

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

ICES stock advice

ICES advises that when the MSY approach is applied, total catches in 2017 should be no more than 23 527 tonnes.

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

Stock development over time

Spawning-stock biomass (SSB) has fluctuated around MSY $B_{trigger}$. Fishing mortality (F) has been above F_{MSY} throughout the time-series. Recruitment (R) has been low since 2003, with recruitment in 2014 and 2015 above previous years.

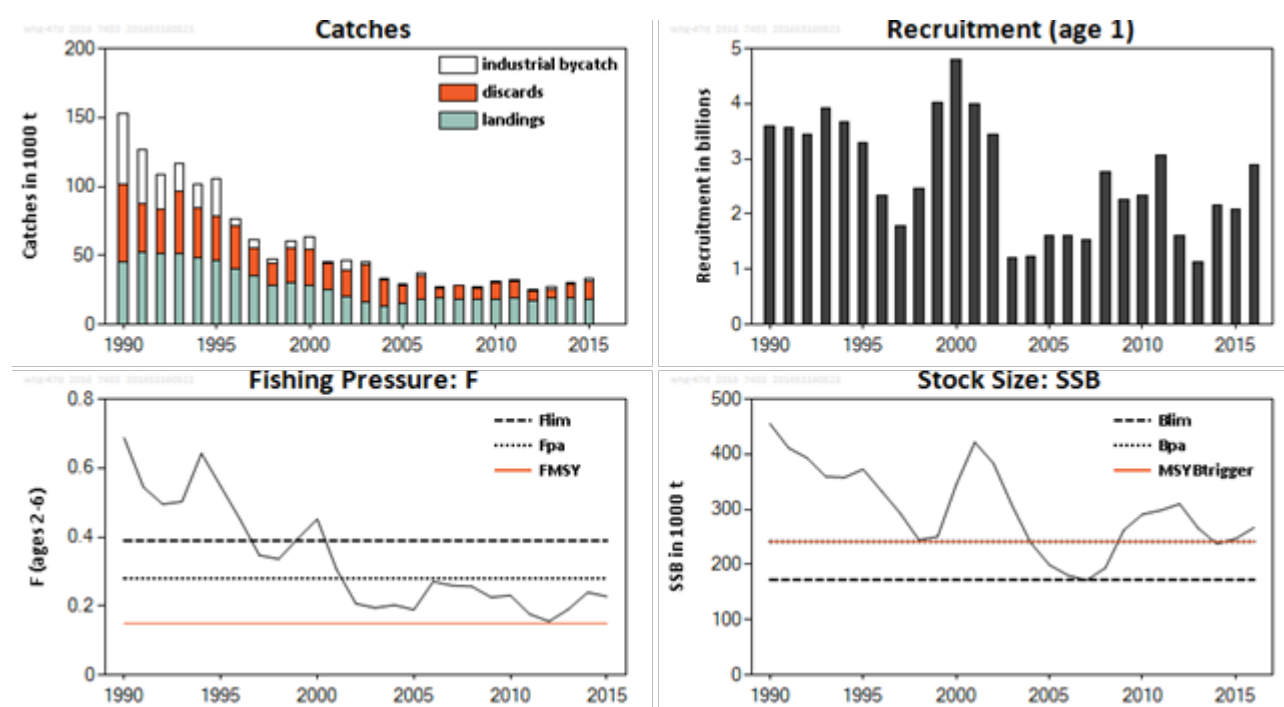


Figure 6.3.56.1 Whiting in Subarea 4 and Division 7.d. Summary of stock assessment.

Stock and exploitation status

Table 6.3.56.1 Whiting in Subarea 4 and Division 7.d. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size		
		2013	2014	2015	2014	2015	2016
Maximum sustainable yield	F_{MSY}	✗	✗	✗ Above	MSY	✗	✓ Above trigger
Precautionary approach	F_{pa} , F_{lim}	✓	✓	✓ Harvested sustainably	B_{pa} , B_{lim}	○	✓ Full reproductive capacity
Management plan	F_{MGT}	-	-	- Not applicable	SSB_{MGT}	-	- Not applicable

Catch options

Table 6.3.56.2 Whiting in Subarea 4 and Division 7.d. The basis for the catch options.

