Published 30 June 2016
Version 2: 11 November 2016

6.3.36 Plaice (*Pleuronectes platessa*) in Subarea 4 (North Sea) and Subdivision 3.a.20 (Skagerrak)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2017 should be no more than 158 201 tonnes in Subarea 4 and Subdivision 3.a.20 combined.

Since this stock is only partially under the EU landing obligation, ICES is not in a position to advise on landings corresponding to the advised catch.

Stock development over time

The combined North Sea and Skagerrak stock is well above MSY $B_{trigger}$, has increased in the past ten years, and has been at a record high for the last five years. Recruitment has been around the long-term average since the mid-1990s. In recent years, fishing mortality (F) has been estimated at around F_{MSY}.

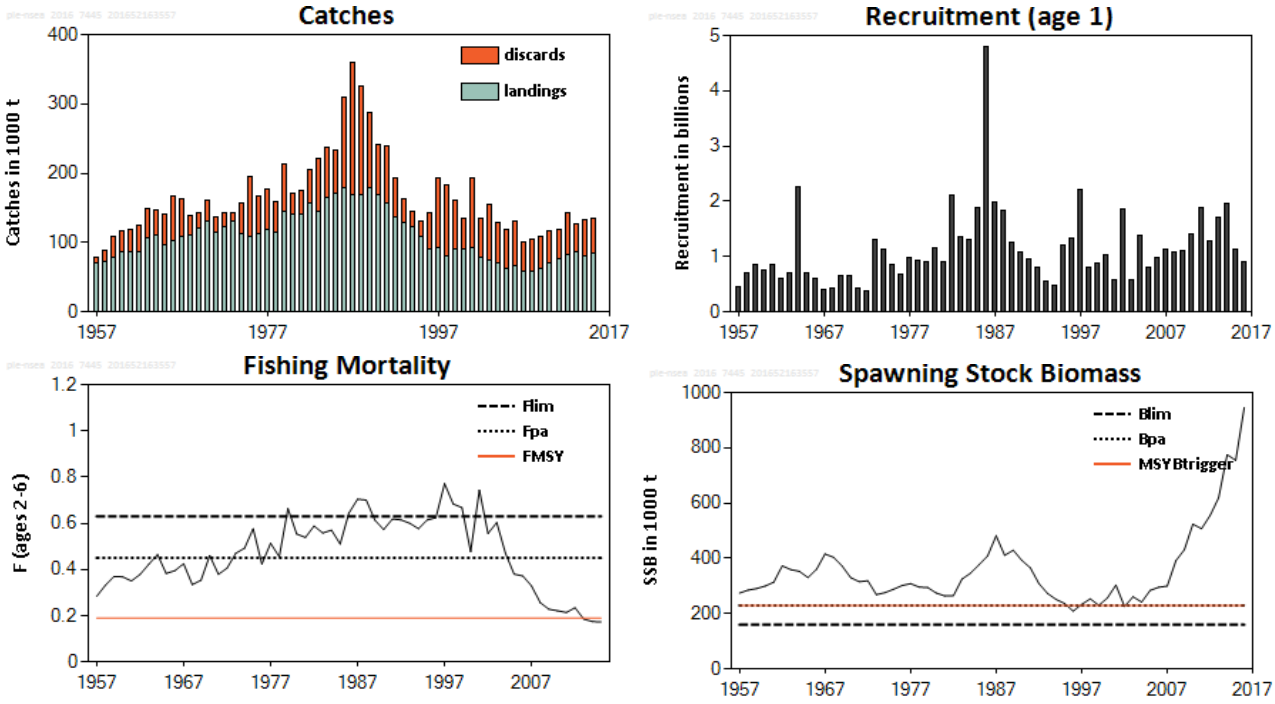

Figure 6.3.36.1 Plaice in Subarea 4 and Subdivision 3.a.20 combined. Summary of stock assessment.

https://doi.org/10.17895/ices.advice.18667979

Stock and exploitation status

Table 6.3.36.1 Plaice in Subarea 4 and Subdivision 3.a.20. State of the stock and fishery relative to reference points.

	Fishing pressure					Stock size				
		2013	2014	2015			2014	2015	2016	
Maximum sustainable yield	F_{MSY}	✓	✓	✓	Appropriate	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 options

Following a review of the stock structure of plaice in the North Sea and the Skagerrak, the two areas were combined into one assessment in 2015.

