

## Sole (*Solea solea*) in Division 7.a (Irish Sea)

### ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 787 tonnes.

### Stock development over time

Fishing pressure on the stock is below  $F_{MSY}$  and spawning–stock size is above MSY  $B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .



**Figure 1** Sole in Division 7.a. Summary of the stock assessment. The assumed recruitment values for 2020 and 2021 are shaded in a lighter colour. Discard values have only been available since 2011.

### Catch scenarios

**Table 1** Sole in Division 7.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 4-7}$ (2021)	0.182	Based on landings of 691 tonnes for 2021
$SSB_{2022}$	3974	Short-term forecast; tonnes
$R_{age\ 2}$ (2020, 2021, 2022)	2931	Geometric mean of recruitment (GM, 2015–2019); thousands
Total catch (2021)	768	Catch advice for 2021; tonnes*
Projected landings (2021)	691	Assuming average landings rate by age 2018–2020; tonnes
Projected discards (2021)	77	Assuming average discard rate by age 2018–2020; tonnes

\*The TAC 2021 was not available and therefore, the catch advice for 2021 was used.

**Table 2<sup>†</sup>** Sole in Division 7.a. Annual catch scenarios. Weights are in tonnes.

Basis	Total catch * (2022)	Projected landings (2022)	Projected discards* (2022)	F <sub>projected landings</sub> (2022)	SSB (2023)	% SSB change**	% TAC change***	% advice change <sup>^</sup>
ICES advice basis								
MSY approach: F <sub>MSY</sub>	787	708	79	0.20	3834	-3.5	2.5	2.5
Other scenarios								
F <sub>MSY lower</sub>	642	578	64	0.16	3966	-0.20	-16.4	-16.4
F <sub>MSY upper</sub>	927	834	93	0.24	3707	-6.7	21	21
F = 0	0	0	0	0	4551	14.5	-100	-100
F <sub>pa</sub>	858	772	86	0.22	3770	-5.1	11.7	11.7
F <sub>lim</sub>	1094	985	109	0.29	3555	-10.5	42	42
SSB <sub>2023</sub> = B <sub>lim</sub>	2263	2037	226	0.73	2500	-37	195	195
SSB <sub>2023</sub> = B <sub>pa</sub> = MSY B <sub>trigger</sub>	1154	1039	115	0.31	3500	-11.9	50	50
F = F <sub>2021</sub>	722	650	72	0.182	3893	-2.0	-6.0	-6.0
SSB <sub>2023</sub> = SSB <sub>2022</sub>	633	570	63	0.158	3974	0	-17.6	-17.6

\* Total catches and projected discards are calculated from projected landings based on the average discard rate in 2018–2020 (10.0% in weight).

\*\* SSB 2023 relative to SSB 2022.

\*\*\* Total catch in 2022 relative to TAC 2021 (768 tonnes).

<sup>^</sup> Advice value for 2022 relative to the corresponding 2021 value (768 tonnes).

### Basis of the advice

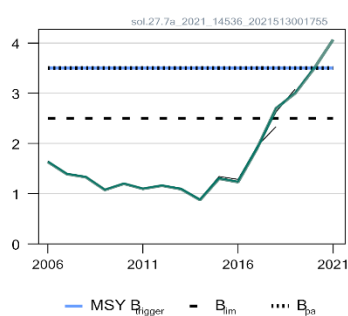
**Table 3** Sole in Division 7.a. The basis of the advice.

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

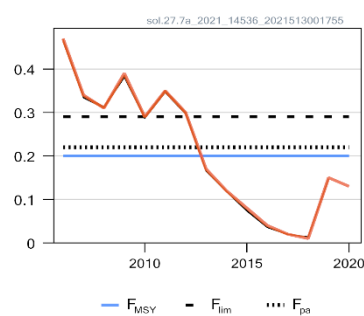
### Quality of the assessment

The UK (E&W)-BTS-Q3 survey was unable to cover Division 7.a in 2020 because of COVID-19 restrictions. The assessment was performed without tuning data for 2020. Sensitivity analyses indicated that recruitment was most influenced by the lack of the last datapoint of the tuning series. Therefore, the recruitment estimate for 2020 was considered uncertain and replaced by the geometric mean of recruitment (GM, 2015–2019).