Variable	Value	Source	Notes
F (2016)	0.228	ICES (2016a)	F (2015)
SSB (2017)	310363	ICES (2016a)	Short-term forecast (STF), tonnes
R (2016)	2900	ICES (2016a)	RCT3, millions of individuals
R (2017)	2443	ICES (2016a)	Geometric mean (GM, 1990–2015), millions of individuals
R (2018)	2443	ICES (2016a)	GM (1990–2015), millions of individuals
Total catch (2016)	33601	ICES (2016a)	STF, tonnes
Commercial landings (2016)	18537	ICES (2016a)	STF, tonnes
Discards (2016)	13424	ICES (2016a)	STF, tonnes; discard rate equals average 2013–2015
Industrial bycatch	1640	ICES (2016a)	STF, tonnes; bycatch rate equals average 2013–2015

Table 6.3.56.3 Whiting in Subarea 4 and Division 7.d. The catch options. Weights are in thousand tonnes.

Rationale	Total catch (2017)	Total wanted catch 4 & 7.d (2017)*	Total unwanted catch (2017)*	Total IBC (2017) **	Wanted catch in 4 (2017) ***	Wanted catch 7.d (2017) ***	Basis	F _{total} (2017)	F _{wanted} (2017)	F _{unwanted} (2017)	F _{IBC} (2017)	SSB (2018)	% SSB change ^	% TAC change wanted catch ^^
MSY approach	23.527	12.679	9.042	1.805	9.744	2.935	F _{MSY}	0.150	0.100	0.035	0.015	327.559	5.5	-29
IBC only	1.887	0.000	0.000	1.887	0.000	0.000	No HC fishery	0.015	0.000	0.000	0.015	345.826	11.4	-100
Other options	43.128	24.025	17.372	1.731	18.465	5.561	F _{PA}	0.280	0.196	0.069	0.015	311.140	0.3	35
	23.527	12.679	9.042	1.805	9.744	2.935	EU-Norway Management strategy	0.150	0.100	0.035	0.015	327.559	5.5	-29
	27.184	14.796	10.596	1.791	11.371	3.424	0.75 × F ₂₀₁₅	0.174	0.118	0.041	0.015	324.495	4.6	-17
	27.759	15.128	10.842	1.789	11.626	3.501	15% TAC decrease	0.178	0.121	0.042	0.015	324.015	4.4	-15
	35.900	19.926	14.216	1.758	15.314	4.612	F ₂₀₁₅	0.228	0.158	0.055	0.015	317.115	2.2	12
	32.369	17.797	12.800	1.772	13.678	4.119	Roll-over TAC	0.209	0.144	0.050	0.015	320.152	3.2	0
	43.213	24.075	17.408	1.731	18.503	5.572	1.25 × F ₂₀₁₅	0.281	0.197	0.069	0.015	311.068	0.2	35
	36.980	20.467	14.759	1.754	15.730	4.737	15% TAC increase	0.239	0.166	0.058	0.015	316.289	1.9	15
	59.714	33.626	24.420	1.668	25.843	7.783	F _{lim}	0.390	0.278	0.097	0.015	297.247	-4.2	89
	125.742	71.846	52.478	1.418	55.218	16.629	SSB > B _{PA}	0.828	0.602	0.211	0.015	241.837	-22.0	304
	125.742	71.846	52.478	1.418	55.218	16.629	SSB > MSY B _{trigger}	0.828	0.602	0.211	0.015	241.837	-22.0	304
	208.120	119.531	87.484	1.106	91.866	27.665	SSB > B _{lim}	1.374	1.007	0.353	0.015	172.741	-44.3	572
<i>Mixed fisheries options – differences with calculations above can occur because of the different methodology used (ICES, 2016e.)[†]</i>														
Maximum	70502						A	0.47				291485	-6	
Minimum	13502						B	0.08				339295	9	
Cod	23957						C	0.15				330424	6	
SQ effort	29532						D	0.18				325713	5	
Value	23214						E	0.14				331053	7	

Mixed-fisheries assumptions

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

- A. Maximum scenario: Each fleet stops fishing when its last stock share is exhausted.
- B. Minimum scenario: Each fleet stops fishing when its first stock share is exhausted.
- C. Cod scenario: Each fleet stops fishing when its cod stock share is exhausted.
- D. SQ (status quo) effort scenario: The effort of each fleet in 2016 and 2017 is as in 2015.
- E. Value scenario: The effort of each fleet is equal to the weighted average of the efforts required to catch the fleet's quota share of each of the stocks, where the weights are the relative catch values of each stock in the fleet's portfolio.