Table 6.3.36.2 Plaice in Subarea 4 and Subdivision 3.a.20. The basis for the catch options.

Variable	Value	Source	Notes
F ages 2–6 (2016)	0.17	ICES (2016a)	Exploitation pattern average 2013–2015, rescaled to 2015
SSB (2017)	1033466	ICES (2016a)	Short-term forecast (STF), tonnes
R_{age1} (2016)	907736	ICES (2016a)	RCT3, thousands
R_{age1} (2017)	980962	ICES (2016a)	Geometric mean (GM, 1957–2013), thousands
Total catch (2016)	151362	ICES (2016a)	Tonnes
Commercial landings (2016)	109282	ICES (2016a)	Tonnes
Discards (2016)	42090	ICES (2016a)	Average discard rate by age 2013–2015 in numbers

* Version 2: The management plan is not agreed and associated symbols have been removed in this version.

Table 6.3.36.3 Plaice in Subarea 4 and Subdivision 3.a.20. The catch options. All weights are in tonnes.

Rationale	Total catch (2017)	Wanted catch (2017) *,**	Unwanted catch (2017) *,**	Basis	F_{total} ages 2–6 (2017)	F_{wanted} ages 2-6 (2017)	$F_{unwanted}$ ages 2-3 (2017)	SSB (2018)	% SSB change ***	% TAC change wanted catch^
MSY approach	158201	121523	36678	F_{MSY}	0.19	0.10	0.18	1065323	3	−15
Management plan (MP)	214738	165142	49596	TAC + 15%	0.265	0.14	0.24	1008386	−2	15
Precautionary approach	339247	261819	77428	F_{pa}	0.45	0.23	0.41	883590	−15	82
Zero catch	0	0	0	F = 0	0	0	0	1227002	19	−100
Other options	131471	100957	30514	$F_{2016} \times 0.90$	0.16	0.08	0.14	1090093	6	−29
	144932	111309	33623	F_{2016}	0.17	0.09	0.16	1078707	4	−22
	158975	122119	36856	$F_{2016} \times 1.10$	0.19	0.10	0.18	1064542	3	−15
	186687	143480	43207	Stable TAC	0.23	0.12	0.21	1036616	0	0
	239611	184384	55227	F_{MP}	0.3	0.15	0.28	983389	−5	28
	272174	209628	62546	$F_{2016} \times 2$	0.35	0.18	0.32	950711	−8	46
	1018728	815440	203288	$SSB > B_{pa}$	2.75	1.41	2.54	230000	−78	465
	443689	343667	100022	F_{lim}	0.63	0.32	0.58	779638	−25	139
	1098815	886406	212409	$SSB > B_{lim}$	3.57	1.83	3.29	160000	−85	514
	1018728	815440	203288	$SSB > MSY\ B_{trigger}$	2.75	1.41	2.54	230000	−78	465
Mixed fisheries options –differences with calculations above can occur because of the different methodology used (ICES, 2016b)†										
Maximum	262508			A	0.3453			921565		-11
Minimum	90697			B	0.1083			1094476		6
Cod	140887			C	0.1727			1043814		1
SQ effort	172413			D	0.2151			1012053		-2
Value	151464			E	0.1868			1033153		0

* "Wanted" and "unwanted" catch are used to described fish that would be landed and discarded in the absence of the EU landing obligation, based on average discard rate estimates for 2013–2015.

** Wanted catch of plaice in Subarea 4 and Subdivision 3.a.20, calculated as the projected total stock wanted catch less the wanted catch of plaice from Subarea 4 taken in Division 7.d. The subtracted value (934 t) is estimated based on the plaice catch advice for Division 7.d for 2016, using the recent 10-year average (2006–2015) proportion of plaice from Subarea 4 in the annual plaice landings in Division 7.d. Similarly, 652 t of unwanted catch of plaice from Subarea 4 are projected to be taken in Division 7.d. These are removed from the unwanted catch. TAC change restrictions of 15% are applied after subtracting the Division 7.d catches.

*** SSB 2018 relative to SSB 2017.

^ Wanted catch 2017 relative to TAC 2016, ignoring that large mesh trawlers (TR1 and BT1) with low discard rates are under landing obligation since 2016.