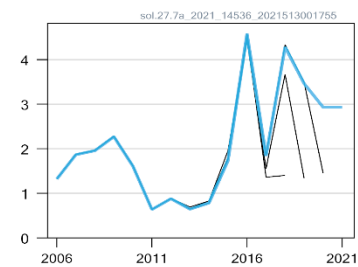
SSB (1000 t)



F (ages 4-7)



Rec (age2; Millions)



**Figure 2** Sole in Division 7.a. Historical assessment results (final-year recruitment Assumption and SSB estimate included).

### Issues relevant for the advice

Discards have increased recently from 3.5% (average 2016–2018) to 10% (average 2018–2020), and are not currently included in the assessment. Discards are, however, taken into account in the calculation of the advice.

<sup>†</sup> Version 2: Rounding correction.

## Reference points

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

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3500	$B_{pa}$ ; in tonnes	ICES (2016)
	$F_{MSY}$	0.20	Stochastic simulations with a segmented regression stock–recruitment relationship	ICES (2016)
	$F_{MSY lower}$	0.16	The minimum F which produces at least 95% of maximum yield	ICES (2016)
	$F_{MSY upper}$	0.24	The maximum F which produces at least 95% of maximum yield	ICES (2016)
Precautionary approach	$B_{lim}$	2500	The lowest value with above-average recruitment; in tonnes	ICES (2017)
	$B_{pa}$	3500	$B_{pa} \sim B_{lim} \times 1.4$ ; in tonnes	ICES (2017)
	$F_{lim}$	0.29	Based on simulated recruitment to give median biomass = $B_{lim}$	ICES (2017)
	$F_{pa}$	0.22	$F_{P05}$ ; F that leads to $SSB \geq B_{lim}$ with 95% probability	ICES (2017, 2021a)
Management plan	MAP MSY $B_{trigger}$			
	MAP $B_{pa}$			
	MAP $B_{lim}$			
	MAP $F_{MSY}$			
	MAP range $F_{lower}$			
	MAP range $F_{upper}$			

## Basis of the assessment

**Table 5** Sole in Division 7.a. The basis of the assessment.

ICES stock data category	1 ( <a href="#">ICES, 2021b</a> )
Assessment type	Age-based analytical assessment (XSA) that uses landings in the model (ICES, 2021a)
Input data	International landings, age and length frequencies from catch sampling; one survey index (UK (E & W)-BTS-Q3 [B6596]); fixed maturity data from UK survey information; 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	This stock was benchmarked in 2011 (ICES, 2011)
Working group	Working Group for the Celtic Seas Ecoregion ( <a href="#">WGCSE</a> )

## History of the advice, catch, and management

**Table 6** Sole in Division 7.a. History of ICES advice, the agreed TAC, official landings, and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES discards	ICES landings
1987	No increase in F	1900		2100	2041	-	2808
1988	80% of F (86); TAC	1600		1750	1885	-	1999
1989	80% of F (87); TAC	< 1480		1480	1823	-	1833
1990	Interim advice	1050*		1500	1576	-	1583
1991	90% of F (89); TAC	1300		1500	1223	-	1212
1992	No long-term gains in increased F	1200**		1350	1234	-	1259
1993	$F = F(91) \sim 920$ tonnes	920		1000	971	-	1023
1994	No long-term gains in increased F	1510**		1500	1367	-	1374
1995	20% reduction in F	800		1300	1300	-	1266