* "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 rates estimates for 2013–2015.

** The split of catch between wanted catch, unwanted catch, and industrial bycatch (IBC) in 2017 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).

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

*** The wanted catch split between Subarea 4 and Division 7.d in 2017 is the same as the proportion of landings between the areas in 2015: 76.9% from Subarea 4 and 23.1% from Division 7.d. This assumes that management for Division 7d is separate from Subarea 7. Total catches are based on a combined discard rate for Subarea 4 and Division 7.d.

^ SSB 2018 relative to SSB 2017.

^^ Human consumption (HC; wanted catch) for Subarea 4 in 2017 relative to TAC for Subarea 4 and Division 2.a in 2016 (13 678 t).

Basis of the advice

Table 6.3.56.4 Whiting in Subarea 4 and Division 7.d. The basis of the advice.

Advice basis	MSY approach
Management plan	<p>The MSY approach using the new F_{MSY} replaces the EU-Norway management strategy for whiting in the North Sea used as the basis for advice in previous years.</p> <p>In an Interbenchmark in 2016, new natural mortality values (ICES, 2015a) were applied. The risk to fall below B_{lim} was higher than 5% when using the harvest control rule F_{MGT}, as proposed in the EU-Norway management strategy (0.15 without a $B_{trigger}$ value). Therefore, the MSY approach is used with F_{MSY} of 0.15 and an additional check whether $SSB(2018) > B_{lim}$ (ICES, 2016c).</p>

Quality of the assessment

The overall reporting of catch data provided to ICES has improved during the period 2012–2015 through, for example, the fully documented fisheries (FDF) programme and increased coverage by the Scottish industry/science observer sampling scheme.

In 2014, natural mortality estimates were revised, resulting in a rescaling of recruitment. After an interbenchmark in early 2016, it was decided to use these new natural mortality values (ICES, 2016c).

Within the North Sea, stock identity remains an unresolved issue with this assessment.

There have been issues with regard to the age readings of North Sea whiting as compared to other gadoids. There are inconsistencies between countries' age reading. This applies in particular to the age readings used for the International Bottom Trawl Survey (IBTS) indices. Until the issue is resolved, age readings are used as in previous years.

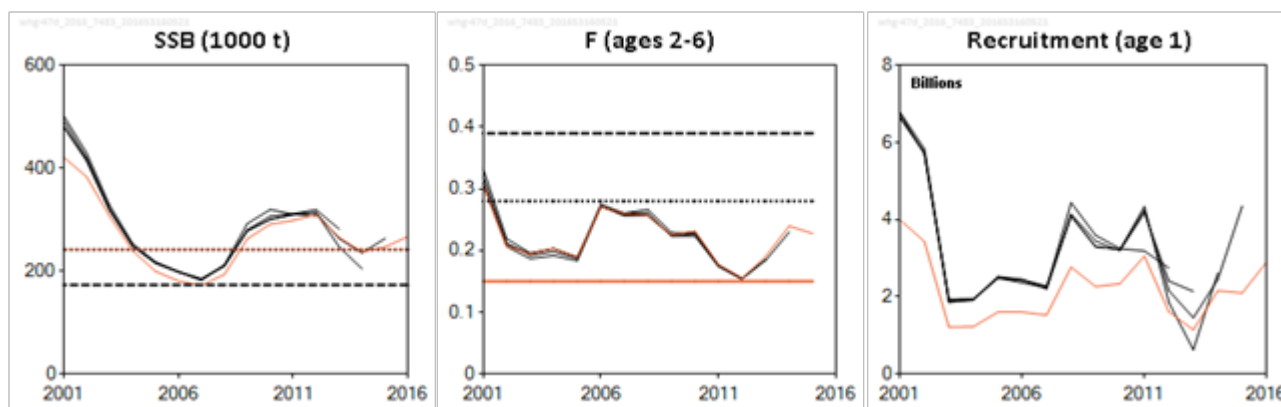


Figure 6.3.56.2 Whiting in Subarea 4 and Division 7.d. Historical assessment results (final-year recruitment estimates included).

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.

To maximize the benefit for the fishery of this stock, the most significant measure would be to improve selectivity in those fisheries in which high rates of discarding occur.

The stock dynamics of North Sea whiting are largely driven by recruitment and natural mortality, and alternative management strategies should be evaluated for this stock.

