

Whiting (*Merlangius merlangus*) in Subarea 4 and Division 7.d (North Sea and eastern English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 22 082 tonnes.

Management should be implemented at the stock level.

Stock development over time

Spawning-stock biomass (SSB) has fluctuated around MSY $B_{trigger}$ since the mid-1980s and is just below it in 2019. Fishing mortality (F) has been above F_{MSY} throughout the time-series, apart from 2005. Recruitment (R) has been fluctuating without trend, but the last two year classes are below average.

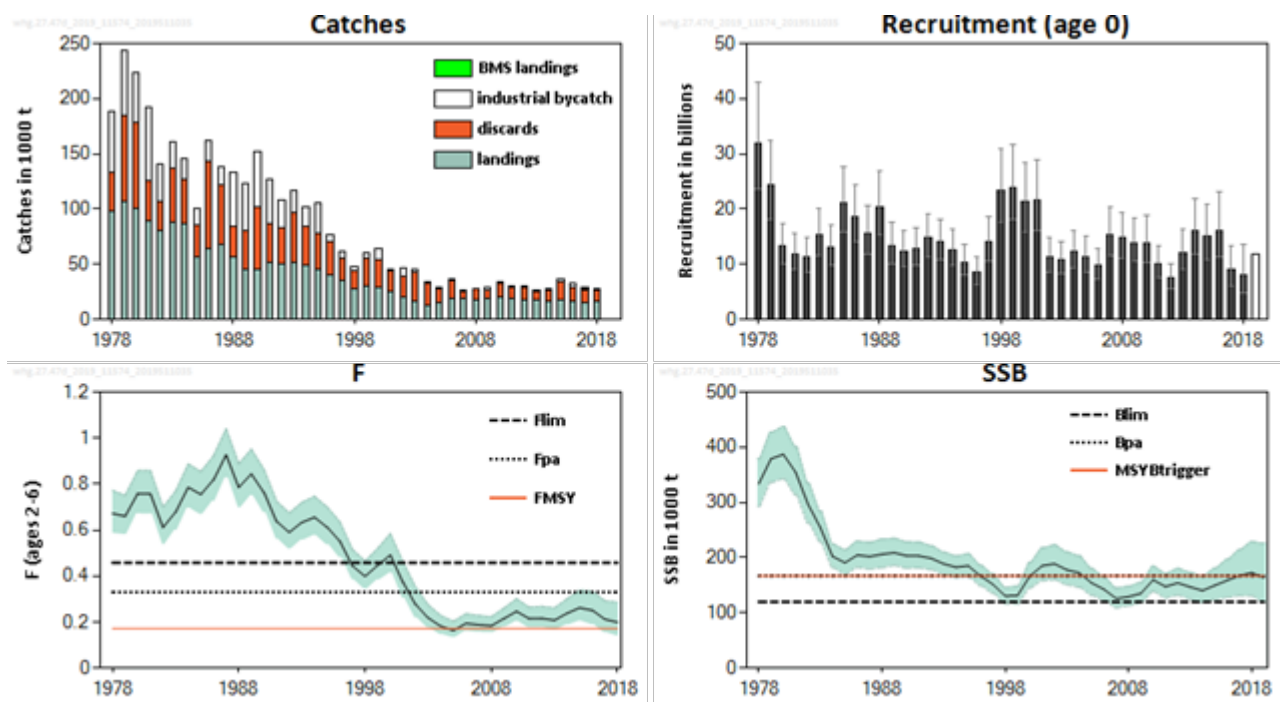


Figure 1 Whiting in Subarea 4 and Division 7.d. Summary of the stock assessment. Shaded areas (F, SSB) and error bars (R) indicate 95% confidence intervals. Assumed recruitment is unshaded.