Mixed-fisheries assumptions

(note: "fleet's stock share" is used to describe the share of the fishing opportunities for each particular fleet, which has been calculated based on the single-stock advice for 2017 and the historical proportion of the stock landings taken by the fleet):

A. Maximum scenario: Each fleet stops fishing when its last stock share is exhausted.

B. Minimum scenario: Each fleet stops fishing when its first stock share is exhausted.

C. Cod scenario: Each fleet stops fishing when its cod stock share is exhausted.

D. SQ (status quo) effort scenario: The effort of each fleet in 2016 and 2017 is as in 2015.

E. Value scenario: The effort of each fleet is equal to the weighted average of the efforts required to catch the fleet's quota share of each of the stocks, where the weights are the relative catch values of each stock in the fleet's portfolio.

† Version 2: Mixed-fisheries considerations as part of this advice added

Basis of the advice

Table 6.3.36.4 Plaice in Subarea 4 and Subdivision 3.a.20. The basis of the advice.

Advice basis	MSY approach
Management plan *	There is an management plan (EU management plan (EU, 2007) for North Sea plaice and sole that does not cover the current stock area for this stock. ICES evaluated the plan (ICES, 2010) and found it to be precautionary for the North Sea component. However, the management plan is not agreed because the parties and ICES was requested to provide advice based on the MSY approach and to include the management plan as a catch option.

*Version 2: Updated description of management plans

Quality of the assessment

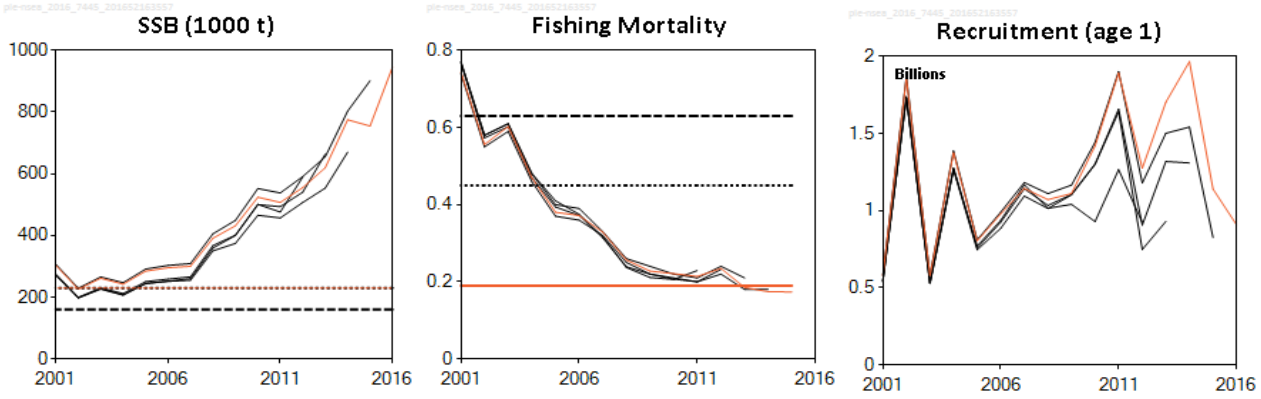

Figure 6.3.36.2 Plaice in Subarea 4 and Subdivision 3.a.20. Historical assessment results (final-year recruitment estimates included). Note that the scale shift in SSB is due to the addition of Skagerrak to the stock definition in 2015.

Issues relevant for the advice

The North Sea and Skagerrak are now combined in one stock area.

The long-term management plan for North Sea plaice and sole, which was evaluated by ICES to be in accordance with the precautionary approach, is not used by ICES in 2016 as the basis for the advice for plaice. The European Commission has informed ICES that agreement has not been reached between the EU and Norway on a method to split the joint advice between the North Sea and Skagerrak. Therefore, advice is provided based on the MSY approach.

However, using the EU multiannual plan based on plaice in the North Sea does not raise immediate concerns, given the status of the combined stock.

When the new management plan for plaice is developed it should, as the current management plan, take the mixed fisheries of plaice and sole into account.

A large proportion of the catch in the western Skagerrak is considered to originate from the North Sea component of the stock, mainly in the summer on mixed feeding aggregations. There are also local plaice components resident in the Skagerrak. These cannot be easily distinguished and assessed separately. There does not appear to be much mixing of the combined stock with these local components in eastern Skagerrak. The status of these components is unknown and catches should not increase in the eastern Skagerrak to avoid local depletion.