Because of updated natural mortality estimates (ICES, 2015a), the management strategy following the EU-Norway management strategy (fixed F without B_{trigger} and TAC constraints) used in previous year's advice is no longer considered precautionary (ICES, 2016b). Accordingly, ICES provides advice on the MSY approach (with B_{trigger}).

Results from a North Sea mixed-fisheries analysis are presented in ICES (2016b). For 2017, assuming a strictly implemented discard ban (corresponding to the "Minimum" scenario), haddock would be the most limiting stock (assuming that the full advised catch is taken), constraining 36 out of 41 fleet segments (corresponding to 91% of the 2015 kW days of effort). Cod and eastern Channel sole would be limiting for fleets, corresponding to 5% and 4% of the 2015 effort, respectively. Conversely, in the "Maximum" scenario with *Nephrops* managed by separate TACs for the individual functional units (FUs), *Nephrops* would be considered the least limiting stocks in many FUs. *Nephrops* in FU 33, FU 5, FU 32, FU 7, and FU Others would be the least limiting stocks for fleets in these FUs, representing 32%, 16%, 10%, 4%, and 17% of the 2015 effort, respectively. Eastern Channel plaice and saithe would be least limiting for other fleet segments, representing 12% and 9% of the 2015 effort, respectively.

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

Reference points

Table 6.3.56.5 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}	242000 t	B_{pa}	ICES (2016c)
	F_{MSY}	0.15	F leading to 5% probability to fall below B_{lim}	ICES (2016c)
Precautionary approach	B_{lim}	173000 t	B_{loss} (SSB in 2007 in the 2016 assessment)	ICES (2016c)
	B_{pa}	242000 t	$B_{\text{lim}} \times \exp(1.645\sigma_B)$; $\sigma_B = 0.205$	ICES (2016c)
	F_{lim}	0.39	F leading to 50% probability to fall below B_{lim}	ICES (2016c)
	F_{pa}	0.28	$F_{\text{lim}} \times \exp(-1.645\sigma_F)$; $\sigma_F = 0.205$	ICES (2016c)

Basis of the assessment

Table 6.3.56.6 Whiting in Subarea 4 and Division 7.d. The basis of the assessment.

ICES stock data category	1 (ICES, 2016d)
Assessment type	Age-based analytical assessment (XSA; ICES, 2015b) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, ages from catch sampling by métier), two survey indices (IBTS Q1 & Q3 ages 1 to 5); maturity data assumed fixed through time; time-varying natural mortalities from the SMS multispecies model (ICES, 2011).
Discards and bycatch	Included in the assessment, using samples (in 2015) to estimate discards from France, UK (England), and UK (Scotland). 70% of the landings had associated discard data imported into Intercatch.. There were no biological samples available for industrial bycatch in 2015. 83% of the discards were imported, the remaining percent was raised discards. 49% of the discards had biological samples associated.
Indicators	None
Other information	This assessment was benchmarked in 2013 (WKROUND; ICES, 2013a). There was an interbenchmark to test new natural mortality values in early 2016 (ICES, 2016c).
Working groups	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), Working Group on Mixed-Fisheries Advice (WGMIXFISH-ADVICE)

Information from stakeholders

The majority of responses from the Fishers' Survey reported an increase in the abundance of whiting in most areas over the last decade (Napier, 2014; Figure 6.3.56.3). This is in contrast with the assessment estimates of SSB, which have remained relatively stable since 2003. No new information has been provided for 2015.

