

9.3.39 Mackerel (*Scomber scombrus*) in subareas 1–7 and 14, and in divisions 8.a–e and 9.a (Northeast Atlantic)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2017 should be no more than 944 302 tonnes.

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

Stock development over time

The spawning-stock biomass (SSB) is estimated to have increased since the early 2000s and has been above $MSY B_{trigger}$ since 2009. The fishing mortality (F) has been declining from high levels in the mid-2000s but remains above F_{MSY} . There has been a succession of large year classes since the early 2000s (2002, 2006, 2011, and 2014) and all year classes since 2005 (except for the 2013 year class) are estimated to be above average.

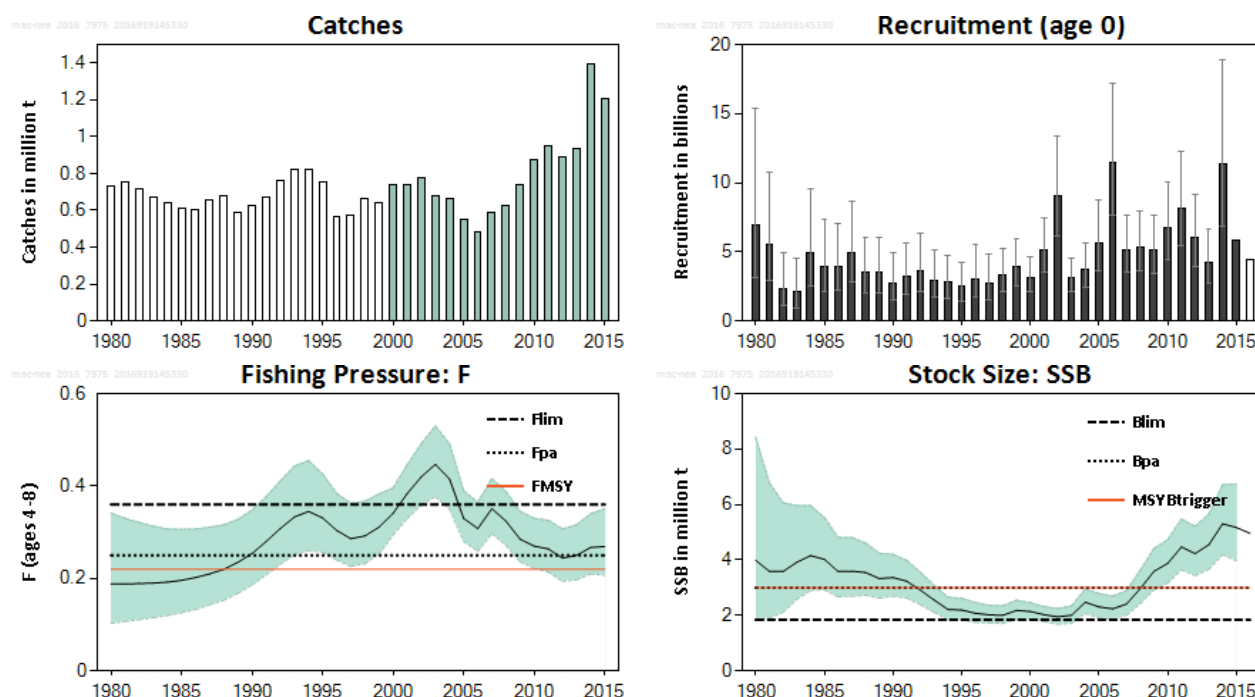


Figure 9.3.39.1 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. Summary of stock assessment. The unshaded catches prior to 2000 are the years that have been down-weighted in the assessment because of the considerable underreporting that is suspected to have taken place. The recruitment value for 2015 is from RCT3 and the unshaded recruitment value for 2016 is the geometric mean of 1990–2014. Confidence intervals (95%) are included in the recruitment, fishing mortality, and spawning-stock biomass plots.