Results from a North Sea mixed-fisheries analysis are presented in ICES (2016b). For 2017, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), haddock would be the most limiting stock (assuming that the full

advised catch is taken), constraining 36 out of 41 fleet segments (corresponding to 91% of the 2015 kW days of effort). Cod and eastern Channel sole would be limiting for fleets, corresponding to 5% and 4% of the 2015 effort, respectively. Conversely, in the "Maximum" scenario with *Nephrops* managed by separate TACs for the individual functional units (FUs), *Nephrops* would be considered the least limiting stocks in many FUs. *Nephrops* in FU 33, FU 5, FU 32, FU 7, and FU Others would be the least limiting stocks for fleets in these FUs, representing 32%, 16%, 10%, 4%, and 17% of the 2015 effort, respectively. Eastern Channel plaice and saithe would be least limiting for other fleet segments, representing 12% and 9% of the 2015 effort, respectively.

Results for the North Sea plaice stock are also included as additional rows in the catch options table of this advice sheet.

Reference points

Table 6.3.36.5 Plaice in Subarea 4 and Subdivision 3.a.20. Reference points, values, and their technical basis. Reference points are based on the North Sea stock only (apart from F_{MSY}).

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	230000 t	Default to value of B_{pa}	
	F_{MSY}	0.19	Combined stock	ICES (2014)
Precautionary approach	B_{lim}	160000 t	B_{loss} = 160000 t, the lowest observed biomass in 1997 as assessed in 2004	ICES (2004)
	B_{pa}	230000 t	1.44 × B_{lim}	ICES (2004)
	F_{lim}	0.63	The F that in equilibrium will maintain the stock above B_{lim} with a 50% probability	ICES (2016a)
	F_{pa}	0.45	$F_{pa} = F_{lim} \times \exp(-1.645\sigma_F)$; $\sigma_F = 0.20$	ICES (2016a)
Management plan	SSB_{MP}	230000 t	Stage one: Article 2	EU management plan (EU, 2007)
	F_{MP}	0.30	Stage two: Article 4.2 – F_{MSY} constrained to F ≥ 0.3	EU management plan (EU, 2007)

Basis of the assessment

Table 6.3.36.6 Plaice in Subarea 4 and Subdivision 3.a.20. The basis of the assessment.

ICES stock data category	1 (ICES, 2016c)
Assessment type	Age-based analytical assessment (XSA; ICES, 2015a) that uses catches in the model and in the forecast.
Input data	Commercial catch, ages and length frequencies from port and observer sampling. Three survey indices (combined BTS (BTS-Tridens and BTS-Isis; 1996–2015), BTS-Isis (1985–1995), and the SNS (split into two series, SNS1 1984–1999, SNS2 2000–2015)). Maturity-at-age assumed constant; natural mortality-at-age assumed constant at 0.1.
Discards and bycatch	Included in the assessment, data series from the majority of the fleet. Discard information in 2015 was available for 72% of the the landings in the North Sea and for 80% in the Skagerrak. 74% of the overall discards estimation in the North Sea come from the observations.
Indicators	IBTS and commercial cpue indicators in the Skagerrak
Other information	Catch information, landings since 1984, and discards since 2002 for plaice from Subdivision 3.a.20 (Skagerrak) are now added to plaice for Subarea 4 (North Sea). The SNS survey was split into two time-series, 1984–1999 and 2000–2015. The Skagerrak stock component was benchmarked in 2015 (ICES, 2015b).
Working groups	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) and Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE)

Information from stakeholders

The cumulative index of perceptions of the abundance of plaice (Figure 6.3.36.3) increased in all areas during the last decade (Napier, 2014). No new information has been provided for 2015.

