

Plaice (*Pleuronectes platessa*) in Subarea 4 (North Sea) and Subdivision 20 (Skagerrak)

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 MSY approach is applied, catches in 2020 should be no more than 166 499 tonnes.

Stock development over time

The spawning-stock biomass (SSB) is well above $MSY B_{trigger}$ and has markedly increased since 2008, following a substantial reduction in fishing mortality (F) since 1999. Recruitment in 2019 is estimated to be the second highest in the time-series. Since 2009, fishing mortality has been estimated below F_{MSY} .

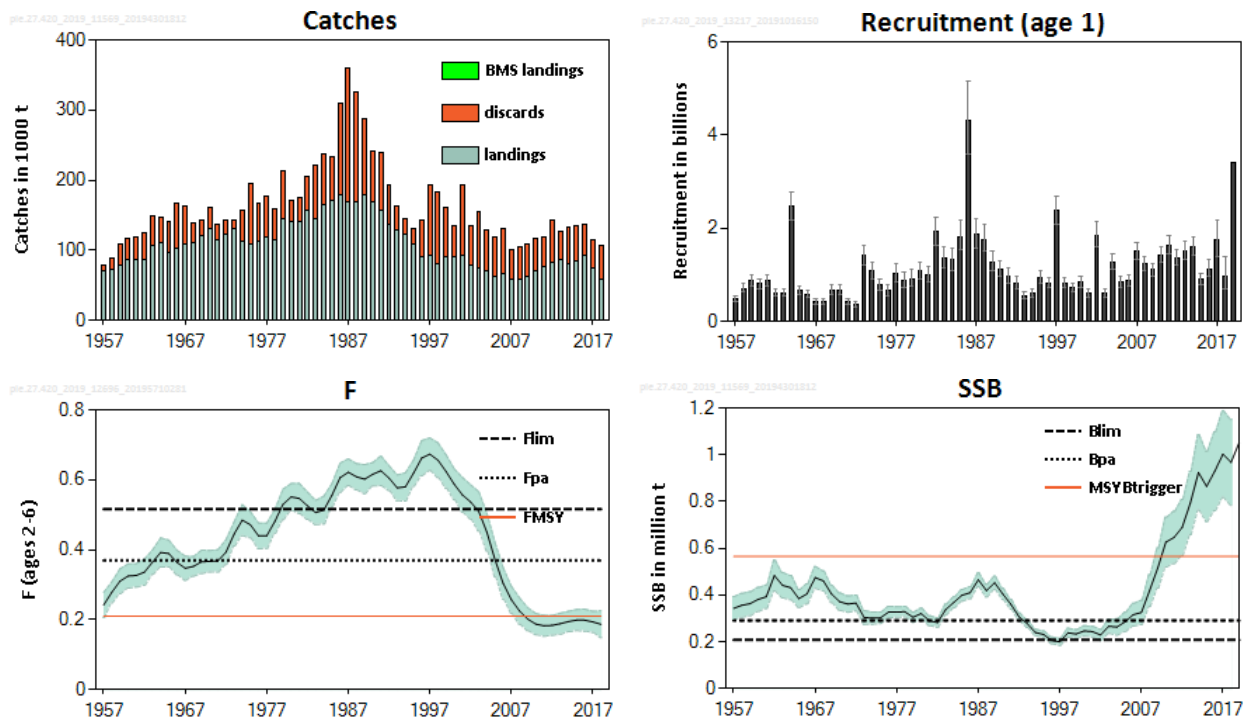


Figure 1 Plaice in Subarea 4 and Subdivision 20. Summary of the stock assessment. Shaded areas (F, SSB) and error bars (Recruitment) indicate 95% confidence intervals.

Stock and exploitation status

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

Table 1 Plaice in Subarea 4 and Subdivision 20. 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}	✓	✓	✓	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	B_{MGT}	—	Not applicable

Catch scenarios

Table 2 Plaice in Subarea 4 and Subdivision 20. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 2-6}}$ (2019)	0.193	Average F in 2016–2018.
SSB (2020)	1 184 762	Short-term forecast (STF), in tonnes.
$R_{\text{age 1}}$ (2019)	3 413 221	RCT3, including BTS-Q3 2019, DFS 2018 and SNS 2018 survey information, in thousands.
$R_{\text{age 1}}$ (2020)	1 287 315	Geometric mean (GM, 2006-2015), in thousands.
Total catch (2019)	138 919	Short-term forecast (STF), in tonnes.
Wanted catch (2019)	76 721	Short-term forecast (STF), average landings rate by age 2016–2018, in tonnes.
Unwanted catch (2019)	62 198	Short-term forecast (STF), average discard rate by age 2016–2018, in tonnes.

