%	13%	44%	76%	9%
3	19%	16%	16%	16%	8%	20%	16%	26%
4	14%	4%	4%	4%	9%	5%	0%	22%
5	20%	8%	8%	8%	10%	7%	0%	10%
6	16%	8%	8%	8%	14%	7%	4%	10%
7	14%				20%	1%	0%	9%
8	5%				16%	0%	0%	5%
9	3%				4%	0%		4%
10	1%				2%	0%		2%
11	0%				1%			1%
12	0%				0%			1%
13	0%				1%			0%
14					0%			
15+								2%

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	4%			2%	7%				
2	26%	0%	2%	13%	42%		1%	0%	
3	24%	1%	7%	28%	35%	0%	8%	3%	1%
4	9%	11%	23%	18%	9%	8%	22%	8%	2%
5	9%	18%	15%	13%	2%	18%	15%	9%	6%
6	10%	29%	19%	7%	2%	29%	20%	17%	15%
7	9%	25%	22%	8%	2%	25%	21%	30%	34%
8	6%	7%	9%	3%	0%	7%	8%	16%	19%
9	2%	8%	3%	2%	0%	10%	3%	9%	12%
10	1%	1%	1%	4%	0%	2%	1%	5%	7%
11	0%	1%	0%	0%		2%	0%	2%	3%
12	0%			0%		0%	0%	1%	1%
13	0%				0%				
14	0%							0%	
15+	0%			1%	0%				

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 2

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							40%		
1			8%	0%	0%		35%	2%	2%
2			18%	0%	0%		16%	7%	11%
3	4%	0%	10%	2%	1%	1%	2%	1%	7%
4	16%	3%	19%	7%	3%	2%	2%	1%	4%
5	28%	12%	20%	21%	14%	6%	1%	2%	2%
6	16%	21%	12%	31%	28%	15%	2%	18%	15%
7	12%	21%	8%	27%	29%	34%	1%	12%	11%
8	8%	18%	3%	10%	15%	19%	1%	13%	11%
9	8%	13%	1%	2%	4%	12%	0%	14%	12%
10	8%	7%	1%	1%	3%	7%	0%	13%	11%
11	0%	2%	0%	0%	1%	3%	0%	8%	7%
12	0%	2%	0%	0%	1%	1%	0%	8%	7%
13	0%	2%							
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									0%
1	0%			0%					1%
2	4%		5%	10%	3%		5%	5%	9%
3	10%		23%	36%	9%		23%	23%	23%
4	15%		16%	13%	5%		16%	16%	14%
5	14%		17%	10%	18%		17%	17%	12%
6	17%		18%	12%	17%		18%	18%	15%
7	19%		12%	10%	20%		12%	12%	13%
8	15%		5%	3%	12%		5%	5%	7%
9	3%		3%	2%	8%		3%	3%	3%
10	2%		0%	1%	3%		0%	0%	2%
11	1%		0%	1%	1%		0%	0%	1%
12	0%		0%	0%	1%				0%
13	0%		0%	0%	0%				0%
14			0%	0%	0%				0%
15+				0%	2%				0%

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 3

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								1%
1	1%	2%	2%	2%	1%	3%	4%	46%
2	8%	44%	44%	44%	5%	23%	76%	33%
3	22%	40%	40%	40%	17%	20%	16%	9%
4	19%	6%	6%	6%	12%	18%	0%	6%
5	20%	2%	2%	2%	20%	11%	0%	2%
6	13%	2%	2%	2%	17%	9%	4%	1%
7	10%	2%	2%	2%	15%	10%	0%	1%
8	4%	2%	2%	2%	6%	3%	0%	0%
9	2%				4%	1%		0%
10	1%				1%	2%		0%
11	0%				0%	0%		
12	0%				0%	0%		0%
13	0%				0%	0%		0%
14								
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0%				0%				
1	32%		11%	32%	54%	6%	2%	7%	
2	31%		67%	36%	23%	7%	9%	39%	
3	11%	1%	11%	17%	11%	4%	3%	12%	
4	5%	2%	11%	7%	7%	3%	3%	10%	
5	5%	6%		3%	2%	5%	5%	7%	
6	5%	15%		2%	0%	13%	13%	9%	
7	4%	34%		1%	1%	28%	30%	7%	
8	4%	19%		2%	1%	16%	16%	5%	
9	2%	12%		1%	0%	10%	10%	2%	
10	1%	7%			0%	5%	6%	1%	
11	0%	3%			0%	2%	2%	1%	
12	0%	1%				1%	1%	0%	
13	0%								
14	0%							0%	
15+	0%								

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 3

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		0%	71%	0%	0%		39%	1%	20%
1	31%	0%	4%	0%	24%		36%	41%	40%
2	34%	3%	11%	3%	29%		18%	45%	33%
3	15%	9%	6%	9%	11%	1%	1%	9%	2%
4	10%	24%	4%	24%	12%	2%	1%	2%	1%
5	2%	29%	3%	31%	11%	6%	1%	2%	1%
6	2%	15%	1%	15%	7%	15%	1%	1%	2%
7	1%	8%	0%	9%	3%	34%	0%	0%	0%
8	3%	6%	0%	5%	2%	19%	0%	0%	0%
9	1%	3%	0%	2%	1%	12%	0%	0%	0%
10		2%	0%	1%	0%	7%	0%	0%	0%
11		1%		1%	0%	3%	0%	0%	0%
12						1%	0%		
13							0%		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0			0%				0%		0%
1			4%		2%		4%		2%
2	3%	0%	18%	6%	13%		18%	3%	8%
3	10%	3%	16%	16%	20%		16%	33%	16%
4	13%	16%	22%	13%	12%		22%	14%	15%
5	17%	15%	19%	17%	18%		19%	19%	18%
6	15%	10%	13%	18%	14%		13%	13%	14%
7	14%	12%	5%	13%	13%		5%	10%	11%
8	11%	15%	2%	8%	4%		2%	4%	7%
9	9%	15%	1%	5%	2%		1%	4%	5%
10	4%	8%	0%	2%	1%		0%	0%	2%
11	2%	3%	0%	1%	0%		0%		1%
12	1%	2%	0%	1%	0%		0%		1%
13	1%	1%		0%	0%				0%
14	0%	0%		0%					0%
15+	0%	0%		0%					0%

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							59%	33%
1	2%		2%		0%	0%	8%	30%
2	35%		35%		15%	13%	25%	20%
3	26%		26%		27%	23%	6%	6%
4	22%		22%		12%	17%	0%	6%
5	10%		10%		15%	17%	0%	2%
6	4%		4%		13%	15%	1%	1%
7	1%		1%		9%	7%	0%	1%
8					5%	4%	0%	0%
9					2%	2%		0%
10					1%	0%		0%
11					1%	1%		
12					0%	0%		0%
13					0%	0%		0%
14					0%	0%		
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	0%	0%	23%	68%	6%		90%	13%	
1	3%	32%	14%	12%	44%	39%	10%	25%	
2	14%	36%	45%	8%	27%	41%	0%	44%	
3	20%	13%	18%	6%	12%	11%	0%	15%	
4	12%	4%		3%	6%	2%	0%	1%	
5	18%	5%		1%	2%	2%	0%	1%	
6	13%	3%		1%	1%	0%	0%		
7	13%	2%		0%	1%	0%	0%		
8	4%	2%		1%	1%	2%	0%	1%	
9	2%	2%		0%	0%	2%	0%	1%	
10	1%	0%			0%	0%			
11	0%	0%			0%	0%			
12	0%	0%				0%			
13	0%	0%							
14									
15+									

Table 2.3.3.2. NE Atlantic Mackerel. Percentage catch numbers-at-age by area for 2013. Zeros represent values <0.5% (cont)

Quarter 4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0			62%	0%			47%	10%	7%
1	31%	11%	14%	0%	4%		39%	47%	43%
2	34%	45%	23%	3%	12%		13%	37%	44%
3	15%	22%	1%	8%	12%	1%	0%	5%	6%
4	10%	11%	0%	24%	21%	2%	0%	0%	0%
5	2%	6%		31%	25%	6%	0%	0%	0%
6	2%	3%		15%	12%	15%	0%	0%	0%
7	1%	1%		9%	7%	34%	0%	0%	0%
8	3%	1%		5%	4%	19%	0%	0%	0%
9	1%	0%		3%	2%	12%	0%	0%	0%
10				2%	1%	7%	0%	0%	0%
11				1%	0%	3%	0%	0%	0%
12						1%	0%		
13							0%		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									1%
1	0%				2%	2%			1%
2	1%	2%	1%		13%	13%			14%
3	2%	10%	6%	1%	21%	20%			25%
4	10%	6%	12%	3%	12%	12%			12%
5	22%	21%	26%	7%	18%	18%			15%
6	39%	18%	23%	19%	14%	14%			14%
7	14%	22%	20%	26%	13%	13%			9%
8	2%	12%	9%	18%	4%	4%			5%
9	10%	7%	3%	11%	2%	2%			2%
10	0%	1%		9%	1%	1%			1%
11	0%	1%		2%	0%	0%			1%
12	0%	1%		2%	0%	0%			0%
13	0%	0%		2%	0%	0%			0%
14	0%	0%							0%
15+	0%	0%							0%

Table 2.3.4.1. NEA Mackerel (Southern component). Effort data by fleets.

	TRAWL		HOOK (HAND–LINE)	
	AVILES	A CORUÑA	SANTANDER	SANTOÑA
	(VIIIc East)	(VIIIc West)	(VIIIc East)	(VIIIc East)
	(Days * 100 CV)	(Days * 100 CV)	(Nº fishing trips)	(Nº fishing trips)
	Annual	Annual	Feb. -May	Feb. -May
1983	12568	51017	-	-
1984	10815	48655	-	-
1985	9856	45358	-	-
1986	10845	39829	-	-
1987	8309	34658	-	-
1988	9047	41498	-	-
1989	8063	44401	-	605
1990	8492	44411	322	509
1991	7677	40435	209	724
1992	12693	38896	70	698
1993	7635	44479	151	1216
1994	9620	39602	130	1926
1995	6146	41476	217	1696
1996	4525	35709	560	2007
1997	4699	35191	736	2095
1998	5929	35191	754	3022
1999	6829	30131	739	2602
2000	4453	30073	719	1709
2001	2385	29923	700	2479
2002	2748	21823	1282	2672
2003	2526	12328	265	759
2004	-	19198	626	2151
2005	-	20663	553	1504
2006	-	12866	845	1933
2007	-	21202	1031	1895
2008	-	20212	1143	1350
2009	-	21112	839	1780
2010	-	13744	533	846
2011	-	11532	796	755
2012	3168	11887	893	697
2013	-	-	630	679

(-) Not available

Table 2.3.4.2. NEA mackerel (Southern component). CPUE index in Spanish commercial fleets.

	TRAWL		HOOK (HAND–LINE)	
	AVILES	A CORUÑA	SANTANDER	SANTOÑA
	(VIIIc East)	(VIIIc West)	(VIIIc East)	(VIIIc East)
	(Kg / 100 CV)	(Kg / 100 CV)	(Kg/Nº fish. trips)	(Kg/Nº fish. trips)
	Annual	Annual	Feb. -May	Feb. -May
1983	14	23	-	-
1984	24	27	-	-
1985	18	25	-	-
1986	41	23	-	-
1987	13	24	-	-
1988	16	33	-	-
1989	19	29	-	1427
1990	83	39	740	1924
1991	68	36	633	1394
1992	35	13	906	856
1993	13	13	613	1791
1994	57	44	2388	1591
1995	95	36	3136	1988
1996	124	33	1166	1509
1997	133	39	2138	1868
1998	142	80	2362	2128
1999	136	44	2438	2085
2000	312	65	1796	1880
2001	223	61	2323	2401
2002	342	58	2062	1871
2003	357	52	1868	1413
2004	-	19	2046	1313
2005	-	143	3618	2425
2006	-	442	2908	2742
2007	-	22	2676	2889
2008	-	12	1921	2832
2009	-	67	4659	3546
2010	-	67	4659	4568
2011	-	95	2033	2079
2012	77	-	1990	1896
2013	-	-	1757	2396

(-) Not available

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013.

Quarters 1-4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							236	237
1	268	237	242	238	274	238	255	271
2	303	279	283	280	300	265	298	297
3	320	307	308	307	315	302	305	315
4	340	325	326	325	339	338	325	343
5	350	339	346	340	346	340	354	349
6	358	350	352	350	355	351	355	372
7	361	395	395	395	360	372	395	373
8	367	405	405	405	367	380	405	375
9	377				374	391		404
10	384				382	394		401
11	430				380	378		400
12	376				392	381		390
13	430				411	405		449
14					425	425		
15+					415			398

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	210	184	184	236	216		236	184	
1	263	268	236	256	251	238	243	236	
2	284	297	275	278	277	274	274	272	
3	306	320	311	310	295	292	302	297	338
4	333	337	332	341	315	319	318	329	331
5	353	347	351	362	331	342	346	341	347
6	362	361	360	361	341	361	356	354	360
7	368	368	368	381	330	369	358	360	370
8	377	380	383	368	339	374	348	381	371
9	381	382	375	389	344	382	351	381	383
10	395	394	404	402	356	394	393	390	392
11	396	409	405	383	334	390	395	389	383
12	404	391		390		390	394	408	390
13	435	415			415				
14	428						415	415	
15+	415	425		405	405				

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarters 1-4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		265	205	265	265		237	223	246
1	273	310	232	241	285		282	286	248
2	290	311	255	277	269	245	286	291	274
3	319	325	295	339	282	333	332	301	291
4	330	336	327	345	325	333	351	342	322
5	344	350	340	356	359	344	372	359	354
6	358	365	357	365	373	358	362	380	407
7	368	374	366	371	377	368	382	380	406
8	369	388	381	381	385	372	396	390	411
9	378	406	399	393	403	382	399	407	415
10	360	399	405	401	405	392	414	410	416
11	416	415	409	406	418	383	419	418	420
12	425	425	417	419	424	390	418	421	421
13	433	433					445		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0			280				280		232
1	260		298	222	263	264	298		273
2	294	299	306	275	282	290	287	321	297
3	304	296	333	297	303	311	305	324	315
4	311	297	346	323	334	340	330	341	333
5	329	310	355	337	347	360	345	350	344
6	344	327	361	349	358	368	355	358	354
7	352	342	370	357	365	373	362	365	361
8	355	347	378	361	375	389	370	371	366
9	359	355	391	366	383	401	374	379	371
10	366	364	381	376	389	415	350	366	376
11	372	374	404	378	399	415	410	410	383
12	386	381	410	400	401	415	410		393
13	389	389	385	400	422	445			396
14	389	378	390	390	428				400
15+	406	406		414	431				421

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 1

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	231			231	231	231	238	235
2	255			255	268	255	288	285
3	290			290	300	290	300	307
4	325			325	334	325	325	338
5	325			325	348	325	325	343
6	345			345	361	345	350	370
7					368			373
8					376			377
9					386			395
10					385			391
11					392			400
12					391			394
13					411			415
14					428			
15+					415			398

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	234	235	235	250	215	235	235	235	
2	271	307	273	282	258	273	273	271	
3	302	320	310	317	285	290	302	297	
4	312	337	332	345	317	315	317	329	
5	337	347	351	364	341	336	346	341	
6	327	361	360	366	330	351	356	354	
7	344	368	368	387	372	366	356	360	
8	316	380	383	368	335	374	342	381	
9	340	382	375	415	343	386	347	380	
10	325	394	405	402	376	397	384	389	
11	325	409	405		325	387	406	389	
12							425	425	
13		415							
14							415	415	
15+		425		405	405				

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 1

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							241		
1		265	230	240	253		268	229	197
2		322	247	268	264	245	274	270	255
3	315	343	272	338	277	299	331	279	278
4	320	335	318	344	317	334	360	320	294
5	344	350	341	355	358	336	377	360	360
6	358	366	366	365	374	352	365	366	366
7	368	375	373	371	377	360	384	371	371
8	370	388	389	382	385	385	396	377	377
9	380	406	404	393	403	379	400	384	384
10	360	399	407	401	405	395	415	387	387
11		416	410	406	418	385	418	394	394
12		425	418	419	424		416	402	402
13		433					445		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									241
1				222	222				231
2				269	274				267
3				292	300				301
4				330	333				334
5				345	346				347
6				353	357				358
7				364	364				365
8				373	374				376
9				382	382				384
10				399	389				390
11				394	399				400
12				407	401				405
13				412	418				424
14				435	428				427
15+				418	431				429

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 2

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	270	231	231	231	256	235	255	235
2	299	255	255	255	270	262	298	286
3	315	290	290	290	302	296	305	307
4	335	325	325	325	336	328	325	339
5	346	325	325	325	349	330	355	343
6	357	345	345	345	363	347	355	370
7	361				371	382	395	373
8	367				377	399	405	377
9	377				388	415		395
10	384				381	396		391
11	430				377			400
12	376				390			394
13	430				409			415
14					390			
15+								398

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	231			237	227				
2	268	319	319	270	267		319	312	
3	293	325	332	309	287	319	325	326	338
4	318	338	335	339	310	344	334	334	331
5	339	348	353	364	303	346	352	349	347
6	355	364	364	364	346	365	362	361	360
7	362	369	374	382	343	369	373	370	370
8	374	386	386	369	352	386	383	373	371
9	382	380	398	401	321	381	391	384	383
10	388	406	404	401	373	403	404	392	392
11	401	405	408	383		403	408	384	383
12	393			390		390	390	390	390
13	416				415				
14	428							415	
15+	415			405	405				

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 2

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							238		
1			230	265	265		283	233	246
2			273	325	282		291	246	269
3	315	338	308	342	337	338	334	270	287
4	320	337	330	347	343	331	347	325	312
5	344	347	341	356	354	347	368	347	349
6	358	368	354	363	363	360	364	408	409
7	368	375	362	368	367	370	380	407	407
8	370	384	377	376	376	371	396	412	412
9	380	404	393	384	387	383	400	415	415
10	360	397	403	396	393	392	410	416	416
11	416	403	407	401	402	383	420	421	421
12	425	420	415	410	410	390	421	421	421
13	433	433							
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									238
1	260			222					254
2	278		287	258	266		286	286	270
3	288		305	291	301		305	305	294
4	310		330	320	332		330	330	321
5	336		345	338	344		345	345	340
6	351		354	347	359		354	354	353
7	364		361	354	367		361	361	362
8	372		370	365	380		370	370	372
9	383		374	354	379		374	374	379
10	375		352	377	411		350	350	383
11	380		409	382	389		410	410	394
12	390		392	400	426				406
13	410		385	412	419				411
14			390	435	428				392
15+				418	435				400

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 3

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								247
1	270	255	255	255	268	270	255	272
2	306	286	286	286	293	278	298	298
3	323	309	309	309	312	311	305	327
4	342	325	325	325	333	343	325	349
5	353	355	355	355	344	353	355	364
6	360	355	355	355	355	356	355	381
7	362	395	395	395	359	371	395	366
8	367	405	405	405	366	378	405	353
9	377				375	397		455
10	384				384	395		435
11	430				430	430		
12	376				376	376		385
13	430				430	430		465
14								
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	205				205				
1	264		315	260	250	273	315	315	
2	284		315	279	281	290	315	314	
3	305	338	315	306	302	324	325	308	
4	331	331	315	336	318	341	323	318	
5	347	347		355	332	348	347	346	
6	357	360		349	345	360	360	358	
7	364	370		366	323	370	370	366	
8	372	371		366	337	371	371	374	
9	375	383		365	365	382	383	384	
10	388	392			345	392	392	390	
11	393	383			335	383	383	394	
12	401	390				390	390	394	
13	423								
14	428							415	
15+	415								

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 3

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		265	192	265	265		235	264	247
1	273	318	305	316	287		289	288	271
2	290	344	313	340	299		293	293	279
3	320	353	326	354	329	338	330	304	308
4	349	363	331	363	354	331	348	350	352
5	355	369	334	369	363	347	366	361	363
6	365	365	346	365	357	360	353	357	397
7	365	374	355	372	366	370	377	370	367
8	367	376	352	375	364	371	394	373	353
9	365	393	378	389	391	383	398	387	387
10		402	385	400	414	392	414	418	418
11		413		411	425	383	421	430	430
12						390	421		
13							445		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	AII
0			280				280		227
1			298		264		298		286
2	296	235	307	294	290		307	321	302
3	305	289	336	306	311		336	324	319
4	311	297	347	323	340		347	341	331
5	327	305	356	336	360		356	350	341
6	343	323	362	349	368		362	358	351
7	351	339	372	356	373		372	365	357
8	352	346	380	356	389		380	371	358
9	359	355	396	365	401		396	379	364
10	366	364	386	372	415		386	366	369
11	372	374	400	361	415		400		372
12	385	380	410	392	415		410		386
13	388	389		385	445				389
14	389	378		390					389
15+	406	406		406					406

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							236	237
1	289		289		279	288	247	269
2	309		309		300	305	297	298
3	330		330		316	321	306	327
4	351		351		341	344	325	356
5	365		365		347	350	355	360
6	375		375		354	358	355	376
7	379		379		361	366	395	375
8					367	371	405	346
9					373	379		455
10					381	389		435
11					379	378		
12					398	385		385
13					395	395		465
14					425	425		
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	218	184	184	236	218		236	184	
1	261	273	305	252	255	273	245	282	
2	290	288	305	279	278	288	296	298	
3	311	310	305	307	296	310	317	306	
4	340	342		340	312	345	354	345	
5	360	356		349	343	345	359	345	
6	368	368		350	336	361	365		
7	373	373		353	326	369	365		
8	389	374		368	343	366	368	365	
9	401	372		365	365	366	365	365	
10	415	415			345	392			
11	413	415			335	383			
12	415	415				390			
13	445	445							
14									
15+									

Table 2.4.1.1. NE Atlantic Mackerel. Mean length (mm) -at-age by area for 2013 (cont)

Quarter 4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0			212	265			235	208	208
1	273	310	271	324	312		289	282	283
2	290	311	278	348	323		293	288	290
3	320	321	295	356	342	338	330	299	302
4	349	331	315	364	361	331	348	327	327
5	355	332		369	368	347	366	340	340
6	365	342		366	364	360	353	359	359
7	365	347		373	372	370	377	380	380
8	367	346		375	374	371	394	382	382
9	365	365		390	393	383	398	408	408
10				401	411	392	414	418	418
11				411	425	383	421	430	430
12						390	421		
13							445		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									232
1	289				264	264			273
2	312	313	330		290	290			300
3	313	311	356	340	311	311			316
4	330	311	355	357	340	340			341
5	361	340	362	354	359	360			349
6	354	344	366	357	367	368			355
7	359	354	376	365	371	373			362
8	369	364	375	373	386	389			368
9	360	360	393	378	397	401			373
10	411	368		383	412	415			383
11	416	381		405	408	415			381
12	394	391		420	413	415			402
13	389	389		420	445	445			421
14	468	378							425
15+	406	406							406

Table 2.4.1.2. NE Atlantic Mackerel. Percentage length composition in catches by country and fleet, 2013. Zeros represent values <0.5%.

