

5.3.62 Whiting (*Merlangius merlangus*) in Division VIa (West of Scotland)

ICES stock advice

ICES advises that when the precautionary approach is applied, there should be no directed fisheries and all catches should be minimized in 2016.

Stock development over time

The spawning-stock biomass (SSB) has been increasing since 2006 but remains very low compared to the historical estimates and is below B_{lim} . Fishing mortality (F) has declined continuously since around 2000 and is now very low. Recruitment is estimated to have been very low since 2002. The 2009, 2011, and 2013 year classes are estimated to be above the recent average.

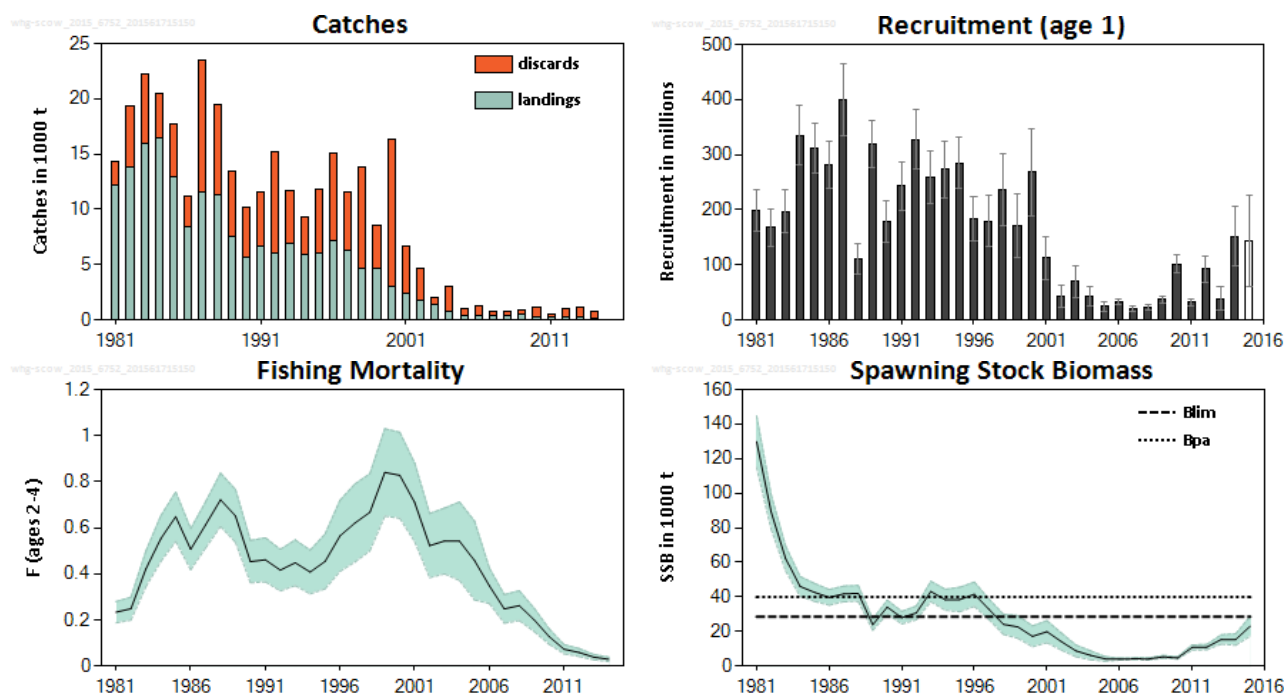


Figure 5.3.62.1 Whiting in Division VIa. Observed catches and summary of stock assessment (weights in thousand tonnes). Predicted recruitment values are not shaded.

Stock and exploitation status

Table 5.3.62.1 Whiting in Division VIa. State of the stock and fishery, relative to reference points.

		Fishing pressure				Stock size			
		2012	2013	2014		2013	2014	2015	
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	MSY	?	?	?
						$B_{trigger}$?	?	?
Precautionary approach	F_{pa} , F_{lim}	?	?	?	Undefined	B_{pa} , B_{lim}	✗	✗	✗
									Reduced reproductive capacity
Management Plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-
									Not applicable
Qualitative evaluation	-	✓	✓	✓	Below possible reference points		-	-	-

Catch options

Table 5.3.62.2 Whiting in Division VIa. The basis for the catch options.

