Sole (*Solea solea*) in Division 7.a (Irish Sea)
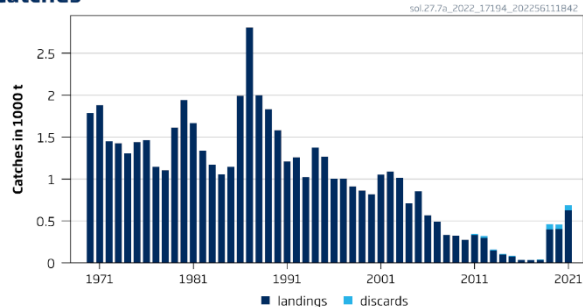
ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 605 tonnes.
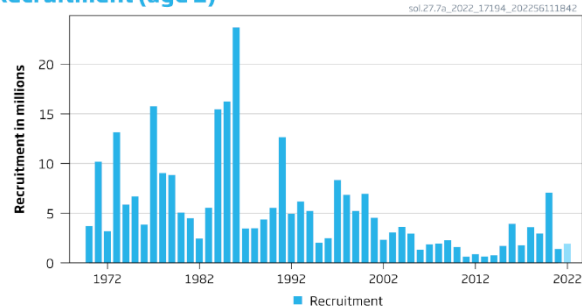
Stock development over time

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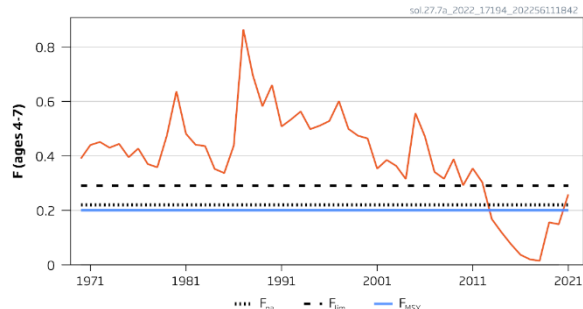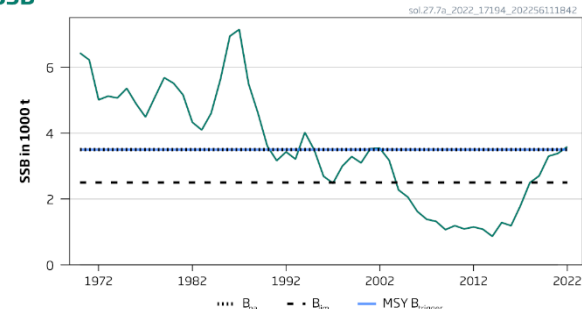

Figure 1   Sole in Division 7.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. Discard values have only been available since 2011.

Catch scenarios

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

Variable	Value	Notes
$F_{ages\ 4-7}$ (2022)	0.22	Based on landings of 696 tonnes for 2022
SSB_{2023}	3299	Short-term forecast; tonnes
$R_{age\ 2}$ (2022, 2023)	1937	Geometric mean of recruitment (GM, 2012–2020); thousands
Total catch (2022)	787	TAC for 2022; tonnes
Projected landings (2022)	696	Assuming average landings rate by age 2019–2021; tonnes
Projected discards (2022)	91	Assuming average discard rate by age 2019–2021; tonnes

Table 2   Sole in Division 7.a. Annual catch scenarios. Weights are in tonnes.

