

Mackerel (*Scomber scombrus*) in subareas 1–8 and 14, and in Division 9.a (the Northeast Atlantic and adjacent waters)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 922 064 tonnes.

Stock development over time

The spawning-stock biomass (SSB) is estimated to have increased since 2007, reaching a maximum in 2014, and has been declining since then. It has, however, remained above $MSY B_{trigger}$ since 2008. The fishing mortality (F) has declined since 2003, but is estimated to have remained above F_{MSY} . There has been a succession of large year classes since 2001, with year classes since 2011 estimated to be above average.

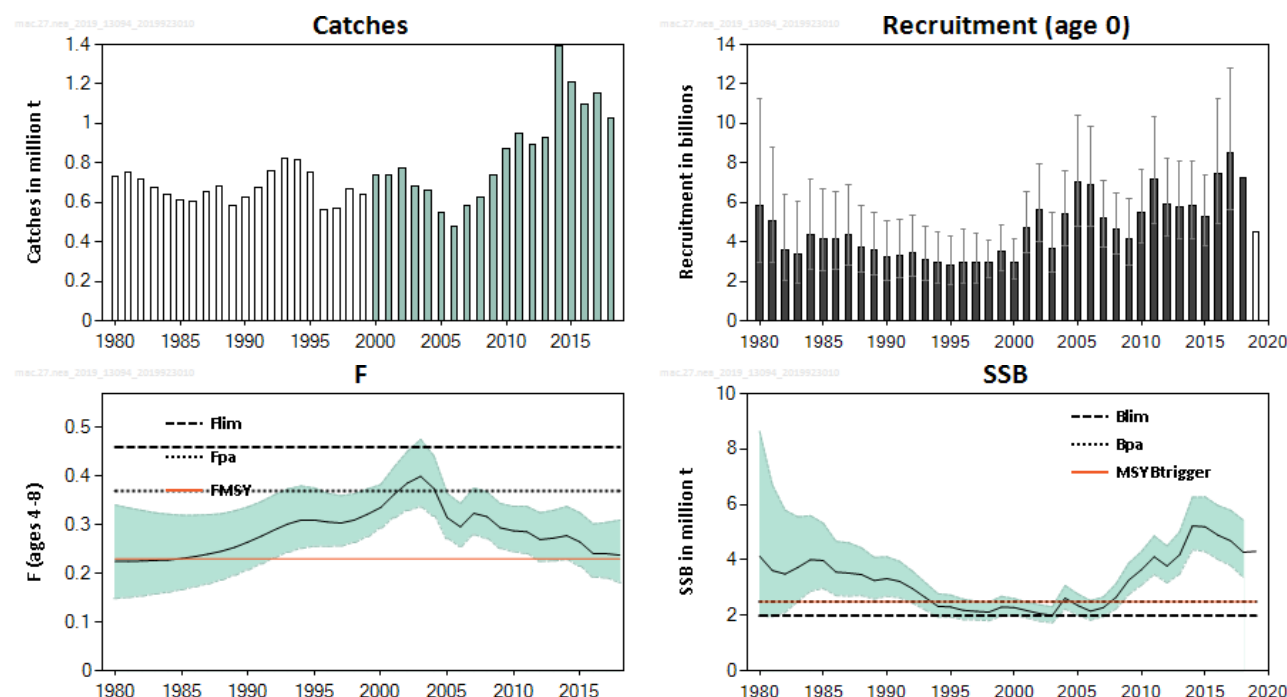


Figure 1 Mackerel in subareas 1–8 and 14, and in Division 9.a. Summary of the stock assessment. The unshaded catches prior to 2000 are the ones that have been down-weighted in the assessment because of the considerable underreporting suspected to have taken place in this period. The recruitment value for 2018 is estimated using the recruitment survey (IBTS) and a model (RCT3), and the recruitment value for 2019 is the geometric mean of the recruitments from 1990 to 2017. Confidence intervals (95%) are included in the recruitment, fishing mortality, and spawning-stock biomass plots.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY} and below F_{pa} and F_{lim} ; the spawning-stock size is above $MSY B_{trigger}$, B_{pa} , and B_{lim} .

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

	Fishing pressure			Stock size						
	2016	2017	2018	2017	2018	2019				
Maximum sustainable yield	F_{MSY}	✗	✗	✗	Above	MSY $B_{trigger}$	✓	✓	✓	Above trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

Catch scenarios

Table 2 Mackerel in subareas 1–8 and 14, and in Division 9.a. The basis for the catch scenarios.