Variable	Value	Source	Notes
F ages 2–4 (2015)	0.04	ICES (2015a)	F (2012–2014)
SSB (2016)	28900 t	ICES (2015a)	
R_{age1} (2015)	144.0 million	ICES (2015a)	Assessment model estimate.
R_{age1} (2016)	43.6 million	ICES (2015a)	GM (2005–2014).
Catch (2015)	1051 t	ICES (2015a)	
Landings (2015)	388 t	ICES (2015a)	
Discards (2015)	663 t	ICES (2015a)	Average discard rates at age of 2012–2014.

Table 5.3.62.3 Whiting in Division VIa. The catch options. Weight in tonnes.

Rationale	Catch total (2016)	Wanted catch* (2016)	Unwanted catch* (2016)	Basis	F Total (2016)	F wanted catch (2016)	F unwanted catch (2016)	SSB (2017)	% TAC change**	% SSB change***
Precautionary approach	0	0	0	zero catch	0.000	0.000	0.000	26192	–100%	–9%
Other options	191	95	97	$F_{2015} \times 0.2$	0.008	0.004	0.004	25968	–64%	–10%
	381	189	193	$F_{2015} \times 0.4$	0.017	0.008	0.009	25746	–28%	–11%
	569	282	289	$F_{2015} \times 0.6$	0.025	0.012	0.013	25525	7%	–11%
	756	374	384	$F_{2015} \times 0.8$	0.034	0.016	0.017	25308	42%	–12%
	941	466	478	$F_{2015} \times 1.0$	0.042	0.020	0.022	25092	77%	–13%
	1125	556	571	$F_{2015} \times 1.2$	0.051	0.024	0.026	24878	112%	–14%
	452	224	229	TAC – 15%	0.020	0.010	0.010	25663	–15%	–11%
	531	263	269	TAC	0.024	0.011	0.012	25570	0%	–11%
	611	302	310	TAC + 15%	0.027	0.013	0.014	25477	15%	–12%

* “Wanted catch” is used to describe fish that would be landed in the absence of the EU landing obligation. The “unwanted catch” refers to the component that was previously discarded.

** Wanted catch in 2016 compared with the TAC of Subarea VI, whereas the stock area is only Division VIa.

*** SSB 2017 relative to SSB 2016.

Basis of the advice

Table 5.3.62.4 Whiting in Division VIa. The basis of the advice.

Advice basis	Precautionary approach
Management plan	There is no management plan for whiting in this area.

Quality of the assessment

The assessment indicates an increasing mismatch between the survey catchability and the fishery. This may lead to underestimation of stock size, but the magnitude of the possible underestimation is unknown. The majority of catches have been discarded in recent years. Discard information is imprecise compared to landings data due to low sampling levels. The mean weights-at-age in the catch have also been quite variable in recent years because of low and patchy sampling. This implies that the catch information of recent years in the assessment is less certain.

The inclusion of the two new Scottish survey time-series increased the precision of the assessment of this stock (ICES, 2015b).

