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 2022 should be no more than 88 426 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management should be implemented at the stock level.

Stock development over time

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

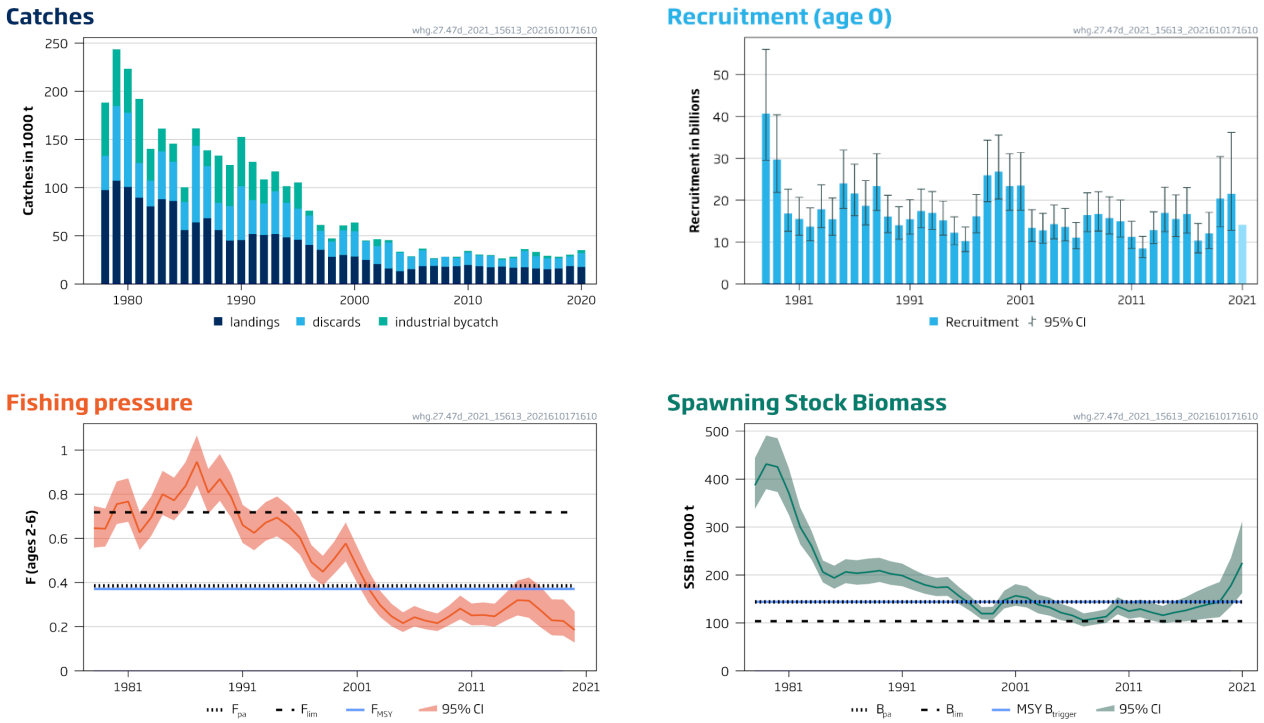

Figure 1 Whiting in Subarea 4 and Division 7.d. Summary of the stock assessment. The assumed recruitment value for 2021 is shaded in a lighter colour.

Catch scenarios

Table 1 Whiting in Subarea 4 and Division 7.d. Values in the forecast and for the interim year. All weights are in tonnes, recruitment is in thousands.

Variable	Value	Notes
$F_{2–6}$ (2021)	0.185	Average exploitation pattern (2018–2020), scaled to the total F in 2020
SSB (2022)	262 094	Short-term forecast (STF)
$R_{age\ 0}$ (2021, 2022)	14 140 017	Geometric mean (GM, 2002–2020)
Total catch (2021)	37 295	STF
Projected landings (2021)	19 629	STF, relative contribution to total catch by age = average 2018–2020
Projected discards (2021)	15 124	STF, relative contribution to total catch by age = average 2018–2020
Industrial bycatch (2021)	2542	STF, relative contribution to total catch by age = average 2018–2020