Stock and exploitation status

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

Table 1 Whiting in Subarea 4 and Division 7.d. 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}	✗	✗	✗	MSY $B_{trigger}$	✓	✗
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	B_{pa}, B_{lim}	✓	○
Management plan	F_{MGT}	—	—	—	B_{MGT}	—	—
				Above			Below trigger
				Harvested sustainably			Increased risk
				Not applicable			Not applicable

Catch scenarios

Table 2 Whiting in Subarea 4 and Division 7.d. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F_{2-6} (2019)	0.199	Average exploitation pattern (2016–2018), scaled to the total F in 2018
SSB (2020)	156 590	Short-term forecast (STF); in tonnes
$R_{age\ 0}$ (2019, 2020)	11 883 334	Geometric mean (GM, 2002–2018); in thousands
Total catch (2019)	28 941	Short-term forecast (STF), sum of catch components; in tonnes
Wanted catch (2019)	16 953	STF, relative contribution to total catch by age = average 2016–2018; in tonnes
Unwanted catch (2019)	9 178	STF, relative contribution to total catch by age = average 2016–2018; in tonnes
Industrial bycatch (2019)	2 810	STF, relative contribution to total catch by age = average 2016–2018; in tonnes

Table 3 Whiting in Subarea 4 and Division 7.d. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch 2020	Total wanted catch 2020 *	Total unwanted catch 2020 *	Total IBC 2020 **	HCF catch 4+7.d 2020	HCF catch 4 2020 ***	HCF catch 7.d 2020 ***	Total F (ages 2–6) 2020 +	F (wanted catch, ages 2–6) 2020	F (unwanted catch, ages 2–6) 2020	F (IBC, ages 2–6) 2020 ++	SSB 2021	% SSB change ^	% TAC change (HCF catch 4) ^^	% Advice change ^^^
ICES advice basis															
MSY approach: $F_{MSY} \times SSB(2020)/MSY B_{trigger}$	22082	12737	6617	2728	19354	15036	4318	0.162	0.098	0.044	0.020	156981	0.25%	–12.5%	–8.7%
Other scenarios															
$F = F_{MSY} = F_{MSY upper}^{##}$	23413	13611	7086	2716	20697	16079	4617	0.172	0.105	0.047	0.020	156045	–0.35%	–6.5%	–3.2%
$F = F_{MSY lower}$	21628	12438	6458	2732	18896	14680	4216	0.158	0.095	0.043	0.020	157301	0.45%	–14.6%	–10.6%
$F = MAP F_{MSY lower} \times SSB(2020)/MSY B_{trigger}^{\#}$	20406	11635	6028	2743	17663	13722	3941	0.148	0.088	0.040	0.020	158160	1.00%	–20%	–15.7%
$F_{2020} = 0$ (IBC only)	2899	0	0	2899	0	0	0	0.020	0.000	0.000	0.020	170621	9.0%	–100%	–88%
$F_{2020} = F_{2019}$	26855	15873	8297	2685	24169	18777	5392	0.199	0.123	0.056	0.020	153624	–1.89%	9.2%	11.0%
Roll-over TAC	24831	14543	7585	2703	22131	17191	4937	0.183	0.112	0.051	0.020	155048	–0.98%	0%	2.6%
15% TAC decrease (27.4 only)	21542	12380	6428	2733	18817	14612	4196	0.157	0.095	0.043	0.020	157363	0.49%	–15.0%	–11.0%
15% TAC increase (27.4 only)	28121	16705	8742	2674	25445	19770	5677	0.21	0.130	0.059	0.020	152733	–2.5%	15.0%	16.2%
$0.75 \times F_{2019}^{+++}$	21130	12111	6282	2737	18393	14290	4103	0.154	0.092	0.042	0.020	157651	0.68%	–16.9%	–12.7%
$1.25 \times F_{2019}^{+++}$	32535	19605	10295	2634	29900	23230	6671	0.24	0.154	0.070	0.020	149628	–4.4%	35%	34%
F_{pa}	43554	26846	14172	2535	41018	31867	9151	0.33	0.21	0.097	0.020	141876	–9.4%	85%	80%
F_{lim}	59870	37568	19914	2389	57482	44657	12824	0.46	0.30	0.136	0.020	130397	–16.7%	160%	147%
$SSB(2021) = B_{pa} = MSY B_{trigger}$	8298	3679	1767	2852	5446	4231	1215	0.053	0.023	0.0100	0.020	166708	6.4%	–75%	–66%
$SSB(2021) = B_{lim}$	74583	47236	25091	2256	72327	56190	16136	0.57	0.38	0.172	0.020	119970	–23%	227%	208%

* “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 discard rate estimates for 2016–2018.

** The split of catch between wanted catch, unwanted catch, and industrial bycatch (IBC) in 2020 was done using partial age-dependent fishing mortalities as forecasting input. Partial Fs were calculated based on total F-at-age and the numbers-at-age per catch category as estimated in the assessment (average exploitation pattern of the three most recent years).

