

Sole (*Solea solea*) in Division 7.e (western English Channel)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 1239 tonnes.

Stock development over time

Fishing mortality (F) has been below F_{MSY} since 2009. Spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ since 1999. Recruitment (R) has been variable without an overall trend.

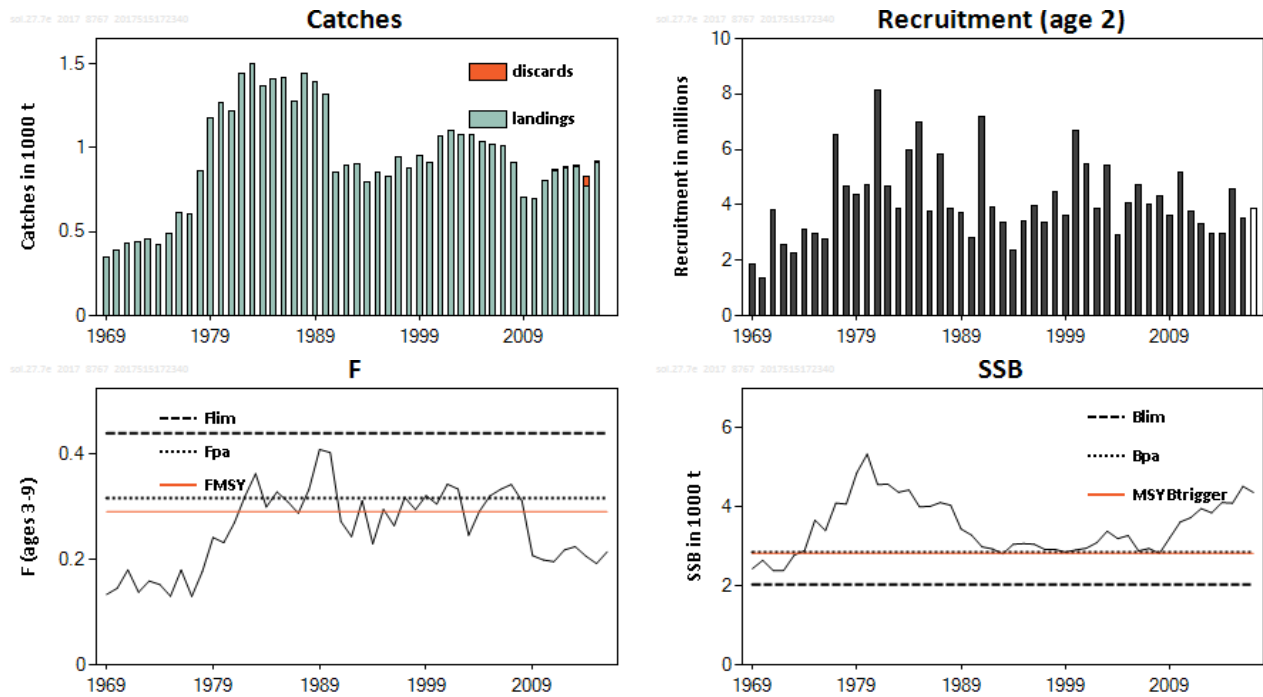


Figure 1 Sole in Division 7.e. Summary of the stock assessment. ICES estimated catches, recruitment, fishing mortality, and spawning-stock biomass from the summary stock assessment. Assumed recruitment values are not shaded. Discard estimates are only available from 2012 onwards.

Stock and exploitation status

Table 1 Sole in Division 7.e. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size				
		2014	2015	2016	2015	2016	2017		
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	MSY	✓	✓	✓	Above trigger
Precautionary Approach	F_{pa}	✓	✓	✓	B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity
	F_{lim}								
Management plan	F_{MGT}	—	—	—	B_{MGT}	—	—	—	Not applicable

Catch options

Table 2 Sole in Division 7.e. The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–9 (2017)	0.21	ICES (2017a)	$F_{sq} = F_{Average}(2014–2016)$ rescaled to F_{2016}
SSB (2018)	4 354 tonnes	ICES (2017a)	Fishing at F_{sq}
Rage2 (2017, 2018)	3 890 thousands	ICES (2017a)	GM (1969–2016)
Total catch (2017)	959 tonnes	ICES (2017a)	Wanted catches adjusted for unwanted catches
Wanted catch (2017)	931 tonnes	ICES (2017a)	Fishing at F_{sq}
Unwanted catch (2017)	28 tonnes	ICES (2017a)	Average ratio (2014–2016) (2.9%)

Table 3 Sole in Division 7.e. Annual catch options. All weights are in tonnes.

