ICES Advice on fishing opportunities, catch, and effort
Greater North Sea ecoregion
Published 30 June 2022
Version 2: 24 November 2022

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 2023 should be no more than 110 172 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}.

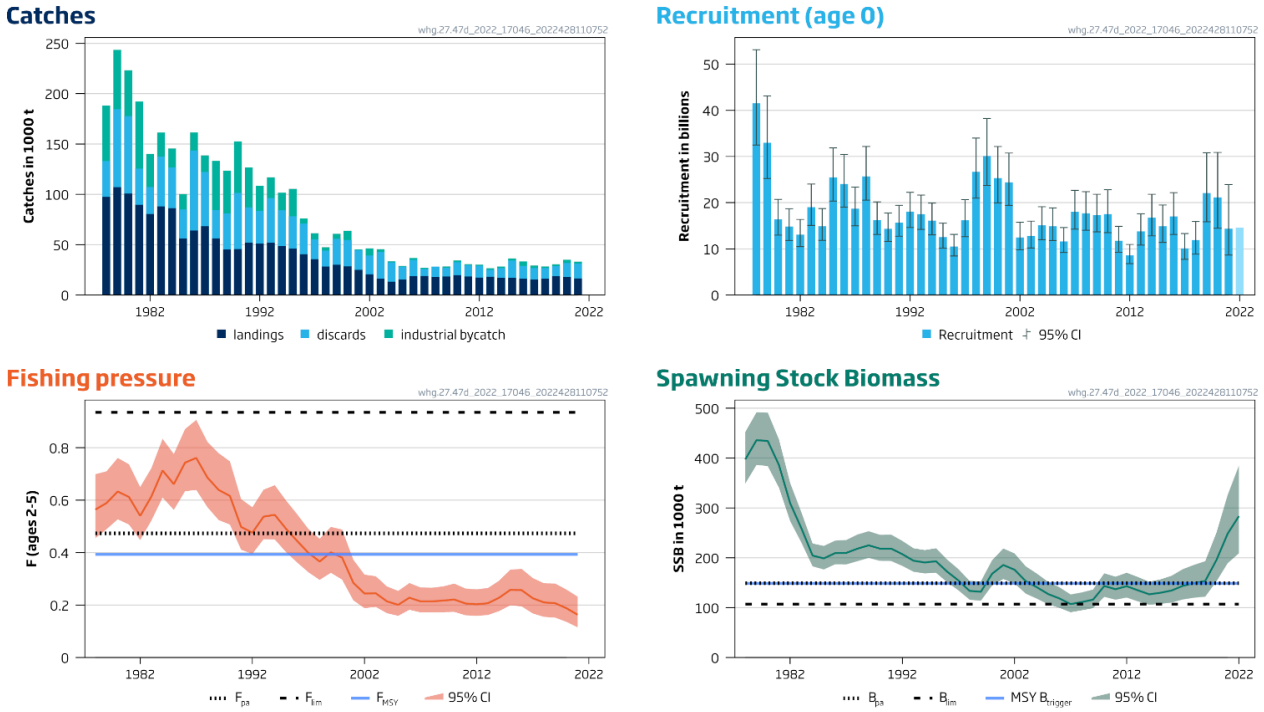

Figure 1 Whiting in Subarea 4 and Division 7.d. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

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
$F_{2–5}$ (2022)	0.163	Average exploitation pattern (2019–2021), scaled to the total F in 2021
SSB (2023)	294 175	Short-term forecast (STF)
$R_{age\ 0}$ (2022, 2023)	14 590 855	Geometric mean (GM, 2002–2021)
Total catch (2022)	44 160	STF
Projected landings (2022)	24 774	STF, relative contribution to total catch by age = average 2019–2021
Projected discards (2022)	16 191	STF, relative contribution to total catch by age = average 2019–2021

Variable	Value	Notes
Industrial bycatch (2022)	3195	STF, relative contribution to total catch by age = average 2019–2021

