

Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 931 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ since 2001. Fishing mortality (F) has been at or above F_{MSY} since 2009. The 2015 and 2016 recruitment are estimated to be well above average.

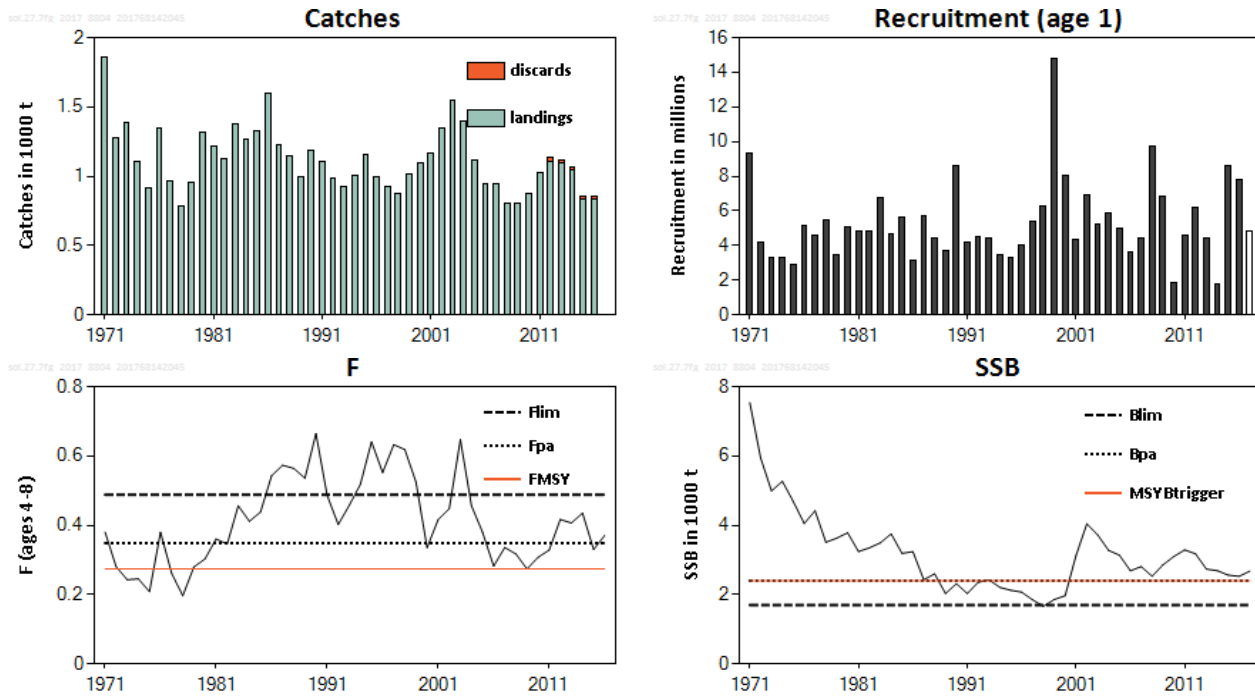


Figure 1 Sole in divisions 7.f and 7.g. Summary of the stock assessment. Assumed recruitment values are not shaded.

Stock and exploitation status

Table 1 Sole in divisions 7.f and 7.g. 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}	✘	✘	✘	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	B_{MGT}	—	—	—	Not applicable

Catch options

Table 2 Sole in divisions 7.f and 7.g. The basis for the catch options.

Variable	Value	Source	Notes
F ages 4–8 (2017)	0.29	ICES (2017)	Catch constraint (TAC 2017)
SSB (2018)	3112 tonnes	ICES (2017)	Fishing at F=0.29
Age1 (2017 and 2018)	4802 thousands	ICES (2017)	GM(1971–2014)
Catch (2017)	873 tonnes	ICES (2017)	TAC 2017 plus a 3.2% discard ratio in weight
Landings (2017)	845 tonnes	ICES (2017)	TAC 2017
Discards (2017)	28 tonnes	ICES (2017)	Average ratio of 2014–2016 (3.2%)

Table 3 Sole in divisions 7.f and 7.g. 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}	931	901	30	0.27	3441	10	10
Other options							
F = 0	0	0	0	0	4310	38	-100
F _{pa}	1138	1101	37	0.34	3249	4.4	35
F _{lim}	1514	1465	49	0.48	2901	-6.8	79
SSB (2019) = B _{lim}	2833	2741	92	1.18	1700	-45	235
SSB (2019) = B _{pa} = MSY B _{trigger}	2060	1993	67	0.72	2400	-23	144
F = F ₂₀₁₇	999	967	32	0.29	3378	8.5	18

* “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 2017 (average 2014–2016).

** SSB 2019 relative to SSB 2018.

*** Total catch in 2018 relative to TAC in 2017 (845 t).

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

Basis of the advice

Table 4 Sole in divisions 7.f and 7.g. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for sole in this area.

Quality of the assessment

The current assessment revised down the high 2015 recruitment by 16% relative to last year’s assessment. Discards are currently not included in the assessment, but given the low discard rates of sole (average discard rate 2014–2016 = 3.2% of catch) it is unlikely that the inclusion of discards would change the perception of the stock.