Table 2 Whiting in Subarea 4 and Division 7.d. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch 2022	Total projected landings 2022*	Total projected discards 2022**	Total IBC 2022**	Human Consumption catch 2022	Total F (ages 2–6) 2022[+]	F (projected landings, ages 2–6) 2022	F (projected discards, ages 2–6) 2022	F (IBC, ages 2–6) 2022[++]	SSB 2023	% SSB change^	% advice change^^
ICES advice basis												
MSY approach: $F = F_{MSY}$	88426	51276	34184	2966	85460	0.371	0.259	0.097	0.015	238600	−9.0%	236%
Other scenarios												
$F = F_{MSY\ upper}$	91703	53247	35508	2947	88755	0.385	0.269	0.100	0.015	236247	−9.9%	249%
$F = F_{MSY\ lower}$	70169	40293	26808	3068	67101	0.293	0.202	0.075	0.015	251709	−4.0%	167%
$F_{2022} = 0$ (IBC only)	3439	0	0	3439	0	0.015	0	0	0.015	299843	15%	−87%
$F_{2022} = F_{2021}$	44890	25087	16594	3209	41681	0.185	0.124	0.046	0.015	269861	3.0%	70%
Rollover TAC	29595	15884	10416	3294	26300	0.120	0.076	0.028	0.015	280846	7.2%	12.5%
15% TAC decrease (27.4 only)	25672	13524	8832	3316	22355	0.103	0.064	0.024	0.015	283664	8.2%	−2.4%
15% TAC increase (27.4 only)	33518	18245	12001	3273	30246	0.136	0.088	0.033	0.015	278028	6.1%	27%
$0.75 \times F_{2021}$[+++]	35036	19159	12613	3264	31772	0.143	0.093	0.035	0.015	276937	5.7%	33%
$1.25 \times F_{2021}$[+++]	54961	31145	20663	3153	51808	0.228	0.155	0.058	0.015	262629	0.20%	109%
F_{pa}	91703	53247	35508	2947	88755	0.385	0.269	0.100	0.015	236247	−9.9%	249%
F_{lim}	169645	100134	66999	2512	167133	0.718	0.512	0.191	0.015	180279	−31%	545%
SSB (2023) = B_{pa} = MSY $B_{trigger}$	219997	130424	87343	2230	217767	0.933	0.669	0.249	0.015	143905	−45%	736%
SSB (2023) = B_{lim}	276086	164164	110004	1917	274169	1.173	0.840	0.314	0.015	103560	−60%	950%

* Marketable landings.

** The split of catch between landings, discards, and industrial bycatch (IBC) in 2022 was done using partial age-dependent fishing mortalities as a 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).

^ SSB 2023 relative to SSB 2022.

^^ Total catch 2022 relative to the advice value 2021 (26 304 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 (discards) and F (landings), with F (IBC) constant.

The change in advice (236%) is mainly caused by updated reference points (i.e., F_{MSY} increased from 0.172 to 0.371) following the recent interbenchmark (ICES, 2021a) in combination with higher recruitment in the recent two years and an increase in SSB.

Basis of the advice

Table 3 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). 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 EC and UK to provide advice based on the MSY approach and to include F_{MSY} ranges in the catch scenarios.

Quality of the assessment

The sampling of landings in 2020 was lower compared to 2019 (18% fewer landings sampled, 20% fewer landings with associated discards), likely because of the COVID-19 disruption. However, this does not seem to affect the quality of the assessment.

