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Plaice (*Pleuronectes platessa*) in subdivisions 21–23 (Kattegat, Belt Seas, and the Sound)

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, as requested by the European Commission, this corresponds to catches in 2019 of no more than 15 237 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has increased significantly from 2009 and has been above MSY $B_{trigger}$ since 2012. Fishing mortality (F) has declined from 2000 to 2014 and has since stabilized. Fishing mortality has been below F_{MSY} since 2013. Recruitment has increased in recent years.
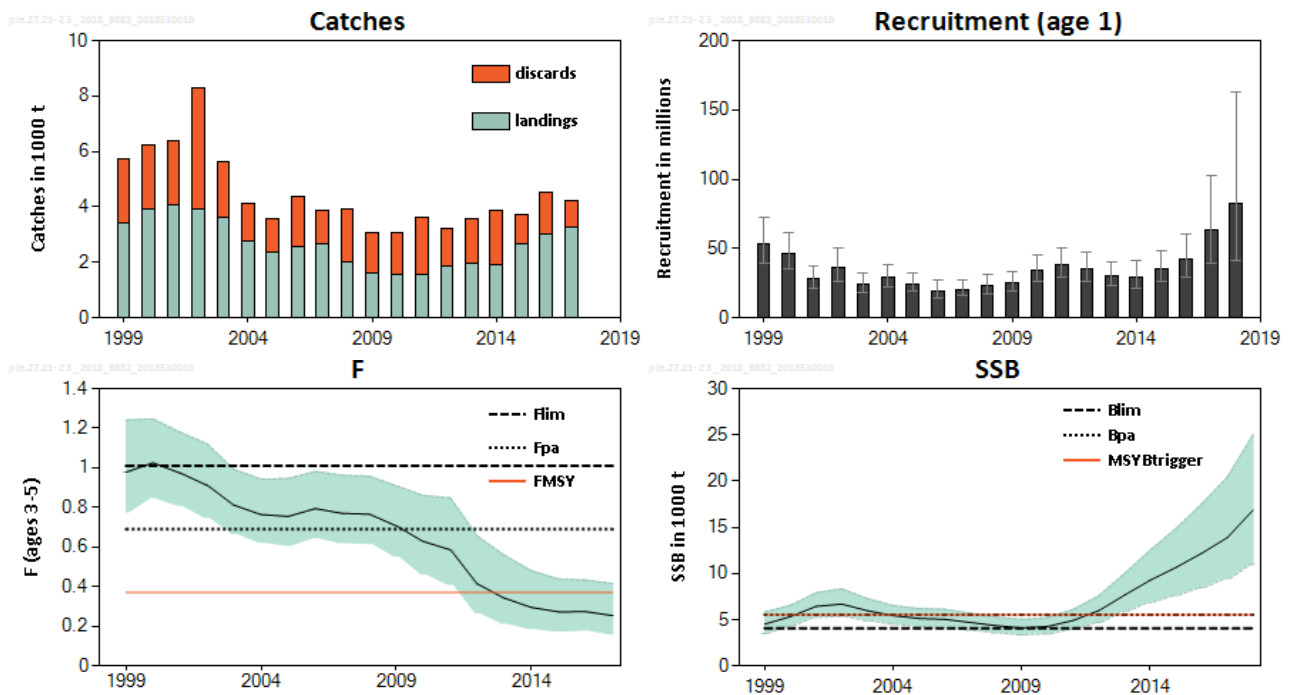

Figure 1   Plaice in subdivisions 21–23. Summary of the stock assessment. Weights in thousand tonnes. Recruitment, F, and SSB have confidence intervals (95%) in the plot.

Stock and exploitation status

ICES assesses fishing pressure on the stock to be below F_{MSY}, F_{pa}, and F_{lim}; and the size of the spawning stock to be above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

Table 1   Plaice in subdivisions 21–23. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2015	2016	2017			2016	2017	2018
Maximum Sustainable Yield	F_{MSY}	✅	✅	✅ Below	MSY $B_{Trigger}$		✅	✅	✅ Above trigger
Precautionary Approach	F_{pa}, F_{lim}	✅	✅	✅ Harvested sustainably	B_{pa}, B_{lim}		✅	✅	✅ Full reproductive capacity
Management plan	F_{MGT}	–	–	– Not applicable	SSB_{MGT}		–	–	– Not applicable

Catch scenarios

Table 2 Plaice in subdivisions 21–23. Assumptions made for the interim year and in the forecast. Weights are in tonnes. Recruitment is in thousand individuals.

