ECOREGION Widely distributed and migratory stocks
STOCK Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components)

Advice for 2013

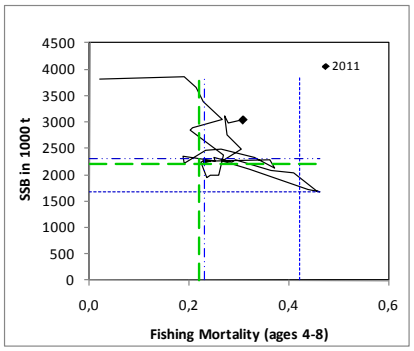
ICES advises on the basis of the Norway, Faroe Islands, and EU management plan that catches in 2013 should be between 497 000 tonnes and 542 000 tonnes.

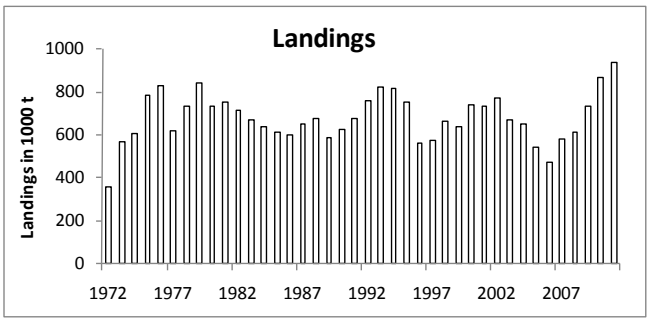
ICES advises that the existing measures to protect the North Sea spawning component should remain in place.

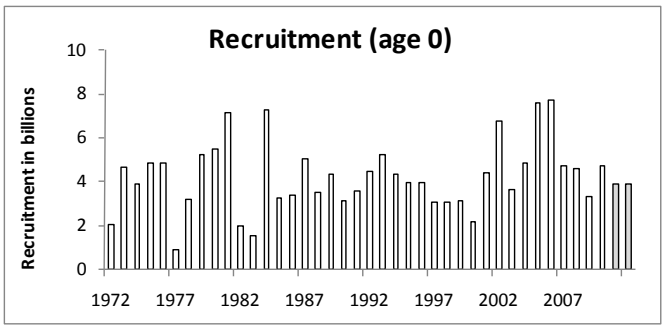
Stock status

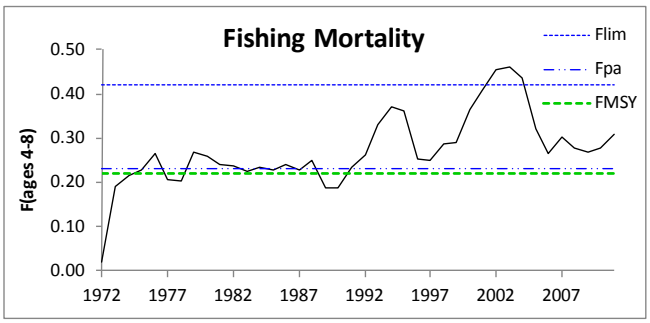
F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	o	o	o	Increased risk
Management Plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management Plan (SSB_{MP})	✓	✓	✓	Above trigger









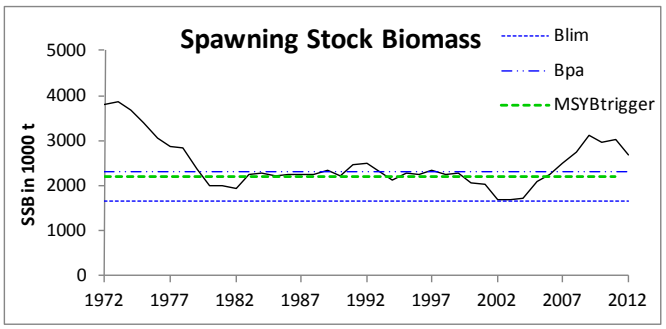


Figure 9.4.2.1 Mackerel in the Northeast Atlantic. Summary of stock assessment (weights in thousand tonnes; the estimated shaded recruitment is the geometric mean of 1972–2009). Top right: SSB and F over the years.

Fishing mortality in 2011 is estimated to be 0.31, above F_{MSY} and F_{pa}. Fishing mortality was above F_{lim} during the early 2000s. SSB has increased considerably since 2002 and remains high, above B_{pa} and MSY $B_{trigger}$, but is currently declining. The 2005 and 2006 year classes are the strongest year classes in the time-series. There is insufficient information to reliably estimate the size of the 2009–2011 year classes.

Management plan

A management plan was agreed by Norway, Faroe Islands, and the EU in October 2008. ICES has evaluated the plan and concluded that it is precautionary (ICES, 2008). However, since 2009, there has been no international agreement on TAC.

Biology

The combined Northeast Atlantic (NEA) mackerel is assessed as one stock, but comprises three spawning components. Spawning areas of mackerel are widely spread, and only the North Sea component is sufficiently distinct to be clearly identified as a separate spawning component. Mackerel from the southern and western areas migrate to feed in the Nordic seas and the North Sea during the second half of the year, and then mix with the North Sea component.

Environmental influence on the stock

Catch and survey data from recent years indicate that the stock has expanded north-westwards during spawning and the summer feeding migration. This distributional change is likely a reflection of increased stock size coupled with changes in the physical environment and the zooplankton concentration and distribution.

The fisheries

Traditionally, the fishing areas with higher catches of mackerel have been in the northern North Sea (along the border of Divisions IVa and IIa), around the Shetland Isles, and off the west coast of Scotland and Ireland. The southern fishery off Spain's northern coast has also accounted for significant catches. In recent years significant catches have also been taken in Icelandic and Faroese waters, areas where almost no catches were reported prior to 2008. In 2011, catches in this area constituted approximately 32% of the total reported landings. In 2011 Greenland has reported catches for the first time. In the Icelandic and Faroese fisheries, in the north-western part of the distribution area, mackerel have been partly taken together with herring. In the southern part of the distribution area, Atlantic mackerel (*Scomber scombrus*) can be caught together with Spanish mackerel (*Scomber colias*). Catches of both species are reported separately.

Catch distribution	Total catch (2011) = 939 kt, where ~99% are landings (pelagic trawls, purse-seine nets, and handlines) and 1% discards (the latter is only available from a limited number of fleets and considered to be an underestimate).

Effects of the fisheries on the ecosystem

There is relatively little bycatch of non-target species in the mackerel fishery, which tends to operate with pelagic trawl gear, purse-seine nets, and handlines.