Variable	Value	Notes
$F_{ages\ 4-8}$ (2019)	0.21	From the forecast for 2019, based on expected catch in 2019.
SSB (2019) at spawning time	4 389 601 tonnes	From the forecast for 2019.
R at age 0 (2019–2020)	4 486 290 thousands	Geometric mean of the recruitment estimates (1990–2017).
Total catch (2019)	834 954 tonnes	Sum of expected catches and discards, corrected by the interannual transfers from 2018.

Table 3 Mackerel in subareas 1–8 and 14, and in Division 9.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch	$F_{ages\ 4-8}$	SSB at spawning time		% change		
	2020	2020 and 2021	2020	2021	SSB *	Catch **	Advice ***
ICES advice basis							
MSY approach: $F = F_{MSY}$	922064	0.23	4526617	4390097	-3.0	10.4	19.7
Other scenarios							
Norway–EU–Faroes LTMS $F = 0.21$ ^	848823	0.21	4541079	4459764	-1.8	1.7	10.2
$F = 0$	0	0.00	4696388	5287640	12.6	-100.0	-100.0
F_{pa}	1401881	0.37	4426953	3941070	-11.0	67.9	82.0
F_{lim}	1682257	0.46	4364303	3684832	-15.6	101.5	118.4
SSB(2021) = MSY $B_{trigger}$ = B_{pa}	3058502	1.03	3991537	2500000	-37.4	266.3	297.0
SSB(2021) = B_{lim}	3705781	1.42	3760134	1990000	-47.1	343.8	381.0
$F = F_{2019}$	835665	0.21	4543657	4472310	-1.6	0.1	8.5
Catch(2020) = Catch(2019) -20%	667963	0.162	4576011	4633032	1.2	-20.0	-13.3
Catch(2020) = Catch(2019)	834954	0.21	4543796	4472988	-1.6	0.0	8.4
Catch(2020) = Catch(2019) +25%	1043693	0.26	4502182	4275053	-5.0	25.0	35.5
$F = 0.20$	811738	0.20	4548331	4495149	-1.2	-2.8	5.4
$F = 0.21$	848823	0.21	4541079	4459764	-1.8	1.7	10.2
$F = 0.22$	885597	0.22	4533841	4424748	-2.4	6.1	15.0
$F = 0.24$	958226	0.24	4519408	4355808	-3.6	14.8	24.4
$F = 0.25$	994086	0.25	4512212	4321876	-4.2	19.1	29.0
$F = 0.26$	1029648	0.26	4505031	4288296	-4.8	23.3	33.7
$F = 0.27$	1064913	0.27	4497864	4255066	-5.4	27.5	38.2
$F = 0.28$	1099885	0.28	4490710	4222180	-6.0	31.7	42.8
$F = 0.29$	1134566	0.29	4483571	4189634	-6.6	35.9	47.3

* SSB 2021 relative to SSB 2020.

** Catch in 2020 relative to estimated catches in 2019 (834 954 t). There is no internationally agreed TAC for 2019.

*** Advice value for 2020 relative to the advice value for 2019 (770 358 t) as revised in May 2019.

^ Following the consultations between Norway, the European Union, and the Faroe Islands on the management of mackerel in the northeast Atlantic for 2019, a total catch of 653 438 t was set for 2019 (Anon., 2018).

The advised catch for 2020 is higher than the updated advice for 2019 (released in May 2019) because:

- The highest recruitment in the time-series (year classes 2016 and 2017) are entering the fishery and the spawning stock.
- There has been an upward revision of the SSB, and a downward revision of F.

Basis of the advice

Table 4 Mackerel in subareas 1–8 and 14, and in Division 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	There is no long-term management strategy for Northeast Atlantic (NEA) mackerel agreed by all parties involved in the mackerel fishery. Coastal State Delegations from Norway, the EU, and the Faroes have agreed on an arrangement for a long-term management strategy for mackerel (Anon., 2017).

Quality of the assessment

As in previous years, the assessment indicates conflicting signals between some of the data sources. The International Ecosystem Summer Survey in the Nordic Seas (IESSNS) index is increasing while the egg survey index is declining. This led to a decrease in the influence of those data sources in the assessment, and a poor fit to the latest egg survey.

Some of the data series are still short (IESSNS: 9 years; new tagging data: 5 years of recapture). In addition, the egg survey provides an SSB estimate every three years and the 2019 value is preliminary. ICES Working Group on Widely Distributed Stocks (WGWIDE) will update the 2019 value in 2020. The inclusion of any additional year of data for these short time-series may modify the relative weight of the different data sources in the assessment, causing a revision in the level of the SSB and mean F.