Basis	Total catch [^] (2018)	Wanted catch* (2018)	Unwanted catch* (2018)	F_{wanted} (2018)	SSB (2019)	% SSB change **	% TAC change ***
ICES advice basis							
MSY approach: F_{MSY}	1239	1202	36	0.29	4079	-6.3	5.2
Other options							
$F = 0$	0	0	0	0	5244	20	-100
F_{pa}	1349	1309	40	0.32	3977	-8.7	15
F_{lim}	1760	1708	52	0.44	3594	-17	49
SSB (2019) = B_{lim}	3501	3399	103	1.17	2000	-54	197
SSB (2019) = $B_{pa} = MSY B_{trigger}$	2511	2437	74	0.70	2900	-33	113
$F = F_{2017}$	949	922	28	0.21	4350	-0.083	-19
Management plan: $F = 0.27$ with 15% TAC constraint	1164	1130	34	0.27	4150	-4.7	-1.19

* “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded in the absence of the EU landing obligation, based on discard rate estimates for 2014-2016.

** SSB 2019 relative to SSB 2018.

*** Total catch in 2018 relative to TAC in 2017 (1178t).

[^] Total catch derived from the wanted catch and the unwanted catches ratio.

Basis of the advice

Table 4 Sole in Division 7.e. The basis of the advice.

Advice basis	MSY approach
Management plan	A management plan has been agreed by the EU in 2007 (EC, 2007). In its current phase, it aims at keeping F at the target value of 0.27 with a 15% TAC constraint. This plan has not been evaluated by ICES.

Quality of the assessment

Reliable discard data is available since 2012 and indicates that discards for this stock are negligible. The average discard rate for 2014–2016 is 2.9%.

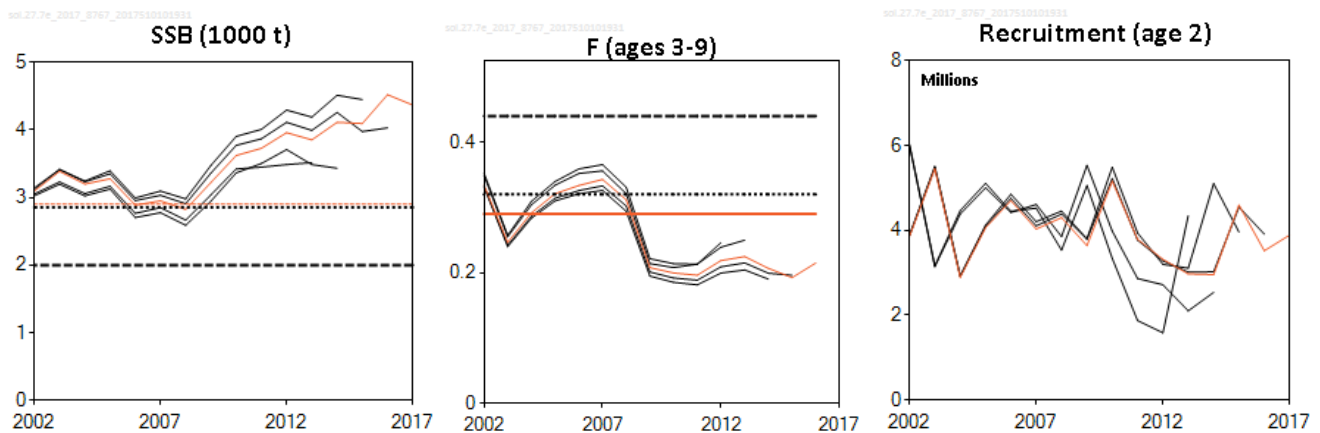


Figure 2 Sole in Division 7.e. Historical assessment results (final-year recruitment estimates included). The recruitment age in the assessment has changed from one to two, following the inter-benchmark in 2015 (ICES, 2015).

Issues relevant for the advice

The advice takes account of the available discard estimates to give catch advice for the stock. The EU landing obligation applied to some vessels catching sole in 2016 for the first time (EU, 2015) and has been refined for 2017 and 2018 (EU, 2016).