Table 3 Plaice in Subarea 4 and Subdivision 20. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2020)	Wanted catch * (2020)	Unwanted catch * (2020)	$F_{\text{total ages 2-6}}$ (2020)	$F_{\text{wanted ages 2-6}}$ (2020)	$F_{\text{unwanted ages 2-3}}$ (2020)	SSB (2021)	% SSB change **	% TAC change ***	% Advice change ^
ICES advice basis										
MSY approach: F_{MSY}	166499	89216	77283	0.21	0.091	0.21	1237188	4.4	17.1	17.1
Other scenarios										
$F = \text{MAP } F_{\text{MSY upper}}$	229528	123550	105978	0.30	0.130	0.29	1180054	-0.40	61	61
$F = \text{MAP } F_{\text{MSY lower}}$	118554	63323	55231	0.146	0.063	0.143	1280808	8.1	-16.6	-16.6
$F = 0$	0	0	0	0.00	0.00	0.00	1390696	17.4	-100	-100
F_{pa}	274634	148348	126286	0.37	0.159	0.36	1139325	-3.8	93	93
F_{im}	362341	197190	165151	0.52	0.22	0.51	1060536	-10.5	155	155
SSB (2021) = B_{im}	1385413	946464	438949	9.3	4.0	9.1	207288	-83	870	870
SSB (2021) = B_{pa}	1278745	844386	434359	6.6	2.8	6.4	290203	-76	800	800
SSB (2021) = $\text{MSY } B_{\text{trigger}}$	935796	555440	380356	2.4	1.04	2.4	564599	-52	560	560
Rollover TAC	142217	76072	66145	0.177	0.077	0.174	1259276	6.3	0	0
$F_{2020} = F_{2019}$	154026	82462	71564	0.193	0.083	0.189	1248522	5.4	8.3	8.3

* “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. Both wanted and unwanted catch refer to Subarea 4 and Subdivision 20, calculated as the projected total stock wanted catch (including Division 7.d) deducted by the catch of plaice from Subarea 4 taken in Division 7.d in 2020. The subtracted value (836 t of wanted catch and 779 t of unwanted catch) is estimated based on the plaice catch advice for Division 7.d for 2020.

** SSB 2021 relative to SSB 2020.

*** Total catch in 2020 relative to the combined TAC of Subarea 4 and Subdivision 20 in 2019 (142 217 t).

^ Total catch in 2020 relative to advice value 2019 (142 217 t).

^^ F_{wanted} and F_{unwanted} do not sum up to the F_{total} as they are calculated using different ages.

The change in advice (17.1%) is mainly the result of the strong 2018 year class.

Basis of the advice

Table 4 Plaice in Subarea 4 and Subdivision 20. The basis of the advice.

Advice basis	MSY approach
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway regarding this plan and it is not used as the basis of the advice for this shared stock. ICES was requested by the EC to provide advice based on the MSY approach, and to include the MAP as a catch option.

Quality of the assessment

The assessment does not provide robust estimates for ages 1–3 because of conflicting information between different data sources. Information from the beam trawl (BTS), sole net (SNS), and demersal fish (DFS) surveys suggest that in recent years the nursery area of plaice (for age 0–1) is shifting away from coastal areas (covered by DFS and SNS) and towards off-shore areas (covered by BTS and IBTS) (ICES, 2018a). Older ages also show a northward expansion in distribution that may affect estimates for these ages.

The assessment shows that a large proportion (37% in 2018) of the SSB is in the plus group (age 10+). However, survey data for the plus group are currently not included in the assessment; this increases uncertainty in the estimates of the oldest fish and therefore of the SSB.

The update using the new survey data from Q3 only changes the 2018 and 2019 recruitments used in the forecast. The upward revision of the SSB in the 2019 assessment is mainly due to the re-estimation of the full time-series of the combined survey indices from the BTS Tridens and Isis and the IBTS (Q1 and Q3) surveys.

