

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

ICES advice on fishing opportunities

In the context of the EU multiannual plan for the Baltic, which considers this stock to be bycatch, the EC has requested that ICES provide advice based on the precautionary approach. ICES advises that catches of up to 10 636 tonnes are considered to be precautionary.

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 since 2008, but F remains above F_{MSY} . Recruitment has fluctuated without trends between 1999 and 2016 and the last two year classes are the highest observed.

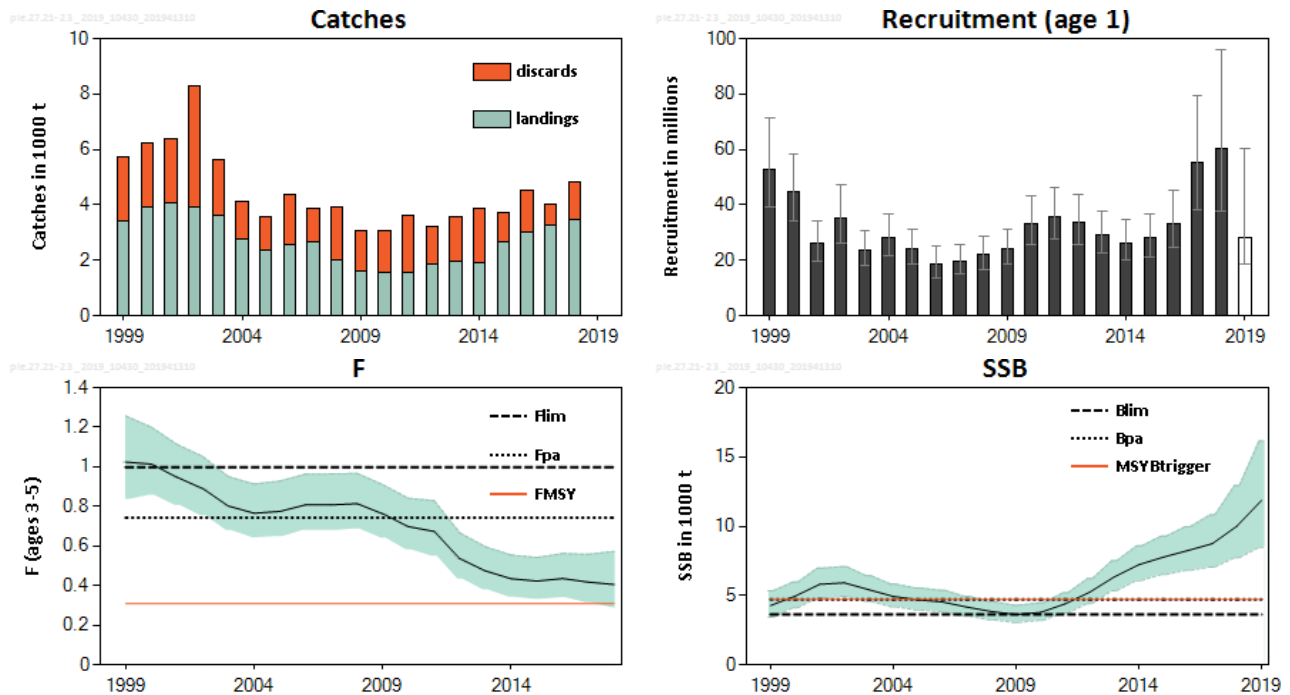


Figure 1 Plaice in subdivisions 21–23. Summary of the stock assessment. Weights in thousand tonnes. Recruitment, F, and SSB have confidence intervals (95%) in the plot. The unshaded 2019 recruitment is not based on data, but is the median of the time series.

Stock and exploitation status

ICES assesses fishing pressure on the stock to be above F_{MSY} , but below 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					
	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}	–	–	–	Not applicable	B_{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
$F_{\text{ages 3-5}}$ (2019)	0.41	$F_{\text{ages 3-5}}$ in 2018.
SSB (2020)	13 207	From the F_{2019} assumption.
$R_{\text{age 1}}$ (2019)	29 103	Median resampled from the entire time series of recruitment.
$R_{\text{age 1}}$ (2020)	28 260	Median resampled from the entire time series of recruitment.
Total catch (2019)	6405	From the F_{2019} assumption.
Wanted catch (2019)	4515	Based on the observed discard rate by age in 2016–2018.
Unwanted catch (2019)	1890	Based on the observed discard rate by age in 2016–2018.

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

Basis	Total catch (2020)	F (2020)	SSB (2021)	% SSB change *	% Advice change **
ICES advice basis					
Precautionary approach: (F=Fp05)	10 636	0.68	10 894	-18%	-30%
Other scenarios					
F = 0	0	0	18 700	42%	-100%
F = F_{2018}	7168	0.41	13 443	2%	-53%
F_{pa}	11 291	0.74	10 403	-21%	-26%
MSY approach: F_{MSY}	5675	0.31	14 527	10%	-63%
F = F_{lim}	13 794	1	8578	-35%	-9%
SSB (2021) = B_{pa}	19 339	1.93	4732	-64%	27%
SSB (2021) = MSY B_{trigger}	19 339	1.93	4732	-64%	27%
SSB (2021) = B_{lim}	20 991	2.41	3637	-72%	38%

* SSB 2021 relative to SSB 2020.

