

Sole (*Solea solea*) in Division 7.d (eastern English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 2380 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim} ; spawning-stock size is below MSY $B_{trigger}$ and between B_{pa} and B_{lim} .

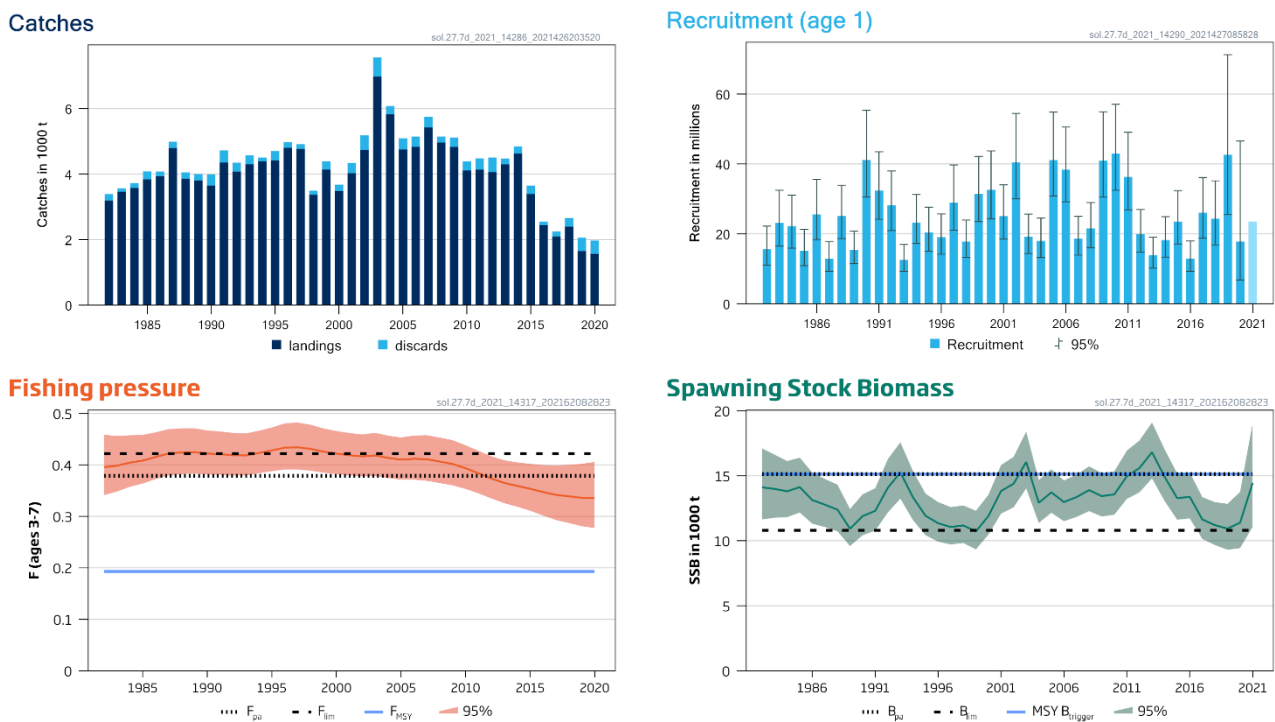


Figure 1 Sole in Division 7.d. Summary of the stock assessment. Discards are reconstructed prior to 2004. The assumed recruitment value for 2021 is shaded in a lighter colour.

Catch scenarios

Table 1 Sole in Division 7.d. Values in the forecast and for the interim year. All weights are in tonnes; recruitment is in thousands.

Variable	Value	Notes
$F_{ages3-7}$ (2021)	0.284	Average exploitation pattern (2016–2020); based on catch advice of 3248 tonnes for 2021
SSB (2022)	14945	Short-term forecast
R_{age1} (2021)	23489	Median recruitment resampled from the years 1982–2019
R_{age1} (2022)	23489	Median recruitment resampled from the years 1982–2019
Catch (2021)	3248	Catch advice for 2021*
Projected landings (2021)	2894	Assuming average landings ratio by age 2016–2020
Projected discards (2021)	354	Assuming average discard ratio by age 2016–2020

*The TAC 2021 was not available. Therefore, the catch advice for 2021 was used.