*** The human consumption fishery (HCF) catch split between Subarea 4 and Division 7.d in 2019 and 2020 is the same as the proportion of HCF catch between the areas in 2018: 77.7% from Subarea 4 and 22.3% from Division 7.d. This assumes that management for Division 7.d is separate from Subarea 7. Total catches are based on a combined discard rate for Subarea 4 and Division 7.d.

^ SSB 2021 relative to SSB 2020.

^^ Human consumption fishery catch (HCF catch) for Subarea 4 in 2020 relative to TAC for Subarea 4 and Division 2.a in 2019 (17 191 tonnes).

^^^ Total catch 2020 relative to the advice value 2019 (24 195 tonnes).

+ Total F is calculated as the sum of partial fishing mortalities.

++ F(IBC) is assumed to be constant in all scenarios at *status quo* value.

+++ Multiplier only applied to F(UW) and F(WC), with F(IBC) constant.

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

For this stock, $F_{MSY upper} = F_{MSY}$.

The change in advice (–8.7%) is caused by low recruitment in the recent two years and the reduction in fishing mortality (below F_{MSY}) due to the SSB being below $MSY B_{trigger}$ at the start of the TAC year.

Basis of the advice

Table 4 Whiting in Subarea 4 and Division 7.d. 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). This plan is not adopted by Norway; thus, 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. EU–Norway have requested an evaluation of multiple management strategies that are currently under consideration (ICES, 2019a).

Quality of the assessment

Stock identity remains an unresolved issue with this assessment, both within the North Sea and between the North Sea and neighbouring areas. The assessment in 2019 is consistent with last year's assessment.



Figure 2 Whiting in Subarea 4 and Division 7.d. Historical assessment results. The stock was benchmarked in 2018, which resulted in a downward rescaling of the SSB and a revision of the recruitment age.

Issues relevant for the advice

There is a concentration of whiting biomass in the western part of the North Sea; therefore, catch rates from some local fleets do not represent trends in the overall stock.

BMS landings reported to ICES in 2015–2018 were low. Since 2018, whiting catches in all fleets (including TR2, BT2) of Subarea 4 and Division 7.d are subject to the landing obligation, with a *de minimis* exemption for whiting caught with bottom trawls in Division 4.c. Substantial discarding still continues, based on observations from sampling programmes (estimated unwanted catch in 2018 is 9942 tonnes, which is 38% of the human consumption fishery catch). To maximize the benefit for the fishery of this stock, the most obvious measure would be to improve the selection pattern and reduce catches of undersized fish.

Whiting in Division 7.d is managed under a common TAC with whiting in divisions 7.b–c and e–k. The mismatch between management and stock areas for different whiting stocks makes it difficult to achieve the objective of fishing at MSY for both stocks. Furthermore, whiting in divisions 7.b–k is included in the Northwestern waters MAPs, while whiting in Subarea 4 is included in the North Sea MAP.

The recent management strategy evaluations (MSE) found that the ICES MSY advice rule with current F_{MSY} and MSY $B_{trigger}$ were not to be precautionary (probability of $SSB < B_{lim}$ higher than 5%) under the assumptions of those simulations (ICES, 2019a). This can be explained by technical differences in the evaluation approach used for the MSE compared to the standard approach used to estimate MSY reference points. Further investigation is now required to establish if the current reference points need to be re-defined. In the interim period ICES will continue to use the current reference points for advice.

Reference points

Table 5 Whiting in Subarea 4 and Division 7.d. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	166 708	B_{pa}	ICES (2018a)
	F_{MSY}	0.172	EQsim analysis based on the recruitment period 1983–2017.	ICES (2018a)
Precautionary approach	B_{lim}	119 970	B_{loss} (SSB in 2007, as estimated in the 2018 benchmark assessment).	ICES (2018a)
	B_{pa}	166 708	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$.	ICES (2018a)
	F_{lim}	0.46	EQsim analysis based on the recruitment period 1983–2017.	ICES (2018a)
	F_{pa}	0.33	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$.	ICES (2018a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	166 708	MSY $B_{trigger}$	ICES (2018a)
	MAP B_{lim}	119 970	B_{lim}	ICES (2018a)
	MAP F_{MSY}	0.172	F_{MSY}	ICES (2018a)
	MAP range F_{lower}	0.158–0.172	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2018a)
	MAP range F_{upper}^{**}	0.172–0.172	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2018a)