Handline Fleets/ Purse Seiners

	UKE Kines								NO PS					DK PS	
	VIIe				VIIf				IIa			IVa		IVa	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q2	Q3	Q4	Q3	Q4	Q3	Q4
15															
16															
17															
18						0%									
19				0%		0%		1%							
20				0%		1%	0%								
21		0%	0%	0%	0%	1%		1%							
22		1%	5%	1%	0%	1%	1%	4%							
23		3%	13%	1%	0%	2%	5%	9%							
24	1%	2%	11%	4%	15%	5%	25%	9%							
25	2%	8%	14%	11%	12%	14%	20%	16%				0%	0%		
26	1%	12%	16%	15%	16%	17%	7%	19%				0%	0%		
27	3%	14%	11%	20%	9%	17%	8%	9%				1%	1%		0%
28	4%	13%	8%	12%	14%	14%	8%	11%	0%	0%	0%	1%	3%		1%
29	8%	10%	6%	8%	8%	8%	7%	4%	1%	0%	0%	2%	7%	1%	5%
30	6%	9%	4%	5%	7%	6%	6%	4%	0%	4%	4%	6%	11%	3%	10%
31	8%	7%	4%	7%	6%	5%	5%	3%	0%	4%	4%	9%	13%	9%	12%
32	8%	6%	1%	6%	7%	3%	3%	3%	1%	6%	6%	8%	11%	7%	14%
33	12%	4%	2%	3%	2%	2%	2%	3%	3%	8%	9%	8%	10%	7%	10%
34	17%	2%	1%	2%	1%	0%	1%	1%	7%	20%	22%	14%	12%	18%	13%
35	12%	3%	1%	1%	1%	1%	1%	1%	9%	20%	20%	19%	13%	20%	12%
36	10%	2%	1%	0%	1%	1%	0%	1%	22%	18%	17%	16%	10%	16%	11%
37	5%	1%	1%	0%	0%	0%	0%	0%	19%	10%	9%	8%	5%	10%	7%
38	2%	1%	0%		0%	0%	0%	0%	16%	5%	4%	5%	3%	5%	3%
39	0%	1%	0%		0%		0%	0%	11%	2%	2%	2%	1%	3%	0%
40	0%	1%	0%				0%		6%	1%	1%	1%	0%	1%	0%
41	0%	1%	0%		0%	0%			2%	0%	0%	0%	0%		0%
42		0%	0%						0%	0%	0%		0%		
43		0%	0%						1%	0%	0%	0%			
44			0%												
45															
46															
47															

Table 2.4.1.2. NE Atlantic Mackerel. Percentage length composition in catches by country and fleet, 2013. Zeros represent values <0.5% (cont)

Southern Fleets

	ES Purse Seine				ES Trawl				ES Artisanal				PT All			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
15																
16																
17								1%								
18								6%								
19	0%							11%							2%	1%
20	0%			0%				8%							3%	6%
21				0%	0%			4%					1%		3%	15%
22	0%			0%				1%					5%			15%
23	0%			0%				0%					5%			15%
24	0%				0%								5%			1%
25	1%		0%		1%								4%	2%		
26	0%		2%	4%	3%				0%	0%	0%	0%	5%	7%	2%	3%
27	0%		15%	33%	4%		8%	0%					3%	11%	17%	10%
28	0%		33%	34%	2%		29%	0%	0%	0%	0%			11%	17%	15%
29	0%		28%	12%	1%		22%	1%			1%		1%	11%	9%	15%
30	0%		11%	9%	0%		10%	1%	0%	2%	8%	11%	4%	6%	17%	3%
31	1%		2%	4%	0%		7%	0%	0%	3%	7%	13%	3%	5%	14%	
32	2%	2%	2%	2%	1%	1%	4%	1%	1%	3%	23%	22%	8%	1%	5%	
33	6%	16%	2%	0%	1%	2%	2%	1%	4%	5%	13%	14%	6%	2%		
34	14%	21%	0%	0%	3%	7%	2%	6%	12%	11%	13%	12%	9%	3%		
35	21%	21%	1%	0%	8%	13%	3%	11%	21%	20%	7%	6%	6%	3%		
36	22%	19%	3%	0%	19%	24%	6%	22%	23%	21%	9%	7%	7%	5%		
37	15%	10%	0%	0%	21%	9%	3%	12%	16%	15%	4%	5%	9%	4%		
38	8%	7%	1%	0%	15%	3%	1%	6%	10%	9%	4%	3%	5%	5%		
39	4%	4%	0%	0%	8%	4%	1%	4%	7%	6%	4%	4%	4%	8%	3%	
40	2%				6%	8%	0%	2%	4%	3%	3%	2%	4%	6%	3%	
41	1%				4%	15%	0%	1%	1%	1%	1%	1%	3%	5%	2%	
42	0%				2%	10%	0%	0%	1%	1%	1%	1%	1%	4%		
43	0%				1%	3%			0%	0%	1%	0%	1%	1%		
44	0%				0%	1%			0%	0%	0%	0%	1%	2%	2%	
45					0%											
46					0%								0%			
47																

Table 2.4.1.2. NE Atlantic Mackerel. Percentage length composition in catches by country and fleet, 2013. Zeros represent values <0.5% (cont)

Pelagic Trawl Fleets

	FO			IS			GL	IE		UKS			
				Va		Va	XIVb			VIa	VIIb	IVa	
	Q2	Q3	Q4	Q2	Q3	Q4	Q3	Q1	Q4	Q1	Q1	Q3	Q4
15													
16													
17													
18													
19													
20													
21													
22							1%	0%					
23	0%							0%		0%			
24	2%							0%					
25	2%						4%	0%	0%	0%			
26	3%			0%			3%	0%	1%	0%			
27	3%	1%		1%	0%		3%	1%	2%	0%		0%	0%
28	9%	2%		1%	1%		3%	1%	3%	1%			2%
29	11%	4%		9%	5%		4%	1%	6%	1%			3%
30	11%	9%		11%	8%		5%	2%	7%	1%		2%	8%
31	5%	10%		10%	5%		5%	3%	9%	2%	1%	6%	10%
32	6%	6%		6%	6%	1%	6%	4%	9%	4%	2%	4%	8%
33	10%	11%	2%	10%	9%	3%	9%	7%	7%	9%	7%	12%	12%
34	14%	13%	5%	14%	15%	5%	11%	12%	9%	15%	13%	20%	16%
35	11%	17%	17%	18%	16%	19%	14%	19%	13%	21%	24%	21%	16%
36	7%	13%	22%	14%	16%	22%	12%	20%	14%	20%	24%	17%	14%
37	2%	9%	23%	1%	9%	22%	7%	13%	10%	11%	15%	8%	7%
38	2%	3%	14%	2%	5%	13%	4%	8%	5%	7%	8%	5%	3%
39	1%	1%	9%	1%	3%	7%	2%	4%	3%	4%	2%	1%	1%
40	0%	0%	4%		2%	3%	2%	3%	1%	2%	1%	1%	1%
41		0%	2%	1%	1%	2%	1%	1%	1%	1%	2%	1%	0%
42			3%		0%	2%	1%	0%	0%	0%	0%	1%	0%
43			1%	0%	0%		1%	0%	0%	0%	0%		
44							1%	0%	0%	0%	0%		
45							1%						
46													
47					0%								

Table 2.4.1.2. NE Atlantic Mackerel. Percentage length composition in catches by country and fleet, 2013. Zeros represent values <0.5% (cont)

Freezer Trawlers

	DE					NL			UKE				RU	
	VIa	VIIb	VIIj		VIId								IIa	
	Q1	Q1	Q1	Q2	Q4	Q1	Q3	Q4	Q1	Q2	Q3	Q4	Q2	Q3
15		0%												
16		0%												
17		0%												
18		0%												
19		0%												
20		1%												
21	0%	0%								4%				
22	0%	0%			0%					4%				
23	1%	0%			0%			0%	0%	16%			0%	0%
24	1%	0%	0%		0%			0%		12%				0%
25	2%	0%			5%		0%	0%	1%	12%	2%		0%	0%
26	2%	0%	0%		15%	2%	1%	0%	2%	8%	5%		6%	0%
27	3%	0%	0%		22%		0%	0%	3%	12%	10%	2%	14%	1%
28	5%	0%	0%		21%	3%	0%	0%	2%	4%	12%	1%	17%	2%
29	3%	1%	1%		16%	0%	0%	0%	5%	4%	23%	5%	24%	6%
30	2%	1%	1%	0%	8%	3%	0%	0%	1%	4%	16%	4%	12%	10%
31	3%	1%	2%	1%	3%	3%	0%	0%	8%	4%	7%	8%	7%	7%
32	6%	3%	5%	2%	3%	3%	0%	0%	6%	8%	6%	15%	3%	7%
33	9%	9%	12%	5%	1%	8%	0%	0%	12%	4%	3%	16%	3%	8%
34	16%	17%	19%	12%	2%	9%		0%	12%		3%	16%	4%	14%
35	17%	22%	23%	18%	0%	17%	0%	0%	14%		5%	13%	4%	16%
36	14%	20%	18%	21%	1%	15%		0%	15%	4%	2%	9%	3%	13%
37	7%	11%	9%	17%	1%	8%	0%	0%	10%		1%	5%	2%	8%
38	3%	5%	5%	11%	0%	10%		0%	5%		0%	3%	1%	4%
39	2%	4%	3%	8%	0%	6%		0%	4%		1%	2%	0%	2%
40	1%	2%	1%	5%	0%	3%			1%		1%		0%	1%
41	0%	1%	0%	2%		4%		0%	0%			1%		0%
42	0%	0%	0%	0%	0%	1%			0%					0%
43	0%	0%	0%			3%		0%	0%					0%
44	0%	0%	0%			0%								0%
45								0%						
46	0%		0%					0%						
47	0%													

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013.

Quarters 1-4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							94	95
1	169	107	113	108	186	110	146	145
2	256	181	188	182	233	153	230	202
3	307	229	233	230	280	225	261	241
4	365	288	296	288	350	332	292	337
5	403	302	321	304	374	337	332	339
6	427	320	329	321	403	353	372	436
7	436	447	447	447	422	445	447	444
8	444	473	473	473	441	474	473	445
9	494				469	557		565
10	510				494	566		556
11	580				477	487		524
12	510				570	514		486
13	640				598	586		822
14					718	718		
15+					607			516

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	79	42	42	94	83		94	36	
1	144	146	100	129	135	102	100	85	
2	182	207	169	176	177	165	141	138	
3	231	247	235	239	211	205	207	180	288
4	305	293	280	340	266	276	238	261	269
5	357	324	333	384	308	325	326	294	308
6	382	369	363	388	326	371	352	339	342
7	405	391	390	473	302	387	370	369	369
8	459	435	447	429	337	401	359	435	369
9	495	441	412	551	332	423	300	439	405
10	516	493	617	569	382	450	452	466	435
11	525	553	543	404	317	443	465	474	404
12	550	438		431		431	450	516	431
13	690	588			523				
14	673						546	546	
15+	607	637		531	531				

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarters 1-4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		148	62	148	148		98	89	98
1	153	243	80	96	183		170	188	111
2	194	244	114	153	136	97	180	197	145
3	255	273	188	271	157	276	286	218	177
4	271	261	258	283	247	276	344	320	249
5	280	288	296	308	320	303	412	355	326
6	319	354	350	330	355	343	382	386	469
7	330	365	380	347	363	370	444	381	456
8	351	407	437	377	388	377	498	408	474
9	399	476	515	412	446	408	512	464	487
10	343	459	540	440	453	437	572	469	490
11	510	507	556	457	495	413	591	497	505
12	572	571	599	499	518	431	573	505	508
13	627	627					723		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0			210				210		91
1	140		251	72	133	134	251		173
2	244	250	271	184	169	184	217	297	234
3	270	262	341	215	212	232	253	315	281
4	295	274	380	285	294	309	318	364	333
5	335	296	409	331	333	372	363	395	359
6	379	351	425	363	368	400	385	417	386
7	403	387	461	384	394	419	406	439	406
8	419	409	482	408	430	478	425	442	428
9	440	436	538	431	465	529	456	515	457
10	463	464	495	455	489	593	390	446	472
11	483	493	621	442	532	592	633	633	493
12	533	529	615	545	528	592	617		540
13	555	567	508	580	644	744			571
14	546	521	525	525	673				581
15+	665	665		646	582				587

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 1

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	98			98	98	98	112	83
2	134			134	155	134	208	168
3	192			192	216	192	237	214
4	265			265	300	265	265	317
5	274			274	344	274	274	310
6	306			306	385	306	338	424
7					418			442
8					453			453
9					505			516
10					482			487
11					520			524
12					536			476
13					597			582
14					673			
15+					607			513

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	100	97	97	122	73	97	83	83	
2	154	226	164	177	126	164	140	136	
3	217	247	231	239	173	201	206	179	
4	231	293	278	339	249	266	235	260	
5	296	324	332	381	309	332	325	294	
6	269	369	362	395	286	385	351	339	
7	314	391	388	503	444	440	366	369	
8	232	435	444	385	290	476	348	438	
9	291	441	409	615	303	516	284	440	
10	252	493	548	573	466	568	426	471	
11	252	553	541		252	490	510	476	
12							592	592	
13		588							
14							546	546	
15+		637		531	531				

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 1

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							103		
1		125	77	93	110		146	81	45
2		225	98	129	125	97	158	132	110
3	204	274	137	261	144	195	284	147	148
4	204	249	236	275	216	284	373	222	178
5	271	285	298	303	311	292	428	315	315
6	309	353	381	329	354	344	395	333	333
7	325	363	408	347	363	373	451	346	346
8	307	408	471	377	388	472	499	363	363
9	382	476	537	412	445	441	514	383	383
10	343	460	548	439	453	518	577	395	395
11		510	562	454	495	467	592	415	415
12		572	604	499	518		583	442	442
13		627					723		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									103
1				72	72				80
2				139	152				135
3				181	201				200
4				277	291				285
5				325	329				322
6				353	366				360
7				389	392				384
8				424	428				424
9				464	463				456
10				530	486				478
11				510	532				521
12				540	526				530
13				627	626				622
14				763	673				667
15+				636	582				580

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 2

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								
1	171	98	98	98	145	105	148	83
2	242	134	134	134	160	146	230	169
3	291	192	192	192	234	206	261	214
4	350	265	265	265	332	287	292	318
5	389	274	274	274	371	290	334	312
6	422	306	306	306	408	314	372	425
7	433				438	434	447	444
8	444				470	478	473	454
9	493				542	670		518
10	509				484	573		490
11	580				491			524
12	510				558			480
13	640				593			582
14					525			
15+								516

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0									
1	95			108	87				
2	149	279	279	161	140		237	223	
3	196	275	319	231	175	244	259	256	288
4	250	304	331	323	223	314	280	277	269
5	312	330	391	386	219	321	335	318	308
6	360	379	434	392	323	382	369	350	342
7	384	399	479	468	308	392	408	376	369
8	427	465	537	380	333	450	452	383	369
9	463	437	593	526	249	435	478	415	405
10	479	545	628	562	402	517	535	439	435
11	537	537	648	404		522	555	412	404
12	502			431		431	431	432	431
13	544				523				
14	673							546	
15+	607			531	531				

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 2

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0							99		
1			77	125	125		173	81	97
2			139	232	152		192	97	132
3	204	288	211	272	259	288	293	135	166
4	204	255	266	282	273	269	329	240	218
5	271	281	298	307	300	308	398	288	291
6	309	362	341	325	323	342	385	462	463
7	325	378	366	337	335	369	437	457	458
8	309	402	420	359	360	369	496	476	476
9	383	475	488	384	394	405	507	487	487
10	344	448	530	423	412	435	534	490	490
11	510	470	547	438	440	404	576	505	505
12	572	551	586	470	469	431	544	508	508
13	627	627							
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									99
1	140			72					130
2	192		217	130	114		216	216	161
3	231		253	179	185		253	253	203
4	263		317	236	275		317	317	269
5	317		362	275	303		362	362	315
6	360		385	294	351		385	385	348
7	404		406	309	364		406	406	376
8	447		424	336	414		425	425	421
9	516		455	316	421		456	456	450
10	429		396	358	520		390	390	422
11	495		628	376	467		633	633	470
12	560		534	417	576				496
13	595		508	627	626				595
14			525	763	673				530
15+				636	574				520

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 3

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0								107
1	172	131	131	131	168	171	148	147
2	265	194	194	194	225	174	230	207
3	315	234	234	234	281	254	261	279
4	372	292	292	292	342	356	292	355
5	412	334	334	334	380	395	334	405
6	432	337	337	337	417	405	372	483
7	438	447	447	447	424	450	447	417
8	444	473	473	473	442	480	473	364
9	495				487	585		832
10	510				512	567		788
11	580				580	580		
12	510				510	510		494
13	640				640	640		938
14								
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	75				75				
1	145		267	139	137	153	227	227	
2	185		267	179	195	194	227	226	
3	239	288	267	245	241	276	253	207	
4	316	269	267	357	281	347	248	232	
5	348	308		406	323	317	308	296	
6	369	342		374	357	344	342	332	
7	394	369		418	294	369	369	356	
8	456	369		496	337	374	369	385	
9	493	405		522	522	408	405	416	
10	488	435			357	435	435	430	
11	513	404			327	404	404	454	
12	536	431				431	431	453	
13	643								
14	673							546	
15+	607								

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 3

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0		148	41	148	148		95	147	98
1	153	262	205	258	190		183	191	140
2	194	334	223	323	216		192	201	155
3	272	364	256	367	290	288	282	227	225
4	401	395	271	397	366	269	332	353	338
5	421	419	280	417	397	308	392	389	382
6	431	403	315	405	376	342	355	378	508
7	407	436	341	430	409	369	430	423	392
8	493	442	334	438	401	369	492	432	345
9	522	508	425	493	503	405	508	485	485
10		545	453	539	598	435	576	620	620
11		596		589	652	404	604	674	674
12						431	605		
13							723		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0			210				210		87
1			251		134		251		205
2	249	136	273	246	184		273	298	256
3	273	252	352	273	232		352	315	305
4	298	274	384	317	309		384	364	343
5	332	286	412	351	372		412	395	371
6	378	344	430	390	400		430	417	401
7	403	383	473	412	419		473	439	419
8	416	404	498	412	478		498	442	426
9	438	435	564	441	529		564	515	457
10	465	464	510	462	593		510	447	470
11	483	493	613	426	592		613		483
12	532	528	617	534	592		617		534
13	552	567		510	744				553
14	546	521		525					543
15+	665	665		665					665

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 4

Age	IIIa	IIIb	IIIc	IIId	IVa	IVb	IVc	VIId
0							94	94
1	214		214		198	207	113	142
2	264		264		234	246	228	208
3	332		332		279	286	255	282
4	395		395		353	360	292	392
5	450		450		372	379	334	391
6	482		482		398	408	370	469
7	492		492		420	439	447	482
8					440	458	473	326
9					460	496		832
10					484	539		788
11					476	486		
12					597	517		494
13					563	563		938
14					718	718		
15+								

Age	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk
0	84	42	42	94	84		94	36	
1	132	153	239	119	134	153	106	168	
2	183	188	239	174	175	188	196	197	
3	232	243	239	239	212	248	253	218	
4	308	351		344	257	406	391	407	
5	372	376		372	333	385	436	387	
6	400	400		366	308	358	431		
7	419	419		365	279	371	407		
8	478	503		469	357	504	471	517	
9	529	523		522	522	515	522	522	
10	592	593			331	435			
11	585	592			303	404			
12	592	592				431			
13	744	744							
14									
15+									

Table 2.4.2.1. NE Atlantic Mackerel. Mean weight (g) -at-age by area for 2013 (cont)

Quarter 4

Age	VIIIa	VIIIb	VIIIc	VIIIcE	VIIIcW	VIIId	IXaCN	IXaN	IXaS
0			72	148			95	69	69
1	153	243	149	278	247		183	180	177
2	194	243	160	347	275		192	193	186
3	272	268	189	372	330	288	281	216	214
4	401	297	230	399	389	269	332	286	286
5	421	299		418	416	308	392	322	322
6	431	329		407	401	342	355	385	385
7	407	345		432	429	369	430	457	457
8	493	341		441	436	369	492	466	466
9	522	404		496	511	405	508	573	573
10				541	587	435	576	620	620
11				588	652	404	605	674	674
12						431	605		
13							723		
14									
15+									

Age	IIa	IIb	Va	Vb	VIa	VIb	XII	XIVb	All
0									90
1	214				134	134			167
2	272	275	334		186	184			231
3	290	286	428	356	235	232			277
4	324	294	409	414	309	309			350
5	424	355	422	404	371	372			374
6	403	380	445	414	399	400			399
7	416	404	478	442	418	419			421
8	472	457	455	472	473	478			444
9	424	443	508	490	519	529			462
10	552	472		512	582	593			496
11	587	510		601	564	592			485
12	549	544		672	598	592			606
13	567	567		670	744	744			678
14	856	521							718
15+	665	665							665

Table 2.5.1.1. NEA mackerel. Comparison between the SSB values used for the updated advice in April 2014 (old) and the new time series used by WGWIDE 2014 (new). The Mendiola *et al.*(2006) equation was used to calculate all data points of the new time series but only for the 2013 data point of the old time series.

Year	SSB (million tons) derived from the international mackerel egg survey					
	Southern component		Western component		Both components	
	New	Old	New	Old	New	Old
1992	0.55	-	3.35	2.93	3.90	2.93
1995	0.45	0.31	3.39	2.47	3.84	2.78
1998	1.04	0.80	3.38	2.95	4.42	3.75
2001	0.47	0.37	2.80	2.53	3.27	2.90
2004	0.36	0.28	2.80	2.47	3.17	2.75
2007	0.75	0.70	3.22	2.95	3.97	3.65
2010	0.95	0.86	3.89	3.43	4.84	4.29
2013	1.21	1.28	3.82	4.29	5.03	5.57

Table 2.5.2.1. IBTS Q4 recruitment index derived from square root transformed CPUE. See Jansen *et al.*(2014, WKPELA WD) and Jansen *et al.*(under review) for details.

Year	IBTS Q4 Index
1998	0.611
1999	0.652
2000	0.422
2001	0.797
2002	0.863
2003	0.538
2004	0.880
2005	1.131
2006	1.076
2007	0.547
2008	0.688
2009	0.481
2010	0.636
2011	1.186
2012	1.051
2013	1.339

Table 2.5.3.1. Swept area estimates of NEA mackerel biomass in the different Exclusive Economic Zones (EEZs) according to the international coordinated ecosystem (IESSNS) survey in July-August 2014.

Exclusive economic zone / international area	Area (in thous. km2)	Biomass (in thous. tonnes)	Biomass (%)
EU	78	226	2.5
Norwegian	640	2267	25.2
Icelandic	478	1593	17.7
Faroese	268	549	6.1
Jan Mayen	222	732	8.2
International north	275	1759	19.6
International west	52	83	0.9
Greenland	335	1164	13.0
Spitzbergen	105	611	6.8
Total	2453	8984	100.0

Table 2.5.5.2.1. b20 values from the length target strength relationship of the main fish species assessed in PELACUS survey (WHB is blue whiting; MAC-mackerel; HOM- horse mackerel; PIL-sardine; JAA-blue jack mackerel (Trachurus picturatus); BOG-bogue (Boops boops); MAS-chub mackerel (Scomber colias); BOC-board fish (Capros aper); and HMM-Mediterranean horse mackerel (Trachurus mediterraneus))

	WHB	MAC	HOM	PIL	JAA	ANE	BOG	MAS	BOC	HMM
Species										
b_{20}	-67.5	-84.9	-68.7	-72.6	-68.7	-72.6	-67.0	-68.7	-72.6 -66.2	-68.7

Table 2.5.5.2.2. Biomass, abundance, mean length and mean weight at age of mackerel from the Spanish spring acoustics surveys (PELACUS 04) from 2001 to 2014.

	2001				2002				2003			
AGE	Number (millions)	L (cm)	W (g)	Biomass t ('000)	Number (millions)	L (cm)	W (g)	Biomass t ('000)	Number (millions)	L (cm)	W (g)	Biomass t ('000)
1	29.0	25.9	126.2	3.7	621.4	23.3	80.5	50.0	5678.6	23.1	81.6	463.2
2	47.6	31.0	213.7	10.2	94.8	32.0	221.9	21.0	324.5	28.9	165.1	53.6
3	184.3	33.7	277.3	51.1	378.1	34.3	277.1	104.8	109.0	33.5	261.3	28.5
4	386.6	36.1	340.3	131.6	706.8	35.8	317.9	224.7	229.0	35.0	299.7	68.6
5	382.1	37.5	383.0	146.4	1065.9	36.8	348.0	370.9	265.2	37.1	359.1	95.2
6	393.6	38.0	397.7	156.5	604.6	38.2	390.9	236.3	230.1	38.0	385.7	88.8
7	202.7	39.5	446.7	90.5	674.5	39.1	419.2	282.8	94.3	39.8	443.4	41.8
8	143.5	40.0	464.5	66.7	191.4	39.9	447.2	85.6	88.5	40.1	454.6	40.2
9	83.7	40.5	481.7	40.3	158.4	40.3	461.4	73.1	19.6	41.5	505.1	9.9
10	17.0	40.2	469.3	8.0	100.2	41.0	490.2	49.1	10.0	41.9	519.9	5.2
11	26.3	42.1	541.4	14.2	54.0	41.4	504.0	27.2	14.0	42.6	549.6	7.7
12	12.3	41.9	533.8	6.5	12.4	43.5	586.7	7.3	3.8	41.5	503.1	1.9
13	1.9	41.5	517.1	1.0	0.0	0.0	0.0	0.0	3.7	43.1	566.9	2.1
14	6.1	43.5	596.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15+	9.4	42.8	568.1	5.3	2.9	45.5	676.9	2.0	2.0	43.3	578.1	1.2
TOTAL	1926.2	37.3	381.9	735.6	4665.3	35.5	329.0	1534.8	7072.1	25.5	128.4	907.8
	2004				2005				2006			
1	195.2	25.0	114.6	22.4	43.4	24.8	112.1	4.6	83.7	20.8	58.5	4.9
2	952.4	28.3	164.5	156.6	106.5	29.2	181.8	19.0	9.3	29.7	177.2	1.7
3	599.3	32.8	258.1	154.7	229.1	32.3	245.4	56.1	57.3	31.9	223.1	12.8
4	227.5	37.5	377.8	86.0	259.6	36.5	349.4	92.4	230.7	33.5	262.7	60.6
5	425.6	38.1	395.5	168.3	82.6	38.3	403.4	34.2	104.7	36.7	345.0	36.1
6	336.7	39.1	428.4	144.2	163.8	38.8	417.6	70.4	34.2	38.5	398.1	13.6
7	181.5	40.1	461.7	83.8	114.9	39.5	438.4	52.0	22.2	39.2	420.5	9.3
8	106.1	40.8	483.2	51.3	63.8	39.8	451.7	29.8	7.6	40.9	483.3	3.6
9	76.5	41.0	492.5	37.7	33.6	41.0	493.9	17.2	2.0	41.9	513.6	1.0
10	31.1	42.3	538.0	16.7	15.3	42.3	535.4	8.5	3.4	41.3	495.1	1.7
11	18.9	42.2	533.9	10.1	13.7	41.8	518.8	7.4	1.4	42.7	545.7	0.8
12	13.5	43.3	573.8	7.7	6.6	42.0	526.6	3.6	0.5	42.8	551.1	0.3
13	3.2	43.9	599.8	1.9	11.3	42.5	544.1	6.4	0.1	43.8	590.7	0.1
14	0.0	0.0	0.0	0.0	5.1	43.8	592.6	3.2	0.0	0.0	0.0	0.0
15+	5.9	46.4	710.5	4.2	7.3	43.7	594.9	4.6	0.0	44.5	621.0	0.0
TOTAL	3173.2	33.8	298.0	945.6	1156.6	35.9	346.7	409.5	557.3	32.7	263.0	146.6
	2007				2008				2009			
1	182.2	21.5	64.1	11.7	407.1	24.4	100.4	40.9	7.5	24.3	98.5	0.7
2	34.6	25.6	110.5	3.8	100.5	27.1	135.2	13.6	65.1	29.3	176.1	11.5
3	22.1	33.4	254.5	5.6	327.4	29.8	180.7	59.1	148.4	30.0	189.4	28.1
4	129.6	34.9	291.7	37.8	125.8	33.5	261.9	32.9	201.7	32.5	248.1	50.0
5	189.4	36.1	324.0	61.4	233.6	36.2	328.2	76.5	86.8	35.0	314.3	27.3
6	117.5	38.1	379.7	44.6	277.5	36.3	328.5	91.0	148.8	36.9	370.0	55.0

7	31.9	39.8	435.9	13.9	131.0	37.9	374.1	48.9	180.8	37.7	394.7	71.3
8	20.5	39.7	431.5	8.8	25.2	39.5	423.4	10.6	93.0	39.5	454.8	42.2
9	4.8	41.2	484.0	2.3	20.1	39.5	422.7	8.5	32.6	40.2	484.7	15.7
10	6.1	40.7	464.7	2.8	20.5	40.2	443.6	9.0	14.9	40.7	500.8	7.5
11	1.5	41.4	490.3	0.8	9.2	41.1	474.8	4.4	4.6	41.6	537.0	2.4
12	4.7	44.5	608.6	2.8	7.3	41.8	500.0	3.6	3.5	42.2	561.9	2.0
13	0.7	43.5	567.6	0.4	2.4	43.4	561.4	1.3	4.1	42.4	569.2	2.3
14	2.6	44.0	591.5	1.5	1.1	44.6	607.1	0.7	0.0	0.0	0.0	0.0
15+	0.7	46.5	697.9	0.5	0.4	46.5	690.3	0.3	0.0	0.0	0.0	0.0
TOTAL	748.9	32.5	265.4	198.8	1689.2	31.7	238.0	401.4	991.8	34.8	319.0	316.2
	2010				2011				2012			
1	431.8	23.6	89.2	38.6	1936.9	22.5	77.4	149.3	698.05	22.07	74.36	51.83
2	72.7	30.6	194.8	14.2	29.7	30.5	201.3	6.0	16.7	27.71	150.62	2.5
3	189.6	31.5	214.9	40.9	63.1	32.3	239.2	15.1	11.18	33.27	265.58	2.98
4	662.7	33.6	262.3	174.1	90.6	33.7	273.6	24.7	32.34	34.63	299.04	9.69
5	873.3	35.0	296.3	258.8	154.8	35.0	308.5	47.6	60.04	35.62	325.28	19.53
6	306.6	36.8	346.3	106.1	144.1	36.1	340.6	49.0	147.09	36.58	353.17	51.84
7	388.9	38.1	385.6	149.8	57.7	38.2	406.2	23.4	121.31	37.66	386.73	46.77
8	239.2	38.2	388.3	92.8	54.2	39.5	446.9	24.1	61.9	39.43	445.95	27.53
9	113.9	39.5	427.5	48.6	31.2	39.6	451.5	14.0	32.39	40.12	470.22	15.19
10	26.4	40.8	470.2	12.4	10.3	41.0	503.5	5.2	19.11	40.54	485.42	9.26
11	16.5	40.9	475.8	7.8	4.7	41.0	503.1	2.4	8.07	40.66	489.56	3.94
12	10.3	41.4	492.4	5.0	3.1	41.8	533.3	1.6	2.78	41.94	538.24	1.49
13	7.5	41.9	509.7	3.8	2.4	41.6	527.1	1.2	1.36	42.38	555.37	0.75
14	5.3	42.4	530.5	2.8	0.0	0.0	0.0	0.0	1.36	42.38	555.37	0.75
15+	3.0	43.1	557.7	1.7	0.0	0.0	0.0	0.0	1.19	44.53	649.03	0.78
TOTAL	3347.8	34.0	286.0	957.5	2582.9	25.8	141.2	363.7	1214.88	28.46	201.91	244.81
	2013				2014							
1	99	24.5	93.0	9	68.1	22.5	71.5	5.1				
2	653	26.5	119.1	81	42.8	32.0	217.4	9.1				
3	123	28.6	152.4	20	157.4	32.3	223.7	34.6				
4	114	34.2	267.6	31	340.4	33.3	245.5	81.9				
5	228	35.3	296.0	68	675.8	34.5	275.3	181.7				
6	235	36.2	322.3	76	581.1	36.1	318.0	179.5				
7	178	36.7	335.3	60	502.4	36.6	333.9	163.0				
8	64	37.6	361.4	23	246.9	36.7	335.2	80.4				
9	11	38.1	378.2	4	84.5	38.2	381.8	31.3				
10	8	40.0	439.4	4	33.1	39.2	414.3	13.3				
11	3	40.8	470.1	1	34.7	39.4	420.9	14.2				
12	2	41.2	490.3	1	34.7	39.4	420.9	14.2				
13												
14												
15+												
TOTAL	1718	31.2	200.2	379	2802.0	35.1	291.0	808.4				

Table 2.5.5.2.3. Mackerel Abundance and Biomass by ICES sub-divisions from Spanish spring acoustic surveys (PELACUS04) from 2001 to 2014.