Table 2 Sole in Division 7.d. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	Projected landings [^] (2022)	Projected discards ^{^^} (2022)	F _{total} (ages 3–7) (2022)	F _{Projected landings} (ages 3–7) (2022)	F _{Projected discards} (ages 3-7) (2022)	SSB (2023)	% SSB change*	% TAC change **	% advice change **
ICES advice basis										
MSY approach: F _{MSY} × SSB (2022)/MSY B _{trigger}	2380	2139	241	0.191	0.167	0.024	16450	10.1	-27	-27
Other scenarios										
F = F _{MSY lower} × SSB(2022)/MSY B _{trigger}	1444	1300	144	0.112	0.098	0.0139	17547	17.4	-56	-56
F = 0	0	0	0	0	0	0	19250	29	-100	-100
F _{pa}	4347	3899	448	0.379	0.33	0.047	14159	-5.3	34	34
F _{lim}	4751	4260	491	0.422	0.37	0.052	13697	-8.4	46	46
SSB (2023) = B _{lim}	7227	6458	769	0.73	0.64	0.091	10811	-28	123	123
SSB (2023) = B _{pa}	3500	3144	356	0.29	0.26	0.037	15135	1.27	7.8	7.8
SSB (2023) = MSY B _{trigger}	3500	3144	356	0.29	0.26	0.037	15135	1.27	7.8	7.8
F = F ₂₀₂₁	3923	3521	402	0.336	0.29	0.042	14638	-2.1	21	21
F = F _{MSY lower}	1462	1315	147	0.113	0.099	0.014	17528	17.3	-55	-55
F = F _{MSY}	2407	2164	243	0.193	0.169	0.024	16418	9.9	-26	-26
F = F _{MSY upper}	3877	3480	397	0.331	0.29	0.041	14693	-1.69	19.4	19.4

[^] Marketable landings.

^{^^} Including BMS landings, assuming recent discard rate.

* SSB 2023 relative to SSB 2022 (14945 tonnes).

** Total catch in 2022 relative to the advice value 2021 and TAC (3248 tonnes).

The 27% decrease in advice is the result of a downward revision of the SSB and an upward revision of the F as a result of the benchmark (ICES, 2021a).

Basis of the advice

Table 3 Sole in Division 7.d. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

This stock was benchmarked in 2021 (ICES, 2021a), which altered the perception of the stock. During the benchmark catch data, stock weights and two commercial tuning fleets (BE-CBT and FR-COTB) were revised and a different assessment model was used (SAM instead of XSA). Finally, reference points were re-calculated.

In 2020, the discard ratio coverage was lower compared to previous years (54% in 2020 versus 71% in 2019) as a result of the COVID-19 pandemic. A high discard rate was observed in 2019 and 2020 as a result of the strong 2018 year class. However, the extent of the perceived discard rate in 2020 might be biased by the lower discard ratio coverage.

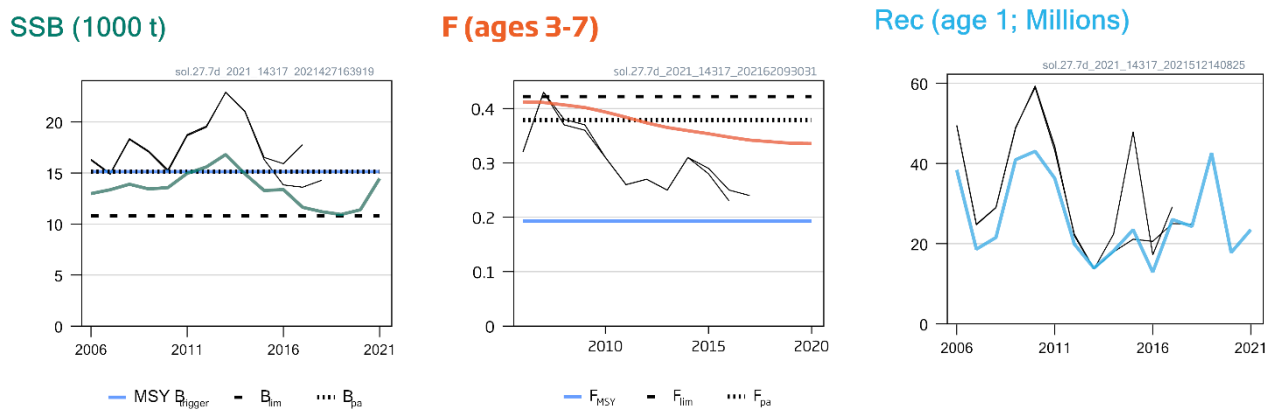


Figure 2 Sole in Division 7.d. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year). The reference points were revised in 2021 following the benchmark (ICES, 2021a), and only assessment results from the last year should be compared to the reference points indicated. The 2019 and 2020 assessment results are missing because category 3 advice was provided.

