Sole (*Solea solea*) in Subarea 4 (North Sea)

ICES advice on fishing opportunities

Please note: The present advice replaces the advice given in June 2019 for catches in 2020.

ICES advises that when the EU multiannual plan (MAP) for the North Sea is applied, catches in 2020 that correspond to the F ranges in the MAP are between 10 192 tonnes and 29 767 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (17 545 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

The spawning-stock biomass (SSB) has increased since 2007, and has been estimated above MSY $B_{trigger}$ since 2012. Fishing mortality (F) has declined since 1999 and is close to F_{MSY} in 2018. Recruitment in 2019 is estimated to be the highest since 1988.

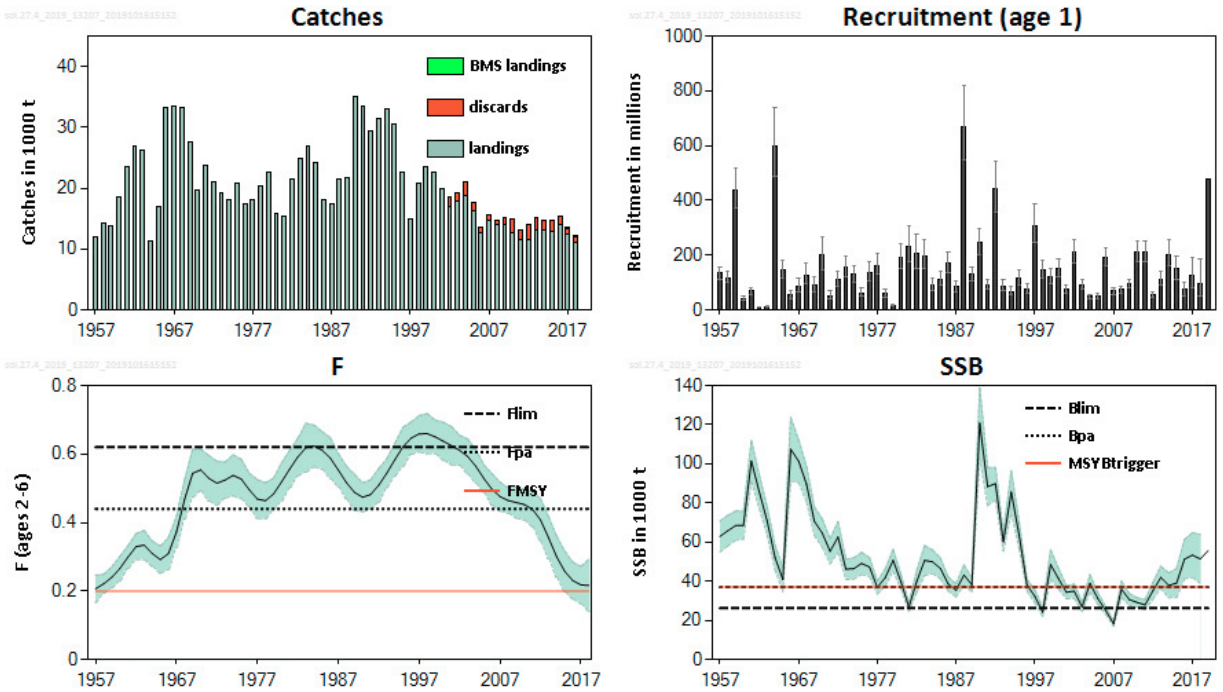

Figure 1 Sole in Subarea 4. Summary of the stock assessment. Estimates of discards are only available since 2002. Shaded areas (F, SSB) and error bars (R) indicate approximately 95% confidence intervals.