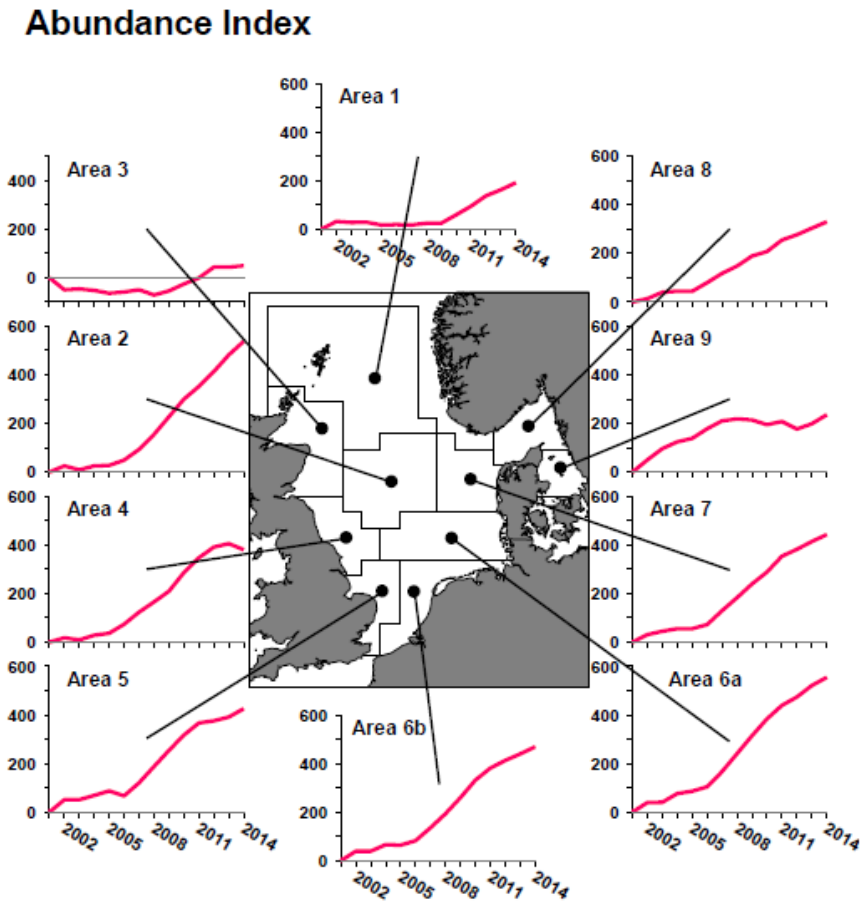

Figure 6.3.36.3 Plaice in Subarea 4 and Subdivision 3.a.20. Cumulative time-series of index of perceptions of abundance of plaice by roundfish sampling area from the Fishers' North Sea Stock Survey (Napier, 2014; see page 14 for an explanation of the index).

History of the advice, catch, and management

Table 6.3.36.7a Plaice in Subarea 4. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES landings	ICES discards
1987	F< F(84); TAC	120		150	131	154	191
1988	70% of F(85); TAC	150		175	138	154	156
1989	Reduce F; Buffer SSB	< 175		185	152	170	108
1990	*Status quo* F; TAC	171		180	156	156	71
1991	No increase in F; TAC	169		175	144	148	81
1992	No long-term gains in increasing F	-*		175	123	125	57
1993	No long-term gains in increasing F	170 *		175	115	117	35
1994	No long-term gains in increasing F	-*		165	110	110	24
1995	Significant reduction in F	87 **		115	96	98	22
1996	Reduction in F of 40%	61		81	80	82	52
1997	Reduction in F of 20%	80		91 ***	82	83	100
1998	Fish at F = 0.3	82		87	70	72	104
1999	Fish at F = 0.3	106		102	79	81	71
2000	Fish at F = 0.3	95		97	84	81	44
2001	Fish at F = 0.26	78		78	80	82	100
2002	F< F_{pa}	< 77		77	70	70	54
2003	Fish at F = 0.23	60		73	66	67	77
2004	Recovery plan	-		61	61	61	54
2005	Rebuild the SSB above B_{pa} in 2006	35		59	55	56	54
2006	Rebuild the SSB above B_{pa} in 2007	48		57	56	58	62
2007	Rebuild the SSB above B_{pa} in 2008	< 32		50	49	50	39
2008	Rebuild the SSB above B_{pa} in 2009	< 35		49	48	49	44
2009	Limit total landings to 55 500 t	< 55.5		55.5	NA	55	44
2010	Limit total landings to 63 825 t	< 63.8		63.8	51	61	45
2011	See scenarios	< 64.2		73.4	66	67	40
2012	Apply first stage of the management plan	< 84.410		84.4	71	74	59
2013	Apply first stage of the management plan	< 97.070		97.1	79	79	39
2014	Apply first stage of the management plan	< 111.631		111.6	69	71	52
2015	(November update) Apply second stage of the management plan	< 128.376	179.301	128.376	75	75	49
2016	Apply second stage of the management plan	-	≤ 216.345^	131.714			
2017	MSY approach	-	≤ 158 201				

* Catch at *status quo* F.

** Catch at 20% reduction in F.

*** After revision from 77 000 t.

^ As of 2016 the advice is for the combined North Sea and Skagerrak stocks.

NA = not available.