Quality considerations

Underestimates of the catch data from misreporting occurred mainly prior to 2005. While the scale of this has recently decreased, some inaccuracy in the current catch data persists due to incomplete estimates of discarding and slipping. Despite these limitations, the assessment is considered to be consistent. Periodic adjustments to the F and SSB estimates can be expected given that fisheries-independent information is only available every third year. No recruitment indices are currently available for use in the assessment, therefore, recent recruitment is poorly estimated.

In order to improve the assessment, there is a need to implement new quantitative and more reliable data sets, as well as time-series of abundance indices. Improving the quality of future catch data could be achieved by comprehensive observer programmes across all fisheries in all areas and seasons The objective would be to improve estimates of discards, slippage, and unreported landings. Increased sampling of the commercial catch at spawning time would also improve the stock weight-at-age estimates.

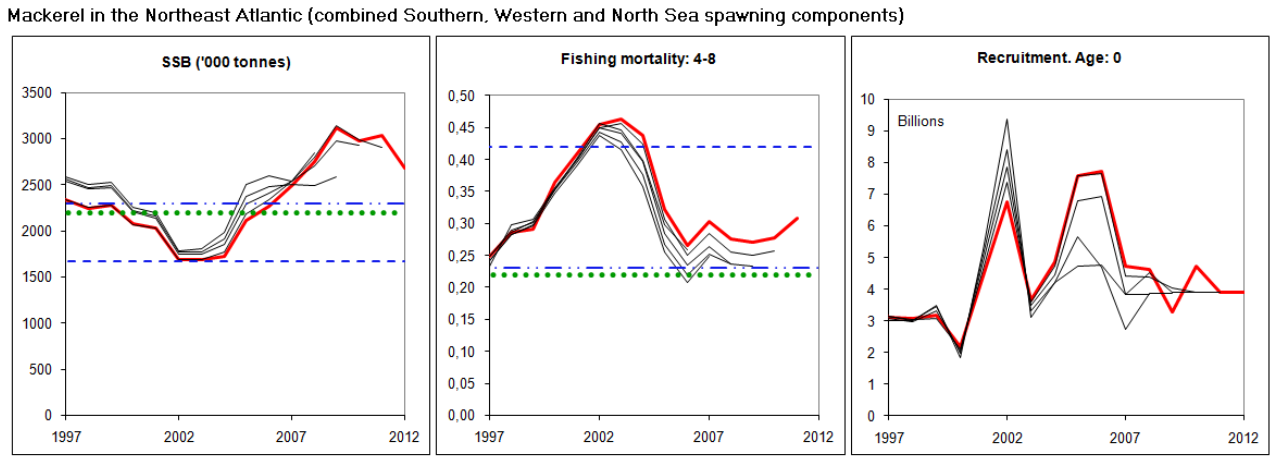


Figure 9.4.2.2 Mackerel in the Northeast Atlantic. Historical assessment results (final-year recruitment estimates included). Horizontal lines represent reference points.

Scientific basis

Assessment type	Age-based analytical (ICA).
Input data	Catch data and one survey index (triennial egg survey SSB estimate, 2007 and 2010 values revised in 2011).
Discards	Discards (since 1978) are included in the assessment, but are regarded to be underestimated.
Indicators	None.
Other information	Ecosystem surveys in the Nordic seas, SSB estimates from tagging–recapture. Spanish and French acoustic surveys and tagging information.
Working group report	WGWIDE

ECOREGION Widely distributed and migratory stocks
STOCK Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components)

Reference points

	Type	*Value*	*Technical basis*
Management plan	$SSB_{trigger}$	2.2 million t	Medium-term simulations conducted in 2008.
	F_{target}	0.20–0.22	Medium-term simulations conducted in 2008.
MSY Approach	MSY $B_{trigger}$	2.2 million t	SSB associated with high long-term yield and low probability of stock depletion based on management strategy evaluation (ICES, 2008).
	F_{MSY}	0.22	F associated with above reference points.
Precautionary Approach	B_{lim}	1.67 million t	B_{loss} of the 2007 assessment for combined stock (Western, Southern, and North Sea components).
	B_{pa}	2.3 million t	B_{loss} of the Western component in 1998 assessment raised by 15% to account for the Southern component.
	F_{lim}	0.42	F_{loss}
	F_{pa}	0.23	F_{lim} * 0.55 (CV 36%).

(unchanged since: 2010)

Outlook for 2013

Basis: F (2012) = 0.357 (catch constraint); SSB (2012)* = 2677; R (2012) = GM (1972–2009) = 3 887 096 thousands; Catch (2012) = 930 kt (See *Additional considerations)*.

Rationale	**Catch (2013)**	**F (2013 & 2014)**	**Basis**	**SSB (2013) Spawning time***	**SSB (2014) Spawning time***	**% SSB change [1)]**	**% catch change[2)3)]**
Management plan	542	0.22	F(management plan upper boundary) 0.22	2546	2556	0	-42
	519	0.21	F(management plan mid-point) 0.21	2554	2581	1	-44
	497	0.20	F(management plan lower boundary) 0.20	2563	2607	2	-47
MSY framework	542	0.22	F_{MSY}	2546	2556	0	-42
MSY transition	564	0.23	F_{pa}	2537	2532	0	-39
Precautionary approach	564	0.23	F_{pa}	2537	2532	0	-39
Zero catch	0	0.00	F = 0	2742	3192	16	-100
Other options [3]	930	0.41	catch 2013 = catch 2012	2390	2138	-11	0
	1116	0.51	catch 2013 = catch 2012 +20%	2310	1950	-16	20
	744	0.31	catch 2013 = catch 2012 -20%	2466	2334	-5	-20

Weights in thousand tonnes.
* SSB at spawning time (early May).
1) SSB 2014 relative to SSB 2013.
2) TAC in 2013 relative to estimated catches in 2012.
3) There is no internationally agreed TAC for 2012.

Management plan

Following the management plan (agreed by the EU, Norway, and Faroes in 2008) implies a TAC between 497 and 542 thousand tonnes in 2013, corresponding to a catch reduction between 47% and 42% compared to the estimated catches in 2012. This would lead to an estimated SSB in 2014 between 2.61 and 2.56 million tonnes.

MSY approach

Following the ICES MSY framework implies that fishing mortality should be reduced to 0.22 (F_{MSY}), resulting in a total catch of 542 thousand tonnes in 2012. This would lead to an estimated SSB in 2014 of 2.56 million tonnes.