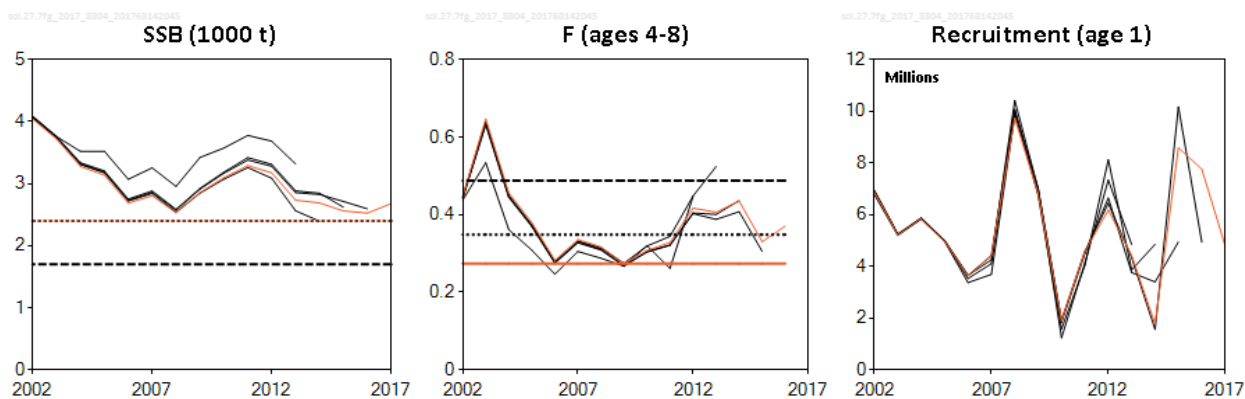


Figure 2 Sole in divisions 7.f and 7.g. Historical assessment results.

Issues relevant for the advice

A TAC constraint has been applied in the forecast because recent landings have been close to the TAC. The EU landings obligation applies to some fleets catching sole from 2017. The catch advice takes into account the discard information.

Reference points

Table 5 Sole in divisions 7.f and 7.g. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2400 tonnes	B_{pa}	ICES (2016a)
	F_{MSY}	0.27	Stochastic simulations with segmented regression stock–recruitment relationship	ICES (2016a)
Precautionary approach	B_{lim}	1700 tonnes	B_{loss} estimated in 2015	ICES (2016a)
	B_{pa}	2400 tonnes	$B_{lim} \times 1.4$	ICES (2016a)
	F_{lim}	0.48	F with 50% probability of $SSB < B_{lim}$	ICES (2016a)
	F_{pa}	0.34	$F_{lim}/1.4$	ICES (2016a)
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 6 Sole in divisions 7.f and 7.g. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Age-analytical assessment (XSA) that uses landings in the model; discards are then included to calculate a catch forecast.
Input data	International landings, ages and length frequencies from catch sampling by métier; one survey index (UK(E&W)-BTS-Q3); three commercial indices (BE-CBT, BE-CBT2, and UK(E&W)-CBT) (1991-2012); maturity data from a combined-sex maturity (ICES, 1998); natural mortality is assumed to be constant
Discards and bycatch	Not included in the assessment, but used to provide catch advice
Indicators	None
Other information	Benchmarked in 2014 (ICES, 2014)
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 divisions 7.f and 7.g. 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 discards	ICES landings
1987	Status quo F; TAC		1600	1600	1264		1222
1988	F = F(pre-86); TAC		900	1100	1204		1146
1989	F at F(81–85); TAC		1000	1000	992		992
1990	No increase in F		1200	1200	1239		1189
1991	No increase in F		1100	1200	1496		1107
1992	No long-term gains in increasing F		1100	1200	1060		981
1993	No long-term gains in increasing F		-	1100	1030		928
1994	No long-term gains in increasing F		-	1100	1018		1009
1995	No increase in F		1000	1100	1165		1157
1996	20% reduction in F		800	1000	1081		995
1997	20% reduction in F		800	900	1038		927
1998	20% reduction in F		700	850	1013		875
1999	Reduce F below F_{pa}		810	960	947		1012
2000	Reduce F below F_{pa}		< 1160	1160	1040		1091
2001	Reduce F below F_{pa}		< 810	1020	1120		1168
2002	Reduce F below F_{pa}		< 1000	1070	1118		1345
2003	Reduce F below F_{pa}		< 1240	1240	1207		1392
2004	Reduce F below F_{pa}		< 1000	1050	1130		1249
2005	Reduce F below F_{pa}		< 840	1000	997		1044
2006	Reduce F below F_{pa}		< 880	950	921		946
2007	Reduce F below F_{pa}		< 840	893	943		945
2008	Keep F below F_{pa}		< 1000	964	780		800
2009	No long-term gain in increasing F		< 940	993	807		805
2010	No long-term gain in increasing F		< 920	993	871		876
2011	See scenarios		-	1241	1013		1029
2012	MSY approach		< 1060	1060	1099	34	1104
2013	MSY approach		< 1100	1100	1086	22	1092
2014	MSY approach		< 920	1001	1044	21	1042
2015	MSY approach		< 652	851	827*	26	830
2016	MSY approach	≤ 760	≤ 745	779	831*	26	831
2017	MSY approach	≤ 806		845			
2018	MSY approach	≤ 931					

*Preliminary.