The model shows a substantial retrospective bias for F which has increased in the updated assessment (i.e. F is overestimated by more than 20%, Figure 3). This is likely to be caused by the shortness of the data series and the conflicting trends in the indices.

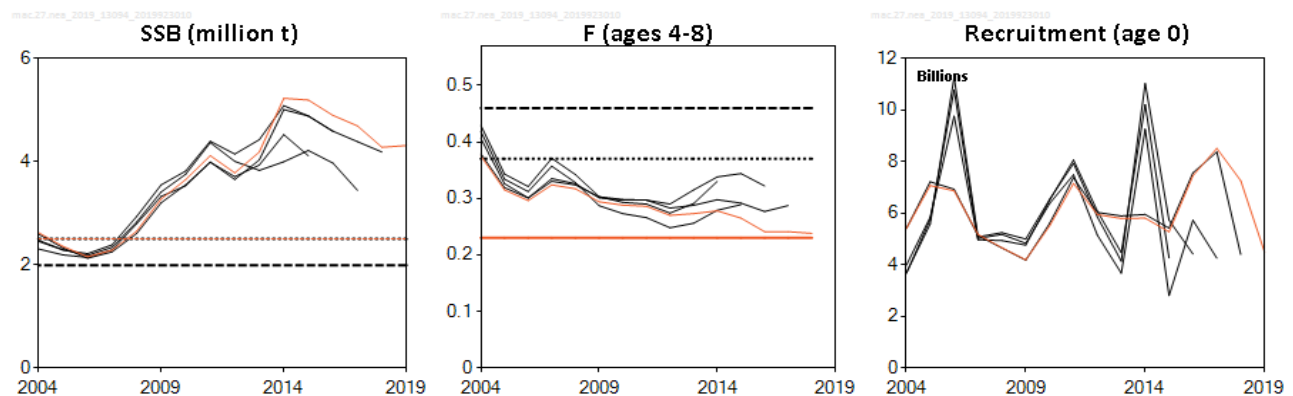


Figure 2 Mackerel in subareas 1–8 and 14, and in Division 9.a. Historical assessment results. Since the 2014 assessment, the last year of each recruitment line is the assumed value used in the forecast.

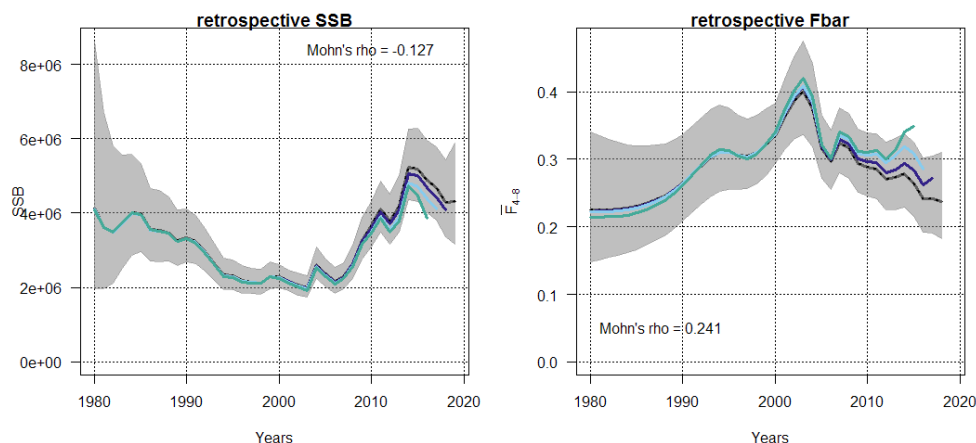


Figure 3 Mackerel in subareas 1–8 and 14, and in Division 9.a. Analytical three peel retrospective assessment plot.

Issues relevant for the advice

ICES evaluated a management strategy for mackerel in 2017. Since the interbenchmark in 2019, the fishing mortality reference points have been changed and F_{MSY} is now estimated to be higher than the target F in the management strategy ($F_{MSY} = 0.23$; $F_{MGT} = 0.21$). ICES has been requested by EU, Norway, and Faroe Islands to advise on the long-term management strategy for mackerel.

ICES currently considers the NEA mackerel stock to consist of three spawning components: western, southern, and North Sea (ICES, 2016), although the stock structure and spawning behaviour is likely to be more dynamic (Jansen and Gislason, 2013).

