

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

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western waters and adjacent waters is applied, catches in 2020 that correspond to the F ranges in the MAP are between 1020 and 2665 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (1731 tonnes) can only be taken under conditions specified in the MAP, whilst the entire range is considered precautionary when applying the ICES advice rule.

Stock development over time

Spawning-stock biomass (SSB) has been above $MSY B_{trigger}$ since 2001 and shows an increasing trend over the last few years. Fishing mortality (F) has decreased in recent years to below F_{MSY} since 2017. Recruitment has been variable without an overall trend. The 2015 and 2017 recruitments are estimated to be among the highest in the time series.

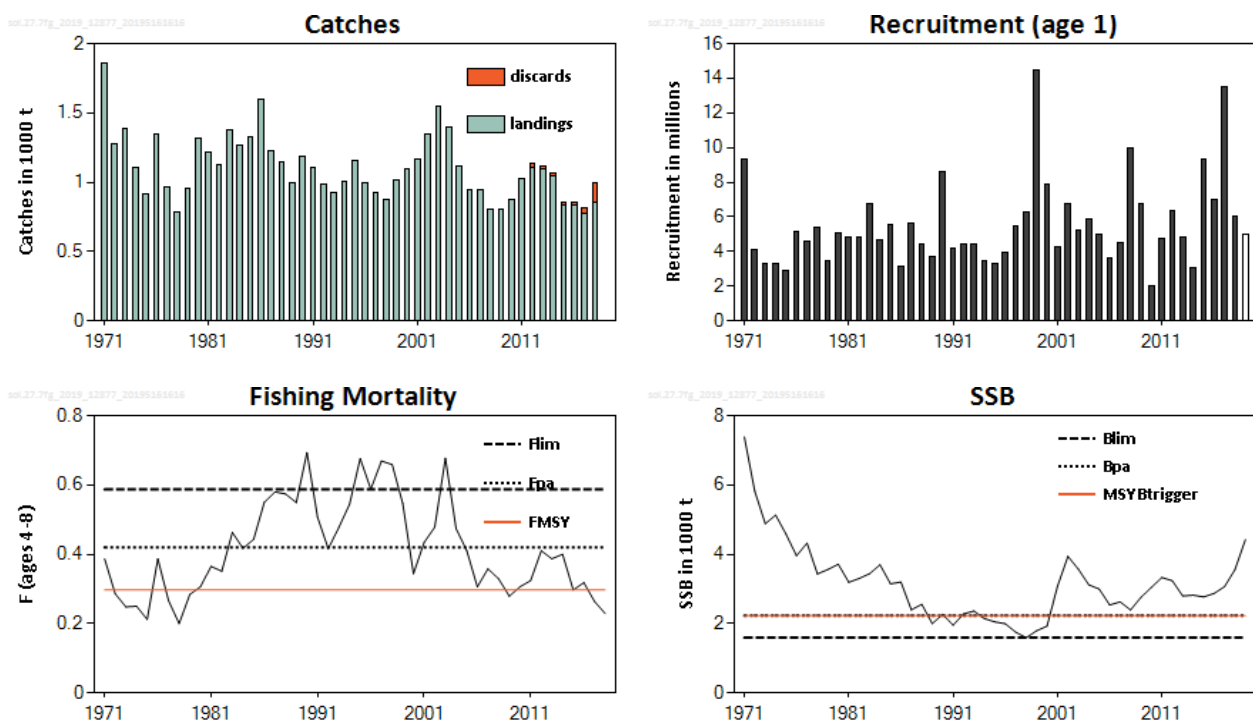


Figure 1 Sole in divisions 7.f and 7.g. Summary of the stock assessment. The assumed recruitment for 2019 is unshaded. Discards estimates are available since 2012.

Stock and exploitation status

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

Table 1 Sole in divisions 7.f and 7.g. 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}	✗	✓	✓ Below	$MSY B_{trigger}$	✓	✓ Above trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓ Harvested sustainably	B_{pa}, B_{lim}	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	✓	✓	✓ Within the range	B_{MGT}	✓	✓ Above trigger

Catch scenarios

Table 2 Sole in divisions 7.f and 7.g. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F _{ages 4-8} (2019)	0.158	Catch constraint (Wanted catch 2019=766 tonnes)
SSB ₂₀₂₀	5439	Tonnes; Fishing at F=0.158
R _{age 1} (2019–2020)	4975	Thousands; GM(1971-2016)
Catch (2019)	841	Tonnes; TAC 2019
Wanted catch (2019)	766	Tonnes; TAC 2019 minus a 8.9% discard ratio in weight
Unwanted catch (2019)	75	Tonnes; Average ratio of 2016-2018 (8.9%)

Table 3 Sole in divisions 7.f and 7.g. Annual catch scenarios. All weights are in tonnes (t).