	ICES IXa-N		ICES VIIIc-W		VIIIc-EW		VIIIc-EE		TOTAL	
	Abund. (109)	Biomass (kt)	Abund. (109)	Biomass (kt)	Abund. (109)	Biomass (kt)	Abund. (109)	Biomass (kt)	Abund. (109)	Biomass (kt)
2001	0.02	7.4	0.31	120.1	1.23	489.1	0.36	119.1	1.93	735.7
2002	0.00	0.0	0.82	333.7	3.80	1191.1	0.04	10.0	4.67	1534.8
2003	4.58	376.6	1.07	184.4	0.88	202.5	0.54	144.3	7.14	907.8
2004	0.61	118.6	1.03	304.3	1.50	515.7	0.03	7.0	3.17	945.6
2005	0.16	45.6	0.23	13.0	0.60	228.6	0.16	32.3	1.06	409.5
2006	0.01	0.7	0.39	100.5	0.15	41.5	0.02	4.0	0.56	146.6
2007	0.16	11.2	0.22	77.4	0.36	108.4	0.01	1.8	0.75	198.8
2008	0.16	21.4	0.38	109.0	0.84	235.0	0.05	4.2	1.42	369.7
2009	0.06	11.8	0.04	10.1	0.57	220.2	0.33	74.1	0.99	316.2
2010	0.38	34.2	0.88	293.7	2.09	628.6	0.00	1.0	3.35	957.5
2011	1.42	109.2	0.51	39.4	0.65	212.4	0.01	2.7	2.58	363.7
2012	0.61	45.03	0.02	1.3	0.57	190.7	0.02	7.8	1.21	244.8
2013	0.00	00.00	0.46	58.0	1.06	270.9	0.19	49.7	1.72	378.6
2014(1)	0.02	2.4	0.03	3.0			2.75	803	2.80	808.4

(1) **Without split VIIIcEw and VIIIcEe**

Table 2.6.1. Input data and parameters and the model configurations for the assessment.

Input data types and characteristics:

Name	Year range	Age range	Variable from year to year
Catch in tonnes	1980 - 2013		Yes
Catch-at-age in numbers	1980 - 2013	0-12+	Yes
Weight-at-age in the commercial catch	1980 - 2013	0-12+	Yes
Weight-at-age of the spawning stock at spawning time.	1980 – 2013	0-12+	Yes
Proportion of natural mortality before spawning	1980 -2013	0-12+	Yes
Proportion of fishing mortality before spawning	1980 -2013	0-12+	Yes
Proportion mature-at-age	1980 -2013	0-12+	Yes
Natural mortality	1980 -2013	0-12+	No, fixed at 0.15

Tuning data:

Type	Name	Year range	Age range
Survey (SSB)	ICES Triennial Mackerel and Horse Mackerel Egg Survey	1992, 1995, 1998, 2001, 2004, 2007, 2010, 2013.	Not applicable (gives SSB)
Survey (abundance index)	IBTS Recruitment index	1998-2013	Age 0
Survey (abundance index)	International Ecosystem Summer Survey in the Nordic Seas (IESSNS)	2007, 2010-2014	Ages 6-11
Tagging/recapture	Norwegian tagging program	1980-2005 (recapture years)	Ages 2 and older

SAM parameter configuration :

Setting	Value	Description
Coupling of fishing mortality states	1/2/3/4/5/6/7/8/8/8/8/8/8	Different F states for ages 0 to 6, one same F state for ages 7 and older
Correlated random walks for the fishing mortalities	0	F random walk of different ages are independent
Coupling of catchability parameters	0/0/0/0/0/0/0/0/0/0/0/0	No catchability parameter for the catches
	0/0/0/0/0/0/0/0/0/0/0/0	One catchability parameter estimated for the egg
	1/0/0/0/0/0/0/0/0/0/0/0	One catchability parameter estimated for the recruitment index
	0/0/0/0/0/0/2/2/2/2/2/0	One catchability parameter estimated for the IESSNS (same for age 6 to11)
Power law model	0	No power law model used for any of the surveys
Coupling of fishing mortality random walk variances	1/1/1/1/1/1/1/1/1/1/1/1	Same variance used for the F random walk of all ages

Coupling of log abundance random walk variances	1/2/2/2/2/2/2/2/2/2/2	Same variance used for the log abundance random walk of all ages except for the recruits (age 0)
Coupling of the observation variances	1/1/1/1/1/1/1/1/1/1/1	Same observation variance for all ages in the catches
	0/0/0/0/0/0/0/0/0/0/0	One observation variance for the egg survey
	2/0/0/0/0/0/0/0/0/0/0	One observation variance for the recruitment index
	0/0/0/0/0/3/3/3/3/3/0	One observation variance for the IESSNS (all ages)
Stock recruitment model	0	No stock-recruiment model

TABLE 2.6.2 NEA Mackerel. CATCH IN NUMBER

Units : Thousands

age \ year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	33101	56682	11180	7333	287287	81799	49983	7403	57644	65400	24246
1	411327	276229	213936	47914	31901	268960	58126	40126	152656	64263	140534
2	393025	502365	432867	668909	86064	20893	424563	156670	137635	312739	209848
3	64549	231814	472457	433744	682491	58346	38387	663378	190403	207689	410751
4	328206	32814	184581	373262	387582	445357	76545	56680	538394	167588	208146
5	254172	184867	26544	126533	251503	252217	364119	89003	72914	362469	156742
6	142978	173349	138970	20175	98063	165219	208021	244570	87323	48696	254015
7	145385	116328	112476	90151	22086	62363	126174	150588	201021	58116	42549
8	54778	125548	89672	72031	61813	19562	42569	85863	122496	111251	49698
9	130771	41186	88726	48668	47925	47560	13533	34795	55913	68240	85447
10	39920	146186	27552	49252	37482	37607	32786	19658	20710	32228	33041
11	56210	31639	91743	19745	30105	26965	22971	25747	13178	13904	16587
12	104927	199615	156121	132040	69183	97652	81153	63146	57494	35814	27905

age \ year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	10007	43447	19354	25368	14759	37956	36012	61127	67003	36345	26034
1	58459	83583	128144	147315	81529	119852	144390	99352	73597	102407	40315
2	212521	156292	210319	221489	340898	168882	186481	229767	132994	142898	158943
3	206421	356209	266677	306979	340215	333365	238426	264566	223639	275376	234186
4	375451	266591	398240	267420	275031	279182	378881	323186	261778	390858	297206
5	188623	306143	244285	301346	186855	177667	246781	361945	281041	295516	309937
6	129145	156070	255472	184925	197856	96303	135059	207619	244212	241550	231804
7	197888	113899	149932	189847	142342	119831	84378	118388	159019	175608	195250
8	51077	138458	97746	106108	113413	55812	66504	72745	86739	106291	120241
9	43415	51208	121400	80054	69191	59801	39450	47353	50613	52394	72205
10	70839	36612	38794	57622	42441	25803	26735	24386	30363	31280	42529
11	29743	40956	29067	20407	37960	18353	13950	16551	17048	18918	20546
12	52986	68205	68217	57551	39753	30648	24974	22932	32446	34202	40706

age \ year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
0	70409	14744	11553	12426	75651	19302	25886	17615	23453	30429	23803
1	222577	187997	31421	46840	149425	88439	59899	36514	78605	62708	66164
2	70041	275661	453133	135648	173646	190857	167748	113574	137101	115346	200064
3	367902	91075	529753	668588	159455	220575	399086	455113	303928	322725	214251
4	350163	295777	147973	293579	470063	215655	284660	616963	739221	469953	416037
5	262716	235052	258177	120538	195594	455131	260314	319465	611729	654395	454147
6	237066	183036	145899	121477	97061	203492	255675	224848	284788	488713	510469
7	151320	133595	89856	63612	73510	77859	124382	194326	143039	244210	323103
8	118870	94168	65669	38763	33399	59652	57297	73171	102072	113012	142390
9	79945	75701	40443	23947	18961	30494	32343	29738	45841	53363	69454
10	43789	45951	35654	18612	13987	16039	19482	14989	21222	25046	30573
11	21611	25797	16430	7955	8334	11416	6798	7470	6255	12311	11648
12	40280	30890	19509	10669	10186	12801	9581	5003	8523	10775	11741

age \ year	2013
0	11325
1	46977
2	226179
3	430081
4	342280
5	437248
6	421220
7	338388
8	192725
9	118727
10	46253
11	18932
12	17856

TABLE 2.6.3 NEA Mackerel. WEIGHTS AT AGE IN THE CATCH

Units : Kg

year / age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.057	0.060	0.053	0.050	0.031	0.055	0.039	0.076	0.055	0.049	0.085	0.068	0.051
1	0.131	0.132	0.131	0.168	0.102	0.144	0.146	0.179	0.133	0.136	0.156	0.156	0.167
2	0.249	0.248	0.249	0.219	0.184	0.262	0.245	0.223	0.259	0.237	0.233	0.253	0.239
3	0.285	0.287	0.285	0.276	0.295	0.357	0.335	0.318	0.323	0.320	0.336	0.327	0.333
4	0.345	0.344	0.345	0.310	0.326	0.418	0.423	0.399	0.388	0.377	0.379	0.394	0.397
5	0.378	0.377	0.378	0.386	0.344	0.417	0.471	0.474	0.456	0.433	0.423	0.423	0.460
6	0.454	0.454	0.454	0.425	0.431	0.436	0.444	0.512	0.524	0.456	0.467	0.469	0.495
7	0.498	0.499	0.496	0.435	0.542	0.521	0.457	0.493	0.555	0.543	0.528	0.506	0.532
8	0.520	0.513	0.513	0.498	0.480	0.555	0.543	0.498	0.555	0.592	0.552	0.554	0.555
9	0.542	0.543	0.541	0.545	0.569	0.564	0.591	0.580	0.562	0.578	0.606	0.609	0.597
10	0.574	0.573	0.574	0.606	0.628	0.629	0.552	0.634	0.613	0.581	0.606	0.630	0.651
11	0.590	0.576	0.574	0.608	0.636	0.679	0.694	0.635	0.624	0.648	0.591	0.649	0.663
12	0.580	0.584	0.582	0.614	0.663	0.710	0.688	0.718	0.697	0.739	0.713	0.708	0.669

year / age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.061	0.046	0.072	0.058	0.076	0.065	0.062	0.063	0.069	0.052	0.081	0.067	0.048
1	0.134	0.136	0.143	0.143	0.143	0.157	0.176	0.135	0.172	0.160	0.170	0.156	0.151
2	0.240	0.255	0.234	0.226	0.230	0.227	0.235	0.227	0.224	0.256	0.267	0.263	0.268
3	0.317	0.339	0.333	0.313	0.295	0.310	0.306	0.306	0.305	0.307	0.336	0.323	0.306
4	0.376	0.390	0.390	0.377	0.359	0.354	0.361	0.363	0.376	0.368	0.385	0.400	0.366
5	0.436	0.448	0.452	0.425	0.415	0.408	0.404	0.427	0.424	0.424	0.438	0.419	0.434
6	0.483	0.512	0.501	0.484	0.453	0.452	0.452	0.463	0.474	0.461	0.477	0.485	0.440
7	0.527	0.543	0.539	0.518	0.481	0.462	0.500	0.501	0.496	0.512	0.522	0.519	0.496
8	0.548	0.590	0.577	0.551	0.524	0.518	0.536	0.534	0.540	0.536	0.572	0.554	0.539
9	0.583	0.583	0.594	0.576	0.553	0.550	0.569	0.567	0.577	0.580	0.612	0.573	0.556
10	0.595	0.627	0.606	0.596	0.577	0.573	0.586	0.586	0.603	0.600	0.631	0.595	0.583
11	0.647	0.678	0.631	0.603	0.591	0.591	0.607	0.594	0.611	0.629	0.648	0.630	0.632
12	0.679	0.713	0.672	0.670	0.636	0.631	0.687	0.644	0.666	0.665	0.715	0.684	0.655

year / age	2006	2007	2008	2009	2010	2011	2012	2013
0	0.038	0.089	0.051	0.104	0.048	0.029	0.089	0.091
1	0.071	0.120	0.105	0.153	0.118	0.113	0.123	0.173
2	0.197	0.215	0.222	0.213	0.221	0.231	0.187	0.234
3	0.307	0.292	0.292	0.283	0.291	0.282	0.285	0.281
4	0.357	0.372	0.370	0.331	0.331	0.334	0.340	0.333
5	0.428	0.408	0.418	0.389	0.365	0.368	0.374	0.359
6	0.479	0.456	0.444	0.424	0.418	0.411	0.401	0.386
7	0.494	0.512	0.497	0.450	0.471	0.451	0.431	0.406
8	0.543	0.534	0.551	0.497	0.487	0.494	0.468	0.428
9	0.584	0.573	0.571	0.538	0.515	0.540	0.503	0.457
10	0.625	0.571	0.620	0.586	0.573	0.580	0.537	0.472
11	0.636	0.585	0.595	0.599	0.604	0.611	0.538	0.493
12	0.689	0.666	0.662	0.630	0.630	0.664	0.585	0.554

TABLE 2.6.4 NEA Mackerel.WEIGHTS AT AGE IN THE STOCK

Units : Kg

year / age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.063	0.063	0.063	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.120	0.118	0.118	0.117	0.114	0.118	0.111	0.076	0.106	0.109	0.096	0.174	0.112
2	0.205	0.179	0.159	0.179	0.204	0.244	0.184	0.157	0.181	0.162	0.166	0.184	0.201
3	0.287	0.258	0.217	0.233	0.251	0.281	0.269	0.234	0.238	0.230	0.247	0.243	0.260
4	0.322	0.312	0.300	0.282	0.293	0.308	0.301	0.318	0.298	0.272	0.290	0.303	0.308
5	0.356	0.335	0.368	0.341	0.326	0.336	0.350	0.368	0.348	0.338	0.332	0.347	0.360
6	0.377	0.376	0.362	0.416	0.395	0.356	0.350	0.414	0.392	0.392	0.383	0.392	0.397
7	0.402	0.415	0.411	0.404	0.430	0.407	0.374	0.415	0.445	0.388	0.435	0.423	0.419
8	0.434	0.431	0.456	0.438	0.455	0.455	0.434	0.431	0.442	0.449	0.447	0.492	0.458
9	0.438	0.454	0.455	0.475	0.489	0.447	0.428	0.483	0.466	0.432	0.494	0.500	0.487
10	0.484	0.450	0.473	0.467	0.507	0.519	0.467	0.507	0.506	0.429	0.473	0.546	0.513
11	0.520	0.524	0.536	0.544	0.513	0.538	0.506	0.492	0.567	0.482	0.495	0.526	0.543
12	0.534	0.531	0.544	0.528	0.567	0.591	0.542	0.581	0.594	0.556	0.536	0.615	0.568

year / age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.111	0.114	0.114	0.109	0.108	0.083	0.112	0.108	0.112	0.109	0.112	0.111	0.116
2	0.190	0.163	0.201	0.185	0.196	0.172	0.210	0.194	0.190	0.206	0.181	0.158	0.140
3	0.266	0.240	0.278	0.250	0.257	0.248	0.260	0.253	0.246	0.245	0.251	0.258	0.221
4	0.323	0.306	0.327	0.322	0.310	0.299	0.317	0.301	0.303	0.288	0.277	0.318	0.328
5	0.359	0.368	0.385	0.372	0.356	0.348	0.356	0.357	0.342	0.333	0.341	0.355	0.378
6	0.410	0.418	0.432	0.425	0.401	0.383	0.392	0.394	0.398	0.360	0.401	0.406	0.403
7	0.432	0.459	0.458	0.446	0.460	0.409	0.424	0.416	0.417	0.418	0.407	0.449	0.464
8	0.459	0.480	0.491	0.471	0.473	0.455	0.456	0.438	0.451	0.429	0.489	0.482	0.481
9	0.480	0.496	0.511	0.513	0.505	0.475	0.489	0.464	0.484	0.458	0.490	0.507	0.548
10	0.515	0.550	0.517	0.508	0.511	0.530	0.508	0.489	0.521	0.511	0.488	0.517	0.536
11	0.547	0.592	0.560	0.538	0.546	0.500	0.545	0.514	0.535	0.523	0.521	0.577	0.507
12	0.577	0.604	0.602	0.573	0.585	0.547	0.576	0.551	0.574	0.557	0.540	0.591	0.605

year / age	2006	2007	2008	2009	2010	2011	2012	2013
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.107	0.083	0.135	0.110	0.111	0.112	0.108	0.108
2	0.165	0.149	0.160	0.162	0.163	0.181	0.153	0.146
3	0.238	0.206	0.207	0.214	0.206	0.219	0.209	0.180
4	0.293	0.288	0.260	0.268	0.253	0.269	0.250	0.247
5	0.334	0.330	0.349	0.295	0.297	0.329	0.284	0.282
6	0.402	0.362	0.354	0.354	0.346	0.366	0.309	0.320
7	0.411	0.448	0.397	0.389	0.380	0.378	0.353	0.342
8	0.436	0.452	0.450	0.437	0.407	0.417	0.376	0.372
9	0.456	0.509	0.453	0.464	0.430	0.443	0.443	0.412
10	0.467	0.525	0.476	0.522	0.486	0.479	0.494	0.442
11	0.528	0.530	0.484	0.550	0.535	0.518	0.502	0.499
12	0.570	0.590	0.515	0.563	0.573	0.527	0.561	0.526

TABLE 2.6.5 NEA Mackerel. NATURAL MORTALITY

Units : NA

age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
0	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
3	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
4	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
5	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
6	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
7	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
8	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
9	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
0	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
3	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
4	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
5	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
6	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
7	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
8	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
9	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

age	2010	2011	2012	2013
0	0.15	0.15	0.15	0.15
1	0.15	0.15	0.15	0.15
2	0.15	0.15	0.15	0.15
3	0.15	0.15	0.15	0.15
4	0.15	0.15	0.15	0.15
5	0.15	0.15	0.15	0.15
6	0.15	0.15	0.15	0.15
7	0.15	0.15	0.15	0.15
8	0.15	0.15	0.15	0.15
9	0.15	0.15	0.15	0.15
10	0.15	0.15	0.15	0.15
11	0.15	0.15	0.15	0.15
12	0.15	0.15	0.15	0.15

TABLE 2.6.6 NEA Mackerel. PROPORTION MATURE

Units : NA

age \ year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.105	0.109	0.110	0.111	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116
2	0.487	0.503	0.511	0.532	0.486	0.487	0.497	0.412	0.404	0.419	0.406	0.466	0.523
3	0.840	0.817	0.877	0.880	0.871	0.888	0.923	0.924	0.917	0.916	0.913	0.920	0.930
4	0.933	0.919	0.934	0.970	0.968	0.967	0.989	0.990	0.990	0.993	0.994	0.993	0.995
5	0.963	0.971	0.970	0.991	0.988	0.988	0.990	0.996	0.994	0.999	0.999	0.998	0.998
6	0.980	0.978	0.980	0.995	0.996	0.994	0.997	0.997	0.997	0.998	1.000	0.998	0.996
7	0.983	0.980	0.979	0.994	0.994	0.996	1.000	1.000	1.000	1.000	1.000	1.000	0.999
8	1.000	0.999	0.999	0.998	0.998	0.997	0.997	0.997	0.997	0.997	0.998	1.000	1.000
9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

age \ year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.116	0.116	0.116	0.116	0.109	0.109	0.109	0.118	0.118	0.118	0.120	0.120	0.120
2	0.558	0.607	0.573	0.588	0.608	0.626	0.606	0.637	0.632	0.696	0.705	0.719	0.704
3	0.936	0.941	0.922	0.916	0.859	0.873	0.874	0.906	0.909	0.944	0.939	0.940	0.941
4	0.996	0.997	0.996	0.997	0.987	0.988	0.988	0.987	0.984	0.994	0.990	0.990	0.991
5	0.999	0.999	0.999	1.000	0.997	0.997	0.997	0.997	0.996	0.999	0.999	0.998	0.998
6	0.996	0.996	0.996	0.998	0.998	0.998	0.999	0.998	0.998	0.999	0.999	0.999	0.999
7	0.999	0.999	0.999	0.999	1.000	1.000	1.000	1.000	0.999	0.999	0.999	0.999	0.999
8	1.000	1.000	1.000	1.000	0.998	0.998	0.998	0.998	0.999	1.000	1.000	1.000	1.000
9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

age \ year	2006	2007	2008	2009	2010	2011	2012	2013
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.107	0.107	0.107	0.108	0.108	0.108	0.105	0.105
2	0.680	0.610	0.588	0.585	0.547	0.545	0.527	0.546
3	0.913	0.905	0.910	0.912	0.909	0.912	0.910	0.916
4	0.994	0.994	0.996	0.997	0.997	0.997	0.997	0.999
5	0.999	0.999	0.998	1.000	0.999	0.999	0.999	1.000
6	1.000	1.000	1.000	1.000	0.999	0.999	0.999	0.999
7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
8	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE 2.6.7 NEA Mackerel. FRACTION OF HARVEST BEFORE SPAWNING

Units : NA

age \ year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.177	0.179	0.181
2	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.177	0.179	0.181
3	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.254	0.285	0.316
4	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.254	0.285	0.316
5	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
6	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
7	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
8	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
9	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
10	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
11	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411
12	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.392	0.402	0.411

age \ year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.216	0.252	0.287	0.250	0.212	0.175	0.179	0.183	0.187	0.202	0.217	0.231	0.230
2	0.216	0.252	0.287	0.250	0.212	0.175	0.179	0.183	0.187	0.202	0.217	0.231	0.230
3	0.318	0.321	0.323	0.329	0.335	0.340	0.364	0.389	0.413	0.406	0.399	0.393	0.375
4	0.318	0.321	0.323	0.329	0.335	0.340	0.364	0.389	0.413	0.406	0.399	0.393	0.375
5	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
6	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
7	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
8	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
9	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
10	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
11	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402
12	0.436	0.461	0.486	0.491	0.496	0.500	0.464	0.426	0.389	0.404	0.419	0.433	0.402

age \ year	2006	2007	2008	2009	2010	2011	2012	2013
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.230	0.229	0.198	0.165	0.134	0.174	0.213	0.112
2	0.230	0.229	0.198	0.165	0.134	0.174	0.213	0.112
3	0.358	0.341	0.307	0.272	0.239	0.226	0.212	0.076
4	0.358	0.341	0.307	0.272	0.239	0.226	0.212	0.076
5	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
6	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
7	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
8	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
9	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
10	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
11	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222
12	0.370	0.339	0.309	0.277	0.247	0.217	0.188	0.222

TABLE 2.6.8 NEA Mackerel. FRACTION OF NATURAL MORTALITY BEFORE SPAWNING

Units : NA

year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
1	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
2	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
3	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
4	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
5	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
6	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
7	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
8	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
9	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
10	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
11	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333
12	0.397	0.396	0.394	0.392	0.394	0.396	0.397	0.388	0.378	0.369	0.357	0.345	0.333

year age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
1	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
2	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
3	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
4	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
5	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
6	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
7	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
8	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
9	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
10	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
11	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346
12	0.341	0.349	0.357	0.339	0.322	0.304	0.325	0.346	0.366	0.361	0.355	0.350	0.346

year age	2006	2007	2008	2009	2010	2011	2012	2013
0	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
1	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
2	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
3	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
4	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
5	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
6	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
7	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
8	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
9	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
10	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
11	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246
12	0.342	0.339	0.311	0.283	0.255	0.252	0.249	0.246

TABLE 2.6.9 NEA Mackerel. SURVEY INDICES

```
Mackerel egg survey (SSB index)
1992    3903155
1993    -1
1994    -1
1995    3840254
1996    -1
1997    -1
1998    4418744
1999    -1
2000    -1
2001    3273832
2002    -1
2003    -1
2004    3166579
2005    -1
2006    -1
2007    3965634
2008    -1
2009    -1
2010    4835955
2011    -1
2012    -1
2013    5025630

IBTS
Age0 abundance index
1998    0.610556724
1999    0.651645802
2000    0.421783455
2001    0.796551079
2002    0.863241606
2003    0.538444879
2004    0.880215459
2005    1.130632667
2006    1.076123061
2007    0.547059771
2008    0.687584007
2009    0.480565796
2010    0.636229662
2011    1.185808357
2012    1.050932122
2013    1.339493007

IESSNS
Age 6-11 abundance index
2007    0.1937      0.0661      0.0470      0.0354      0.0130      0.0104
2008    NA          NA          NA          NA          NA          NA
2009    NA          NA          NA          NA          NA          NA
2010    0.6296      0.2733      0.1900      0.1162      0.0310      0.0203
2011    0.9953      0.4638      0.2264      0.0998      0.0513      0.0466
2012    1.3108      0.8903      0.3539      0.1857      0.0647      0.0328
2013    1.3009      1.2022      0.5729      0.1950      0.0787      0.0687
2014    1.071       1.0911      0.6883      0.3018      0.1469      0.0350
```

TABLE 2.6.10 NEA Mackerel. Final assessment estimated parameters (WGWIDE 2014)and comparison with the parameters estimated during the previous assessment (ICES CM 2014/ACOM:48)

	WGWIDE 2014		Previous assessment	
Parameter	Estimate	CV	Estimate	CV
Random walk variance				
Fishing mortality at age	0.258	20%	0.286	17%
log(N-at-age 0)	0.416	21%	0.468	20%
log(N-at-age1 to 12+)	0.183	11%	0.185	12%
Observation variance				
catches	0.122	33%	0.101	41%
egg survey index	0.193	33%	0.174	31%
recruit index	0.286	31%	0.338	25%
IESSNS indices	0.257	18%	0.223	19%
tag recaptures over dispersion	1.206	27%	1.206	27%
Survey catchability				
Recruitment index	1.46E-07	14%	1.15E-07	15%
IESSNS indices	6.10E-07	14%	5.31E-07	14%
egg survey index	1.471	9%	1.280	9%
post tagging survival	0.383	10%	0.379	10%

TABLE 2.6.11 NEA Mackerel. STOCK SUMMARY. Low = lower limit and High = higher limit of 95% confidence interval.