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES discards	ICES landings
1996	20% reduction in F	800		1000	1023	-	1002
1997	20% reduction in F	800		1000	1027	-	1003
1998	20% reduction in F	850		900	895	-	911
1999	Reduce F below $F_{pa}$	830		900	810	-	863
2000	Reduce F below $F_{pa}$	< 1080		1080	833	-	818
2001	Reduce F below $F_{pa}$	< 930		1100	1012	-	1053
2002	Keep F below $F_{pa}$	< 1100		1100	1085	-	1090
2003	Keep F below $F_{pa}$	< 1010		1010	1014	-	1014
2004	Maintain SSB above $B_{pa}$	< 790		800	712	-	709
2005	$F < F_{pa}$	< 1000		960	854	-	855
2006	Recent catch levels (2002–2004)	< 930		960	576	-	569
2007	Maintain SSB above $B_{pa}$	0		820	491	-	492
2008	Zero catch	0		669	320	-	332
2009	Zero catch and recovery plan	0		502	325	-	325
2010	Zero catch and recovery plan	0		402	277	-	277
2011	See scenarios	-		390	330	14	330
2012	MSY transition	< 200		300	296	22	298
2013	No directed fisheries, bycatch and discards should be minimized	0		140	148	11	148
2014	No directed fisheries, bycatch and discards should be minimized	0		95	96	7	99
2015	No directed fisheries, bycatch and discards should be minimized	0		90	76	7	76
2016	MSY approach (minimize all catches)	0		40	35	2	35
2017	MSY approach		0	40	32	2	34
2018	MSY approach		0	40	36	2	36
2019	MSY approach		≤ 414	414	399***	63	400
2020	MSY approach		≤ 561	457	398***	42	404
2021	MSY approach		≤ 768	768			
2022	MSY approach		≤ 787				

\* Revised to 1500 tonnes in 1990.

\*\* Catch at *status quo* F.

\*\*\* Preliminary.

## History of the catch and landings

**Table 7** Sole in Division 7.a. Catch distribution by fleet in 2020 as estimated by ICES.

Total catch	Landings			Discards	
	Beam trawlers	Otter trawlers	Other gears	Beam trawlers	Otter trawlers
446 tonnes	91%	7.6%	1.24%	99%	1%
	404 tonnes			42 tonnes	

**Table 8** Sole in Division 7.a. History of official and ICES estimated landings. Weights are in tonnes.

Year	Belgium	France	Ireland	Netherlands	UK (E + W)	UK (Isle of Man)	UK (NI)*	UK (Scotland)	Officially reported	ICES landings
1973	793	12	27	281	258	-	46	11	1428	1428
1974	664	54	28	320	218	-	23	-	1307	1307
1975	805	59	24	234	281	-	24	15	1442	1441
1976	674	72	74	381	195	-	49	18	1463	1463
1977	566	39	84	227	160	-	49	21	1146	1147
1978	453	65	127	177	189	-	57	30	1098	1106
1979	779	48	134	247	290	-	47	42	1587	1614
1980	1002	41	229	169	367	-	44	68	1920	1941
1981	884	13	167	186	311	-	41	45	1647	1667
1982	669	9	161	138	277	-	31	44	1329	1338
1983	544	3	203	224	219	-	33	29	1255	1169
1984	425	10	187	113	230	-	38	17	1020	1058
1985	589	9	180	546	269	-	36	28	1657	1146
1986	930	17	235	-	637	1	50	46	1916	1995
1987	987	5	312	-	599	3	72	63	2041	2808
1988	915	11	366	-	507	1	47	38	1885	1999
1989	1010	5	155	-	613	2	-	38	1823	1833
1990	786	2	170	-	569	10	-	39	1576	1583
1991	371	3	198	-	581	44	-	26	1223	1212
1992	531	11	164	-	477	14	-	37	1234	1259
1993	495	8	98	-	338	4	-	28	971	1023
1994	706	7	226	-	409	5	-	14	1367	1374
1995	675	5	176	-	424	12	-	8	1300	1266
1996	533	5	133	149	194	4	-	5	1023	1002
1997	570	3	130	123	189	5	-	7	1027	1003
1998	525	3	134	60	161	3	-	9	895	911
1999	469	< 1	120	46	165	1	-	8	810	863
2000	493	3	135	60	133	1	-	8	833	818
2001	674	4	135	-	195	-	-	4	1012	1053
2002	817	4	96	-	165	-	-	3	1085	1090
2003	687	4	103	-	217	-	-	3	1014	1014
2004	527	1	77	-	106	-	-	1	712	709
2005	662	3	85	-	103	-	-	1	854	855
2006	419	1	85	-	69	-	-	2	576	569
2007	305	1	115	-	66	< 1	-	4	491	492
2008	216	1	66	-	37	-	-	-	320	332
2009	257	-	47	-	19	1	-	1	325	325
2010	217	< 1	47	-	12	< 1	-	-	277	277
2011	250	< 1	48	-	31	< 1	-	-	330	330
2012	222	< 1	51	-	21	< 1	-	-	294	294
2013	96	< 1	40	-	12	< 1	-	-	148	148
2014	43	-	43	-	10	< 1	-	-	96	99
2015	37	-	32	-	7	-	-	-	76	76
2016	14	-	15	-	6	-	-	-	35	35
2017	14	-	14	-	4	-	-	-	32	34
2018	14	-	16	-	6	-	-	-	36	36
2019**	329	<1	55	-	15	-	-	-	399	400
2020**	284	<1	48	-	65	-	-	-	398	404