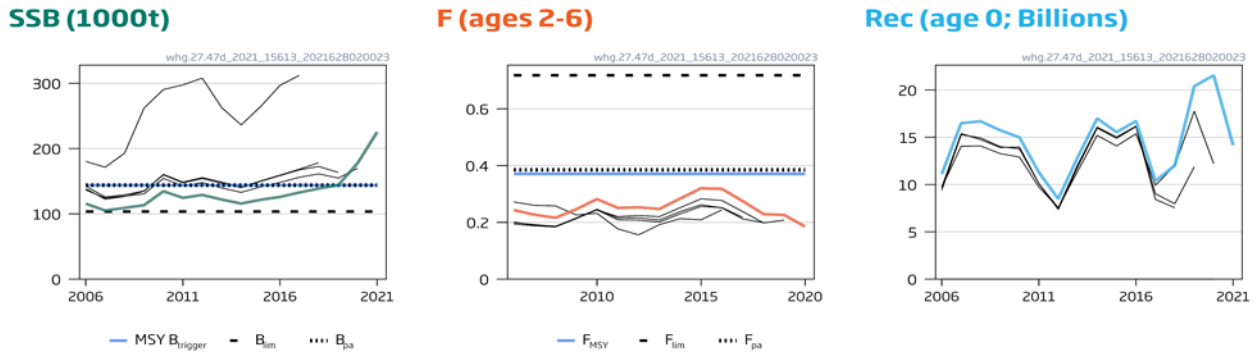

Figure 2 Whiting in Subarea 4 and Division 7.d. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year). The stock was benchmarked in 2018 and has undergone an interbenchmark in 2021.

Issues relevant for the advice

BMS landings reported to ICES in 2015–2018 were low. Substantial discarding still continues, based on observations from sampling programmes (estimated discards in 2020 is 14 229 tonnes, which is 45% of the human consumption fishery[1] catch).

Whiting in Division 7.d is managed under a common TAC with whiting in divisions 7.b–c and e–k. Management should be implemented at the stock level to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and the corresponding MSY approach.

An interbenchmark was conducted in 2021 to update natural mortality estimates. This resulted in a substantial change in reference points, with F_{MSY} increasing from 0.172 to 0.371 (ICES, 2021a).

[1] Human consumption fishery does not include IBC

Reference points

Table 4 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 $B_{trigger}$	143 905	B_{pa}	ICES (2021a)
	F_{MSY}	0.371	Stochastic simulation (EQsim) with segmented regression with a freely estimated breakpoint based on recruitment period 1983–2020	ICES (2021a)
Precautionary approach	B_{lim}	103 560	B_{loss} (SSB in 2007, as estimated in the 2021 interbenchmark assessment)	ICES (2021a)
	B_{pa}	143 905	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2021a)
	F_{lim}	0.718	Stochastic simulation (EQsim) with segmented regression fixed at B_{lim} based on recruitment period 1983–2020.	ICES (2021a)
	F_{pa}	0.385	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05} with advice rule [AR]).	ICES (2021a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	143 905	MSY $B_{trigger}$	ICES (2021a)
	MAP B_{lim}	103 560	B_{lim}	ICES (2021a)
	MAP F_{MSY}	0.371	F_{MSY}	ICES (2021a)
	MAP range F_{lower}	0.293	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2021a)
	MAP range F_{upper}	0.385	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2021a)

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

Basis of the assessment

Table 5 Whiting in Subarea 4 and Division 7.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b)
Assessment type	Age-based analytical assessment (SAM; ICES, 2021c) 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 (NS-IBTS Q1 [G1022] & Q3 [G2829]; 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, 2021d)
Discards, BMS landings, and bycatch	The proportion of landings with associated discards was 47%. Fifty-two percent 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 in the assessment since 2015.
Indicators	None
Other information	This assessment was benchmarked in 2018 (WKNSEA;) and interbenchmarked in 2021 (ICES, 2021a)
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6a Whiting in Subarea 4. ICES advice, TAC, official landings, and ICES estimates of catch. All weights are in tonnes.

Stock				Subarea 4 (North Sea)							
								ICES estimates^^			
Year	ICES advice	Landings corresponding to advice	Total catch corresponding to advice	Human consumption catch in Subarea 4 corresponding to advice	Landings in Subarea 4 corresponding to advice	Agreed TAC	Official landings	Landings	Industrial bycatch	Discards	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. Fishing mortality in 2004 should be < F_{pa}		Catch should not increase compared to recent years		-	16000	9491	8950	1210	18142	28302
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

