

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 EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, catches in 2021 that correspond to the F ranges in the MAP are between 4458 tonnes and 5261 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has decreased since 2010 and is estimated to have been below $MSY B_{trigger}$ since 2017 and below B_{lim} since 2018. Fishing mortality (F) has generally fluctuated above F_{MSY} throughout the time-series and was below F_{MSY} in 2019. Recruitment has been relatively low since 2010, with the exception of 2013.



Figure 1 Whiting in divisions 7.b–c and 7.e–k. Summary of the stock assessment. The paler shaded recruitment is assumed. Discard estimates are available since 2003; prior to 2003, discards have been reconstructed from incomplete sampling data.

Stock and exploitation status

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

Table 1 Whiting in divisions 7.b–c and 7.e–k. State of the stock and the fishery relative to reference points.

	Fishing pressure			Stock size			
		2017	2018	2019	2018	2019	2020
Maximum sustainable yield	F_{MSY}	✗	✗	✓ Below	$MSY B_{trigger}$	✗	✗ Below trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓ Harvested sustainably	B_{pa}, B_{lim}	✗	✗ Reduced reproductive capacity
Management plan	F_{MGT}	✗	✗	✓ Within the range	B_{MGT}	✗	✗ Below trigger

Catch scenarios

Table 2 Whiting in divisions 7.b–c and 7.e–k. The basis for the catch scenarios.

Variable	Value	Notes
$F_{\text{ages 2-5}} (2020)$	0.495	F_{mix} = mixed fisheries catch constraint (Total catch [2020] = 8772 tonnes).
SSB_{2021}	32108	Fishing at F_{mix} ; in tonnes.
Recruitment age 0 (2020–2021)	568878	Median resampled (2010–2019); in thousands.
Catch (2020)	8772	Catch based on mixed fisheries considerations (ICES 2019a) when haddock is fished in 2020 at $F=0.4$; in tonnes.
Projected landings (2020)	6937	Short-term forecast assuming average 2017–2019 landings pattern; in tonnes.
Projected discards (2020)	1835	Short-term forecast assuming average 2017–2019 discard pattern; in tonnes.

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 (2021)	Projected landings (2021)	Projected discards (2021)	F_{total} (2021)	$F_{\text{projected landings}}$ (2021)	$F_{\text{projected discards}}$ (2021)	SSB (2022)	% SSB change *	% advice change **
ICES advice basis									
EU MAP [^] : $F_{\text{MSY}} \times$ $SSB_{2021}/MSY B_{\text{trigger}}$	5261	4215	1046	0.268	0.224	0.044	37494	16.8	-18.8
EU MAP [^] : $F_{\text{MSY lower}} \times$ $SSB_{2021}/MSY B_{\text{trigger}}$	4458	3582	876	0.222	0.186	0.036	38164	18.9	7.2
Other Scenarios									
F_{MSY}	7420	5898	1522	0.4	0.335	0.065	35702	11.2	14.5
$F_{\text{MSY upper}} \times$ $SSB_{2021}/MSY B_{\text{trigger}}$	5261	4215	1046	0.268	0.224	0.044	37494	16.8	-18.8
$F = 0$	0	0	0	0	0	0	42104	31	-100
$F = F_{\text{pa}}$	7420	5898	1522	0.4	0.335	0.065	35702	11.2	14.5
$SSB_{2022} = B_{\text{lim}}$	8854	7002	1852	0.497	0.417	0.08	34517†	7.5	37
$SSB_{2022} = B_{\text{pa}} = B_{\text{trigger}}$ ^{^^}									
$F = F_{2020}$	8824	6978	1846	0.495	0.415	0.08	34569	7.7	36

* SSB 2022 relative to SSB 2021.

** Advice values for 2021 relative to the corresponding 2020 values (MAP advice of 6481 tonnes and 4157 tonnes, respectively; other values are relative to 6481 tonnes).

† Numbers presented are approximations of the reference point values.

[^] EU multiannual plan (MAP) for the Western Waters (EU, 2019).

^{^^} The B_{pa} and $MSY B_{\text{trigger}}$ options were left blank, because B_{pa} and $MSY B_{\text{trigger}}$ cannot be achieved in 2022, even with zero catches.

The advice for 2021 is a decrease compared to the advice for 2020 because of revised reference points and lower estimates for the incoming recruitments.

Basis of the advice

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

Advice basis	Management plan.
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock. Full details of the plan are described in EU (2019).

Quality of the assessment

The stock assessment was benchmarked in 2020 (ICES, 2020a). The model has been changed to a stochastic state-space assessment model (SAM). Maturity and natural mortality information were updated, catch (landings and discards) time-series were reviewed and updated from 2003 to 2018, and survey indices updated to a single-modelled time-series, using the vector-autoregressive spatio-temporal model (VAST).