Following the transition scheme towards the ICES MSY Harvest Control Rule implies that fishing mortality should be reduced to F_{pa} (= 0.23), resulting in a total catch of 564 thousand tonnes in 2013. This would lead to an estimated SSB in 2014 of 2.53 million tonnes.

Precautionary approach

Following the precautionary approach (PA) implies that fishing mortality in 2012 should be no higher than F_{pa} (F = 0.23), corresponding to a total catch of 564 thousand tonnes in 2013. This is expected to maintain SSB above B_{pa} in 2014.

Additional considerations

Ecosystem considerations

The changes in mackerel distribution and migration have been investigated in an *Ad hoc* Group on the Distribution and Migration of Northeast Atlantic Mackerel (report to be published in the autumn 2012). The workshop concluded that a temporal shift to an earlier spawning migration of NEA mackerel, from March–April to February, is indicated in the southern area (Cantabrian Sea) in 2012, suggesting very early spawning. Spawning distribution has expanded towards the north and northwest, but most of the eggs are still produced in the historical core spawning area located from the west of the Celtic Sea to the west of Ireland. The expansion seems to be less related to changes in the environmental conditions, than to the increase in stock size. This has led to part of the stock spawning in previously unused areas.

The record-high surface temperatures observed in the Nordic seas during summer in recent years, compared to the long-term average, have largely increased the potential feeding habitat for mackerel, including a documented large spatial expansion of mackerel to the north and west. This expansion has resulted in increased spatiotemporal overlap with Norwegian spring-spawning (NSS) herring in the outer edges of their distribution area, as well as other fish stocks utilizing these feeding grounds. In spring and summer 2012 the measurements of plankton concentrations were among the lowest in the entire time-series in the Nordic seas. This seems to influence feeding migration patterns of mackerel. It may also lead to increased competition for available food resources in the most productive surface waters, in the mackerel stock itself as well as competition between NEA mackerel and NSS herring.

Management considerations

Distribution and timing of migrations and spawning in recent years have resulted in the development of new fisheries and have also impacted the operations of well established fisheries. The TAC should apply to all areas where mackerel are caught. Catches since 2008 have been considerably in excess of ICES advice, which was based on the management plan. This situation continued in 2011. The absence of comprehensive international agreements on the exploitation of the stock (between all nations involved in the fishery) remains a critical concern, and prevents control of the total exploitation rate. Because the management plan has not been followed, the expected 2012 catch needed to be estimated (see table below). The estimation procedure took account of the declared quotas, interannual transfer of quotas not fished in 2011, an estimate of the part of the quotas that are not expected to be fished in 2012, discards, estimated overshoot in catches, and quota payback. The total estimated catch in 2012 (930 135 tonnes) used for projections corresponds to a fishing mortality of 0.36, which is well above F_{MSY} and the stipulated range in the management plan for this stock. Maintaining such a catch in 2013 and 2014 would result in a decrease of the stock size in the short term. ICES notes that interannual transfers occur and that their consistency with the PA has not been evaluated.

ICES Estimation of 2012 catch	Tonnes	Reference
EU quota and Swedish quota	398 575	European Council Regulation COM (2012) 0182
EU deduction (DE+LT+PL+UK overcatch in 2011)	−6 907	European Commission press release 1 Aug 2012
UK–Ireland payback	−18 222	European Council Regulation 2012/147
Spanish payback	−5 500	European Council Regulation 2011/165
Norwegian quota	181 095	European Council Regulation COM (2012) 0182
Russian quota	62 072	NEAFC HOD 12/27
Discards	9 012	Previous years estimate
Icelandic quota	145 000	Ministry of Fisheries and Agriculture: Press release 17 Feb. 2012
Interannual quota transfer 2011→2012 (Iceland)	5 811	http://www.fiskistofa.is
Faroese quota	148 375	Ministry of Foreign Affairs : Press release 29 Feb 2012
Interannual quota transfer 2011→2012 (Faroe Islands)	3 000	WGWIDE estimate
Greenland quota	5 410	Greenland Fisheries License Control Authority 24 Aug 2012
Expected overcatch	2 414	Based on 2011 overcatch percentage
Total expected catch (incl. discards)	930 135	

Uncertainties in the assessment and forecast

Total removals are expected to be underestimated because of discards, slippage, under-reporting (believed to be less of a problem in recent years), and underestimated natural mortality rates. The confidence intervals on SSB (2.67–3.62 million tonnes) and F (0.25–0.43) in 2011 likely underestimate the true uncertainty in the assessment and the uncertainty for the last year in the assessment is higher than in last year's assessment, due to the fact that we are one year further from the last egg survey estimate. There is the potential for large revisions in the estimates every three years when a new egg production estimate becomes available.

Forecasts are uncertain because of the uncertainties in the population estimates, the uncertainty in the prediction of catch in 2012, and the absence of a recruitment index.

The fishery

Mackerel is mainly exploited in a directed fishery for human consumption. This fishery tends to target bigger fish and there is evidence of discarding of smaller, less marketable fish.

Regulations and their effects

Prior to the late 1960s, spawning biomass of North Sea mackerel was estimated to be above 3 million tonnes. Subsequently, overexploitation occurred and recruitment has failed since 1969, leading to a marked decline in the size of the North Sea component. The measures advised by ICES have been aimed at protecting the North Sea spawning component and promoting stock recovery. Despite a small increase in the North Sea spawning up to 1999, the SSB has most recently declined again from 2005 to 2011.

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 to protect juvenile Western mackerel which are numerous, particularly in Divisions IVb,c during the second half of the year. Unfortunately, the closure has resulted in increased discards of mackerel in the non-directed fisheries (especially horse mackerel fisheries) in these areas as vessels are currently permitted to take only 10% of their catch as mackerel bycatch. As estimates of mackerel bycatch are not available, the reported landings of mackerel in Divisions IIIa and IVb,c from 1997 and onwards underestimate catches because they do not include discarded bycatch.

The advised fishery closure of Division IVa 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 back to their spawning areas. Observations in the late 1990s suggested that this return migration started in mid- to late February. Since 2009, the return migration seems to occur earlier again. According to the EU TAC regulation some smaller quotas are assigned to Divisions IIIa and IVb,c. In the same regulation it is also stated that within the limits of the quota for the western component (Subareas and Divisions VI, VII, VIIIa,b,d,e, Vb (EU), IIa (non-EU), XII, and XIV), a certain quantity of this stock may be caught in Division IVa, but only during the periods 1 January to 15 February and 1 September to 31 December.

