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

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 5405 tonnes.

Stock development over time

Spawning-stock biomass (SSB) has increased significantly from 2009 and has been above MSY $B_{trigger}$ since 2011. Fishing mortality (F) has declined from 2000 to 2014 and has since stabilized. Fishing mortality has been below F_{MSY} since 2012. Recruitment has been stable in recent years.

Figure 1   Plaice in subdivisions 21–23. Summary of the stock assessment. Catch weights in thousand tonnes. Recruitment, F, and SSB have confidence intervals (95%) in the plot. Predicted values are not shaded.[*]

Stock and exploitation status

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

		Fishing pressure					Stock size			
		2014	2015	2016			2015	2016	2017	
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

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[*] Version 2: SSB plot updated with correct value for B_{lim}.

Catch options

Table 2 Plaice in subdivisions 21–23. The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–5 (2017)	0.28	ICES (2017)	F_{2016}
SSB (2018)	14328	ICES (2017)	SSB resulting from the F assumption (in tonnes)
$R_{age\ 1}$ (2017)	24279	ICES (2017)	SAM estimate (in thousands)
$R_{age\ 1}$ (2018)	29882	ICES (2017)	Sampled from the entire time-series (in thousands)
$R_{age\ 1}$ (2019)	29882	ICES (2017)	Sampled from the entire time-series (in thousands)
Total catch (2017)	4211	ICES (2017)	Catch resulting from F_{2016} assumption (in tonnes)
Wanted catch (2017)	3031	ICES (2017)	Based on the observed discard rate by age in 2016 (in tonnes)
Unwanted catch (2017)	1180	ICES (2017)	Based on the observed discard rate by age in 2016 (in tonnes)

Table 3 Plaice in subdivisions 21–23. Annual catch options. All weights are in tonnes.[†]

Basis	Total catch (2018)	Wanted catch* (2018)	Unwanted catch* (2018)	F (2018)	SSB (2019)	% SSB change **	% advice change ***
ICES advice basis							
MSY approach: F_{MSY}	5405	4005	1400	0.37	13842	−3	−35
Other options							
F = 0	0	0	0	0	17959	25	−100
F_{pa}	8885	6564	2321	0.69	11192	−22	7
F_{lim}	11559	8546	3014	1.01	9194	−36	39
SSB (2019) = B_{pa}	16599	12259	4340	1.98	5550	−61	99
SSB (2019) = MSY $B_{trigger}$	16599	12259	4340	1.98	5550	−61	99
F = F_{2017}	4285	3172	1113	0.28	14699	3	−49

* "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 rate estimates for 2016.
** SSB 2019 relative to SSB 2018.
*** Catches in 2018 relative to the ICES advised catch for 2017 (8333 t).

Basis of the advice

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

Advice basis	MSY approach.
Management plan	The EU Multiannual Plan for the Baltic Sea (EU, 2016) takes bycatch of this species into account.

[†] Version 2: Due to correction of B_{lim}, the catch option "SSB (2019) = B_{lim}" applying the incorrect value for B_{lim} has been removed.

Quality of the assessment

The sampling coverage is generally quite good and sampling intensity in 2016 is average for recent years. The relatively large decrease in the 2016 SSB estimate (25%) can be explained by the annual extension of the survey and catch data. Age-reading problems still exist and influence the internal consistency in the survey and catch data. The assessment suffers from a relatively short time-series (1999–2016) and the confidence intervals are in general quite large.
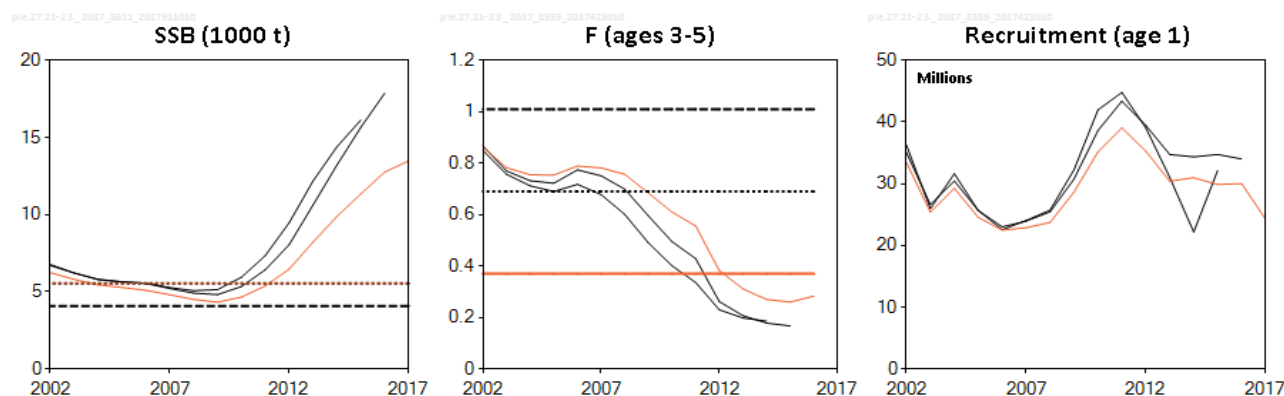
Figure 2   Plaice in subdivisions 21–23. Historical assessment results.[‡]

Issues relevant for the advice

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). This section provides an option for calculating TACs by management area based on the catch distribution observed in 2016. The catch ratio between SD 21 and SDs 22−23 in 2016 was used to calculate a split of the advised catches for 2018, and a similar calculation was done for the landings only. The advised catch for the stock in SDs 24−32 (ICES, 2017a) 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 2237 tonnes in SD 21 and 6272 tonnes in SDs 22−32. The corresponding wanted catches would be no more than 1467 tonnes in SD 21 and 4106 tonnes in SDs 22−32.