Basis	Total catch * (2023)	Projected landings (2023)	Projected discards* (2023)	$F_{projected\ landings}$ (2023)	SSB (2024)	% SSB change**	% TAC change***	% advice change^
ICES advice basis								
MSY approach: F = F_{MSY} × SSB_{2023}/MSY $B_{trigger}$	605	535	70	0.189	3129	−5.2	−23	−23
Other scenarios								
F = $F_{MSY\ lower}$ × SSB_{2023}/MSY $B_{trigger}$	492	435	57	0.151	3230	−2.1	−37	−37
F = 0	0	0	0	0	3674	11.4	−100	−100
F= F_{pa}	695	615	81	0.22	3047	−7.6	−11.6	−11.6
F= F_{lim}	888	786	103	0.29	2874	−12.9	12.9	12.9
SSB_{2024} = B_{lim}	1305	1154	151	0.46	2500	−24	66	66
SSB_{2024} = B_{pa} = MSY $B_{trigger}$	192	170	22	0.056	3500	6.1	−76	−76
SSB_{2024} = SSB_{2023}	415	367	48	0.126	3299	0	−47	−47
F= F_{2022}	687	608	80	0.22	3054	−7.4	−12.7	−12.7
F= $F_{MSY\ lower}$	520	460	60	0.16	3205	−2.9	−34	−34
F= F_{MSY}	638	564	74	0.20	3099	−6.1	−18.9	−18.9
F= $F_{MSY\ upper}$	752	665	87	0.24	2996	−9.2	−4.5	−4.5

* Total catches and projected discards are calculated from projected landings based on the average discard rate in 2019–2021 (11.6% in weight).

** SSB 2024 relative to SSB 2023.

*** Total catch in 2023 relative to TAC 2022 (787 tonnes).

^ Advice value for 2023 relative to the corresponding 2022 value (787 tonnes).

The reduction in catch advice is caused by a combination of a downward revision of stock size and a further projected decline because of low incoming recruitments. In addition, the target F is reduced since SSB is estimated to be below MSY $B_{trigger}$ in 2023.

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. As a result, in last year's assessment the 2020 recruitment was assumed. This year's assessment resulted in a substantial higher estimate of the 2020 recruitment compared to last year's assumption.

Last year's advice was derived using a shorter time series for the recruitment assumption. However, this year with the decrease in recruitment in 2021 the longer time period recommended was considered more representative of present recruitment.
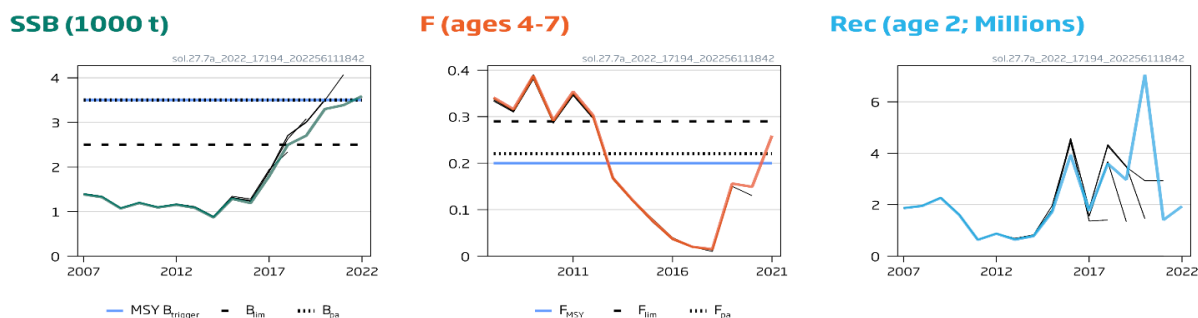
Figure 2   Sole in Division 7.a. Historical assessment results (final-year recruitment assumption and SSB estimate included).

Issues relevant for the advice

Discards have increased recently from 3.5% (average 2016–2018) to 12% (average 2019–2021), but are not currently included in the assessment. Discards are, however, taken into account in the calculation of the advice.