Stock and exploitation status

Table 9.3.39.1 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size			
		2013	2014	2015	2014	2015	2016	
Maximum sustainable yield	F_{MSY}	✘	✘	✘ Above	MSY $B_{trigger}$	✔	✔	✔ Above trigger
Precautionary approach	F_{pa} , F_{lim}	✔	⦿	⦿ Increased risk	B_{pa} , B_{lim}	✔	✔	✔ Full reproductive capacity
Management plan	F_{MGT}	-	-	- Not applicable	SSB_{MGT}	-	-	- Not applicable

Catch options for 2017

Table 9.3.39.2 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. The basis for the catch options for 2017.

Variable	Value	Source	Notes
F ages 4–8 (2016)	0.24	ICES (2016a)	Based on the ICES estimate of the total catch for 2016.
SSB (2016) spawning time (May)	4 957 702 t	ICES (2016a)	Based on the ICES estimate of the total catch for 2016.
$R_{age 0}$ (2016)	4 469 915 thousands	ICES (2016a)	Geometric mean of the recruitment estimates (1990–2014).
$R_{age 0}$ (2017)	4 469 915 thousands	ICES (2016a)	
$R_{age 0}$ (2018)	4 469 915 thousands	ICES (2016a)	
Total catch (2016)	1 067 828 t	ICES (2016a)	Sum of declared quotas corrected by the interannual transfers.

Table 9.3.39.3 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. The catch options for 2017.

Rationale	Catch (2017)	F (2017 & 2018)	Basis	SSB (2017) Spawning time	SSB (2018) Spawning time	SSB change*	Catch change**
MSY approach	944302	0.22	F_{MSY}	4793232	4544588	-5%	-12%
Other options	0	0.00	$F = 0$	4949577	5454304	10%	-100%
	1020996	0.24	F in the EU, Faroe Islands, and Norway long-term management strategy	4779365	4472848	-6%	-4%
	1020996	0.24	$F(2016)$	4779365	4472848	-6%	-4%
	854262	0.20	Catch(2017) = 2016 catch -20%	4809265	4629238	-4%	-20%
	1067828	0.25	Catch(2017) = 2016 catch	4770799	4429206	-7%	0%
	1281394	0.31	Catch(2017) = 2016 catch +20%	4730754	4231803	-11%	20%
	982824	0.23	0.23	4786291	4508512	-6%	-8%
	1096301	0.26	0.26	4765554	4402734	-8%	3%
	1133442	0.27	0.27	4758670	4368274	-8%	6%
	1170247	0.28	0.28	4751800	4334205	-9%	10%
	1058820	0.25	F_{pa}	4772452	4437590	-7%	-1%
	1453004	0.36	F_{lim}	4697340	4075136	-13%	36%
2697591	0.80	F(2017–2018) leading to B_{pa} in 2018	4413138	3000000	-32%	153%	
4200426	1.70	F(2017–2018) leading to B_{lim} in 2018	3904536	1840000	-53%	293%	

Weights in tonnes.

* SSB 2018 relative to SSB 2017.

** Catch in 2017 relative to estimated catches in 2016. There is no internationally agreed TAC for 2016.

Basis of the advice

Table 9.3.39.4 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. The basis of the advice.

Advice basis	MSY approach.
Management plan	The EU, Faroe Islands, and Norway have agreed on a long-term management strategy for NEA mackerel (Anon., 2015). ICES has not yet evaluated this management strategy and not all parties involved in the mackerel fishery have taken part in the agreement.

Quality of the assessment

The surveys give contradictory information on the recent development of the stock. The 2016 egg survey suggests a decrease in the SSB since 2013 while the abundances-at-age from the IESSNS index have increased between those years. As a result of this discrepancy, in this year’s assessment, the surveys have less influence on the estimated stock abundance than the catch information.

Year-to-year changes in the indices from surveys carried out during the assessment year, for which no catch information is available, have caused substantial changes in the scale of the stock over the last ten years. The lower estimate of SSB in the 2015 assessment compared to the 2014 and 2016 assessments (Figure 9.3.39.2) was mostly caused by a low value in the IESSNS index in 2015.