Abundance Index

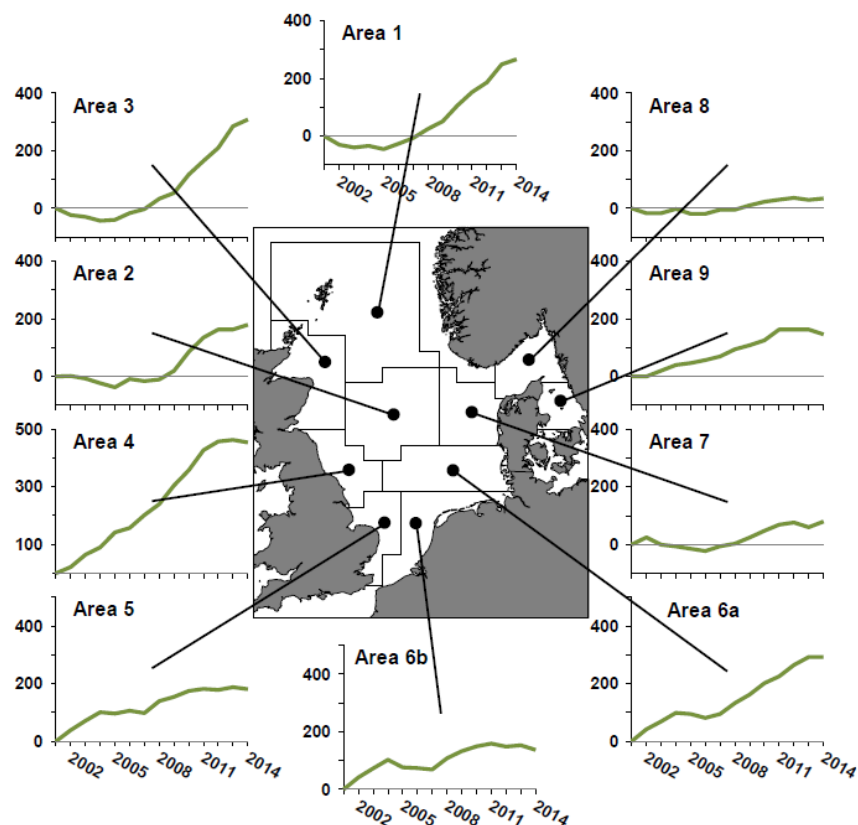


Figure 6.3.56.3 Cumulative time-series of index of perceptions of abundance of whiting by roundfish sampling area from the Fishers' North Sea Stock Survey (Napier (2014); see page 14 for explanation of the index).

History of advice, catch, and management

Table 6.3.56.7a Whiting in Subarea 4 and Division 7.d. History of ICES advice, the agreed TAC, and ICES estimates of catches. Weights are in thousand tonnes. n/a = Not available.**Subarea 4 (North Sea)**

Year	ICES advice	Predicted landings corresp. to advice*	Predicted catch corresp. to advice**	Agreed TAC	Official landings	ICES estimates			
						Human cons. landings	Indust. bycatch	Discards	Total catch
1989	Protect juveniles	-		115	40	41	43	36	120
1990	80% of F(88); TAC	130		125	41	42	51	52	146
1991	70% of effort (89)	-		141	47	46	40	30	117
1992	70% of effort (89)	-		135	47	45	25	28	99
1993	70% of effort (89)	-		120	47	47	21	41	109
1994	Significant reduction in effort; mixed fishery	-		100	42	42	17	32	91
1995	Significant reduction in effort; mixed fishery	-		81	41	41	27	29	97
1996	Mixed fishery; take into account cod advice	-		67	35	36	5	27	68
1997	Mixed fishery; take into account cod advice	-		74	32	31	6	17	54
1998	No increase from 1996 level	54		60	24	24	3	12	40
1999	at least 20% reduction of F(95–97)	40.4		44	25	26	5	22	52
2000	lowest possible catch	0		30	24	24	9	22	55
2001	60% reduction of F(97–99)	19.4		30	19	19	1	16	36
2002	F not larger than 0.37	≤ 33		32	16	15	7	17	39
2003	No cod catches	-		16	11	10	3	26	39
2004	No cod catches. Fishing mortality in 2004 should be < F _{pa}	No increase compared to recent years		16	9	9	1	18	28
2005	No cod catches. Less than recent average	52		28.5	8	11	1	10	22
2006	No cod catches. Less than recent average	< 17.3		23.8	16	15	2	14	31
2007	No cod catches. Less than recent average	< 15.1		23.8	16	16	1	5	22
2008	No cod catches. Less than recent average	< 15.1		17.9	14	13	0	8	22
2009	No cod catches. F < F _{max}	< 11		15.2	12	12	1	5	18
2010	No cod catches. Stable SSB	< 6.8		12.9	12	12	1	8	21
2011	No cod catches. Stable SSB	< 9.5		14.832	13	13	2	8	23
2012	Management plan	< 17.1		17.056	12.588	12.929	0.078	5.929	18.936
2013	Precautionary considerations (F = 0.225) and separate management for Division 7d	< 19		18.932	13.361	15.384	1.53	4.198	21.119
2014	November update: Precautionary considerations (15% TAC reduction) and separate management for Division 7d	< 16.092		16.092	13.756	15.616	1.479	8.326	25.421
2015	November update: management plan and separate management for Division 7d	< 13.678		13.678	13.098	13.609	2.053	10.468	24.076
2016	EU–Norway management strategy	< 12.373	< 30.510	13.678					
2017	MSY approach	≤ 9.744 ***	≤ 23.527						

*Including Division 7d from 2006 to 2010.

