

Sole (*Solea solea*) in subdivisions 20–24 (Skagerrak and Kattegat, western Baltic Sea)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for the North Sea and adjacent waters is applied, catches in 2021 that correspond to the F ranges in the plan are between 502 tonnes and 665 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (596 tonnes) can only be taken under conditions specified in the MAP, whilst the entire range is considered precautionary when applying the ICES advice rule.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2020 is attached as Annex 1.

Stock development over time

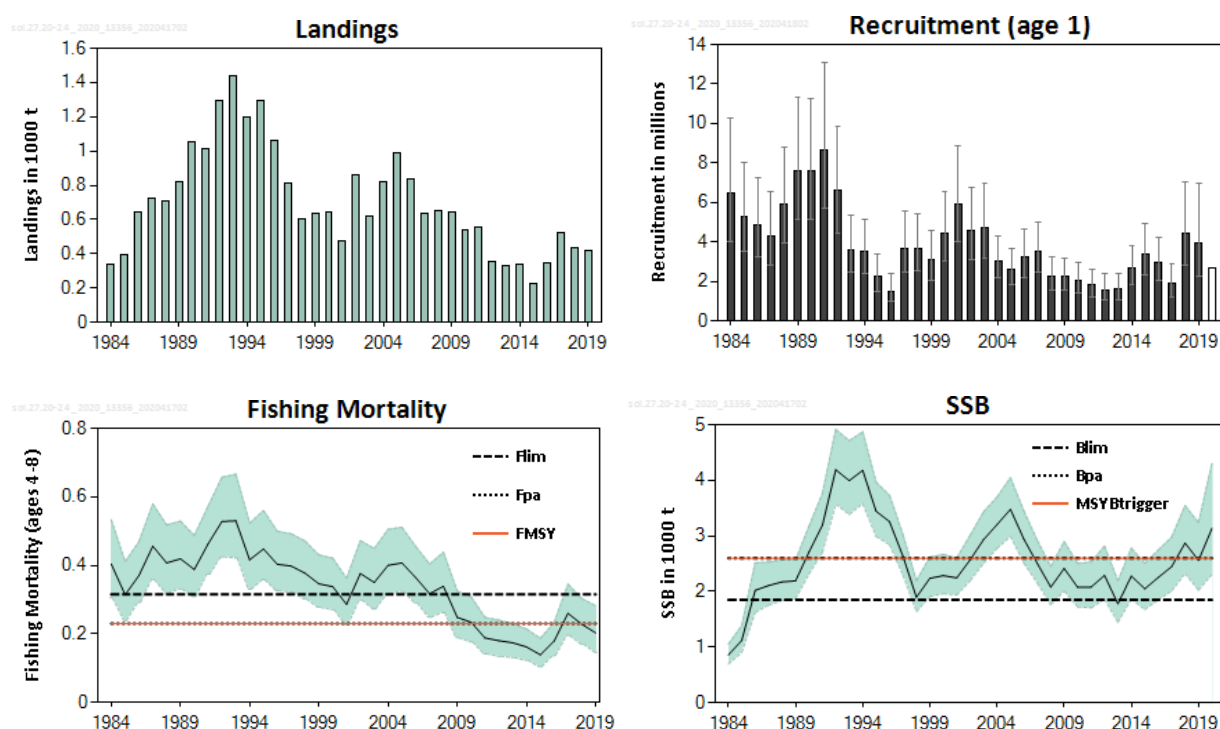


Figure 1 Sole in subdivisions 20–24. Summary of the stock assessment (weights in thousand tonnes). Recruitment, fishing mortality, and spawning-stock biomass (SSB) are indicated with 95% confidence limits. Assumed recruitment value is unshaded.

Stock and exploitation status

Table 1 Sole in subdivisions 20–24. State of the stock and the fishery relative to reference points.