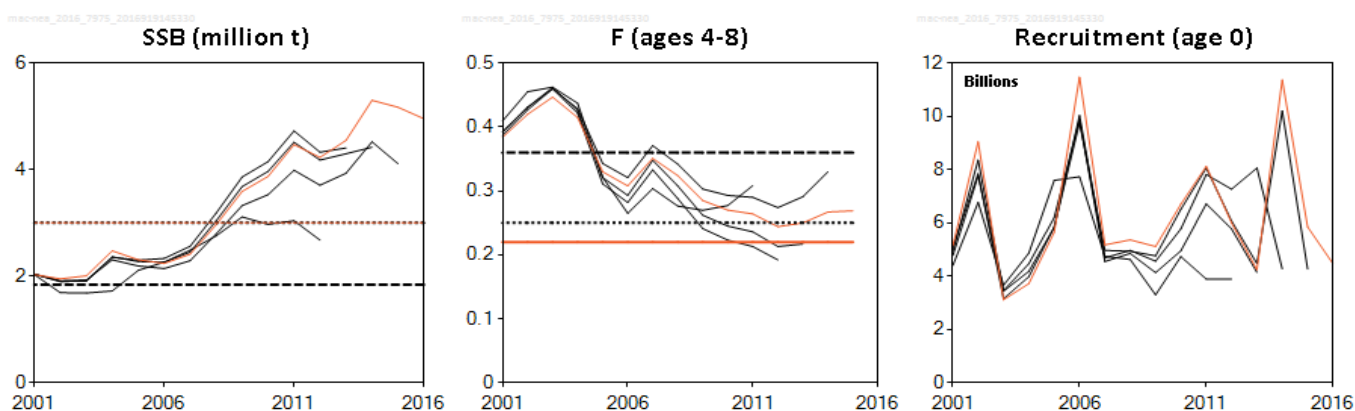


Figure 9.3.39.2 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

The IBTS recruitment index was used incorrectly in the 2015 mackerel assessment. A correction of the advice issued last year for 2016 was released in September 2016. The assumption made on intermediate year catch for the advice for 2017 is based on the declared TACs.

There are considered to be three components to the NEA mackerel stock: western, southern, and North Sea (ICES, 2016b). The results of the recent egg surveys indicate a decrease in the relative importance of the southern component (from 24% of the mackerel stock in 2013 to 11% in 2016). While the biomass of the western component estimated by the egg survey also decreased in the same period, its relative contribution to the mackerel stock increased from 73% to 85%. The biomass of the North Sea component (egg survey conducted in 2015) remains stable at a low level and its relative contribution to the stock increased from 3% to 4%.

Reference points

Table 9.3.39.5 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3 million t	B_{pa}	ICES (2015)
	F_{MSY}	0.22	Stochastic simulation.	ICES (2015)
Precautionary approach	B_{lim}	1.84 million t	B_{loss} in 2002 from 2014 benchmark assessment.	
	B_{pa}	3 million t	$\exp(1.654 \times \sigma) \times B_{lim}, \sigma = 0.30$.	ICES (2015)
	F_{lim}	0.36	The F that on average leads to B_{lim} .	ICES (2015)
	F_{pa}	0.25	The F that on average leads to B_{pa} .	ICES (2015)

Basis of the assessment

Table 9.3.39.6 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. The basis of the assessment.

ICES stock data category	1 (ICES, 2016c).
Assessment type	1.0 age-based analytical model (SAM: ICES, 2016a) that uses catches in the model and in the forecast.
Input data	Catch data, tagging data (1980–2005 recapture year), and three survey indices: SSB index from the triennial egg survey (1992–2016), abundance indices from the IBTS survey (combined Q1 and Q4; age 0, 1998–2015), and from the IESSNS survey (ages 6–11, 2007, 2010–2016). Catches prior to 2000 are given a very low weight in the assessment. Natural mortality (= 0.15 for all ages and years) is based on tagging studies from the early 1980s.
Discards	Discarding is known to take place, but is only quantified for part of the fisheries (0.8% in weight in 2015); the proportion of the landings covered cannot be calculated. Partial discard estimates are included in the assessment and overall discarding is considered negligible.
Indicators	None
Other information	Benchmarked in 2014 (WKPELA; ICES, 2014). A benchmark is planned for 2017.
Working group	Working Group on Widely Distributed Stocks (WGWIDE)

Information from stakeholders

Over the last eight years the pelagic industry has encountered large shoals of mackerel over the entire distribution area which has expanded both south and north. Based upon these observations the industry believes the stock size has greatly increased. This increase in the stock is not confined to one area or observed by only one fleet. The industry has noted signs of good recruitment (above average) in recent years, particularly in 2014 and 2015. Mackerel is also caught in substantial amounts outside of the directed mackerel fishery and in places where it has not been caught in recent years (e.g. during the herring fishery in the North Sea). Danish fishers have reported catches of spawning mackerel in the sandeel fishery.