ICES recommends that the existing measures to protect the North Sea spawning component should remain in place. Prior to the late 1960s, spawning biomass of the North Sea component (i.e. mackerel with an affinity for spawning in the North Sea) was estimated at above 2.5 million tonnes. Overexploitation reduced the size of the North Sea component and it has not recovered despite decades of protection. A recent study has indicated that the lack of recovery is related to unfavourable environmental conditions (Jansen, 2014). Consequently, ICES considers that the North Sea spawning mackerel should be protected to conserve stock structure and dynamics in the NEA mackerel stock (ICES, 2017). The existing management measures to ensure the protection on the North Sea component (i.e. no mackerel fishing in divisions 3.a and 4.b–c, except for Norway where a limited amount of the TAC can be fished in Division 3.a; no mackerel fishing in Division 4.a during the period 15 February–31 July; and a 30 cm minimum conservation reference size) should therefore remain in place for precautionary reasons. However, an evaluation of the relevance of the minimum conservation reference size in relation to stock production and conservation is needed.

The North Sea part of the IENSSN survey that has been covered in the last two years is not currently included in the assessment, but it might be incorporated in the future once the time-series is sufficiently long.

Reference points

Table 5 Mackerel in subareas 1–8 and 14, and in Division 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2 500 000 t	B_{pa}	ICES (2019a)
	F_{MSY}	0.23	Stochastic simulations	ICES (2019a)
Precautionary approach	B_{lim}	1 990 000 t	B_{loss} in 2003 from the 2019 interbenchmark assessment	ICES (2019a)
	B_{pa}	2 500 000 t	$B_{lim} \times \exp(1.654 \times \sigma)$, $\sigma = 0.14$	ICES (2019a)
	F_{lim}	0.46	The F that on average leads to B_{lim}	ICES (2019a)
	F_{pa}	0.37	$F_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma = 0.14$	ICES (2019a)
Management plan	SSB_{mgt}			
	F_{mgt}			

Basis of the assessment

Table 6 Mackerel in subareas 1–8 and 14, and in Division 9.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical model (SAM) that uses catches in the model and in the forecast.
Input data	Catch data, steel tagging data (1980–2006) and RFID tagging data (2014–2018), and three survey indices: SSB index from the triennial egg survey (1992–2019), abundance indices from the IBTS survey (combined Q1 and Q4; age 0, 1998–2018), and from the IESSNS survey (ages 3–11, 2010, 2012–2019). 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 (0.3%) of the total catch in weight in 2018, but is only quantified for part of the fisheries; the proportion of the landings covered cannot be calculated. Partial discard estimates are included in the assessment and overall discarding in recent years is assumed negligible.
Indicators	None.
Other information	Inter-benchmarked in 2019 (IBPNEAMac; ICES, 2019a).
Working group	Working Group on Widely Distributed Stocks (WGWISE)

Information from stakeholders

The pelagic industry has reported encountering large shoals of mackerel over the entire distribution area for the past eleven years. Based upon these observations, the industry considers that the stock abundance has significantly increased over those years and remains at a high level and this increase in the stock is not confined to one area or observed by only one fleet. The industry has noted signs of increased abundance of smaller fish in recent years, particularly in 2014, 2015, 2017, 2018, and again at the start of 2019. The industry report that mackerel is also caught in substantial amounts outside of the directed mackerel fishery areas. The industry noted that the timing of the fishery targeting the main spawning migration at the end of January in 2019 was similar to 2018.

The IESSNS survey, which was expanded into the North Sea in 2018, was continued in 2019 with a Danish commercial vessel participating. The EU industry is examining the possibility of carrying out an acoustic survey at the end of this year or at the beginning of next year.

History of the advice, catch, and management

Table 7 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	TAC *	Official landings	Discards and slipping **	ICES catch
1987	Given by stock component		442000	616000	10789	654992
1988	Given by stock component		610000	622000	35566	680491
1989	Given by stock component		532000	576000	7090	585920
1990	Given by stock component		562000	580000	15600	626107
1991	Given by stock component		612000	609000	30700	675665
1992	Given by stock component		707000	729000	25000	760690
1993	Given by stock component		767000	784000	18180	824568
1994	Given by stock component		837000	794000	5370	819087
1995	Given by stock component		645000	729000	7721	756277
1996	Significant reduction in F	-	452000	509000	11415	563472
1997	Significant reduction in F	-	470000	517000	18864	573029
1998	F between 0.15 and 0.2	498000	549000	627000	8012	666316
1999	F of 0.15 consistent with PA	437000	562000	585000	n/a	640309
2000	F = 0.17: F _{pa}	642000	612000	655000	2084	738606
2001	F = 0.17: F _{pa}	665000	670000	660000	1188	737463
2002	F = 0.17: F _{pa}	694000	683000	685000	23774	771422
2003	F = 0.17: F _{pa}	542000	583000	600000	19427	679287
2004	F = 0.17: F _{pa}	545000	532000	587000	19962	660491
2005	F = 0.15 to 0.20	320000–420000	422000	447000	25788	549514
2006	F = 0.15 to 0.20	373000–487000	444000	318000^	26594	481181