** Catches in 2020 relative to the ICES advised catch for 2019 (15 237 t).

The large decrease in the advice is due to the downward revision of the SSB from this year's assessment.

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 21.

Quality of the assessment

In the past this assessment has suffered from bias in SSB and F; changes were made to the assessment this year to address these problems. Nevertheless, the updated assessment has a large downward revision in SSB and upward revision in F compared to last year.

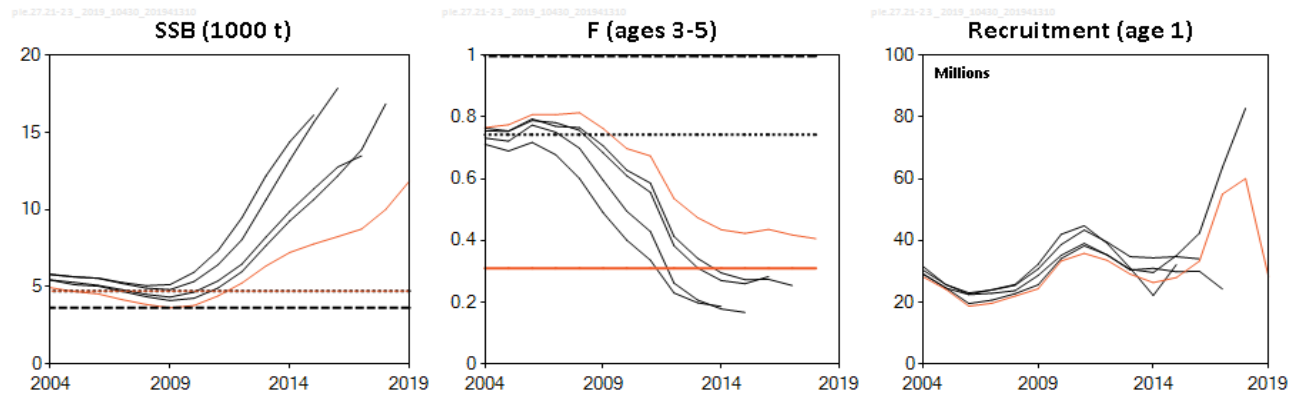


Figure 2 Plaice in subdivisions 21–23. Historical assessment results. The final recruitment estimate in 2019 is the median of the time series.

Issues relevant for the advice

The basis for the advice this year is the precautionary approach, as requested by the European Commission (ICES, 2019a). The precautionary advice for this stock is based on a constant fishing mortality that has a low probability of bringing SSB below B_{lim} in the long term ($F_{p05} = 0.68$; see introduction to the advice). This would imply a large increase in F compared to current levels, and is also well above F_{MSY} .

The assessment was revised and the reference points were updated accordingly in 2019, leading to a lower estimate of reference points (see Table 6.)

The EU landing obligation has covered plaice in the Baltic (subdivisions (SDs) 22–32) from January 2017 onwards. The implementation has been gradual in the Kattegat (SD 21), but the main fisheries have been included from 2019 onwards. Landings of fish below the minimum conservation reference size (MCRS) are very low (13 t BMS were reported in 2018), and discarding still takes place. The estimated discard amount, 1387 tonnes in 2018 (approximately 29%), is based on observer data.

The management areas for plaice in the Baltic Sea (i.e. subdivisions 21 and 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, 2019b), this section provides an option for calculating TACs by management area, based on the catch distribution observed in 2018. The catch ratio between SDs 21 and 22–23 in 2018 was used to calculate a split of the advised catches for the stock in SDs 21–23 for 2020. The advised catch for the stock in SDs 24–32 was added to the calculated catch for SDs 22–23, in order 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 3 010 tonnes in SD 21, and 10 452 tonnes in SDs 22–32.

Table 5 Plaice in subdivisions (SDs) 21–23. Calculation of TACs by management area based on the catch distribution observed in 2018. Weights are in tonnes. Landings including BMS.

