

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

ICES stock advice

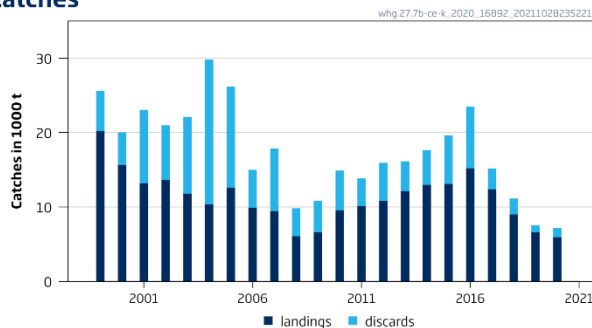
Please note: The current advice for 2021 replaces the advice provided in October 2020.

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 3435 tonnes and 4029 tonnes*.

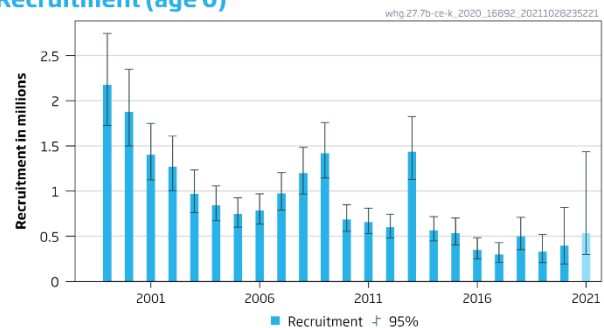
Stock development over time

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.

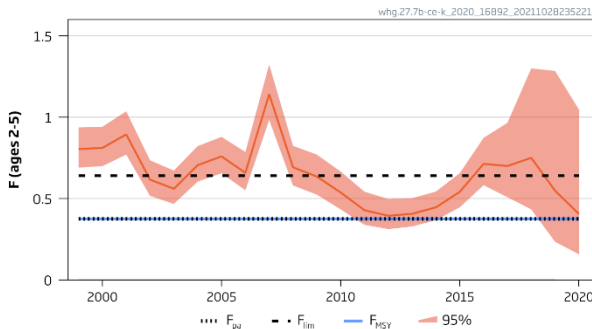
Catches



Recruitment (age 0)



F



SSB

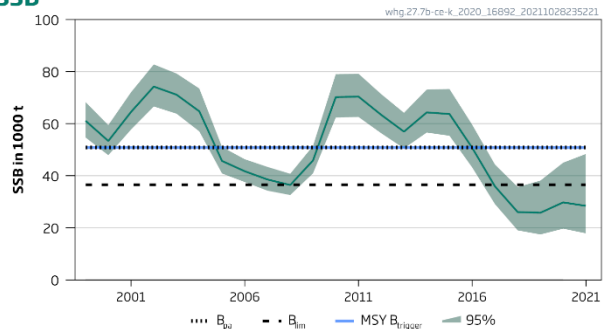


Figure 1 Whiting in divisions 7.b–c and 7.e–k. Summary of the stock assessment. The paler shaded recruitment is assumed. Discard estimates are available since 2003; prior to 2003, discards have been reconstructed from incomplete sampling data.

* In spring 2021, it appeared that there was an error in the software code introduced at the WKCELTIC 2020 benchmark (ICES 2020a) to raise un-sampled national catch data to international catch numbers at age and an issue in the 1999 – 2002 stock weights that went into the assessment was also noted. An inter-benchmark was conducted in summer- autumn 2021 to review these data issues, update the assessment with the corrected inputs and derive reference points accordingly. The resulting updated assessment conducted in 2021 was used to revise the advice for 2021.

Stock and exploitation status

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

	Fishing pressure				Stock size			
	2017	2018	2019		2018	2019	2020	
Maximum sustainable yield	F_{MSY}	✘	✘	✘ Above	$MSY B_{trigger}$	✘	✘	✘ Below trigger
Precautionary approach	F_{pa}, F_{lim}	✘	○	○ Increased risk	B_{pa}, B_{lim}	✘	✘	✘ Reduced reproductive capacity
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	—	— Not applicable

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

Catch scenarios

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

Variable	Value	Notes
$F_{ages\ 2-5}$ (2020)	0.409	$F_{ages\ 2-5}$ estimated in the updated assessment conducted in 2021
SSB_{2021}	28381	Estimated in the updated assessment conducted in 2021; in tonnes.
Recruitment age 0 (2020)	395701	Median (resampled from updated assessment conducted in 2021); in thousands.
Recruitment age 0 (2021)	533781	Median resampled (2010–2020); in thousands.
Catch (2020)	7082	Official Catch; tonnes
Landings (2020)	5873*	Official Landings; tonnes
Discards (2020)	1209*	Official Discards; tonnes

* Values used in the stochastic forecast differ slightly from the official landings and discards due to the methodology used in the SAM software.