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

Basis	Total catch 2023	Total projected landings 2023	Total projected discards 2023*	Total IBC 2023*	Human Consumption catch 2023	Total F (ages 2–5) 2023+	F (projected landings, ages 2–5) 2023	F (projected discards, ages 2–5) 2023	F (IBC, ages 2–5) 2023++	SSB 2024	% SSB change^	% advice change^^
ICES advice basis												
MSY approach: F = F_{MSY}	110 172	71 182	35 711	3280	106 892	0.39	0.26	0.12	0.01	244 860	−16.8	25
Other scenarios												
F = $F_{MSY\ upper}$	132 198	85 910	43 146	3142	129 055	0.47	0.31	0.15	0.01	228 596	−22	50
F = $F_{MSY\ lower}$	82 366	52 587	26 325	3454	78 912	0.29	0.19	0.09	0.01	265 392	−9.8	−6.9
F = 0 (IBC only)	3941	0	0	3941	0	0.01	0	0	0.01	323 506	10.0	−96
F = F_{2022}	46 850	28 838	14 336	3675	43 174	0.16	0.10	0.05	0.01	291 617	−0.87	−47
Rollover TAC	38 059	22 959	11 370	3730	34 328	0.13	0.08	0.04	0.01	298 109	1.34	−57
15% TAC decrease (27.4 only)	32 941	19 536	9643	3762	29 179	0.11	0.07	0.03	0.01	301 888	2.6	−63
15% TAC increase (27.4 only)	43 176	26 381	13 096	3698	39 478	0.15	0.09	0.04	0.01	294 330	0.053	−51
0.75 × F_{2022}+++	36 570	21 964	10 866	3740	32 830	0.13	0.08	0.04	0.01	299 207	1.71	−59
1.25 × F_{2022}+++	57 135	35 716	17 808	3611	53 524	0.20	0.13	0.06	0.01	284 022	−3.5	−35
F_{pa}	132 198	85 910	43 146	3142	129 055	0.47	0.31	0.15	0.01	228 596	−22	50
F_{lim}	259 393	170 964	86 081	2348	257 045	0.94	0.63	0.30	0.01	134 676	−54	193
SSB (2024) = B_{pa} = MSY $B_{trigger}$	239 816	157 873	79 473	2470	237 346	0.87	0.58	0.27	0.01	148 888	−49	171
SSB (2024) = B_{lim}	296 251	195 610	98 522	2118	294 133	1.07	0.72	0.34	0.01	107 146	−63	235

* The split of catch between landings, discards, and industrial bycatch (IBC) in 2023 was done using recent (2019–2021) partial age-dependent fishing mortalities as a forecasting assumption.
^ SSB 2024 relative to SSB 2023.
^^ Total catch 2023 relative to the advice value 2022 (88 426 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 (25%) is caused by a combination of an increase in SSB, changes to the assessment model configuration and subsequent re-estimation of reference points during WGNSSK 2022.

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 and UK 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 model showed issues in estimating abundance of age 7 and 8+. As a result, a new assessment model configuration with an age 6+ and a fishing mortality averaged over ages 2 to 5 was agreed upon. New reference points were calculated during the Working Group and subsequently reviewed (ICES, 2022a). These changes do not affect the trend and the stock status.

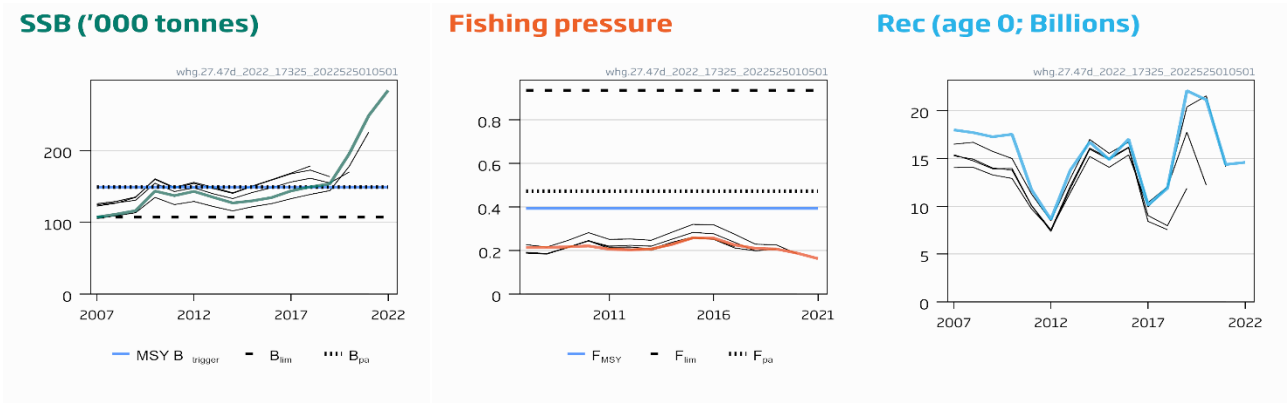

Figure 2 Whiting in Subarea 4 and Division 7.d. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year). The stock has undergone an interbenchmark in 2021, and an update of the model and reference points in 2022 (only the final year should be compared to the reference points shown on all plots). On the fishing pressure plot, the most recent line (orange) cannot be compared to previous years because the age range was changed in 2022.