History of advice, catch, and management

Table 9.3.39.7 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch.

Year	ICES advice	Predicted catch corresp. to advice	Total agreed TAC*	Official landings**	Disc.*** & slipping	ICES catch
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^	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^^	442	13	735
2010	harvest control rule	[527–572]	885^^^	862	7	869
2011	See scenarios	[529–672]	959^^^	930	9	939
2012	Follow the management plan	[586–639]	927^^^	877	15	893
2013	Follow the management plan	[497–542]	906^^^	927	5	932
2014	Follow the management plan	[927–1011]	1392^^^	1388	6	1393
2015	Follow the management plan	[831–906]	1229^^^	1199	10	1209
2016	MSY approach	≤ 774†	1057^^^			
2017	MSY approach	≤ 944				

Weights in thousand tonnes.

n/a: not available.

* For all areas, except some catches in international waters in Subarea 2.

** Updated with ICES FishStat data.

*** Data on discards and slipping from only two fleets.

^ Incomplete.

^^ Does not include the unilateral Norway/Faroe Islands TAC first declared in 2009, nor the Icelandic quota.

^^^ No internationally agreed quotas. Values presented are the sum of unilateral quotas.

† Catch advice for 2016 corrected in September 2016.

Table 9.3.39.8 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch for the Western component.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	Disc. & slipping	ICES catch**
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***	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	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	-	^	4	817
2011	No separate advice	-	^	8	920
2012	No separate advice	-	^	11	864
2013	No separate advice	-	^	2	910
2014	No separate advice	-	^	6	1342
2015	No separate advice	-	^	3	1161
2016	No separate advice	-	^		
2017	No separate advice	-			

Weights in thousand tonnes.

* TAC for mackerel taken in all divisions and subareas 6, 7, 8.a, 8.b, 8.d, 5.b, 2.a, 3.a, and 4.a.

** Landings and discards of the Western component; includes some catches from the North Sea component.

*** Catch at *status quo* F.

^ No internationally agreed TAC.

Table 9.3.39.9 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch for the North Sea component.

Year	ICES advice	Predicted catch corresp. to advice*	Agreed TAC**	ICES catch
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	n/a
1992	Closed areas and seasons; min. landing size; bycatch regulations	LPL	76.3	n/a
1993	Maximum protection; closed areas and seasons; min. landing size	LPL	83.1	n/a
1994	Maximum protection; closed areas and seasons; min. landing size	LPL	95.7	n/a
1995	Maximum protection; closed areas and seasons; min. landing size	LPL	76.3	n/a
1996	Maximum protection; closed areas and seasons; min. landing size	LPL	52.8	n/a
1997	Maximum protection; closed areas and seasons; min. landing size	LPL	52.8	n/a
1998	Maximum protection; closed areas and seasons; min. landing size	LPL	62.5	n/a
1999	Maximum protection; closed areas and seasons; min. landing size	LPL	62.5	n/a
2000	Maximum protection; closed areas and seasons; min. landing size	LPL	69.7	n/a
2001	Maximum protection; closed areas and seasons; min. landing size	LPL	71.4	n/a
2002	Maximum protection; closed areas and seasons; min. landing size	LPL	72.9	n/a
2003	Maximum protection; closed areas and seasons; min. landing size	LPL	62.5	n/a
2004	Maximum protection; closed areas and seasons; min. landing size	LPL	57.7	n/a
2005	Maximum protection; closed areas and seasons; min. landing size	LPL	44.9	n/a
2006	Maximum protection; closed areas and seasons; min. landing size	LPL	47.1	n/a
2007	Maximum protection; closed areas and seasons; min. landing size	LPL	53.1	n/a
2008	Maximum protection; closed areas and seasons; min. landing size	LPL	48.6	n/a
2009	Maximum protection; closed areas and seasons; min. landing size	LPL	63.8	n/a
2010	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2011	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2012	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2013	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2014	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2015	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2016	Maximum protection; closed areas and seasons; min. landing size	LPL		
2017	Maximum protection; closed areas and seasons; min. landing size	LPL		

Weights in thousand tonnes.