Variable	Value	Notes
$F_{ages\ 3-5}$ (2018)	0.26	*Status quo* F.
SSB (2019)	20444	SSB resulting from the F assumption.
$R_{age\ 1}$ (2018)	82854	SAM estimate from NS-IBTSQ1 and BITS–Q1 survey.
$R_{age\ 1}$ (2019)	34131	Resampled from the entire time-series.
Total catch (2018)	3747	Catch resulting from F_{2017} assumption.
Wanted catch (2018)	2865	Based on the observed discard rate by age in 2017.
Unwanted catch (2018)	882	Based on the observed discard and below the minimum conservation reference size (BMS) rates by age in 2017.

Table 3 Plaice in subdivisions 21–23. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2019)	Wanted catch* (2019)	Unwanted catch* (2019)	F (2019)	SSB (2020)	% SSB change **	% Advice change ***
ICES advice basis							
Precautionary approach: F_{PA}	15237	11651	3586	0.69	17271	−16	+182
Other scenarios							
F = 0	0	0	0	0	29679	+45	−100
F_{MSY}	9338	7140	2198	0.37	21949	+7	+73
F = F_{lim}	19669	15040	4629	1.01	13735	−33	+264
SSB (2020) = B_{pa}	30096	23012	7084	2.45	5550	−73	+457
SSB (2020) = MSY $B_{trigger}$	30096	23012	7084	2.45	5550	−73	+457
SSB (2020) = B_{lim}	32239	24651	7588	3.06	4077	−80	+496
F = F_{2018}	6821	5216	1605	0.26	23670	−5	+26

* "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 the discard and BMS rate estimates for 2017.
** SSB 2020 relative to SSB 2019.
*** Catches in 2019 relative to the ICES advised catch for 2018 (5405 t).

The large increase in the advice is due to an increase in SSB and to a change of the basis of advice from MSY to precautionary approach.

Basis of the advice

Table 4 Plaice in subdivisions 21–23. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	The EU Multiannual Plan for the Baltic Sea (EU, 2016) takes bycatch of this species into account. Currently no management plan covers Subdivision (SD) 21.

Quality of the assessment

The sampling coverage is good and sampling intensity in 2017 is above average. Age-reading problems still exist and confidence intervals of the assessment estimates are in general large. The relatively large decrease in the 2016 SSB estimate (25%) can be explained by the annual extension of the survey and catch data. This year's assessment is fairly consistent with last year's results.
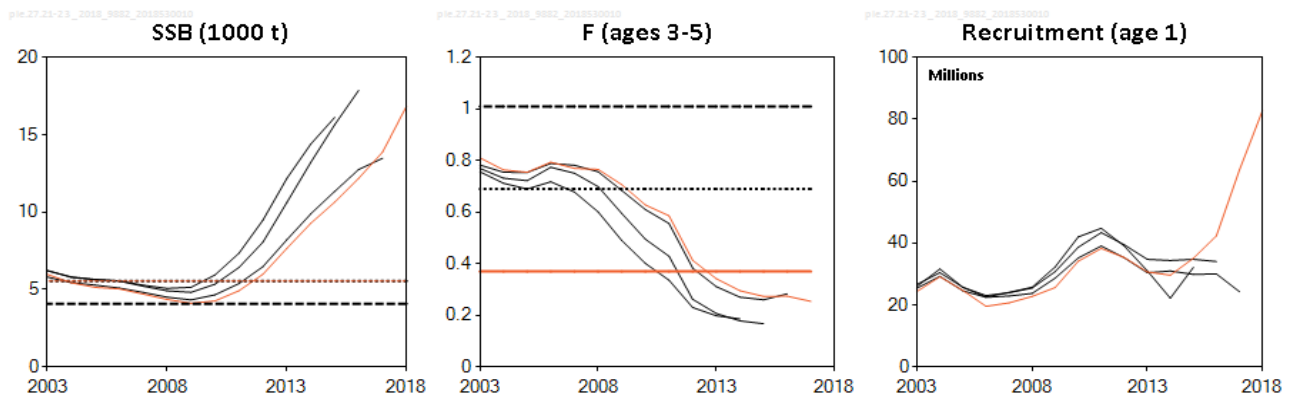
Figure 2   Plaice in subdivisions 21–23. Historical assessment results.