Basis	Total catch * (2020)	Wanted catch ** (2020)	Unwanted catch ** (2020)	F Wanted (2020)	SSB (2021)	% SSB change ***	% TAC change ^	% Advice change ^^
ICES advice basis								
EU MAP ^{^^^} : F _{MSY}	1731	1577	154	0.297	5202	-4.4	106	100
EU MAP F _{MSY lower}	1020	929	91	0.165	5842	7.4	21	18.0
EU MAP F _{MSY upper}	2665	2428	237	0.499	4366	-19.7	217	208
Other scenarios								
F = 0	0	0	0	0	6763	24	-100	-100
F _{pa}	2320	2114	206	0.420	4674	-14.1	176	169
F _{lim}	2987	2721	266	0.578	4080	-25	255	246
SSB ₂₀₂₁ = B _{lim}	5845	5325	520	1.75	1592	-71	595	576
SSB ₂₀₂₁ = B _{pa} = MSY B _{trigger}	5097	4644	453	1.31	2228	-59	506	490
F = F ₂₀₁₉	981	894	87	0.158	5877	8.1	16.7	13.6

* Total catches are calculated from wanted catch (fish that would be landed in the absence of the EU landing obligation), based on the average discard rate in 2016–2018 (8.9% in weight).

** “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded, respectively, in the absence of the EU landing obligation.

*** SSB 2021 relative to SSB 2020.

^ Total catch in 2020 relative to the TAC in 2019 (841 t).

^^ Advice value for 2020 relative to the advice value for 2019 (864 t).

^^^ EU multiannual plan (MAP) for the Western Waters and adjacent waters (EU, 2019)

The advice for 2020 has increased greatly from the advice for 2019, because of a substantial upwards revision in the stock size and the resulting increase in SSB.

Basis of the advice

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

Advice basis	Management plan
Management plan	<p>The EU multiannual plan (MAP) for stocks in in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the FMSY range for the stock.</p> <p>In accordance with the MAP, catches higher than those corresponding to FMSY can only be taken providing SSB is greater than MSYB_{trigger}, and one of the following conditions is met:</p> <ol style="list-style-type: none"> if it is necessary for the achievement of objectives of mixed fisheries; if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; in order to limit variations in fishing opportunities between consecutive years to not more than 20 %. <p>ICES considers that the FMSY range for this stock used in the MAP is precautionary.</p> <p>Full details of the plan are described in EU (2019).</p>

Quality of the assessment

The Inter-Benchmark in 2019 (ICES 2019b) caused a substantial change in perception of the stock with an upward revision of the stock size and recruitment, and a downward revision of the F. During the Inter-Benchmark, a new Belgian commercial tuning index was constructed, focusing on the landings and effort data of trips entirely within divisions 7.f and 7.g. The selected ages of the different tuning series were revised. These changes resulted in a reduced retrospective bias.



Figure 2 Sole in divisions 7.f and 7.g. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

There is no information to present for this stock.

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 $B_{trigger}$	2228	Tonnes; B_{pa}	ICES (2019a)
	F_{MSY}	0.297	EQsim analysis based on the recruitment period 1971–2017	ICES (2019a)
Precautionary approach	B_{lim}	1592	Tonnes; B_{loss} estimated in 2018, corresponding to SSB in 1998	ICES (2019a)
	B_{pa}	2228	Tonnes; $B_{lim} \times 1.4$	ICES (2019a)
	F_{lim}	0.578	EQsim analysis, based on the recruitment period 1971–2017	ICES (2019a)
	F_{pa}	0.420	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$	ICES (2019a)
Management plan	MAP MSY $B_{trigger}$	2228	Tonnes; MSY $B_{trigger}$	EU (2019), ICES (2019a)
	MAP B_{pa}	2228	Tonnes; B_{pa}	EU (2019), ICES (2019a)
	MAP B_{lim}	1592	Tonnes; B_{lim}	EU (2019), ICES (2019a)
	MAP F_{MSY}	0.297	F_{MSY}	EU (2019), ICES (2019a)
	MAP range F_{lower}	0.165	Consistent with ranges provided by ICES (2019a), resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2019a)
	MAP range F_{upper}	0.499	Consistent with ranges provided by ICES (2019a), resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2019a)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2018)
Assessment type	Age-based analytical assessment (XSA) that uses landings in the model; discards are then included to calculate a catch forecast (ICES, 2019a).
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-CBT3, 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), Inter-Benchmark in 2019 (ICES, 2019b)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Sole in divisions 7.f and 7.g. History of ICES advice, agreed TAC, official landings, and ICES estimates for landings and discards. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards
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 gains in increasing F		< 940	993	807	805	
2010	No long-term gains in increasing F		< 920	993	871	876	
2011	See scenarios		-	1241	1013	1029	

Year	ICES advice	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards
2012	MSY approach		< 1060	1060	1099	1104	34
2013	MSY approach		< 1100	1100	1086	1092	22
2014	MSY approach		< 920	1001	1044	1042	21
2015	MSY approach		< 652	851	827	830	26
2016	MSY approach	≤ 760	≤ 745	779	831	831	26
2017	MSY approach	≤ 806		845	780	776	42
2018	MSY approach	≤ 931		920	849*	850	147
2019	MSY approach	≤ 864		841			
2020	Management plan	1731 (range 1020–2665)					

*Preliminary.