Issues relevant for the advice

Following the benchmark in 2021, the stock assessment was upgraded from category 3 to category 1.

Technical measures applicable to the mixed demersal beam trawl fishery affect both sole and plaice. The minimum mesh size of 80 mm for the sole fishery generates high discards of plaice, which have a larger minimum landing size than sole. The use of larger mesh sizes would reduce the catch of undersized plaice and sole but would also result in a loss of marketable sole in the short term.

The TAC 2021 was not available at the time of the release of this advice. Therefore, the catch advice for 2021 was used as the basis of the catch constraint in the interim year.

Reference points

Table 4 Sole in Division 7.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B _{trigger}	15135	B _{pa} ; in tonnes	ICES (2021a)
	F _{MSY}	0.193	Stochastic simulations (EqSim) with segmented regression fixed at B _{lim} based on recruitment period 1982–2018	ICES (2021a)
Precautionary approach	B _{lim}	10811	B _{loss} , lowest observed SSB (1999) with 2019 as the last year of catch data; in tonnes	ICES (2021a)
	B _{pa}	15135	B _{lim} × 1.4; in tonnes	ICES (2021a)
	F _{lim}	0.422	The F that on average leads to B _{lim} from EqSim	ICES (2021a)
	F _{pa}	0.379	The F that provides a 95% probability for SSB to be above B _{lim} (F _{P05} with advice rule [AR])	ICES (2021a)
Management plan *	MAP MSY B _{trigger}	15135	MSY B _{trigger} ; in tonnes	ICES (2021a)
	MAP B _{lim}	10811	B _{lim} ; in tonnes	ICES (2021a)
	MAP F _{MSY}	0.193	F _{MSY}	ICES (2021a)
	MAP range F _{lower}	0.113	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F _{MSY}	ICES (2021a)
	MAP range F _{upper}	0.331	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F _{MSY}	ICES (2021a)

* EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the assessment

Table 5 Sole in Division 7.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b)
Assessment type	Age-based analytical assessment (SAM; Nielsen and Berg, 2014; ICES, 2021c) that uses catches in the model and in the forecast
Input data	Commercial catches: international landings and discards, age compositions from catch data; three survey indices: UK(E&W)-BTS (B2453), UK(E&W)-YFS, and FR-YFS; three commercial indices: BE-CBT, FR-COTB, and UK(E&W)-CBT; natural mortality is assumed to be constant; maturity-at-age vary with age (ICES, 2017, 2021a)
Discards, BMS landings, and bycatch	Discards are reconstructed from 1982–2003. Discards (including ICES estimated BMS) are combined with the landings as input in the model. In 2020, 54% of the landings had associated discarding information, and 52% of the discards were sampled.
Indicators	None.
Other information	This stock was benchmarked in 2021 (ICES, 2021a)
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6 Sole in Division 7.d. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards
1987	Precautionary TAC	3100		3850	3841	4791	197
1988	Status quo (shot) TAC	3400		3850	3302	3853	198
1989	Status quo (shot) TAC	3800		3850	2945	3805	192
1990	No effort increase; TAC	3700		3850	3036	3647	342
1991	Status quo F; TAC	3400		3850	3784	4351	368
1992	TAC	2700		3500	3794	4072	275
1993	70% of F(91)~ 2800 tonnes	2800		3200	3862	4299	273
1994	Reduce F	< 3800		3800	4038	4383	122
1995	No increase in F	3800		3800	3743	4420	282
1996	No long-term gain in increasing F	4700		3500	4098	4797	174
1997	No advice	-		5230	3941	4764	147
1998	No increase in effort	4500		5230	3047	3363	127
1999	Reduce F to F _{pa}	3800		4700	3900	4135	247
2000	F < F _{pa}	< 3900		4100	3832	3476	201
2001	F < F _{pa}	< 4700		4600	4617	4025	317
2002	F < F _{pa}	< 5200		5200	5399	4733	444
2003	F < F _{pa}	< 5400		5400	6247	6977	584
2004	F < F _{pa}	< 5900		5900	5667	5819	258
2005	F < F _{pa}	< 5700		5700	4620	4748	344
2006	F < F _{pa}	< 5700		5720	4832	4830	315
2007	F < F _{pa}	< 6440		6220	5313	5421	332
2008	F < F _{pa}	< 6590		6590	4972	4963	183
2009	F < F _{pa}	< 4380		5274	5282	4828	287
2010	F < F _{pa}	< 3190		4219	4449	4108	273
2011	See scenarios	< 4840		4852	4203	4136	342
2012	MSY transition	< 5600		5580	4043	4058	445
2013	MSY transition	< 5900		5900	4442	4295	180
2014	MSY transition	< 3251		4838	4651	4626	216
2015	MSY approach	< 1931		3483	3411	3385	263
2016	MSY approach		≤ 2685	3258	2529	2433	106
2017	MSY approach		≤ 2487	2724	2223	2090	156
2018	MSY approach		≤ 3866	3405	2312	2395	263
2019	MSY approach		≤ 2571	2515	1762	1648	404
2020	Precautionary approach		< 2846	2797	1706	1562	409
2021	Precautionary approach		< 3248	3248			
2022	MSY approach		≤ 2380				