Existing measures to protect the North Sea spawning component are:

- There should be no fishing for mackerel in Divisions IIIa and IVb,c at any time of the year;
- There should be no fishing for mackerel in Division IVa during the period 15 February–31 July;
- The 30 cm minimum landing size at present in force in Subarea IV should be maintained.

In the southern area a new Spanish national regulation affecting mackerel catches of Spanish fisheries has been implemented in 2010, distributing the Spanish catch quota by gear (30.5% quota for trawlers, 27.7% for purse-seiners, and 34.6% for artisanal fisheries), half-year, and area. Additionally, a stricter control on mackerel landings was enforced by the Spanish fishery administration. In 2011 the EU introduced a new regulation scheduling payback until 2015 due to overfishing of the mackerel quota allocated to Spain in 2010 (Commission Regulation (EU) No. 165/2011). A similar regulation applied to Scottish and Irish vessels expires in 2012.

Other factors

Stock components: ICES currently uses the term "Mackerel in the Northeast Atlantic" to define the mackerel present in the area extending from ICES Division IXa in the south to Division IIa in the north, including mackerel in the North Sea and Division IIIa. Catches cannot be allocated specifically to spawning area components on biological grounds, but by convention; catches from the Southern and Western components are separated according to the areas in which these are taken.

To keep track of the development of spawning biomass in the different spawning areas, mackerel in the Northeast Atlantic stock are divided into three area components: the Western Spawning Component, the North Sea Spawning Component**,** and the Southern Spawning Component.

Mackerel in the Northeast Atlantic			
Mainly distributed and fished in ICES Subareas and Divisions IIa, IIIa, IV, V, VI, VII, VIII, and IXa			
Spawning component	**Western**	**Southern**	**North Sea**
Main spawning areas	VI, VII, VIIIa,b,d,e,	VIIIc, IXa	IV, IIIa

The Western component is defined as mackerel spawning in the western area (ICES Divisions and Subareas VI, VII, and VIII a,b,d,e). This component currently accounts for ~77% of the entire Northeast Atlantic stock. Similarly, the Southern component (~19%) is defined as mackerel spawning in the southern area (ICES Divisions VIIIc and IXa). Although the North Sea component has been at an extremely low level since the early 1970s, ICES considers that the North Sea component still exists as a discrete unit (~4%). This component spawns in the North Sea and Skagerrak (ICES Subarea IV and Division IIIaN). Current knowledge of the state of the spawning components is summarized below.

Western component: The catches of this component were low in the 1960s, but have increased since. The main catches are taken in directed fisheries by mid-water trawlers and purse-seiners. Large catches of the western component are taken in the northern North Sea, west of Scotland, and in the Nordic seas. A separate assessment for this stock component has not been conducted in recent years, as an extension of the time-series of mackerel in the Northeast Atlantic data allows the estimation of the mean recruitment from 1972 onwards. Estimates of the SSB of the Western component derived from egg surveys indicate an increase from 2.47 million t in 2004 to 3.43 million t in 2010.

North Sea component: Very large catches were taken in the late 1960s in the purse-seine fishery, reaching a maximum of about 1 million tonnes in 1967. The component subsequently collapsed and catches declined to less than 100 000 tonnes in the late 1970s. Annual catches in the last ten years are assumed to be about 10 000 tonnes. Estimates of the SSB of the North Sea component derived from the North Sea egg survey indicate a decrease from 0.22 million t in 2005 to 0.17 million t in 2011.

Southern component: Mackerel in this component are taken in a mixture of purse-seine, demersal trawl, line, and gillnet fisheries. The highest catches (87%) from the Southern component are taken in the first half of the year, mainly

from Division VIIIc, and consist of adult fish. In the second half of the year, the catches are mainly taken in Division IXa and contain a high proportion of juveniles. Catches from the Southern component increased from about 20 000 t in the early 1990s to about 40 000 tonnes in the early 2000s, reaching a peak at 108 000 tonnes in 2009 and decreasing to 19 000 tonnes in 2011. The 2011 decline was due to pay-back of 18 000 tonnes and tighter regulations. Estimates of the SSB of the Southern component derived from egg surveys indicate an increase from 0.28 million tonnes in 2004 to 0.85 million tonnes in 2010.

Data and methods

This assessment is based on catch numbers-at-age for the period 1972–2011 and triennial mackerel egg survey estimates of SSB from 1992 to 2010.

Limited sampling for discards has been carried out since 2000 despite a formal requirement initiated in the EU in 2002. Estimating the discarded and slipped proportions of catch is problematic in pelagic fisheries due to high variability in discard and slipping practices. In some fleets no sampling for discards is carried out, including those fleets for which discarding is illegal. The discards included in the catch in the assessment are an underestimate.

Recruit surveys provide information on the distribution of young mackerel, but are subject to high variability and have not proved useful in estimating year-class strength.

Unreported catches in the time-series cause underestimation of stock size in the analytical assessment, which is the basis of the scientific advice. The level of misreporting may have changed over time. This will remain a problem for future years, as the model cannot compensate for an unknown level of historical unreported catches.

Information from the fishing industry

Over the last four years the pelagic industry has encountered large shoals of mackerel over the entire distribution area. This is not confined to one area or one fleet. Based on its qualitative information from the fishing grounds the industry is of the firm view that the abundance of mackerel is increasing. The industry is also seeing signs of very good recruitment (above average) over the last number of years, particularly in 2009 and 2010. It is the opinion of the industry that the stock size continues to be underestimated. The widespread distribution over the entire area creates problems with unwanted bycatches for some fleets targeting species other than mackerel. Stakeholders are actively seeking mechanisms that would allow inclusion of fishing industry information into the assessment process, and are involved in a number of pilot projects in this regard.

Comparison with previous assessment and advice

The assessment this year is consistent with last year's assessment. The 2012 estimate for the 2011 SSB is less than 1% different from the estimate from the 2011 assessment. The estimate of F in 2010 has been revised upward by 7%.

The estimated catch for 2011 in last year's forecast is similar (−1%) to the catch reported this year for 2011.