History of the catch and landings

Table 8 Sole in divisions 7.f and 7.g. Catch distribution by fleet in 2018 as estimated by ICES.

Total catch (2018)	Landings			Discards	
997 tonnes	Beam trawlers	Otter trawlers	Other gears	Beam trawlers	Otter trawlers
	90%	9.3%	<1%	99.7%	<1%
	850 tonnes			147 tonnes	

Table 9 Sole in divisions 7.f and 7.g. History of official and ICES estimated landings. All weights are in tonnes.

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

Year	Belgium	Denmark	France	Ireland	UK (E&W,NI)	UK (Scotland)	Netherlands	Total- official	ICES landings
2014	705	-	59	28	252	-	-	1044	1042
2015	671	-	24	27	105	-	-	827	830
2016	563	-	72	21	175	-	-	831	831
2017	553	-	49	28	149	-	-	780	776
2018**	607		44	28	171			849	850

* Including divisions 7.g–k.

**Preliminary.

Summary of the assessment

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

Year	Recruitment (age 1)	SSB	Landings	Discards *	F (ages 4–8)
1971	9290	7385	1861		0.39
1972	4143	5820	1278		0.29
1973	3291	4884	1391		0.25
1974	3280	5128	1105		0.25
1975	2914	4574	919		0.21
1976	5142	3958	1350		0.39
1977	4568	4322	961		0.27
1978	5424	3433	780		0.20
1979	3490	3560	954		0.28
1980	5083	3714	1314		0.31
1981	4836	3191	1212		0.37
1982	4856	3301	1128		0.35
1983	6724	3439	1373		0.46
1984	4653	3695	1266		0.42
1985	5581	3146	1328		0.44
1986	3118	3200	1600		0.55
1987	5667	2395	1222		0.58
1988	4437	2556	1146		0.57
1989	3670	2000	992		0.55
1990	8566	2267	1189		0.69
1991	4177	1955	1107		0.51
1992	4464	2280	981		0.42
1993	4454	2362	928		0.48
1994	3427	2142	1009		0.54
1995	3283	2048	1157		0.68
1996	3984	1996	995		0.59
1997	5450	1751	927		0.67
1998	6259	1592	875		0.66
1999	14451	1792	1012		0.55
2000	7909	1926	1091		0.34
2001	4262	3073	1168		0.43
2002	6766	3938	1345		0.48
2003	5215	3568	1547		0.68
2004	5861	3119	1398		0.47
2005	4958	2995	1118		0.41
2006	3651	2536	946		0.31
2007	4476	2627	945		0.36
2008	9941	2393	800		0.33
2009	6758	2758	805		0.28
2010	2023	3046	876		0.31

Year	Recruitment (age 1)	SSB	Landings	Discards *	F (ages 4–8)
2011	4735	3329	1029		0.32
2012	6372	3236	1104	32	0.41
2013	4861	2797	1093	22	0.39
2014	3051	2819	1042	21	0.40
2015	9333	2769	830	26	0.30
2016	6969	2867	831	27	0.32
2017	13524	3063	776	42	0.26
2018	5997	3557	850	147	0.23
2019	4975 **	4420			

* Discards are not included in the assessment.

** Geometric mean (1971–2016).

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. 17pp. <http://data.europa.eu/eli/reg/2019/472/oj>

ICES. 1998. Report of the Study Group on Precautionary Approach to Fisheries Management, 3–6 February 1998, ICES Headquarters, Copenhagen, Denmark. ICES CM 1998/ACFM:10. 43 pp.

ICES. 2014. Report of the Benchmark Workshop on Celtic Sea stocks (WKCELT), 3–7 February 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:42. 194 pp.

ICES. 2018. Advice basis. In Report of the ICES Advisory Committee, 2018. ICES Advice 2018, Book 1, Section 1.2. <https://doi.org/10.17895/ices.pub.4503>

ICES. 2019a. Report of the Working Group for the Celtic Seas Ecoregion. ICES Scientific Reports. 1:29. XXXX pp. <http://doi.org/10.17895/ices.pub.4982>.

ICES. 2019b. Inter-benchmark protocol on Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea) (IBPBristol). ICES Scientific Reports. 1:ISS NO. 106 pp. <http://doi.org/10.17895/ices.pub.4708>

Recommended citation: ICES. 2019. Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, sol.27.7fg, <https://doi.org/10.17895/ices.advice.4805>