

9.3.8 Blue whiting (*Micromesistius poutassou*) in Subareas I–IX, XII, and XIV (Northeast Atlantic)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2016 should be no more than 776 391 tonnes.

Stock development over time

Fishing mortality (F) has increased from a historical low in 2011 to above F_{MSY} in 2014. Spawning-stock biomass (SSB) increased from 2010 to 2014 and is above $MSY B_{trigger}$. Recent recruitments are estimated above average, but with an uncertainty. Additional survey information indicates recruitment above average in 2014 and 2015 and this is taken into account in the short-term forecast.

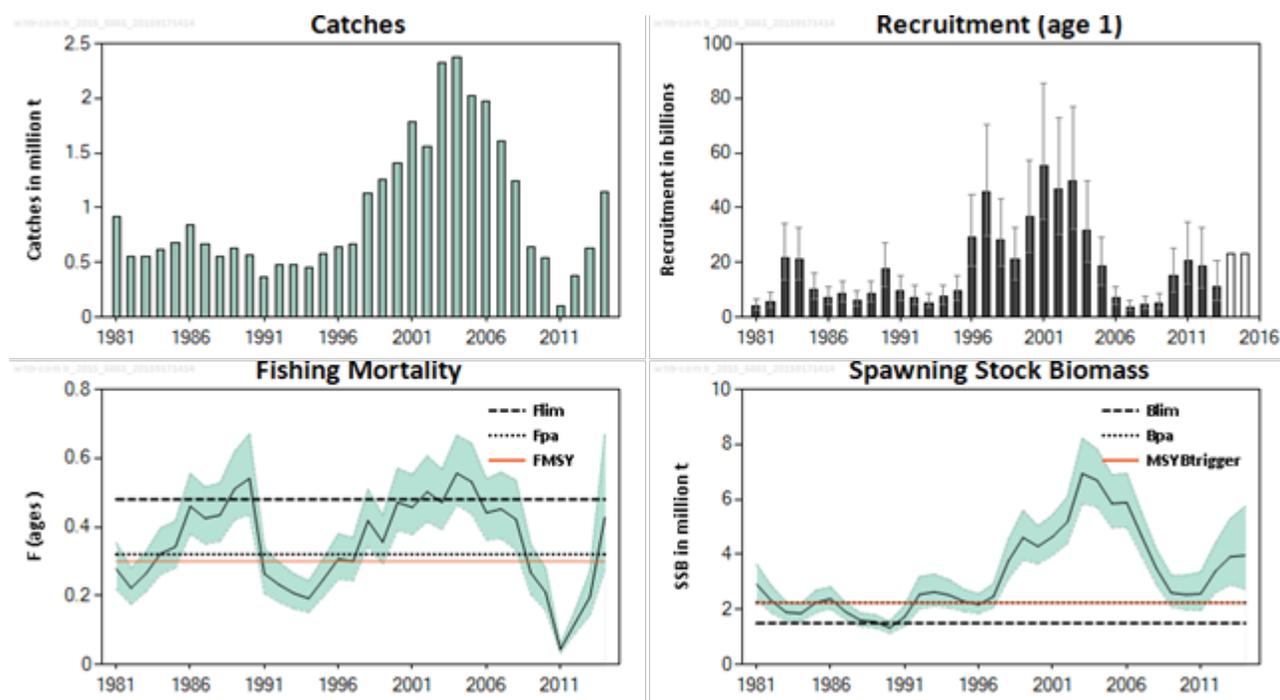


Figure 9.3.8.1 Blue whiting in Subareas I–IX, XII, and XIV. Summary of stock assessment. Recruitment for 2014 and 2015 is the 75th percentile of recruitment 1981–2012. Predicted values are not shadowed.

Stock and exploitation status

Table 9.3.8.1 Blue whiting in Subareas I–IX, XII, and XIV. 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}	✓	✓	✗ Above	MSY	✓	✓ Above trigger
Precautionary approach	F_{pa} , F_{lim}	✓	✓	○ Increased risk	B_{pa} , B_{lim}	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	-	-	- Not applicable	SSB_{MGT}	-	- Not applicable

Catch options

Table 9.3.8.2 Blue whiting in Subareas I–IX, XII, and XIV. The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–5 (2015)	0.501	ICES (2015a)	Catch constraint (1.3 million tonnes)
SSB (2016)	3.618 million tonnes	ICES (2015a)	
R _{age1} (2014)	23.3 billion	ICES (2015a)	75% percentiles of recruitment 1981–2012
R _{age1} (2015)	23.3 billion	ICES (2015a)	75% percentiles of recruitment 1981–2012
R _{age1} (2016)	13.4 billion	ICES (2015a)	GM (1981–2012)
R _{age1} (2017)	13.4 billion	ICES (2015a)	GM (1981–2012)
Total catch (2015)	1.3 million tonnes	ICES (2015a)	Estimated by ICES based on declared quotas and expected uptake.