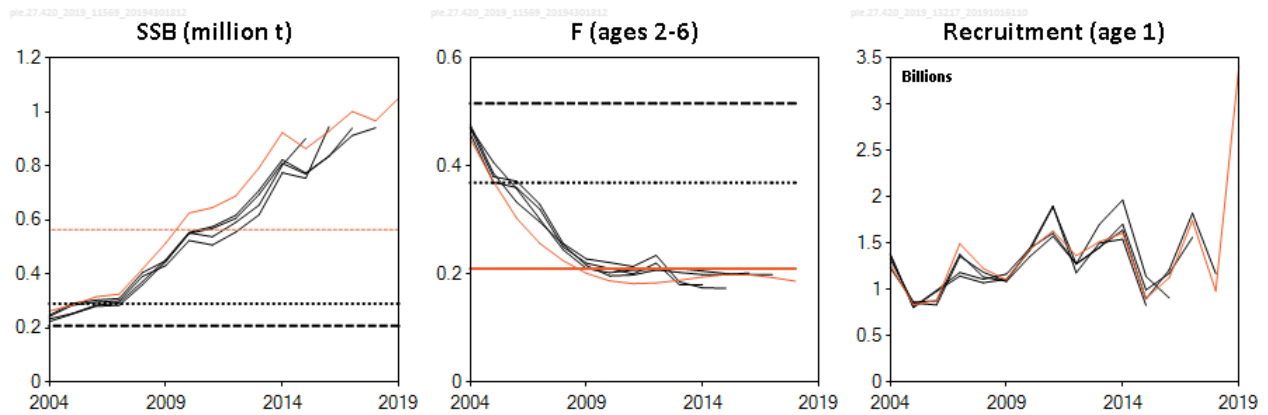


Figure 2 Plaice in Subarea 4 and Subdivision 20. Historical assessment results.

Issues relevant for the advice

Based on the 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.

Information from surveys (BTS, IBTS-Q3, SNS, and DFS) implies that older fish are likely migrating to the northwestern part of the North Sea (ICES, 2018a), where the targeted fishing effort is low. This partly resulted in a reduced fishing mortality at older ages, and in an upward trend of SSB in recent years (in 2018, for example, plaice aged five years and older contribute to 85% of the SSB).

Since 2016, large mesh trawlers (TR1 and BT1) are under the landing obligation in Subarea 4. In 2019, the fleets (BT2 and TR2) that contribute most to the total discards will fall under the landing obligation in Subarea 4, with *de minimis* exemptions in certain fisheries. In 2018, 52% of the total catch in Subarea 4 and 19% in Subdivision 20 was discarded. The reported BMS landings for fleets that are under the landing obligation in Subarea 4 are currently much lower than the estimates of unwanted catch from catch monitoring programmes.

Reference points

Table 5 Plaice in Subarea 4 and Subdivision 20. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	564 599	Fifth percentile of the current SSB ($SSB_{2015}/1.4$), as estimated at the benchmark.	ICES (2017)
	F_{MSY}	0.21	EqSim analysis based on the recruitment period 1958–2012.	ICES (2017)
Precautionary approach	B_{lim}	207 288	Break-point of hockey stick stock–recruit relationship, based on the recruitment period 1958–2012.	ICES (2017)
	B_{pa}	290 203	$B_{\text{lim}} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{\text{lim}}$	ICES (2017)
	F_{lim}	0.516	EqSim analysis based on the recruitment period 1958–2012.	ICES (2017)
	F_{pa}	0.369	$F_{\text{lim}} \times \exp(-1.645 \times 0.2) \approx F_{\text{lim}} / 1.4$	ICES (2017)
EU Management plan (MAP) *	MAP MSY B_{trigger}	564 599	MSY B_{trigger}	ICES (2017)
	MAP B_{lim}	207 288	B_{lim}	ICES (2017)
	MAP F_{MSY}	0.21	F_{MSY}	ICES (2017)
	MAP target range F_{lower}	0.146–0.21	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2017)
	MAP target range F_{upper}	0.21–0.30	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2017)

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

Basis of the assessment

Table 6 Plaice in Subarea 4 and Subdivision 20. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018b).
Assessment type	An age-structured stock assessment, based on Aarts and Poos (2009), that uses catches in the model and the forecast (ICES, 2019).
Input data	Commercial catch, ages, and length frequencies from port and observer sampling. Six survey indices: combined BTS (Tridens, Isis, Belgica, Solea, UK-BTS; 1996–2018), BTS-Isis (1985–1995), SNS (split into two series, SNS1 1970–1999 and SNS2 2000–2018), IBTS Q1 (2007–2018), and IBTS Q3 (1997–2018). Both the combined BTS Tridens and Isis and the IBTS (Q1 and Q3) survey indices are updated yearly using a delta-GAM model (Berg <i>et al.</i> , 2014). Maturity-at-age is assumed constant; natural mortality-at-age is assumed constant at 0.1 year^{-1} (ICES, 2017).
Discards, BMS landings, and bycatch	Data from the majority of fleets were included in the assessment. In 2018, 75% of the total discards in Subarea 4 were obtained from sampling programmes. For Subdivision 20, 59% of the total discards were obtained from sampling programmes. BMS landings, where reported, are included with discards as unwanted catch in the assessment from 2016.
Indicators	None.
Other information	Catch information, landings since 1984, and discards since 2002 for plaice from Subdivision 20 (Skagerrak) are now added to plaice for Subarea 4 (North Sea). The SNS survey was split into two time-series, 1984–1999 and 2000–2018. Plaice migrate into Division 7.d during quarter 1; 50% of the mature catches in Division 7.d were assigned, therefore, to the North Sea plaice stock during the stock assessment. This stock was last benchmarked in 2017 (WKNSEA; ICES, 2017).
Working groups	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Plaice in Subarea 4 and Subdivision 20. ICES advice, TAC, and official and ICES estimates of landings and discards. All weights are in tonnes.