LPL = Lowest Practical Level.

* Subarea 4 and Division 3.a.

** TAC for Subarea 4, divisions 3.a and 3.b–d (EU zone), and Division 2.a (EU zone).

n/a: no information available.

Table 9.3.39.10 Subareas 1–7 and 14 and divisions 8.a–e and 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch for the Southern component.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	ICES catch
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	29
2013	No separate advice	-	31.16	22
2014	No separate advice	-	56.64	51
2015	No separate advice	-	48.14	44
2016	No separate advice	-		
2017	No separate advice	-		

Weights in thousand tonnes.

*Division 8.c, subareas 9 and 10, and CECAF Division 34.1.1 (EU waters only).

History of catch and landings

Table 9.3.39.11 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. Catch distribution by fleet in 2015 as estimated by ICES.

Total catch	Landings			Discards
	Pelagic trawl	Purse-seine nets	Others	Discarding is known to take place but is only quantified for part of the fisheries (0.9% in weight in 2015)
1 208 991 t	78.7%	21.2%	0.1%	10 431 t
	1 198 560 t			

Table 9.3.39.12 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of catch and landings, both the official and ICES estimated values are presented by country (combined Southern, Western, and North Sea spawning components).

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	20	37		125	102	191	351	106	62	114	125	177	146
Denmark	36853	34264	35800	41505	42164	42502	50142	36780	28526	21971	27416	30011	29177
Estonia					616		3302	2286	3741	4422	7356	3595	2673
Faroe Islands	2622	5032	10000	11131	3347	12575	21568	31199	16851	11513	11229	11620	21023
France	10706	14911	19000	6480	962	3836	11573	11782	15663	20916	17835	16367	19445
Germany, Fed. Rep.	16457	22512	21600	14537	13719	13236	26508	24415	16227	15374	21412	19949	22979
Germany, Dem. Rep.		2409											
Greenland													
Guernsey													
Iceland									92	925	357		
Ireland	85800	69980	74300	30138	35088	36982	89028	78534	54313	53129	66650	59675	71233
Jersey													
Latvia					311	4700	1508	389	233				
Lithuania													2085
Netherlands	28664	31343	38200	69418	82860	89543	44335	35789	36760	23700	30163	28621	32385
Norway	163450	150400	151700	208266	239965	257800	258094	202205	136436	137523	158177	160738	174098
Poland						600				22			
Portugal	4388	3112	3819	2789	3576	2015	2158	2893	3023	2080	2897	2002	2253
Romania							2903						
Spain	21884	16609	17892	22011	17234	20864	27113	29165	33371	46470	44607	45915	38321
Sweden	1003	6601	6400	4227	5100	5934	7099	6285	5307	4714	5146	5233	4994
United Kingdom	210815	187760	193900	200019	232829	256275	237841	212147	146205	321821	185948	160152	184902
USSR/Russia	27924	12088	28900	13361	42440	49600	28041	44537	44545	53732	67836	51348	50772
Misreported							109625	18647				-211	4816
Unallocated	34330	25361	8100	12956	15038		4632	29228	10839	5679	11498	38996	66235
Discards	35576	7090	15600	30750	25000	18380	5370	7721	11415	18864	8030		3832
Total	680492	589509	625211	667713	760351	815033	931194	774108	563610	742969	666682	634545	731459

Table 9.3.39.12 (continued) Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of catch and landings; both the official and ICES estimated values are presented by country (combined Southern, Western, and North Sea spawning components).