[‡] Version 2: SSB plot updated with correct value for B_{lim}.

Table 5 Plaice in subdivisions 21–23. Calculation of TACs by management area based on the catch distribution observed in 2016. Weights are in tonnes.

Basis		Catch 2016	Landings 2016	ICES stock advice 2018 (catch)	ICES stock advice 2018 (corresponding wanted catch)
Stock area-based	SDs 21–23	4521	3020	5405	4005
	SDs 24–32	1580	521	3104	1568
Total advised catch and corresponding wanted catch, 2018 (SDs 21–32)				8509	5573
Management area-based	SD 21	1871	1106		
	SDs 22–23	2650	1914		
	SDs 22–32	4230	2435		
		calculation			results
Share of SDs 21–23 2016 catch in SD 21		1871 t / 4521 t (catch 2016 SD 21 / catch 2016 SDs 21–23)			0.414
Catch 2018 for SD 21		5405 t × 0.414 (ICES stock advice 2018 (catch) for SDs 21–23 × share)			2237
Catch 2018 for SDs 22–32		8509 t – 2237 t (total advised catch 2018 SDs 21–32 – catch SD 21)			6272
Share of SDs 21–23 2016 landings in SD 21		1106 t / 3020 t (landings 2016 SD 21 / landings 2016 SDs 21–23)			0.366
Wanted catch 2018 for SD 21		4005 t × 0.366 (ICES stock advice 2018 (wanted catch) for SDs 21–23 × share)			1467
Wanted catch 2018 for SDs 22–32		5573 t – 1467 t (wanted catch 2018 SDs 21–32 – wanted catch SD 21)			4106

Reference points

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

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5 550 t	= B_{pa}	ICES (2015a)
	F_{MSY}	0.37	Equilibrium scenarios stochastic recruitment.	ICES (2015a)
Precautionary approach	B_{lim}	4 077 t[§]	B_{loss}	ICES (2015a)
	B_{pa}	5 550 t	$B_{lim} \times e^{1.645\sigma}$, σ = 0.20	ICES (2015a)
	F_{lim}	1.01	Equilibrium scenarios prob(SSB< B_{lim})< 50% with stochastic recruitment.	ICES (2016a)
	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.		

[§] Version 2: Value corrected.

Basis of the assessment

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

ICES stock data category	1 (ICES, 2016b).
Assessment type	Age-based analytical assessment SAM (ICES, 2017b) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, catch numbers by age, mean weight-at-age in the catch); two survey indices (IBTSQ1 and Q3, BITS–Q1 and Q4); mean maturity data for the modelled period (from commercial catch during 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).
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 available information.

History of the advice, catch, and management

Table 8   Plaice in subdivisions 21–23. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Pred. catch corresp. to advice for SDs 21–23	Pred. 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
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	2889	2000	1637
2014	Increase landings by 20%	2224^		216	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		
2018	MSY approach	≤ 5405					

* 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.

History of the catch and landings

Table 9   Plaice in subdivisions 21–23. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
4521 tonnes	Active gears 72%	Passive gears 28%	1501 tonnes
	3020 tonnes		

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	
	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

Year and SD	Denmark		Germany		Sweden	
	Discards	Landings	Discards	Landings	Discards	Landings
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
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

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	52523	68583	40223	3892	5024	3015	3406	2313	0.946	1.217	0.735
2000	45615	58642	35483	4769	5916	3844	3935	2313	0.996	1.219	0.814
2001	29319	38513	22320	5935	7360	4786	4054	2313	0.938	1.137	0.774
2002	33456	42985	26040	6239	7747	5025	3939	4357	0.863	1.053	0.708
2003	25413	32818	19678	5805	7094	4749	3618	2004	0.783	0.971	0.632
2004	29261	37593	22775	5444	6622	4476	2766	1369	0.755	0.944	0.604
2005	24563	31426	19199	5283	6459	4322	2354	1197	0.754	0.946	0.6
2006	22494	28806	17565	5094	6282	4131	2580	1770	0.789	0.98	0.635
2007	22880	29295	17869	4809	5927	3901	2691	1191	0.782	0.983	0.622
2008	23742	30491	18487	4504	5537	3665	2028	1902	0.757	0.962	0.596
2009	28653	36511	22485	4330	5349	3505	1635	1448	0.684	0.906	0.516
2010	35172	44835	27591	4652	5850	3699	1570	1489	0.61	0.869	0.429
2011	39066	50135	30440	5378	6913	4184	1584	2045	0.556	0.867	0.357
2012	35277	45121	27581	6475	8673	4834	1845	1351	0.383	0.7	0.21
2013	30424	39254	23581	8218	11560	5842	1956	1638	0.311	0.592	0.164
2014	30977	40655	23603	9883	14514	6730	1931	1946	0.27	0.503	0.145
2015	29882	40668	21956	11340	17271	7446	2687	1021	0.26	0.462	0.146
2016	30031	43971	20511	12759	20272	8031	3020	1501	0.283	0.487	0.164
2017	24279*			13487**	22205**	8192**					

* Predicted.
** Calculated based on the short-term forecast.

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