Plaice in Subarea 4

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards
1987	F < F(84); TAC	120000		150000	130794	153670	190524
1988	70% of F(85); TAC	150000		175000	138412	154475	156423
1989	Reduce F; Buffer SSB	< 175000		185000	152408	169818	107793
1990	Status quo F; TAC	171000		180000	156261	156240	71225
1991	No increase in F; TAC	169000		175000	143565	148003	80935
1992	No long-term gains in increasing F	- *		175000	123482	125190	57049
1993	No long-term gains in increasing F	170000 *		175000	115278	117113	35016
1994	No long-term gains in increasing F	- *		165000	109679	110392	23785
1995	Significant reduction in F	87000 **		115000	96410	98356	21828
1996	Reduction in F of 40%	61000		81000	80033	81673	52049
1997	Reduction in F of 20%	80000		91000 ***	81483	83048	100145
1998	Fish at F = 0.3	82000		87000	70365	71534	103751
1999	Fish at F = 0.3	106000		102000	78617	80662	70976
2000	Fish at F = 0.3	95000		97000	82151	81150	44311
2001	Fish at F = 0.26	78000		78000	79700	81847	100309
2002	F < F _{pa}	< 77000		77000	69705	70217	54525
2003	Fish at F = 0.23	60000		73000	65669	66489	77838
2004	Recovery plan	-		61000	61008	61436	54605
2005	Rebuild the SSB above B _{pa} in 2006	35000		59000	54908	55700	54169
2006	Rebuild the SSB above B _{pa} in 2007	48000		57000	55933	57943	61917
2007	Rebuild the SSB above B _{pa} in 2008	< 32000		50000	49031	49744	39511
2008	Rebuild the SSB above B _{pa} in 2009	< 35000		49000	47682	48875	45950
2009	Limit total landings to 55 500 t	< 55500		55500	NA	54973	45292
2010	Limit total landings to 63 825 t	< 63800		63800	50666	60674	45728
2011	See scenarios	< 64200		73400	65923	67386	40553
2012	Apply first stage of the management plan	< 84410		84400	71246	73830	59068
2013	Apply first stage of the management plan	< 97070		97100	78982	78905	38864
2014	Apply first stage of the management plan	< 111631		111600	69179	70847	51915
2015	(November update) Apply second stage of the management plan	< 128376	179301	128376	74807	74963	49432
2016	Apply second stage of the management plan	-	≤ 216345 ^	131714	78659	81059	42063 ^^
2017	MSY approach	-	≤ 158201 ^	129917	64352	65442	37613 ^^
2018	MSY approach	-	≤ 142481 ^	112643	49513	50783	46305 ^^
2019	MSY approach	-	≤ 142217 ^	125435			
2020	MSY approach	-	≤ 166499 ^				

* Catch at *status quo* F.

** Catch at 20% reduction in F.

*** After revision from 77 000 t.

^ From 2016 onwards, the advice is for the combined North Sea and Skagerrak stock.

^^ Since 2016 discards correspond to unwanted catch (including BMS landings).

NA = not available.

Table 8 Plaice in Subarea 4 and Subdivision 20. ICES advice, TAC, and ICES estimates of landings and discards. All weights are in tonnes. Advice until 2012 was given for Skagerrak and Kattegat separately. Since 2016, the Skagerrak component has been merged with plaice in Subarea 4.