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	97	22	2	5	1	3	1	2	3	29	21	39	62	56	52
Denmark	22522	34376	27900	25665	23212	24219	25223	26726	23491	41445	35958	36501	33218	42222	46871
Estonia	219												1367		
Faroe Islands	24184	19768	14014	13030	9769	12067	13430	11289	14062	70987	122050	107630	143001	150236	108412
France	20956	21878	22906	20266	16338	14953	20038	15602	18340	11379	12766	20467	14643	21719	25704
Germany, Fed. Rep.	25307	26532	24061	23244	19040	16608	18221	15502	22703	19055	24083	18944	20931	28456	28257
Germany, Dem. Rep.															
Greenland											62	7402	54148	78581	30351
Guernsey						10					10	5	9	9	4
Iceland		53	122		363	4222	36706	112286	116160	121008	159263	149282	151235	172960	169333
Ireland	70452	72172	67355	61102	45687	40664	49259	44760	61056	57994	61596	63049	56511	103178	88744
Jersey					9	8	6	7	8	6	7	8	8	7	3
Latvia															
Lithuania						95	7				23			9598	554
Netherlands	36095	33444	30424	27532	22734	24157	24244	19972	23568	23088	28395	25817	21159	46665	39807
Norway	180372	184291	163406	157363	119678	121993	131691	121524	121229	233952	208065	176023	164607	277731	242231
Poland					570	1368	978								24
Portugal	3119	2934	2749	2289	1509	2620	2605	2381	1753	2363	962	824	254	618	1456
Romania															
Spain	44142	50123	23762			54136	62946	64637	114074	52737	18725	19386	16414	37806	34530
Sweden	5098	5232	445	4437	3204	3209	3858	3664	7303	3429	3248	4564	2906	4422	3930
United Kingdom	192631	194045	183008	214771	152801	95815	133688	112394	157010	160417	180972	169745	163807	287851	247986
USSR/Russia	41567	45811	40026	49489	40495	33580	35408	32728	41414	59310	73601	74587	80817	116433	128433
Misreported		6009													
Unallocated	62825	50543	59172	41335	68414	4954	12453	1069	-139	5271	5961	5237	3336	9457	1876
Discards	1188	23774	9481	19962	25788	26594	15444	37075	15934	13045	10894	15174	4732	6451	10430
Total	730774	771007	668833	660491	549514	481276	586206	621618	737969	875515	946662	894684	933165	1394456	1208988

Table 9.3.39.13 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. History of catch and landings; both the official and ICES estimated values are presented by area.

YEAR	SUBAREA 6			SUBAREA 7 AND DIVISIONS 8.A, B, D, E			SUBAREAS 3 AND 4			SUBAREAS 1, 2, 5, AND 14			DIVISIONS 8.C AND 9.A			TOTAL		
	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	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	23309	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
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
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

YEAR	SUBAREA 6			SUBAREA 7 AND DIVISIONS 8.A, B, D, E			SUBAREAS 3 AND 4			SUBAREAS 1, 2, 5, AND 14			DIVISIONS 8.C AND 9.A			TOTAL		
	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch	Land	Disc	Catch
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
2011	160756	1836	162592	51098	5317	56415	301746	1906	303652	398132	28	398160	24036	1807	25843	935767	10894	946661
2012	121115	952	122067	65728	9701	75429	218400	1089	219489	449325	1	449326	24941	3431	28372	879510	15174	894684
2013	132062	273	132335	49871	1652	51523	260921	337	261258	465714	15	465729	19733	2455	22188	928433	4732	933165
2014	180068	340	180408	93709	1402	95111	383887	334	384221	684082	91	684173	46257	4284	50541	1388003	6451	1394454
2015	134728	30	134757	98563	3155	101718	295877	34	295911	632493	78	632571	36899	7133	44033	1198560	10431	1208990

Summary of the assessment

Table 9.3.39.14 Mackerel in subareas 1–7 and 14, and in divisions 8.a–e and 9.a. Assessment summary; weights in tonnes and recruitment in thousands.