Stock and exploitation status

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

Table 1 Sole in Subarea 4. 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}	✗	✗	✗ Above	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 range	MAP MSY $B_{trigger}$	✓	✓	✓ Above trigger

Catch scenarios

Table 2 Sole in Subarea 4. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 2–6}$ (2019)	0.22	Average exploitation pattern (2016–2018), scaled to average $F_{ages\ 2–6}$ (2016–2018).
SSB (2020)	54 776	Short-term forecast; in tonnes.
$R_{age\ 1}$ (2019)	476 477	RCT3 estimation; in thousands.
$R_{age\ 1}$ (2020)	112 788	Geometric mean (1957–2015); in thousands.
Total catch (2019)	15 137	Short-term forecast; in tonnes.
Wanted catch (2019)	13 461	Short-term forecast, average landings ratio by age 2016–2018; in tonnes.
Unwanted catch (2019)	1676	Short-term forecast, average discard ratio by age 2016–2018; in tonnes.

Table 3 Sole in Subarea 4. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch* (2020)	Wanted catch** (2020)	Unwanted catch (2020)	F_{total} (ages 2–6)# (2020)	F_{wanted} (ages 2–6) (2020)	$F_{unwanted}$ (ages 1–3) (2020)	SSB (2021)	% SSB change***	% TAC change^	% Advice change^^
ICES advice basis										
EU MAP^^^: F_{MSY}	17545	15117	2427	0.20	0.166	0.058	89527	63	40	37
F = MAP $F_{MSY\ lower}$	10192	8787	1406	0.113	0.093	0.033	96677	76	−18.8	−20
F = MAP $F_{MSY\ upper}$	29767	25625	4142	0.37	0.30	0.106	77682	42	137	133
Other scenarios										
MSY approach: F_{MSY}	17545	15117	2427	0.20	0.166	0.058	89527	63	40	37
F_{mp} (former management plan)	17386	14980	2405	0.20	0.165	0.058	89682	64	38	36
F = 0	0	0	0	0	0	0	106614	95	−100	−100
F_{pa}	34646	29814	4832	0.44	0.36	0.127	72969	33	176	171
F_{lim}	46007	39551	6456	0.63	0.52	0.182	62038	13.3	270	260
SSB (2021) = B_{pa}	72372	62040	10332	1.24	1.02	0.36	37000	−32	480	470
SSB (2021) = B_{lim}	83891	71796	12095	1.65	1.36	0.48	26300	−52	570	560
SSB (2021) = MSY $B_{trigger}$	72372	62040	10332	1.24	1.02	0.36	37000	−32	480	470
F = F_{2019}	18702	16113	2589	0.22	0.178	0.062	88404	61	49	46
Roll-over TAC	12555	10822	1733	0.141	0.116	0.041	94378	72	0.00	−1.92

* Differences between the total catch and the sum of wanted and unwanted catches result from rounding.
** "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 average discard rate estimates for 2016–2018.
*** SSB 2021 relative to SSB 2020.
^ Total catch in 2020 relative to TAC in 2019 (12 555 tonnes).
^^ Total catch in 2020 relative to advice value 2019 (12 801 tonnes).
^^^ EU multiannual plan (MAP) for the North Sea (EU, 2018).
# F_{wanted} and $F_{unwanted}$ do not sum up to the F_{total} as they are calculated using different ages.

The advice change for catches in 2020 (+37%) is due to strong recruitment for 2019.

Basis of the advice

Table 4 Sole in Subarea 4. The basis of the advice.

Advice basis	EU multiannual plan (MAP) for the North Sea (EU, 2018).
Management plan	The EU multiannual plan (MAP) for stocks in North Sea and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock. In accordance with the MAP, catches higher than those corresponding to F_{MSY} can only be taken providing SSB is greater than MSY $B_{trigger}$, and one of the following conditions is met: a. if it is necessary for the achievement of objectives of mixed fisheries; b. if is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; c. in order to limit variations in fishing opportunities between consecutive years to not more than 20%. ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary.

Quality of the assessment

There has been a downward revision of the SSB in the latest assessments.

The main fishery targeting sole has gradually shifted fishing effort to the southern North Sea. Currently no survey information about the area where the main part of the catch is taken is included in the assessment.