		Fishing pressure				Stock size		
		2017	2018	2019		2018	2019	2020
Maximum sustainable yield	F_{MSY}	✗	✓	✓ Below	MSY	✓	✗	✓ 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

Catch scenarios

Table 2 Sole in subdivisions 20–24. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 4–8}} (2020)$	0.197	$F_{\text{ages 4–8}} (2020)$; F_{sq} (average F_{2017} – F_{2019} rescaled to F_{2019})
SSB (2021)	3549	Tonnes; when fishing at F_{sq}
$R_{\text{age 1}} (2020)$	2647	Thousands; resampled from recruitment (2004–2019)
$R_{\text{age 1}} (2021)$	2595	Thousands; resampled from recruitment (2004–2019)
Projected landings (2020)	447	Tonnes; fishing at <i>status quo</i> (F_{sq}) in 2020
Projected discards (2020)	13	Tonnes; mean discard rate in weight (2015–2019): 2.8%.
Total catch (2020)	460	Tonnes; based on fishing at F_{sq} and mean discard rate

Table 3 Sole in subdivisions 20–24. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch * (2021)	Projected landings ** (2021)	Projected discards ** (2021)	$F_{\text{projected landings (4–8)}}$ (2021)	SSB (2022)	% SSB change ***	% TAC change ^	% advice change ^^
ICES advice basis								
EU MAP #: F_{MSY}	596	580	16	0.23	3537	–0.34	12	11
EU MAP #: F_{lower}	502	488	14	0.190	3626	2.2	–5.8	–11 §
EU MAP #: F_{upper}	665	647	18	0.26	3457	–2.6	25	11 §§
Other scenarios								
$F = 0$	0	0	0	0	4160	17	–100	–100
F_{pa}	596	580	16	0.23	3537	–0.34	12	11
F_{lim}	785	764	21	0.315	3330	–6.2	47	46
SSB (2022) = B_{lim}	2153	2156	60	1.31	1859	–48	304	299
SSB (2022) = B_{pa}	1490	1449	41	0.71	2614	–26	180	176
SSB (2022) = $\text{MSY } B_{\text{trigger}}$	1490	1449	41	0.71	2614	–26	180	176
$F = F_{2020}$	525	511	14	0.20	3602	1.49	–1.50	–2.6

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

* Total catch is calculated based on projected landings (fish that would be landed in the absence of the EU landing obligation) and 2.8% discard ratio (in weight).

** “Projected landings” and “projected discards” are used to describe fish that would be landed and discarded in the absence of the EU landing obligation, based on discard ratio estimates for 2015–2019.

*** SSB 2022 relative to SSB 2021.

^ Total catch in 2021 relative to the TAC in 2020 (533 tonnes).

^^ Advice value 2021 relative to the advice value 2020 (539 tonnes).

§ ICES advice for F_{lower} in 2021 relative to ICES advice F_{lower} in 2020 (452 tonnes).

§§ ICES advice for F_{upper} in 2021 relative to ICES advice F_{upper} in 2020 (600 tonnes).

Quality of the assessment

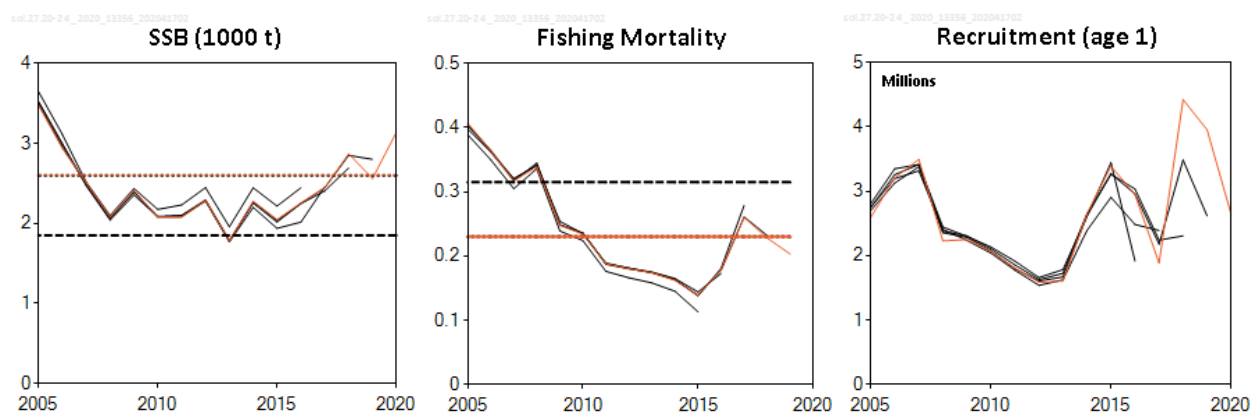


Figure 2 Sole in subdivisions 20–24. Historical assessment results (final-year recruitment estimates included).