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)	$F_{projected}$ landings (2021)	$F_{projected}$ discards (2021)	SSB (2022)	% SSB change *	% advice change **
ICES advice basis									
EU MAP ^:	4029	3290	739	0.209	0.173	0.036	34486	22	-38
$F_{MSY} \times SSB_{2021} / MSY B_{trigger}$									
EU MAP ^:	3435	2808	627	0.176	0.146	0.030	34984	23	-17.4
$F_{MSY\ lower} \times SSB_{2021} / MSY B_{trigger}$									
Other Scenarios									
F_{MSY}	6729	5458	1271	0.375	0.310	0.065	32216	14	4
$F_{MSY\ upper} \times SSB_{2021} / MSY B_{trigger}$	4029	3290	739	0.209	0.173	0.036	34486	22	-38
$F = 0$	0	0	0	0.000	0.000	0.000	47398	67	-100
$F = F_{pa}$	6729	5458	1271	0.375	0.310	0.065	32216	14	3.8
$SSB_{2022} = B_{lim}$	1605	1318	287	0.079	0.065	0.014	36571	29	-75
$SSB_{2022} = B_{pa} = B_{trigger}^{^^}$									
$F = F_{2020}$	7232	5858	1374	0.409	0.338	0.071	31793	12.0	11.6

* 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 $MSY B_{trigger}$ options were left blank, because B_{pa} and $MSY B_{trigger}$ 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.

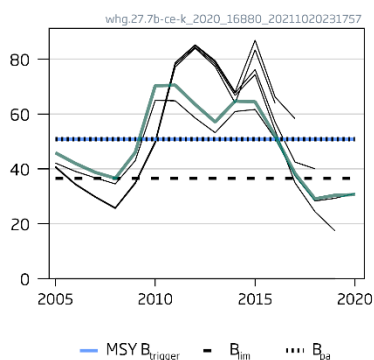
Advice basis	Management plan.
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock. Full details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

Quality of the assessment

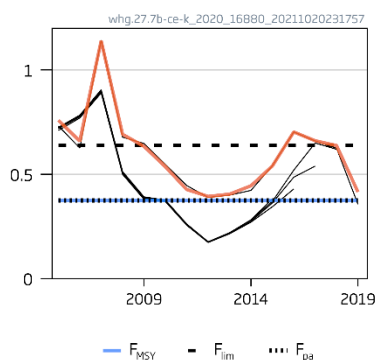
The stock assessment was benchmarked in 2020 (ICES, 2020a). The model has been changed to a stochastic state-space assessment model (SAM). Maturity and natural mortality information were updated, catch (landings and discards) time-series were reviewed and updated from 2003 to 2018, and survey indices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

SSB (1000 t)



F (ages 2-5)



Rec (age 0; Billions)

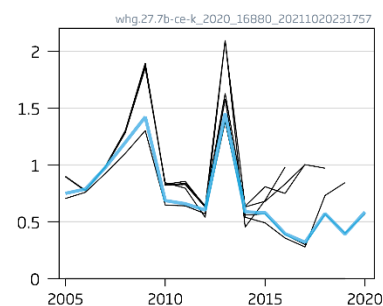


Figure 2 Whiting in divisions 7.b–c and 7.e–k. Historical assessment results (final-year recruitment assumptions included). The stock was benchmarked in 2020 (ICES, 2020a). Black lines show the results of the previous assessments of the stock.

Issues relevant for the advice

The advice for 2021 that was issued on 30 October 2020 has been revised in autumn 2021 following the discovery of errors in the assessment conducted in 2020.

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.