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

** For this stock, $F_{MSY upper} = F_{MSY}$.

Basis of the assessment

Table 6 Whiting in Subarea 4 and Division 7.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018b).
Assessment type	Age-based analytical assessment (SAM; ICES, 2019b) that uses catches in the model and in the forecast.
Input data	Commercial catches (international catches, ages from catch sampling by métier, since 1978), two survey indices (IBTS Q1 & Q3; ages 0 to 5; since 1983); time-varying maturity estimated from NS IBTS Q1 data; time-varying natural mortalities from the SMS multispecies model (ICES, 2019b).
Discards, BMS landings, and bycatch	The proportion of landings with associated discards was 73%. 55% of the discards were sampled. No biological samples were available for age allocations from the industrial bycatch, therefore samples of total catches were used and mean weight-at-age is assumed equal to catch weights-at-age. Below minimum size (BMS) landings, where reported to ICES, are included with discards as unwanted catch in the assessment since 2015.
Indicators	None.
Other information	This assessment was benchmarked in 2018 (WKNSEA; ICES, 2018a).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

The number of samples used to derive the input data for the assessment has increased since 2012 through extended sampling programmes such as the Scottish Industry/Science observer sampling scheme.

History of the advice, catch, and management

Table 7 Whiting in Subarea 4 and Division 7.d. ICES advice, TAC, official landings, and ICES estimates of catch. All weights are in tonnes.

Stock				Subarea 4 (North Sea)							
Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Catch in Subarea 4 corresponding to advice	Wanted catch in Subarea 4 corresponding to advice	Agreed TAC	Off. landings	ICES estimates ^{^^}			
								Wanted catch	Indust. bycatch	Unwanted catch*	Total catch ^{^^^}
1994	Significant reduction in effort; mixed fishery	-			-	100000	42216	41870	17473	31840	91183
1995	Significant reduction in effort; mixed fishery	-			-	81000	41400	40550	27379	28940	96869
1996	Mixed fishery; take into account cod advice	-			-	67000	35116	35550	5116	27130	67796
1997	Mixed fishery; take into account cod advice	-			-	74000	31573	30940	6213	16660	53813
1998	No increase from 1996 level	50700			44900	60000	23937	23690	3494	12480	39664
1999	At least 20% reduction of F(95–97)	33800			29900	44000	22110	25700	5038	22110	52848
2000	Lowest possible catch		0		0	30000	24453	24280	9160	21931	55371
2001	60% reduction of F(97–99)	21900			19400	29700	18834	19260	940	16130	36330
2002	F not larger than 0.37	≤ 37000			≤ 33000	41000	15608	14870	7270	17144	39284
2003	No cod catches	-	-		-	16000	11255	10450	2730	26135	39315
2004	No cod catches.		Catch should not increase compared to recent years		-	16000	9491	8950	1210	18142	28302
	Fishing mortality in 2004 should be < F _{pa}										
2005	No cod catches. Less than recent average	25000	52000			28500	8394	10680	890	10300	21870
2006	No cod catches. Less than recent average	< 17300				23800	15660	15097	2190	14018	31305
2007	No cod catches. Less than recent average	< 15100				23800	16275	15666	1240	5206	22112
2008	No cod catches. Less than recent average	< 5000				17850	14451	13479	0	8356	21835
2009	No cod catches. F < F _{max}	< 5900	< 11000			15173	12320	12444	1344	6597	20385
2010	No cod catches. Stable SSB	< 6800	< 12500			12897	11690	12801	1907	8451	23159
2011	No cod catches. Stable SSB	< 12700	< 21900		< 9500	14832	12554	13260	1035	7989	22283
2012	Management plan	< 21300	< 31500		< 17100	17056	12588	12944	1117	9307	23368

Stock				Subarea 4 (North Sea)							
Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Catch in Subarea 4 corresponding to advice	Wanted catch in Subarea 4 corresponding to advice	Agreed TAC	Off. landings	ICES estimates^^			
								Wanted catch	Indust. bycatch	Unwanted catch*	Total catch^^^
2013	Precautionary considerations (F = 0.225) and separate management for Division 7.d	< 26000			< 19000	18932	13361	13817	1654	4608	20079
2014	November update: Precautionary considerations (15% TAC reduction) and separate management for Division 7.d	< 21199	< 31553		< 16092	16092	13795	13847	1623	7016	22486
2015	November update: Management plan and separate management for Division 7.d	< 17190	< 30579		< 13678	13678	15333	13232	2097	12265	27593
2016	EU–Norway management strategy		≤ 30510		≤ 12373	13678	17355	12242	4551	10413	27206
2017	MSY approach		≤ 23527		≤ 9744	16003	14719	11828	2635	9799	24262
2018	MSY approach		≤ 26191		≤ 11040	22057	15380	12769	1698	7692	22160
2019	MSY approach		≤ 24195	≤ 17191		17191					
2020	MSY approach		≤ 22082	≤ 15036							

* Unwanted catch includes discards and BMS landings.