History of the advice, catch, and management

Table 4 Sole in subdivisions 20–24. History of ICES advice, agreed TAC, and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings**	ICES discards***
1987	-	-	-	850	722	-
1988	-	-	-	950	706	-
1989	TAC	-	< 800	800	824	-
1990	Precautionary TAC	-	600	500	1050	-
1991	TAC	-	1000	1000	-^	-
1992	TAC	-	1000	1400	-^	-
1993	TAC at recent catch levels	-	1000	1600	-^	-
1994	No advice due to uncertain catches	-	-	2100	1198	-
1995	No advice	-	-	2250	1297	-
1996	No advice	-	-	2250	1059	-
1997	No advice	-	-	2250	814	-
1998	No advice	-	-	1800	605	-
1999	No increase in F	-	800	1350	637	-
2000	No increase in F	-	650	950	645	169
2001	No increase in F	-	700	700	478	-
2002	F below F_{pa}	-	500	500	862	10
2003	F below F_{pa}	-	300	350	618	43
2004	F below F_{pa}	-	500	520	824	-
2005	No increase in F	-	850	900	990	-
2006	F below F_{pa}	-	820	900	836	-
2007	Limit catches to 2002–2005 average	-	740	900	633	-
2008	F below F_{pa}	-	970	940	655	-
2009	F below F_{pa}	-	800	800	641	-
2010	F below F_{pa}	-	620	700	538	14
2011	See scenarios	-	-	840	552	8
2012	MSY framework	-	610	610^^	358	11
2013	MSY framework	-	560	590	332	10

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings**	ICES discards***
2014	MSY approach	353	353^^	350	335	32
2015	MSY approach	211	205	205	224	6
2016	MSY approach	≤ 394	379	391	348	17
2017	MSY approach	≤ 555	-	555	520	15
2018	MSY approach	≤ 453	-	448	434	7
2019	Proposed MAP F ranges, F _{lower} to F _{upper}	422–562	-	502	419	8
2020	MAP target F ranges: F _{lower} to F _{upper} , but F higher than F _{MSY} only under conditions specified in MAP	452–600, but catch higher than 539 only under conditions specified in MAP		533		
2021	Management Plan	596 (range 502–665)				

* TAC applies to subdivisions 20–21 and the EC waters of subdivisions 22–32.

** Landings include subdivisions 20–21 and subdivisions 22–24.

*** Discard estimates are not available for all years.

^ Uncertain.

^^ No more than 461 tonnes in subdivisions 20–21.

^^^ Discarding is assumed to be negligible.

Summary of the assessment

Table 5 Sole in subdivisions 20–24. Assessment summary. Weights are in tonnes, recruitment in thousands. High and Low refer to 95% confidence intervals.

Year	Recruitment			Spawning-stock biomass			Landings	Fishing mortality		
	R (age 1)	High	Low	SSB	High	Low		F (ages 4–8)	High	Low
	thousands			tonnes			tonnes			
1984	6444	10284	4038	857	1055	696	337	0.40	0.53	0.31
1985	5285	7993	3495	1121	1389	905	397	0.31	0.41	0.24
1986	4857	7222	3267	2023	2519	1625	643	0.37	0.47	0.29
1987	4280	6510	2813	2108	2530	1756	722	0.46	0.58	0.36
1988	5886	8762	3953	2173	2569	1838	706	0.41	0.52	0.32
1989	7620	11358	5112	2192	2565	1873	824	0.42	0.53	0.33
1990	7590	11257	5117	2708	3171	2313	1050	0.39	0.49	0.31
1991	8650	13051	5734	3188	3759	2703	1011	0.46	0.57	0.37
1992	6609	9857	4431	4189	4913	3572	1294	0.53	0.66	0.43
1993	3599	5320	2434	3994	4712	3386	1439	0.53	0.67	0.42
1994	3510	5166	2384	4178	4873	3581	1198	0.42	0.52	0.33
1995	2256	3367	1511	3444	3965	2991	1297	0.45	0.56	0.36
1996	1517	2405	958	3257	3731	2843	1059	0.40	0.50	0.33
1997	3687	5554	2447	2633	3019	2297	814	0.40	0.49	0.32
1998	3689	5426	2508	1897	2197	1638	605	0.38	0.47	0.30
1999	3092	4610	2073	2237	2619	1910	637	0.35	0.43	0.28
2000	4446	6534	3026	2287	2668	1961	645	0.34	0.42	0.27
2001	5945	8836	4000	2245	2603	1937	478	0.29	0.36	0.23
2002	4560	6721	3094	2571	3011	2195	862	0.38	0.47	0.30
2003	4707	6979	3175	2935	3433	2509	618	0.35	0.45	0.27
2004	3047	4273	2173	3204	3699	2775	824	0.40	0.51	0.32
2005	2595	3659	1840	3479	4047	2992	990	0.41	0.51	0.32
2006	3209	4646	2216	2942	3447	2511	836	0.36	0.46	0.29