Plaice in Subdivision 20

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards
1992	TAC	14000		11200	9554	
1993	Precautionary TAC	-		11200	9854	
1994	If required, precautionary TAC	-		11200	9551	
1995	If required, precautionary TAC	-		11200	9380	
1996	If required, precautionary TAC	-		11200	8003	
1997	No advice	-		11200	7814	
1998	No increase in F from the present level	11900		11200	6449	
1999	No increase in F from the present level	11000		11200	7049	
2000	$F < F_{pa}$	11800		11200	6989	
2001	$F < F_{pa}$	9400		9400	9231	
2002	$F < F_{pa}$	8510		6420	7102	574
2003	$F < F_{pa}$	18400		10400	7143	1437
2004	$F < F_{pa}$	*		9500	8033	2873
2005	$F < F_{pa}$	< 9500		7600	6099	2081
2006	No increase in F	< 9600		7600	8345	2243
2007	Maintain current TAC	< 9600		8500	7621	2862
2008	No increase in catch	< 9400		9300	8356	1043
2009	Same advice as last year	< 9400		9300	6514	610
2010	Same advice as last year	< 9400		9300	8700	842
2011	Last three years' average landings (2007–2009)	< 8000		7900	8218	1040
2012	Reduce catch	-		7900	7680	846
2013	Increase catch by 7% – protect Eastern component		< 8400	9142	6812	1161
2014	Increase catch by 7% – protect Eastern component	< 8972	< 10196	10056	9213	1022
2015	Decrease catch (2012–2013) by 13% – protect Eastern component	≤ 6287	≤ 7232	10056	9804	676
2016	Apply second stage of the management plan	-	≤ 216345 ^	11766	10900	1908 **
2017	MSY approach	-	≤ 158201 ^	17639	8775	1353 **
2018	MSY approach	-	≤ 142481 ^	15343	6229	1487 **
2019	MSY approach	-	≤ 142217 ^	16782		
2020	MSY approach	-	≤ 166499 ^			

* The exploitation of this stock should be conducted in the context of mixed fisheries.

** Since 2016 discards correspond to unwanted catch (including BMS landings).

^ From 2016 onwards, the advice is for the combined North Sea and Skagerrak stock.

History of the catch and landings

Table 9 Plaice in Subarea 4 and Subdivision 20. Catch distribution by fleet in 2018 as estimated by ICES. Weights are in tonnes.

Catch (2018)	Wanted catch			Unwanted catch
	Beam trawl 52%	Otter trawl 37%	Other 11%	
104 804	57 012			47 792

Table 10 Plaice in Subarea 4 and Subdivision 20. History of official commercial catch and landings of plaice in Subarea 4, along with ICES estimates for individual areas. All weights are in tonnes.
 NS = North Sea, SK = Skagerrak.

Year	Belgium NS	Denmark NS	France NS	Germany NS	Netherlands NS	Norway NS	Sweden NS	UK NS	Others NS	Landings NS (official)	Total landings NS (ICES estimates)	Landings SK (ICES estimates)	Landings NS+SK (ICES estimates)	Discards NS+SK (ICES estimates)	Landings SK (official)	BMS landings (official)
1980	7005	27057	711	4319	39782	15	7	23032	0	101928	139951	10510	150461	31080	-	
1981	6346	22026	586	3449	40049	18	3	21519	0	93996	139697	8501	148198	33031		
1982	6755	24532	1046	3626	41208	17	6	20740	0	97930	154546	8073	162619	49127		
1983	9716	18749	1185	2397	51328	15	22	17400	0	100812	144030	7130	151160	74483		
1984	11393	22154	604	2485	61478	16	13	16853	0	114996	156149	7921	164070	70816		
1985	9965	28236	1010	2197	90950	23	18	15912	0	148311	159838	10095	169933	60549		
1986	7232	26332	751	1809	74447	21	16	17294	0	127902	165347	11378	176725	129953		
1987	8554	21597	1580	1794	76612	12	7	20638	0	130794	153670	12503	166173	190524	15694	
1988	11527	20259	1773	2566	77724	21	2	24497	43	138412	154475	10820	165295	156423	12858	
1989	10939	23481	2037	5341	84173	321	12	26104	0	152408	169818	5997	175815	107793	7710	
1990	13940	26474	1339	8747	78204	1756	169	25632	0	156261	156240	10048	166288	71225	12078	
1991	14328	24356	508	7926	67945	560	103	27839	0	143565	148003	6679	154682	80935	8685	
1992	12006	20891	537	6818	51064	836	53	31277	0	123482	125190	9554	134744	57049	11823	
1993	10814	16452	603	6895	48552	827	7	31128	0	115278	117113	9854	126967	35016	11407	
1994	7951	17056	407	5697	50289	524	6	27749	0	109679	110392	9551	119943	23785	11334	
1995	7093	13358	442	6329	44263	527	3	24395	0	96410	98356	9380	107736	21828	10766	
1996	5765	11776	379	4780	35419	917	5	20992	0	80033	81673	8003	89676	52049	10517	
1997	5223	13940	254	4159	34143	1620	10	22134	0	81483	83048	7814	90862	100145	10292	
1998	5592	10087	489	2773	30541	965	2	19915	1	70365	71534	6449	77983	103751	8431	
1999	6160	13468	624	3144	37513	643	4	17061	0	78617	80662	7049	87711	70976	8719	
2000	7260	13408	547	4310	35030	883	3	20710	0	82151	81150	6989	88139	44311	8826	
2001	6369	13797	429	4739	33290	1926	3	19147	0	79700	81847	9231	91078	100309	11653	
2002	4859	12552	548	3927	29081	1996	2	16740	0	69705	70217	7102	77319	55099	8789	
2003	4570	13742	343	3800	27353	1967	2	13892	0	65669	66489	7143	73632	79275	9110	
2004	4314	12123	231	3649	23662	1744	1	15284	0	61008	61436	8033	69469	57478	9090	
2005	3396	11385	112	3379	22271	1660	0	12705	0	54908	55700	6099	61799	56250	6764	
2006	3487	11907	132	3599	22764	1614	0	12429	0	55933	57943	8345	66288	64160	9565	
2007	3866	8128	144	2643	21465	1224	4	11557	0	49031	49744	7621	57365	42373	8747	
2008	3396	8229	125	3138	20312	1051	20	11411	0	47682	48875	8356	57231	46993	8657	