^^ Prior to 2009 values are from historical assessments.

^^^ Slight discrepancy in sum of landings/catches by area (Table 7) as compared to total landings/catches (tables 8 and 10) due to Intercatch raising and data export procedures for landings (incl. IBC) and assignment of total catch weights-at-age for IBC afterwards.

NA = not available.

Table 7 Continued

Stock				Division 7.d (Eastern English Channel)						
Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Catch in Division 7.d corresponding to advice	Wanted catch in Division 7.d corresponding to advice	Agreed TAC*	Off. landings	ICES estimates^^		
								Wanted catch	Unwanted catch^	Total catch ^^^
1994	No long-term gains in increasing F	-			-	-	7088	6620	3850	10470
1995	Significant reduction in effort; link to North Sea	-			-	-	5551	5390	3240	8630
1996	Reference made to North Sea advice	-			-	-	5056	4950	3370	8320
1997	Reference made to North Sea advice	-			-	-	4779	4620	3000	7620
1998	Reference made to North Sea advice	50700			5800	27000	4765	4600	3210	7810
1999	Reference made to North Sea advice	33800			3900	25000	NA	4430	3570	8000
2000	Lowest possible catch		0		0	22000	6072	4300	4129	8429
2001	60% reduction of F_{sq}	21900			2500	21000	6614	5800	3109	8909
2002	F not larger than 0.37	≤ 37000			≤ 4000	31700	5361	5800	1356	7156
2003	No cod catches	-	-		-	31700	7005	5710	604	6314
2004	No cod catches.	-	Catch should not increase compared to recent years		-	27000	5283	4350	907	5257
	Fishing mortality should be < F_{pa}									
2005	No cod catches	25000	52000			21600	4901	4790	2219	7009
2006	No cod catches. Less than recent average	< 17300				19940	3749	3443	2291	5734
2007	No cod catches. Less than recent average	< 15100				19940	3391	3254	1763	5017
2008	No cod catches. Less than recent average	< 5000				19940	3192	4471	1943	6414
2009	No cod catches. $F < F_{max}$	< 5900	< 11000			16949	6569	5920	2086	8006
2010	No cod catches. Stable SSB	< 6800	< 12500			14407	6133	7100	4532	11632
2011	No cod catches. Stable SSB	< 12700	< 21900		< 3200	16568	5464	5149	3183	8332
2012	Management plan	< 21300	< 31500		< 4200	19053	3857	4413	2389	6802
2013	Precautionary considerations ($F = 0.225$) and separate management for Division 7.d	< 26000			< 7000	24500	4293	4308	2186	6494

Stock				Division 7.d (Eastern English Channel)						
Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Catch in Division 7.d corresponding to advice	Wanted catch in Division 7.d corresponding to advice	Agreed TAC*	Off. landings	ICES estimates^^		
								Wanted catch	Unwanted catch^	Total catch ^^^
2014	November update: Precautionary considerations (15% TAC reduction) and separate management for Division 7.d	< 21199	< 31553		< 5106	20668	3224	3125	2709	5834
2015	November update: management plan and separate management for Division 7.d	< 17190	< 30579		< 3512	17742	4167	3977	4627	8604
2016	EU–Norway management strategy for Division 7.d		≤ 30510		< 2480	22778	3732	3700	2313	6013
2017	MSY approach		≤ 23527		≤ 2935	27500	3444	3354	1550	4904
2018	MSY approach		≤ 26191		≤ 2759	22213	3470	3626	2249	5875
2019	MSY approach		≤ 24195	≤ 3897						
2020	MSY approach		≤ 22082	≤ 4318						

* Included in TAC for Subarea 7 (except Division 7.a).

^ Unwanted catch includes BMS landings since 2015.

^^ Prior to 2009 values are from historical assessments.