Year	Recruitment			Spawning-stock biomass			Landings	Fishing mortality		
	R (age 1)	High	Low	SSB	High	Low		F (ages 4–8)	High	Low
	thousands			tonnes				tonnes		
2007	3496	4967	2461	2506	2917	2153	633	0.32	0.40	0.25
2008	2229	3240	1533	2080	2450	1765	655	0.34	0.44	0.26
2009	2250	3196	1584	2415	2900	2011	641	0.25	0.33	0.189
2010	2064	2941	1448	2078	2505	1724	538	0.23	0.31	0.177
2011	1807	2639	1237	2079	2533	1706	552	0.188	0.25	0.142
2012	1586	2408	1044	2289	2815	1862	358	0.180	0.24	0.135
2013	1605	2422	1063	1780	2190	1447	332	0.174	0.23	0.131
2014	2647	3802	1842	2278	2780	1866	335	0.162	0.21	0.123
2015	3391	4960	2318	2049	2506	1676	224	0.139	0.187	0.104
2016	2948	4250	2045	2254	2747	1849	348	0.179	0.23	0.137
2017	1885	2895	1227	2448	2978	2012	520	0.26	0.35	0.196
2018	4427	7013	2794	2871	3544	2325	434	0.23	0.30	0.171
2019	3955	6947	2251	2561	3240	2024	419	0.20	0.28	0.147
2020	2647*			3136	4305	2310				

* Resampled from recruitment in 2004–2019.

Sources and references

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. 2020. Baltic Fisheries Assessment Working Group (WGBFAS). ICES Scientific Reports, 2:45. 632 pp. <http://doi.org/10.17895/ices.pub.6024>.

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Annex 1

ICES Advice on fishing opportunities, catch, and effort
Baltic Sea and Greater North Sea ecoregions
Published 28 June 2019

Sole (*Solea solea*) in subdivisions 20–24 (Skagerrak and Kattegat, western Baltic Sea)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) is applied, catches in 2020 that correspond to F_{ranges} in the plan are between 452 tonnes and 600 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (539 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) shows an increasing trend from 2015 and has been above $MSY B_{\text{trigger}}$ in the past two years. Fishing mortality (F) has increased in recent years and is at F_{MSY} in 2018. Recruitment has fluctuated below the average of the time-series since 2004.