Issues relevant for the advice

The basis for the advice this year has changed from the MSY approach to the precautionary approach, as requested by the European Commission (EC and ICES, 2018).

The EU landing obligation covers plaice in the Baltic (SDs 22–32) from January 2017 onwards, but plaice in the Kattegat (SD 21) only from 2019 onwards. The partitioning of the catch for 2019 (wanted and unwanted catch) is based on the assumption that the observed discard and BMS rate estimates in 2017 will continue. Landings of fish below the minimum conservation reference size (MCRS) are very low (10 t BMS were reported in 2017) and discarding still takes place, despite the fact that the landing obligation has been in place since 2015. The estimated discard amount, 998 tonnes in 2017 (approximately 23.5%), is based on observer data. ICES understands that this is not in accordance with the current regulations.

The management areas for plaice in the Baltic Sea (i.e. Subdivision (SD) 21 and SDs 22–32) are different from the stock areas (i.e. SDs 21–23 and 24–32). As for the plaice stock in SDs 24–32 (ICES, 2018a), this section provides an option for calculating TACs by management area, based on the catch distribution observed in 2017. The catch ratio between SD 21 and SDs 22–23 in 2017 was used to calculate a split of the advised catches for the stock in SDs 21–23 for 2019. The advised catch for the stock in SDs 24–32 was added to the calculated catch for SDs 22–23 to obtain plaice catches by management area that would be consistent with the ICES advice for the two stocks. The details of this calculation are presented in Table 5. This results in catches of no more than 4802 tonnes in SD 21 and 14 160 tonnes in SDs 22–32.

Table 5   Plaice in subdivisions 21–23. Calculation of TACs by management area based on the catch distribution observed in 2017. Weights are in tonnes.

Basis		Catch 2017	Landings 2017	ICES stock advice 2019 (catch)
Stock area-based	SDs 21–23	4242	3243	15 237
	SDs 24–32	1051	650	3725
Total advised catch, 2019 (SDs 21–32)				18 962
Management area-based	SD 21	1337	801	
	SDs 22–23	2905	2442	
	SDs 22–32	3956	3092	
		calculation		results
Share of SD 21 of the total catch in SDs 21–23 in 2017		1337 t / 4242 t (catch in 2017 SD 21 / catch in 2017 SDs 21–23)		0.315
Catch in 2019 for SD 21		15 237 t × 0.315 (ICES stock advice in 2019 (catch) for SDs 21–23 × share)		**4802**
Catch in 2019 for SDs 22–32		18 962 t – 4802 t (total advised catch in 2019 SDs 21–32 – catch SD 21)		**14 160**
Share of SD 21 of the total landings in SDs 21–23 in 2017		801 t / 3243 t (landings in 2017 SD 21 / landings in 2017 SDs 21–23)		0.247

Reference points

Table 6   Plaice in subdivisions 21–23. Reference points, values, and their technical basis. Weights in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5 550	= B_{pa}	ICES (2015a)
	F_{MSY}	0.37	Equilibrium scenarios stochastic recruitment.	ICES (2015a)
Precautionary approach	B_{lim}	4 077	B_{loss}	ICES (2015a, 2018b)
	B_{pa}	5 550	$B_{lim} \times e^{1.645\sigma}$, σ = 0.20	ICES (2015a)
	F_{lim}	1.01	Equilibrium scenarios prob(SSB< B_{lim})< 50% with stochastic recruitment.	ICES (2016a, 2018b)
	F_{pa}	0.69	$F_{lim} \times e^{-1.645 \times \sigma(F)}$, σ_F = 0.236	ICES (2016a)
Management plan	SSB_{mgt}	Not defined.		
	F_{mgt}	Not defined.		

Basis of the assessment

Table 7   Plaice in subdivisions 21–23. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Age-based analytical assessment SAM (ICES, 2018b) that uses catches in the model and in the forecast.
Input data	Commercial catches; two combined survey indices (NS-IBTSQ1 and BITS–Q1, NS-IBTSQ3 and BITS–Q4); mean maturity data for the modelled period (from commercial catch and surveys); natural mortalities are fixed and assumed to be 0.1 except for age 1, which has 0.2.
Discards and bycatch	Discard information is available from 1999 from the main fleets (covering 100% of the landings) and is included.
Indicators	None.
Other information	The stock was last benchmarked in 2015 (ICES, 2015b).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS).