These changes resulted in revised estimates of SSB, F, and reference points.

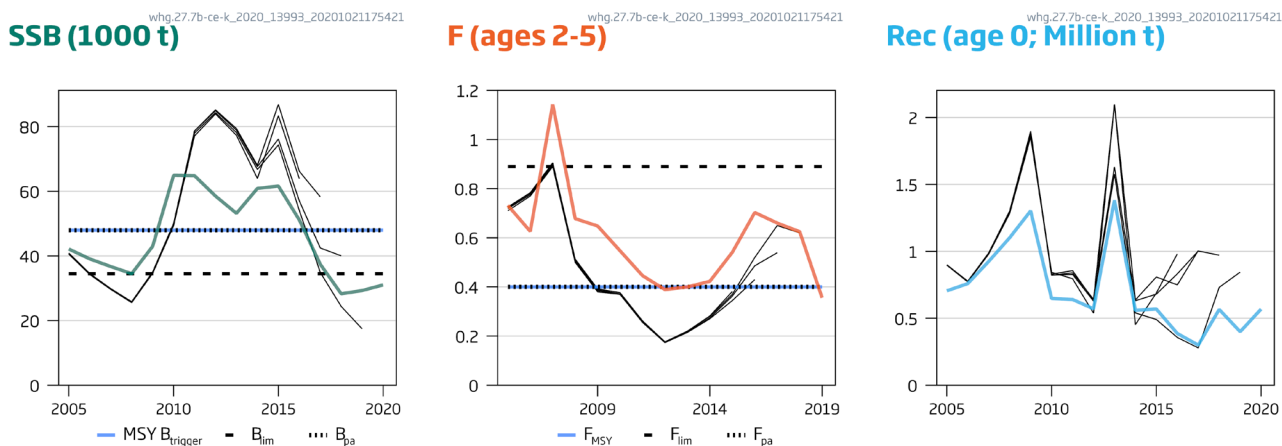


Figure 2 Whiting in divisions 7.b–c and 7.e–k. Historical assessment results (final-year recruitment assumptions included). The stock was benchmarked in 2020 (ICES, 2020a). Black lines show the results of the previous assessments of the stock.

Issues relevant for the advice

The assessment and the advice are for divisions 7.b–c and 7.e–k, including reallocations from rectangles 33E2 and 33E3 in Division 7.a. There has been a significant amount of discarding historically, but this is now decreasing.

Whiting in divisions 7.b–c and 7.e–k is fished 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 maximum sustainable yield (MSY) for both stock areas. Hence, ICES recommends that the TAC area corresponds to the assessment area.

Mixed-fisheries considerations

Whiting in divisions 7.b–c and 7.e–k is caught as part of a mixed fishery with haddock and cod. Mixed-fisheries advice will be provided in the Celtic Seas fisheries overview later in the year.

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 $B_{trigger}$	47963	B_{pa} ; in tonnes.	ICES (2020a)
	F_{MSY}	0.40	From EqSim with segmented regression and fixed breakpoint (B_{lim}) capped to $F_{p0.5}$.	ICES (2020a)
Precautionary approach	B_{lim}	34516	B_{loss} ; lowest observed SSB (2008) from which stock recovery was observed.	ICES (2020a)
	B_{pa}	47963	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$ (default setting).	ICES (2020a)
	F_{lim}	0.89	F with 50% probability of SSB less than B_{lim} .	ICES (2020a)
	F_{pa}	0.40	$F_{p0.5}$; The F that leads to SSB $\geq B_{lim}$ with 95% probability.	ICES (2020a)
Management plan	MAP MSY $B_{trigger}$	47963	MSY $B_{trigger}$; in tonnes.	EU (2019), ICES (2020a)
	MAP B_{lim}	34516	B_{lim} ; in tonnes.	EU (2019), ICES (2020a)
	MAP F_{MSY}	0.40	F_{MSY}	EU (2019), ICES (2020a)
	MAP range F_{lower}	0.332	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	EU (2019), ICES (2020a)
	MAP range F_{upper}	0.40	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY capped to $F_{p0.5}$.	EU (2019), ICES (2020a)

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, 2019b).
Assessment type	Analytical age-based assessment (State-space fish stock assessment model; SAM) that uses catches in the model and the forecast (ICES, 2020b).
Input data	Commercial catches (age composition of landings and discards); vector autoregressive spatio-temporal (VAST) standardized survey index (combined IGFS-WIBTS-Q4 and EVHOE-WIBTS-Q4); maturity data (surveys and observer data; constant for all years); age-dependent natural mortalities (Lorenzen, 1996).
Discards and bycatch	Included in the assessment for the full time-series. Full observer-based estimates from 2003, partial observer-based estimates from 1999 to 2002.
Indicators	None.
Other information	This stock was benchmarked in 2020 (ICES, 2020a).
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	Status quo 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	

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC [^]	ICES landings	ICES discards
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 selection	-	-	19053	10626	2449
2013	MSY approach	-	< 17500 ***	24500	12118	2512
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	8773	1495
2019	MSY approach	≤ 15841		19184	5542	752
2020	Management plan	6481 (range 4157–6481)		10863		
2021	Management plan	5261 (range 4458–5261)				

[^] 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 2019, as estimated by ICES.