Year	Recruits (thousands)	TSB (tonnes)	SSB (tonnes)	Fbar4–8	Landings (tonnes)
1980	6331198	5688744	3964935	0.172	734950
1981	5204322	5427559	3594804	0.172	754045
1982	2735979	5199120	3584036	0.173	716987
1983	2473142	5214741	3894205	0.173	672283
1984	4470452	5142243	4139146	0.175	641928
1985	3937277	5261886	4053130	0.181	614371
1986	3949107	4828276	3623678	0.188	602201
1987	4625060	4643598	3638201	0.198	654992
1988	3534209	4770683	3580453	0.209	680491
1989	3416065	4457060	3331723	0.227	585920
1990	2853338	4386315	3361843	0.252	626107
1991	3207492	4355718	3213914	0.285	675665
1992	3534209	3817094	2856192	0.32	760690
1993	3011654	3492052	2505503	0.351	824568
1994	2827773	3044965	2169484	0.365	819087
1995	2597344	2999631	2152198	0.338	756277
1996	3097172	2782889	2057495	0.294	563472
1997	2931427	2830602	2049282	0.268	573029
1998	3541284	2757955	2053385	0.274	666316
1999	3859314	3128299	2233320	0.301	640309
2000	2981688	3087894	2176002	0.342	738606
2001	4940613	2808048	2032953	0.392	737463
2002	8360259	2940235	1899308	0.431	771422
2003	3433189	3295274	1916479	0.462	679287
2004	4180745	3311792	2361954	0.426	660491
2005	5832755	3100271	2273884	0.321	549514
2006	10039120	3405833	2262543	0.293	481181
2007	4685579	3674766	2450984	0.348	586206
2008	4965378	4390703	3038881	0.308	623165
2009	4560761	4780234	3682123	0.262	737969
2010	5774718	5126840	3968902	0.245	875515
2011	7818474	5774718	4515380	0.236	946661
2012	7268060	5548288	4180745	0.213	892353
2013	8064141*	5609656	4299460	0.217	931732

*** : the last estimated recruitment was replaced by the output of RCT3**

TABLE 2.6.12 NEA Mackerel. ESTIMATED FISHING MORTALITY

Units : f

age \ year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
0	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.011
1	0.036	0.036	0.036	0.036	0.036	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
2	0.054	0.054	0.053	0.052	0.053	0.052	0.051	0.051	0.051	0.050	0.051	0.051	0.052
3	0.085	0.085	0.084	0.084	0.085	0.088	0.091	0.093	0.097	0.102	0.107	0.113	0.117
4	0.149	0.149	0.151	0.150	0.151	0.156	0.164	0.178	0.188	0.206	0.220	0.235	0.241
5	0.151	0.151	0.152	0.155	0.157	0.161	0.166	0.170	0.180	0.187	0.192	0.201	0.218
6	0.185	0.187	0.188	0.190	0.196	0.204	0.212	0.221	0.227	0.249	0.270	0.289	0.305
7	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418
8	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418
9	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418
10	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418
11	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418
12	0.187	0.187	0.186	0.186	0.186	0.191	0.199	0.211	0.224	0.247	0.288	0.351	0.418

age \ year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0	0.011	0.011	0.011	0.011	0.011	0.012	0.012	0.012	0.007	0.008	0.005	0.003	0.003
1	0.035	0.035	0.035	0.035	0.035	0.034	0.034	0.033	0.029	0.037	0.026	0.016	0.016
2	0.054	0.055	0.055	0.057	0.060	0.062	0.065	0.069	0.068	0.068	0.066	0.074	0.067
3	0.123	0.125	0.127	0.128	0.131	0.139	0.159	0.183	0.166	0.175	0.139	0.163	0.147
4	0.241	0.240	0.230	0.220	0.208	0.213	0.230	0.266	0.296	0.302	0.253	0.239	0.192
5	0.226	0.224	0.226	0.235	0.254	0.286	0.317	0.372	0.342	0.374	0.373	0.355	0.288
6	0.321	0.321	0.314	0.300	0.293	0.293	0.316	0.362	0.459	0.446	0.476	0.439	0.354
7	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384
8	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384
9	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384
10	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384
11	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384
12	0.484	0.519	0.460	0.357	0.291	0.289	0.322	0.355	0.432	0.517	0.604	0.547	0.384

age \ year	2006	2007	2008	2009	2010	2011	2012	2013	2014
0	0.006	0.005	0.005	0.004	0.004	0.004	0.003	0.002	0.002
1	0.021	0.014	0.014	0.012	0.016	0.013	0.011	0.009	0.009
2	0.056	0.038	0.032	0.032	0.037	0.038	0.043	0.044	0.044
3	0.105	0.094	0.091	0.092	0.093	0.098	0.094	0.109	0.109
4	0.173	0.159	0.154	0.168	0.176	0.165	0.163	0.181	0.181
5	0.239	0.259	0.239	0.220	0.222	0.211	0.196	0.207	0.207
6	0.350	0.365	0.285	0.281	0.255	0.251	0.231	0.214	0.209
7	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251
8	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251
9	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251
10	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251
11	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251
12	0.353	0.478	0.430	0.320	0.286	0.276	0.236	0.243	0.251

TABLE 2.6.13 NEA Mackerel. ESTIMATED POPULATION ABUNDANCE

Units : NA

year / age	1980	1981	1982	1983	1984	1985	1986	1987
0	6331198	5204322	2735979	2473142	4470452	3937277	3949107	4625060
1	4528947	5615269	4833107	2105366	1848712	4347015	3259225	3262486
2	2012725	3745254	4842782	4368805	1581683	1351871	4114385	2639236
3	845768	1629852	3125172	4325334	4184928	1162403	996496	3921560
4	1424028	667303	1260476	2636598	3779113	3828563	905280	718557
5	3125172	1080571	493856	897169	2032953	3017683	2978707	720716
6	2500497	2308249	810171	377755	646288	1558135	2242272	2103262
7	861991	1786913	1646233	578967	277618	467428	1087074	1551915
8	331042	615383	1275693	1171740	408808	204638	325462	783088
9	890911	236570	439327	910728	834009	293021	148449	225032
10	254231	636666	168721	313013	650177	593030	211082	104925
11	369904	181680	454067	120451	223463	463240	418738	148598
12	718557	777625	683512	809361	661325	629071	769888	826537

year / age	1988	1989	1990	1991	1992	1993	1994	1995
0	3534209	3416065	2853338	3207492	3534209	3011654	2827773	2597344
1	4303762	2870509	2984671	2294441	2749693	3162900	2520581	2419327
2	2639236	3905905	2278436	2543369	1803068	2305942	2757955	2053385
3	2103262	2273884	3752752	2010713	2383308	1518145	1893618	2317501
4	3576875	1649528	1803068	2913891	1460077	1928012	1048635	1381942
5	476394	2816484	1077334	1226899	1815733	939403	1304069	653436
6	570918	327420	1951288	795718	946002	1140526	585370	930986
7	1409859	448202	213630	1244196	501822	593623	658026	353274
8	1077334	1040280	336718	136353	722159	307737	324811	271577
9	559053	747882	702921	233515	84120	386157	167879	158103
10	154045	386157	487966	460469	143918	46677	186839	89949
11	73350	102744	259367	303155	271577	81308	23600	98716
12	669978	504842	403931	422523	429768	382697	246965	139107

year / age	1996	1997	1998	1999	2000	2001	2002	2003
0	3097172	2931427	3541284	3859314	2981688	4940613	8360259	3433189
1	2107473	2755198	2378546	2864774	3301872	1674458	5792068	7725213
2	2014739	1666106	2390469	1878530	2269341	2605148	1131438	4833107
3	2074021	1869161	1228126	2312871	1664441	1694672	2324464	816678
4	1746283	1716847	1600777	1182333	1770903	1191829	1387480	1474751
5	931918	1167062	1457160	1246687	938464	1195410	882929	819951
6	477347	697320	838190	887355	855122	605615	752382	511447
7	554599	315527	466028	600189	614768	576079	372503	353628
8	204638	327420	253723	306815	372131	397918	324811	216858
9	128798	142771	204638	177194	190422	230729	214058	175431
10	80017	81471	100408	129444	112984	120692	119611	105768
11	48339	43871	53263	66171	71325	66703	59219	59456
12	128927	105556	100609	106617	119253	120331	103156	73644

year / age	2004	2005	2006	2007	2008	2009	2010	2011
0	4180745	5832755	10039120	4685579	4965378	4560761	5774718	7818474
1	2438759	3478111	6837960	7210148	4519898	3870909	4611206	5330737
2	6524011	2202272	3288690	5677378	6070794	3988796	3917640	3450398
3	3652783	5020299	1803068	2703344	4995260	5564958	3693186	3645485
4	714258	1893618	3233255	1578523	2193480	4239687	4770683	3318422
5	917126	516071	1064483	2101160	1297565	1760309	3233255	3656438
6	432354	463703	352921	675359	1177613	959339	1361367	2319820
7	244019	220577	269682	228205	410446	742665	641138	1044449
8	167879	125367	127899	163081	167042	276509	427624	485532
9	105556	82207	69633	87553	96086	114348	191568	242316
10	81471	57584	49762	41564	55050	55326	84036	111079
11	42531	30061	30669	30061	20611	30212	31070	58630
12	51072	38330	37012	36425	29792	22181	35846	45936

Year / age	2012	2013	2014
0	7268060	6022422	6022422
1	6622609	5722979	5173190
2	5010268	5609656	4881680
3	2684486	4333994	4620438
4	3029778	2171655	3345076
5	2782889	2460807	1561254
6	2649814	2340792	1878530
7	1618483	1830317	1837653
8	730146	1016626	1310606
9	339422	530195	671991
10	153277	208355	342491
11	64151	102539	113777
12	62567	87904	128541

Table 2.7.2.1 RCT3 output.

```
Analysis by RCT3_R ver3.1 of data from file :

RCT3/RCT3init.txt

RCT3 for NEA Mackerel

Data for 1 surveys over 24 years :  1990 - 2013

Regression type = c
Tapered time weighting applied
Power = 3 over 20 years
Survey weighting not applied
Final estimates shrunk towards mean
Minimum S.E. for any survey taken as 0.000
Minimum of   3 points used for regression

Forecast/Hindcast variance correction used.


yearclass = 2013

          I-----------Regression----------I  I-----------Prediction---------I

 Survey/  Slope  Inter-   Std  Rsquare  No.  Index Predicted   Std     WAP
 Series           cept   Error          Pts  Value   Value    Error   Weights

 IBTS.index   1.72  14.14   0.30  0.581     15   1.34   16.45    0.409    0.428

                                      VPA Mean =   15.50    0.354    0.572




 Year     Weighted      Log     Int     Ext     Var     VPA      Log
 Class     Average      WAP     Std     Std    Ratio            VPA
          Prediction           Error   Error

 2013     8064141     15.90    0.27    0.47     3.09
```

Table 2.7.3.1 NE Atlantic Mackerel. Short-term prediction: INPUT DATA

2014	Stock Numbers	M	Maturity ogive	Prop of F before spw.	Prop of M before spw.	Weights in the stock	Exploitation pattern	Weights in the catch
0	4272254	0.15	0.000	0.000	0.249	0.000	0.003	0.070
1	6925455	0.15	0.106	0.166	0.249	0.109	0.011	0.136
2	4881680	0.15	0.539	0.166	0.249	0.160	0.042	0.217
3	4620438	0.15	0.913	0.171	0.249	0.203	0.100	0.283
4	3345076	0.15	0.998	0.171	0.249	0.255	0.170	0.336
5	1561254	0.15	0.999	0.209	0.249	0.298	0.205	0.367
6	1878530	0.15	0.999	0.209	0.249	0.332	0.232	0.399
7	1837653	0.15	1.000	0.209	0.249	0.358	0.252	0.429
8	1310606	0.15	1.000	0.209	0.249	0.388	0.252	0.463
9	671991	0.15	1.000	0.209	0.249	0.433	0.252	0.500
10	342491	0.15	1.000	0.209	0.249	0.472	0.252	0.530
11	113777	0.15	1.000	0.209	0.249	0.506	0.252	0.547
12+	128541	0.15	1.000	0.209	0.249	0.538	0.252	0.601
2015								
0	4272254	0.15	0.000	0.000	0.249	0.000	0.003	0.070
1	-	0.15	0.106	0.166	0.249	0.109	0.011	0.136
2	-	0.15	0.539	0.166	0.249	0.160	0.042	0.217
3	-	0.15	0.913	0.171	0.249	0.203	0.100	0.283
4	-	0.15	0.998	0.171	0.249	0.255	0.170	0.336

2014	Stock Numbers	M	Maturity ogive	Prop of F before spw.	Prop of M before spw.	Weights in the stock	Exploitation pattern	Weights in the catch
5	-	0.15	0.999	0.209	0.249	0.298	0.205	0.367
6	-	0.15	0.999	0.209	0.249	0.332	0.232	0.399
7	-	0.15	1.000	0.209	0.249	0.358	0.252	0.429
8	-	0.15	1.000	0.209	0.249	0.388	0.252	0.463
9	-	0.15	1.000	0.209	0.249	0.433	0.252	0.500
10	-	0.15	1.000	0.209	0.249	0.472	0.252	0.530
11	-	0.15	1.000	0.209	0.249	0.506	0.252	0.547
12+	-	0.15	1.000	0.209	0.249	0.538	0.252	0.601
2016								
0	4272254	0.15	0.000	0.000	0.249	0.000	0.003	0.070
1	-	0.15	0.106	0.166	0.249	0.109	0.011	0.136
2	-	0.15	0.539	0.166	0.249	0.160	0.042	0.217
3	-	0.15	0.913	0.171	0.249	0.203	0.100	0.283
4	-	0.15	0.998	0.171	0.249	0.255	0.170	0.336
5	-	0.15	0.999	0.209	0.249	0.298	0.205	0.367
6	-	0.15	0.999	0.209	0.249	0.332	0.232	0.399
7	-	0.15	1.000	0.209	0.249	0.358	0.252	0.429
8	-	0.15	1.000	0.209	0.249	0.388	0.252	0.463
9	-	0.15	1.000	0.209	0.249	0.433	0.252	0.500
10	-	0.15	1.000	0.209	0.249	0.472	0.252	0.530
11	-	0.15	1.000	0.209	0.249	0.506	0.252	0.547
12+	-	0.15	1.000	0.209	0.249	0.538	0.252	0.601

Table 2.7.3.2 NE Atlantic Mackerel. Short-term prediction: Multi-option table for 1 396 kt catch in 2014 and a range of F-multipliers in 2015.

2014							
TSB	SSB	Fmult	Fbar	Landings			
6162863	4605433	1.200	0.324	1 396 238			
2015					2016		
TSB	SSB	Fmult	Fbar	Landings	TSB	SSB	Implied change in the landings
5563709	4528449	0	0.00	0	6074888	5193026	-100%
-	4504959	0.1	0.03	144669	5952195	5048093	-90%
-	4481618	0.2	0.06	285283	5833030	4908243	-80%
-	4458423	0.3	0.10	421967	5717282	4773282	-70%
-	4435374	0.4	0.13	554844	5604844	4643024	-60%
-	4412470	0.5	0.16	684032	5495610	4517292	-51%
-	4389710	0.6	0.19	809644	5389481	4395912	-42%
-	4367093	0.7	0.23	931792	5286359	4278720	-33%
-	4344618	0.8	0.26	1050581	5186150	4165558	-25%
-	4322284	0.9	0.29	1166116	5088763	4056273	-16%
-	4300091	1	0.32	1278497	4994108	3950720	-8%
-	4278036	1.1	0.36	1387820	4902102	3848758	-1%
-	4256119	1.2	0.39	1494179	4812662	3750252	7%
-	4234340	1.3	0.42	1597664	4725707	3655073	14%
-	4212697	1.4	0.45	1698364	4641162	3563096	22%
-	4191189	1.5	0.49	1796363	4558950	3474202	29%
-	4169816	1.6	0.52	1891744	4478999	3388275	35%
-	4148577	1.7	0.55	1984585	4401241	3305206	42%
-	4127470	1.8	0.58	2074965	4325607	3224889	49%
-	4106494	1.9	0.62	2162957	4252031	3147220	55%
-	4085650	2.0	0.65	2248633	4180451	3072103	61%

Table 2.7.3.3. NE Atlantic Mackerel. Short-term prediction: Management option table for 1 396 kt catch in 2014 and a range of catch options for 2015.

options	Fbar (2015)	Catch (2015)	SSB (2015)	TSB (2015)	SSB (2016)	TSB (2016)	% change TAC 2014->2015	% change SSB 2015->2016
Catch(2015) = Zero	0.00	0	4528449	5563709	5193026	6074888	-100%	15%
Catch(2015) = 2014 catch -20%	0.28	1116990	4331839	5563709	4101120	5130162	-20%	-5%
Catch(2015) = 2014 catch	0.36	1396238	4276318	5563709	3840274	4895020	0%	-10%
Catch(2015) = 2014 catch +20%	0.45	1675486	4217654	5563709	3581774	4660363	20%	-15%
Fbar(2015) = 0.20	0.20	831030	4385786	5563709	4375334	5371421	-40%	0%
Fbar(2015) = 0.21	0.21	868912	4378797	5563709	4338944	5339435	-38%	-1%
Fbar(2015) = 0.22	0.22	906469	4371822	5563709	4302946	5307731	-35%	-2%
Fbar(2015) = 0.26 (Fpa)	0.26	1053508	4344058	5563709	4162779	5183682	-25%	-4%
Fbar(2015) = 0.25 (Fmsy)	0.25	1017221	4350979	5563709	4197257	5214285	-27%	-4%

Table 2.7.3.4 : NE Atlantic Mackerel. Short-term prediction: Management option table using an assumption of 10% banking for EU and Norway in 2014 (catches and SSB in tonnes)

Fbar (2014)	0.30
Catch (2014)	1307206
banked 2014->2015	89032
SSB (2014)	4623227
TSB (2014)	6162862

	Fbar (2015) advice	Fbar (2015) effective	Catch (2015) advice	Catch (2015) + banking 2014	SSB (2015) advice	SSB (2015) real	TSB (2015) real	SSB (2016) real	TSB (2016) real	% change TAC 2014->2015	% change SSB 2015->2016
Catch(2015) = Zero	0.00	0.02	0	89032	4599641	4585223	5638587	5189779	6071038	-93%	13%
Catch(2015) = 2014 catch	0.33	0.35	1307206	1396238	4365556	4347570	5638587	3925265	4966544	7%	-10%
Fbar(2015) = 0.20	0.20	0.22	846079	935110	4454113	4437581	5638587	4360695	5355150	-28%	-2%
Fbar(2015) = 0.21	0.21	0.23	884637	973669	4446985	4430340	5638587	4323823	5322610	-26%	-2%
Fbar(2015) = 0.22	0.22	0.24	922864	1011895	4439870	4423113	5638587	4287350	5290358	-23%	-3%
Fbar(2015) = 0.26(Fpa)	0.26	0.28	1072515	1161547	4411550	4394336.	5638587	4145355	5164173	-11%	-6%
Fbar(2015) = 0.25(Fmsy)	0.25	0.27	1035584	1124616	4418610	4401511	5638587	4180279	5195301	-14%	-5%

Table 2.7.3.5 : NE Atlantic Mackerel. Short-term prediction: Management option table using an assumption of 20% banking for EU and Norway in 2014 (catches and SSB in tonnes)

Fbar (2014)	0.28
Catch (2014)	1218174

banked 2014->2015	178064										
SSB (2014)	4640744										
TSB (2014)	6162863										
	Fbar (2015) advice	Fbar (2015) effective	Catch (2015) advice	Catch (2015) + banking 2014	SSB (2015) advice	SSB (2015) real	TSB (2015) real	SSB (2016) real	TSB (2016) real	% change TAC 2014->2015	% change SSB 2015->2016
Catch(2015) = Zero	0.00	0.04	0	178064	4670890	4641815	5713506	5186563	6067231	-85%	12%
Catch(2015) = 2014 catch	0.29	0.34	1218174	1396238	4454474	4418875	5713506	4009363	5038089	15%	-9%
Fbar(2015) = 0.20	0.20	0.25	861152	1039216	4522491	4489104	5713506	4346081	5338911	-15%	-3%
Fbar(2015) = 0.21	0.21	0.26	900387	1078451	4515222	4481606	5713506	4308726	5305817	-11%	-4%
Fbar(2015) = 0.22	0.22	0.27	939285	1117349	4507968	4474121	5713506	4271778	5273016	-8%	-5%
Fbar(2015) = 0.26(Fpa)	0.26	0.31	1091552	1269616	4479091	4444310	5713506	4127956	5144695	4%	-7%
Fbar(2015) = 0.25(Fmsy)	0.25	0.30	1053977	1232041	4486289	4451744	5713506	4163326	5176349	1%	-6%

Table 2.8.1 ICES Reference points for NEA mackerel as proposed by the 2014 WKPELA benchmark workshop.

Type		Value	Technical basis
Management Plan	SSBtrigger	2.2 million t	Medium-term simulations conducted in 2008 Revision required1
	F target	0.20-0.22	Medium-term simulations conducted in 2008 Revision required1
MSY Approach	MSY Btrigger	2.36 million t	Proxy based on Bpa Revision required2
	FMSY target	0.25	Stochastic simulation conducted at WKPELA 2014
Precautionary Approach	Blim	1.84 million t	Bloss in 2002 from WKPELA 2014 benchmark assessment
	Bpa	2.36 million t	exp(1.654*σ)*Bim, σ=0.15
	Flim	0.39	Floss, the F that on average leads to Blim
	Fpa	0.26	F that on average leads to Bpa

[1]Under evaluation

[2]To be revised at WGWIDE after the management plan evaluation.

Table 2.11.1. Catches in tonnes of *Scomber colias* in Divisions VIIIb, VIIIc and IXa in the period 1982 – 2013.