Sources

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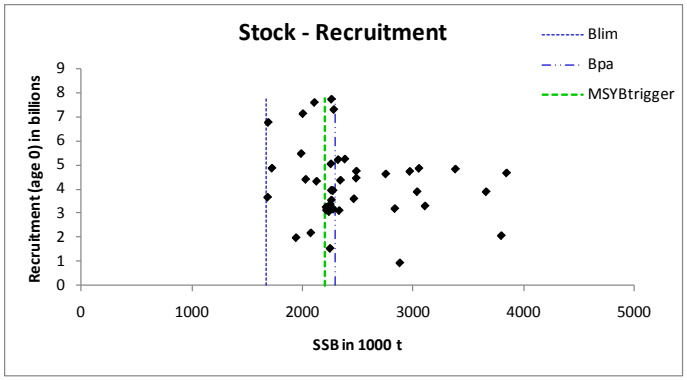

Figure 9.4.2.3 Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Stock (1000 tonnes)–recruitment (age 0, in billions) plot.

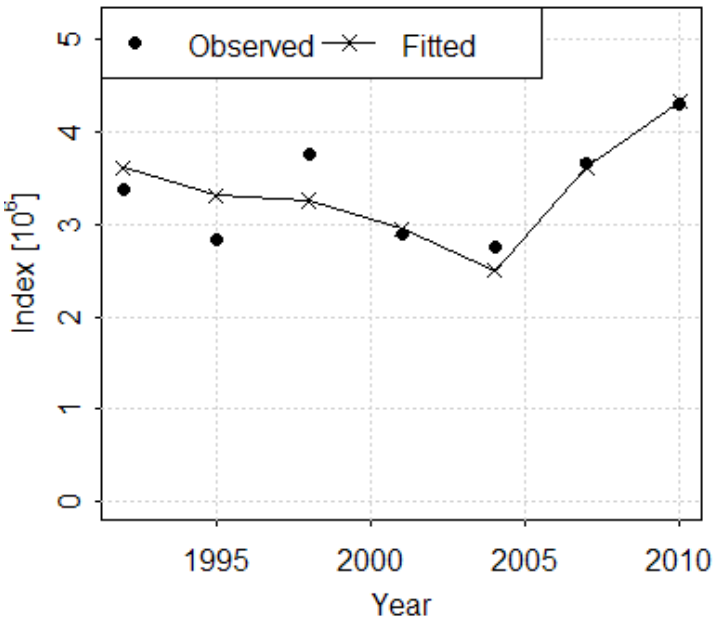

Figure 9.4.2.4 Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Observed and fitted SSB index (million tonnes) from the egg survey.

Table 9.4.2.1 Mackerel in the Northeast Atlantic. Advice, management, and catch data for the combined area.

Year	ICES Advice	Predicted catch corresp. to advice	Total Agreed TAC[3]	Official Landings[5]	Disc.[1] slip	ICES catch[2,4]
1987	Given by stock component		442	616	11	655
1988	Given by stock component		610	622	36	680
1989	Given by stock component		532	576	7	590
1990	Given by stock component		562	580	16	628
1991	Given by stock component		612	609	31	668
1992	Given by stock component		707	729	25	760
1993	Given by stock component		767	784	18	825
1994	Given by stock component		837	794	5	821
1995	Given by stock component		645	729	8	756
1996	Significant reduction in F	-	452	509	11	564
1997	Significant reduction in F	-	470	517	19	570
1998	F between 0.15 and 0.2	498	549	627	8	667
1999	F of 0.15 consistent with PA	437	562	585	n/a	640
2000	F=0.17: F_{pa}	642	612	655	2	738
2001	F=0.17: F_{pa}	665	670	660	1	737
2002	F=0.17: F_{pa}	694	683	685	24	773
2003	F=0.17: F_{pa}	542	583	600	9	670
2004	F=0.17: F_{pa}	545	532	587	11	650
2005	F=0.15 to 0.20	[320–420]	422	447	20	543
2006	F=0.15 to 0.20	[373–487]	444	318[6]	18	473
2007	F=0.15 to 0.20	[390–509]	502	558	8	579
2008	F=0.15 to 0.20	[349–456]	458	420	27	611
2009	F=0.15 to 0.20	[443–578]	605[7]	442	13	735
2010	harvest control rule	[527-572]	885[8]	862	7	869
2011	See scenarios	529 - 672	959[8]	930	9	939
2012	Follow the management plan	[586-639]	927[8]			
2013	Follow the management plan	[497-542]				

Weights in thousand tonnes.
[1]Data on discards and slipping from only two fleets.
[2]Landings and discards from Divisions and Subareas IIa, IIIa, IV, V, VI, VII, VIII, and IXa.
[3]For all areas, except some catches in international waters in Subarea II.
[4]Catches updated in 2003 with revisions from SGDRAMA in 2002.
[5] Updated with ICES FishStats data.
[6] Incomplete.
[7] Does not include the unilateral Norway/Faroe Islands TAC first declared in 2009, or the Icelandic TAC.
[8] No internationally agreed TAC for 2010 and 2011. Values presented are the sum of unilateral TACs.

Table 9.4.2.2 Mackerel in the Northeast Atlantic. Advice, management, and catch data for the **Western component**.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC[1]	Disc. slip	ICES catch[2,4]
1987	SSB = 1.5 mill. t; TAC	380	405	11	633
1988	F = $F_{0.1}$; TAC; closed area; landing size	430	573	36	656
1989	Halt SSB decline; TAC	355	495	7	571
1990	TAC; F = $F_{0.1}$	480	525	16	606
1991	TAC; F = $F_{0.1}$	500	575	31	647
1992	TAC for both 1992 and 1993	670	670	25	742
1993	TAC for both 1992 and 1993	670	730	18	805
1994	No long-term gains in increased F	831[3]	800	5	796
1995	20% reduction in F	530	608	8	728
1996	No separate advice	-	422	11	529
1997	No separate advice	-	416	19	529
1998	No separate advice	-	514	8	623
1999	No separate advice	-	520	0	597
2000	No separate advice	-	573	2	703
2001	No separate advice	-	630	1	694
2002	No separate advice	-	642	24	723
2003	No separate advice	-	548	9	644
2004	No separate advice	-	500	11	615
2005	No separate advice	-	397	20	494
2006	No separate advice	-	418[5]	17	420
2007	No separate advice	-	472	8	519
2008	No separate advice	-	431	27	552
2009	No separate advice	-	569	13	627
2010	No separate advice	-	---[6]	4	817
2011	No separate advice	-	---[6]	8	920
2012	No separate advice				

Weights in thousand tonnes.
[1]TAC for mackerel taken in all Divisions and Subareas VI, VII, VIIIa,b,d, Vb, IIa, IIIa, and IVa.
[2]Landings and discards of the Western component; includes some catches from the North Sea component.
[3]Catch at *status quo* F.
[4]Catches updated in 2003 with revisions from SGDRAMA in 2002.
[5]Revised from previous year (was 392).
[6] No internationally agreed TAC for 2010.