**Catch corresponding to the advice for the whole stock (Subarea 4 and Division 7.d).

*** Landings are only for Division 7.d.

Table 6.3.56.7b Whiting in Subarea 4 and Division 7.d. History of ICES advice, the agreed TAC, and ICES estimates of catches. Weights are in thousand tonnes. n/a = Not available.**Division 7.d (Eastern Channel)**

Year	ICES advice	Predicted landings corresp. to advice*	Predicted catch corresp. to advice^	Agreed TAC ***	Official landings	ICES estimates		
						Human cons.	Discards	Total catch
1989	Precautionary TAC	-		-	n/a	4.2	n/a	n/a
1990	No increase in F; TAC	8.0 **		-	n/a	3.5	3.3	6.8
1991	F _{sq} ; TAC	5.1		-	n/a	5.7	4.2	9.9
1992	If required, precautionary TAC	6.0 **		-	5.9	5.7	4.1	9.8
1993	No basis for advice	-		-	5.4	5.2	3	8.2
1994	No long-term gains in increasing F	-		-	7.1	6.6	3.9	10.5
1995	Significant reduction in effort; link to North Sea	-		-	5.6	5.4	3.2	8.6
1996	Reference made to North Sea advice	-		-	5.1	5.0	3.4	8.3
1997	Reference made to North Sea advice	-		-	4.8	4.6	3.0	7.6
1998	Reference made to North Sea advice	5.8		27	4.8	4.6	3.2	7.8
1999	Reference made to North Sea advice	3.9		25	0.2	4.4	3.6	8.0
2000	Lowest possible catch	0		22	6.1	4.3	4.1	8.4
2001	60% reduction of F _{sq}	2.5		21	6.6	5.8	3.1	8.9
2002	F not larger than 0.37	≤ 4		31.7	5.4	5.8	1.3	7.2
2003	No cod catches	-		27	7.0	5.7	0.6	6.3
2004	No cod catches. Fishing mortality should be < F _{pa}	Catch should not increase compared to recent years		21.6	5.3	4.4	0.9	5.3
2005	No cod catches	-		19.9	4.9	4.8	2.2	7.0
2006	No cod catches. Less than recent average	< 17.3		19.9	3.7	3.4	2.2	5.7
2007	No cod catches. Less than recent average	< 15.1		19.9	3.4	3.3	1.8	5.0
2008	No cod catches. Less than recent average	< 15.1		19.9	3.2	4.5	1.9	6.4
2009	No cod catches. F < F _{max}	< 11		16.9	6.6	6.6	2.5	9.1
2010	No cod catches. Stable SSB	< 6.8		14.4	6.1	6.0	3.7	9.7
2011	No cod catches. Stable SSB	< 3.2		16.6	5.5	5.1	3.5	8.6
2012	Management plan	< 4.2		19.053	3.857	4.103	2.446	6.549
2013	Precautionary considerations (F = 0.225) and separate management for Division 7d	< 7		24.500	4.293	3.950	1.778	5.728
2014	November update: Precautionary considerations (15% TAC reduction) and separate management for Division 7d	< 5.106		20.668	3.212	3.130	2.125	5.255
2015	November update: management plan and separate management for Division 7d	< 3.512		17.742	4.109	4.098	2.961	7.059
2016	EU–Norway management strategy Division 7d	< 2.480	< 30.510	22.778				
2017	MSY approach	≤ 2.935^^	≤ 23.527					

* Includes both areas (Subarea 4 and Division 7.d) from 2006 to 2010.

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

*** Including Division 7.e.

^ Catch corresponding to the advice for the whole stock (Subarea 4 and Division 7.d).

^^ Landings are only for Division 7.d.

History of catch and landings

Table 6.3.56.8 Whiting in Subarea 4 and Division 7.d. Catch distribution by fleet in 2015 as estimated by ICES.

Catch (2015)	Landings				Discards	Industrial bycatch
33 188 t	53% demersal trawls and seine, mesh size ≥120 mm (North Sea)	13% demersal trawls, mesh size 70–99 mm (North Sea)	19% demersal trawls, mesh size 70–99 mm (Eastern Channel)	15% other gears	13 428 t	2053 t
	17 706 t					

Table 6.3.56.9a Whiting in Subarea 4. History of commercial landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. Weights in tonnes. NA = not available.