Issues relevant for the advice

Whiting in the North Sea is under EU landing obligation and Norway and UK national legislation regulating discards. BMS (Below Minimum Size) landings reported to ICES in 2015–2021 were low. Substantial discarding still continues, based on observations from sampling programmes (estimated discards in 2021 are 14 638 tonnes, which is 47% of the human consumption fishery 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.

Reference points

Table 4 Whiting in Subarea 4 and Division 7.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	148 888	B_{pa}; in tonnes.	ICES (2022a)
	F_{MSY}	0.393	Stochastic simulation (EQsim) with segmented regression with a freely estimated breakpoint based on recruitment period 1983–2021	ICES (2022a)
Precautionary approach	B_{lim}	107 146	B_{loss} (SSB in 2007, as estimated in the 2022 assessment); in tonnes.	ICES (2022a)
	B_{pa}	148 888	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.20$; in tonnes.	ICES (2022a)
	F_{lim}	0.935	Stochastic simulation (EQsim) with segmented regression fixed at B_{lim} based on recruitment period 1983–2021	ICES (2022a)
	F_{pa}	0.473	The F that provides a 95% probability for SSB to be above B_{lim} ($F_{P.05}$ with advice rule [AR]).	ICES (2022a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	148 888	MSY $B_{trigger}$; in tonnes.	ICES (2022a)
	MAP B_{lim}	107 146	B_{lim}; in tonnes.	ICES (2022a)
	MAP F_{MSY}	0.393	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.292–0.393	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2022a)
	MAP range F_{upper}	0.393–0.473	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2022a)

* 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, 2022b)
Assessment type	Age-based analytical assessment (SAM; ICES, 2022a) 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 North Sea SMS multispecies model (ICES, 2021b)
Discards, BMS landings, and bycatch	The proportion of landings with associated discards was 46%. Fifty-three 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), interbenchmarked in 2021 (ICES, 2021a) and revised in 2022 (ICES, 2022a)
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	-			-	100 000	42 216	41 870	17 473	31 840	91 183
1995	Significant reduction in effort; mixed fishery	-			-	81 000	41 400	40 550	27 379	28 940	96 869
1996	Mixed fishery; take into account cod advice	-			-	67 000	35 116	35 550	5 116	27 130	67 796
1997	Mixed fishery; take into account cod advice	-			-	74 000	31 573	30 940	6 213	16 660	53 813
1998	No increase from 1996 level	50 700			44 900	60 000	23 937	23 690	3494	12 480	39 664
1999	At least 20% reduction of F (95–97)	33 800			29 900	44 000	22 110	25 700	5038	22 110	52 848
2000	Lowest possible catch		0		0	30 000	24 453	24 280	9160	21 931	55 371
2001	60% reduction of F (97–99)	21 900			19 400	29 700	18 834	19 260	940	16 130	36 330
2002	F not larger than 0.37	≤ 37 000			≤ 33 000	41 000	15 608	14 870	7270	17 144	39 284
2003	No cod catches	-	-		-	16 000	11 255	10 450	2730	26 135	39 315
2004	No cod catches. Fishing mortality in 2004 should be < F_{pa}		Catch should not increase compared to recent years		-	16 000	9491	8950	1210	18 142	28 302
2005	No cod catches. Less than recent average	25 000	52 000			28 500	8394	10 680	890	10 300	21 870
2006	No cod catches. Less than recent average	< 17 300				23 800	15 660	15 097	2190	14 018	31 305
2007	No cod catches. Less than recent average	< 15 100				23 800	16 275	15 666	1240	5206	22 112
2008	No cod catches. Less than recent average	< 5 000				17 850	14 451	13 479	0	8356	21 835
2009	No cod catches.F < F_{max}	< 5 900	< 11 000			15 173	12 320	12 444	1 344	6597	20 385
2010	No cod catches. Stable SSB	< 6 800	< 12 500			12 897	11 690	12 801	1 907	8451	23 159
2011	No cod catches. Stable SSB	< 12 700	< 21 900		< 9500	14 832	12 554	13 260	1 035	7989	22 283
2012	Management plan	< 21 300	< 31 500		< 17 100	17 056	12 588	12 944	1 117	9307	23 368