Subdivisions		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
VIIIb	Spain	0	0	0	0	0	0	0	0	0	487	7	4	427	247	778
VIIIc	Spain	322	254	656	513	750	1150	1214	3091	1923	1502	859	1892	1903	2558	2679
IXa N & S	Spain	0	0	0	0	0	0	0	0	0	0	895	3357	8573	5068	5437
IXa-CN, CS & S	Portugal	2458	1364	8059	9118	8184	8876	3816	6447	8568	10142	8981	7341	4430	3884	4759
Sub–Divisions		**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
VIIIb	Spain	362	1218	632	344	426	99	157	40	222	262	744	42	122	520	384
VIIIc	Spain	5026	1765	418	1905	1496	1509	2525	2741	3150	4260	7153	5203	3930	8939	17694
IXa N & S	Spain	2340	1381	983	1001	553	1566	981	888	812	2984	8239	8544	11860	12218	9152
IXa-CN, CS & S	Portugal	5408	6690	13877	10520	4228	5301	8030	14714	14905	13031	20222	23286	14428	22283	30635
Subdivisions		**2012**	**2013**													
VIIIb	Spain	2089	4688													
VIIIc	Spain	12068	5356													
IXa N & S	Spain	13499	8597													
IXa-CN, CS & S	Portugal	37191	39250													
Unallocated			1070													

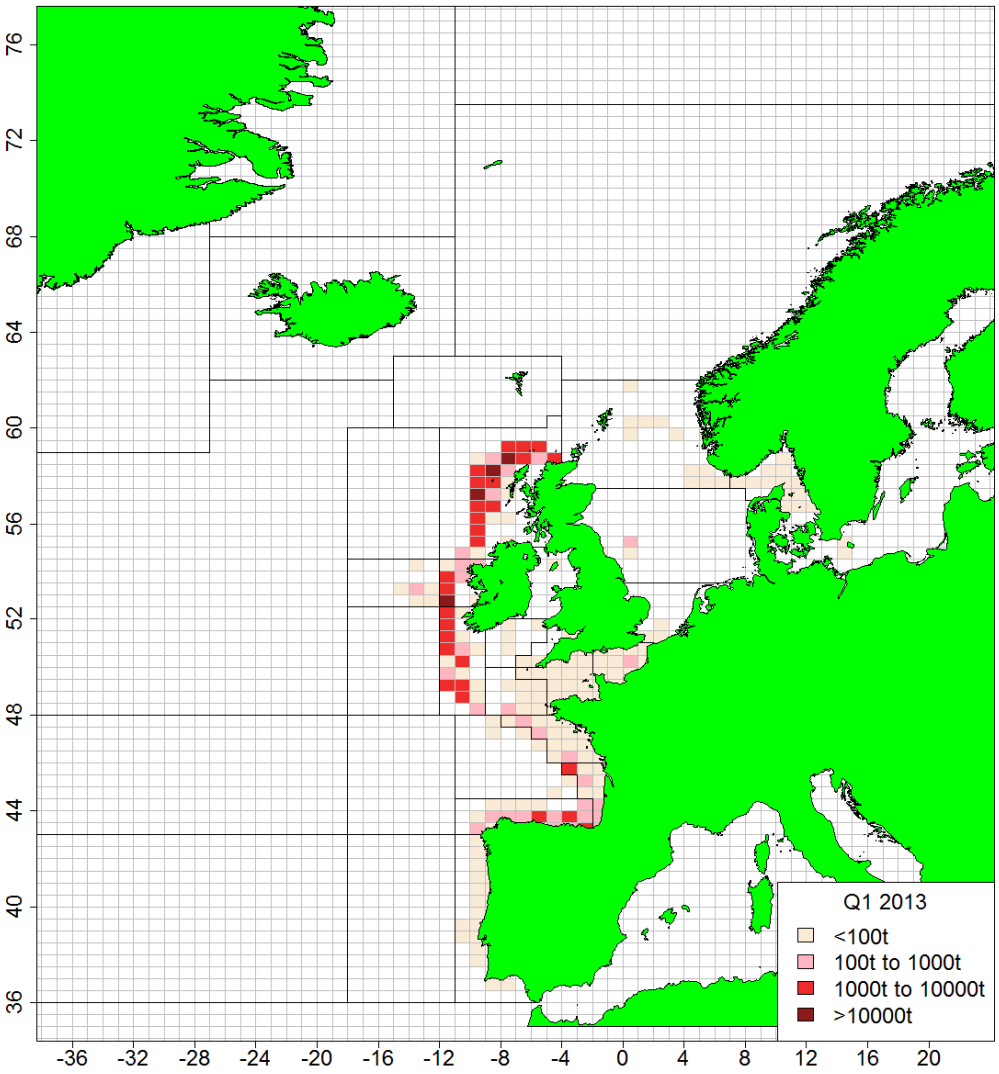


Figure 2.3.2.1. NE Atlantic Mackerel. Commercial catches in 2013, quarter1.

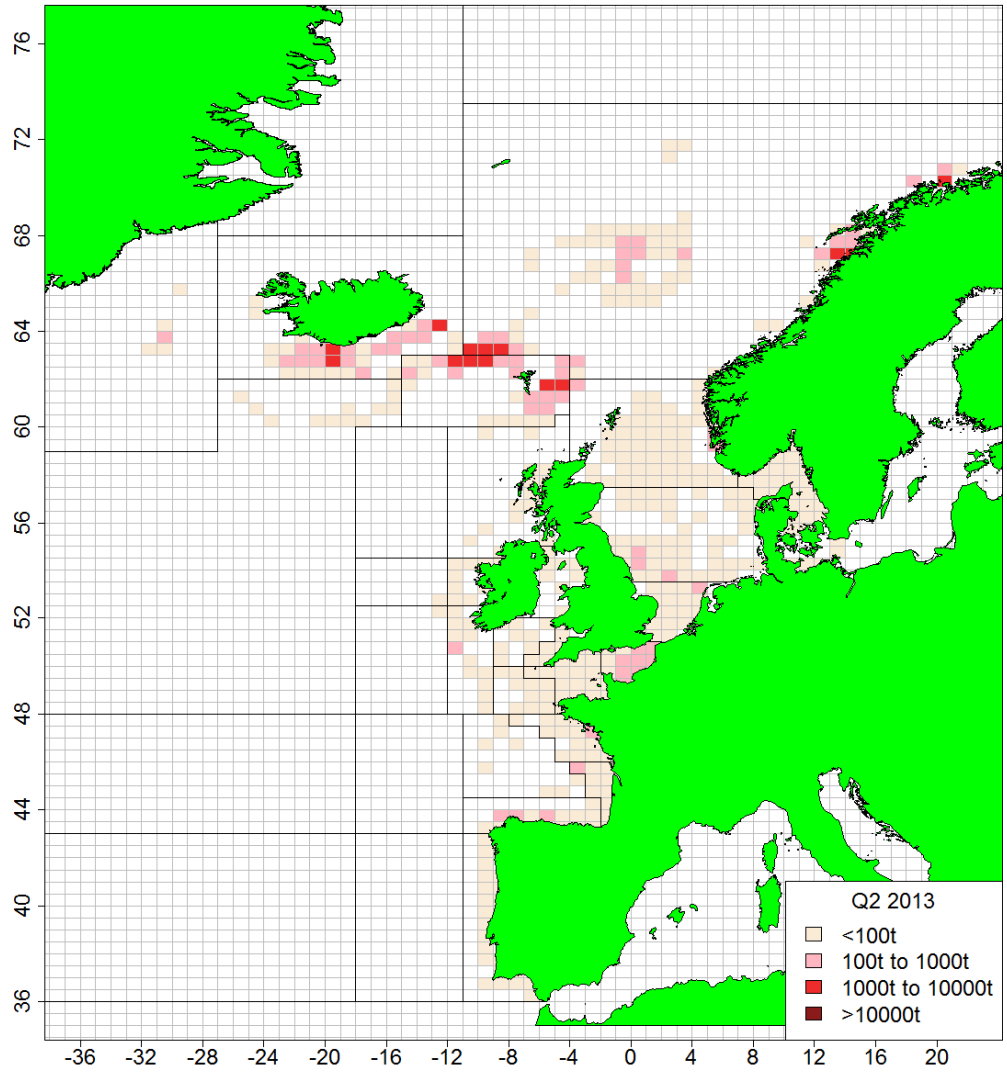


Figure 2.3.2.2. NE Atlantic Mackerel. Commercial catches in 2013, quarter 2.

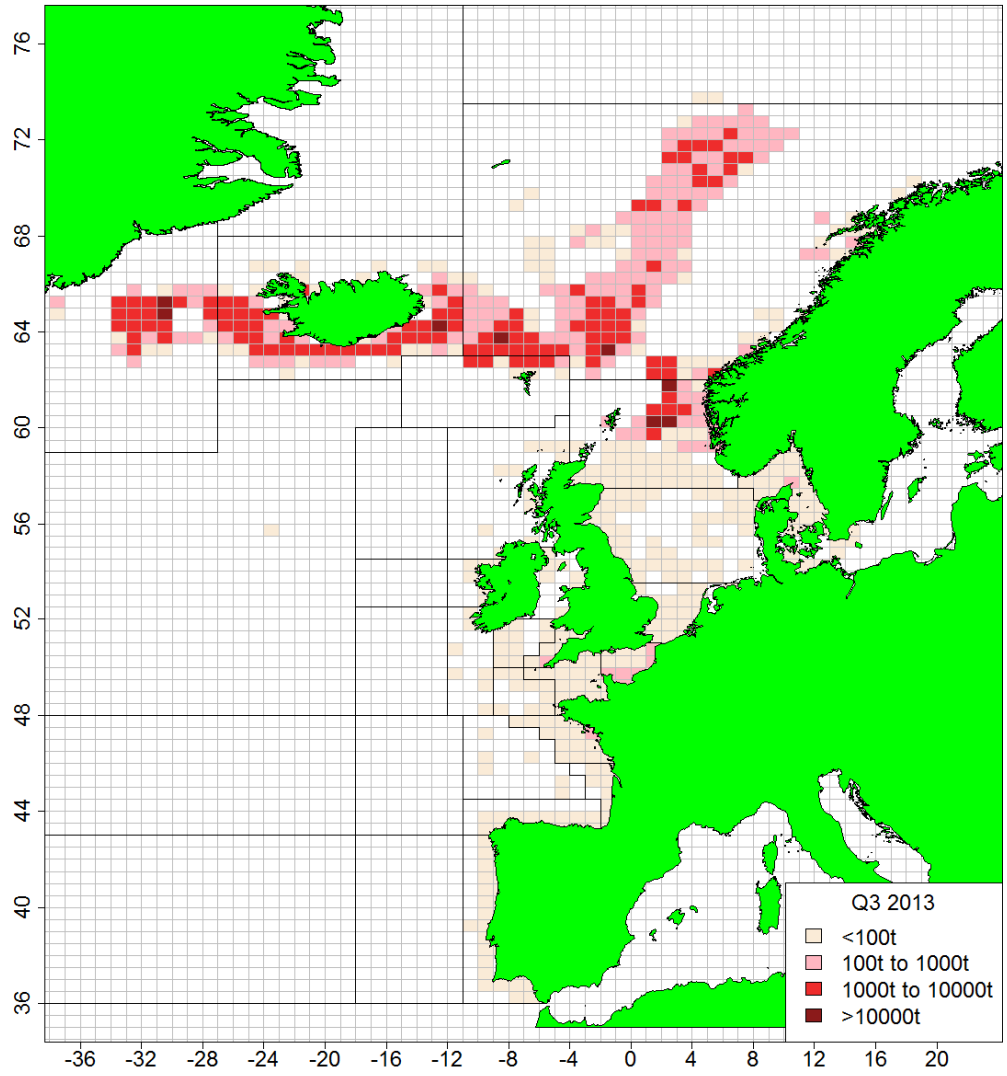


Figure 2.3.2.3. NE Atlantic Mackerel. Commercial catches in 2013, quarter 3.

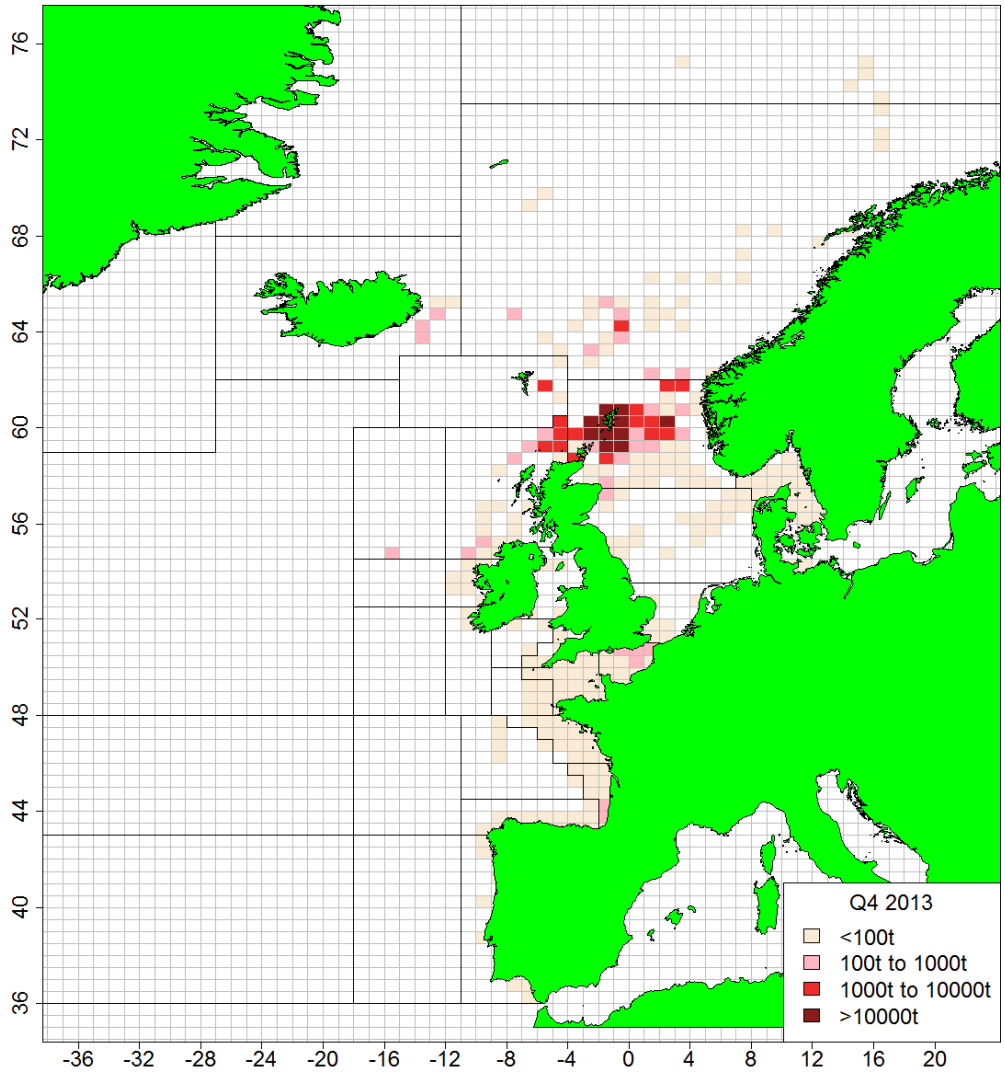


Figure 2.3.2.4. NE Atlantic Mackerel. Commercial catches in 2013, quarter 4.

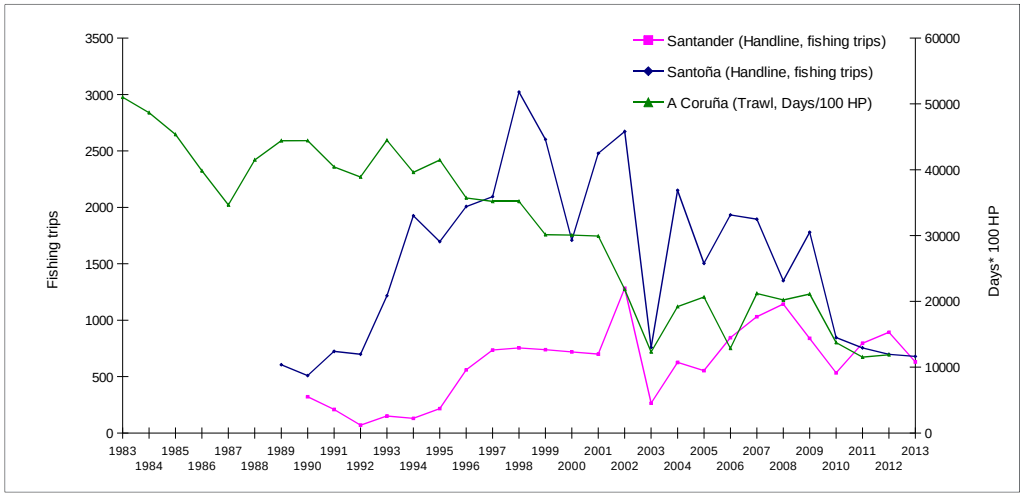


Figure 2.3.4.1. NEA mackerel (Southern component). Effort data by fleets.

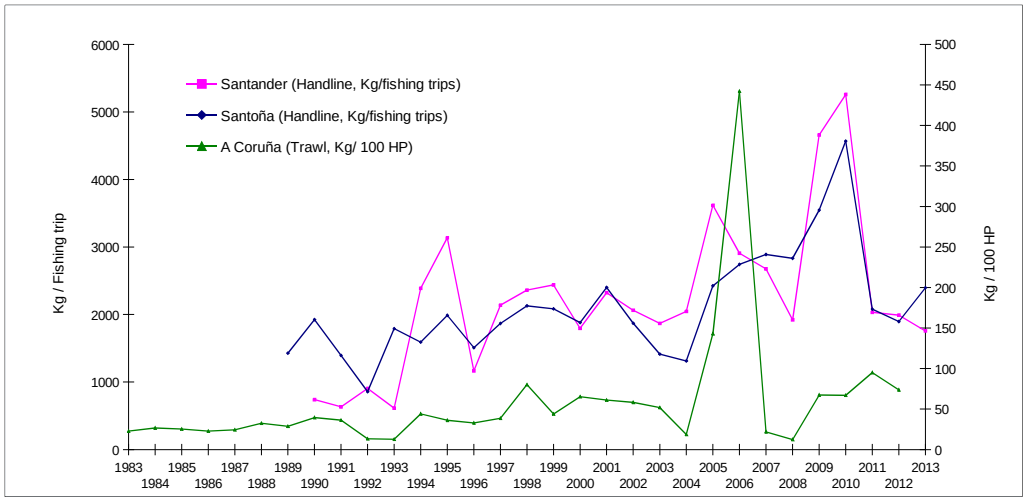


Figure 2.3.4.2. NEA mackerel (Southern component). CPUE index by fleet.

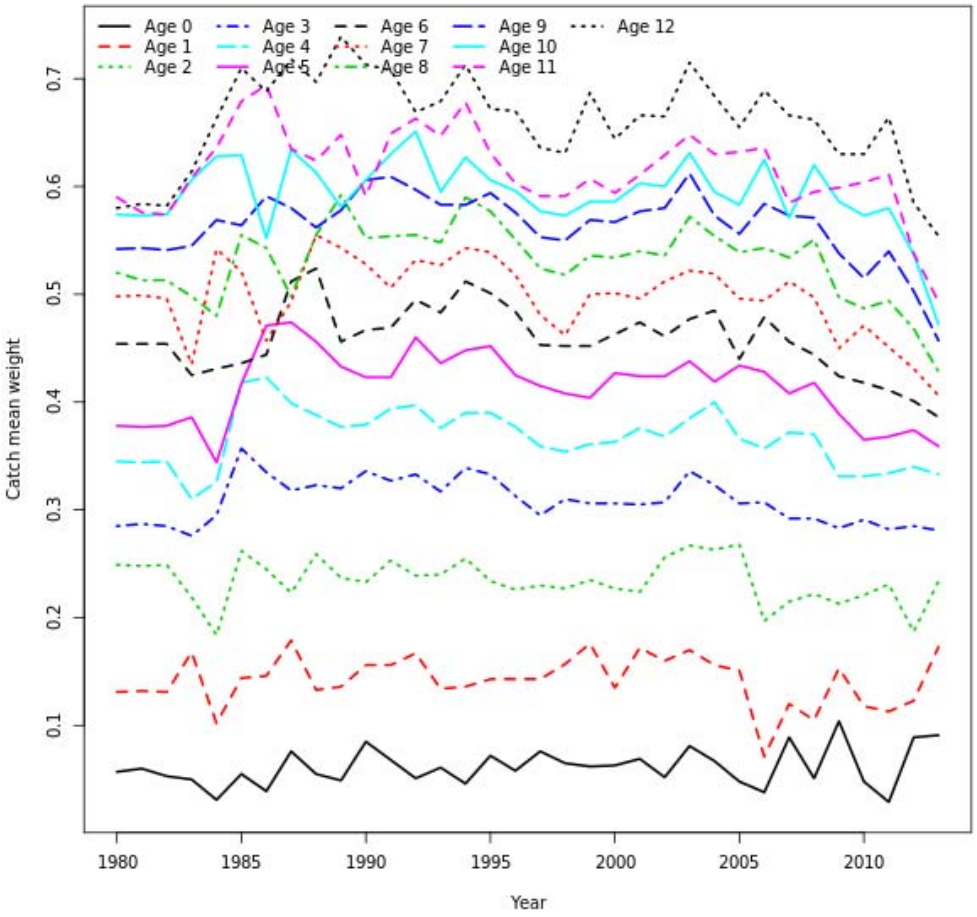


Figure 2.4.2.1. NE Atlantic mackerel. Weights-at-age in the catch.

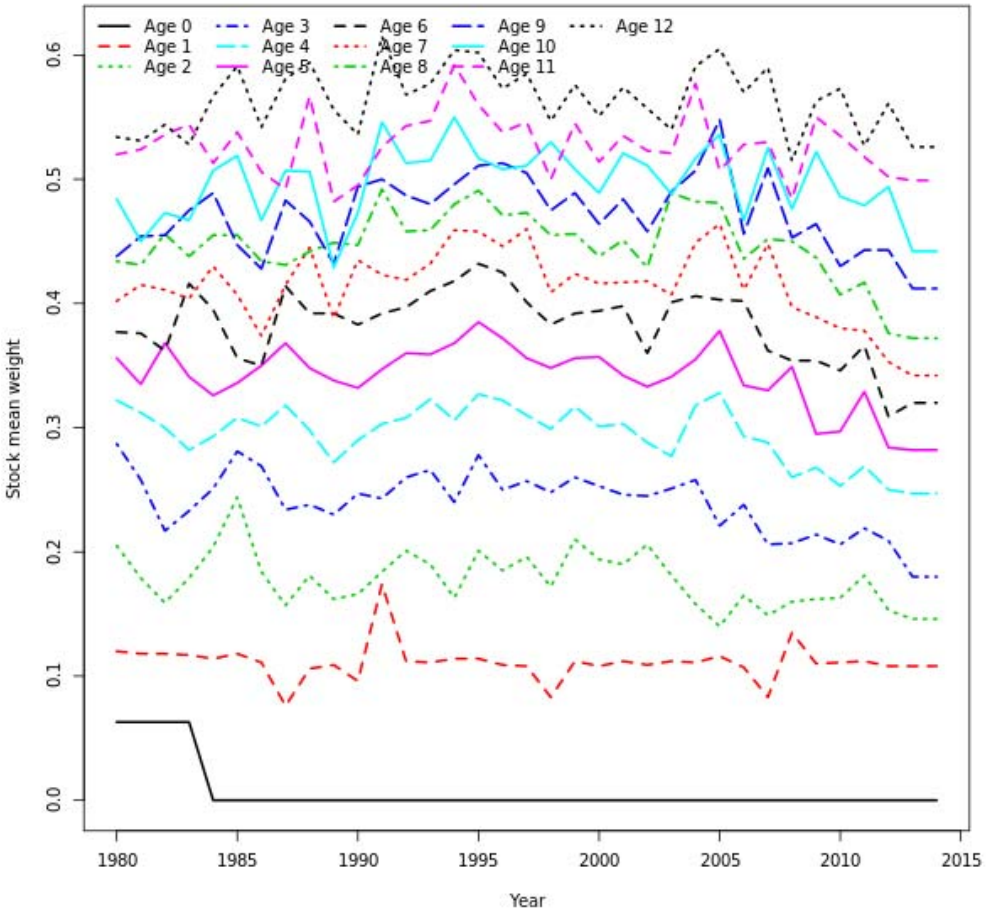


Figure 2.4.2.2. NE Atlantic mackerel. Weights-at-age in the stock.

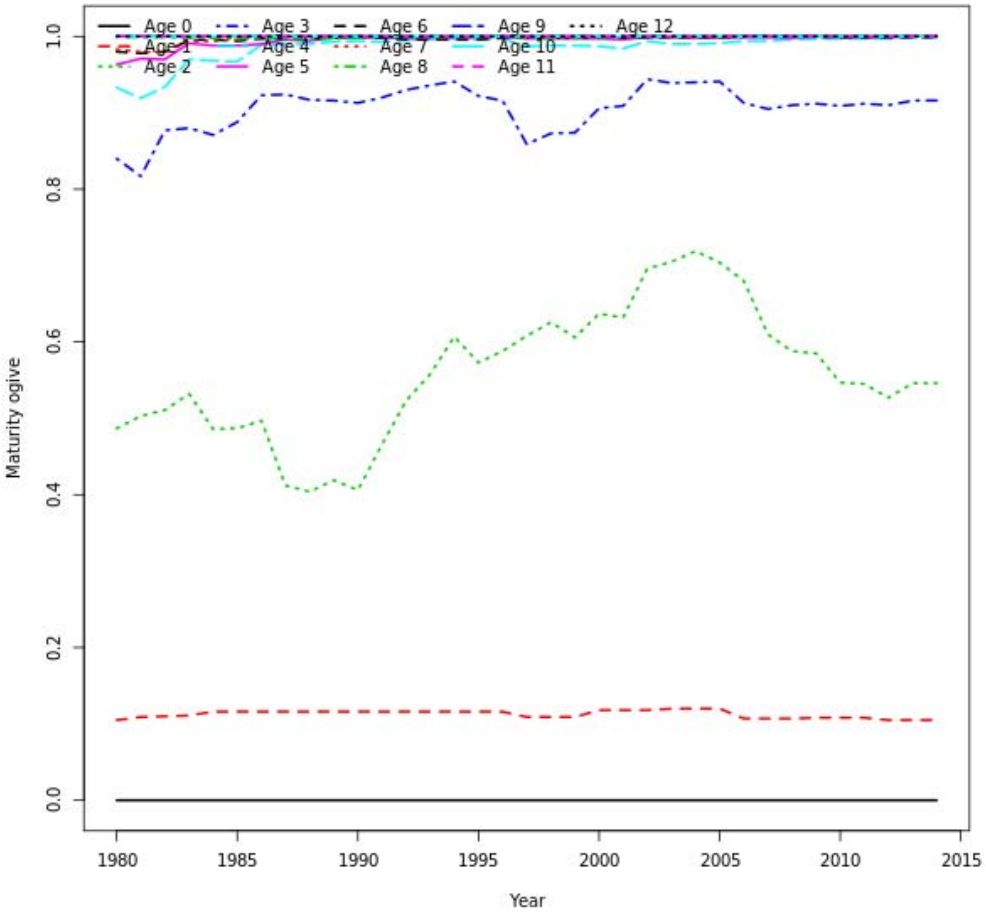


Figure 2.4.3. NE Atlantic mackerel. Proportion of mature fish at age

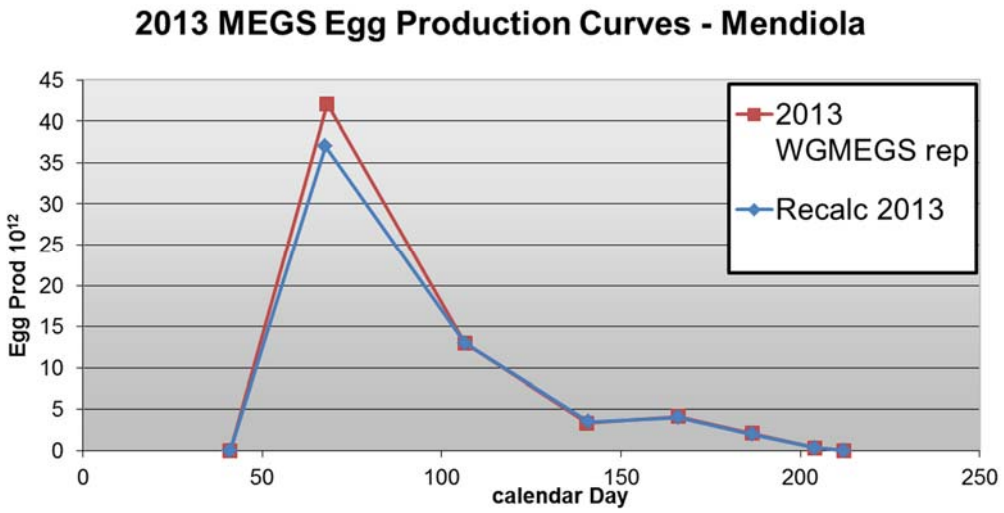


Figure 2.5.1.1. NE Atlantic mackerel. Comparison of the originally reported and revised egg production curve for the Western area.