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 8   Plaice in subdivisions 21–23. ICES advice, TACs, and ICES catches. All weights are in tonnes.

Year	ICES advice	Catch corresp. to advice for SDs 21–23	Catch corresp. to advice for Skagerrak and Kattegat combined	TAC Kattegat (SD 21)	TAC Baltic Sea (SDs 22–32)	ICES landings (SDs 21–23)^^	Discards (SDs 21–23)^^
1992	TAC		14000	2800		2700	
1993	Precautionary TAC		-	2800		1700	
1994	If required, precautionary TAC		-	2800		2100	
1995	If required, precautionary TAC		-	2800		2100	
1996	If required, precautionary TAC		-	2800		3500	
1997	No advice		-	2800		3400	
1998	No increase in F from the present level		11900	2800		2900	
1999	No increase in F from the present level		11000	2800		3400	2313
2000	F < F_{pa}		11800	2800		3900	2313
2001	F < F_{pa}		9400	2350		4100	2313

Year	ICES advice	Catch corresp. to advice for SDs 21–23	Catch corresp. to advice for Skagerrak and Kattegat combined	TAC Kattegat (SD 21)	TAC Baltic Sea (SDs 22–32)	ICES landings (SDs 21–23)^^	Discards (SDs 21–23)^^
2002	F < F_{pa}		8500*	1600**		3900	4357
2003	F < F_{pa}		18400	3000		3400	2004
2004	F < F_{pa}		***	1800		2600	1368
2005	F < F_{pa}		< 9500	1900		2400	1197
2006	No increase in F		< 9600	1900		2400	1769
2007	Maintain current TAC		< 9600	2100		2600	1190
2008	No increase in catch		< 9400	2300		2000	1901
2009	Same advice as last year		< 9400	2300		1700	1447
2010	Same advice as last year		< 9400	2300		1500	1488
2011	Last three years' average landings (2007–2009)		< 8000	1988	3041	1600	2045
2012	Reduce catch		-	1988	2889	1800	1350
2013	Increase catch by 16%, transition to F_{MSY}	< 1800^		1800	3409	2000	1637
2014	Increase landings by 20%	2224^		2160	3409	1931	1946
2015	Increase catch by 20%	4031		2626	3409	2687	1021
2016	MSY approach	≤ 8639		2347	4034	3020	1501
2017	MSY approach	≤ 8333		2343	7862	3253	988
2018	MSY approach	≤ 5405		1483	7076		
2019	Precautionary approach	≤15237					

* In March 2002 ACFM revised its advice to 11 600 tonnes for both areas combined.
** The TAC for the two areas combined was adjusted to 11 200 tonnes in mid-2002.
*** The exploitation of this stock should be conducted in the context of mixed fisheries.
^ Landings.
^^ On 1/1/2017 the EU landing obligation was introduced for plaice in SDs 22 to 32. From 2017 landings include BMS.

History of the catch and landings

Table 9   Plaice in subdivisions 21–23. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)	Landings		Discards
4242 tonnes	Active gears 73%	Passive gears 27%	988 tonnes
	3253* tonnes		

*Including 10 tonnes of BMS.

Table 10   Plaice in subdivisions 21–23. History of commercial catch and landings. ICES estimated landings and discards are presented by area for each country participating in the fishery. All weights are in tonnes.