^^^ Slight discrepancy in sum of landings/catches in by area (Table 7) as compared to total (Tables 8 and 10) due to Intercatch raising and export procedures for landings (incl. IBC) and assignment of total catch weights-at-age for IBC afterwards.

NA = not available.

History of the catch and wanted catch

Table 8 Whiting in Subarea 4 and Division 7.d. Catch distribution by fleet in 2018 as estimated by ICES. All weights are in tonnes.

Catch (2018)	Wanted catch				Unwanted catch	Industrial bycatch
28 083	Demersal trawls and seine mesh size ≥ 120 mm (North Sea) 65%	Demersal trawls mesh size 70–99 mm (North Sea) 6%	Demersal trawls mesh size 70–99 mm (Eastern English Channel) 21%	Other 8%	9942	1698
	16 444					

Table 9a Whiting in Subarea 4. History of human consumption landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes. NA = not available.

Year	Belgium	Denmark	Faroes	France	Germany	Netherl.	Norway	Sweden	England (Wales)	Scotland	UK	Total landings	Unallocated landings	Official BMS landings	ICES landings *** , ^
1990	1040	1206	26	4951	692	3273	55	16	2338	27486	NA	41083	-1097		42180
1991	913	1528	0	5188	865	4028	103	48	2676	31257	NA	46606	396		46210
1992	1030	1377	16	5115	511	5390	232	22	2528	30821	NA	47042	1832		45210
1993	944	1418	7	5502	441	4799	130	18	2774	31268	NA	47301	691		46610
1994	1042	549	2	4735	239	3864	79	10	2722	28974	NA	42216	346		41870
1995	880	368	21	5963	124	3640	115	1	2477	27811	NA	41400	850		40550
1996	843	189	0	4704	187	3388	66	1	2329	23409	NA	35116	-434		35550
1997	391	103	6	3526	196	2539	75	1	2638	22098	NA	31573	633		30940
1998	268	46	1	1908	103	1941	65	0	2909	16696	NA	23937	247		23690
1999	529	58	1	NA	176	1795	68	9	2268	17206	NA	NA	NA		25700
2000	536	105	0	2527	424	1884	33	4	1782	17158	NA	24453	173		24280
2001	454	105	0	3455	402	2478	44	6	1301	10589	NA	18834	-426		19260
2002	270	96	17	3314	354	2425	47	7	1322	7756	NA	15608	738		14870
2003	248	89	5	2675	334	1442	39	10	680	5734	NA	11255	805		10450
2004	144	62	0	1721	296	977	23	2	1209	5057	NA	9491	541		8950
2005	105	57	0	1261	149	805	16	0	2560	3441	NA	8394	-2286		10680
2006	93	251	0	2711	252	702	17	2	NA	NA	11632	15660	563		15097
2007	45	78	0	3336	76	618	11	1	NA	NA	12110	16275	609		15666
2008	116	42	0	3076	76	656	92	2	NA	NA	10391	14451	972		13479
2009	162	79	2	2305	124	718	73	4	NA	NA	8853	12320	-124		12444
2010	147	158	0	2644	156	614	118	8	NA	NA	7845	11690	-1111		12801
2011	74	135	0	2794	111	514	28	6	NA	NA	8892	12554	-706		13260
2012	45	131	0	1925	25	471	94	4	NA	NA	9893	12588	-356		12944
2013	33	124	0	942	44	495	560	1	NA	NA	11162	13361	-456		13817
2014	46	160	0	1884	31	464	918	2	NA	NA	10290	13795	-52		13847
2015	70	2375**	0	1131	73	581	1088	0	NA	NA	10015	15333	2101**		13232
2016	65	4727**	8	1232	111	644	1150	6	NA	NA	9412	17355	5113**		12242
2017*	71	2803**	1	952	81	687	993	11	NA	NA	9120	14719	2891**	< 1	11828
2018*	NA	2026**	NA	918	99	679	1025	8	NA	NA	10625	15380	2611**	46	12769

* Preliminary.

** The value of official landings in 2015–2018 for Denmark is substantially higher than in previous years. It is likely that before 2015 the official landings exclude IBC.

*** Human consumption landings. Values prior to 2009 are from historical assessments and prior to 2006 these values are rounded to the nearest 10 tonnes.