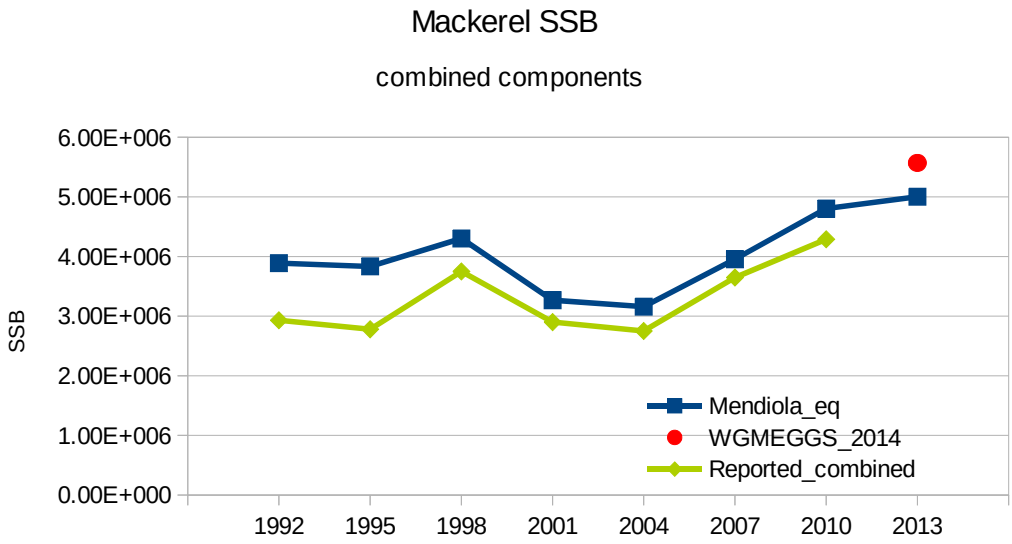


Figure 2.5.1.2. NE Atlantic mackerel. Mackerel SSB estimates derived from the mackerel egg surveys for the combined survey area. The green line represents the input data for the mackerel assessment until 2012. The red spot is the estimate given by WGMEGS for the updated advice. The blue line represents the agreed input data by WGWIDE 2014.

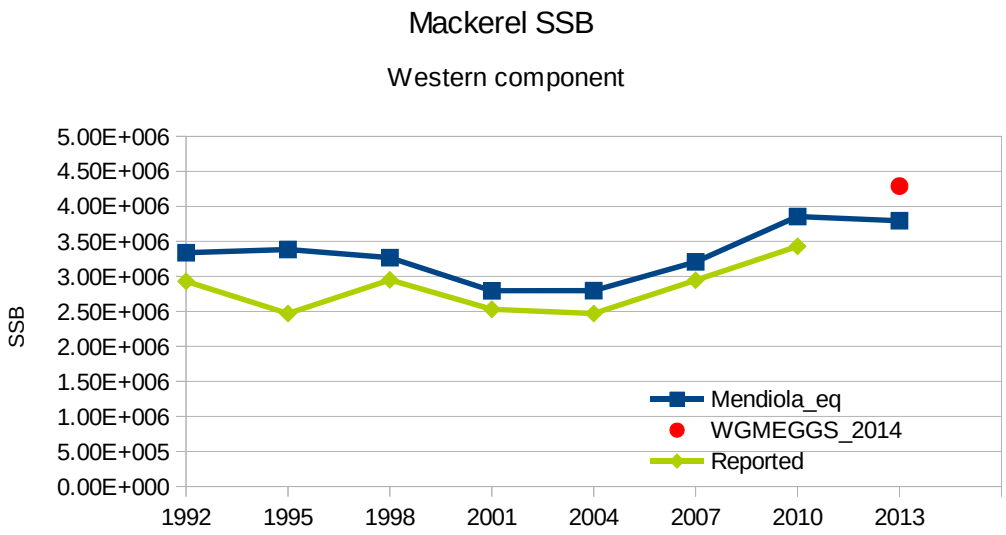


Figure 2.5.1.3. NE Atlantic mackerel. Mackerel SSB estimates derived from the mackerel egg surveys for the western component of the survey area only. The green line represents the input data for the mackerel assessment until 2012. The red spot is the estimate given by WGMEGS for the updated advice. The blue line represents the agreed input data by WGWIDE 2014.

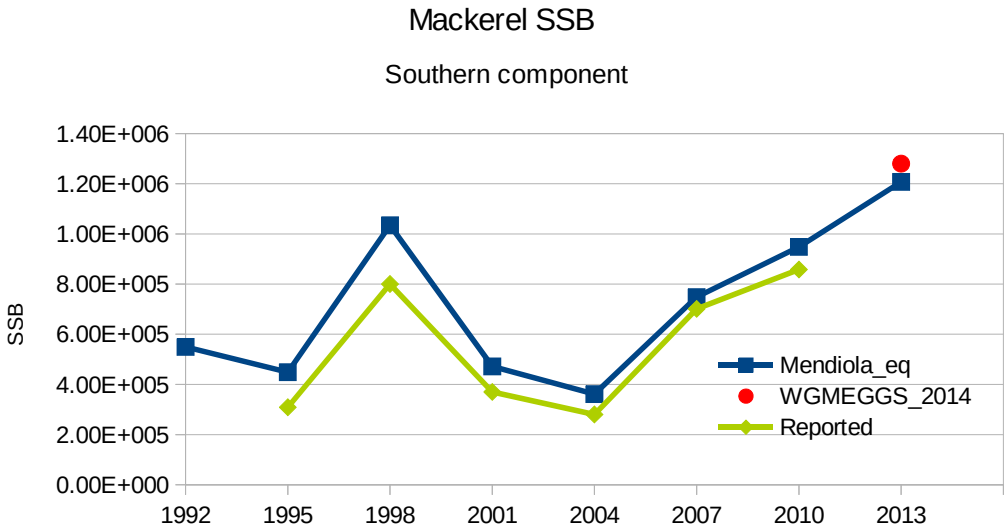


Figure.2.5.1.4. NE Atlantic mackerel. Mackerel SSB estimates derived from the mackerel egg surveys for the southern component of the survey area only. The green line represents the input data for the mackerel assessment until 2012. The red spot is the estimate given by WGMEGS for the updated advice. The blue line represents the agreed input data by WGWIDE 2014.

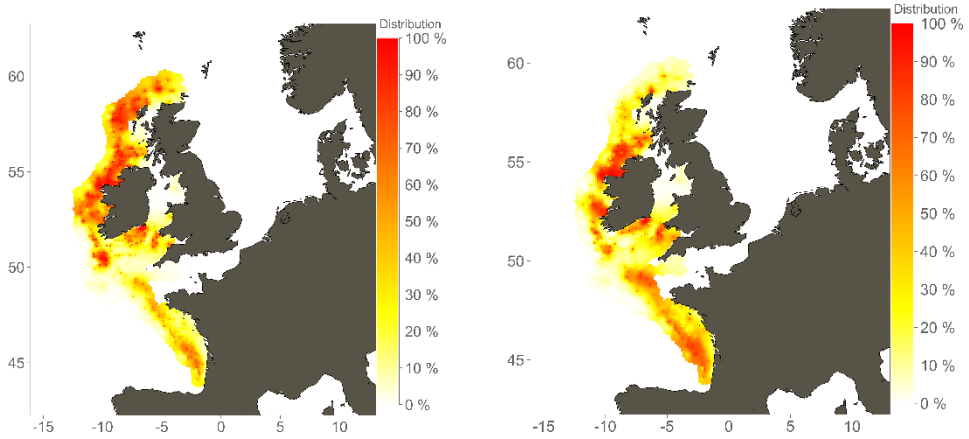


Figure 2.5.2.1. Distributions of modelled squared catch rates of mackerel at approximately 3-9 months of age in fourth quarter demersal trawl surveys. Left) average rates for 1998-2013, and Right) 2013. See Jansen *et al.*(2014, WKPELA WD) and Jansen *et al.*(under review) for details.

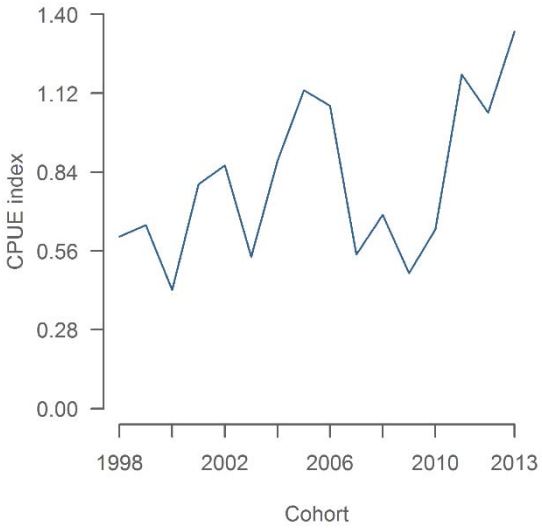


Figure 2.5.2.2. IBTS Q4 recruitment index derived from square root transformed CPUE. See Jansen *et al.*(2014, WKPELA WD) and Jansen *et al.*(under review) for details.

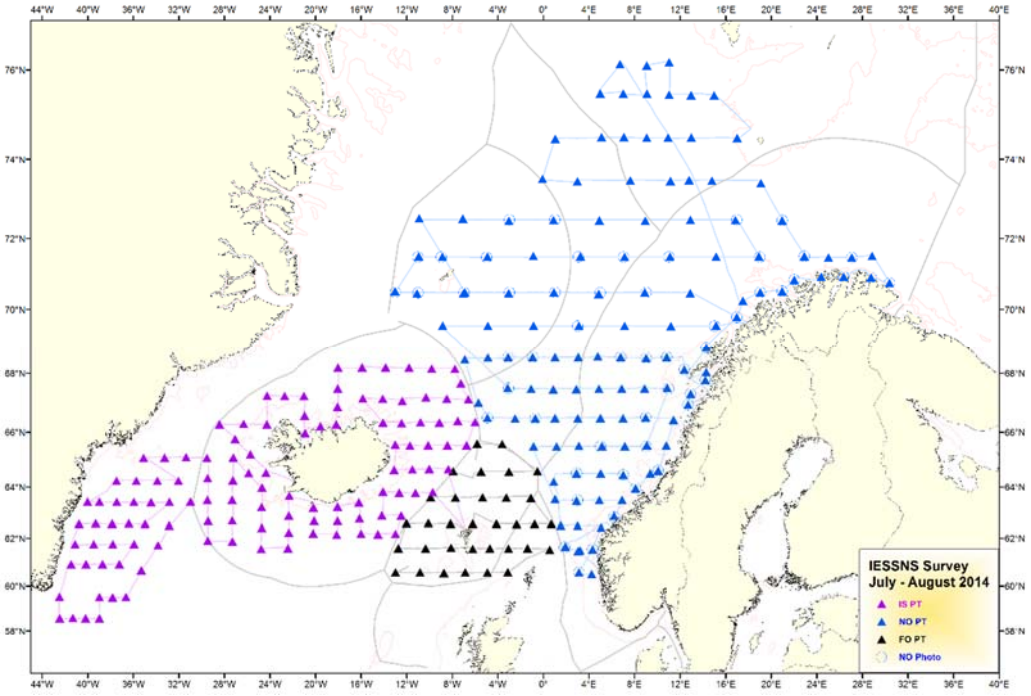


Figure 2.5.3.1. CTD stations (0-500 m) using SEABIRD SBE 37 (Arni Fridriksson) SEABIRD SB 25+ (Finnur Friði) and SAIV SD2002 (Brennholm and Vendla) CTD sensors and WP2 plankton net samples (0-200 m depth) from 2 July to 12 August 2014. These were taken systematically on every pelagic trawl station on all four vessels. Underwater filming with GoPro cameras inside the trawls were performed on all vessels, although only shown from the two Norwegian vessels (NO Photo).

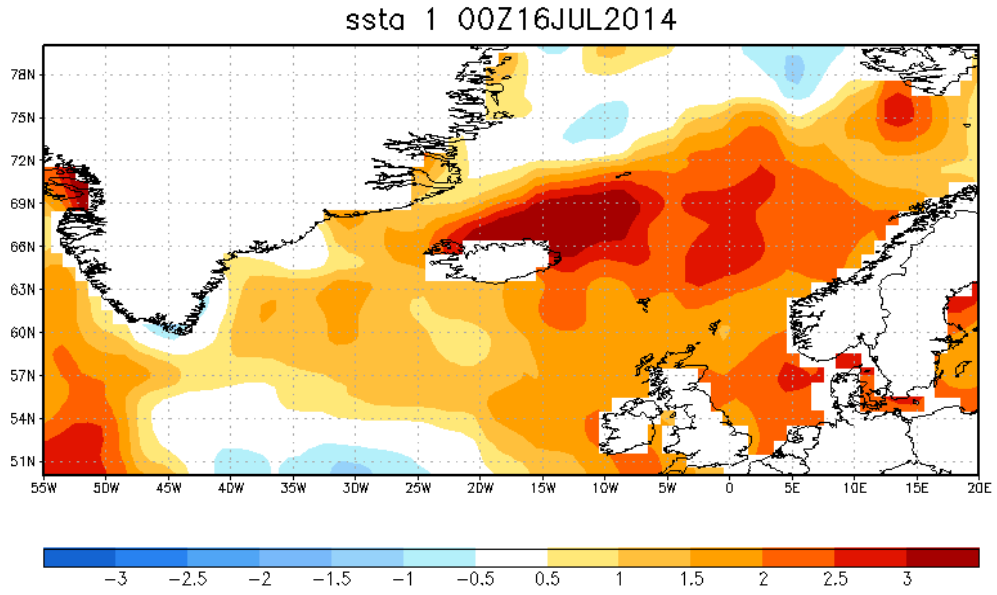


Figure 2.5.3.2. Sea surface temperature anomalies (°C; averaged for the entire month of July 2014) showing significantly warmer conditions (1-3°C) in July 2014 in most of the Northeast Atlantic in comparison to a 20 year average.

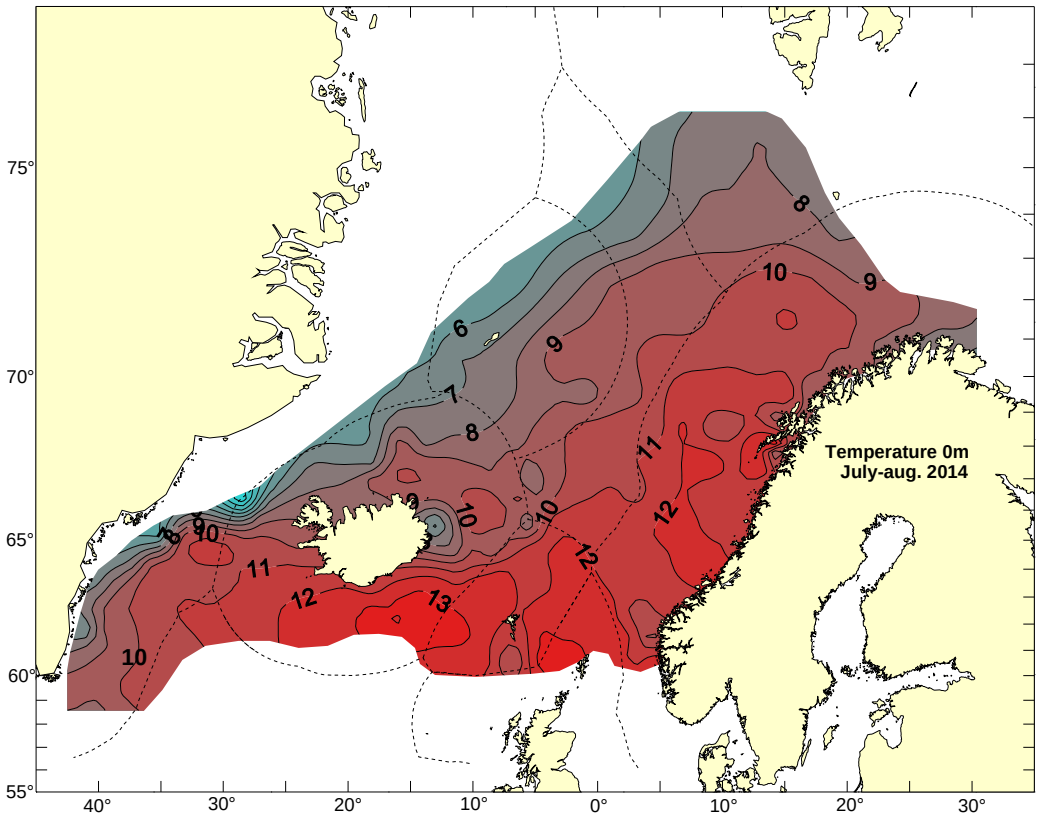


Figure 2.5.3.3. Temperature (°C) at 10 m depth in the Norwegian Sea and surrounding waters in July/August 2014.

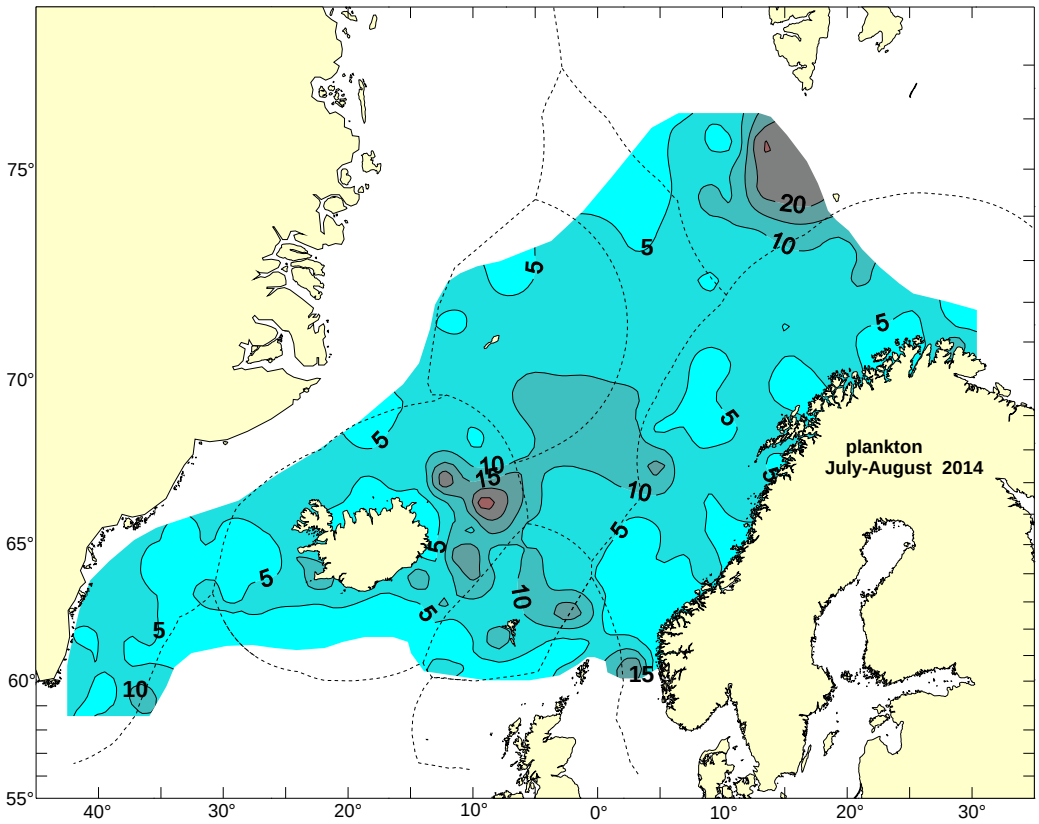


Figure 2.5.3.4. Zooplankton biomass (g dw/m2, 0-200 m) in the Norwegian Sea and surrounding waters, 2nd of July -12th of August 2014.

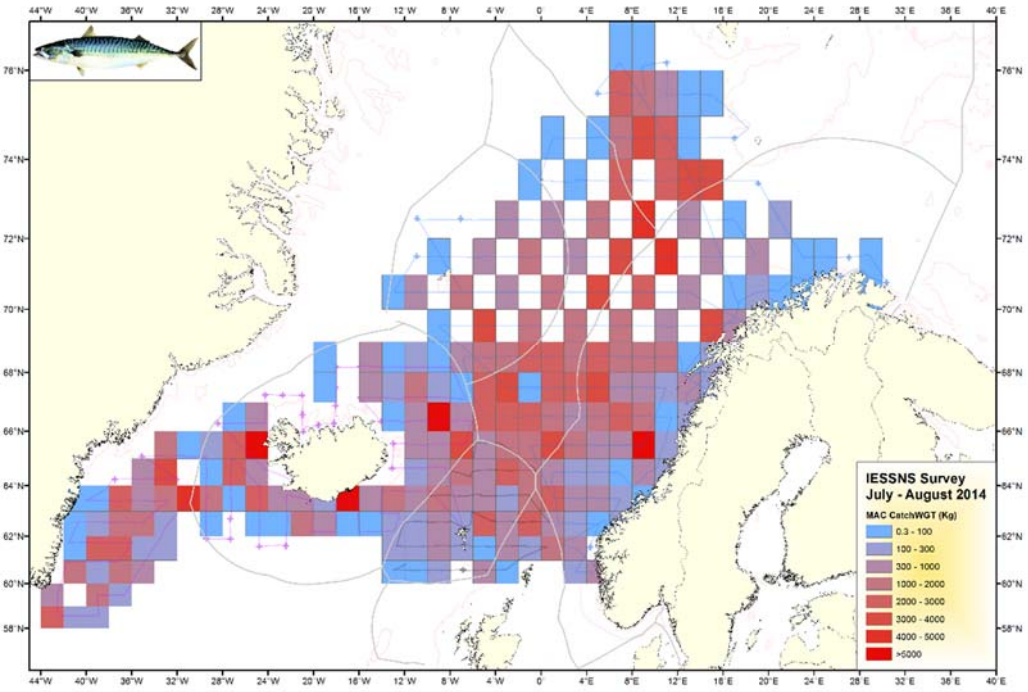


Figure 2.5.3.5. Catches of mackerel in kg represented in standardized rectangles. Light blue represents small catches (<100 kg), while dark red represents catches of more than 5000 kg mackerel. Empty rectangles have not been trawled due to very dense station net and distances between neighbouring pelagic trawl stations in northern waters. Small + indicate trawling done, but where no mackerel was caught. Vessel tracks are shown as continuous lines.

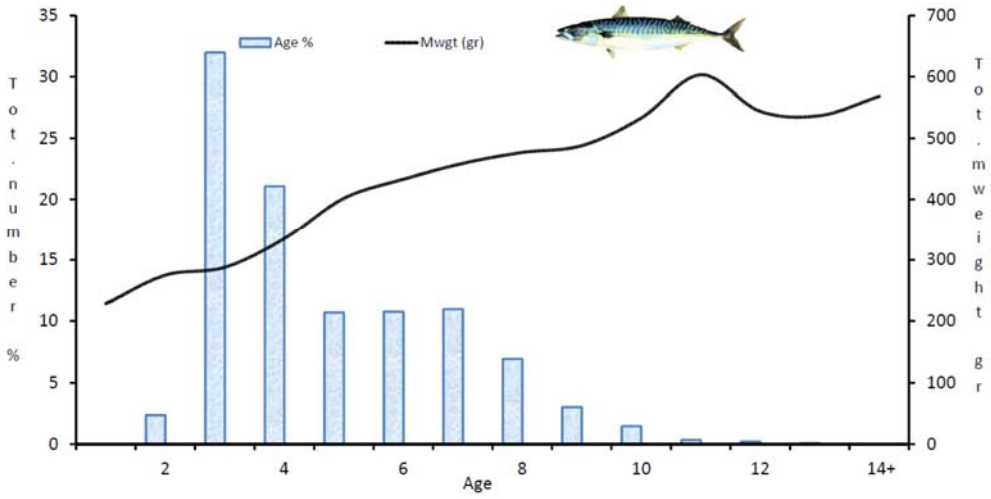


Figure 2.5.3.6. Age and weight distribution in percent (%) of Northeast Atlantic mackerel in the Norwegian Sea and surrounding waters from the IESSNS survey 2nd of July to 12th of August 2014.

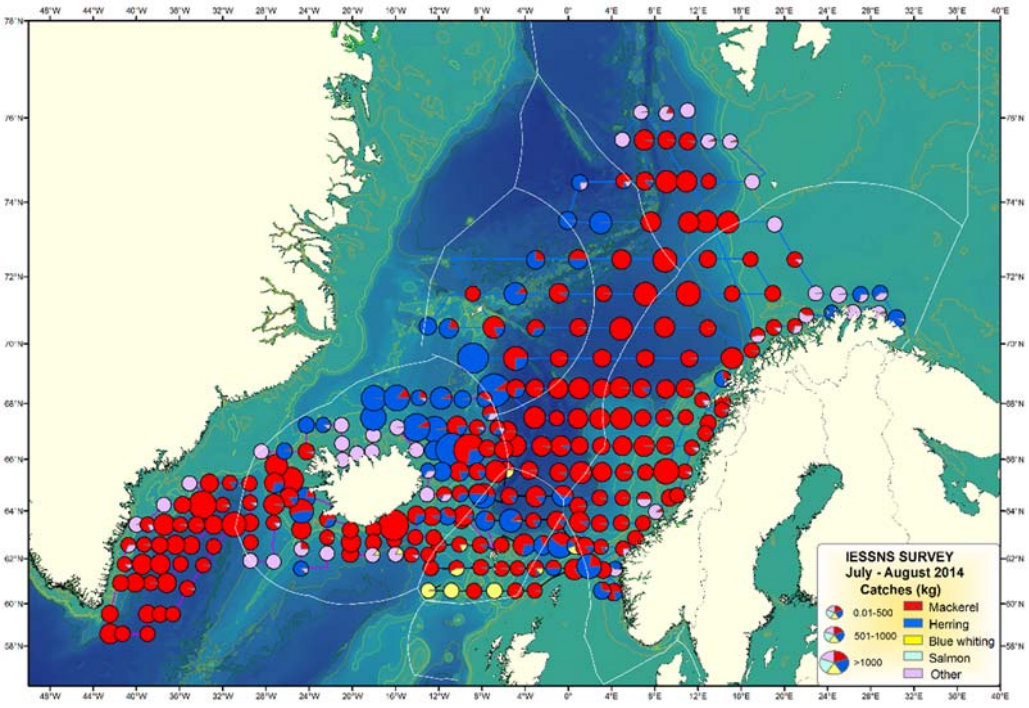


Figure 2.5.3.7. Distribution and spatial overlap between mackerel (red), herring (blue), blue whiting (yellow) and salmon (violet) from joint ecosystem surveys conducted onboard M/V "Brennholm" and M/V "Vendla" (Norway), M/V "Finnur Friði" (Faroe Islands) and R/V "Arni Fridriksson" (Iceland) in the Norwegian Sea and surrounding waters between 2nd of July and 12th of August 2014. Vessel tracks are shown as continuous lines.