Year	Belgium NS	Denmark NS	France NS	Germany NS	Netherlands NS	Norway NS	Sweden NS	UK NS	Others NS	Landings NS (official)	Total landings NS (ICES estimates)	Landings SK (ICES estimates)	Landings NS+SK (ICES estimates)	Discards NS+SK (ICES estimates)	Landings SK (official)	BMS landings (official)
2009	3474	N/A*	N/A*	2931	29142	1116	1	13143	0	N/A*	54973	6514	61487	45902	6748	
2010	3699	435	383	3601	26689	1089	5	14765	0	50666	60674	8700	69374	46570	9057	
2011	4466	11634	344	3812	29272	1223	3	15169	0	65923	67386	8218	75604	41593	8251	
2012	4862	12245	281	3742	32201	1022	5	16888	0	71246	73830	7680	81510	59914	7611	
2013	6462	13650	249	4903	33537	843	3	19334	0	78982	78905	6812	85717	40025	6911	
2014	7105	12004	276	4203	29309	577	5	17370	0	69179	70847	9213	80060	52937	9004	
2015	5522	14401	223	5171	32074	169	7	17240	0	74807	74963	9804	84767	50108	10171	
2016	6659	16398	169	4371	32227	94	9	18731	0	78659	81059	10900	91959	43971**	10883	
2017	5317	12518	151	2526	28775	67	5	14993	0	64352	65442	8775	74217	38966**	8467	5
2018	4894	9666	112	2580	22586	69	3	9603	0	49513	50783	6229	57012	47792**	5958	90

* N/A = not available.

** Since 2016, discards correspond to unwanted catch (including BMS landings).

Table 11 Plaice in Subarea 4 and Subdivision (SD) 20. ICES estimated landings for plaice in Subdivision 20 for each country participating in the fishery. All weights are in tonnes.

Year	Denmark	Sweden	Germany	Belgium	Norway	Netherlands	Total landings SD 20	BMS landings (official)
1972	5095	70			3		5168	
1973	3871	80			6		3957	
1974	3429	70			5		3504	
1975	4888	77			6		4971	
1976	9251	51		717	6		10025	
1977	12855	142		846	6		13849	
1978	13383	94		371	9		13857	
1979	11045	67		763	9		11884	
1980	9514	71		914	11		10510	
1981	8115	110		263	13		8501	
1982	7789	146		127	11		8073	
1983	6828	155		133	14		7130	
1984	7560	311		27	22		7921	
1985	9646	296		136	18		10095	
1986	10645	202		505	26		11378	
1987	11327	241		907	27		12503	
1988	9782	281		716	41		10820	
1989	5414	320		230	33		5997	
1990	8729	779		471	69		10048	
1991	5809	472	15	315	68		6679	
1992	8514	381	16	537	106		9554	
1993	9125	287	37	326	79		9854	
1994	8783	315	37	325	91		9551	
1995	8468	337	48	302	224		9380	
1996	7304	260	11		428		8003	
1997	7306	244	14		249		7814	
1998	6132	208	11		98		6449	
1999	6473	233	7		336		7049	
2000	6680	230	5		67		6989	
2001	9045	125			61		9231	
2002	6773	141	3		164	3	7102	
2003	5079	143	8		385	1484	7143	
2004	5999	545	67		111	1288	8033	
2005	4684	554	14		9	823	6099	
2006	6563	366	21		352	1059	8345	
2007	5656	281	21		166	1503	7621	
2008	7163	220	17		117	775	8356	
2009	5828	92	13		62	506	6514	
2010	7101	127	13		103	1331	8700	
2011	7746	179	13		230	15	8218	
2012	7338	155	12		136	10	7680	
2013	6326	160	10		138	181	6812	
2014	7484	240	46		48	506	9213	
2015	7808	274	14		69	1639	9804	
2016	8035	218	14	0	84	2550	10900	
2017	6864	159	11	0	154	1588	8775	2
2018	4382	70	7	0	26	1743	6229	19