Table 6.3.36.7b Plaice in Subdivision 3.a.20 (Skagerrak). History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes. Advice until 2012 was given for Skagerrak and Kattegat combined. For 2016 the Skagerrak component has been merged with plaice in Subarea 4.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice	Agreed TAC	ICES landings	ICES discards
1992	TAC	14		11.2	9.6	
1993	Precautionary TAC	-		11.2	9.9	
1994	If required, precautionary TAC	-		11.2	9.6	
1995	If required, precautionary TAC	-		11.2	9.4	
1996	If required, precautionary TAC	-		11.2	8	
1997	No advice	-		11.2	7.8	
1998	No increase in F from the present level	11.9		11.2	6.4	
1999	No increase in F from the present level	11		11.2	7	
2000	$F < F_{pa}$	11.8		11.2	7	
2001	$F < F_{pa}$	9.4		9.4	9.2	
2002	$F < F_{pa}$	8.51		6.42	7.1	0.574
2003	$F < F_{pa}$	18.4		10.4	7.1	1.437
2004	$F < F_{pa}$	[3]		9.5	8	2.873
2005	$F < F_{pa}$	< 9.5		7.6	6.1	2.081
2006	No increase in F	< 9.6		7.6	8.4	2.243
2007	Maintain current TAC	< 9.6		8.5	7.6	2.862
2008	No increase in catch	< 9.4		9.3	8.3	1.043
2009	Same advice as last year	< 9.4		9.3	6.5	0.610
2010	Same advice as last year	< 9.4		9.3	8.7	0.842
2011	Last three years' average landings (2007–2009)	< 8.0		7.9	8.2	1.040
2012	Reduce catch	-		7.9	7.6	0.846
2013	Increase catch by 7% – protect Eastern component		< 8.4	9.142	6.824	1.161
2014	Increase catch by 7% – protect Eastern component	< 8.972	< 10.196	10.056	8.981	1.022
2015	Decrease catch (2012–2013) by 13% – protect Eastern component	≤ 6.287	≤ 7.232	10.056	9.804	0.676
2016*	-	-	-	11.766		

* As of 2016 the advice is for the combined North Sea and Skagerrak stocks.

History of catch and landings

Table 6.3.36.8 Plaice in Subarea 4 and Subdivision 3.a.20. Catch distribution by fleet in 2015 as estimated by ICES.

Catch (2015)	Landings			Discards
134.875 kt	65% beam trawl	30% trawl	5% other gears	50.108 kt
	84.767 kt			

Table 6.3.36.9a Plaice in Subarea 4. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. NS = North Sea, SK = Skagerrak.