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
2013	Precautionary considerations (F = 0.225) and separate management for Division 7.d	< 26 000			< 19 000	18 932	13 361	13 817	1654	4608	20 079
2014	November update: precautionary considerations (15% TAC reduction) and separate management for Division 7.d	< 21 199	< 31 553		< 16 092	16 092	13 795	13 847	1623	7016	22 486
2015	November update: management plan and separate management for Division 7.d	< 17 190	< 30 579		< 13 678	13 678	15 333	13 232	2097	12 265 ^	27 593
2016	EU–Norway management strategy		≤ 30 510		≤ 12 373	13 678	17 355	12 242	4551	10 413^	27 206
2017	MSY approach		≤ 23 527		≤ 9744	16 003	14 968	11 828	2635	9799^	24 262
2018	MSY approach		≤ 26 191		≤ 11 040	22 057	15 451	12 578	1658	8026^	22 263
2019	MSY approach		≤ 24 195	≤ 17 191		17 191	17 419	15 534	1864	7581^	24 979
2020	MSY approach		≤ 22 082	≤ 15 036		17 158	19 475	15 781	3132	10 034^	28 947
2021	MSY approach		≤ 26 304	≤ 19 497		21 306	17 124	14 163	2048	9930^	26 141
2022	MSY approach		≤ 88 426	≤ 69 231		26 636					
2023	MSY approach		≤ 110 172	≤ 82 940*							

*The human consumption fishery (HCF) catch split between Subarea 4 and Division 7.d in 2023 is given as an example assuming the same as the proportion of HCF catch between the areas in 2021: 78% from Subarea 4 and 22% 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.

[†]Version 2: % updated

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	10 470
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	50 700			5800	27 000	4765	4600	3210	7810
1999	Reference made to North Sea advice	33 800			3900	25 000	n/a	4430	3570	8000
2000	Lowest possible catch		0		0	22 000	6072	4300	4129	8429
2001	60% reduction of F_{sq}	21 900			2500	21 000	6614	5800	3109	8909
2002	F not larger than 0.37	≤ 37 000			≤ 4000	31 700	5361	5800	1356	7156
2003	No cod catches	-	-		-	31 700	7005	5710	604	6314
2004	No cod catches. Fishing mortality should be < F_{pa}	-	Catch should not increase compared to recent years		-	27 000	5283	4350	907	5257
2005	No cod catches	25 000	52 000			21 600	4901	4790	2219	7009
2006	No cod catches. Less than recent average	< 17 300				19 940	3749	3443	2291	5734
2007	No cod catches. Less than recent average	< 15 100				19 940	3391	3254	1763	5017
2008	No cod catches. Less than recent average	< 5000				19 940	3192	4471	1943	6414
2009	No cod catches. F < F_{max}	< 5900	< 11 000			16 949	6569	5920	2086	8006
2010	No cod catches. Stable SSB	< 6800	< 12 500			14 407	6133	7100	4532	11 632
2011	No cod catches. Stable SSB	< 12 700	< 21 900		< 3200	16 568	5464	5149	3183	8332
2012	Management plan	< 21 300	< 31 500		< 4200	19 053	3857	4413	2389	6802
2013	Precautionary considerations (F = 0.225) and separate management for Division 7.d	< 26 000			< 7000	24 500	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	< 21 199	< 31 553		< 5106	20 668	3224	3125	2709	5834
2015	November update: management plan and separate management for Division 7.d	< 17 190	< 30 579		< 3512	17 742	4167	3977	4627	8604
2016	EU–Norway management strategy for Division 7.d		≤ 30 510		< 2480	22 778	3732	3700	2313	6013
2017	MSY approach		≤ 23 527		≤ 2935	27 500	3457	3354	1550	4904
2018	MSY approach		≤ 26 191		≤ 2759	22 213	3608	3482	2562	6044
2019	MSY approach		≤ 24 195	≤ 3897		19 184	3101	2975	2499	5474
2020	MSY approach		≤ 22 082	≤ 4318		10 863	1971	1857	4195	6052
2021	MSY approach		≤ 26 304	≤ 4573		10 259	2453	2250	4708	6958
2022	MSY approach		≤ 88 426	≤ 16 229		8352				
2023	MSY approach		≤ 110 172	≤ 23 953*						

*The human consumption fishery (HCF) catch split between Subarea 4 and Division 7.d in 2023 is given as an example assumingthe same proportion of HCF catch between the areas in 2021: 79% from Subarea 4 and 21% 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 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings				Discards	Industrial bycatch
33 186	Demersal trawls and seine mesh size ≥ 120 mm (North Sea) 64%	Demersal trawls mesh size 70–99 mm (North Sea) 4%	Demersal trawls mesh size 70–99 mm (Eastern English Channel) 6%	Other 27%	14 638	2048
	16 499					

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	27 486		41 083	−1097		42 180
1991	913	1528	0	5188	865	4028	103	48	2676	31 257		46 606	396		46 210
1992	1030	1377	16	5115	511	5390	232	22	2528	30 821		47 042	1832		45 210
1993	944	1418	7	5502	441	4799	130	18	2774	31 268		47 301	691		46 610
1994	1042	549	2	4735	239	3864	79	10	2722	28 974		42 216	346		41 870
1995	880	368	21	5963	124	3640	115	1	2477	27 811		41 400	850		40 550
1996	843	189	0	4704	187	3388	66	1	2329	23 409		35 116	−434		35 550
1997	391	103	6	3526	196	2539	75	1	2638	22 098		31 573	633		30 940
1998	268	46	1	1908	103	1941	65	0	2909	16 696		23 937	247		23 690
1999	529	58	1	n/a	176	1795	68	9	2268	17 206		n/a	n/a		25 700
2000	536	105	0	2527	424	1884	33	4	1782	17 158		24 453	173		24 280
2001	454	105	0	3455	402	2478	44	6	1301	10 589		18 834	−426		19 260
2002	270	96	17	3314	354	2425	47	7	1322	7756		15 608	738		14 870
2003	248	89	5	2675	334	1442	39	10	680	5734		11 255	805		10 450
2004	144	62	0	1721	296	977	23	2	1209	5057		9491	541		8950
2005	105	57	0	1261	149	805	16	0	2560	3441		8394	−2286		10 680
2006	93	251	0	2711	252	702	17	2			11 632	15 660	563		15 097
2007	45	78	0	3336	76	618	11	1			12 110	16 275	609		15 666
2008	116	42	0	3076	76	656	92	2			10 391	14 451	972		13 479
2009	162	79	2	2305	124	718	73	4			8853	12 320	−124		12 444
2010	147	158	0	2644	156	614	118	8			7845	11 690	−1111		12 801
2011	74	135	0	2794	111	514	28	6			8892	12 554	−706		13 260
2012	45	131	0	1925	25	471	94	4			9893	12 588	−356		12 944
2013	33	124	0	942	44	495	560	1			11 162	13 361	−456		13 817
2014	46	160	0	1884	31	464	918	2			10 290	13 795	−52		13 847
2015	70	2375**	0	1131	73	581	1088	0			10 015	15 333	2101**		13 232
2016	65	4727**	8	1232	111	644	1150	6			9412	17 355	5113**		12 242
2017	71	2804**	1	952	82	791	993	11			9263	14 968	3140**	< 1	11 828
2018	71	2026**	0	918	99	684	1025	8			10 689	15 520	2942**	46	12 578
2019	141	2357**	80	890	81	838	1102	18			11 847	17 354	1885**	66	15 534
2020*	211	3606**	25	677	246	769	1674	27			12 144	19 399	3421**	76	15 978
2021*	475	2493**	0	478	195	711	1099	50			11 584	17 085	2922	53	14 163

*Preliminary.

** The value of official landings in 2015–2021 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.

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		3480
1991	83	n/a	0	292	0		n/a	n/a		5720
1992	66	5414	0	419	24		5923	183		5740
1993	74	5032	0	321	2		5429	219		5210
1994	61	6734	0	293	0		7088	468		6620
1995	68	5202	0	280	1		5551	161		5390
1996	84	4771	1	199	1		5056	106		4950
1997	98	4532	1	147	1		4779	159		4620
1998	53	4495	32	185	0		4765	165		4600
1999	48	n/a	6	135	0		n/a	n/a		4430
2000	65	5875	14	118	0		6072	1772		4300
2001	75	6338	67	134	0		6614	814		5800
2002	58	5172	19	112	0		5361	−439		5800
2003	67	6654	175	109	0		7005	1295		5710
2004	46	5006	132	99	0		5283	933		4350
2005	45	4638	128			90	4901	111		4790
2006	73	3487	117			72	3749	306		3443
2007	75	3135	118			63	3391	137		3254
2008	69	2875	162			87	3193	−1278		4471
2009	71	6248	112			138	6569	649		5920
2010	88	5512	275			258	6133	−967		7100
2011	78	4833	282			271	5464	315		5149
2012	66	3093	437			261	3857	−556		4413
2013	95	3076	650			472	4293	−15		4308
2014	90	2126	663			345	3224	99		3125
2015	121	3102	565			379	4167	190		3977
2016	146	2771	556			259	3732	32		3700
2017	128	2378	593			358	3457	103	<1	3354
2018	138	2720	484			283	3625	143	<1	3482
2019	144	2095	602			259	3100	125	<1	2975
2020*	45	1309	329			287	1971	60	<1	1911
2021*	86	1718	229			417	2453	203	<1	2250

*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.

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 pressure (ages 2–5)		
	R	High	Low	SSB	High	Low				F	High	Low
	thousands			tonnes			Tonnes					
1978	41 514 893	53 096 944	32 459 238	397 350	452 402	348 997	97 553	35 382	55 287	0.56	0.70	0.46
1979	32 952 922	43 060 656	25 217 802	435 931	491 868	386 356	107 231	77 391	58 948	0.59	0.71	0.49
1980	16 380 174	20 685 242	12 971 088	434 365	491 339	383 997	100 775	77 003	45 584	0.63	0.76	0.53
1981	14 832 658	18 662 272	11 788 905	386 077	437 500	340 698	89 583	35 894	66 641	0.61	0.74	0.51
1982	13 078 987	16 366 375	10 451 911	309 463	350 028	273 600	80 576	26 620	33 055	0.54	0.65	0.45
1983	19 031 550	24 025 454	15 075 673	259 164	291 219	230 637	88 002	49 562	23 753	0.61	0.72	0.52
1984	14 888 804	18 716 709	11 843 774	204 483	228 703	182 828	86 275	40 483	18 878	0.71	0.83	0.61
1985	25 443 849	31 847 645	20 327 702	198 807	223 802	176 604	56 059	28 961	15 310	0.66	0.78	0.56
1986	24 055 566	30 434 379	19 013 703	209 363	234 465	186 948	64 019	79 523	17 953	0.74	0.87	0.63
1987	18 708 678	23 370 069	14 977 047	209 820	235 711	186 773	68 317	53 901	16 519	0.76	0.91	0.64
1988	25 693 010	32 159 453	20 526 803	218 373	246 734	193 272	56 100	28 146	48 969	0.67	0.82	0.57
1989	16 254 631	20 165 950	13 101 938	224 974	253 289	199 824	45 103	35 787	42 643	0.64	0.78	0.52
1990	14 326 692	17 734 338	11 573 824	218 464	246 183	193 865	45 662	55 603	51 337	0.61	0.75	0.51
1991	15 709 216	19 410 694	12 713 584	218 452	246 546	193 559	51 929	35 058	39 755	0.50	0.60	0.41
1992	18 032 192	22 238 220	14 621 672	207 259	233 869	183 676	50 946	32 564	25 045	0.48	0.57	0.40
1993	17 521 334	21 629 847	14 193 218	194 132	219 156	171 965	51 818	44 370	20 723	0.54	0.64	0.45
1994	16 106 570	19 904 378	13 033 394	190 631	215 431	168 685	48 486	35 692	17 473	0.54	0.66	0.45
1995	12 554 264	15 564 459	10 126 246	193 011	219 195	169 955	45 938	32 176	27 379	0.49	0.60	0.40
1996	10 520 357	13 122 832	8 433 997	172 134	196 369	150 890	40 503	30 505	5116	0.44	0.55	0.36
1997	16 158 169	20 657 127	12 639 049	154 532	177 262	134 716	35 563	19 660	6213	0.40	0.49	0.33
1998	26 703 170	33 977 666	20 986 117	133 487	153 732	115 908	28 288	15 693	3494	0.37	0.45	0.30
1999	30 080 187	38 197 820	23 687 678	131 960	152 871	113 909	30 130	25 677	5038	0.40	0.50	0.32
2000	25 319 749	32 157 258	19 936 080	167 906	195 142	144 472	28 583	26 063	9160	0.38	0.49	0.30
2001	24 404 204	30 731 649	19 379 539	185 542	218 716	157 400	25 061	19 237	944	0.29	0.37	0.22
2002	12 453 417	15 786 879	9 823 829	176 107	208 809	148 527	20 675	18 501	7275	0.24	0.32	0.188
2003	12 778 803	15 997 903	10 207 451	153 119	182 951	128 151	16 161	26 745	2734	0.25	0.31	0.193
2004	15 115 751	19 120 246	11 949 947	140 840	168 194	117 935	13 295	19 048	1214	0.21	0.27	0.169
2005	14 885 042	18 833 579	11 764 332	127 270	151 769	106 726	15 471	12 525	888	0.20	0.26	0.159
2006	11 603 766	14 600 471	9 222 126	118 478	140 886	99 635	18 535	16 310	1924	0.23	0.29	0.182
2007	17 991 045	22 695 813	14 261 560	107 146	126 493	90 758	18 915	6971	1088	0.21	0.27	0.172
2008	17 703 740	22 369 196	14 011 340	111 238	130 551	94 782	17 951	10 296	-	0.21	0.27	0.172
2009	17 267 764	21 803 948	13 675 307	116 122	136 376	98 875	18 403	8684	1344	0.22	0.27	0.173
2010	17 531 478	22 768 519	13 499 022	143 389	168 926	121 713	19 846	12 683	1907	0.22	0.28	0.174
2011	11 750 419	14 888 212	9 273 937	137 069	162 045	115 943	18 461	11 173	1035	0.21	0.26	0.161
2012	8 615 069	10 948 591	6 778 900	142 989	170 051	120 234	17 407	11 697	1117	0.20	0.26	0.159
2013	13 770 710	17 564 447	10 796 381	134 793	161 454	112 535	18 211	6795	1654	0.21	0.27	0.162
2014	16 709 968	21 802 816	12 806 741	126 865	152 127	105 797	17 027	9725	1623	0.23	0.29	0.177