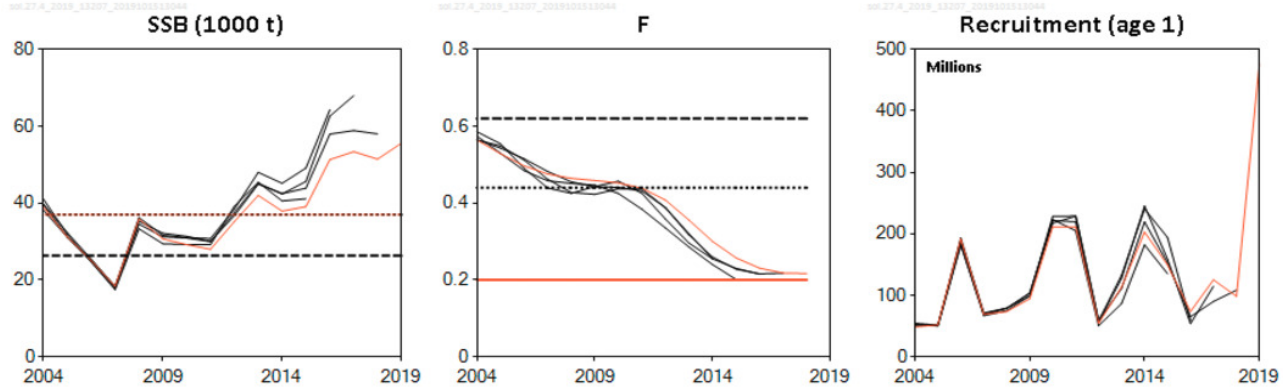

Figure 2 Sole in Subarea 4. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

Based on the beam-trawl survey information (BTS Q3) that became available in summer 2019, the forecast and advice has been updated from that released in June 2019. The increase in advice compared to June is due to updated recruitment estimates based on recent survey data.

ICES was requested to provide advice based on the EU MAP for the North Sea.

Between 2014 and 2018, the use of pulse trawls in the main fishery operating in the North Sea has increased and fewer vessels operate with traditional beam trawls. The pulse gear allows fishing of softer grounds; as a result the spatial distribution of the main fisheries has changed to the southern part of the Division 4.c. Consequently, a larger proportion of the sole catch is now taken in this area (ICES, 2018a). Following the EU decision in February 2019 to revise the technical measures regulations, all pulse gear will be prohibited from 30 June 2021 and is now being phased out. It is expected that the fleets will revert to the traditional gears and fishing grounds.

Sole in Subarea 4 has been fully under the EU landing obligation since 2016, with *de minimis* exemptions in certain fisheries.

Below minimum size (BMS) landings of sole reported to ICES are currently much lower than the estimates of unwanted catches, which in 2018, based on catch monitoring programmes, comprises 8.6% of the total catch.

An analysis of BTS survey data over the period 2000–2017 (Brunel and Verkempynck, 2018) shows that the stock distribution is expanding north of 56°N, up to the west coast of Denmark, particularly for larger sole (>24 cm).

Reference points

Table 5 Sole in Subarea 4. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	37 000	Default to value of B_{pa}.	ICES (2015)
	F_{MSY}	0.202	EQsim analysis, assuming a hockey-stick stock–recruit relationship based on the recruitment period 1958–2010.	ICES (2015)
Precautionary approach	B_{lim}	26 300	Break-point of hockey-stick stock–recruit relationship, based on the recruitment period 1958–2010.	ICES (2015)
	B_{pa}	37 000	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$.	ICES (2015)
	F_{lim}	0.63	EQsim analysis, based on the recruitment period 1958–2010.	ICES (2016)
	F_{pa}	0.44	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$.	ICES (2016)
EU Management plan (MAP)*	MAP MSY $B_{trigger}$	37 000	MSY $B_{trigger}$.	ICES (2015)
	MAP B_{lim}	26 300	B_{lim}.	ICES (2015)
	MAP F_{MSY}	0.202	F_{MSY}.	ICES (2015)
	MAP target range F_{lower}	0.113–0.202	Consistent with ranges provided by ICES (2015), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2015)
	MAP target range F_{upper}	0.202–0.367	Consistent with ranges provided by ICES (2015), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2015)