Table 9.4.2.3 Mackerel in the Northeast Atlantic. Advice, management, and catch data for the **North Sea component**.

Year	ICES Advice	Predicted catch corresp. to advice[1]	Agreed TAC[2]	ICES catch[3]
1987	Lowest practical level	LPL	55	3
1988	Closed areas and seasons; min. landing size; bycatch regulations	LPL	55	6
1989	Closed areas and seasons; min. landing size; bycatch regulations	LPL	49.2	7
1990	Closed areas and seasons; min. landing size; bycatch regulations	LPL	45.2	10
1991	Closed areas and seasons; min. landing size; bycatch regulations	LPL	65.5	-[4]
1992	Closed areas and seasons; min. landing size; bycatch regulations	LPL	76.3	-[4]
1993	Maximum protection; closed areas and seasons; min landing size	LPL	83.1	-[4]
1994	Maximum protection; closed areas and seasons; min landing size	LPL	95.7	-[4]
1995	Maximum protection; closed areas and seasons; min landing size	LPL	76.3	-[4]
1996	Maximum protection; closed areas and seasons; min landing size	LPL	52.8	-[4]
1997	Maximum protection; closed areas and seasons; min landing size	LPL	52.8	-[4]
1998	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	-[4]
1999	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	-[4]
2000	Maximum protection; closed areas and seasons; min landing size	LPL	69.7	-[4]
2001	Maximum protection; closed areas and seasons; min landing size	LPL	71.4	-[4]
2002	Maximum protection; closed areas and seasons; min landing size	LPL	72.9	-[4]
2003	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	-[4]
2004	Maximum protection; closed areas and seasons; min landing size	LPL	57.7	-[4]
2005	Maximum protection; closed areas and seasons; min landing size	LPL	44.9	-[4]
2006	Maximum protection; closed areas and seasons; min landing size	LPL	47.1	-[4]
2007	Maximum protection; closed areas and seasons; min landing size	LPL	53.1	-[4]
2008	Maximum protection; closed areas and seasons; min landing size	LPL	48.6	-[4]
2009	Maximum protection; closed areas and seasons; min landing size	LPL	63.8	-[4]
2010	Maximum protection; closed areas and seasons; min landing size	LPL	-	
2011	Maximum protection; closed areas and seasons; min landing size	LPL	-	
2012	Maximum protection; closed areas and seasons; min landing size	LPL	-	

Weights in thousand tonnes.
[1]Subarea IV and Division IIIa.
[2]TAC for Subarea IV, Divisions IIIa, IIIb,c,d (EU zone), and Division IIa (EU zone).
[3]Estimated landings of the North Sea component.
[4]No information.
LPL = Lowest Practical Level.

Table 9.4.2.4 Mackerel in the Northeast Atlantic. Advice, management, and catch data for the **Southern component**.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC[1]	ICES Catch[2]
1987	Reduce juvenile exploitation	-	36.57	22
1988	Reduce juvenile exploitation	-	36.57	25
1989	No advice	-	36.57	18
1990	Reduce juvenile exploitation	-	36.57	21
1991	Reduce juvenile exploitation	-	36.57	21
1992	No advice	-	36.57	18
1993	No advice	-	36.57	20
1994	No advice	-	36.57	25
1995	No advice	-	36.57	28
1996	No separate advice	-	30.00	34
1997	No separate advice	-	30.00	41
1998	No separate advice	-	35.00	44
1999	No separate advice	-	35.00	44
2000	No separate advice	-	39.20	36
2001	No separate advice	-	40.18	43
2002	No separate advice	-	41.10	50
2003	No separate advice	-	35.00	26
2004	No separate advice	-	32.31	35
2005	No separate advice	-	24.87	50
2006	No separate advice	-	26.18	53
2007	No separate advice	-	29.61	63
2008	No separate advice	-	27.01	60
2009	No separate advice	-	35.83	108
2010	No separate advice	-	33.88	52
2011	No separate advice	-	37.14	19
2012	No separate advice	-	36.74	

Weights in thousand tonnes.
[1]Division VIIIc, Subareas IX and X, and CECAF Division 34.1.1 (EU waters only).
[2]Catches updated in 2003 with revisions from SGDRAMA in 2002.

Table 9.4.2.5a Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Catches (in tonnes) by country 1988–2011 (data submitted by Working Group members).

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Belgium	20	37		125	102	191	351	106	62	114	125	177	146	97
Denmark	36853	34264	35800	41505	42164	42502	50145	36780	28526	21971	27416	30011	29177	22522
Estonia					616		3302	2286	3741	4422	7356	3595	2673	219
Faroe Islands	2622	5032	10000	11131	3347	12575	21568	31199	16851	11513	11229	11620	21023	24184
France	10706	14911	19000	6480	962	3836	11573	11782	15663	20916	17835	16367	19445	20956
Germany, Fed. Rep.	16457	22512	21600	14537	13719	13236	26508	24415	16227	15374	21412	19949	22979	25307
Germany, Dem. Rep.		2409												
Guernsey														
Iceland									92	925	357	357		
Ireland	85800	69980	74300	30138	35088	36982	89028	78534	54313	53129	66650	59675	71233	70452
Jersey														
Latvia					311	4700	1508	389	233					
Lithuania													2085	
Netherlands	28664	31343	38200	69418	82860	89543	44335	35789	36760	23700	30163	28621	32385	36095
Norway	163450	150400	151700	208266	239965	257800	258094	202205	136436	137523	158177	160738	174098	180372
Poland						600				22				
Portugal	4388	3112	3819	2789	3576	2015	2158	2893	3023	2080	2897	2002	2253	3119
Romania							2903							
Spain	21884	16609	17892	22011	17234	20864	27113	29165	33371	46470	44607	45915	38321	44142
Sweden	1003	6601	6400	4227	5100	5934	7099	6285	5307	4714	5146	5233	4994	5098
United Kingdom	210815	187760	193900	200019	232829	256275	237841	212147	146205	321821	185948	160152	184902	192631
Russia/USSR	27924	12088	28900	13361	42440	49600	28041	44537	44545	53732	67836	51348	50772	41567
Misreported							109625	18647				−211	4816	
Unallocated	34330	25361	8100	12956	15038		4632	29228	10839	5679	11498	38996	66325	62825
Discards	35576	7090	15600	30750	25000	18380	5370	7721	11415	18864	8030		3832	1188
Total	680492	589509	625211	667713	760351	815033	931194	774108	563610	742969	666682	634545	731459	730774

Table 9.4.2.5b Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Catches (in tonnes) by country 1988–2011 (cont.) (data submitted by Working Group members).