Catch	Landings					Discards				
	Otter trawls	Seine nets	Beam trawls	Mid-water trawls	Other gears	Otter trawls	Seine nets	Beam trawls	Mid-water trawls	Other gears
6294 tonnes	73%	20%	3%	1%	3%	63%	5%	29%	0%	3%
	5542 tonnes					752 tonnes				

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

Year	Belgium	France	Ireland	UK England and Wales	Others	Rectangles 33E2 and 33E3 **	Total
1998	479	11748	5549	1755	179		19710
1999	448	16418	6013	1354	27		24260
2000	194	9186	5358	1255	39		16032
2001	171	7317	5365	948	31		13832
2002	149	7548	5718	847	35		14297
2003	129	5989	4516	763	21		11418
2004	180	4874	4350	587	132		10123
2005	218	5913	5774	482	136		12523
2006	128	4710	4570	413	129		9951

Year	Belgium	France	Ireland	UK England and Wales	Others	Rectangles 33E2 and 33E3 **	Total
2007	127	3574	4864	576	86		9226
2008	121	3072	2406	620	35		6255
2009	87	2814	2798	827	25		6551
2010	102	3463	4330	798	85		8779
2011	100	4312	4752	740	174		10077
2012	170	3710	5841	764	141	32	10627
2013	226	4006	6888	907	92	34	12119
2014	222	4928	6874	1062	35	49	13121
2015	152	5634	6437	828	97	32	13149
2016	186	6294	7700	892	39	40	15110
2017	102	5256	6296	607	32	20	12293
2018*	103	3666	4628	592	31	18	9019
2019*	73	3203	2599	487	126	24	6488

* Preliminary.

** Included in Ireland landings. 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. All weights are in tonnes and recruitment in thousands.

Year	Recruitment age 0			SSB			Landings	Discards	F ages 2–5		
	Low	Value	High	Low	Value	High			Low	Value	High
1999	1487023	1991304	2666598	43873	49533	55923	20180	5420	0.68	0.80	0.94
2000	1168590	1753550	2631322	34228	38475	43249	15644	4400	0.70	0.82	0.96
2001	1013832	1339280	1769198	33584	38996	45279	13196	9877	0.80	0.94	1.09
2002	948663	1219995	1568932	37947	44447	52060	13640	7336	0.58	0.69	0.82
2003	733059	953077	1239131	45202	51285	58187	10013	10308	0.48	0.58	0.71
2004	627415	807039	1038088	52551	59444	67241	7810	19454	0.62	0.73	0.86
2005	551977	704660	899576	37713	42142	47091	10306	13410	0.62	0.73	0.86
2006	571404	759105	1008463	34782	39075	43898	8790	5096	0.52	0.63	0.76
2007	718843	924978	1190225	32129	36722	41972	9082	8435	0.98	1.14	1.34
2008	865036	1101976	1403815	30452	34516	39121	5623	3678	0.57	0.68	0.81
2009	888339	1302290	1909135	38042	42977	48553	6532	4204	0.54	0.65	0.79
2010	507742	647512	825758	56493	64934	74637	9376	4743	0.44	0.55	0.68
2011	504235	640425	813400	56875	64827	73891	9617	3562	0.35	0.45	0.56
2012	437898	570910	744323	51913	58529	65988	9854	4502	0.31	0.39	0.49
2013	907428	1380300	2099591	47399	53184	59674	11097	3631	0.32	0.40	0.50
2014	429610	559906	729720	53613	60889	69151	12589	3151	0.35	0.42	0.52
2015	422926	568878	765200	54012	61628	70316	12758	6491	0.45	0.54	0.66
2016	270083	386504	553107	43689	51135	59851	15021	7865	0.57	0.70	0.86
2017	192311	299681	466998	31060	37444	45140	12288	2589	0.49	0.66	0.89
2018	352143	566120	910120	21680	28283	36898	8951	1764	0.39	0.63	1.01
2019	188850	399563	845384	21195	29290	40477	5542	752	0.190	0.36	0.67
2020	299681	568878 *	1380300	21034	31034	45523					

* Median resampled (2010–2019).

Sources and references

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