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

Basis of the assessment

Table 6 Sole in Subarea 4. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018b).
Assessment type	Age-based analytical assessment (Aarts and Poos, 2009; ICES, 2019) that uses catches in the model and in the forecast.
Input data	Commercial catches (age frequencies from catch sampling), three survey indices (BTS-ISIS Q3, SNS Q3, DFS Q3). Natural mortality is assumed constant at 0.1 (except for 1963: 0.9). Maturity-at-age is assumed to be knife-edged (at age 3) and constant over time.
Discards, BMS landings, and bycatch	Discards are included in the assessment. In 2018, 85% of the landings had associated discarding information, and 91% of the discards were sampled. BMS landings, where reported, are included with discards as unwanted catch in the assessment from 2016.
Indicators	None.
Other information	The stock was last benchmarked in 2015 (ICES, 2015). The main changes were the inclusion of discards and the removal of the Dutch beam trawl fleet commercial index (ICES, 2015).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional information.

History of the advice, catch, and management

Table 7 Sole in Subarea 4. ICES advice, and ICES estimates of landings and discards reported to ICES. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards
1987	Rebuild SSB to 40 000 t; TAC	11000		14000	17368	
1988	Increase SSB towards 50 000 t; TAC	11000		14000	21590	
1989	Increase SSB towards 50 000 t; TAC	14000		14000	21805	
1990	80% of F(88); TAC	25000		25000	35120	
1991	SSB > 50 000 t; TAC	27000		27000	33513	
1992	TAC	21000		25000	29341	
1993	No long-term gains in increased F	29000		32000	31491	
1994	No long-term gains in increased F	31000		32000	33002	
1995	No long-term gains in increased F	28000		28000	30467	
1996	Mixed fishery, link plaice advice	23000		23000	22651	
1997	< 80% of F(95)	14.600		18000	14901	
1998	75% of F(96)	18100		19100	20868	
1999	$F < F_{pa}$ (80% of F(97))	20300		22000	23475	
2000	$F < F_{pa}$	< 19800		22000	22641	
2001	$F < F_{pa}$	< 17700		19000	19944	
2002	F < 0.37	< 14300		16000	16945	1712
2003	$F < F_{pa}$	< 14600		15900	17920	1364
2004	$F < F_{pa}$	< 17900		17000	18757	2181
2005	$F < F_{pa}$	< 17300		18600	16355	1341
2006	Keep SSB above B_{pa}	< 11900		17700	12594	994
2007	SSB above B_{pa}	< 10800		15000	14635	871
2008	SSB above B_{pa}	< 9800		12800	14071	545
2009	Apply management plan	< 14000		14000	13952	1261
2010	Apply management plan	< 14100		14100	12603	2246
2011	See scenarios	-		14100	11485	1703
2012	Apply first stage of the management plan	< 15700		16200	11602	2528
2013	Apply first stage of the management plan	< 14000		14000	13137	2119
2014	Apply first stage of the management plan	< 11900		11900	13060	1568
2015	Apply second stage of the management plan	< 11400		11900	12867	1763
2016	Apply second stage of the management plan		≤ 12800	13262	14127	1205^
2017	Apply second stage of the management plan		≤ 15300	16123	12370	1246^
2018	Apply second stage of the management plan		≤ 15726	15694	11199	1056^
2019	MAP* F ranges: F_{lower} to F_{upper} (F = 0.113 – 0.367), but F higher than F_{MSY} = 0.202 only under conditions specified in the MAP		7451–21644, but catches greater than 12801 only under conditions specified in the MAP	12555		
2020	Management Plan		17545 (range 10192–29767)			

^ Since 2016 discards correspond to unwanted catch (including BMS landings).
* EU multiannual plan (MAP) for the North Sea (EU, 2018).