Year	Recruitment (Age 0)	High	Low	SSB (Spawning time)	High	Low	Landings	Discards	Mean F (ages 4–8)	High	Low
1980	6976096	15346838	3171071	3988796	8425050	1888475	713311	21600	0.188	0.341	0.103
1981	5581678	10767469	2893450	3594804	6772494	1908103	708960	45516	0.188	0.330	0.107
1982	2364318	4910862	1138293	3584036	6066789	2117316	691909	25350	0.189	0.321	0.111
1983	2078174	4518542	955796	3921560	5956538	2581807	660242	11396	0.190	0.313	0.115
1984	4901246	9522995	2522548	4159893	5958206	2904350	629626	12302	0.192	0.307	0.120
1985	3953058	7357274	2123975	4024857	5538310	2924985	606084	8191	0.196	0.306	0.126
1986	3921560	7060878	2178005	3584036	4809578	2670777	594697	7431	0.202	0.307	0.133
1987	4911058	8611766	2800644	3598401	4806213	2694114	644016	10789	0.210	0.311	0.143
1988	3495545	6059634	2016432	3548374	4614250	2728711	644926	35566	0.220	0.316	0.153
1989	3485075	6054304	2006134	3331723	4240620	2617630	582419	7090	0.235	0.328	0.168
1990	2771779	4962896	1548040	3365207	4200021	2696324	611911	15600	0.254	0.348	0.186
1991	3242970	5588827	1881764	3236490	3987121	2627176	637183	30700	0.280	0.377	0.208
1992	3671093	6336138	2126993	2913891	3550397	2391497	735351	25000	0.308	0.411	0.231
1993	2963851	5087718	1726592	2553562	3084241	2114194	806856	18180	0.333	0.443	0.251
1994	2791250	4760389	1636647	2215525	2658780	1846167	816025	5370	0.345	0.455	0.261
1995	2475616	4242232	1444682	2195675	2617557	1841789	748079	7721	0.331	0.426	0.257
1996	3048012	5532664	1679186	2078174	2464777	1752209	552196	11415	0.304	0.384	0.240
1997	2757955	4864527	1563629	2022814	2365580	1729713	550749	18864	0.286	0.363	0.226
1998	3365207	5240670	2160910	2004690	2348741	1711037	658652	8012	0.292	0.367	0.232
1999	3890312	5901871	2564361	2180359	2546097	1867158	640311		0.311	0.383	0.253
2000	3112697	4615081	2099395	2141463	2457320	1866206	736524	2084	0.341	0.396	0.294
2001	5147388	7458464	3552421	2028891	2317190	1776461	736274	1188	0.384	0.446	0.330
2002	9047509	13332030	6139906	1949337	2250115	1688765	749131	23774	0.420	0.492	0.359
2003	3109586	4508703	2144635	2004690	2343359	1714966	659831	19427	0.447	0.530	0.377
2004	3719129	5636422	2454025	2475616	2954524	2074337	640529	19962	0.415	0.491	0.350
2005	5649062	8752588	3645996	2308249	2787573	1911345	523726	25788	0.330	0.390	0.280
2006	11478658	17184528	7667338	2237792	2693920	1858894	454587	26594	0.308	0.365	0.259
2007	5173190	7639479	3503104	2412080	2893282	2010910	570762	15444	0.351	0.416	0.297
2008	5362817	7935366	3624258	2966816	3626795	2426936	586090	37075	0.324	0.388	0.272
2009	5111482	7642689	3418594	3591211	4413595	2922062	722035	15934	0.285	0.345	0.236
2010	6702559	10054793	4467949	3874782	4734658	3171071	862470	13045	0.270	0.330	0.222
2011	8129419	12241471	5398653	4470452	5476627	3649132	935767	10894	0.264	0.326	0.214
2012	6004381	9098863	3962319	4231216	5215158	3432914	877390	14963	0.244	0.307	0.194
2013	4239687	6652079	2702155	4551648	5654600	3663831	927067	4664	0.250	0.316	0.197
2014	11375813	18846165	6866602	5304150	6714501	4190036	1388003	6451	0.267	0.340	0.210
2015	5850212*	5732372	1630439	5173190	6736560	3972634	1198559	10431	0.269	0.351	0.207
2016	4469915**			4957702**							
average	4765658	7779433	2872693	3219405	4262171	2478945	716729	16395	0.284	0.371	0.220

* RCT3 estimate.

** Geometric mean 1990–2014.

*** Estimated value from the forecast.

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