\* 1989 onwards: N. Ireland included with England & Wales.

\*\* Preliminary.

**Summary of the assessment**

**Table 9** Sole in Division 7.a. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment age 2	SSB	Landings	Fishing mortality ages 4–7
1970	3695	6436	1785	0.39
1971	10177	6222	1882	0.44
1972	3186	5011	1450	0.45
1973	13133	5123	1428	0.43
1974	5870	5068	1307	0.44
1975	6680	5359	1441	0.40
1976	3857	4889	1463	0.43
1977	15772	4490	1147	0.37
1978	9040	5092	1106	0.36
1979	8848	5685	1614	0.47
1980	5070	5513	1941	0.64
1981	4497	5165	1667	0.48
1982	2460	4331	1338	0.44
1983	5557	4095	1169	0.44
1984	15464	4602	1058	0.35
1985	16229	5637	1146	0.34
1986	23709	6947	1995	0.44
1987	3458	7153	2808	0.86
1988	3493	5504	1999	0.69
1989	4369	4616	1833	0.58
1990	5553	3610	1583	0.66
1991	12666	3173	1212	0.51
1992	4947	3440	1259	0.53
1993	6181	3219	1023	0.56
1994	5239	4034	1374	0.50
1995	2004	3504	1266	0.51
1996	2496	2698	1002	0.53
1997	8356	2488	1003	0.60
1998	6871	3009	911	0.50
1999	5240	3302	863	0.47
2000	6955	3108	818	0.46
2001	4552	3545	1053	0.35
2002	2330	3556	1090	0.38
2003	3056	3193	1014	0.36
2004	3638	2285	709	0.31
2005	2952	2065	855	0.55
2006	1320	1632	569	0.47
2007	1866	1389	492	0.34
2008	1956	1328	332	0.31
2009	2270	1074	325	0.39
2010	1609	1197	277	0.29
2011	636	1096	330	0.35
2012	878	1158	298	0.30
2013	644	1090	148	0.167
2014	782	874	99	0.119
2015	1732	1297	76	0.080
2016	4580	1230	35	0.040
2017	1840	1900	34	0.020
2018	4280	2698	36	0.0141
2019	3463	2997	400	0.148
2020	2931*	3493	404	0.131
2021	2931*	4067		

\* Geometric mean (2015–2019).

## Sources and references

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

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