Stock				Subarea 4 (North Sea)							
								ICES estimates^^			
Year	ICES advice	Landings corresponding to advice	Total catch corresponding to advice	Human consumption catch in Subarea 4 corresponding to advice	Landings in Subarea 4 corresponding to advice	Agreed TAC	Official landings	Landings	Industrial bycatch	Discards	Total catch
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
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	14968	11828	2635	9799^	24262
2018	MSY approach		≤ 26191		≤ 11040	22057	15451	12578	1658	8026^	22263
2019	MSY approach		≤ 24195	≤ 17191		17191	17419	15534	1864	7581^	24979
2020	MSY approach		≤ 22082	≤ 15036		17158	19475	15781	3132	10034^	28947
2021	MSY approach		≤ 26304	≤ 19497		21306					
2022	MSY approach		≤ 88426	≤ 69231*							

*The human consumption fishery (HCF) catch split between Subarea 4 and Division 7.d in 2022 is the same as the proportion of HCF catch between the areas in 2020: 81% from Subarea 4 and 19% 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.

^ Since 2015, discards include BMS landings.

^^ From 2009, the estimated values are the sum of product (SOP) from catch and weight-at-age. The slight discrepancy in the sum of landings/catches by area (tables 6a and 6b) as compared to the total landings/catches (tables 7 and 9) is due to Intercatch raising (excl. industrial bycatch [IBC]) and data export procedures for landings (incl. IBC), as well as to the assignment of total catch weights-at-age for IBC afterwards.

Table 6b Whiting in Division 7.d. ICES advice, TAC, official landings, and ICES estimates of catch. All weights are in tonnes.

Stock				Division 7.d (eastern English Channel)						
								ICES estimates^^		
Year	ICES advice	Landings corresponding to advice	Total catch corresponding to advice	Human Consumption Catch in Division 7.d corresponding to advice	Landings in Division 7.d corresponding to advice	Agreed TAC**	Official landings	Landings	Discards^	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	n/a	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. Fishing mortality should be < F_{pa}	-	Catch should not increase compared to recent years		-	27000	5283	4350	907	5257
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)						
								ICES estimates^^		
Year	ICES advice	Landings corresponding to advice	Total catch corresponding to advice	Human Consumption Catch in Division 7.d corresponding to advice	Landings in Division 7.d corresponding to advice	Agreed TAC**	Official landings	Landings	Discards^	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	3457	3354	1550	4904
2018	MSY approach		≤ 26191		≤ 2759	22213	3608	3482	2562	6044
2019	MSY approach		≤ 24195	≤ 3897		19184	3101	2975	2499	5474
2020	MSY approach		≤ 22082	≤ 4318		10863	1971	1857	4195	6052
2021	MSY approach		≤ 26304	≤ 4573		10259				
2022	MSY approach		≤ 88426	≤ 16229*						

*The human consumption fishery (HCF) catch split between Subarea 4 and Division 7.d in 2022 is the same as the proportion of HCF catch between the areas in 2020: 81% from Subarea 4 and 19% 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.

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

^ Since 2015, discards include BMS landings.

^^ From 2009 on the estimated values are the sum of product (SOP) from catch and weight-at-age.

The slight discrepancy in the sum of landings/catches in by area (tables 6a and 6b) as compared to the total landings/catches (tables 7 and 9) is due to Intercatch raising (excl. IBC) and export procedures for landings (incl. IBC) as well as to the assignment of total catch weights-at-age for IBC afterwards.

n/a = not available.

History of catch and landings

Table 7 Whiting in Subarea 4 and Division 7.d. Catch distribution by fleet in 2020 as estimated by ICES. All weights are in tonnes.

Catch (2020)	Landings				Discards	Industrial bycatch
35 123	Demersal trawls and seine mesh size ≥ 120 mm (North Sea) 62%	Demersal trawls mesh size 70–99 mm (North Sea) 4%	Demersal trawls mesh size 70–99 mm (Eastern English Channel) 8%	Other 26%	14 229	3132
	17 762					

Table 8a 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.