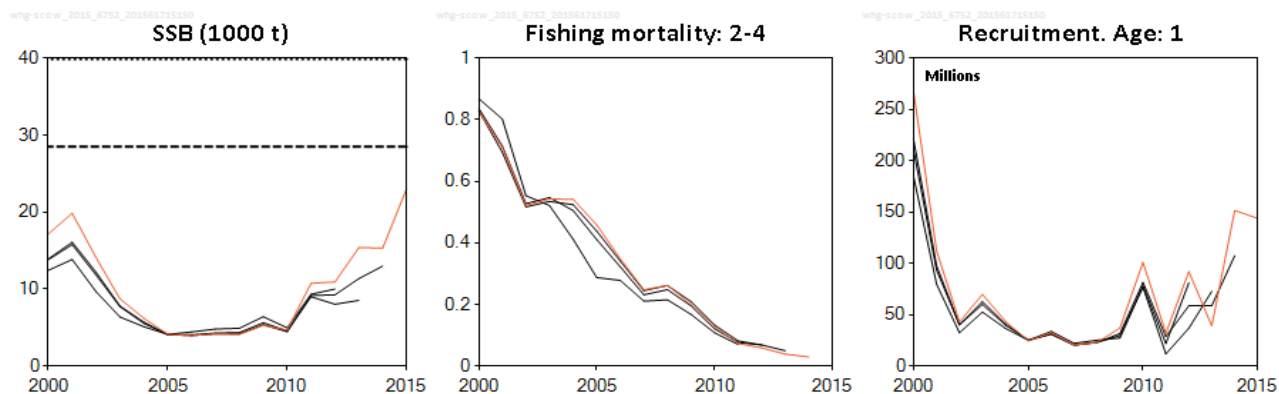


Figure 5.3.62.2 Whiting in Division VIa. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

The increase in mesh size, from 100 mm to 120 mm, under the emergency measures since 2010 and the introduction of large square mesh panels in the *Nephrops* fishery are likely to have contributed to the observed reductions in fishing mortality. The catch numbers-at-age expressed as the proportion of stock numbers-at-age generally show a decline after 2010, especially for whiting at age 2+.

Reference points

Table 5.3.62.5 Whiting in Division VIa. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	Not defined.		
	F_{MSY}	Not defined.		
Precautionary approach	B_{lim}	28500 t	B_{lim} = SSB value at the change point in the segmented regression stock–recruit function.	ICES (2015b)
	B_{pa}	39900 t	B_{pa} = $B_{\text{lim}} \times 1.4$. This is considered to be the minimum SSB required to have a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.	ICES (2015b)
	F_{lim}	Not defined.		
	F_{pa}	Not defined.		
Management plan	SSB_{MGT}	Not defined.		
	F_{MGT}	Not defined.		

Basis of the assessment

Table 5.3.62.6 Whiting in Division VIa. The basis of the assessment.

ICES stock data category	1 (ICES, 2015c).
Assessment type	Age-based analytic assessment (TSA) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling); five survey indices (ScoGFS-WIBTS-Q1, ScoGFS-WIBTS-Q4, IGFS-WIBTS-Q4, UKS-WIBTS-Q1 and UKS-WIBTS-Q4); fixed maturity data from surveys; natural mortalities estimated from mean weight-at-age (Lorenzen's model (Lorenzen, 1996) using mean weight data from market sampling and discard observations).
Discards and bycatch	Included in the assessment, data series from the main fleets (covering 95% of the landings).
Indicators	None.
Other information	The stock was benchmarked in 2012 (WKROUND; ICES, 2012) and in 2015 (IBPWSRound; ICES, 2015b).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

Information from stakeholders

Since 2014, effort has been made to improve coverage by the Scottish industry/science observer sampling scheme in Subareas IV and VI. The sampling coverage now is more likely to reflect fishing patterns. The Scottish Industry–Science partnership survey was initiated in 2013 and conducted throughout 2014 to provide information on a quarterly basis on the distribution and abundance of cod and other demersal species in Division VIa. Preliminary results from the survey confirm the relatively high 2014 recruitment.

History of advice, catch, and management

Table 5.3.62.7 Whiting in Division VIa. History of ICES advice, the agreed TAC, ICES estimates of landings and discards. Weights in thousand tonnes.