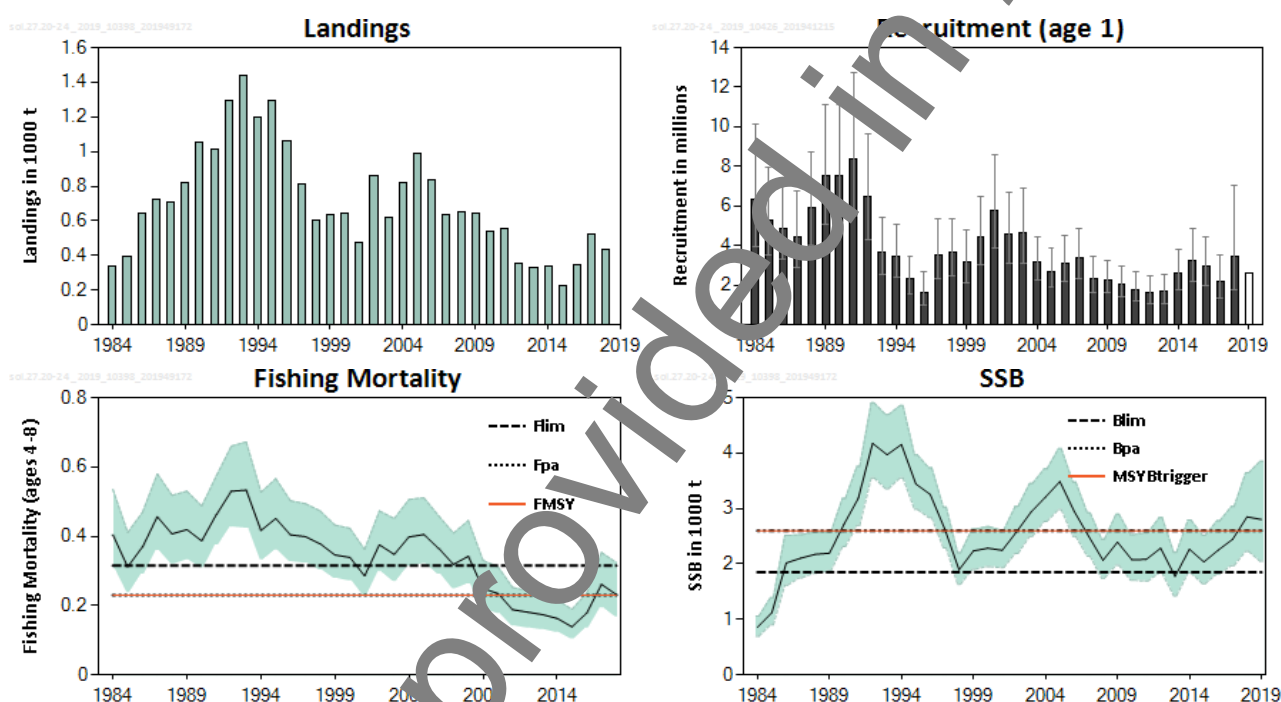


Figure 1 Sole in subdivisions 20–24. Summary of the stock assessment (weights in thousand tonnes). 95% confidence limits indicated for recruitment, fishing mortality, and spawning-stock biomass. Assumed recruitment value is unshaded.

Stock and exploitation status

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

Table 1 Sole in subdivisions 22–24. 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}	✓	✗	✓ At	$MSY B_{\text{trigger}}$	✗	✓ Above trigger
Precautionary approach	$F_{\text{pa}}, F_{\text{lim}}$	✓	○	✓ Harvested sustainably	$B_{\text{pa}}, B_{\text{lim}}$	○	✓ Full reproductive capacity
Management plan	F_{ranges}	✓	✓	✓ Within range	B_{MGT}	✗	✓ Above trigger

Catch scenarios

Table 2 Sole in subdivisions 20–24. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F _{ages 4–8} (2019)	0.23	F corresponding to a TAC of 502 tonnes in 2019.
SSB (2020)	3065 tonnes	Fishing at F = 0.23 in 2019.
R _{age 1} (2019–2020)	2618 thousands	Resampled from recruitment (2004–2018)
Wanted catch (2019)	482 tonnes	Based on the TAC and mean discard ratio.
Unwanted catch (2019)	20 tonnes	Mean discard ratio in weight (2014–2018) of 4%.
Total catch (2019)	502 tonnes	Corresponding to a TAC of 502 tonnes.

Table 3 Sole in subdivisions 20–24. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch * (2020)	Wanted catch ** (2020)	Unwanted catch ** (2020)	F wanted (4–8) (2020)	SSB (2021)	% SSB change ***	% TAC change ^	% Advice change ^^
ICES advice basis								
EU MAP#: F _{MSY}	539	518	21	0.23	3081	1%	7.4%	7.4%
EU MAP#: F _{lower}	452	435	17	0.19	3168	3%	7.1% #	7.1% #
EU MAP#: F _{upper}	600	577	23	0.26	3009	–2%	6.8% ##	6.8% ##
Other scenarios								
F = 0	0	0	0		3631	18%	–100%	–100%
F _{pa}	539	518	21	0.23	3081	1%	7.4%	7.4%
F _{lim}	710	683	27	0.31	2902	–5%	41.4%	41.4%
SSB (2021) = B _{lim}	1758	1690	68	0.07	1848	–40%	250.2%	250.2%
SSB (2021) = B _{pa}	1015	976	39	0.49	2620	–15%	102.2%	102.2%
SSB (2021) = MSY B _{trigger}	1015	976	39	0.49	2620	–15%	102.2%	102.2%
F = F ₂₀₁₉	539	518	21	0.23	3081	1%	7.4%	7.4%

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

* Total catch is calculated based on wanted catch (fish that would be landed in the absence of the EU landing obligation) and 4% discard ratio (in weight).

** “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 discard ratio estimates for 2014–2018.

*** SSB 2021 relative to SSB 2020.

^ Total catch in 2020 relative to TAC in 2019 (502 tonnes).

^^ Advice value 2020 relative to advice value 2019 (502 tonnes).

ICES advice for F_{lower} in 2020 relative to ICES advice F_{lower} in 2019 (422 tonnes).

ICES advice for F_{upper} in 2020 relative to ICES advice F_{upper} in 2019 (562 tonnes).

The advised catch for 2020 presents an increase from previous advice (+7.4%) because of increased recruitment.