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	n/a	41083	−1097		42180
1991	913	1528	0	5188	865	4028	103	48	2676	31257	n/a	46606	396		46210
1992	1030	1377	16	5115	511	5390	232	22	2528	30821	n/a	47042	1832		45210
1993	944	1418	7	5502	441	4799	130	18	2774	31268	n/a	47301	691		46610
1994	1042	549	2	4735	239	3864	79	10	2722	28974	n/a	42216	346		41870
1995	880	368	21	5963	124	3640	115	1	2477	27811	n/a	41400	850		40550
1996	843	189	0	4704	187	3388	66	1	2329	23409	n/a	35116	−434		35550
1997	391	103	6	3526	196	2539	75	1	2638	22098	n/a	31573	633		30940
1998	268	46	1	1908	103	1941	65	0	2909	16696	n/a	23937	247		23690
1999	529	58	1	NA	176	1795	68	9	2268	17206	n/a	n/a	n/a		25700
2000	536	105	0	2527	424	1884	33	4	1782	17158	n/a	24453	173		24280
2001	454	105	0	3455	402	2478	44	6	1301	10589	n/a	18834	−426		19260
2002	270	96	17	3314	354	2425	47	7	1322	7756	n/a	15608	738		14870
2003	248	89	5	2675	334	1442	39	10	680	5734	n/a	11255	805		10450
2004	144	62	0	1721	296	977	23	2	1209	5057	n/a	9491	541		8950
2005	105	57	0	1261	149	805	16	0	2560	3441	n/a	8394	−2286		10680
2006	93	251	0	2711	252	702	17	2	n/a	n/a	11632	15660	563		15097
2007	45	78	0	3336	76	618	11	1	n/a	n/a	12110	16275	609		15666
2008	116	42	0	3076	76	656	92	2	n/a	n/a	10391	14451	972		13479
2009	162	79	2	2305	124	718	73	4	n/a	n/a	8853	12320	−124		12444
2010	147	158	0	2644	156	614	118	8	n/a	n/a	7845	11690	−1111		12801
2011	74	135	0	2794	111	514	28	6	n/a	n/a	8892	12554	−706		13260
2012	45	131	0	1925	25	471	94	4	n/a	n/a	9893	12588	−356		12944
2013	33	124	0	942	44	495	560	1	n/a	n/a	11162	13361	−456		13817
2014	46	160	0	1884	31	464	918	2	n/a	n/a	10290	13795	−52		13847
2015	70	2375**	0	1131	73	581	1088	0	n/a	n/a	10015	15333	2101**		13232
2016	65	4727**	8	1232	111	644	1150	6	n/a	n/a	9412	17355	5113**		12242
2017	71	2804**	1	952	82	791	993	11	n/a	n/a	9263	14968	3140**	< 1	11828
2018	71	2026**	0	918	99	684	1025	8	n/a	n/a	10689	15520	2942	46	12578
2019*	141	2357**	80	890	81	853	1102	18	n/a	n/a	11897	17419	1885	66	15534
2020*	211	3606**	25	677	277	780	1674	28	n/a	n/a	12177	19475	3694	76	15781

*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 by area (Table 8a) as compared to total (tables 7 and 9) due to Intercatch raising and export procedures for landings (incl. IBC) as well as to the assignment of total catch weights-at-age for IBC afterwards.
n/a = not available.

Table 8b 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.

Year	Belgium	France	Netherlands	England (Wales)	Scotland	UK	Total landings	Unallocated landings	Official BMS landings	ICES landings **, ^
1990	83	n/a	0	239	0	n/a	n/a	n/a		3480
1991	83	n/a	0	292	0	n/a	n/a	n/a		5720
1992	66	5414	0	419	24	n/a	5923	183		5740
1993	74	5032	0	321	2	n/a	5429	219		5210
1994	61	6734	0	293	0	n/a	7088	468		6620
1995	68	5202	0	280	1	n/a	5551	161		5390
1996	84	4771	1	199	1	n/a	5056	106		4950
1997	98	4532	1	147	1	n/a	4779	159		4620
1998	53	4495	32	185	0	n/a	4765	165		4600
1999	48	NA	6	135	0	n/a	n/a	n/a		4430
2000	65	5875	14	118	0	n/a	6072	1772		4300
2001	75	6338	67	134	0	n/a	6614	814		5800
2002	58	5172	19	112	0	n/a	5361	−439		5800
2003	67	6654	175	109	0	n/a	7005	1295		5710
2004	46	5006	132	99	0	n/a	5283	933		4350
2005	45	4638	128	n/a	n/a	90	4901	111		4790
2006	73	3487	117	n/a	n/a	72	3749	306		3443
2007	75	3135	118	n/a	n/a	63	3391	137		3254
2008	69	2875	162	n/a	n/a	87	3193	−1278		4471
2009	71	6248	112	n/a	n/a	138	6569	649		5920
2010	88	5512	275	n/a	n/a	258	6133	−967		7100
2011	78	4833	282	n/a	n/a	271	5464	315		5149
2012	66	3093	437	n/a	n/a	261	3857	−556		4413
2013	95	3076	650	n/a	n/a	472	4293	−15		4308
2014	90	2126	663	n/a	n/a	345	3224	99		3125
2015	121	3102	565	n/a	n/a	379	4167	190		3977
2016	146	2771	556	n/a	n/a	259	3732	32		3700
2017	128	2378	593	n/a	n/a	358	3457	103	< 1	3354
2018	138	2720	484	n/a	n/a	283	3625	143	< 1	3482
2019*	144	2095	603	n/a	n/a	259	3101	126	< 1	2975
2020*	45	1309	330	n/a	n/a	287	1971	114	< 1	1857