Year	Belgium NS	Denmark NS	France NS	Germany NS	Netherlands NS	Norway NS	Sweden NS	UK NS	Others NS	Total (ICES estimate) NS	Landings (official) NS	Landings SK (ICES estimates)	Landings (NS+SK)	Discards (NS+SK)	Landings SK (official)*
1980	7005	27057	711	4319	39782	15	7	23032		139951	101928	10510	150461	31080	-
1981	6346	22026	586	3449	40049	18	3	21519		139697	93996	8501	148198	33031	
1982	6755	24532	1046	3626	41208	17	6	20740		154546	97930	8073	162619	49127	
1983	9716	18749	1185	2397	51328	15	22	17400		144030	100812	7130	151160	74483	
1984	11393	22154	604	2485	61478	16	13	16853		156149	114996	7921	165772	70816	
1985	9965	28236	1010	2197	90950	23	18	15912		159838	148311	10095	171838	60549	
1986	7232	26332	751	1809	74447	21	16	17294		165347	127902	11378	178878	129953	
1987	8554	21597	1580	1794	76612	12	7	20638		153670	130794	12503	168759	190524	15694
1988	11527	20259	1773	2566	77724	21	2	24497	43	154475	138412	10820	168552	156423	12858
1989	10939	23481	2037	5341	84173	321	12	26104		169818	152408	5997	178891	107793	7710
1990	13940	26474	1339	8747	78204	1756	169	25632		156240	156261	10048	169453	71225	12078
1991	14328	24356	508	7926	67945	560	103	27839		148003	143565	6679	157277	80935	8685
1992	12006	20891	537	6818	51064	836	53	31277		125190	123482	9554	136727	57049	11823
1993	10814	16452	603	6895	48552	827	7	31128		117113	115278	9854	128506	35016	11407
1994	7951	17056	407	5697	50289	524	6	27749		110392	109679	9551	121925	23785	11334
1995	7093	13358	442	6329	44263	527	3	24395		98356	96410	9380	109348	21828	10766
1996	5765	11776	379	4780	35419	917	5	20992		81673	80033	8003	91386	52049	10517
1997	5223	13940	254	4159	34143	1620	10	22134		83048	81483	7814	92958	100145	10292
1998	5592	10087	489	2773	30541	965	2	19915	1	71534	70365	6449	79810	103751	8431
1999	6160	13468	624	3144	37513	643	4	17061		80662	78617	7049	89726	70976	8719
2000	7260	13408	547	4310	35030	883	3	20710		81150	82151	6989	90754	44311	8826
2001	6369	13797	429	4739	33290	1926	3	19147		81847	79700	9231	92912	100309	11653
2002	4859	12552	548	3927	29081	1996	2	16740		70217	69705	7102	79178	55099	8789
2003	4570	13742	343	3800	27353	1967	2	13892		66489	65669	7143	74722	79275	9110
2004	4314	12123	231	3649	23662	1744	1	15284		61436	61008	8033	70511	57478	9090
2005	3396	11385	112	3379	22271	1660	0	12705		55700	54908	6099	62796	56250	6764
2006	3487	11907	132	3599	22764	1614	0	12429		57943	55933	8345	67143	64160	9565
2007	3866	8128	144	2643	21465	1224	4	11557	-	49744	49031	7621	58576	42373	8747
2008	3396	8229	125	3138	20312	1051	20	11411		48875	47682	8356	58336	46993	8657
2009	3474	N/A*	N/A*	2931	29142	1116	1	13143	-	54973	N/A*	6514	62360	45902	6748
2010	3699	435	383	3601	26689	1089	5	14765	-	60674	50666	8700	70340	46570	9057
2011	4466	11634	344	3812	29272	1223	3	15169	-	67386	65923	8218	76507	41593	8251
2012	4862	12245	281	3742	32201	1022	5	16888	-	73830	71246	7680	82018	59914	7611
2013	6462	13650	249	4903	33537	843	3	19334	-	78905	78982	6812	86222	40025	6911
2014	7105	12004	276	4203	29309	577	5	17370	-	70847	69179	9213	80686	52937	9004
2015	5522	14401	223	5171	32074	169	7	17240	-	74963	74807	9804	84611	50108 **	9804

*Official landings available for Subdivision 3.a.20.

**Version 2: Corrected value

Table 6.3.36.9b Plaice in Subdivision 3.a.20. ICES estimated landings for each country participating in the fishery.

Year	Denmark	Sweden	Germany	Belgium	Norway	Netherlands	Total
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		7920
1985	9646	296		136	18		10096
1986	10645	202		505	26		11378
1987	11327	241		907	27		12502
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		9379
1996	7304	260	11		428		8003
1997	7306	244	14		249		7813
1998	6132	208	11		98		6449
1999	6473	233	7		336		7049
2000	6680	230	5		67		6982
2001	9045	125			61		9231
2002	6773	141	3		164	3	7084

Year	Denmark	Sweden	Germany	Belgium	Norway	Netherlands	Total
2003	5079	143	8		385	1484	7098
2004	5999	545	67		111	1288	8011
2005	4684	554	14		9	823	6084
2006	6563	366	21		352	1059	8361
2007	5656	281	21		166	1503	7626
2008	7163	220	17		117	775	8292
2009	5828	92	13		62	506	6500
2010	7101	127	13		103	1331	8676
2011	7746	179	13		230	15	8183
2012	7338	155	12		136	10	7651
2013	6326	160	10		138	181	6815
2014	7484	240	46		48	506	8981
2015	7808	274	14		69	1639	9804

Summary of the assessment

Table 6.3.36.10 Plaice in Division 4 and Subdivision 3.a.20. Assessment summary. Weights are in tonnes.