Basis of the advice

Table 4 Sole in subdivisions 20–24. The basis of the advice.

Advice basis	EU multiannual plan (MAP) for stocks in the North Sea (EU, 2018).
Management plan	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> a) if it is necessary for the achievement of objectives of mixed fisheries; b) if it 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 %. <p>ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary.</p>

Quality of the assessment

This assessment is considered to be internally consistent and of good quality. The number of biological samples has increased significantly in 2018.

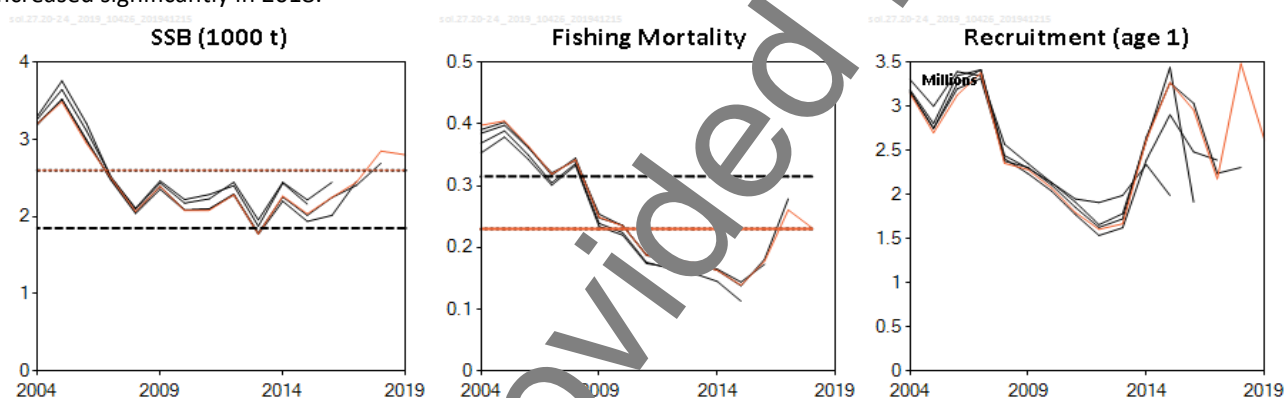


Figure 2 Sole in subdivisions 20–24. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

There are no specific issues relevant for this stock.

Reference points

Table 5 Sole in subdivisions 20–24. Reference points, values, and their technical basis. Weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	$MSY B_{trigger}$	2600	B_{pa}	ICES (2015a)
	F_{MSY}	0.23	Equilibrium scenarios stochastic recruitment, short time-series 1992–2014, constrained by F_{pa} .	ICES (2015a)
Precautionary approach	B_{lim}	1850	B_{loss} from 1992 (low productivity regime).	ICES (2015a)
	F_{lim}	0.315	$B_{lim} \times e^{1.645\sigma}$, $\sigma = 0.20$.	ICES (2015a)
	F_{pa}	0.23	$F_{lim} \times e^{-1.645\sigma}$, $\sigma = 0.18$.	ICES (2015a)
	F_{lim}	0.315	Equilibrium scenarios prob($SSB < B_{lim}$) = 50% with stochastic recruitment.	ICES (2015a)
Management plan*	MAP B_{MGT}	2600	$MSY B_{trigger}$.	ICES (2015a)
	MAP B_{lim}	1850	B_{lim} .	ICES (2015a)
	MAP F_{MSY}	0.23	F_{MSY} .	ICES (2015a)
	MAP range F_{lower}	0.19	$F_{MSY lower}$ without AR from equilibrium scenarios.	ICES (2015b)
	MAP range F_{upper}	0.26	F_{p05} with AR from equilibrium scenarios.	ICES (2015b)

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

Basis of the assessment

Table 6 Sole in subdivisions 20–24. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical stochastic assessment (SAM) that uses landings only in the model. Discards are included afterwards in the forecast (ICES, 2019).
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling), one survey index (Fishermen–DTU Aqua 2004–2018), two commercial indices: (private logbook gillnetters (1994–2007), private logbook trawlers (1987–2008)); fixed maturity and fixed natural mortality (0.1) for all age groups.
Discards and bycatch	Used to provide advice, but not included in the assessment. Discard information available since 2000, average discard ratio 2014–2018 is 4%.
Indicators	None.
Other information	Stock inter-benchmarked in 2015 (ICES, 2015a).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

Information from stakeholders

There is no additional available information for this stock.

