

Whiting (*Merlangius merlangus*) in divisions 7.b–c and 7.e–k (southern Celtic Seas and western English Channel)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 15 841 tonnes.

Management should be implemented at the stock level.

Stock development over time

The spawning–stock biomass (SSB) has decreased since 2012 but remains above MSY $B_{trigger}$. Fishing mortality (F) has been below F_{MSY} since 2008, but increased in recent years and is just above F_{MSY} in 2017. Recruitment has been relatively stable, with the exception of three strong year classes with the most recent one occurring in 2013.

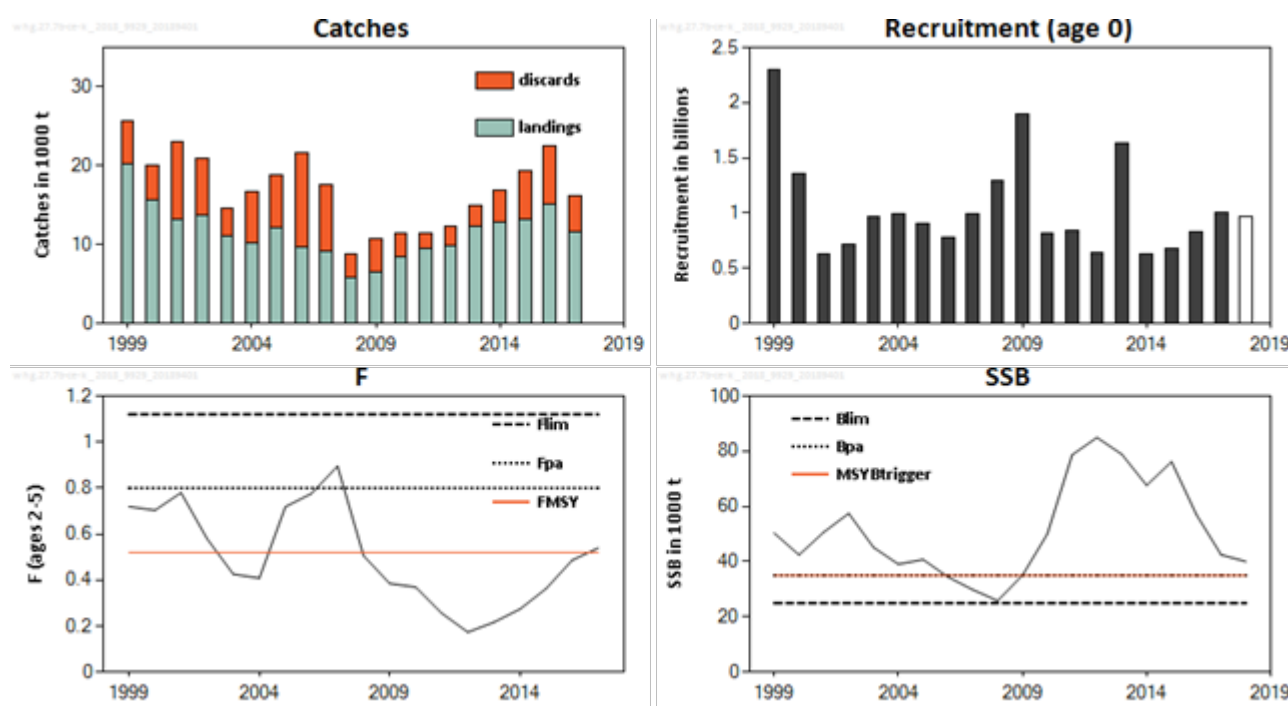


Figure 1* Whiting in divisions 7.b–c and 7.e–k. Summary of the stock assessment. The assumed recruitment value is not shaded.

Stock and exploitation status

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

*Version 2: SSB value for 2018 updated.

Table 1 Whiting in divisions 7.b–c and 7.e–k. 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	$B_{trigger}$	✓ 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 divisions 7.b–c and 7.e–k. The basis for the catch options.

Variable	Value	Notes
$F_{ages\ 2-5}$ (2018)	0.54	$F_{sq} = F_{average}$ (2015–2017) rescaled to 2017
SSB (2019)	42 819 tonnes	Fishing at F_{sq}
Recruitment age 0 (2018–2019)	971 263 thousands	$GM_{1999-2016}$
Total catch (2018)	15 770 tonnes	Fishing at F_{sq}
Wanted catch (2018)	10 322 tonnes	Average discard pattern (2015–2017)
Unwanted catch (2018)	5 571 tonnes	Average discard pattern (2015–2017)

Table 3 Whiting in divisions 7.b–c and 7.e–k. Annual catch scenarios. All weights are in tonnes. No information on % TAC change can be shown because the TAC area differs from the stock distribution area.