History of the catch and landings

Table 8 Sole in Subarea 4. Catch distribution by fleet in 2018 as estimated by and reported to ICES.

Catch	Wanted catch				Unwanted catch
12255 tonnes	Beam trawl 90%	Gillnets 4.1%	Trammel nets 4.3%	Other 1.7%	1056 tonnes
	11199 tonnes				

Table 9 Sole in Subarea 4. History of landings; the official reported landings are presented by country and total. Official reported BMS landings, ICES estimated landings, and the TAC are presented. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Netherlands	UK	Other	Total landings	Official BMS landings	ICES total landings	TAC
1982	1900	524	686	266	17686	403	2	21467		21579	21000
1983	1740	730	332	619	16101	435	0	19957		24927	20000
1984	1771	818	400	1034	14330	586	1	18940		26839	20000
1985	2390	692	875	303	14897	774	3	19934		24248	22000
1986	1833	443	296	155	9558	647	2	12934		18201	20000
1987	1644	342	318	210	10635	676	4	13829		17368	14000
1988	1199	616	487	452	9841	740	28	13363		21590	14000
1989	1596	1020	312	864	9620	1033	50	14495		21805	14000
1990	2389	1427	352	2296	18202	1614	263	26543		35120	25000
1991	2977	1307	465	2107	18758	1723	271	27608		33513	27000
1992	2058	1359	548	1880	18601	1281	277	26004		29341	25000
1993	2783	1661	490	1379	22015	1149	298	29775		31491	32000
1994	2935	1804	499	1744	22874	1137	298	31291		33002	32000
1995	2624	1673	640	1564	20927	1040	312	28780		30467	28000
1996	2555	1018	535	670	15344	848	229	21199		22651	23000
1997	1519	689	99	510	10241	479	204	13741		14901	18000
1998	1844	520	510	782	15198	549	339	19742		20868	19100
1999	1919	828	NA	1458	16283	645	501	*21634		23475	22000
2000	1806	1069	362	1280	15273	600	539	20929		22641	22000
2001	1874	772	411	958	13345	597	394	18351		19944	19000
2002	1437	644	266	759	12120	451	292	15969		16945	16000
2003	1605	703	728	749	12469	521	363	17138		17920	15850
2004	1477	808	655	949	12860	535	544	17828		18757	17000
2005	1374	831	676	756	10917	667	357	15579		16355	18600
2006	980	585	648	475	8299	910	0	11933		12594	17670
2007	955	413	401	458	10365	1203	5	13800		14635	15000
2008	1379	507	714	513	9456	851	15	13435		14071	12800
2009	1353	476	NA	555	12038	951	1	*14898		13952	14000
2010	1268	406	621	537	8770	526	1.38	12129		12603	14100
2011	857	346	539	327	8133	786	2	10990		11485	14100
2012	593	418	633	416	9089	599	3	11752		11602	16200
2013	697	497	680	561	9987	867	0	13291		13137	14000
2014	920	314	675	642	9569	840	0	12547		13060	11900
2015	933	271	532	765	8899	804	0	12203		12867	11900
2016	**767	**355	**362	**861	**9600	**705	**0	**12651	NA	14127	13262
2017	**556	**432	**393	**731	**9155	**513	**0	**11781	**30	12370	16123
2018	**408	**368	**432	**717	**8412	**431	**2	**10771	**57	11199	12555

* These totals do not include reported official landings of all countries.

** Preliminary reported official landings.

NA = not available.

Summary of the assessment

Table 10 Sole in Subarea 4. Assessment summary. Recruitment in thousands. Weights are in tonnes. "High" and "Low" are two standard errors (approximately 95% confidence intervals).