Basis		Catch 2018	Landings 2018	ICES stock advice 2020 (catch)
Stock area-based	SDs 21–23	4846	3459	10636
	SDs 24–32	2355	1644	2826
Total advised catch, 2020 (SDs 21–32)				13462
Management area-based	SD 21	1372	534	
	SDs 22–23	3474	2925	
	SDs 22–32	5829	4569	
				Calculation
Share of SD 21 of the total catch in SDs 21–23 in 2018		1372 t / 4846 t (catch in 2018 SD 21 / catch in 2018 SDs 21–23)		0.283
Catch in 2020 for SD 21		10 636 t × 0.283 (ICES stock advice in 2019 (catch) for SDs 21–23 × share)		3010
Catch in 2020 for SDs 22–32		13462 t – 3010 t (total advised catch in 2019 SDs 21–32 – catch SD 21)		10452
Share of SD 21 of the total landings in SDs 21–23 in 2018		534 t / 3459 t (landings in 2018 SD 21 / landings in 2018 SDs 21–23)		0.154

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 $B_{trigger}$	4730	$= B_{pa}$	ICES (2019b)
	F_{MSY}	0.31	Equilibrium scenarios stochastic recruitment.	ICES (2019b)
Precautionary approach	B_{lim}	3635	B_{loss} (lowest observed biomass = Biomass in 2009)	ICES (2019b)
	B_{pa}	4730	$B_{lim} \times e^{1.645\sigma}$, $\sigma = 0.16$	ICES (2019b)
	F_{lim}	1.00	Equilibrium scenarios $prob(SSB < B_{lim}) < 50\%$ with stochastic recruitment.	ICES (2019b)
	F_{pa}	0.74	$F_{lim} \times e^{-1.645\sigma(F)}$, $\sigma_F = 0.18$	ICES (2019b)
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, 2018).
Assessment type	Age-based analytical assessment SAM (ICES, 2019b) 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 89% of the landings in 2018) and is included.
Indicators	None.
Other information	The stock was last benchmarked in 2015 (ICES, 2015).
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 (SDs) 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		14 000	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		11 900	2800		2900	
1999	No increase in F from the present level		11 000	2800		3400	2313
2000	$F < F_{pa}$		11 800	2800		3900	2313
2001	$F < F_{pa}$		9400	2350		4100	2313
2002	$F < F_{pa}$		8500*	1600**		3900	4357
2003	$F < F_{pa}$		18 400	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 FMSY	< 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	3459	1387
2019	Precautionary approach	≤ 15 237		1705	10 122		

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) ^{^^}
2020	Precautionary approach	≤ 10 636					

* In March 2002 ICES 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 2018 as estimated by ICES.

Catch (2018)	Landings		Discards
	Active gears 85%	Passive gears 15%	
4846 tonnes	3459* tonnes		1387 tonnes

*including 13 tonnes of BMS

Table 10 Plaice in subdivisions (SDs) 21–23. History of commercial catch and landings. ICES estimated landings by area and country, estimated discards, and officially reported BMS. 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	-	70			3	13	0.106
27.3.c.22	-	1424	-	936			10
2018							13
27.3.a.21	-	482	-	1	-	51	
27.3.b.23	-	111	-		-	13	
27.3.c.22	-	1708	-	1080	-	0	

Summary of the assessment

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

Year	Recruitment (Age 1)	Recruitment High	Recruitment Low	SSB	SSB High	SSB Low	Landings	Discards	F (ages 3–5)	F High	F Low
1999	52 781	71 358	39 041	4279	5344	3426	3406	2313	1.02	1.26	0.83
2000	44 729	58 241	34 352	4961	5970	4122	3935	2313	1.01	1.20	0.86
2001	25 936	34 334	19 591	5811	6980	4837	4054	2313	0.95	1.11	0.81
2002	35 014	47 090	26 036	5920	7083	4947	3939	4357	0.89	1.05	0.75
2003	23 550	30 837	17 986	5426	6424	4584	3618	2004	0.80	0.95	0.68
2004	28 260	36 663	21 782	4941	5820	4195	2766	1369	0.77	0.91	0.64
2005	24 153	31 281	18 648	4691	5546	3968	2354	1197	0.78	0.93	0.65
2006	18 679	25 228	13 831	4537	5380	3826	2580	1770	0.81	0.96	0.68
2007	19 657	25 532	15 134	4168	4940	3516	2691	1191	0.81	0.96	0.68
2008	21 977	28 739	16 806	3851	4558	3254	2028	1902	0.81	0.97	0.69
2009	24 345	31 419	18 864	3635	4302	3071	1635	1448	0.76	0.91	0.64
2010	33 350	43 391	25 632	3785	4463	3210	1570	1489	0.70	0.84	0.58
2011	35 831	46 252	27 758	4403	5189	3736	1584	2045	0.67	0.83	0.55
2012	33 553	43 794	25 707	5244	6215	4425	1845	1351	0.54	0.67	0.43
2013	29 103	37 470	22 605	6343	7513	5355	1956	1638	0.47	0.60	0.38
2014	26 360	34 927	19 894	7224	8573	6086	1931	1946	0.44	0.55	0.34
2015	27 975	36 819	21 256	7772	9275	6513	2687	1021	0.42	0.54	0.33
2016	33 319	45 013	24 662	8249	9972	6824	3020	1501	0.44	0.56	0.34
2017	55 037	79 304	38 196	8741	10 819	7062	3257	768	0.42	0.56	0.31
2018	60 066	95 920	37 614	10 004	12 936	7737	3459	1387	0.41	0.57	0.29
2019	29 103*	60 066*	18 679*	11 907	16 241	8541					

* not based on data, but the median of the time series.

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