Year	ICES advice	Catch corresponding to advice	TAC *	Official landings	Discards and slipping **	ICES catch
2007	F = 0.15 to 0.20	390000–509000	502000	558000	15444	586206
2008	F = 0.15 to 0.20	349000–456000	458000	420000	37075	623165
2009	F = 0.15 to 0.20	443000–578000	605000^^	442000	15934	737969
2010	Harvest control rule	527000–572000	885000^^^	862000	13045	875515
2011	See scenarios	529000–672000	959000^^^	930000	10894	946661
2012	Follow the management plan	586000–639000	927000^^^	877000	15174	892353
2013	Follow the management plan	497000–542000	906000^^^	927000	4732	931732
2014	Follow the management plan	927000–1011000	1392000^^^	1388000	6451	1393000
2015	Follow the management plan	831000–906000	1229000^^^	1199000	10431	1208990
2016	MSY approach	≤ 773 842	1057000^^^	1085000	5971	1094066
2017	MSY approach	≤ 857 185	1173000^^^	1153112	2832	1155944
2018	MSY approach	≤ 550 948	998000^^^	1026045	2890	1026437
2019	MSY approach	≤ 770 358 #	864000^^^			
2020	MSY approach	≤ 922 064				

n/a: not available.

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

** 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 (including quotas and transfers).

Updated from 318 403 t to 770 358 t in May 2019 (ICES, 2019b).

Table 8 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch for the **Western component**. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	TAC *	Discards and slipping	ICES catch **
1987	SSB = 1.5 mill. t; TAC	380000	405000	11000	633000
1988	F = F _{0.1} ; TAC; closed area; landing size	430000	573000	36000	656000
1989	Halt SSB decline; TAC	355000	495000	7000	571000
1990	TAC; F = F _{0.1}	480000	525000	16000	606000
1991	TAC; F = F _{0.1}	500000	575000	31000	647000
1992	TAC for both 1992 and 1993	670000	670000	25000	742000
1993	TAC for both 1992 and 1993	670000	730000	18000	805000
1994	No long-term gains in increased F	831000***	800000	5000	796000
1995	20% reduction in F	530000	608000	8000	728000
1996	No separate advice	-	422000	11000	529000
1997	No separate advice	-	416000	19000	529000
1998	No separate advice	-	514000	8000	623000
1999	No separate advice	-	520000	0	597000
2000	No separate advice	-	573000	2000	703000
2001	No separate advice	-	630000	1000	694000
2002	No separate advice	-	642000	24000	723000
2003	No separate advice	-	548000	9000	644000
2004	No separate advice	-	500000	11000	615000
2005	No separate advice	-	397000	20000	494000
2006	No separate advice	-	418000	17000	420000
2007	No separate advice	-	472000	8000	519000
2008	No separate advice	-	431000	27000	552000
2009	No separate advice	-	569000	13000	627000
2010	No separate advice	-	^	4000	817000
2011	No separate advice	-	^	8000	920000
2012	No separate advice	-	^	11000	864000
2013	No separate advice	-	^	2000	910000

Year	ICES advice	Catch corresponding to advice	TAC *	Discards and slipping	ICES catch **
2014	No separate advice	-	^	6000	1342000
2015	No separate advice	-	^	3000	1161000
2016	No separate advice	-	^	3000	1058000
2017	No separate advice	-	^	3000	1120298
2018	No separate advice	-	^	2372	987977
2019	No separate advice	-	^		
2020	No separate advice	-			