^ Slight discrepancy in sum of landings/catches in by area (Table 9) as compared to total (tables 8 and 10) due to Intercatch raising and export procedures for landings (incl. IBC) and assignment of total catch weights-at-age for IBC afterwards.

Table 9b Whiting in Division 7.d. History of human consumption landings. Both the official and ICES estimated values are presented by area for each country participating in the fishery. Weights are in tonnes. NA = not available.

Year	Belgium 7.d	France 7.d	Netherl ands 7	England (Wales) 7.d	Scotland 7.d	UK 7.d	Total landings	Unallocated landings 7.d	Official BMS landings	ICES landings 7.d **, ^^^
1990	83	NA	0	239	0	NA	NA	NA		3480
1991	83	NA	0	292	0	NA	NA	NA		5720
1992	66	5414	0	419	24	NA	5923	183		5740
1993	74	5032	0	321	2	NA	5429	219		5210
1994	61	6734	0	293	0	NA	7088	468		6620
1995	68	5202	0	280	1	NA	5551	161		5390
1996	84	4771	1	199	1	NA	5056	106		4950
1997	98	4532	1	147	1	NA	4779	159		4620
1998	53	4495	32	185	0	NA	4765	165		4600
1999	48	NA	6	135	0	NA	NA	NA		4430
2000	65	5875	14	118	0	NA	6072	1772		4300
2001	75	6338	67	134	0	NA	6614	814		5800
2002	58	5172	19	112	0	NA	5361	-439		5800
2003	67	6654	175	109	0	NA	7005	1295		5710
2004	46	5006	132	99	0	NA	5283	933		4350
2005	45	4638	128	NA	NA	90	4901	111		4790
2006	73	3487	117	NA	NA	72	3749	306		3443
2007	75	3135	118	NA	NA	63	3391	137		3254
2008	69	2875	162	NA	NA	87	3193	-1278		4471
2009	71	6248	112	NA	NA	138	6569	649		5920
2010	88	5512	275	NA	NA	258	6133	-967		7100
2011	78	4833	282	NA	NA	271	5464	315		5149
2012	66	3093	437	NA	NA	261	3857	-556		4413
2013	95	3076	650	NA	NA	472	4293	-15		4308
2014	90	2126	663	NA	NA	345	3224	99		3125
2015	121	3102	556	NA	NA	379	4167	190		3977
2016	146	2771	557	NA	NA	259	3732	32		3700
2017*	128	2378	584	NA	NA	354	3444	90	< 1	3354
2018*	NA	2720	467	NA	NA	283	3470	-156	< 1	3626

* Preliminary.

** Human consumption landings. Values prior to 2009 are from historical assessments and prior to 2006 these values are rounded to the nearest 10 tonnes.

^^^ Slight discrepancy in sum of landings/catches in by area (Table 9) as compared to total (tables 8 and 10) due to Intercatch raising and export procedures for landings (incl. IBC) and assignment of total catch weights-at-age for IBC afterwards.

NA = not available.

Summary of the assessment

Table 10 Whiting in Subarea 4 and Division 7.d. Assessment summary. Recruitment in thousands. Weights are in tonnes. High and low refer to 95% confidence intervals.