Year	Recruitment			SSB			Landings	Discards	Official BMS landings	F		
	Age 1	High	Low	SSB	High	Low				Ages 2–6	High	Low
1957	133639	157494	113421	62890	70821	54959	12067			0.21	0.25	0.167
1958	117618	139891	98852	65799	73622	57976	14287			0.22	0.25	0.193
1959	437231	516879	369696	68451	75869	61033	13832			0.24	0.27	0.21
1960	41880	49899	35181	68637	75785	61489	18620			0.27	0.30	0.23
1961	69475	82937	58230	101460	111903	91017	23566			0.30	0.33	0.27
1962	11063	13151	9305	85679	94315	77043	26877			0.33	0.37	0.29
1963	12718	15277	10588	70883	78096	63670	26164			0.33	0.38	0.29
1964	600118	737469	488463	52266	58618	45914	11342			0.31	0.35	0.27
1965	145602	180586	117482	40890	47042	34738	17043			0.29	0.33	0.25
1966	54216	69349	42408	107460	123677	91243	33340			0.31	0.36	0.26
1967	87066	115206	65744	101370	112225	90515	33439			0.37	0.42	0.33
1968	127495	170294	95485	89656	98680	80632	33179			0.47	0.52	0.41
1969	88735	119315	65939	70654	77974	63334	27559			0.54	0.61	0.47
1970	199060	268918	147243	64660	71907	57413	19685			0.55	0.61	0.49
1971	53209	69349	40827	55306	61687	48925	23652			0.53	0.60	0.46
1972	109432	140998	84923	62591	70426	54756	21086			0.51	0.58	0.45
1973	154175	198206	119963	46167	51375	40959	19309			0.52	0.58	0.47
1974	129631	163325	102796	46478	51885	41071	17989			0.54	0.60	0.48
1975	61849	78636	48602	49134	54755	43513	20773			0.53	0.58	0.47
1976	135909	174200	106090	47305	52120	42490	17326			0.50	0.54	0.45
1977	163006	206006	129100	36869	40207	33531	18003			0.47	0.53	0.41
1978	60809	77276	47804	41892	46237	37547	20280			0.46	0.52	0.41
1979	18040	22968	14168	50712	56266	45158	22598			0.48	0.53	0.44
1980	190841	243205	149693	39777	43517	36037	15807			0.52	0.57	0.46
1981	230091	304388	173849	26801	28944	24658	15403			0.56	0.61	0.50
1982	205107	276227	152211	39906	45524	34288	21579			0.59	0.65	0.54
1983	197096	257270	150862	50644	58257	43031	24927			0.62	0.69	0.55
1984	91723	117965	71386	49977	55987	43967	26839			0.62	0.68	0.56
1985	112527	140702	90003	46635	51963	41307	24248			0.61	0.67	0.56
1986	169330	210109	136574	38637	42220	35054	18201			0.59	0.65	0.53
1987	84736	105960	67723	35406	38760	32052	17368			0.55	0.60	0.51
1988	669270	820050	546276	43237	48389	38085	21590			0.52	0.56	0.47
1989	129322	157248	106342	38183	41808	34558	21805			0.49	0.54	0.44
1990	244852	299084	200290	120830	138843	102817	35120			0.47	0.52	0.43
1991	90455	110193	74311	88339	98073	78605	33513			0.48	0.52	0.44
1992	441410	542932	359065	89905	98136	81674	29341			0.51	0.56	0.46
1993	88004	110472	70086	60136	64849	55423	31491			0.54	0.59	0.50
1994	67430	85280	53332	85614	96381	74847	33002			0.58	0.63	0.54
1995	117215	148097	92817	63664	70563	56765	30467			0.62	0.68	0.56
1996	75301	95404	59404	38059	41082	35036	22651			0.65	0.69	0.60
1997	306980	386103	244297	32400	35652	29148	14901			0.66	0.71	0.61
1998	145514	182623	115939	24221	26530	21912	20868			0.66	0.72	0.60
1999	119335	150449	94714	48535	56024	41046	23475			0.65	0.70	0.60
2000	149473	185176	120685	41415	46758	36072	22641			0.64	0.69	0.58
2001	75840	92616	62055	34396	37719	31073	19944			0.62	0.68	0.57