Year and SD	Denmark		Germany		Sweden		Total BMS
	Discards	Landings	Discards	Landings	Discards	Landings	
2002	3877	3654	22	39	458	246	
27.3.a.21	3314	1880			446	204	
27.3.b.23	178	75			13	42	
27.3.c.22	385	1699	22	39		0	
2003	1635	3308	17	31	353	279	
27.3.a.21	1235	2132			351	253	
27.3.b.23	23	105			1	26	
27.3.c.22	377	1071	17	31	0	0	
2004	1195	2540	48	54	126	173	
27.3.a.21	711	1454			119	137	
27.3.b.23	48	137			7	35	
27.3.c.22	435	949	48	54		0	
2005	1048	2171	37	48	113	135	
27.3.a.21	617	1145			108	100	
27.3.b.23	37	152			4	34	
27.3.c.22	394	874	37	48			
2006	1593	2321	25	45	152	214	
27.3.a.21	1165	1400			149	175	
27.3.b.23	17	180			3	39	
27.3.c.22	410	742	25	45			
2007	962	2376	56	75	173	241	
27.3.a.21	641	1244			170	172	
27.3.b.23	42	199			2	69	
27.3.c.22	279	933	56	75			
2008	1807	1754	16	92	79	182	
27.3.a.21	1471	899			76	137	
27.3.b.23	39	120			3	45	
27.3.c.22	297	735	16	92		0	
2009	1332	1317	16	191	99	127	
27.3.a.21	1033	589			99	84	
27.3.b.23	10	144			0	42	
27.3.c.22	289	585	16	191		0	
2010	1212	1262	149	226	127	83	
27.3.a.21	388	428	5	5	127	66	
27.3.b.23	5	59			1	17	
27.3.c.22	819	775	144	221		0	
2011	1823	1224	127	310	95	51	
27.3.a.21	1042	327			94	40	
27.3.b.23	27	46			1	11	
27.3.c.22	754	851	127	310		0	
2012	1192	1439	119	365	39	41	
27.3.a.21	277	196			39	30	
27.3.b.23	1	54			1	12	
27.3.c.22	914	1189	119	365		0	
2013	1423	1561	111	320	104	74	
27.3.a.21	756	232	3	1	103	60	
27.3.b.23	1	76			1	14	
27.3.c.22	666	1252	109	319		0	
2014	1750	1497	100	321	96	113	
27.3.a.21	525	343	1	1	94	68	
27.3.b.23	5	57			2	45	
27.3.c.22	1220	1097	99	320		0	

Year and SD	Denmark		Germany		Sweden		Total BMS
	Discards	Landings	Discards	Landings	Discards	Landings	
2015	784	2014	115	560	122	113	
27.3.a.21	345	807	0	0	122	87	
27.3.b.23	6	103			0	26	
27.3.c.22	434	1103	115	560		0	
2016	1223	2199	145	681	133	141	
27.3.a.21	633	984	1	1	131	121	
27.3.b.23	17	107			2	20	
27.3.c.22	573	1108	144	680		0	
2017	787	2198	142	936	59	110	10
27.3.a.21	479	703		1	56	97	
27.3.b.23	23	70			3	13	0.106
27.3.c.22	285	1424	141	936			10

Summary of the assessment

Table 11 Plaice in subdivisions 21–23. Assessment summary. Weights are in tonnes, recruitment in thousands. High and low refers to 95% confidence intervals.

Year	Recruitment (age 1)	High	Low	SSB	High	Low	Landings	Discards	F (Ages 3–5)	High	Low
1999	53187	72185	39188	4519	5836	3499	3406	2313	0.98	1.24	0.77
2000	46657	61325	35497	5318	6548	4319	3935	2313	1.02	1.25	0.84
2001	28034	37676	20860	6440	7912	5242	4054	2313	0.97	1.18	0.8
2002	36042	50194	25880	6689	8339	5366	3939	4357	0.91	1.12	0.74
2003	24336	32262	18357	5973	7268	4908	3618	2004	0.81	0.99	0.66
2004	29130	38076	22287	5432	6526	4522	2766	1369	0.76	0.94	0.62
2005	24685	32184	18934	5135	6204	4250	2354	1197	0.76	0.95	0.6
2006	19565	27062	14145	5040	6118	4151	2580	1770	0.79	0.98	0.64
2007	20655	27168	15704	4700	5702	3873	2691	1191	0.77	0.96	0.62
2008	22762	30816	16813	4354	5278	3591	2028	1902	0.77	0.96	0.61
2009	25611	33394	19643	4107	5028	3355	1635	1448	0.71	0.91	0.55
2010	34131	44907	25941	4260	5232	3469	1570	1489	0.63	0.86	0.46
2011	38271	50048	29264	4920	6107	3965	1584	2045	0.59	0.85	0.41
2012	35337	47411	26338	5979	7596	4706	1845	1351	0.41	0.65	0.26
2013	30649	40492	23198	7660	9996	5871	1956	1638	0.34	0.56	0.21
2014	29619	40796	21504	9278	12534	6868	1931	1946	0.3	0.48	0.182
2015	35094	47819	25755	10651	14865	7632	2687	1021	0.27	0.44	0.17
2016	42366	60419	29707	12185	17524	8472	3020	1501	0.27	0.43	0.174
2017	63701	102223	39695	13886	20433	9436	3253	988	0.25	0.42	0.155
2018	*82854	162748	40854	16856	25019	10980					

*Output from the SAM analysis is based on survey data.

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