History of the advice, catch, and management

Table 7 Sole in subdivisions 20–24. History of ICES advice, agreed TAC, and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings**	ICES discards***
1987	-	-	-	850	722	-
1988	-	-	-	950	706	-
1989	TAC	-	800	800	824	-
1990	Precautionary TAC	-	600	500	1050	-
1991	TAC	-	1000	1000	-^	-
1992	TAC	-	1000	1400	-^	-
1993	TAC at recent catch levels	-	1000	1600	-^	-
1994	No advice due to uncertain catches	-	-	2100	1198	-
1995	No advice	-	-	2250	1297	-
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Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings**	ICES discards***
2010	F below F_{pa}	-	620	700	538	14
2011	See scenarios	-	-	840	552	8
2012	MSY framework	-	610	0.61^^	358	11
2013	MSY framework	-	560	590	332	10
2014	MSY approach	353	353^^^	350	235	32
2015	MSY approach	211	205	205	224	6
2016	MSY approach	≤ 394	379	391	348	17
2017	MSY approach	≤ 555	-	555	220	15
2018	MSY approach	≤ 453	-	448	43	7
2019	Proposed MAP F ranges, F_{lower} to F_{upper}	422–562		502		
2020	MAP target F ranges: F_{lower} to F_{upper} , but F higher than F_{MSY} only under conditions specified in MAP	452–600, but catch higher than 539 only under conditions specified in MAP				

* TAC applies to subdivisions 20–21 and the EC waters of subdivisions 22–32.

** Landings include subdivisions 20–21 and subdivisions 22–24.

*** Discard estimates are not available for all years.

^ Uncertain.

^^ No more than 461 tonnes in subdivisions 20–21.

^^^ Discarding assumed to be negligible.

History of the catch and landings

Table 8 Sole in subdivisions 20–24. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings		Discards
441 tonnes	Active gear 65%	Passive gears 35%	7 tonnes
	434 tonnes		

Table 9 Sole in subdivisions 20–24. History of landings by country and area. Weights are in tonnes.

Year	Denmark			Sweden	Germany	Belgium	Netherlands	Norway	Total official landings	ICES estimated landings
	Kattegat	Skagerrak	Belts	Skagerrak and Kattegat	Kattegat and the Belts	Skagerrak	Skagerrak	Skagerrak		
1952	156			51	59				266	266
1953	159			48	42				249	249
1954	177			43	34				254	254
1955	152			36	35				223	223
1956	168			30	57				255	255
1957	265			29	53				347	347
1958	226			35	56				317	317
1959	222			30	44				296	296
1960	294			24	83				401	401
1961	339			30	61				430	430
1962	356				58				414	414
1963	338				27				365	365
1964	376				45				421	421
1965	324				50				374	374
1966	312				20				332	332
1967	429				26				455	455
1968	290				16				306	306
1969	261				7				268	268
1970	158	25							183	183
1971	242	32			9				283	283
1972	327	31			12				370	370
1973	260	52			13				325	325
1974	388	39			9				436	436
1975	381	55		16	16		9		477	468
1976	367	34		11	11	2	155		590	435
1977	400	91		1	8	1	276		789	513
1978	336	141		9	9		141		636	495
1979	301	57		8	6	1	84		457	373
1980	228	73		9	12	2	5		329	324
1981	199	59		7	16	1			282	282
1982	147	52		4	8	1	1		213	212
1983	180	70		11	15		31		307	276
1984	235	70		13	13		54		391	337
1985	275	102		19	1	+	132		529	397
1986	456	158		26	1	2	109		752	643
1987	564	137		19		2	70		792	722
1988	540	138		24		4			706	706
1989	57	21		21	7	1			824	824
1990	464	128		29		2			623	1050
1991	746	216		38	+				1000	1011
1992	836	372		54					1282	1294
1993	1016	355		68	9				1448	1439
1994	90	296		12	4				1202	1198
1995	850	382		65	6				1303	1297
1996	784	203		57	612				1656	1059
1997	560	200		52	2				814	814