Year	ICES advice / Single-stock exploitation boundaries since 2004	Predicted catch corresp. to advice	Agreed TAC*	Official landings	ICES landings	Discards	ICES catch
1987	No increase in F	15.0	16.4	12.4	11.5	6.9	18.4
1988	No increase in F; TAC	15.0	16.4	11.9	11.4	11.8	23.1
1989	No increase in F; TAC	13.0	16.4	7.7	7.5	4.1	11.6
1990	No increase in F; TAC	11.0	11.0	6.0	5.6	4.4	10.0
1991	70% of effort (89)	-	9.0	6.9	6.7	5.3	12.0
1992	70% of effort (89)	-	7.5	6.0	6.0	9.4	15.4
1993	70% of effort (89)	-	8.7	6.8	6.9	8.5	15.4
1994	30% reduction in effort	-	6.8	5.8	5.9	8.9	14.8
1995	Significant reduction in effort	-	6.8	6.3	6.1	7.6	13.7
1996	Significant reduction in effort	-	10.0	6.6	7.2	6.9	14.1
1997	Significant reduction in effort	-	13.0	6.2	6.3	4.9	11.2
1998	No increase in F	6.5	9.0	4.7	4.6	5.8	10.5
1999	Reduce F below F_{pa}	4.3	6.3	4.7	4.6	3.1	7.7
2000	Reduce F below F_{pa}	< 4.3	4.3	3.2	3.0	6.7	9.7
2001	Reduce F below F_{pa}	< 4.2	4.0	2.5	2.4	2.4	4.9
2002	SSB > B_{pa} in the short term	< 2.0	3.5	1.7	1.7	2.1	3.8
2003	No cod catches	-	2.0	1.3	1.3	1.6	2.9
2004	SSB > B_{pa} in the short term **	< 2.1***	1.6	0.8	0.8	2.6	3.4
2005	Exploitation not allowed to increase	< 1.6	1.6	0.29	0.3	0.9	1.2
2006	Lowest possible level	0	1.36	0.38	0.4	0.9	1.3
2007	Lowest possible level	0	1.02	0.48	0.5	0.3	0.8
2008	Lowest possible level	0	0.765	0.44	0.4	0.2	0.4
2009	Same advice as last year	0	0.574	0.49	0.5	0.4	0.9
2010	Same advice as last year	0	0.431	0.35	0.3	0.9	1.2
2011	See scenarios	-	0.323	0.23	0.2	0.3	0.6
2012	Reduce catches	-	0.307*	0.30	0.3	0.7	1.0
2013	Lowest possible catch, improve selectivity	0	0.292*	0.21	0.2	1.0	1.2
2014	Lowest possible catch, improve selectivity	0	0.292*	0.17	0.2	0.6	0.8
2015	Lowest possible catch	0	0.263*				
2016	Precautionary approach (minimize all catches)	0					

* TAC is set for Divisions VIa and VIb combined.

** TAC is set for Division VIb and Subareas VI, XII, and XIV.

*** Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.

History of catch and landings

Table 5.3.62.8 Whiting in Division VIa. Catch distribution by fleet in 2014 as estimated by ICES.

Catch (2014)	Landings			Discards*
	93% large-meshed trawl (TR1)	4% smaller-meshed trawl (TR2)	3% other gear	
1113 tonnes	181 tonnes			932 tonnes (TR1 40% and TR2 58%)

* All discards, including the 0-group (note that discard estimates in Tables 5.3.62.7 and 5.3.62.10 are for 1+ discards).

Table 5.3.62.9 Whiting in Division VIa. History of official landings by countries participating in the fishery.

Year	Belgium	Denmark	Faroe Islands	France	Germany	Ireland	Netherlands	Norway	Spain	UK (E W & NI)	UK (Scot.)	UK (total)	Total official landings
1989	1	1	-	199	+	1315	-	-	-	44	6109		7669
1990	-	+	-	180	+	977	-	-	-	50	4819		6026
1991	+	3	-	352	+	1200	-	-	-	218	5135		6908
1992	-	1	-	105	1	1377	-	-	-	196	4330		6010
1993	+	1	-	149	1	1192	-	-	-	184	5224		6751
1994	+	+	-	191	+	1213	-	-	-	233	4149		5786
1995	+	+	-	362	-	1448	-	-	1	204	4263		6278
1996	-	+	-	202	+	1182	-	-	-	237	5021		6642
1997	1	+	-	108	-	977	-	-	1	453	4638		6178
1998	1	-	-	82	-	952	-	-	2	251	3369		4657
1999	+	-	-	300	+	1121	-	-	+	210	3046		4677
2000	-	-	-	48	-	793	-	-	-	104	2258		3203
2001	-	-	-	52	-	764	-	-	2	71	1654		2543
2002	-	-	-	21	-	577	-	-	-	73	1064		1735
2003	-	+	-	11	-	568	-	-	-	35	751		1365
2004	+	+	-	6	-	356	-	-	-	13	444		819
2005	-	-	-	9	-	172	-	-	-	5	103		289
2006	-	-	-	7	+	196	-	-	-	2	178		383
2007	-	-	+	1	1	56	-	-	-	1	424		484
2008	-	-	+	3	-	69	-	-	-	-	-	369	441
2009	-	-	-	1	-	125	-	2	-	-	-	354	482
2010	-	-	+	3	-	99	-	-	-	-	-	247	349
2011	-	-	+	4	-	149	-	-	-	-	-	77	230
2012	-	-	1	+	-	96	-	-	-	-	-	204	300
2013	-	-	-	1	-	116	-	-	-	-	-	97	215
2014*	-	-	-	1	-	88	-	-	-	-	-	83	173

* Preliminary.