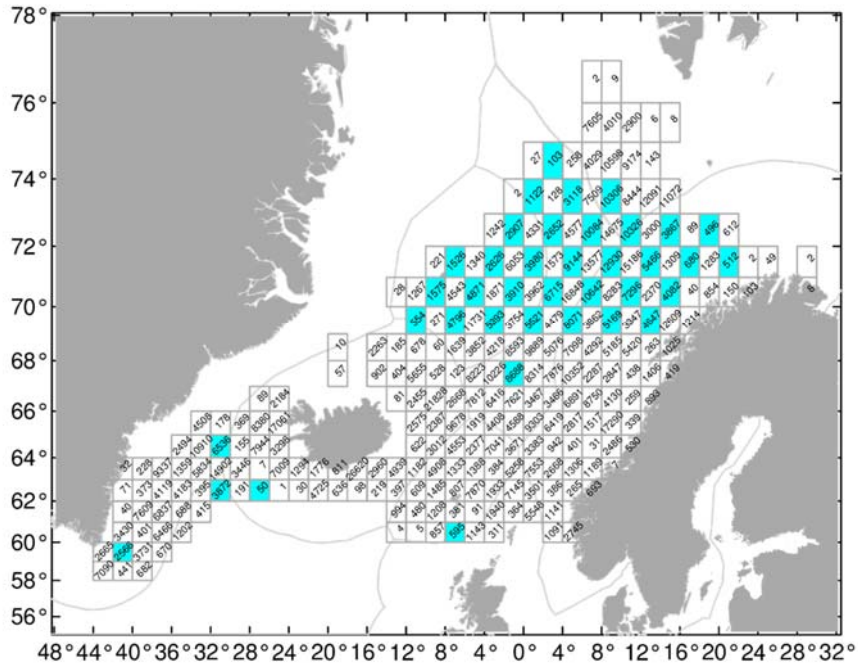


Figure 2.5.3.8a. Mean mackerel catch index (kg/km) in 1° lat. by 2° lon. rectangles from swept area estimates in July/August 2014, where interpolated rectangles are denoted with blue shading.

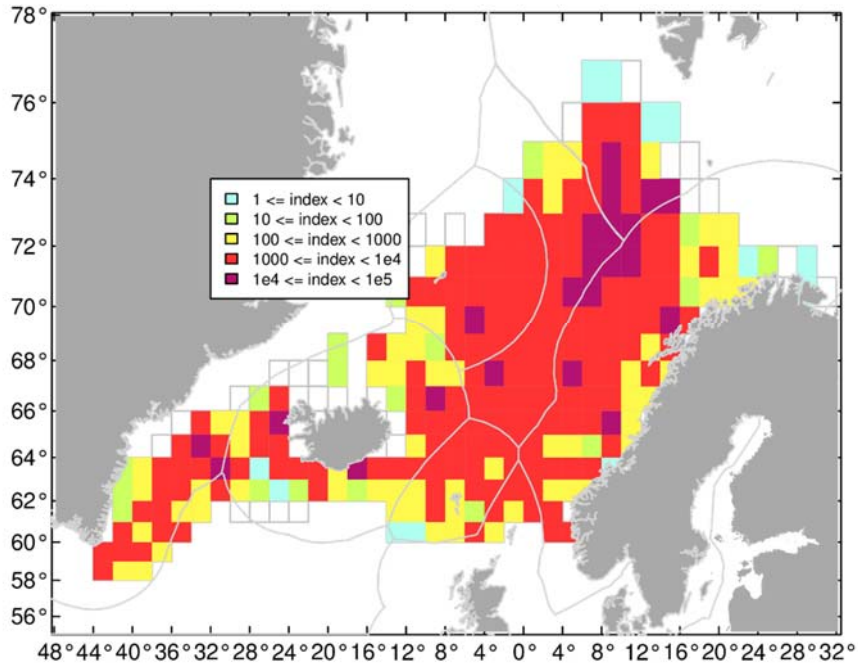


Figure 2.5.3.8b. Mean mackerel catch index (kg/km) in 1° lat. by 2° lon. rectangles from swept area estimates in July/August 2014. Light blue represents very small catches (<10 kg), while dark violet represents catches of more than 10 000 kg/km2 of mackerel. Empty rectangles shown in the map indicate that trawling has been done, but where no mackerel was caught.

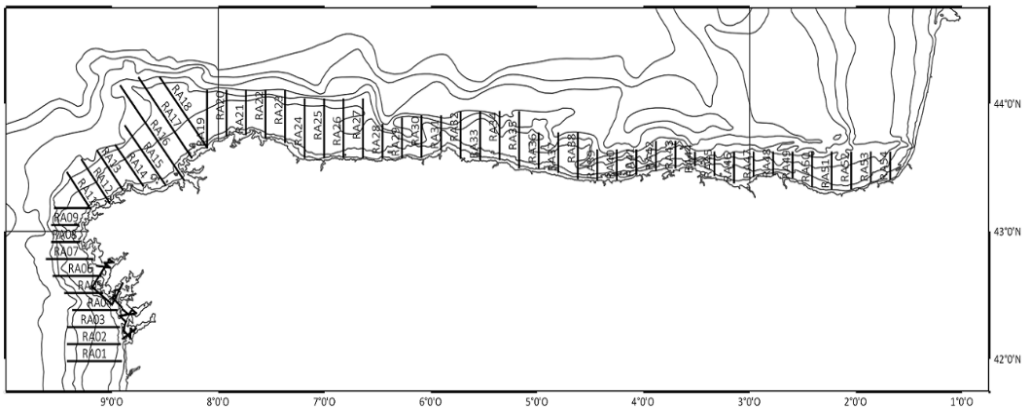


Figure 2.5.5.2.1: Survey track for PELACUS 0314

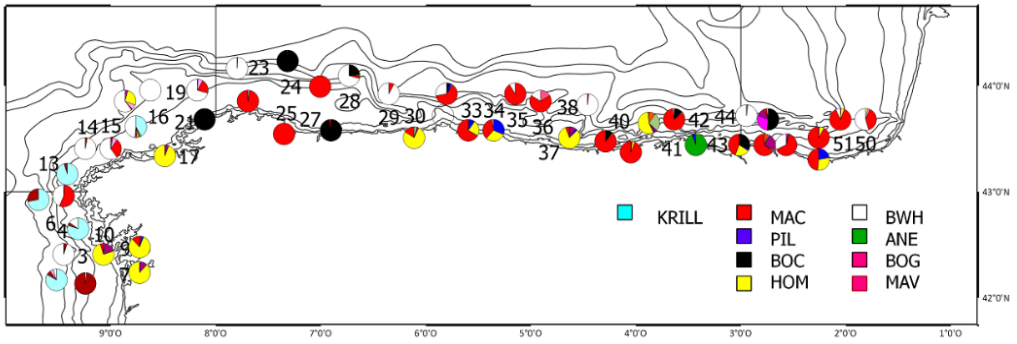
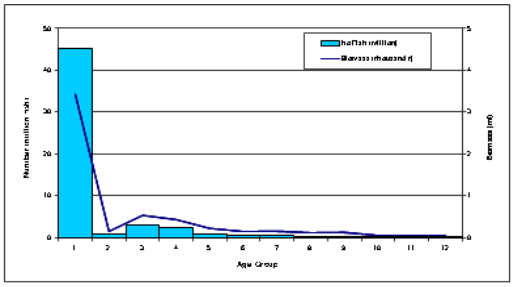
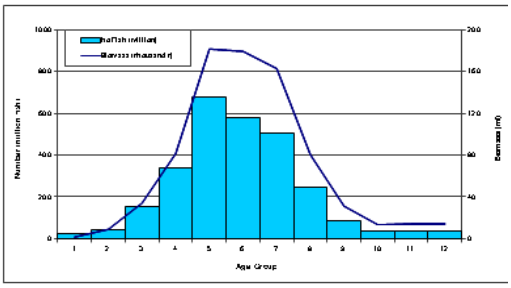


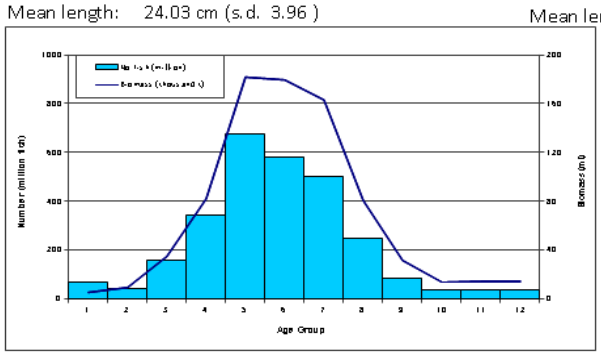
Figure 2.5.5.2.2: Trawl hauls and catch proportions in number during PELACUS 0314



Biomass: 5.47 thousand mt
Mean weight: 87.65 g
Number: 54 million fish
Mean length: 24.03 cm (s.d. 3.96)



Biomass: 802.95 thousand mt
Mean weight: 296.75 g
Number: 2748 million fish
Mean length: 35.31 cm (s.d. 2.51)



Biomass: 808.42 thousand mt
Mean weight: 290.99 g
Number: 2802 million fish
Mean length: 35.09 cm (s.d. 2.98)

Figure 2.5.5.2.3: Mackerel abundance and biomass estimates by age group. Top left, VIIIc-West and IXaN; top right, VIIIc-East; and bottom panel whole area.

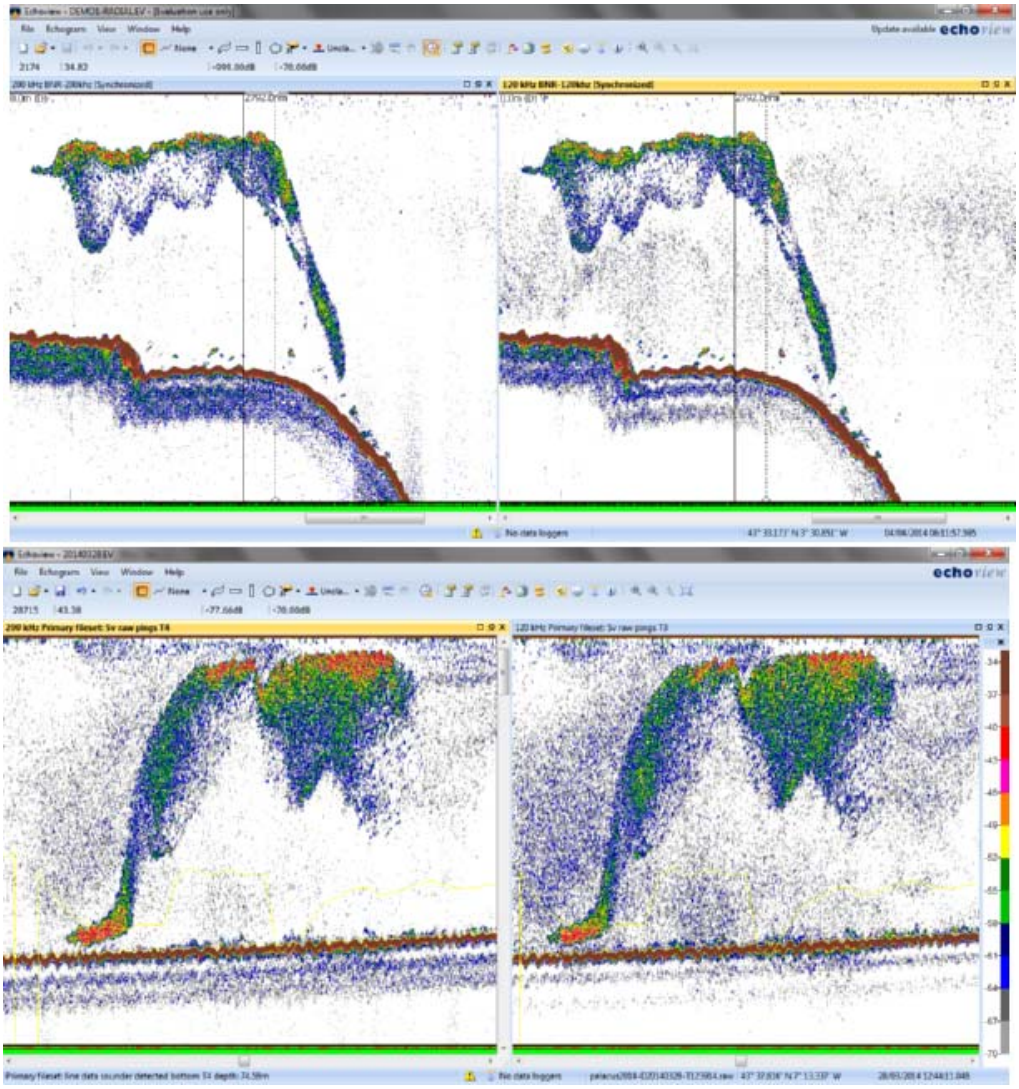


Figure 2.5.5.2.4: Mackerel diving (top panel) and raising (bottom panel) reactions observed at 120 (right) and 200 khz (left) during PELACUS survey.

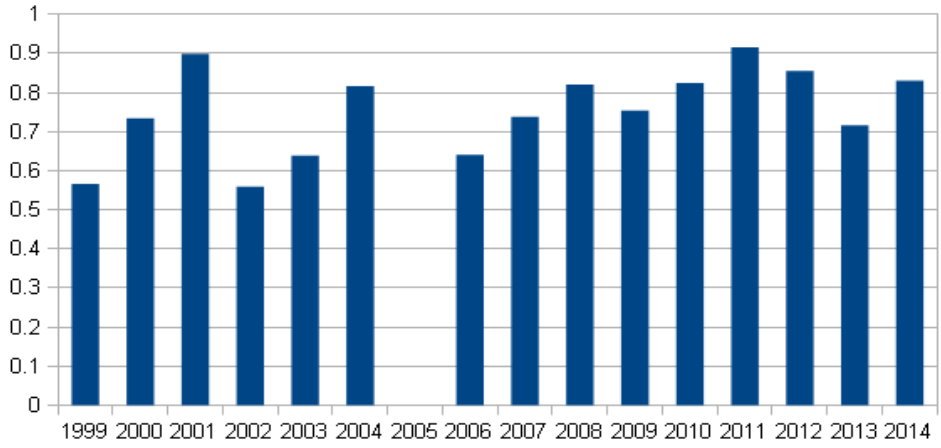


Figure 2.5.5.2.5:Percentage of non-empty mackerel stomachs taken during PELACUS time series (1999-2014).

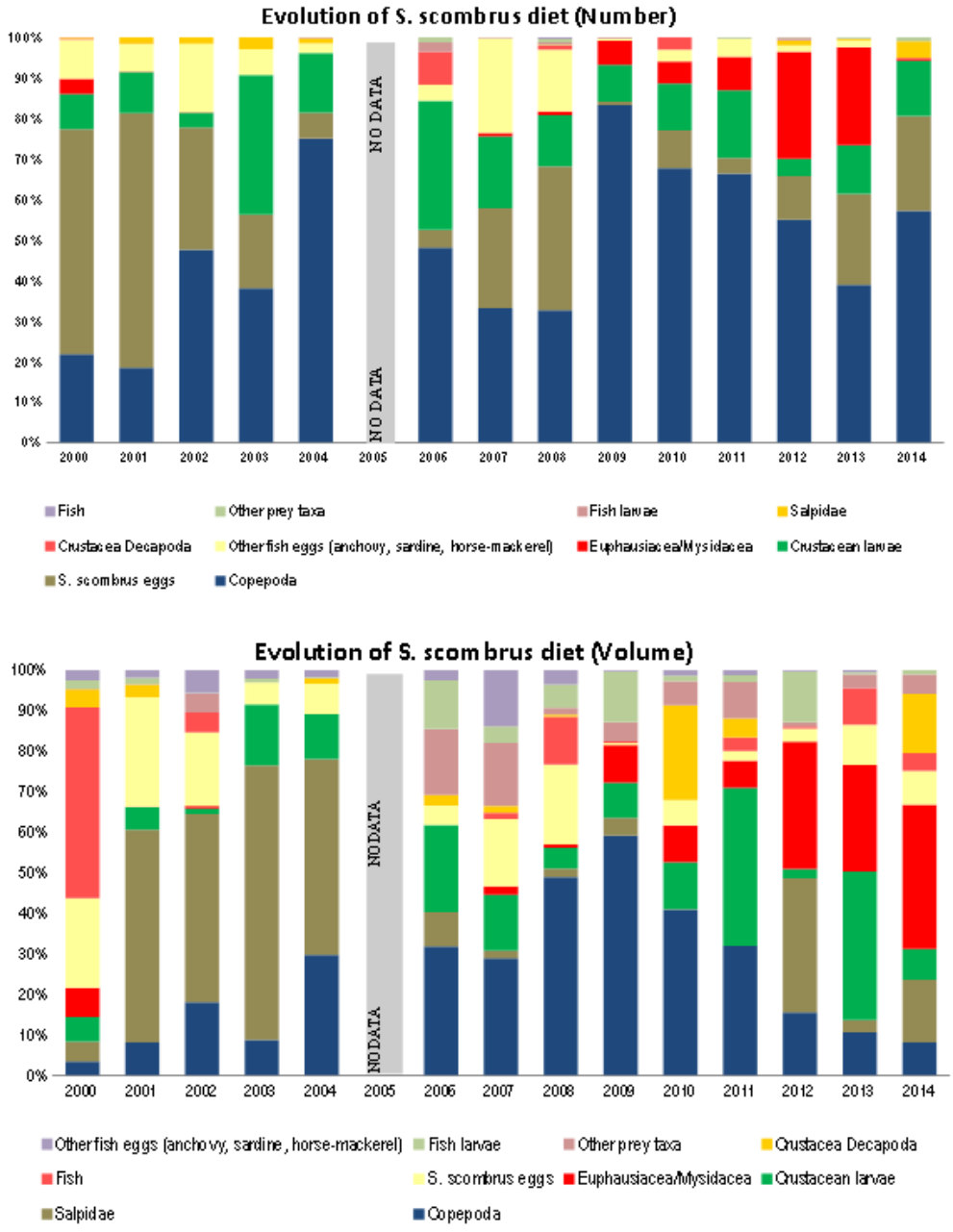


Figure 2.5.5.2.6: Mackerel diet in number (top panel) and in volume (bottom panel). All figures are in percentage.

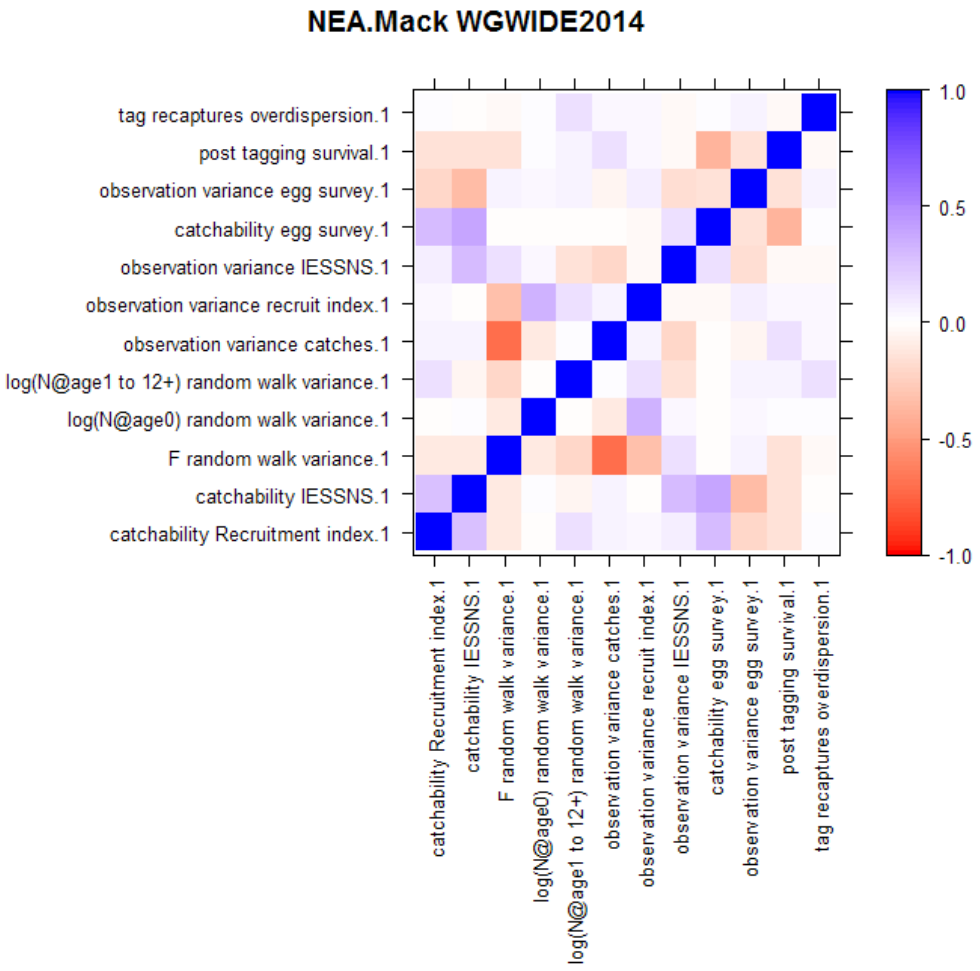


Figure 2.6.1.1. NE Atlantic mackerel. Parameter correlations for the final model. The horizontal and vertical axes show the parameters estimated by the model. The colouring indicates the (Pearson) correlation between the two parameters

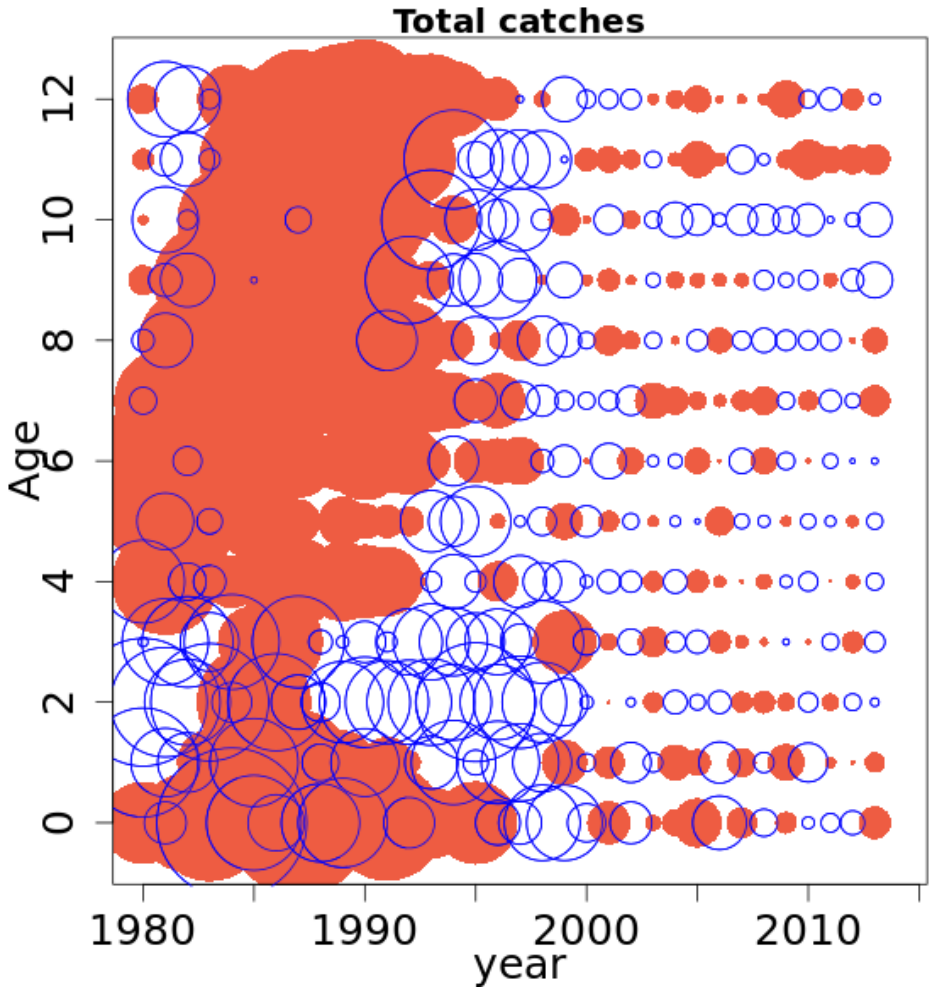


Figure 2.6.1.2. NE Atlantic mackerel. Normalized residuals for the fit to the catch data (catch data prior to 2000 were not used to fit the model). Blue circles indicate positive residuals (observation larger than predicted) and filled red circles indicate negative residuals.

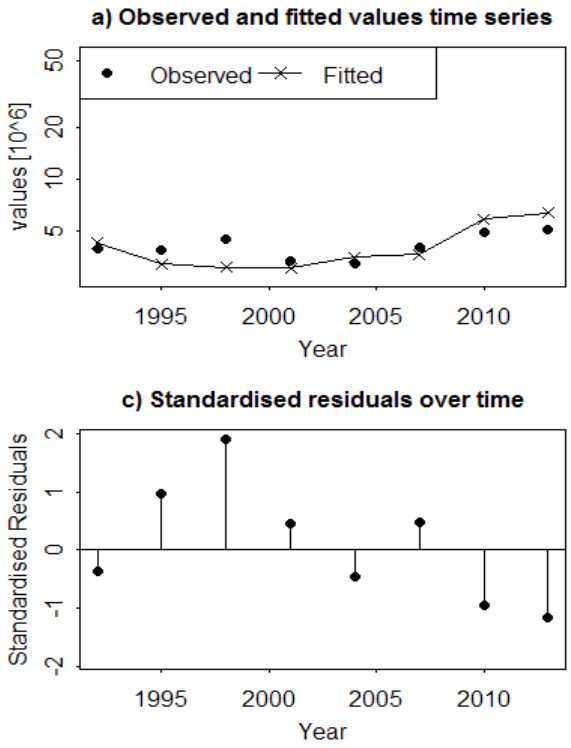


Figure 2.6.1.3. NE Atlantic mackerel. model diagnostics for the fit to the egg survey index time-series.