Year	Recruitment Age 1 thousands	Spawning-stock biomass tonnes	Landings tonnes	Discards tonnes	Fishing mortality Ages 2–6
1957	460518	274522	70563	7880	0.284
1958	700350	285276	73354	14837	0.331
1959	864891	290983	79300	29864	0.37
1960	760716	300102	87541	29793	0.368
1961	866067	313758	85984	32490	0.35
1962	593498	373171	87472	37903	0.379
1963	694671	359434	107118	41258	0.422
1964	2254825	353366	110540	37031	0.464
1965	701920	330960	97143	43080	0.383
1966	594050	360172	101834	64718	0.395
1967	407196	416311	108819	54546	0.425
1968	438895	404080	111534	27987	0.335
1969	658811	372570	121651	21169	0.353
1970	664223	330537	130342	29640	0.46
1971	420332	315802	113944	22995	0.379
1972	374301	319302	122843	19632	0.406
1973	1320356	269028	130429	13354	0.47
1974	1136000	276144	112540	44945	0.492
1975	864714	288327	108536	86699	0.576
1976	691691	302097	113670	53247	0.424
1977	990829	308977	119188	57501	0.513
1978	920713	296206	113984	45655	0.455
1979	905430	294824	145347	67935	0.663
1980	1148883	274888	140764	31080	0.554
1981	901574	264149	141233	33031	0.539
1982	2111275	265691	156153	49127	0.588
1983	1368338	325094	145779	74483	0.558
1984	1299663	346524	165772	70816	0.57
1985	1880989	377342	171838	60549	0.51
1986	4797263	408832	178878	129953	0.644
1987	1979144	481620	168759	190524	0.704
1988	1830953	411146	168552	156423	0.701
1989	1250820	429704	178891	107793	0.613
1990	1084035	393180	169453	71225	0.573
1991	959797	365941	157277	80935	0.618
1992	811532	308734	136727	57049	0.615
1993	565366	273504	128506	35016	0.6
1994	480910	251627	121925	23785	0.577
1995	1197928	236939	109348	21828	0.614
1996	1339279	209525	91386	52049	0.624
1997	2212118	234011	92958	100145	0.772
1998	813659	254039	79810	103751	0.683

Year	Recruitment Age 1 thousands	Spawning-stock biomass tonnes	Landings tonnes	Discards tonnes	Fishing mortality Ages 2–6
1999	882903	230508	89726	70976	0.668
2000	1035754	256904	90754	44311	0.477
2001	577074	303421	92912	100309	0.744
2002	1857519	226008	79178	55099	0.556
2003	579018	261400	74722	79275	0.603
2004	1375294	242136	70511	57478	0.47
2005	803930	284394	62796	56250	0.38
2006	979159	295586	67143	64160	0.372
2007	1143879	300157	58576	42373	0.329
2008	1071558	391203	58336	46993	0.256
2009	1110840	431357	62360	45902	0.228
2010	1419551	523991	70340	46570	0.221
2011	1892434	507330	76507	41593	0.214
2012	1274853	555199	82018	59914	0.235
2013	1703575	619281	86222	40025	0.185
2014	1966051	774978	80686	52937	0.174
2015	1140208	754812	85360	49100	0.174
2016	907736	945709			
Average	**1133998**	**357547**	**109251**	**55712**	**0.468**

Sources and references

EU. 2007. COUNCIL REGULATION (EC) No. 676/2007 of 11 June 2007 establishing a multiannual plan for fisheries exploiting stocks of plaice and sole in the North Sea. Official Journal of the European Union L 157/1. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R0676&from=EN.

ICES. 2004. Report of the Working Group on the Assessment of the Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 7–16 September 2004, Bergen, Norway. ICES CM 2005/ACFM:07. 783 pp.

ICES. 2010. Request from the Netherlands on the evaluation of the long-term management plan for sole and plaice in the North Sea (part 2). *In* Report of the ICES Advisory Committee, 2010. ICES Advice 2010, Book 6, Section 6.3.3.4.

ICES. 2014. Report of the Joint ICES–MYFISH Workshop to consider the basis for F_{MSY} ranges for all stocks (WKMSYREF3), 17–21 November 2014, Charlottenlund, Denmark. ICES CM 2014/ACOM:64. 147 pp.

ICES. 2016a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2016. ICES CM 2016/ACOM:14.

ICES. 2016b. Report of the Working Group on Mixed-Fisheries Advice for the North Sea (WGMIXFISH), 23–27 May 2015. ICES CM 2015/ACOM:22‡

ICES. 2016c. General context of ICES advice. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

Napier, I. R. 2014. Fishers' North Sea stock survey 2014. NAFC Marine Centre, Shetland, Scotland. http://nsss.eu.

‡ Version 2: Reference added

Ulrich, C., Hemmer-Hansen, J., Boje, J., Christensen, A., Hüssy, K., and Clausen, L. A. W. In press. Variability and connectivity of plaice populations from the Eastern North Sea to the Baltic Sea, Part II. Biological evidence of population mixing. Journal of Sea Research.