*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 8b) as compared to total (tables 7 and 9) due to Intercatch raising and export procedures for landings (incl. IBC) as well as to the assignment of total catch weights-at-age for IBC afterwards.
n/a = not available.

Summary of the assessment

Table 9 Whiting in Subarea 4 and Division 7.d. Assessment summary. Recruitment is in thousands, weights are in tonnes. High and Low refer to 95% confidence intervals.

Year	Recruitment (age 0)			Spawning-stock biomass			Landings^	Discards^	Industrial Bycatch^	Fishing mortality		
	Age 0	High	Low	SSB	High	Low				F (ages 2–6)	High	Low
	thousands			tonnes			tonnes					
1978	40685696	56024311	29546563	386906	443589	337466	97553	35382	55287	0.65	0.75	0.56
1979	29725244	40396017	21873198	431278	490901	378897	107231	77391	58948	0.64	0.74	0.56
1980	16872504	22631317	12579090	425283	485116	372830	100775	77003	45584	0.76	0.86	0.67
1981	15512459	20680593	11635856	370703	422532	325231	89583	35894	66641	0.77	0.87	0.68
1982	13682956	18173290	10302114	299759	340548	263855	80576	26620	33055	0.63	0.72	0.55
1983	17859789	23679087	13470623	260308	292036	232027	88002	49562	23753	0.69	0.79	0.61
1984	15453599	20521541	11637221	206037	230153	184448	86275	40483	18878	0.80	0.91	0.71
1985	24019471	31950916	18056916	193794	219301	171254	56059	28961	15310	0.77	0.88	0.68
1986	21586680	28590204	16298756	206303	232885	182755	64019	79523	17953	0.84	0.95	0.74
1987	18674788	24697299	14120885	203570	230739	179600	68317	53901	16519	0.95	1.07	0.84
1988	23358277	31099439	17544018	205977	234266	181104	56100	28146	48969	0.81	0.91	0.71
1989	16125958	21223191	12252942	209005	235795	185259	45103	35787	42643	0.87	0.98	0.77
1990	14036807	18454904	10676400	202350	228355	179305	45662	55603	51337	0.79	0.89	0.69
1991	15476111	20139981	11892267	198712	223792	176443	51929	35058	39755	0.66	0.75	0.58
1992	17444205	22678177	13418199	188442	211120	168199	50946	32564	25045	0.63	0.72	0.55
1993	16984436	22085371	13061636	179289	200039	160691	51818	44370	20723	0.67	0.76	0.59
1994	15190205	19771769	11670293	173863	193902	155895	48486	35692	17473	0.69	0.79	0.61
1995	12269889	16036631	9387893	174951	195911	156233	45938	32176	27379	0.66	0.75	0.57
1996	10244438	13579884	7728233	156241	174911	139564	40503	30505	5116	0.60	0.69	0.53
1997	16164421	21371829	12225838	139483	156087	124646	35563	19660	6213	0.49	0.57	0.43
1998	25976121	34359844	19638008	119526	133093	107341	28288	15693	3494	0.45	0.52	0.39
1999	26831680	35548362	20252384	119493	133847	106679	30130	25677	5038	0.51	0.59	0.44
2000	23379703	31092306	17580250	147410	167141	130009	28583	26063	9160	0.58	0.67	0.50
2001	23526676	31396346	17629583	156643	180854	135673	25061	19237	944	0.47	0.56	0.40
2002	13420546	17743112	10151042	152446	176047	132010	20675	18501	7275	0.37	0.45	0.31
2003	12824947	16883695	9741900	137920	158788	119795	16161	26745	2734	0.30	0.36	0.24
2004	14273340	18857153	10803764	132546	152760	115006	13295	19048	1214	0.25	0.30	0.20
2005	13621487	18042688	10283663	121497	139855	105549	15471	12525	888	0.22	0.27	0.176
2006	11103414	14687095	8394158	115618	132117	101179	18535	16310	1924	0.24	0.29	0.20
2007	16492418	21745613	12508263	105168	119972	92191	18915	6971	1088	0.23	0.27	0.188
2008	16688831	22019027	12648928	109132	123705	96275	17951	10296	0	0.22	0.26	0.180
2009	15740978	20801416	11911612	113282	128477	99884	18403	8684	1344	0.25	0.30	0.21
2010	14995406	20025526	11228779	134649	153659	117991	19846	12683	1907	0.28	0.34	0.23
2011	11290558	14969835	8515571	124574	143025	108504	18461	11173	1035	0.25	0.31	0.21
2012	8475192	11390641	6305955	129010	148826	111833	17407	11697	1117	0.25	0.31	0.21