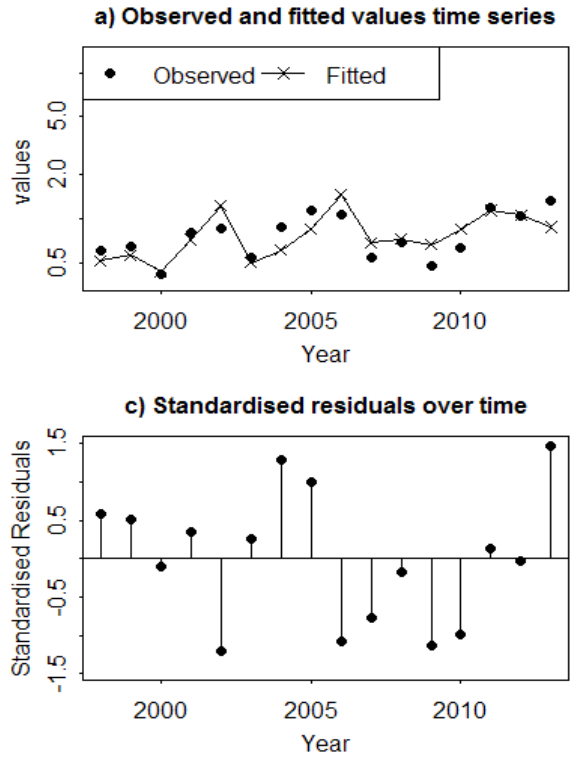


Figure 2.6.1.4. NE Atlantic mackerel. model diagnostics for the fit to the recruitment index time-series.

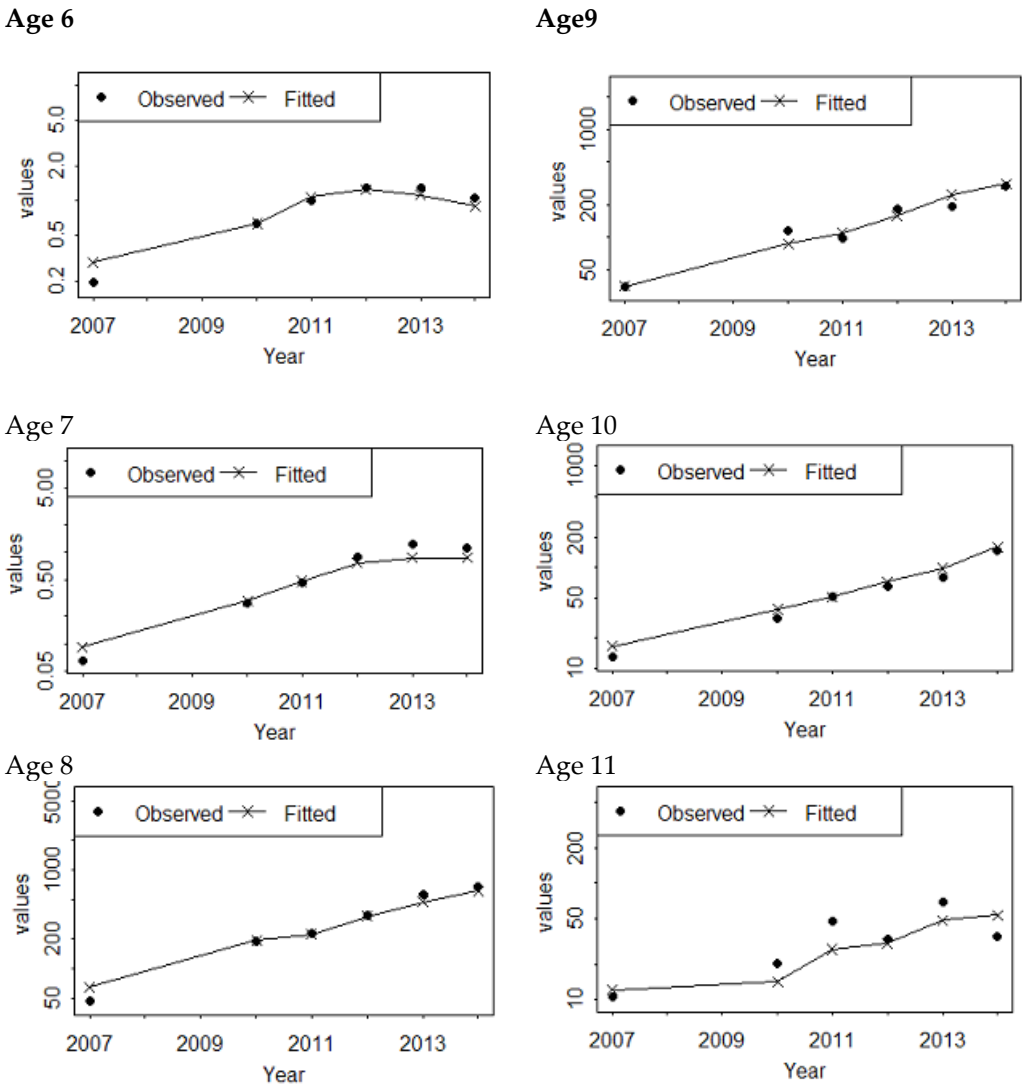


Figure2.6.1.5. NE Atlantic mackerel. fit of the final assessment to the IESSNS indices for ages 6 to 11 (observed vs. fitted).

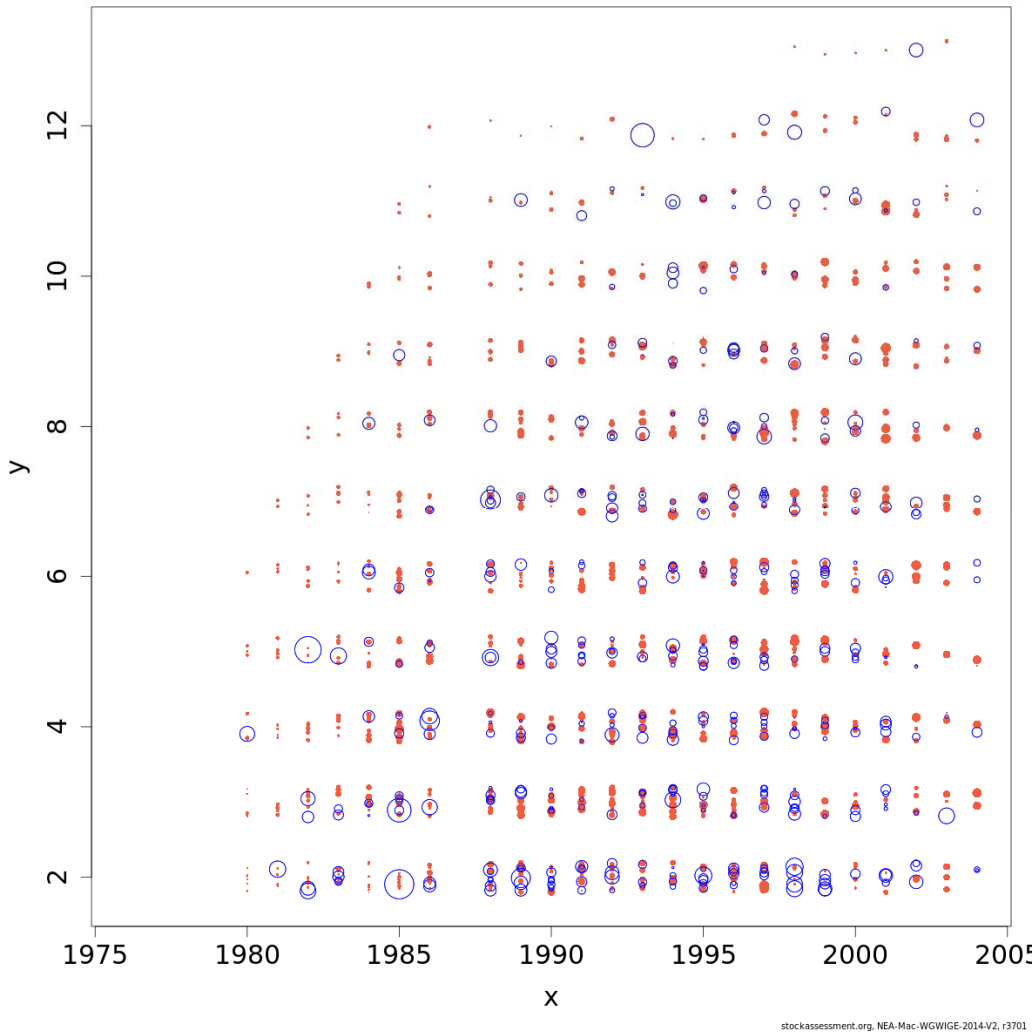


Figure2.6.1.6. NE Atlantic mackerel. Normalized residuals for the fit to the recaptures of tags in the final assessment. The x-axis represents the release year, and the y-axis is the age of the fish at release. The different circles for a same x-y point represent the successive recaptures. Blue circles indicate positive residuals (observation larger than predicted) and filled red circles indicate negative residuals

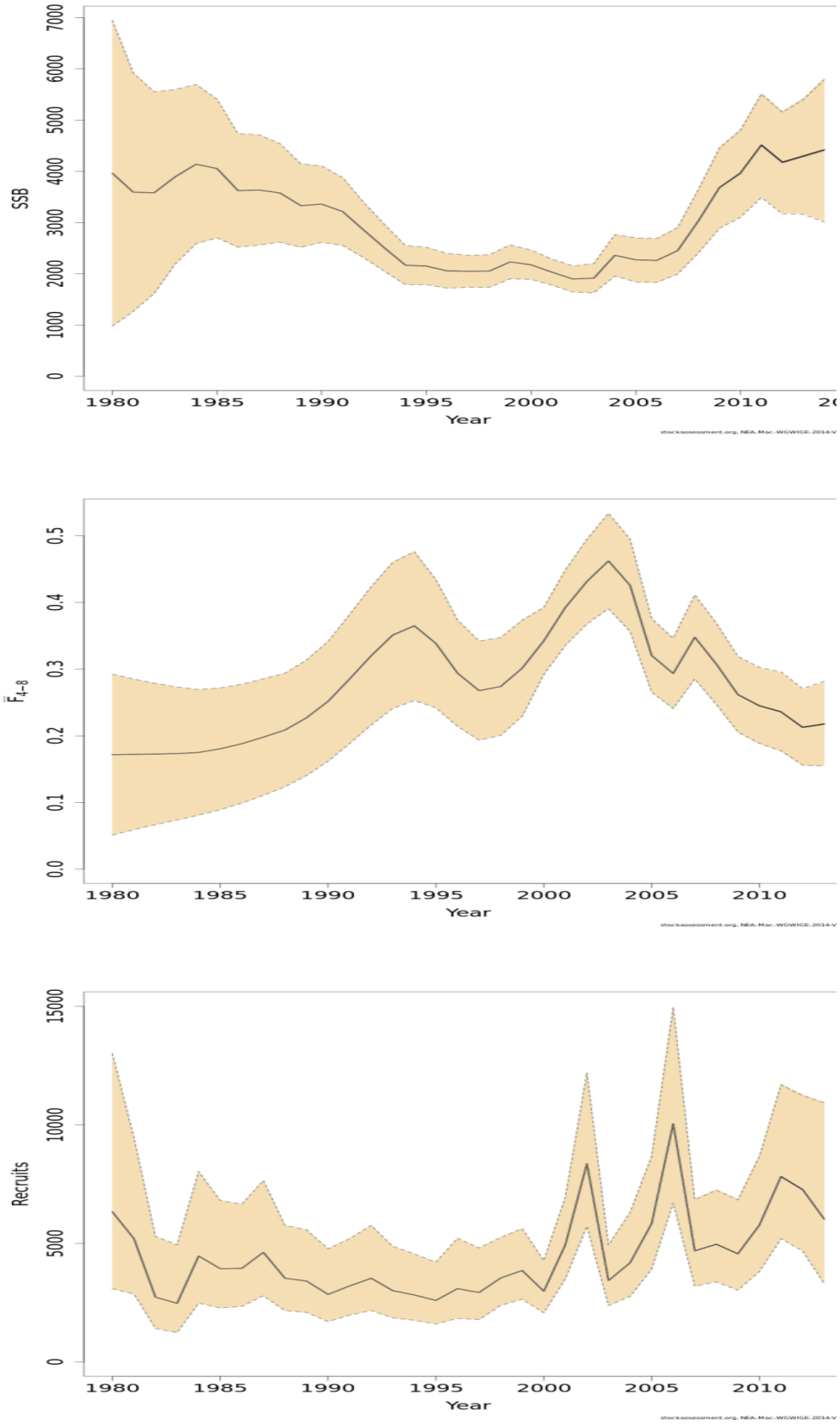


Figure2.6.2.1. NE Atlantic mackerel. Perception of the NEA mackerel stock, showing the SSB, Fbar4-8 and recruitment (with 95% confidence intervals) from the SAM assessment

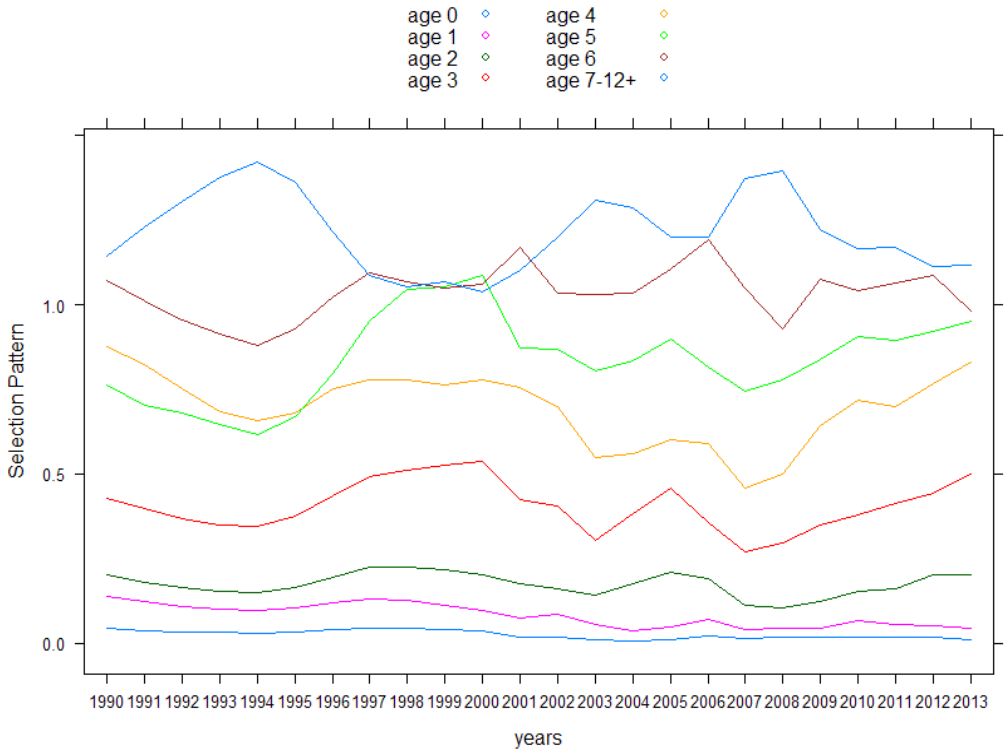


Figure 2.6.2.2. NE Atlantic mackerel. Estimated selectivity for the period 1990 to 2013, calculated as the ratio of the estimated fishing mortality-at-age and the Fbar4-8 value in the corresponding year.

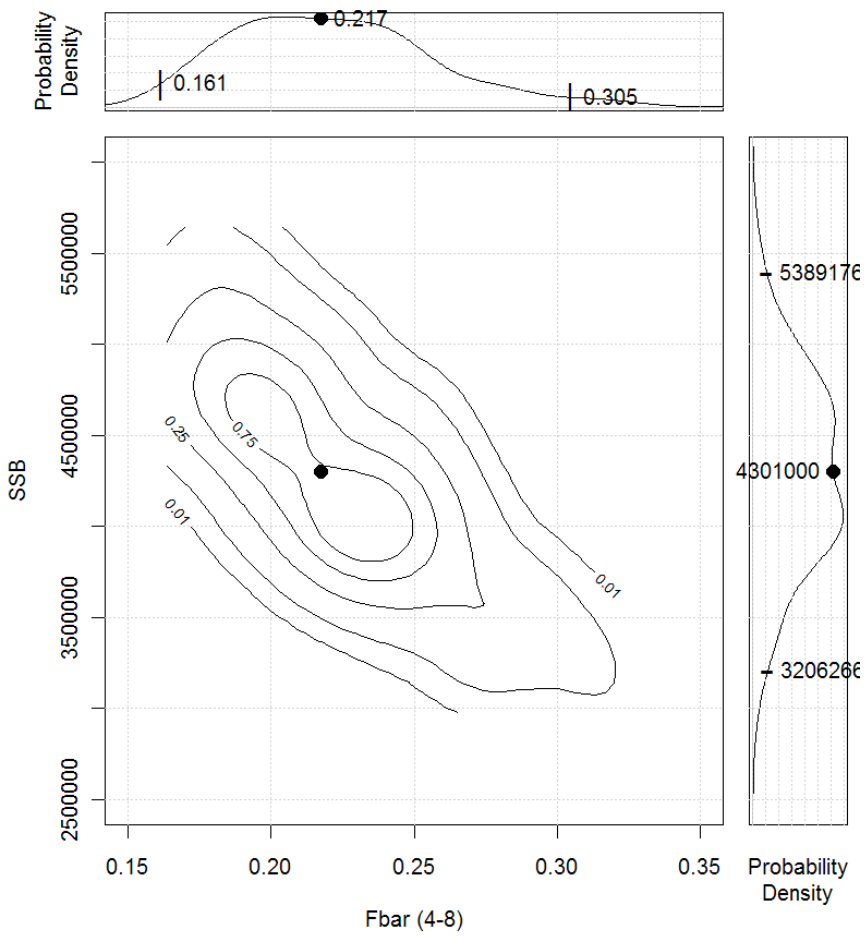


Figure 2.6.2.3. NE Atlantic mackerel. Joint distribution of the estimates of SSB and Fbar in 2013 resulting from the uncertainty in the parameters estimated by resampling parameters from the variance covariance matrix estimated by SAM.

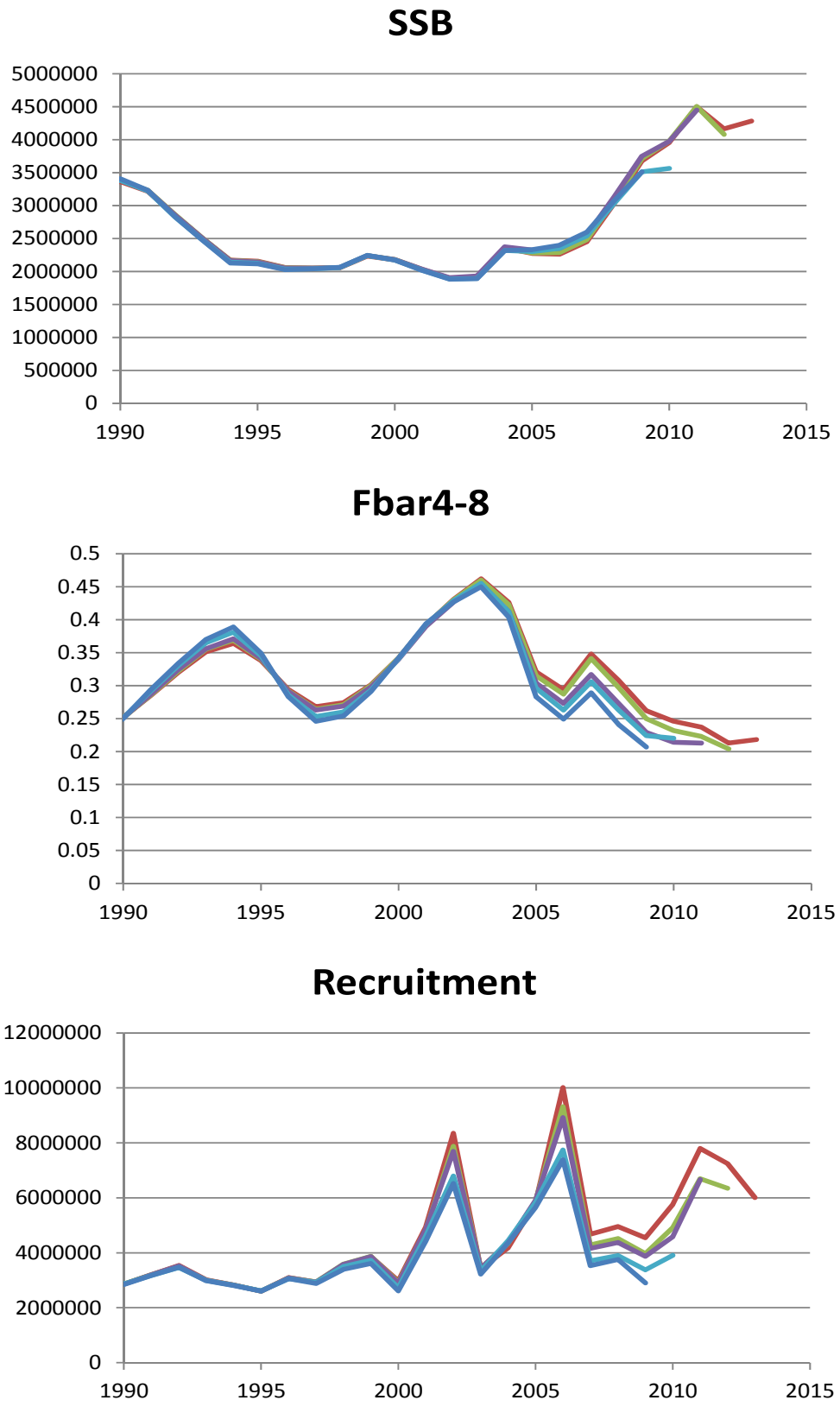


Figure 2.6.2.4. NE Atlantic mackerel. Analytical retrospective patterns (2013 to 2010) of SSB, Fbar4-8 and recruitment from the benchmarked SAM assessment.

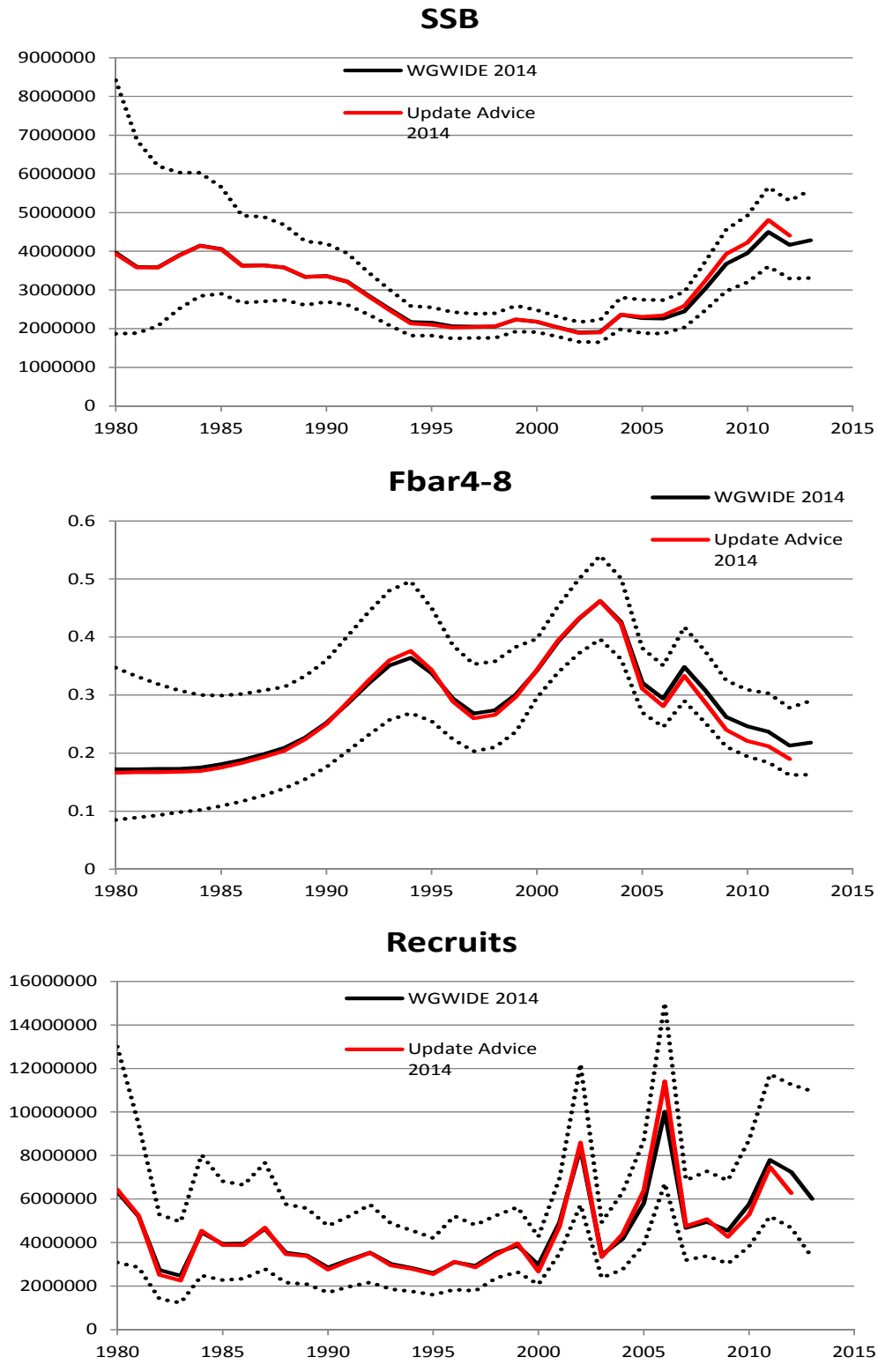


Figure 2.9.1. NE Atlantic mackerel. Comparison of the stock trajectories between the 2014 WGWIDE assessment and the 2014 advice update assessment.