Summary of the assessment

Table 12 Plaice in Subarea 4 and Subdivision 20. Assessment summary. Recruitments are in thousands. Weights are in tonnes. High and low are 95% confidence intervals.

Year	Recruitment			SSB			Fishing mortality			Landings *	Discards	Official BMS landings
	Age 1	Low	High	SSB	Low	High	Ages 2–6	Low	High			
1957	477525	418477	544499	342349	291326	393374	0.24	0.21	0.28	70563	7880	
1958	710787	624406	808911	355403	304034	406766	0.28	0.25	0.31	73354	14837	
1959	875057	766882	998403	362316	311220	413420	0.31	0.27	0.35	79300	29864	
1960	802714	703090	916906	380645	329572	431728	0.32	0.29	0.36	87541	29793	
1961	867365	758479	991456	392199	342332	442068	0.33	0.29	0.36	85984	32490	
1962	615217	536861	705390	482790	417120	548460	0.34	0.30	0.37	87472	37903	
1963	608124	532062	694873	441157	387596	494724	0.36	0.33	0.40	107118	41258	
1964	2459690	2173554	2786024	431042	379020	483060	0.39	0.35	0.43	110540	37031	
1965	663359	586336	750393	384301	346192	422408	0.39	0.35	0.43	97143	43080	
1966	577954	510787	653627	404479	361494	447466	0.36	0.33	0.40	101834	64718	
1967	429273	377251	488617	474109	427554	520666	0.35	0.31	0.38	108819	54546	
1968	419523	365837	481209	460272	417756	502784	0.35	0.32	0.38	111534	27987	
1969	668786	577231	774523	404080	366784	441376	0.37	0.33	0.40	121651	21169	
1970	670920	580699	774530	371002	333814	408186	0.37	0.34	0.40	130342	29640	
1971	429894	371636	496992	360721	325922	395518	0.37	0.34	0.40	113944	22995	
1972	366857	316092	426007	365362	331354	399366	0.39	0.36	0.43	122843	19632	
1973	1414310	1217819	1642004	303496	274166	332834	0.44	0.41	0.48	130429	13354	
1974	1079830	919657	1267103	300592	274636	326544	0.48	0.44	0.53	112540	44945	
1975	782016	665198	920029	302267	277638	326902	0.47	0.43	0.51	108536	86699	
1976	665645	555620	798236	326752	302360	351140	0.44	0.40	0.48	113670	53247	
1977	1029840	853146	1243343	327003	304310	349690	0.44	0.40	0.48	119188	57501	
1978	878573	730262	1056891	328221	305554	350886	0.48	0.45	0.51	113984	45655	
1979	921985	764869	1110743	304718	282888	326552	0.53	0.49	0.57	145347	67935	
1980	1087410	921487	1282416	320083	296530	343630	0.55	0.51	0.59	140764	31080	
1981	998312	850667	1172002	289567	268414	310726	0.55	0.50	0.59	141233	33031	
1982	1918150	1643164	2239730	281802	261865	301735	0.53	0.49	0.56	156153	49127	
1983	1366570	1163124	1606197	337076	313880	360280	0.51	0.47	0.54	145779	74483	
1984	1314260	1100664	1569984	367841	344106	391574	0.51	0.47	0.55	165772	70816	
1985	1818360	1527205	2163094	398599	373362	423838	0.56	0.52	0.59	171838	60549	
1986	4306660	3593769	5164341	409452	383954	434946	0.61	0.56	0.65	178878	129953	
1987	1866210	1581218	2200717	464638	435370	493910	0.62	0.58	0.66	168759	190524	
1988	1763250	1504387	2068024	418332	390920	445740	0.61	0.57	0.65	168552	156423	
1989	1278120	1092405	1495705	452022	424102	479938	0.60	0.56	0.64	178891	107793	
1990	1112890	953345	1297913	404299	380594	428006	0.62	0.58	0.65	169453	71225	
1991	970053	824765	1140692	359877	339550	380210	0.63	0.58	0.67	157277	80935	
1992	823400	704775	961612	306374	289790	322950	0.60	0.57	0.64	136727	57049	
1993	559267	480271	650759	277351	261161	293539	0.58	0.54	0.61	128506	35016	
1994	606864	523329	703648	239157	225334	252986	0.58	0.54	0.62	121925	23785	
1995	931026	806885	1074176	230862	216084	245636	0.62	0.58	0.66	109348	21828	
1996	824369	718399	945264	205335	191050	219610	0.66	0.61	0.71	91386	52049	
1997	2369150	2082288	2695305	199394	184414	214366	0.67	0.63	0.72	92958	100145	
1998	829033	729733	941817	237801	218566	257034	0.66	0.61	0.71	79810	103751	
1999	724979	637230	824980	232670	213519	251821	0.62	0.58	0.67	89726	70976	
2000	836436	734523	952670	245864	223598	268122	0.59	0.54	0.63	90754	44311	
2001	606235	527418	696799	242846	220128	265572	0.56	0.51	0.61	92912	100309	
2002	1852180	1607795	2134250	228746	204824	252676	0.54	0.49	0.59	79178	55099	
2003	611844	527942	708750	265939	235208	296672	0.51	0.45	0.57	74722	79275	
2004	1271770	1110213	1457070	262747	227820	297680	0.45	0.40	0.50	70511	57478	
2005	834323	728883	954299	284877	243840	325920	0.37	0.32	0.42	62796	56250	
2006	881839	771586	1008320	315171	266618	363722	0.30	0.26	0.35	67143	64160	
2007	1494920	1314362	1701699	325053	273034	377066	0.26	0.22	0.30	58576	42373	
2008	1226400	1076104	1398823	418569	350684	486456	0.22	0.187	0.26	58336	46993	
2009	1103570	977925	1245207	514648	428764	600536	0.20	0.169	0.23	62360	45902	
2010	1431820	1273307	1608596	626083	519586	732574	0.187	0.157	0.22	70340	46570	
2011	1632940	1453103	1835428	645834	534098	757562	0.182	0.153	0.21	76507	41593	