Basis	Total catch (2019)	Wanted catch* (2019)	Unwanted catch* (2019)	F_{total} (2019)	F_{wanted} (2019)	$F_{unwanted}$ (2019)	SSB (2020)	% SSB change **	% Advice change ***
ICES advice basis									
MSY approach: F_{MSY}	15841	9882	5960	0.52	0.34	0.18	44943	5	-18.5
Other scenarios									
$F_{MSY\ lower}$	10468	6602	3866	0.32	0.21	0.11	49610	15.9	-46
$F_{MSY\ upper}$	19395	12002	7393	0.67	0.44	0.23	41904	-2	-0.175
$F = 0$	0	0	0	0	0	0	58900	38	-100
$F = F_{pa}$	22190	13639	8552	0.80	0.53	0.27	39543	-8	14.2
$F = F_{lim}$	28128	17013	11115	1.12	0.74	0.38	34628	-19.1	45
$SSB_{2020} = B_{lim}$	40437	23447	16990	2.08	1.37	0.71	25000	-42	108
$SSB_{2020} = B_{pa} = B_{trigger}$	27672	16760	10912	1.09	0.72	0.37	35000	-18.3	42
$F = F_{2018}$	16320	10169	6150	0.54	0.36	0.18	44532	4	-16.0
Mixed fisheries options									
A: Max.	16089	-	-	0.53	-	-	44731	4	-
B: Min.	0	-	-	0	-	-	58900	38	-
C: Stock	15841	-	-	0.52	-	-	44943	5	-
D: SQ effort	17679	-	-	0.59	-	-	43367	1.28	-
E: Value	11995	-	-	0.37	-	-	48336	4	-
F: Range	10668	-	-	0.33	-	-	49434	15.4	-

* “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded, respectively, in the absence of the EU landing obligation.

** SSB 2020 relative to SSB 2019.

*** Advice value for 2019 relative to advice value for 2018 (19 429 tonnes).

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. Stock scenario: Each fleet stops fishing when its individual stock share is exhausted.
- D. SQ (*status quo*) effort scenario: The effort of each fleet in 2018 and 2019 is the same 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 (price × weight) of each stock in the fleet's portfolio.
- F. Range scenario: The potential for TAC mismatch in 2019 is minimized within the F_{MSY} range, for the demersal fish stocks for which such a range is available (cod in divisions 7.e–k, haddock in divisions 7.b–k, and whiting in divisions 7.b–c and 7.e–k).

SSB is declining and has been revised downwards in the current assessment, which has resulted in a reduction in catch advice for 2019.

Basis of the advice

Table 4 Whiting in divisions 7.b–c and 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU has proposed a multiannual management plan for the Western Waters, which is not yet finalized. (EU, 2018).

Quality of the assessment

The assessment this year shows a significant downward revision in SSB compared with last year. The downward revision of the strong 2013 year class is likely to have contributed to the SSB revision.

The French contribution to the combined IBTS survey tuning index was not available for 2017 and was partially replaced by extended Irish survey coverage. This was not considered to have impacted on the quality of the assessment.

Owing to a lack of French market sampling of length in Q1 and Q2 of 2017 (biological and on-board sampling was unaffected), some sampling strata length data were supplemented using data from previous years. This is considered to have limited impact on the assessment.



Figure 2† Whiting in divisions 7.b, 7.c, and 7.e–k. Historical assessment results (final-year recruitment estimates included).

† Version 2: SSB value for 2018 updated.

Issues relevant for the advice

Discards by weight continued to be high in 2017, despite the introduction of the square-mesh panels in 2012. The majority of discards occur above the minimum landing size.

Whiting in divisions 7.b, 7.c, and 7.e–k is managed under a common TAC with whiting in Division 7.d. By mixing the biological and TAC areas for different whiting stocks, it will be difficult to achieve the objective of fishing at MSY for both stocks. ICES therefore recommends that the TAC area corresponds to the assessment area.

Mixed fish considerations

Whiting are caught in mixed fisheries with cod and haddock, and this should be taken into account when managing the fishery. The mixed-fisheries analysis carried out by ICES shows that cod will be the limiting species for all fleets (representing 100% of fleet effort) in 2019 (ICES, 2018). Whiting is fished at or below F_{MSY} in 2018 under all mixed-fisheries scenarios except 'max' and 'status quo effort', reflecting that it is the least limiting stock for most fleets (representing 68% of fleet effort).