Reference points

Table 5 Sole in Division 7.e. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2900 tonnes	The 5 th percentile of the distribution of SSB when fishing at F_{MSY} (0.29)	ICES (2016a)
	F_{MSY}	0.29	Median point estimate of EqSim simulations.	ICES (2016a)
Precautionary approach	B_{lim}	2 000 tonnes	$B_{pa}/1.4$	ICES (2016a)
	B_{pa}	2 900 tonnes	Rounded B_{loss} (1999 year class). Lowest SSB with high recruitment.	ICES (2016a)
	F_{lim}	0.44	Segmented regression of stock-recruitment with B_{lim} as the breakpoint	ICES (2016a)
	F_{pa}	0.32	$F_{lim} \times \exp(-1.645 \times \sigma)$; $\sigma = 0.2$.	ICES (2016a)
Management plan	SSB_{MGT}	Not defined		
	F_{MGT}	0.27		EC (2007)

Basis of the assessment

Table 6 Sole in Division 7.e. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Age-based analytical assessment (XSA) that uses landings in the model, and discards are then included to calculate a catch forecast (ICES, 2017).
Input data	Commercial catch-at-age data; two survey indices (UK-FSP and Q1SWBeam) and two commercial tuning fleets (UK-CBT-late and UK-COT); natural mortality is assumed constant over ages and years at 0.1; fixed maturity ogive from divisions 7.f and 7.g.
Discards and bycatch	Not included in the assessment, but used to provide catch advice.
Indicators	None
Other information	Last inter-benchmark in 2015 (IBPWCFIat2; ICES, 2015)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

There is no additional available information for this stock.

History of the advice, catch, and management

Table 7 Sole in Division 7.e. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catches corresp. to advice	Predicted landings corresp. to advice	Agreed TAC	Official landings	ICES landings	ICES discards
1987	No increase in F		1150	1150	1110	1280	
1988	No decrease in SSB; TAC		1300	1300	950	1444	
1989	No decrease in SSB; TAC		1000	1000	800	1390	
1990	SSB = 3000 t; TAC		900	900	750	1315	
1991	TAC		540	800	840	852	
1992	70% of F1990		770	800	770	895	
1993	35% reduction in F		700	900	790	904	
1994	No increase in F		1000	1000	840	800	
1995	No increase in F		860	950	880	856	
1996	F1996 < F1994		680	700	740	833	
1997	No increase in F		690	750	860	949	
1998	No increase in F		670	670	770	880	
1999	Reduce F below F_{pa}		670	700	660	957	
2000	Reduce F below F_{pa}		< 640	660	660	914	
2001	Reduce F below F_{pa}		< 580	600	650	1069	
2002	Reduce F below F_{pa}		< 450	525	540	1106	
2003	Rebuilding plan or F = 0		-	394	620	1078	
2004	F = 0 or recovery plan 1		0	300	490	1075	
2005	80% reduction in F or recovery plan		< 230	865	960	1039	
2006	80% reduction in F or recovery plan		< 240	940	970	1022	
2007	68% reduction in F or recovery plan		< 350	900	820	1015	
2008	75% reduction in F		< 260	765	670	908	
2009	70% reduction in F		< 320	650	640	701	
2010	Reduce fishing effort and catches		-	618	760	698	
2011	MSY framework		< 660	710	750	801	
2012	MSY framework		< 740	777	870	872	2
2013	MSY framework		< 960	894	889	883	1
2014	MSY approach		< 832	832	885	885	10
2015	MSY approach		< 851	851	774	774	54
2016	MSY approach		≤ 1226	979	914	913	10
2017	MSY approach	≤ 1198		1178			
2018	MSY approach	≤ 1239					

History of the catch and landings

Table 8 Sole in Division 7.e. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings				Discards			
	Beam trawl	Otter trawl	Gillnets	Other gears	Beam trawl	Otter trawl	Gillnets	Other gears
924 tonnes	63%	24%	7.8%	4.4%	37%	62%	0.82%	0%
	913 tonnes				10 tonnes			

Table 9 Sole in Division 7.e. History of commercial catch and landings presented. All weights are in tonnes.

Year	Landings						Unallocated landings	Discards ICES estimate
	Belgium	France	Netherlands	Ireland	UK and Channel Islands	Total		
1974		323				427	104	
1975	3	271			217	491		
1976	4	352			260	616		
1977	3	331			272	606		
1978	4	384			453	861	20	
1979	1	515			665	1181		
1980	45	447		13	764	1269		
1981	16	415	1		788	1215	-5	
1982	98	321			1028	1446	-1	
1983	47	405	3		1043	1498		
1984	48	421			901	1370		
1985	58	130			911	1409	310	
1986	62	467			840	1419	50	
1987	48	432			632	1280	168	
1988	67	98			784	1444	495	
1989	69	112	6		613	1390	590	
1990	41	81			636	1315	556	
1991	35	325			477	852	15	
1992	41	267			468	895	119	
1993	59	236			498	904	111	
1994	33	257			546	800	-38	
1995	21	294			565	856	-24	
1996	8	297			428	833	91	
1997	13	348		1	496	949	91	
1998	40	343			389	880	108	
1999	13				396	957	548	
2000	4	241			413	914	256	
2001	19	224			407	1069	419	
2002	33	198			309	1106	566	
2003	1	363		1	255	1078	458	
2004	7	302			185	1075	581	
2005	26	406			527	1039	80	
2006	32	357			576	1022	56	
2007	34	384		2	531	1015	64	
2008	28	312		0	472	908	96	
2009	17	386			381	701	-83	
2010	17	375			368	698	-62	
2011	22	401			428	801	-50	
2012	39	325		0	506	872	2	2
2013	30	319			540	883	-6	1
2014	25	351			509	884	-1	10
2015*	42	243		0	490	774	-1	54
2016*	46	245			623	913	-1	10