Year	Recruitment			SSB			Fishing mortality			Landings *	Discards	Official BMS landings
	Age 1	Low	High	SSB	Low	High	Ages 2–6	Low	High			
2012	1364450	1215643	1530670	688862	568968	808752	0.183	0.155	0.21	82018	59914	
2013	1514410	1343088	1709169	793217	657816	928624	0.188	0.158	0.22	86222	40025	
2014	1607560	1417067	1822829	923897	763434	1084366	0.194	0.165	0.22	80686	52937	
2015	901948	782906	1038442	864391	713562	1015218	0.199	0.168	0.23	85360	49100	
2016	1126150	955418	1326555	929263	761236	1097284	0.198	0.167	0.23	92744	44205**	
2017	1743340	1401929	2166536	1002207	817136	1187264	0.193	0.163	0.22	74928	39355**	7
2018	982127	689774	1397059	967508	783736	1151284	0.187	0.148	0.22	57800	47877**	109
2019	3413221***			1052266								

* These values include part of the catches in Division 7.d in the first quarter (Q1).

** Since 2016, discards correspond to unwanted catch minus BMS landings from EU fleets officially reported in logbooks.

*** RCT3, including BTS-Q3 2019, SNS 2018, and DFS 2018 survey information.

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>.

Berg, C., Nielsen, A., and Christensen, K. 2014. Evaluation of alternative age-based methods for estimating relative abundance from survey data in relation to assessment models. *Fisheries Research*, 151: 91–99. <https://doi.org/10.1016/j.fishres.2013.10.005>.

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: 1–13. <http://data.europa.eu/eli/reg/2018/973/oj>.

ICES. 2017. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 6–10 February 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:34. 673 pp. <https://doi.org/10.17895/ices.pub.5339>.

ICES. 2018a. Report on the Working Group on Beam Trawl Surveys (WGBEAM), 10–13 April 2018, IJmuiden, Netherlands. ICES CM 2018/EOSG:05. 105 pp. <https://doi.org/10.17895/ices.pub.5462>.

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>.

Recommended citation: ICES. 2019. Plaice (*Pleuronectes platessa*) in Subarea 4 (North Sea) and Subdivision 20 (Skagerrak). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, ple.27.420, <https://doi.org/10.17895/ices.advice.5644>