This year, two "range" scenarios are presented; the traditional range scenario which uses the ICES advice of zero catches for cod, and a new range scenario which uses the uncapped reduced MSY approach for cod. Both of these scenarios search for the minimum sum of differences between potential catches by stock under the "min" and the "max" scenarios within the F_{MSY} ranges. The outcome of both of these scenarios are driven by the limiting cod catch in 2019. All fleets within the Celtic Sea catch cod to a greater or lesser extent, therefore these large reductions in fishing mortality of cod result in a "choke" for both haddock and whiting in all fleets.

Reference points

Table 5 Whiting in divisions 7.b–c and 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	35000 t	B_{pa}	ICES (2016a)
	F_{MSY}	0.52	Segmented regression with B_{loss} , the lowest observed spawning stock biomass (EqSim).	ICES (2016a)
Precautionary approach	B_{lim}	25000 t	Lowest observed SSB (2008), rounded value	ICES (2016b)
	B_{pa}	3000 t	$B_{lim} \times 1.4$	ICES (2016b)
	F_{lim}	1.12	Based on a segmented regression with B_{lim} as breakpoint	ICES (2016b)
	F_{pa}	0.80	$F_{lim}/1.4$	ICES (2016b)
Management plan*	MAP MSY $B_{trigger}$	35000 t	MSY $B_{trigger}$	
	MAP B_{pa}	35000 t	B_{pa}	
	MAP B_{lim}	25000 t	B_{lim}	
	MAP F_{MSY}	0.52	F_{MSY}	
	MAP range F_{lower}	0.32	Consistent with ranges provided by ICES (2016a), resulting in no more than 5% reduction in long-term yield compared with MSY.	
	MAP range F_{upper}	0.67	Consistent with ranges provided by ICES (2016a), resulting in no more than 5% reduction in long-term yield compared with MSY.	

* Proposed EU multiannual plan (MAP) for the Western Waters (EU, 2018).

Basis of the assessment

Table 6 Whiting in divisions 7.b–c and 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016c).
Assessment type	Age-based analytical assessment (XSA) that uses catches in the model and in the forecast.
Input data	Commercial landings, estimated discards, age composition of catches and one survey index (EVHOE-WIBTS-Q4 & IGFS-WIBTS-Q4 combined: IGFSEVHOE); maturity knife-edge at age 2; Lorenzen-based M (Lorenzen, 1996) derived from the mean weight-at-age.
Discards and bycatch	Included in the assessment for the full time-series.
Indicators	None.
Other information	This stock was benchmarked in 2014 (WKCELT; ICES, 2014).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Whiting in divisions 7.b–c and 7.e–k. ICES advice and landings as used in the assessment. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	ICES discards
1987	<i>Status quo</i> F; TAC	-	7100 [#]	18500	13720	
1988	Precautionary TAC	-	7000 [#]	18500	15822	
1989	Precautionary TAC	-	7900 [#]	19300	24276	
1990	No increase in F; TAC	-	8400 [#]	24000	24099	
1991	Precautionary TAC	-	8000 [#]	24000	14402	
1992	If required, precautionary TAC	-	8000 [#]	22000	14419	
1993	Within safe biological limits	-	6600 [#]	22000	17904	
1994	Within safe biological limits	-	< 9400 [#]	29000	21659	
1995	20% reduction in F	-	8200 ^{##}	31000	23559	
1996	20% reduction in F	-	600 ^{##}	28000	19539	
1997	At least 20% reduction in F	-	< 7300 ^{###}	27000	21067	
1998	At least 20% reduction in F	-	< 8200 ^{###}	27000	19710	
1999	No increase in F	-	12400 ^{###}	25000	24260	5420
2000	17% reduction in F	-	< 13100 ^{###}	22200	16030	4400
2001	No increase in F	-	13500 ^{###}	21000	13832	9877
2002	No increase in F	-	27700 ^{###}	31700	14295	7336
2003	No increase in F	-	20200 ^{###}	27000	11418	3559
2004	No increase in F	-	14000 ^{###}	27000	10119	6481
2005	No increase in F	-	10600 ^{###}	21600	12496	6700
2006	No increase in F	-	10800 ^{###}	19940	9951	12031
2007	No increase in F	-	-	19940	9228	8456
2008	Reduction in F	-	-	19940	6254	2880
2009	Same advice as last year	-	-	16949	6553	4101
2010	Same advice as last year	-	-	14407	8781	3008
2011	See scenarios	-	-	16658	10076	1954
2012	No increase catch and improved gear	-	-	19053	10626	2449
2013	MSY approach	-	< 17500 ^{###}	24500	12118	2512

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	ICES discards
2014	MSY approach	-	< 15562###	19162	13117	3977
2015	MSY approach	< 18501	< 14230	17742	13145	6101
2016	MSY approach	≤ 19076	≤ 15395	22778	15179	7278
2017	MSY approach	≤ 25125	≤ 19825	27500	11693	4505
2018	MSY approach	≤ 19429	≤ 13759	22213		
2019	MSY approach	≤ 15841				

*TAC covers Subarea 7 (except Division 7.a).