Summary of the assessment

Table 5.3.62.10 Whiting in Division VIa. Assessment summary with weights (in tonnes).

Year	Recruit- ment Age 1	High	Low	SSB	High	Low	Landings	Discards	Mean F Ages 2–4	High	Low
	thousands			tonnes			tonnes	tonnes			
1981	198263	236492	160035	129883	144756	115009	12194	2132	0.234	0.28	0.187
1982	167419	200678	134159	89174	99069	79279	13880	5485	0.249	0.299	0.199
1983	196955	236430	157481	62199	69355	55042	15962	6294	0.421	0.498	0.344
1984	334852	389077	280627	46042	51788	40296	16459	4017	0.553	0.652	0.454
1985	311073	356777	265369	42582	47765	37399	12879	4840	0.648	0.756	0.541
1986	282039	324131	239946	39730	44267	35192	8458	2669	0.507	0.596	0.417
1987	399475	465473	333476	41728	46236	37219	11542	11918	0.613	0.713	0.512
1988	109995	137928	82062	42017	46604	37431	11349	8132	0.721	0.837	0.606
1989	319188	362747	275628	23911	27176	20645	7523	5876	0.652	0.766	0.537
1990	178898	216951	140844	34105	38146	30064	5642	4530	0.453	0.545	0.361
1991	242758	287563	197953	27991	31635	24346	6658	4883	0.461	0.557	0.365
1992	326997	381169	272826	30718	34717	26719	6005	9249	0.416	0.506	0.326
1993	258228	305341	211115	43124	49020	37228	6872	4759	0.448	0.547	0.349
1994	273126	324068	222183	38322	44422	32222	5901	3455	0.408	0.503	0.313
1995	284951	331626	238275	38478	45555	31402	6078	5771	0.454	0.573	0.335
1996	183386	222501	144271	41539	48588	34490	7158	7940	0.565	0.72	0.41
1997	178863	225103	132623	32872	38799	26945	6290	5251	0.621	0.79	0.451
1998	236124	300908	171340	24122	29951	18294	4627	9216	0.667	0.835	0.5
1999	170639	228324	112954	22585	29163	16007	4613	3975	0.84	1.03	0.65
2000	267631	347886	187376	17166	23192	11140	3011	13285	0.828	1.015	0.641
2001	112461	151768	73155	19862	26243	13482	2439	4263	0.71	0.881	0.539
2002	42993	64099	21887	14078	19033	9123	1767	2851	0.522	0.662	0.383
2003	69835	98050	41620	8730	12128	5331	1355	719	0.543	0.686	0.4
2004	43821	61056	26586	6196	8795	3596	811	2159	0.542	0.712	0.371
2005	24516	33459	15574	4139	5475	2802	341	629	0.458	0.63	0.287
2006	32582	38342	26822	3948	4513	3383	380	946	0.348	0.425	0.271
2007	20464	25292	15636	4186	4717	3655	427	317	0.248	0.31	0.186
2008	23123	27662	18583	4110	4722	3498	445	314	0.262	0.327	0.197
2009	37067	42927	31207	5278	6160	4397	488	419	0.2	0.251	0.15
2010	101034	117626	84443	4679	5373	3986	307	893	0.128	0.161	0.094
2011	32028	38032	26025	10746	12289	9203	230	339	0.073	0.093	0.053
2012	92017	115386	68648	10926	12482	9371	313	727	0.059	0.076	0.042
2013	39174	59715	18633	15380	18104	12655	222	951	0.038	0.05	0.027
2014	151631	205290	97973	15342	18661	12023	184	583	0.029	0.039	0.02
2015	143998*	226495*	61502*	23058	28845	17271					
Average	168217	205325	131110	29113	33650	24576	5377	4111	0.439	0.539	0.339

* Model estimate.

Sources and references

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