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 $B_{trigger}$	50818	B_{pa} ; in tonnes.	ICES (2021b)
	F_{MSY}	0.375	From EqSim with segmented regression and fixed breakpoint (B_{lim}) capped to $F_{p0.5}$.	ICES (2021b)
Precautionary approach	B_{lim}	36571	B_{loss} ; lowest observed SSB (2008) from which stock recovery was observed.	ICES (2021b)
	B_{pa}	50818	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$ (default setting).	ICES (2021b)
	F_{lim}	0.64	F with 50% probability of SSB less than B_{lim}	ICES (2021b)
	F_{pa}	0.375	$F_{p0.5}$; The F that leads to SSB $\geq B_{lim}$ with 95% probability.	ICES (2021b)
Management plan	MAP MSY $B_{trigger}$	50818	MSY $B_{trigger}$; in tonnes.	EU (2019), ICES (2021b)
	MAP B_{lim}	36571	B_{lim} ; in tonnes	EU (2019), ICES (2021b)
	MAP F_{MSY}	0.375	F_{MSY}	EU (2019), ICES (2021b)
	MAP range F_{lower}	0.315	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	EU (2019), ICES (2021b)
	MAP range F_{upper}	0.375	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 (2021b)

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	
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	5931	1266
2021	Management plan	4029 (range 3290–4029) ^{^^}		10259		

[^] TAC covers Subarea 7 (except Division 7.a).

^{^^} The initial advice issued on 30 October 2020 was 5261 tonnes (range 4458–5261).

* 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 2020, as estimated by ICES.

Catch	Landings					Discards				
	Otter trawls	Seine nets	Beam trawls	Gill Nets	Other gears	Otter trawls	Seine nets	Beam trawls	Gill Nets	Other gears
7197 tonnes	79%	15%	2%	1%	3%	81%	1%	14%	2%	2%
	5931 tonnes					1266 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	6322	4634	757	75		11788
2004	180	5119	4406	567	49		10321
2005	218	5961	5826	471	101		12575
2006	128	4731	4594	384	72		9908
2007	127	3596	5048	574	80		9424
2008	121	2871	2451	602	36		6080
2009	87	2776	2862	811	38		6574
2010	102	3402	4424	745	896		9570
2011	100	4287	4826	691	181		10084
2012	170	3866	5884	723	191	32	10834
2013	226	3986	6916	741	261	34	12131
2014	222	4928	6929	742	161	49	12983
2015	152	5623	6477	601	257	32	13110
2016	186	6281	7782	801	151	40	15201
2017	102	5290	6338	592	54	20	12377
2018	103	3625	4650	588	40	18	9007
2019*	73	3221	2672	486	136	24	6588
2020*	80	3596	2669	329	154	14	5931

* 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		
	Value	Low	High	Value	Low	High			Value	Low	High
1999	2164746	1630362	2874285	61155	54562	68545	20180	5420	0.804	0.69	0.937
2000	1854498	1302778	2639869	53303	47616	59669	15644	4400	0.811	0.698	0.941
2001	1406546	1100727	1797332	64208	54794	75239	13196	9877	0.893	0.77	1.036
2002	1270409	996812	1619099	73921	63504	86047	13640	7336	0.616	0.515	0.737
2003	969463	754657	1245413	70959	62752	80239	11788	10337	0.562	0.466	0.677
2004	843915	665849	1069600	64785	57046	73574	10321	19522	0.706	0.602	0.828
2005	746124	594158	936959	45709	40839	51161	12575	13598	0.759	0.655	0.879
2006	788980	608365	1023217	41667	37324	46515	9908	5098	0.657	0.549	0.787
2007	977045	773793	1233686	38626	34034	43838	9424	8439	1.143	0.982	1.329
2008	1201563	950051	1519659	36493	32390	41117	6080	3760	0.692	0.58	0.824
2009	1400384	975170	2011010	45959	40621	51999	6574	4281	0.635	0.524	0.769
2010	685700	547050	859492	69991	61094	80182	9570	5346	0.536	0.432	0.666
2011	653475	519382	822188	70233	61565	80121	10084	3750	0.428	0.338	0.542
2012	600632	468107	770676	63302	55938	71636	10834	5116	0.394	0.312	0.498
2013	1414790	927480	2158141	56931	50490	64194	12131	4026	0.407	0.328	0.505
2014	567204	443861	724824	64149	55692	73892	12983	4672	0.447	0.367	0.544
2015	533781	401170	710229	63702	55396	73253	13110	6528	0.541	0.446	0.656
2016	348159	245858	493028	50810	43212	59744	15201	8259	0.714	0.584	0.873
2017	299364	206517	433954	35894	29262	44029	12377	2791	0.701	0.514	0.957
2018	497185	346494	713413	25981	19060	35415	9007	2139	0.753	0.441	1.284
2019	328106	206650	520948	25705	17431	37904	6588	970	0.552	0.238	1.279
2020	395701	191470	817776	29668	19636	44824	5931	1266	0.409	0.158	1.06
2021	533781	299364	1414790	28381	17873	48042					

* Median resampled (2010–2020).

Sources and references

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