Year	Recruitment (age 0)			Spawning-stock biomass			Landings^	Discards^	Industrial Bycatch^	Fishing mortality		
	Age 0	High	Low	SSB	High	Low				F (ages 2–6)	High	Low
	thousands			tonnes			tonnes					
2013	12894319	17241003	9643492	121940	141606	105006	18211	6795	1654	0.25	0.30	0.20
2014	16988265	23104306	12491228	115837	135362	99128	17027	9725	1623	0.28	0.35	0.23
2015	15535141	21285200	11338423	121574	144988	101941	17299	16891	2097	0.32	0.41	0.25
2016	16713651	23011622	12139349	125946	153798	103138	16118	12726	4551	0.32	0.42	0.24
2017	10381577	14444847	7461287	132785	165812	106337	15361	11348***	2635	0.28	0.38	0.20
2018	12047844	17106051	8485333	138838	176110	109454	16160	10588***	1658	0.23	0.32	0.161
2019	20392302	30431022	13665200	144019	185444	111847	18579	10080***	1864	0.23	0.32	0.159
2020	21546571	36224555	12816023	177993	235693	134419	17762	14229***	3132	0.185	0.27	0.128
2021	14140017*			225375**	312644	162466						

^ ICES estimates are the sum of product (SOP) values from catch and weight-at-age, as used in the assessment model.

* In 2021, recruitment is the geometric mean 2002–2020.

** In 2021, SSB is estimated by SAM, stock weights-at-age, and maturity estimates averaged over the last three years.

*** Since 2017, discards include BMS landings from EU and UK fleets.

Sources and references

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. 13 pp. http://data.europa.eu/eli/reg/2018/973/oj.

ICES 2018. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA 2018), 5–9 February 2018, Copenhagen, Denmark. ICES CM 2018/ACOM:33. 636 pp.

ICES. 2021a. Inter-benchmark Protocol of North Sea Whiting (IBPNSWhiting). ICES Scientific Reports, 3:34. 38 pp. https://doi.org/10.17895/ices.pub.7924.

ICES. 2021b. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, section 1.1.1. https://doi.org/10.17895/ices.advice.7720.

ICES. 2021c. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports. 3:66. https://doi.org/10.17895/ices.pub.8211. *In prep.*

ICES. 2021d. Working Group on Multispecies Assessment Methods (WGSAM; outputs from 2020 meeting). ICES Scientific Reports, 3:10. 231 pp. https://doi.org/10.17895/ices.pub.7695.

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