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 (1997); 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 ≥ B_{lim} with 95% probability	ICES (2017, 2021a)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

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

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (XSA) that uses landings in the model (ICES, 2022b)
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 (WGCSE)

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) ~ 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
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	492	-	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	297	23	298
2013	No directed fisheries, bycatch and discards should be minimized	0		140	148	12	148
2014	No directed fisheries, bycatch and discards should be minimized	0		95	96	9	99
2015	No directed fisheries, bycatch and discards should be minimized	0		90	75	7	76
2016	MSY approach (minimize all catches)	0		40	35	1	35
2017	MSY approach		0	40	34	1	34
2018	MSY approach		0	40	36	2	36
2019	MSY approach		≤ 414	414	345†	63	400
2020	MSY approach		≤ 561	457	398***	56	404
2021	MSY approach		≤ 768	768	633***	61	629
2022	MSY approach		≤ 787	787			
2023	MSY approach		≤ 605				

* Revised to 1500 tonnes in 1990.
** Catch at *status quo* F.
*** Preliminary.
† Incomplete/missing due to part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7   Sole in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings			Discards
	Beam trawlers	Otter trawlers	Other gears	
690 tonnes	87%	12%	< 1%	61 tonnes

	629 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	-	71	-	-	2	576	569
2007	306	1	115	-	70	-	-	4	492	492
2008	216	1	66	-	37	-	-	-	320	332
2009	257	-	47	-	20	1	-	1	325	325
2010	217	--	47	-	12	-	-	-	277	277
2011	250	< 1	49	-	31	-	-	-	330	330
2012	222	< 1	51	-	23	-	-	-	297	298
2013	96	< 1	40	-	12	-	-	-	148	148
2014	43	-	43	-	10	-	-	-	96	99
2015	36	< 1	32	-	7	-	-	-	75	76
2016	14	-	15	-	6	-	-	-	35	35
2017	14	< 1	14	-	4	2	-	-	34	34
2018	14	-	16	-	6	< 1	-	-	36	36
2019	329	< 1	†	-	15	< 1	-	-	345†	400
2020**	284	< 1	48	-	65	< 1	-	-	398	404
2021**	477	< 1	81	-	74	< 1	-	-	633	629

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

** Preliminary.

† Incomplete/missing due to part of the data being unavailable under data confidentiality clauses.

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	6679	5359	1441	0.40
1976	3857	4889	1463	0.43
1977	15772	4490	1147	0.37
1978	9040	5092	1106	0.36
1979	8847	5684	1614	0.48
1980	5070	5513	1941	0.64
1981	4496	5165	1667	0.48
1982	2460	4330	1338	0.44
1983	5556	4095	1169	0.44
1984	15457	4601	1058	0.35
1985	16223	5635	1146	0.34
1986	23690	6944	1995	0.44
1987	3454	7148	2808	0.86
1988	3490	5498	1999	0.70
1989	4366	4609	1833	0.58
1990	5547	3603	1583	0.66
1991	12650	3165	1212	0.51
1992	4943	3430	1259	0.53
1993	6174	3212	1023	0.56
1994	5230	4023	1374	0.50
1995	2004	3493	1266	0.51
1996	2493	2689	1002	0.53
1997	8338	2480	1003	0.60
1998	6849	2998	911	0.50
1999	5230	3288	863	0.47
2000	6943	3097	818	0.46
2001	4543	3531	1053	0.35
2002	2328	3539	1090	0.39
2003	3052	3174	1014	0.36
2004	3632	2274	709	0.32
2005	2945	2055	855	0.56
2006	1318	1623	569	0.47
2007	1863	1383	492	0.34
2008	1949	1320	332	0.32
2009	2263	1069	325	0.39
2010	1602	1190	277	0.29

Year	Recruitment age 2	SSB	Landings	Fishing mortality ages 4–7
2011	633	1091	330	0.35
2012	872	1150	298	0.30
2013	639	1081	148	0.168
2014	775	866	99	0.120
2015	1714	1284	76	0.076
2016	3931	1189	35	0.037
2017	1755	1794	34	0.020
2018	3596	2494	36	0.0150
2019	2964	2703	400	0.156
2020	7051	3298	404	0.149
2021	1405	3385	629	0.26
2022	1937*	3588		

* Geometric mean (2012–2020).

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Download the stock assessment data and figures.

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