* 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 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch for the **North Sea component**. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice *	TAC **	ICES catch
1987	Lowest practical level	LPL	55000	3000
1988	Closed areas and seasons; min. landing size; bycatch regulations	LPL	55000	6000
1989	Closed areas and seasons; min. landing size; bycatch regulations	LPL	49200	7000
1990	Closed areas and seasons; min. landing size; bycatch regulations	LPL	45200	10000
1991	Closed areas and seasons; min. landing size; bycatch regulations	LPL	65500	n/a
1992	Closed areas and seasons; min. landing size; bycatch regulations	LPL	76300	n/a
1993	Maximum protection; closed areas and seasons; min. landing size	LPL	83100	n/a
1994	Maximum protection; closed areas and seasons; min. landing size	LPL	95700	n/a
1995	Maximum protection; closed areas and seasons; min. landing size	LPL	76300	n/a
1996	Maximum protection; closed areas and seasons; min. landing size	LPL	52800	n/a
1997	Maximum protection; closed areas and seasons; min. landing size	LPL	52800	n/a
1998	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
1999	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
2000	Maximum protection; closed areas and seasons; min. landing size	LPL	69700	n/a
2001	Maximum protection; closed areas and seasons; min. landing size	LPL	71400	n/a
2002	Maximum protection; closed areas and seasons; min. landing size	LPL	72900	n/a
2003	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
2004	Maximum protection; closed areas and seasons; min. landing size	LPL	57700	n/a
2005	Maximum protection; closed areas and seasons; min. landing size	LPL	44900	n/a
2006	Maximum protection; closed areas and seasons; min. landing size	LPL	47100	n/a
2007	Maximum protection; closed areas and seasons; min. landing size	LPL	53100	n/a
2008	Maximum protection; closed areas and seasons; min. landing size	LPL	48600	n/a
2009	Maximum protection; closed areas and seasons; min. landing size	LPL	63800	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	-	n/a
2017	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2018	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2019	Maximum protection; closed areas and seasons; min. landing size	LPL	-	
2020	Maximum protection; closed areas and seasons; min. landing size	LPL		

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 10 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch for the **Southern component**. All weights are in tonne.

Year	ICES advice	Catch corresponding to advice	TAC *	ICES catch
1987	Reduce juvenile exploitation	-	36570	22000
1988	Reduce juvenile exploitation	-	36570	25000
1989	No advice	-	36570	18000
1990	Reduce juvenile exploitation	-	36570	21000
1991	Reduce juvenile exploitation	-	36570	21000
1992	No advice	-	36570	18000
1993	No advice	-	36570	20000
1994	No advice	-	36570	25000
1995	No advice	-	36570	28000
1996	No separate advice	-	30000	34000
1997	No separate advice	-	30000	41000
1998	No separate advice	-	35000	44000
1999	No separate advice	-	35000	44000
2000	No separate advice	-	39200	36000
2001	No separate advice	-	40180	43000
2002	No separate advice	-	41100	50000
2003	No separate advice	-	35000	26000
2004	No separate advice	-	32310	35000
2005	No separate advice	-	24870	50000
2006	No separate advice	-	26180	53000
2007	No separate advice	-	29610	63000
2008	No separate advice	-	27010	60000
2009	No separate advice	-	35830	108000
2010	No separate advice	-	33880	52000
2011	No separate advice	-	37140	19000
2012	No separate advice	-	36740	29000
2013	No separate advice	-	31160	22000
2014	No separate advice	-	56640	51000
2015	No separate advice	-	48140	44000
2016	No separate advice	-	40920	36000
2017	No separate advice	-	46631	33000
2018	No separate advice	-	37305	34369
2019	No separate advice	-	29844	
2020	No separate advice	-		

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

History of the catch and landings

Table 11 Mackerel in subareas 1–8 and 14, and in Division 9.a. Landings distribution by fleet and discards as estimated by ICES.

Catch (2018)	Landings			Discards
	Pelagic trawl 82.9%	Purse seine 16.9%	Others 0.2%	
1 026 437 tonnes	1 023 547 tonnes			2 890 tonnes*

* Only quantified for part of the fisheries.

Table 12 Mackerel in subareas 1–8 and 14, and in Division 9.a. Catches inside and outside the NEAFC regulatory area (RA). All weights are in tonnes.

Year	Catches inside NEAFC RA	Catches outside NEAFC RA	Total catches
2018	213 608	812 829	1 026 437