Year	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden	England (Wales)	Scotland	UK	Total landings	Unallocated 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	544	11774
2010	147	156	2644	156	614	118	8	NA	NA	7845	11690	-591	12281
2011	74	135	2794	111	514	28	6	NA	NA	8892	12554	-751	13305
2012	45	131	1925	25	471	94	4	NA	NA	9893	12588	-341	12929
2013	33	124	942	44	495	560	1	NA	NA	11162	13361	-2023	15384
2014	46	160	1887	31	466	916	2	NA	NA	10248	13756	-1860	15616
2015	69	215	1130	73	548	1088	5	NA	NA	9970	13098	-510	13608

Table 6.3.56.9b Whiting in Division 7.d. History of commercial landings. Both the official and ICES estimated values are presented by area for each country participating in the fishery. Weights 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	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	203	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	-77	6646
2010	88	5512	275	NA	NA	258	6133	194	5939
2011	78	4833	282	NA	NA	271	5464	400	5064
2012	66	3093	437	NA	NA	261	3857	-246	4103
2013	95	3076	650	NA	NA	472	4293	-343	3950
2014	89	2115	663	NA	NA	345	3212	-82	3130
2015	121	3065	558	NA	NA	365	4109	11	4098

Summary of the assessment

Table 6.3.56.10 Whiting in Subarea 4 and Division 7.d. Assessment summary (weights in tonnes).

Year	Recruitment age 1 (thousands)	Stock size: SSB	Landings	Discards	Industrial bycatch	Fishing pressure: F ages 2–6
1990	3602988	455397	45662	55603	51337	0.687
1991	3561689	411205	51929	35058	39755	0.544
1992	3429482	393038	50946	32564	25045	0.495
1993	3911169	359374	51818	44370	20723	0.503
1994	3665192	357759	48486	35692	17473	0.642
1995	3286257	372599	45938	32176	27379	0.547
1996	2338049	332860	40503	30505	5116	0.451
1997	1785364	292840	35563	19660	6213	0.347
1998	2473817	244557	28288	15693	3494	0.336
1999	4023722	250537	30130	25677	5038	0.396
2000	4784856	344713	28583	26063	9160	0.452
2001	3996189	421586	25061	19237	944	0.306
2002	3432777	383340	20675	18501	7275	0.207
2003	1210399	307048	16161	26745	2734	0.195
2004	1225220	239720	13295	19048	1214	0.203
2005	1599745	199482	15471	12525	888	0.189
2006	1600655	180601	18535	16310	2193	0.271
2007	1526369	171915	18915	6971	1239	0.259
2008	2767240	193429	17951	10296	0	0.257
2009	2263468	262550	18418	7705	1016	0.225
2010	2335777	291072	18224	11577	1346	0.231
2011	3053030	298456	18899	11977	1750	0.176
2012	1612011	309860	17032	7968	78	0.155
2013	1140360	265474	19335	5976	1530	0.191
2014	2155672	237652	18746	10451	1479	0.24
2015	2097757	246870	17707	13428	2053	0.227
2016	2900142*	266998**				

* RCT3 estimate.

** Estimated survivors from 2015.

Sources and references

ICES. 2013a. Report of the Benchmark Workshop on Roundfish Stocks (WKROUND), 4–8 February 2013, Aberdeen, UK. ICES CM 2013/ACOM:47.

ICES. 2013b. Joint EU–Norway request to evaluate the long-term management plan for whiting in the North Sea. *In* Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 6, Section 6.3.5.2.

ICES. 2015a. Report of the Working Group on Multispecies Assessment Methods (WGSAM), 9–13 November 2015, Woods Hole, USA. ICES CM 2015/SSGEPI:20.

ICES. 2015b. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April–7 May 2015, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1229 pp.

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

ICES. 2016b. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 14–18 March 2016, Copenhagen, Denmark. ICES CM 2016/ACOM:37.

ICES. 2016c. Report of the Inter-Benchmark Protocol for Whiting in the North Sea (IBP Whiting), May 2016, By correspondence. ICES CM 2016/ACOM:48. 69 pp

ICES. 2016d. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2016/2016/Introduction_to_advice_2016.pdf

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

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

[†] Version 2: Reference added