Year	Denmark			Sweden	Germany	Belgium	Netherlands	Norway	Total official landings	ICES estimated landings
	Kattegat	Skagerrak	Belts	Skagerrak and Kattegat	Kattegat and the Belts	Skagerrak	Skagerrak	Skagerrak		
1998	367	145		90	3				605	605
1999	431	158		45	3				637	637
2000	399	320	13	34	11				677	645
2001	249	286	21	25					521	478
2002*	360	177	18	15	11				581	862
2003*	195	77	17	11	17				317	618
2004*	249	109	40	16	18				432	824
2005*	531	132	118	30	34				845	990
2006	521	114	107	38	43		4	9	836	836
2007	366	81	93	45	39		0	0	633	633
2008	361	102	113	34	35		3	7	655	655
2009	325	103	145	37	27			4	641	641
2010	273	61	125	46	26		3	5	537	538
2011	271	127	65	53	33			5	552	552
2012	154	140	28	30					358	358
2013	153	78		54	9			6	300	332
2014	141	104	48	36	2		0.3	3	335	335
2015	95	66	36	9	7		6	5	224	224
2016	164	78	56	14	17		16	2	348	348
2017	221	169	47	20	22		41	2	520	520
2018	158	140	57	16	15		47	0	434	434

* Assuming misreporting rates at 50%, 100%, 100%, and 20% in 2002–2005, respectively.

Summary of the assessment

Table 10 Sole in subdivisions 20–24. Assessment summary. Weights are in tonnes, recruitment in thousands. High and low refers to 95% confidence intervals.

Year	Recruitment			SSB			Landings	Fishing mortality		
	Age 1	High	Low	SSB	High	Low		Ages 4–8	High	Low
	thousands			tonnes						
1984	6328	10098	3965	859	1062	696	337	0.41	0.51	0.31
1985	5294	7944	3528	1123	1395	903	397	0.31	0.41	0.24
1986	4878	7197	3307	2018	2514	1619	643	0.37	0.47	0.29
1987	4410	6726	2891	2104	2529	1751	722	0.45	0.58	0.36
1988	5891	8705	3987	2173	2572	1835	706	0.41	0.52	0.32
1989	7495	11105	5059	2196	2574	1873	824	0.42	0.53	0.33
1990	7555	11133	5127	2712	3181	2313	1050	0.39	0.49	0.31
1991	8378	12726	5515	3183	3758	2696	1011	0.46	0.57	0.37
1992	6456	9637	4326	4175	4905	3553	1294	0.53	0.66	0.43
1993	3687	5426	2505	3970	4694	3357	1439	0.53	0.67	0.42
1994	3469	5071	2373	4155	4856	3554	1118	0.42	0.53	0.33
1995	2295	3442	1531	3442	3968	2985	1247	0.45	0.57	0.36
1996	1628	2682	988	3254	3734	2836	1059	0.40	0.50	0.33
1997	3550	5348	2357	2635	3027	2293	811	0.40	0.49	0.32
1998	3649	5338	2495	1896	2200	1635	605	0.38	0.47	0.30
1999	3183	4754	2131	2236	2628	1912	637	0.35	0.43	0.28
2000	4437	6481	3038	2284	2672	1913	645	0.34	0.42	0.27
2001	5780	8596	3886	2247	2611	1924	478	0.29	0.36	0.23
2002	4574	6701	3122	2582	3040	2192	862	0.38	0.47	0.30
2003	4628	6869	3119	2938	3453	2491	618	0.35	0.45	0.27
2004	3150	4451	2230	3205	3712	2767	824	0.40	0.51	0.31
2005	2701	3844	1897	3487	4079	2981	990	0.41	0.51	0.32
2006	3128	4514	2167	2949	3411	2500	836	0.37	0.46	0.29
2007	3381	4845	2360	2419	2821	2137	633	0.32	0.41	0.25
2008	2356	3426	1620	2067	2449	1744	655	0.34	0.45	0.26
2009	2283	3273	1592	2394	2898	1977	641	0.25	0.33	0.189
2010	2073	2985	1440	2078	2527	1709	538	0.24	0.31	0.177
2011	1797	2651	1218	2032	2562	1691	552	0.188	0.25	0.141
2012	1606	2440	1057	2284	2838	1839	358	0.181	0.24	0.135
2013	1668	2537	1015	1776	2210	1427	332	0.174	0.23	0.130
2014	2618	3808	1400	2266	2794	1837	335	0.163	0.22	0.122
2015	3272	4870	2159	2037	2519	1647	224	0.139	0.189	0.103
2016	2960	4409	1988	2250	2779	1822	348	0.178	0.24	0.135
2017	2179	3510	1323	2446	3034	1972	520	0.26	0.35	0.193
2018	3485	7021	1732	2850	3643	2229	434	0.23	0.32	0.167
2019	2618*			2802	3853	2050				

* Resampled from recent recruitment (2004–2018).

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