Table 13 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of commercial catch and landings; the official values are presented by country. All weights are in tonnes. “Misreported” refers to assumed area misreporting between divisions 4.a and 6.a, and “Unallocated” indicates differences between official reported values and ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	20	37		125	102	191	351	106	62	114	125	177	146	97	22
Denmark	36853	34264	35800	41505	42164	42502	50142	36780	28526	21971	27416	30011	29177	22522	34376
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	19768
France	10706	14911	19000	6480	962	3836	11573	11782	15663	20916	17835	16367	19445	20956	21878
Germany, Fed.	16457	22512	21600	14537	13719	13236	26508	24415	16227	15374	21412	19949	22979	25307	26532
Germany, Dem.		2409													
Greenland															
Guernsey															
Iceland									92	925	357				53
Ireland	85800	69980	74300	30138	35088	36982	89028	78534	54313	53129	66650	59675	71233	70452	72172
Jersey															
Latvia					311	4700	1508	389	233						
Lithuania													2085		
Netherlands	28664	31343	38200	69418	82860	89543	44335	35789	36760	23700	30163	28621	32385	36095	33444
Norway	163450	150400	151700	208266	239965	257800	258094	202205	136436	137523	158177	160738	174098	180372	184291
Poland						600				22					
Portugal	4388	3112	3819	2789	3576	2015	2158	2893	3023	2080	2897	2002	2253	3119	2934
Romania							2903								
Spain	21884	16609	17892	22011	17234	20864	27113	29165	33371	46470	44607	45915	38321	44142	50123
Sweden	1003	6601	6400	4227	5100	5934	7099	6285	5307	4714	5146	5233	4994	5098	5232
United Kingdom	210815	187760	193900	200019	232829	256275	237841	212147	146205	321821	185948	160152	184902	192631	194045
USSR/Russia	27924	12088	28900	13361	42440	49600	28041	44537	44545	53732	67836	51348	50772	41567	45811
Misreported							109625	18647				-211	4816		6009
Unallocated	34330	25361	8100	12956	15038		4632	29228	10839	5679	11498	38996	66235	62825	50543
Discards	35576	7090	15600	30750	25000	18380	5370	7721	11415	18864	8030		3832	1188	23774
Total	680492	589509	625211	667713	760351	815033	931194	774108	563610	742969	666682	634545	731459	730774	771007

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	2	5	1	3	1	2	3	29	21	39	62	56	52	143	128	168
Denmark	27900	25665	23212	24219	25223	26726	23491	41445	35958	36501	33218	42222	46871	41139	40028	30690
Estonia										1367						
Faroe Islands	14014	13030	9769	12067	13430	11289	14062	70987	122050	107630	143001	150236	108412	93267	99667	81079
France	22906	20266	16338	14953	20038	15602	18340	11379	12766	20467	14643	21719	25704	20189	22950	21471
Germany, Fed.	24061	23244	19040	16608	18221	15502	22703	19055	24083	18944	20931	28456	28257	23411	24858	19883
Germany, Dem.																

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Greenland									62	7402	54148	78581	30351	36142	46388	62973
Guernsey				10					10	5	9	9	4			12
Iceland	122		363	4222	36706	112286	116160	121008	159263	149282	151235	172960	169333	170374	167366	168330
Ireland	67355	61102	45687	40664	49259	44760	61056	57994	61596	63049	56511	103178	88744	76526	84915	66747
Jersey			9	8	6	7	8	6	7	8	8	7	3	3		3
Latvia																
Lithuania				95	7				23			9598	554	2540		
Netherlands	30424	27532	22734	24157	24244	19972	23568	23088	28395	25817	21159	46665	39807	37929	43766	30392
Norway	163406	157363	119678	121993	131691	121524	121229	233952	208065	176023	164607	277731	242231	209352	222356	187207
Poland			570	1368	978								24		1	4057
Portugal	2749	2289	1509	2620	2605	2381	1753	2363	962	824	254	618	1456	619	634	4565
Romania																
Spain	23762			54136	62946	64637	114074	52737	18725	19386	16414	37806	34530	30036	32885	33329
Sweden	445	4437	3204	3209	3858	3664	7303	3429	3248	4564	2906	4422	3930	3663	3701	3966
United Kingdom	183008	214771	152801	95815	133688	112394	157010	160417	180972	169745	163807	287851	247986	217633	225410	190028
USSR/Russia	40026	49489	40495	33580	35408	32728	41414	59310	73601	74587	80817	116433	128433	121644	138061	118255
Misreported																
Unallocated	59172	41335	68414	4954	12453	1069	-139	5271	5961	5237	3336	9457	1876	3480		392
Discards	9481	19962	25788	26594	15444	37075	15934	13045	10894	15174	4732	6451	10430	5971	2832	2890
Total	668833	660491	549514	481276	586206	621618	737969	875515	946662	894684	933165	1394456	1208988	1094066	1155944	1026437

Table 14 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of catch and landings; the ICES estimates are presented by area. All weights are in tonnes.