History of the catch and landings

Table 7 Sole in Division 7.d. Catch distribution by fleet in 2020 as estimated by and reported to ICES.

Catch (2020)	Landings				Discards
	Trammel-/gillnets 28%	Beam trawls 36%	Otter trawls 33%	Other gears 2.8%	
1971 tonnes	1562 tonnes				409 tonnes

Table 8 Sole in Division 7.d. History of commercial catch and landings; both the official and ICES estimated values are presented by country. All weights are in tonnes.

Year	Official landings						ICES estimates	
	Belgium	France	UK (E + W)	Others	BMS landings	Total	Landings	Discards
1974	159	383	309	3		854	884	
1975	132	464	244	1		841	882	
1976	203	599	404	-		1206	1305	
1977	225	737	315	-		1277	1335	
1978	241	782	366	-		1389	1589	
1979	311	1129	402	-		1842	2215	
1980	302	1075	159	-		1536	1923	
1981	464	1513	160	-		2137	2477	
1982	525	1828	317	4		2674	3190	196
1983	502	1120	419	-		2041	3458	101
1984	592	1309	505	-		2406	3575	141
1985	568	2545	520	-		3633	3837	242
1986	858	1528	551	-		2937	3932	145
1987	1100	2086	655	-		3841	4791	197
1988	667	2057	578	-		3302	3853	198
1989	646	1610	689	-		2945	3805	192
1990	996	1255	785	-		3036	3647	342
1991	904	2054	826	-		3784	4351	368
1992	891	2187	706	10		3794	4072	275
1993	917	2322	610	13		3862	4299	273
1994	940	2382	701	15		4038	4383	122
1995	817	2248	669	9		3743	4420	282
1996	899	2322	877	-		4098	4797	174
1997	1306	1702	933	-		3941	4764	147
1998	541	1703	803	-		3047	3363	127
1999	880	2251	769	-		3900	4135	247
2000	1021	2190	621	-		3832	3476	201
2001	1313	2482	822	-		4617	4025	317
2002	1643	2780	976	-		5399	4733	444
2003	1657	3475	1114	1		6247	6977	584
2004	1485	3070	1112	-		5667	5819	258
2005	1221	2832	567	-		4620	4748	344
2006	1547	2627	658	0		4832	4830	315
2007	1530	2981	801	1		5313	5421	332
2008	1368	2880	724	0		4972	4963	183
2009	1475	3047	760	0		5282	4828	287
2010	1294	2476	679	0		4449	4108	273
2011	1222	2281	700	0		4203	4136	342
2012	941	2475	627	< 1		4043	4058	445

Year	Official landings						ICES estimates	
	Belgium	France	UK (E + W)	Others	BMS landings	Total	Landings	Discards
2013	952	2884	605	0		4442	4295	180
2014	1496	2507	648	< 1		4651	4626	216
2015	1048	1895	468	0		3411	3385	263
2016	799	1337	392	< 1		2529	2433	106
2017	697	1178	349	< 1		2223	2090	156
2018	653	1265	394	< 1		2312	2395	263
2019*	603	914	245	< 1	< 1	1762	1648	404
2020*	686	827	193	< 1	< 1	1706	1562	409**

* Preliminary.

** Including ICES reported BMS

Summary of the assessment

Table 9 Sole in Division 7.d. Assessment summary. Weights are in tonnes and recruitment in thousands. High and low refer to 95% confidence intervals.