*Preliminary

Summary of the assessment

Table 10 Sole in Division 7.e. Assessment summary. Weights are in tonnes, numbers in thousands.

Year	Recruitment (age 2)	Stock size SSB	Landings	Discards	Fishing mortality (ages 3-9)
1969	1874	2437	353		0.134
1970	1343	2652	391		0.146
1971	3826	2390	432		0.181
1972	2568	2395	437		0.138
1973	2264	2778	459		0.160
1974	3107	2896	427		0.153
1975	2967	3670	491		0.131
1976	2791	3403	616		0.180
1977	6556	4098	606		0.130
1978	4657	4074	861		0.178
1979	4389	4865	1181		0.24
1980	4702	5338	1269		0.23
1981	8130	4572	1215		0.27
1982	4680	4575	1446		0.32
1983	3866	4374	1498		0.36
1984	5968	4430	1370		0.30
1985	6982	4009	1409		0.33
1986	3766	4014	1419		0.31
1987	5849	4112	1280		0.29
1988	3880	4044	1444		0.33
1989	3736	3443	1390		0.41
1990	2818	3288	1315		0.40
1991	7169	2993	852		0.27
1992	3908	2940	895		0.24
1993	3354	2814	904		0.31
1994	2373	3058	800		0.23
1995	3434	3073	856		0.30
1996	3987	3059	833		0.27
1997	3388	2928	949		0.32
1998	4468	2927	880		0.30
1999	3599	2859	957		0.32
2000	6693	2912	914		0.31
2001	5495	2957	1069		0.34
2002	3857	3097	1106		0.33
2003	5452	3388	1078		0.25
2004	2893	3200	1075		0.29
2005	4063	3279	1039		0.32
2006	4701	2888	1023		0.33
2007	4031	2951	1015		0.34
2008	4301	2825	908		0.31
2009	3640	3224	701		0.21
2010	5158	3622	698		0.20
2011	3790	3730	801		0.20
2012	3317	3960	872	2	0.22
2013	2973	3854	883	1	0.23
2014	2955	4114	885	10	0.21
2015	4598	4097	774	54	0.193
2016	3520	4522	913	10	0.21
2017	3890*	4370			

*geometric mean

Sources and references

EC. 2007. Council Regulation (EC) No. 509/2007 of 7 May 2007 establishing a multi-annual plan for the sustainable exploitation of the stock of sole in the Western Channel. Official Journal of the European Union, L 122/7. <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R0509&from=EN>.

EU. 2015. Commission Delegated Regulation (EU) 2015/2438 of 12 October 2015 establishing a discard plan for certain demersal fisheries in north-western waters. OJ L 336, 23.12.2015, p. 29–35. http://eur-lex.europa.eu/eli/reg_del/2015/2438/oj

EU. 2016. Commission Delegated Regulation (EU) 2016/2375 of 12 October 2016 establishing a discard plan for certain demersal fisheries in North-Western waters. C/2016/6439, OJ L 352, 23.12.2016, p. 39–47. http://eur-lex.europa.eu/eli/reg_del/2016/2375/oj

ICES. 2015. Report of the Second Inter-Benchmark Protocol on West of Channel Flatfish (IBPWFlat2), June–September 2015, by correspondence. ICES CM 2015/ACOM:55. 142 pp.

ICES. 2016a. Report of the Workshop to consider F_{MSY} ranges for stocks in ICES categories 1 and 2 in Western Waters (WKMSYREF4), 13–16 October 2015, Brest, France. ICES CM 2015/ACOM:58. 187 pp.

ICES. 2016b. Advice basis. *In*: Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

ICES. 2017. Report of the Working Group for the Celtic Seas Ecoregion (WGCSE), 9–18 May 2017, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM