

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

### ICES advice on fishing opportunities

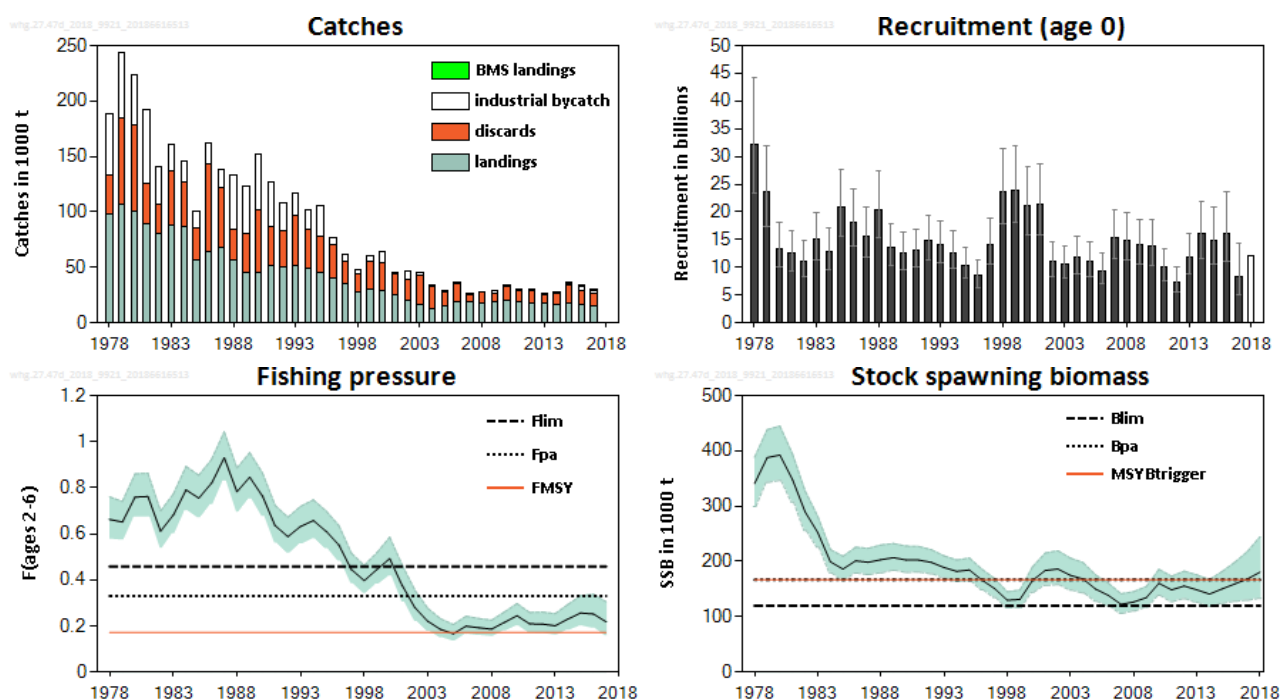
Please note: This advice was updated in November 2018 ([ICES, 2018d](#))

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 25 302 tonnes.

Management should be implemented at the stock level.

### Stock development over time

Spawning-stock biomass (SSB) has fluctuated around, and is now above, MSY  $B_{trigger}$ . Fishing mortality (F) has been above  $F_{MSY}$  throughout the time-series, apart from 2005. Since 2002 recruitment (R) has been generally lower than in previous years.



**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. Unshaded recruitment is the geometric mean.

### 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 above  $MSY B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .

**Table 1** Whiting in Subarea 4 and Division 7.d. State of the stock and fishery relative to reference points.

	Fishing pressure			Stock size						
	2015	2016	2017	2016	2017	2018				
Maximum sustainable yield	$F_{MSY}$	✗	✗	✗	Above	MSY $B_{trigger}$	✗	✓	✓	Above trigger
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓	Harvested sustainably	$B_{pa}, B_{lim}$	○	✓	✓	Full reproductive capacity
Management plan	$F_{MGT}$	—	—	—	Not applicable	$B_{MGT}$	—	—	—	Not applicable

### Catch scenarios

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

Variable	Value	Notes
$F_{2-6}$ (2018)	0.218	Average exploitation pattern (2015–2017) scaled to the F in 2017
SSB (2019)	172 124 tonnes <sup>†</sup>	Short-term forecast (STF)
$R_{age 0}$ (2018, 2019)	11 964 millions	Geometric mean (GM, 2002–2017)
Total catch (2018)	32 556 tonnes	Short-term forecast
Wanted catch (2018)	16 961 tonnes	Short-term forecast
Unwanted catch (2018)	12 490 tonnes	Short-term forecast; discard rate equals three year average
Industrial bycatch (2018)	3105 tonnes	Short-term forecast; bycatch rate equals three year average

<sup>†</sup> Version 2: Value for SSB (2019) corrected.

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

Basis	Total catch 2019	Total wanted catch 2019 *	Total unwanted catch 2019 *	Total IBC 2019 **	HC catch 4+7.d 2019	HC catch 4 2019 ***	HC catch 7.d 2019 ***	Total F 2019 +	F (wanted catch) 2019	F (unwanted catch) 2019	F(IBC) 2019 ++	SSB 2020	% SSB change <sup>^§</sup>	% TAC change (HC catch 4) <sup>^^</sup>	% Advice change <sup>^^^</sup>
ICES advice basis															
MSY approach: F <sub>MSY</sub>	25302	13298	8815	3190	22113	18026	4086	0.172	0.099	0.051	0.022	171663	-0.27%	-18.3%	-3.4%
Other scenarios															
F = MAP <sup>#</sup> F <sub>MSY lower</sub>	23382	12145	8030	3207	20174	16446	3728	0.158	0.090	0.046	0.022	172992	0.50%	-25%	-10.7%
F = MAP F <sub>MSY upper</sub> <sup>##</sup>	25302	13298	8815	3190	22113	18026	4086	0.172	0.099	0.051	0.022	171663	0%	-18.3%	-3.4%
F <sub>2019</sub> = 0(IBC only)	3385	0	0	3385	0	0	0	0.022	0	0	0.022	186996	8.6%	-100%	-87%
F <sub>2019</sub> = F <sub>2018</sub>	31614	17087	11394	3133	28481	23218	5263	0.22	0.129	0.067	0.022	167297	-2.8%	5.3%	21%
Rollover TAC	30203	16239	10818	3146	27060	22057	5000	0.21	0.123	0.063	0.022	168274	-2.2%	0%	15.3%
15% TAC decrease (27.4 only)	26181	13824	9175	3182	23008	18748	4250	0.178	0.103	0.053	0.022	171057	-0.62%	-15.0%	-0.040%
15% TAC increase (27.4 only)	34225	18655	12461	3110	31111	25366	5750	0.24	0.142	0.073	0.022	165491	-3.9%	15.0%	31%
0.75 × F <sub>2018</sub> <sup>+++</sup>	24930	13075	8663	3193	21737	17720	4017	0.169	0.097	0.050	0.022	171920	-0.118%	-20%	-4.8%
1.25 × F <sub>2018</sub> <sup>+++</sup>	38402	21162	14169	3072	35330	28801	6529	0.27	0.162	0.084	0.022	162602	-5.5%	31%	47%
F <sub>pa</sub>	46981	26311	17675	2995	43986	35858	8129	0.33	0.20	0.105	0.022	156668	-9.0%	63%	79%
F <sub>lim</sub>	64544	36854	24853	2837	61707	50303	11403	0.46	0.29	0.148	0.022	144521	-16.0%	128%	146%
SSB (2020) = B <sub>pa</sub> = MSY B <sub>trigger</sub>	32464	17597	11742	3126	29339	23917	5422	0.22	0.133	0.069	0.022	166708	-3.1%	8.4%	24%
SSB (2020) = B <sub>lim</sub>	99878	58065	39294	2520	97359	79367	17992	0.72	0.46	0.24	0.022	119970	-30%	260%	281%
F <sub>mgt</sub> = 0.15 (EU–Norway Management Strategy)	22284	11486	7581	3217	19067	15543	3524	0.150	0.084	0.044	0.022	173751	0.95%	-30%	-14.9%
Mixed-fisheries scenarios															
A: Max.	59286							0.4337				147842	-12		
B: Min.	16107							0.1041				177521	5		
C: COD	18807							0.1224				175625	5		
D: SQ effort	32029							0.2162				166416	-1		
E: Value	32305							0.2182				166225	-1		
F: Range	24208							0.159				172176	2		

\* “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 2015–2017.

\*\* The split of catch between wanted catch, unwanted catch, and industrial bycatch (IBC) in 2019 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 (HC) catch split between Subarea 4 and Division 7.d in 2018 is the same as the proportion of HC catch between the areas in 2017: 81.5% from Subarea 4 and 18.5% 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.

<sup>^</sup> SSB 2020 relative to SSB 2019.

<sup>^^</sup> Human consumption catch (HC catch) for Subarea 4 in 2019 relative to TAC for Subarea 4 and Division 2.a in 2018 (22 057 t).

<sup>^^^</sup> Total catch 2019 relative to advice value 2018 (26 191 t).

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

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

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

<sup>§</sup> Version 2: %SSB change corrected.

ICES Advice 2018

# Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

## For this stock,  $F_{MSY\ upper} = F_{MSY}$

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 2018 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: Each fleet stops fishing when its individual cod share is exhausted.

D. SQ (*status quo*) effort scenario: The effort of each fleet in 2018 and 2019 is as in 2017.

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.

F. Range scenario: where the potential for TAC mismatches in 2018 are minimized within the FMSY range, for the demersal fish stocks for which such a range is available (cod.27.47d20; had.27.46a20; pok.27.3a46; ple.27.420; ple.27.7d; sol.27.4; sol.27.7d, ; whg.27.47d).

The stock underwent a benchmark in 2018 (WKNSEA; ICES, 2018a). The change in advice (-3.4%) is minor.

**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	<p>The stock assessment and reference points has been benchmarked in 2018 implying a need to re-evaluate the EU–Norway management strategy. Until such an evaluation is conducted for the new assessment benchmarked in 2018, the ICES advice is based on the MSY approach (and has been since 2016).</p> <p>An EU multiannual management plan (MAP) has been proposed for this stock (EU 2016). This plan is not adopted by Norway, thus, 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.</p>

**Quality of the assessment**

In the 2018 benchmark, estimates of stock weights and maturity at age were updated, which resulted in a downward rescaling of the SSB (WKNSEA; ICES, 2018a). Furthermore, new natural mortality estimates (ICES, 2018b) were used. Recruitment estimates changed, because the assessment model now uses recruitment at age 0 instead of age 1. The assessment model was updated from XSA to SAM. Reference points were adapted accordingly.

Stock identity remains an unresolved issue with this assessment, both within the North Sea and between the North Sea and neighbouring areas. The 2018 benchmark concluded to continue to run an assessment for whiting in the North Sea and Eastern Channel.

There have been issues with regard to the age readings of North Sea whiting compared to other gadoids; in particular, age readings used for the IBTS indices. Age-reading techniques were reviewed and coordinated between countries in late 2016 (ICES, 2016b), and continue to be investigated. Until these investigations have been concluded, reported age readings continue to be used as in previous years.



**Figure 2** Whiting in Subarea 4 and Division 7.d. Historical assessment results.

## 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.

Because of updated natural mortality estimates (ICES, 2015, 2016a, 2018a, 2018b), the EU–Norway management strategy (fixed  $F$  without  $B_{\text{trigger}}$  and with TAC constraints; ICES, 2013) is no longer considered precautionary. The ICES advice since 2017 has been based on the MSY approach.

The stock dynamics of North Sea whiting are largely driven by recruitment and natural mortality. To maximize the benefit for the fishery of this stock, the most significant measure would be to improve selectivity and reduce under-sized catches in those fisheries with high rates of discarding.

BMS landings reported to ICES in 2015–2017 were low. In 2017, whiting was not fully under landings obligation. In 2018, whiting catches in all fleets (including TR2, BT2) of Subarea 4 and Division 7.d will enter the landing obligation, with a *de minimis* exemption for whiting caught with bottom trawls in Division 4.c.

Whiting in Division 7.d is managed under a common TAC with whiting in divisions 7.b–c and e–k. By mixing the biological and TAC areas for different whiting stocks, it will be difficult to achieve the objective of fishing at MSY for all these stock units. This situation may be further compounded by the development of different plans (MAPs) for the North Sea and Northwestern waters.

### Mixed fisheries considerations

After years of positive development, North Sea cod is again estimated to be the most limiting stock in the Greater North Sea mixed-fisheries model. For 2019, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), cod is estimated to constrain 18 out of 34 fleet segments. Whiting is the second most limiting stock, constraining twelve fleet segments. Conversely, in the “Maximum” scenario, saithe and both plaice stocks (North Sea and Eastern Channel) plaice would be the least limiting for 15, 6, and 3 fleet segments, respectively. Finally, if Norway lobster were managed by separate TACs, Norway lobster in FU 7, would be the least limiting for six fleet segments. Whiting a limiting stock for 12 fleets in the mixed fisherie scenario (ICES, 2018c).

For those demersal fish stocks for which the  $F_{\text{MSY}}$  range is available, a “range” scenario is presented that minimizes the potential for TAC mismatches in 2019 within the  $F_{\text{MSY}}$  range. This scenario returns a fishing mortality by stock which, if used for setting single-stock fishing opportunities for 2019, may reduce the gap between the most and the least restrictive TACs, thus reducing the potential for quota over- and undershoots. This “range” scenario suggests that the potential for mixed-fisheries mismatch would be lowered with a 2019 TAC that applies the lower part of the  $F_{\text{MSY}}$  range for Eastern English Channel and North Sea plaice, saithe and the highest possible value for North Sea cod and sole in accordance with the MSY approach and the MAP (EU multiannual plan).

## Reference points

**Table 5** 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 $B_{trigger}$	166 708 t	$B_{pa}$	ICES (2018a)
	$F_{MSY}$	0.172	EQsim analysis based on the recruitment period 1983–2017	ICES (2018a)
Precautionary approach	$B_{lim}$	119 970 t	$B_{loss}$ (SSB in 2007, as estimated in the 2018 benchmark assessment)	ICES (2018a)
	$B_{pa}$	166 708 t	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	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-Norway Management Strategy	SSB <sub>MGT</sub>	Not defined		
	$F_{MGT}$	0.150	$F_{MSY}$	ICES (2013)
Management Plan*	MAP MSY $B_{trigger}$	166 708 t	MSY $B_{trigger}$	ICES (2018a)
	MAP $B_{lim}$	119 970 t	$B_{lim}$	ICES (2018a)
	MAP $F_{MSY}$	0.172	$F_{MSY}$	ICES (2018a)
	MAP range $F_{lower}$	0.158	Consistent with ranges provided by ICES (2018a), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018a)
	MAP range $F_{upper}^{**}$	0.172	Consistent with ranges provided by ICES (2018a), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018a)

\*Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

\*\* 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 ( <a href="#">ICES, 2016c</a> )
Assessment type	Age-based analytical assessment (SAM; ICES, 2018b) 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, 2018b).
Discards, BMS landings, and bycatch	The proportion of landings with associated discards was 65%. 50% of discards were sampled. No biological samples were available from the industrial bycatch. Below minimum size (BMS) landings, where reported, 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 ( <a href="#">WGNSSK</a> )

## Information from stakeholders

The amount and coverage of input data for the assessment has increased since 2012 through extended sampling programs such as fully documented fishery (FDF) and 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.

Year	Stock			Subarea 4 (North Sea)						
	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Wanted catch in Subarea 4 corresponding to advice	Agreed TAC	Off. landings	ICES estimates <sup>^^</sup>			
							Wanted catch	Indust. bycatch	Unwanted catch*	Total catch
1994	Significant reduction in effort; mixed fishery	-		-	100000	42214	41870	17473	31840	91183
1995	Significant reduction in effort; mixed fishery	-		-	81000	41379	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	31567	30940	6213	16660	53813
1998	No increase from 1996 level	50700		44900	60000	23936	23690	3494	12480	39664
1999	At least 20% reduction of F(95–97)	33800		29900	44000	NA	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	15591	14870	7270	17144	39284
2003	No cod catches	-	-	-	16000	11251	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 <sub>pa</sub>									
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 <sub>max</sub>	< 5900	< 11000		15173	12318	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
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	13791	13847	1623	7016	22486



Stock				Subarea 4 (North Sea)						
Year	ICES advice	Wanted catch corresponding to advice	Total catch 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
2015	November update: Management plan and separate management for Division 7.d	< 17190	< 30579	< 13678	13678	13098	13232	2097	12265	27593
2016	EU–Norway management strategy		≤ 30510	≤ 12373	13678	12709	12242	4551	10413	27206
2017	MSY approach		≤ 23527	≤ 9744	16003	14718	11828	2635	9799	24262
2018	MSY approach		≤ 26191	≤ 11040	22057					
2019	MSY approach		≤ 25302	≤ 18026						

\* Unwanted catch includes discards and BMS landings.

^^ Prior to 2009 values from historic assessments

**Table 7 Continued**

Stock				Division 7.d (Eastern English Channel)					
Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Wanted catch in Division 7.d corresponding to advice	Agreed TAC*	Official 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	3193	4471	1943	6414
2009	No cod catches. $F < F_{max}$	< 5900	< 11000		16949	6569	5920	2086	8006

Year	Stock			Division 7.d (Eastern English Channel)					
	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice	Wanted catch in Division 7.d corresponding to advice	Agreed TAC*	Official landings	ICES estimates^^		
							Wanted catch	Unwanted catch^	Total catch
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
2014	November update: Precautionary considerations (15% TAC reduction) and separate management for Division 7.d	< 21199	< 31553	< 5106	20668	3212	3125	2709	5834
2015	November update: management plan and separate management for Division 7.d	< 17190	< 30579	< 3512	17742	4109	3977	4627	8604
2016	EU–Norway management strategy for Division 7.d		≤ 30510	< 2480	22778	3730	3700	2313	6013
2017	MSY approach		≤ 23527	≤ 2935	27500	3443	3354	1550	4904
2018	MSY approach		≤ 26191	≤ 2759	22213				
2019	MSY approach		≤ 25302	≤ 4086					

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

^ Unwanted catch includes BMS landings since 2015.

^^ Prior to 2009 values from historic assessments

### History of the catch and wanted catch

**Table 8** Whiting in Subarea 4 and Division 7.d. Catch distribution by fleet in 2017 as estimated by ICES.

Catch (2017)	Wanted catch				Unwanted catch	Industrial bycatch
29344 tonnes	Demersal trawls and seine mesh size ≥ 120 mm (North Sea) 61%	Demersal trawls mesh size 70–99 mm (North Sea) 7%	Demersal trawls mesh size 70–99 mm (Eastern English Channel) 26%	Other 6%	11348 tonnes	2635 tonnes
	15361 tonnes					

**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	France	Germany	Netherl.	Norway	Sweden	England (Wales)	Scotland	UK	Total landings	Unallocated landings	BMS landings	ICES landings ***
1990	1040	1206	4951	692	3273	55	16	2338	23486	NA	41057	-1123		42180
1991	913	1528	5188	865	4028	103	48	2676	31257	NA	46606	396		46210
1992	1030	1377	5115	511	5390	232	22	2528	30821	NA	47026	1816		45210
1993	944	1418	5502	441	4799	130	18	2774	31268	NA	47295	685		46610
1994	1042	549	4735	239	3864	79	10	2722	28974	NA	42214	344		41870
1995	880	368	5963	124	3640	115	1	2477	27811	NA	41379	829		40550
1996	843	189	4704	187	3388	66	1	2329	23409	NA	35116	-434		35550
1997	391	103	3526	196	2539	75	1	2638	22098	NA	31567	627		30940
1998	268	46	1908	103	1941	65	0	2909	16696	NA	23936	246		23690
1999	529	58	NA	176	1795	68	9	2268	17206	NA	NA	NA		25700
2000	536	105	2527	424	1884	33	4	1782	17158	NA	24453	173		24280
2001	454	105	3455	402	2478	44	6	1301	10589	NA	18834	-426		19260
2002	270	96	3314	354	2425	47	7	1322	7756	NA	15591	721		14870
2003	248	89	2675	334	1442	39	10	680	5734	NA	11251	801		10450
2004	144	62	1721	296	977	23	2	1209	5057	NA	9491	541		8950
2005	105	57	1261	149	805	16	0	2560	3441	NA	8394	-2286		10680
2006	93	251	2711	252	702	17	2	NA	NA	11632	15660	563		15097
2007	45	78	3336	76	618	11	1	NA	NA	12110	16275	609		15666
2008	115	42	3076	76	656	92	2	NA	NA	10391	14451	972		13479
2009	162	79	2305	124	718	73	4	NA	NA	8853	12318	-126		12444
2010	147	156	2644	156	614	118	8	NA	NA	7845	11690	-1111		12801
2011	74	135	2794	111	514	28	6	NA	NA	8892	12554	-706		13260
2012	45	131	1925	25	471	94	4	NA	NA	9893	12588	-356		12944
2013	33	124	942	44	495	560	1	NA	NA	11162	13361	-456		13817
2014	46	160	1884	31	464	916	2	NA	NA	10248	13791	-56		13847
2015	69	215	1130	73	548	1088	5	NA	NA	9970	13098	-134		13232
2016	65	208	1232	0	644	1148	6	NA	NA	9406	12709	467		12242
2017*	71	2803**	952	81	687	993	11	NA	NA	9120	14718	2890**	< 1	11828

\* Preliminary. \*\* The value of official landings in 2017 for Denmark is substantially higher than previous years. It is likely that in 2017 the official landings include IBC. \*\*\* Values prior to 2009 are from historic assessments and prior to 2006 these values are rounded to the nearest 10 t.

**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	Netherlands 7	England (Wales) 7.d	Scotland 7.d	UK 7.d	Total landings	Unallocated landings 7.d	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	89	2115	663	NA	NA	345	3212	87		3125
2015	121	3065	558	NA	NA	365	4109	132		3977
2016	144	2771	557	NA	NA	259	3730	30		3700
2017*	128	2378	583	NA	NA	354	3443	89	< 1	3354

\* Preliminary.

\*\* Values prior to 2009 are from historic assessments and prior to 2006 these values are rounded to the nearest 10 t.

**Summary of the assessment**

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

Year	Recruitment age 0	High	Low	SSB	High	Low	Wanted catch	Unwanted catch	Industrial by-catch	F ages (2–6)	High	Low
	thousands			tonnes			tonnes					
1978	32173603	44134592	23454181	340871	388221	299297	97553	35382	55287	0.66	0.76	0.58
1979	23508077	31840994	17355918	387713	438274	342985	107231	77391	58948	0.65	0.74	0.57
1980	13435164	18025154	10013986	392462	444784	346294	100775	77003	45584	0.76	0.86	0.67
1981	12486394	16663113	9356597	348041	394296	307212	89583	35894	66641	0.76	0.86	0.67
1982	11129465	14775978	8382863	289448	327331	255950	80576	26620	33055	0.61	0.70	0.54
1983	14992109	19884729	11303314	252147	281385	225948	88002	49562	23753	0.68	0.77	0.60
1984	12788531	17005353	9617356	199334	221388	179477	86275	40483	18878	0.79	0.89	0.70
1985	20747524	27561283	15618277	186196	209286	165653	56059	28961	15310	0.76	0.85	0.67
1986	18224476	24134262	13761827	200945	225544	179029	64019	79523	17953	0.82	0.92	0.73
1987	15682572	20821232	11812128	198580	223677	176298	68317	53901	16519	0.93	1.04	0.83
1988	20484987	27300491	15370958	203003	229665	179436	56100	28146	48969	0.78	0.89	0.69
1989	13482017	17800898	10210990	206810	232261	184149	45103	35787	42643	0.85	0.95	0.75
1990	12519715	16450622	9528105	202625	227641	180357	45662	55603	51337	0.76	0.86	0.68
1991	12985402	16903667	9975390	202410	226974	180504	51929	35058	39755	0.64	0.72	0.56
1992	14844061	19297354	11418464	198249	221052	177798	50946	32564	25045	0.59	0.67	0.52
1993	14124277	18362089	10864515	188901	209962	169953	51818	44370	20723	0.63	0.72	0.56
1994	12674306	16496942	9737444	182103	202394	163847	48486	35692	17473	0.66	0.75	0.58
1995	10440111	13670900	7972841	184580	206086	165318	45938	32176	27379	0.61	0.70	0.53
1996	8466452	11271470	6359491	166215	185770	148719	40503	30505	5116	0.55	0.64	0.48
1997	14203355	18869077	10691318	150875	168932	134748	35563	19660	6213	0.44	0.52	0.38
1998	23676831	31515961	17787569	129787	144989	116179	28288	15693	3494	0.40	0.46	0.34
1999	23972919	31945144	17990241	131422	148171	116567	30130	25677	5038	0.45	0.52	0.38
2000	21103066	28215353	15783584	165850	190298	144543	28583	26063	9160	0.49	0.59	0.42
2001	21402326	28758386	15927860	183566	215010	156721	25061	19237	944	0.37	0.46	0.30
2002	11013379	14667232	8269763	186201	219331	158075	20675	18501	7275	0.28	0.35	0.22
2003	10488591	13852574	7941524	174785	205879	148387	16161	26745	2734	0.22	0.28	0.176
2004	11793614	15651285	8886768	168255	197935	143026	13295	19048	1214	0.185	0.23	0.148
2005	11019676	14670011	8277653	149868	175382	128066	15471	12525	888	0.166	0.21	0.134
2006	9396302	12509624	7057805	138601	160761	119496	18535	16310	1924	0.199	0.24	0.163
2007	15274161	20292747	11496718	122457	141442	106021	18915	6971	1088	0.192	0.23	0.158
2008	14931925	19791204	11265731	126656	145267	110429	17951	10296	0	0.186	0.23	0.154
2009	14006950	18601837	10547058	134569	154513	117200	18403	8684	1344	0.22	0.26	0.178
2010	13779469	18621600	10196426	160466	185578	138752	19846	12683	1907	0.24	0.30	0.199
2011	10076610	13432609	7559073	148654	173196	127589	18461	11173	1035	0.21	0.26	0.169
2012	7359536	9945644	5445879	155561	182362	132698	17407	11697	1117	0.21	0.26	0.167
2013	11852610	16014612	8772261	148700	175640	125893	18211	6795	1654	0.20	0.25	0.160
2014	15969752	21942553	11622758	140928	167262	118740	17027	9725	1623	0.23	0.29	0.181
2015	14888780	20982500	10564794	150416	181700	124519	17299	16891	2097	0.26	0.33	0.199
2016	16125587	23719337	10962978	159234	198355	127829	16118	12726	4551	0.25	0.34	0.189
2017	8423682	14266776	4973682	168397	217871	130157	15361	11348	2635	0.22	0.31	0.156
2018	11964329*			180592	244681	133290						

\*In 2018, recruitment is the geometric mean for the years 2002–2017.

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