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Belgium	22	2	5	1	3	1	2	3	29	21
Denmark	34376	27900	25665	23212	24219	25223	26726	23491	41445	35958
Estonia										
Faroe Islands	19768	14014	13029	9769	12067	13429	11289	14062	70987	122050
France	21878	22906	20266	16338	14953	20038	15602	18340	11379	12766
Germany, Fed.	26532	24061	23244	19040	16608	18221	15502	22703	19055	24083
Germany, Dem. Rep.										
Greenland										62
Guernsey					10					10
Iceland	53	122		363	4222	36706	112286	116160	121008	159263
Ireland	72172	67355	61102	45687	40664	49260	44759	61056	57994	61596
Jersey				9	8	6	7	8	6	7
Latvia										
Lithuania					95	7				23
Netherlands	33444	30424	27532	25127	24157	24234	19972	23568	23089	28395
Norway	184291	163406	157364	119678	121993	131691	121524	121229	233952	208065
Poland				570		978				
Portugal	2934	2749	2289	1509	2620	2605	2381	1753	2363	962
Romania										
Spain	50123	23762	34455	52753	54136	62946	64648	114074	52845	18725
Sweden	5232	445	4437	3204	3209	3858	3664	7303	3428	3249
United Kingdom	194045	183008	174730	152801	95815	133688	112149	157010	160403	180971
Russia/USSR (Russia from	45811	40026	49489	40495	33580	35408	32728	41414	59292	73601
Misreported	6009		31							
Unallocated	50543	59172	46596	13171	4954	12453	1069	−139	5163	
Discards	23774	9481	10972	19760	17970	8615	26766	12854	6977	9012
Total	771007	668833	651206	543487	471283	579367	611074	734889	880671	938819

Table 9.4.2.6 Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Catches by area. Discards not estimated prior to 1978 (data submitted by Working Group members).

Year	Subarea VI			Subarea VII and Divisions VIIIabde			Subareas III[1] and IV			Subareas I,II,V and XIV[2]			Divisions VIIIc and IXa			Total		
	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch	Ldg	Disc	Catch
1969	4,800		4,800	47,404		47,404	739,175		739,175	7		7	42,526		42,526	833,912		833,912
1970	3,900		3,900	72,822		72,822	322,451		322,451	163		163	70,172		70,172	469,508		469,508
1971	10,200		10,200	89,745		89,745	243,673		243,673	358		358	32,942		32,942	376,918		376,918
1972	13,000		13,000	130,280		130,280	188,599		188,599	88		88	29,262		29,262	361,229		361,229
1973	52,200		52,200	144,807		144,807	326,519		326,519	21,600		21,600	25,967		25,967	571,093		571,093
1974	64,100		64,100	207,665		207,665	298,391		298,391	6,800		6,800	30,630		30,630	607,586		607,586
1975	64,800		64,800	395,995		395,995	263,062		263,062	34,700		34,700	25,457		25,457	784,014		784,014
1976	67,800		67,800	420,920		420,920	305,709		305,709	10,500		10,500	23,306		23,306	828,235		828,235
1977	74,800		74,800	259,100		259,100	259,531		259,531	1,400		1,400	25,416		25,416	620,247		620,247
1978	151,700	15,100	166,800	355,500	35,500	391,000	148,817		148,817	4,200		4,200	25,909		25,909	686,126	50,600	736,726
1979	203,300	20,300	223,600	398,000	39,800	437,800	152,323	500	152,823	7,000		7,000	21,932		21,932	782,555	60,600	843,155
1980	218,700	6,000	224,700	386,100	15,600	401,700	87,931		87,931	8,300		8,300	12,280		12,280	713,311	21,600	734,911
1981	335,100	2,500	337,600	274,300	39,800	314,100	64,172	3,216	67,388	18,700		18,700	16,688		16,688	708,960	45,516	754,476
1982	340,400	4,100	344,500	257,800	20,800	278,600	35,033	450	35,483	37,600		37,600	21,076		21,076	691,909	25,350	717,259
1983	320,500	2,300	322,800	235,000	9,000	244,000	40,889	96	40,985	49,000		49,000	14,853		14,853	660,242	11,396	671,638
1984	306,100	1,600	307,700	161,400	10,500	171,900	43,696	202	43,898	98,222		98,222	20,208		20,208	629,626	12,302	641,928
1985	388,140	2,735	390,875	75,043	1,800	76,843	46,790	3,656	50,446	78,000		78,000	18,111		18,111	606,084	8,191	614,275
1986	104,100		104,100	128,499		128,499	236,309	7,431	243,740	101,000		101,000	24,789		24,789	594,697	7,431	602,128
1987	183,700		183,700	100,300		100,300	290,829	10,789	301,618	47,000		47,000	22,187		22,187	644,016	10,789	654,805
1988	115,600	3,100	118,700	75,600	2,700	78,300	308,550	29,766	338,316	120,404		120,404	24,772		24,772	644,926	35,566	680,492
1989	121,300	2,600	123,900	72,900	2,300	75,200	279,410	2,190	281,600	90,488		90,488	18,321		18,321	582,419	7,090	589,509
1990	114,800	5,800	120,600	56,300	5,500	61,800	300,800	4,300	305,100	118,700		118,700	21,311		21,311	611,911	15,600	627,511
1991	109,500	10,700	120,200	50,500	12,800	63,300	358,700	7,200	365,900	97,800		97,800	20,683		20,683	637,183	30,700	667,883
1992	141,906	9,620	151,526	72,153	12,400	84,553	364,184	2,980	367,164	139,062		139,062	18,046		18,046	735,351	25,000	760,351
1993	133,497	2,670	136,167	99,828	12,790	112,618	387,838	2,720	390,558	165,973		165,973	19,720		19,720	806,856	18,180	825,036
1994	134,338	1,390	135,728	113,088	2,830	115,918	471,247	1,150	472,397	72,309		72,309	25,043		25,043	816,025	5,370	821,395
1995	145,626	74	145,700	117,883	6,917	124,800	321,474	730	322,204	135,496		135,496	27,600		27,600	748,079	7,721	755,800
1996	129,895	255	130,150	73,351	9,773	83,124	211,451	1,387	212,838	103,376		103,376	34,123		34,123	552,196	11,415	563,611
1997	65,044	2,240	67,284	114,719	13,817	128,536	226,680	2,807	229,487	103,598		103,598	40,708		40,708	550,749	18,864	569,613
1998	110141	71	110,212	105,181	3,206	108,387	264,947	4,735	269,682	134,219		134,219	44,164		44,164	658,652	8,012	666,664
1999[3]	116,362		116,362	94,290		94,290	313,014		313,014	72,848		72,848	43,796		43,796	640,311		640,311
2000	187,595	1	187,595	115,566	1,918	117,484	285,567	165	304,898	92,557		92,557	36,074		36,074	736,524	2,084	738,608
2001	143,142	83	143,142	142,890	1,081	143,971	327,200	24	339,971	67,097		67,097	43,198		43,198	736,274	1,188	737,462
2002	136,847	12,931	149,778	102,484	2,260	104,744	375,708	8,583	394,878	73,929		73,929	49,576		49,576	749,131	23,774	772,905
2003	142,728	91	142,819	89,492		89,492	334,639	9,390	357,766	53,701		53,701	25,823		25,823	660,119	9,481	669,600
2004	134,251	240	134,491	99,922	1,862	101,784	300,768	8,870	316,620	62,486		62,486	34,840		34,840	639,248	10,972	650,221
2005	79,960	11,400	91,361	90,278	5,878	96,156	249,740	2,482	252,223	54,129		54,129	49,618		49,618	523,726	19,760	543,486
2006	88,077	6,031	94,108	66,209	6,556	72,765	200,929	5,383	206,312	46,716		46,716	52,751		52,751	454,682	17,970	472,652
2007	110,788	405	111,193	71,235	2,024	73,259	253,013	6,187	259,200	72,891		72,891	62,834		62,834	570,761	8,616	579,379
2008[4]	76,358	21,793	98,151	73,377	1,987	75,364	227,251	2,986	230,237	148,669		148,669	59,859		59,859	584,297	26,766	611,063
2009	135,468	1,255	136,723	88,287	4,387	92,674	226,928	7,212	234,140	163,604		163,604	107,747		107,747	732,034	12,854	734,889
2010	106,732	114	106,846	104,127	3,723	107,850	246,817	14	246,831	355,724	5	355,729	49,068	3,126	52,194	862,470	6,981	869,451
2011	160,756	1,633	162,389	50,699	6,027	56,726	301,746	790	302,536	370,761		370,761	18,430	562	19,037	929,807	9,012	938,819