Year	Recruitment			Spawning stock biomass			Landings	Discards*	Fishing mortality		
	Age 1	High	Low	SSB	High	Low			F ₃₋₇	High	Low
	thousands			tonnes			tonnes	tonnes			
1982	15632	22170	11023	14114	17111	11641	3190	196	0.40	0.46	0.34
1983	23137	32460	16492	13991	16629	11772	3458	101	0.40	0.46	0.35
1984	22206	31083	15864	13808	16133	11818	3575	141	0.40	0.46	0.36
1985	15173	21224	10848	14128	16393	12176	3837	242	0.41	0.46	0.36
1986	25535	35580	18326	13131	15243	11312	3932	145	0.42	0.46	0.37
1987	12831	17778	9260	12775	14758	11058	4791	197	0.42	0.47	0.38
1988	25102	33863	18608	12393	14313	10731	3853	198	0.42	0.47	0.38
1989	15408	20751	11440	10928	12445	9595	3805	192	0.42	0.47	0.38
1990	41139	55334	30586	11901	13578	10432	3647	342	0.42	0.47	0.38
1991	32382	43459	24129	12301	14039	10779	4351	368	0.42	0.47	0.38
1992	28182	37969	20918	14077	16275	12175	4072	275	0.42	0.46	0.38
1993	12528	16966	9250	15255	17575	13241	4299	273	0.42	0.46	0.38
1994	23215	31262	17239	13343	15365	11587	4383	122	0.42	0.47	0.38
1995	20345	27616	14989	11921	13628	10427	4420	282	0.43	0.47	0.39
1996	19041	25694	14111	11352	12977	9930	4797	174	0.43	0.48	0.39
1997	28876	39703	21001	11062	12589	9720	4764	147	0.43	0.48	0.39
1998	17758	23911	13189	11182	12718	9832	3363	127	0.43	0.48	0.39
1999	31444	42157	23453	10721	12307	9339	4135	247	0.43	0.47	0.39
2000	32596	43715	24305	11910	13538	10479	3476	201	0.42	0.47	0.38
2001	25073	34005	18487	13831	15826	12088	4025	317	0.42	0.46	0.38
2002	40433	54466	30016	14386	16458	12576	4733	444	0.42	0.46	0.38
2003	19167	25610	14344	16063	18397	14026	6977	584	0.42	0.46	0.38
2004	17970	24507	13177	12922	14678	11376	5819	258	0.41	0.46	0.37
2005	41116	54834	30831	13723	15495	12154	4748	344	0.41	0.45	0.37
2006	38375	50564	29124	12979	14641	11506	4830	315	0.41	0.46	0.37
2007	18624	25012	13867	13361	15082	11836	5421	332	0.41	0.46	0.37
2008	21535	28907	16043	13899	15728	12283	4963	183	0.41	0.45	0.36
2009	40926	54879	30521	13436	15206	11872	4828	287	0.40	0.45	0.36
2010	43026	57055	32447	13567	15336	12002	4108	273	0.39	0.44	0.35
2011	36287	49043	26849	14962	16935	13220	4136	342	0.38	0.43	0.34
2012	19886	26939	14680	15595	17717	13727	4058	445	0.37	0.42	0.33
2013	13903	19037	10153	16810	19097	14797	4295	180	0.37	0.41	0.33
2014	18200	24881	13314	14921	17044	13062	4626	216	0.36	0.40	0.32

Year	Recruitment			Spawning stock biomass			Landings	Discards*	Fishing mortality		
	Age 1	High	Low	SSB	High	Low			F ₃₋₇	High	Low
	thousands			tonnes			tonnes	tonnes			
2015	23489	32327	17067	13282	15178	11623	3385	263	0.35	0.40	0.31
2016	12891	17958	9253	13379	15269	11724	2433	106	0.35	0.40	0.30
2017	26029	36137	18748	11638	13355	10141	2090	156	0.34	0.40	0.29
2018	24297	35158	16790	11206	12976	9676	2395	263	0.34	0.40	0.29
2019	42617	71280	25480	10936	12842	9313	1648	404	0.34	0.40	0.28
2020	17791	46567	6797	11394	13756	9438	1562	409	0.34	0.41	0.28
2021	23489**			14461	19062	11074					

* Discard estimates prior to 2004 assume the average discard proportion by age for 2004–2008 (WKNSEA; ICES, 2021c).

** Median recruitment resampled from the years 1982–2019.

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[Download the stock assessment data and figures.](#)

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