History of the catch and landings

Table 8 Sole in divisions 7.f and 7.g. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings			Discards
	Beam trawlers 83%	Otter trawlers 13 %	Other gear 3.8%	
857 tonnes	831 tonnes			26 tonnes

Table 9 Sole in divisions 7.f and 7.g. History of commercial landings and TAC. All weights are in tonnes.

Year	Belgium	Denmark	France	Ireland	UK (E.&W,NI.)	UK (Scotland)	Netherlands	Total- official	Unallocated landings	ICES landings	TAC
1986	1039*	2	146	188	611	-	3	1989	-389	1600	
1987	701*	-	117	9	437	-	-	1264	-42	1222	1600
1988	705*	-	110	72	317	-	-	1204	-58	1146	1100
1989	684*	-	87	18	203	-	-	992	0	992	1000
1990	716*	-	130	40	353	0	-	1239	-50	1189	1200
1991	982*	-	80	32	402	0	-	1496	-389	1107	1200
1992	543*	-	141	45	325	6	-	1060	-79	981	1200
1993	575*	-	108	51	285	11	-	1030	-102	928	1100
1994	619*	-	90	37	264	8	-	1018	-9	1009	1100
1995	763*	-	88	20	294	-	-	1165	-8	1157	1100
1996	695*	-	102	19	265	0	-	1081	-86	995	1000
1997	660*	-	99	28	251	0	-	1038	-111	927	900
1998	675*	-	98	42	198	-	-	1013	-138	875	850
1999	604	-	61	51	231	0	-	947	65	1012	960
2000	694	-	74	29	243	-	-	1040	51	1091	1160
2001	720	-	77	35	288	-	-	1120	48	1168	1020
2002	703	-	65	32	318	+	-	1118	227	1345	1070
2003	715	-	124	26	342	+	-	1207	340	1547	1240
2004	735	-	79	33	283	-	-	1130	268	1398	1050
2005	645	-	101	34	217	-	-	997	121	1118	1000
2006	576	-	75	38	232	-	-	921	25	946	950
2007	582	-	85	32	244	-	-	943	2	945	893
2008	466	-	68	28	218	-	-	780	20	800	964
2009	513	-	74	26	194	-	-	807	-2	805	993
2010	620	-	45	27	179	-	-	871	5	876	993
2011	766	-	50	30	168	-	-	1013	16	1029	1241
2012	843	-	48	33	175	-	-	1099	5	1104	1060
2013	789	-	49	42	206	-	-	1086	6	1092	1100
2014	705	-	59	28	252	-	-	1044	2	1042	1001
2015^	671	-	24	27	105	-	-	827	3	830	851
2016^	563	-	72	21	175	-	-	831	0	831	779

^Preliminary.

* Including divisions 7.g-k.

Summary of the assessment

Table 10 Sole in divisions 7.f and 7.g. Assessment summary. Weights are in tonnes.

Year	Recruitment age 1 thousands	SSB	Landings	Discards	F ages 4–8
1971	9356	7540	1861		0.38
1972	4173	5939	1278		0.28
1973	3312	4994	1391		0.24
1974	3301	5266	1105		0.25
1975	2928	4684	919		0.21
1976	5154	4050	1350		0.38
1977	4585	4417	961		0.26
1978	5438	3511	780		0.197
1979	3501	3629	954		0.28
1980	5095	3783	1314		0.30
1981	4839	3242	1212		0.36
1982	4862	3350	1128		0.35
1983	6754	3492	1373		0.46
1984	4671	3750	1266		0.41
1985	5612	3188	1328		0.44
1986	3132	3240	1600		0.54
1987	5699	2429	1222		0.57
1988	4459	2599	1146		0.56
1989	3717	2032	992		0.54
1990	8620	2313	1189		0.66
1991	4215	2031	1107		0.49
1992	4477	2352	981		0.40
1993	4456	2426	928		0.46
1994	3441	2208	1009		0.52
1995	3317	2125	1157		0.64
1996	4016	2071	995		0.55
1997	5423	1852	927		0.63
1998	6288	1664	875		0.62
1999	14756	1859	1012		0.53
2000	8077	1966	1091		0.34
2001	4324	3124	1168		0.42
2002	6878	4043	1345		0.45
2003	5214	3720	1547		0.65
2004	5848	3277	1398		0.46
2005	4975	3137	1118		0.38
2006	3634	2687	946		0.28
2007	4409	2806	945		0.34
2008	9740	2529	800		0.32
2009	6815	2857	805		0.27
2010	1897	3098	876		0.31
2011	4581	3290	1029		0.33
2012	6183	3176	1104	32	0.42
2013	4422	2735	1093	22	0.41
2014	1765	2689	1042	21	0.44
2015	8587	2561	830	26	0.33
2016	7762	2525	831	26	0.37
2017	4802	2678			

* GM(1971–2014).

Sources and references

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