[1] Divisions IIIb and IIId from 2000 onwards.

[2] 1976–1985 Division IIa; 1986–1999 Divisions IIa and Va; 2000–2008 Subareas I, II, and V; 2009 Subareas I, II, V, and XIV.

[3] Discards reported as part of the unallocated catches.

[4] Data revised for Northern Ireland.

Table 9.4.2.7 Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). Summary of stock assessment.

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4–8
1972	2058690	3804766	361262	0.0194
1973	4668008	3852143	570719	0.1894
1974	3886135	3666777	607473	0.2142
1975	4828718	3387991	784329	0.2280
1976	4858871	3056807	828434	0.2656
1977	925473	2882961	620016	0.2060
1978	3184579	2837670	736519	0.2022
1979	5245061	2384313	842739	0.2676
1980	5473224	1987258	734950	0.2594
1981	7134107	2002453	754045	0.2420
1982	1973245	1940784	716987	0.2360
1983	1526942	2249227	672283	0.2240
1984	7306312	2283514	641928	0.2330
1985	3247226	2212845	614371	0.2280
1986	3359654	2250875	602201	0.2420
1987	5047012	2257126	654992	0.2280
1988	3539141	2261821	680491	0.2508
1989	4364707	2344037	585920	0.1882
1990	3120536	2217589	626107	0.1890
1991	3594934	2465887	675665	0.2334
1992	4452452	2487167	760690	0.2632
1993	5221402	2322842	824568	0.3304
1994	4321617	2126968	819087	0.3712
1995	3933811	2277196	756277	0.3624
1996	3950114	2261416	563472	0.2516
1997	3101805	2332185	573029	0.2486
1998	3058022	2240916	666316	0.2860
1999	3160861	2279975	640309	0.2910
2000	2173242	2074604	738606	0.3636
2001	4400312	2028410	737463	0.4098
2002	6770497	1687771	772905	0.4554
2003	3656264	1682326	669600	0.4626
2004	4865420	1721746	650221	0.4374
2005	7600021	2107192	543486	0.3212
2006	7735634	2262265	472652	0.2650
2007	4742898	2488322	579379	0.3038
2008	4626598	2755441	612856	0.2764
2009	3294467	3112217	734889	0.2698
2010	4731644	2973399	869451	0.2772
2011	3887096*	3040108	938819	0.3084
2012	3887096*	2676645		
Average	4217411	2470389	680888	0.2725

* Replaced by geometric mean 1972–2009.

9.4.2.1 Annex

ICES evaluated the following harvest control rule contained in the Norway, Faroe Islands, and EU management plan for mackerel in the Northeast Atlantic, agreed in October 2008:

1. *For the purpose of this long-term management plan, "SSB" means the estimate according to ICES of the spawning stock biomass at spawning time in the year in which the TAC applies, taking account of the expected catch.*
2. *When the SSB is above 2,200,000 tonnes, the TAC shall be fixed according to the expected landings, as advised by ICES, on fishing the stock consistent with a fishing mortality rate in the range of 0.20 to 0.22 for appropriate age groups as defined by ICES.*
3. *When the SSB is lower than 2,200,000 tonnes, the TAC shall be fixed according to the expected landings as advised by ICES, on fishing the stock at a fishing mortality rate determined by the following:*

Fishing mortality F = 0.22 SSB/ 2,200,000*

4. *Notwithstanding paragraph 2, the TAC shall not be changed by more than 20% from one year to the next, including from 2009 to 2010.*
5. *In the event that the ICES estimate of SSB is less than 1,670,000 tonnes, the Parties shall decide on a TAC which is less than that arising from the application of paragraphs 2 to 4.*
6. *The Parties may decide on a TAC that is lower than that determined by paragraphs 2 to 4.*
7. *The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.*