Year	Recruitment			SSB			Landings	Discards	Official BMS landings	F		
	Age 1	High	Low	SSB	High	Low				Ages 2–6	High	Low
2002	211151	257537	173006	34996	38590	31402	16945	1712		0.61	0.65	0.57
2003	92102	110971	76495	26927	29406	24448	17920	1364		0.59	0.64	0.54
2004	48463	58297	40324	38962	43416	34508	18757	2181		0.56	0.61	0.52
2005	51785	62000	43265	31179	34172	28186	16355	1341		0.53	0.57	0.49
2006	191607	227424	161366	25058	27067	23049	12594	994		0.50	0.54	0.45
2007	69113	82440	57883	18336	19709	16963	14635	871		0.48	0.52	0.43
2008	73577	87929	61557	35888	40069	31707	14071	545		0.46	0.50	0.43
2009	94379	112327	79287	30699	33690	27708	13952	1261		0.46	0.50	0.41
2010	211395	251943	177201	29193	31577	26809	12603	2246		0.45	0.50	0.41
2011	211307	252167	177044	27976	30627	25325	11485	1703		0.44	0.49	0.39
2012	54622	65722	45379	35215	39524	30906	11602	2528		0.41	0.47	0.35
2013	113335	139057	92352	42003	47664	36342	13137	2119		0.36	0.42	0.29
2014	202993	256915	160412	37922	44261	31583	13060	1568		0.30	0.36	0.24
2015	149480	197189	113332	39085	46515	31655	12867	1763		0.26	0.32	0.198
2016	73600	101751	53195	51331	61341	41321	14127	1205*		0.23	0.28	0.177
2017	125181	189087	82954	53396	64827	41965	12370	1216*	30	0.22	0.27	0.163
2018	98395	185532	52210	51459	63972	38946	11199	999*	57	0.22	0.29	0.140
2019	476477**			55591***								

* Since 2016, discards correspond to unwanted catch minus BMS landings from EU fleets officially reported in logbooks.
** RCT3 estimate.
*** From the short-term forecast.

Sources and references

Aarts, G., and Poos, J. J. 2009. Comprehensive discard reconstruction and abundance estimation using flexible selectivity functions. ICES Journal of Marine Science, 66: 763–771. https://doi.org/10.1093/icesjms/fsp033.

Brunel, T., and Verkempynck, R. 2018. Variations in North Sea sole distribution: Variation in North Sea sole distribution with respect to the 56°N parallel perceived through scientific survey and commercial fisheries. Wageningen University & Research report C087/18. https://doi.org/10.18174/465031.

EU. 2018. Regulation (EU) 2018/973 of the European Parliament and of the Council of 4 July 2018 establishing a multiannual plan for demersal stocks in the North Sea and the fisheries exploiting those stocks, specifying details of the implementation of the landing obligation in the North Sea and repealing Council Regulations (EC) No 676/2007 and (EC) No 1342/2008. Official Journal of the European Union, L. 179. 13 pp. http://data.europa.eu/eli/reg/2018/973/oj.

ICES. 2015. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp. https://doi.org/10.17895/ices.pub.5324.

ICES. 2016. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2016, Hamburg, Germany. ICES CM 2016/ACOM:14. 1096 pp. https://doi.org/10.17895/ices.pub.5329.

ICES. 2018a. Report of the Working Group on Electric Trawling (WGELECTRA), 17–19 April 2018, IJmuiden, the Netherlands. ICES CM 2018/EOSG: 10. 155 pp. https://doi.org/10.17895/ices.pub.5633.

ICES. 2018b. 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. 2019. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports, 1:7. http://doi.org/10.17895/ices.pub.5402.

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