Year	Recruitment (Age 0)			Spawning-stock biomass			Landings^	Discards^	Industrial Bycatch^	Fishing pressure (ages 2–5)		
	R	High	Low	SSB	High	Low				F	High	Low
	thousands			tonnes			Tonnes					
2015	14 890 907	19 487 714	11 378 405	129 799	156 654	107 547	17 299	16 891	2097	0.26	0.34	0.199
2016	17 032 380	22 167 907	13 086 575	134 385	163 952	110 150	16 118	12 726	4551	0.26	0.34	0.195
2017	10 133 907	13 306 204	7 717 908	143 654	177 193	116 464	15 361	11 348***	2635	0.23	0.30	0.168
2018	11 885 469	15 943 971	8 860 050	149 239	185 804	119 870	16 160	10 588***	1658	0.21	0.28	0.155
2019	22 090 037	30 775 952	15 855 554	153 550	193 202	122 037	18 579	10 080***	1864	0.21	0.28	0.152
2020	21 131 946	30 873 310	14 464 246	195 513	250 363	152 679	18 014	13 795***	3115	0.188	0.26	0.136
2021	14 371 814	23 882 836	8 648 430	248 436	326 207	189 206	16 499	14 638***	2048	0.163	0.23	0.115
2022	14 590 855*			283 605**	384 846	208 997						

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

* In 2022, recruitment is the geometric mean 2002–2021.

** In 2022, 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. https://doi.org/10.17895/ices.pub.5326.

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. 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.

ICES. 2022a. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports. 4:43. http://doi.org/10.17895/ices.pub.19786285. *In prep*.

ICES. 2022b. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, section 1.1.1. https://doi.org/10.17895/ices.advice.19928060.

Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Whiting (*Merlangius merlangus*) in Subarea 4 and Division 7.d (North Sea and eastern English Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, whg.27.47d. https://doi.org/10.17895/ices.advice.19457411.