For the divisions 7.f and 7.g stock component.

For the divisions 7.f–h stock component.

For the divisions 7.e–k stock component.

History of the catch and landings

Table 8 Whiting in divisions 7.b–c and 7.e–k. Catch distribution by fleet in 2017 as estimated by ICES.

Catch	Landings					Discards				
	Otter trawls	Seine nets	Beam trawls	Midwater	Other gears	Otter trawls	Seine nets	Beam trawls	Midwater	Other gears
16 198 t	77%	14%	2%	1%	6%	61%	21%	5%	1%	12%
	11693 t					4505 t				

Table 9 Whiting in divisions 7.b –c and 7.e–k. History of commercial landings; the official landings by country and estimated landings in rectangles 33E2 & 33E3 are presented. All weights are in tonnes.

Year	Belgium	France	Ireland	UK England & Wales	Others	Rectangles 33E2 & 33E3**	Total
1998	479	11 748	5549	1755	179		19 710
1999	448	16 418	6013	1354	27		24 260
2000	194	9186	5358	1255	39		16 032
2001	171	7317	5365	948	31		13 832
2002	149	7548	5718	847	35		14 297
2003	129	5989	4516	763	21		11 418
2004	180	4874	4350	587	132		10 123
2005	218	5913	5774	482	136		12 523
2006	128	4711	4570	413	129		9951
2007	127	3575	4864	575	86		9227
2008	122	3072	2406	618	35		6253
2009	87	2815	2798	828	25		6553
2010	101	3464	4331	792	86		8774
2011	100	4311	4752	739	174		10 076
2012	170	3709	5842	750	141	32	10 644
2013	226	4056	6895	906	92	34	12175
2014	222	4980	6883	1063	36	49	13184
2015	152	5676	6438	828	98	32	13192
2016*	186	6294	7644	890	38	40	15052
2017*	102	5256	6296	607	32	20	12293

*Preliminary.

**Included in Ireland landing estimates. Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are included in the assessment and are considered to be part of the stock.

Summary of the assessment

Table 10 Whiting in divisions 7.b–c and 7.e–k. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment age 0	SSB	Landings	Discards	F ages 2–5
1999	2301323	50349	20180	5420	0.72
2000	1361022	42424	15644	4400	0.70
2001	624693	50674	13196	9877	0.78
2002	718234	57460	13640	7336	0.58
2003	972032	45153	11098	3559	0.43
2004	989782	39083	10188	6481	0.41
2005	898863	40742	12207	6700	0.72
2006	777051	34429	9660	12031	0.78
2007	988702	29805	9086	8456	0.90
2008	1300432	25819	5859	2880	0.51
2009	1892949	35043	6572	4101	0.39
2010	820509	50049	8514	3008	0.37
2011	839672	78666	9498	1954	0.26
2012	641985	84943	9812	2449	0.174
2013	1629688	78884	12402	2512	0.22
2014	631040	67627	12847	3977	0.27
2015	680365	76187	13174	6101	0.36
2016	831787	57048	15179	7278	0.49
2017	1002643	42470	11693	4505	0.54
2018	*971263	40029			

* Geometric mean recruitment 1999–2016.

Sources and references

EU. 2018. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a multiannual plan for fish stocks in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulation (EU) 2016/1139 establishing a multiannual plan for the Baltic Sea, and repealing Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) 509/2007 and (EC) 1300/2008. COM/2018/0149 final. 30 pp. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018PC0149&from=EN>.

ICES. 2014. Report of the Benchmark Workshop on Celtic Sea Stocks (WKCELT), 3–7 February 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:42. 194 pp.

ICES. 2016a. EU request to ICES to provide F_{MSY} ranges for selected stocks in ICES subareas 5 to 10. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 5, Section 5.4.1. 13 pp.

ICES. 2016b. Report of the Workshop to consider F_{MSY} ranges for stocks in ICES categories 1 and 2 in Western Waters (WKMSYREF4), 13–16 October 2015, Brest, France. ICES CM 2015/ACOM:58. 187 pp.

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

ICES. 2018. Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE), 21–25 May 2018, ICES Headquarters, Copenhagen, Denmark. ICES CM 2018/ACOM:18. *In prep.*

Lorenzen, K. 1996. The relationship between body weight and natural mortality in juvenile and adult fish: a comparison of natural ecosystems and aquaculture. *Journal of Fish Biology*, 49(4): 627–642.