Year	Recruitment			SSB			Landings [^]	Discards [^]	Industrial bycatch [^]	F			Official BMS landings
	Age 0	High	Low	SSB	High	Low				ages 2–6	High	Low	
1978	31872376	42854774	23704438	333397	379130	293181	97553	35382	55287	0.67	0.77	0.58	0
1979	24300701	32483614	18179137	378971	427145	336231	107231	77391	58948	0.66	0.75	0.58	0
1980	13224104	17459415	10016195	387148	437128	342883	100775	77003	45584	0.76	0.86	0.67	0
1981	11865515	15644279	8999485	354613	400717	313812	89583	35894	66641	0.76	0.86	0.67	0
1982	11271239	14839756	8560843	296925	334997	263180	80576	26620	33055	0.61	0.70	0.54	0
1983	15332814	20201480	11637523	254716	284115	228358	88002	49562	23753	0.68	0.77	0.60	0
1984	12958941	17130414	9803275	202088	224438	181964	86275	40483	18878	0.79	0.89	0.69	0
1985	21031885	27741952	15944811	190643	214331	169573	56059	28961	15310	0.76	0.85	0.67	0
1986	18546170	24395938	14099085	204610	229745	182225	64019	79523	17953	0.82	0.92	0.73	0
1987	15622505	20619665	11836403	201968	227672	179166	68317	53901	16519	0.93	1.04	0.83	0
1988	20391066	27000144	15399754	206030	233376	181888	56100	28146	48969	0.79	0.89	0.70	0
1989	13357133	17517581	10184796	208797	234762	185703	45103	35787	42643	0.84	0.95	0.75	0
1990	12423940	16206313	9524331	203358	228551	180942	45662	55603	51337	0.76	0.86	0.67	0
1991	12864278	16645820	9941815	203119	227841	181080	51929	35058	39755	0.64	0.73	0.56	0
1992	14719730	19020711	11391291	198615	221525	178074	50946	32564	25045	0.59	0.67	0.52	0
1993	14052649	18162264	10872926	188708	209831	169711	51818	44370	20723	0.63	0.72	0.56	0
1994	12645504	16364107	9771922	182616	203031	164255	48486	35692	17473	0.66	0.75	0.58	0
1995	10381631	13518928	7972398	185221	206785	165905	45938	32176	27379	0.61	0.70	0.54	0
1996	8469254	11210185	6398491	166690	186257	149178	40503	30505	5116	0.55	0.64	0.48	0
1997	14017367	18514489	10612584	151645	169766	135457	35563	19660	6213	0.44	0.52	0.38	0
1998	23317972	30823971	17639772	130558	145909	116822	28288	15693	3494	0.40	0.47	0.34	0
1999	23935119	31754003	18041503	131452	148244	116562	30130	25677	5038	0.45	0.52	0.38	0
2000	21240380	28293178	15945673	166681	191337	145202	28583	26063	9160	0.49	0.58	0.41	0
2001	21620487	28888227	16181175	185406	217560	158004	25061	19237	944	0.37	0.46	0.30	0
2002	11246935	14917125	8479754	188806	222894	159931	20675	18501	7275	0.28	0.35	0.22	0
2003	10798107	14184607	8220116	177787	209912	150578	16161	26745	2734	0.22	0.28	0.173	0
2004	12223974	16101013	9280505	172470	203102	146457	13295	19048	1214	0.182	0.23	0.145	0
2005	11389128	15029109	8630733	154258	180366	131930	15471	12525	888	0.163	0.20	0.132	0
2006	9711377	12829817	7350911	142616	165219	123105	18535	16310	1924	0.194	0.24	0.160	0
2007	15398634	20318231	11670205	125806	144978	109170	18915	6971	1088	0.188	0.23	0.155	0
2008	14753261	19446832	11192502	129167	147930	112784	17951	10296	0	0.184	0.22	0.153	0
2009	13926062	18380551	10551109	135173	155120	117791	18403	8684	1344	0.22	0.26	0.178	0
2010	13960028	18739521	10399538	159680	184282	138363	19846	12683	1907	0.25	0.30	0.20	0
2011	10103265	13407795	7613181	147580	171450	127033	18461	11173	1035	0.22	0.26	0.174	0
2012	7528980	10128806	5596469	154092	180193	131772	17407	11697	1117	0.22	0.27	0.174	0
2013	12117709	16294204	9011724	146939	173181	124673	18211	6795	1654	0.21	0.26	0.166	0

Year	Recruitment			SSB			Landings [^]	Discards [^]	Industrial bycatch [^]	F			Official BMS landings
	Age 0	High	Low	SSB	High	Low				ages 2–6	High	Low	
2014	16080625	21919505	11797096	140232	166321	118235	17027	9725	1623	0.24	0.30	0.187	0
2015	15024074	20896366	10802012	149798	180917	124032	17299	16891	2097	0.26	0.34	0.20	0
2016	16177054	23128042	11315142	158649	196860	127855	16118	12726	4551	0.25	0.33	0.188	0
2017	9029636	13392934	6087861	167485	214381	130848	15361	11348***	2635	0.21	0.29	0.153	0.2
2018	7965668	13535888	4687677	172592	228754	130218	16444	9896***	1698	0.199	0.29	0.139	45.7
2019	11883334*			163406**	225599**	118359**							

[^] ICES estimates.

* In 2019, recruitment is the geometric mean 2002–2018.

** In 2019, SSB from estimated survivors in 2018, stock weights-at-age (same as 2018) and maturity estimates for 2019.

*** Since 2017, discards correspond to unwanted catch minus BMS landings from EU fleets officially reported in logbooks.

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