Year	Subarea 6			Subarea 7 and divisions 8.a, 8.b, 8.d, and 8.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

Year	Subarea 6			Subarea 7 and divisions 8.a, 8.b, 8.d, and 8.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
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	44 164		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
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
2016	206326	200	206526	37300	1927	39227	248041	570	248611	563440	54	563494	32987	3220	36207	1088094	5971	1094066
2017	225959	151	226110	21128	1992	23119	269404	400	269804	603806	62	603869	32815	227	33042	1153112	2832	1155944
2018	157239	90	157329	35240	1611	36851	341527	620	342147	455689	51	455740	33851	518	34369	1023547	2890	1026437

Summary of the assessment

Table 15 Mackerel in subareas 1–8 and 14, and in Division 9.a. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment (age 0)			SSB ***			Total catch	F (ages 4–8)		
	Low	Value	High	Low	Value	High		Low	Value	High
1980	2993662	5811487	11281629	1978488	4133735	8636782	734950	0.149	0.23	0.34
1981	2931698	5081028	8806106	1955059	3619938	6702587	754045	0.151	0.23	0.34
1982	2041350	3613849	6397678	2105977	3493680	5795789	716987	0.154	0.23	0.33
1983	1876687	3372139	6059250	2507647	3731743	5553376	672283	0.158	0.23	0.33
1984	2642350	4359034	7191015	2874270	4010169	5594970	641928	0.162	0.23	0.32
1985	2570310	4140770	6670781	2973239	3978339	5323213	614371	0.167	0.23	0.32
1986	2615106	4128829	6518751	2718570	3562706	4668953	602201	0.173	0.24	0.32
1987	2797577	4388517	6884198	2695161	3528345	4619100	654992	0.179	0.24	0.32
1988	2436833	3762477	5809274	2718784	3473395	4437452	680491	0.187	0.25	0.32
1989	2312000	3573130	5522172	2592729	3257928	4093792	585920	0.197	0.25	0.33
1990	2046045	3214451	5050081	2692831	3327951	4112868	626107	0.21	0.27	0.34
1991	2174251	3346363	5150345	2637787	3226517	3946646	675665	0.22	0.28	0.35
1992	2244504	3456082	5321666	2448778	2968248	3597914	760690	0.23	0.29	0.36
1993	2034941	3112788	4761538	2199450	2648332	3188824	824568	0.24	0.30	0.37
1994	1928161	2943059	4492155	1947957	2329018	2784623	819087	0.25	0.31	0.38
1995	1818532	2792843	4289157	1941410	2303399	2732882	756277	0.26	0.31	0.38
1996	1932217	2994638	4641226	1848588	2185774	2584463	563472	0.26	0.31	0.37
1997	1936803	2926988	4423402	1839814	2148580	2509165	573029	0.26	0.30	0.36
1998	2171685	2977574	4082521	1810296	2118079	2478192	666316	0.26	0.31	0.36
1999	2547705	3528098	4885760	1973069	2302099	2685997	640309	0.28	0.32	0.37
2000	2112975	2952146	4124594	2001413	2283798	2606025	738606	0.29	0.34	0.38
2001	3452779	4749644	6533612	1907342	2172227	2473899	737463	0.32	0.36	0.42
2002	4025264	5646271	7920072	1792202	2066525	2382837	771422	0.33	0.39	0.45
2003	2502549	3696698	5460662	1734279	2001924	2310873	679287	0.34	0.40	0.48
2004	3828829	5397194	7607994	2236181	2623839	3078701	660491	0.32	0.38	0.44
2005	4816015	7070591	10380629	2003961	2356722	2771579	549514	0.27	0.32	0.37
2006	4799793	6866257	9822401	1833349	2154446	2531780	481181	0.26	0.30	0.34
2007	3756146	5176997	7135318	1954818	2282022	2663993	586206	0.28	0.32	0.38
2008	3364249	4658201	6449832	2237447	2651098	3141224	623165	0.27	0.32	0.37
2009	2840952	4188877	6176341	2755301	3272629	3887090	737969	0.25	0.29	0.34
2010	3939474	5507435	7699466	3094848	3650817	4306662	875515	0.25	0.29	0.34
2011	4951329	7152461	10332115	3480137	4115518	4866903	946661	0.24	0.29	0.34
2012	4300959	5944485	8216050	3174452	3780926	4503266	892353	0.23	0.27	0.33
2013	4157315	5795704	8079781	3493207	4185895	5015939	931732	0.23	0.27	0.33
2014	4177963	5807466	8072513	4368401	5229726	6260879	1393000	0.23	0.28	0.34
2015	3777291	5273724	7362995	4304180	5195560	6271543	1208990	0.22	0.27	0.33
2016	4935333	7454724	11260215	4021132	4896846	5963271	1094066	0.193	0.24	0.30
2017	5650073	8514386	12830766	3801919	4692164	5790867	1155944	0.191	0.24	0.31
2018		7259498*		3368975	4279185	5435312	1026437	0.182	0.24	0.31
2019		4486290**			4389601†					

* RCT3 estimate.

** Geometric mean 1990–2017.

*** SSB is at spawning time.

† Estimated value from the forecast.

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