Table 9.3.8.3 Blue whiting in Subareas I–IX, XII, and XIV. The catch options.

Rationale	Catch (2016)	Basis	F 2016	SSB (2017)	% SSB change *	% Catch change **
MSY framework	776.391	F _{MSY} = 0.30	0.30	3827.988	6	-40
Zero catch	0	F = 0	0	4569.654	26	-100
F = 0.18	489.605		0.18	4100.934	13	-62
F = 0.20	539.449		0.20	4053.403	12	-59
F = 0.22	588.451		0.22	4006.712	11	-55
F = 0.25	660.414		0.25	3938.210	9	-49
F _{pa} 0.32	821.443	F _{pa}	0.32	3785.232	5	-37
1.0 × F(2015)	1198.073	Multiplier on the intermediate year F	0.50	3429.248	-5	-8
1.50 × F(2015)	1637.036	Multiplier on the intermediate year F	0.75	3018.104	-17	26
Status quo catch	1300.000	Catch 2016 = Catch 2015	0.56	3334.140	-8	0

Weights in thousand tonnes.

* SSB 2017 relative to SSB 2016.

** Catch 2016 relative to estimated catch in 2015 (1300 kt).

Basis of the advice

Table 9.3.8.4 Blue whiting in Subareas I–IX, XII, and XIV. The basis of the advice.

Advice basis	MSY approach.
Management plan	Currently there is no management plan for blue whiting in this area.

Quality of the assessment

This year's assessment gave a substantial downward revision of the historical SSB and recruitment and a small upward revision of F. The revisions are mainly caused by low abundance indices from the 2015 acoustic survey for the adult part of this stock. These abundance indices were lower than expected, given the perception of the stock from last year's assessment, especially for the older age groups. Although the weather conditions were less favorable than in the two previous years, the survey was conducted as planned. Despite some divergence in the age structure in a few commercial samples, overall it was considered that the age structure of the 2015 catch was not in conflict with the survey data. The 2015 survey was considered robust and was used in the assessment.

The uncertainty of the assessment and forecast is considered higher than in previous years. The model estimated very high F and catch values for 2015 in order to fit the low 2015 survey (March–April) abundance indices. This is considered unrealistic. Overall the approach chosen may have resulted in a higher than 50% probability of overestimating the stock.

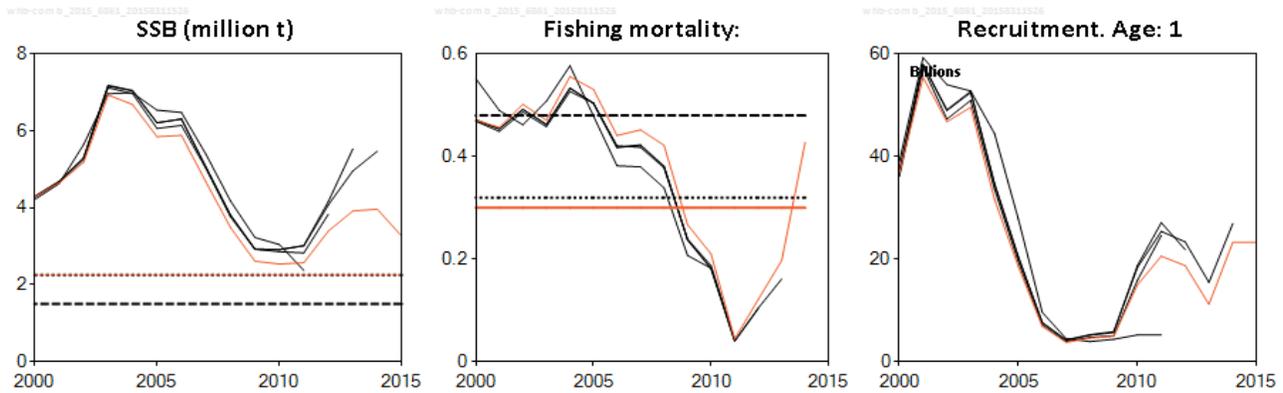


Figure 9.3.8.2 Blue whiting in Subareas I-IX, XII, and XIV. Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 9.3.8.5 Blue whiting in Subareas I-IX, XII, and XIV. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2.25 million t	B_{pa}	ICES (2013a)
	F_{MSY}	0.30	Equilibrium stochastic simulations	ICES (2013a)
Precautionary approach	B_{lim}	1.50 million t	Approximately B_{loss}	ICES (2013a)
	B_{pa}	2.25 million t	$B_{lim} \exp(1.645 \times \sigma)$, with $\sigma = 0.25$.	ICES (2013a)
	F_{lim}	0.48	Equilibrium stochastic simulations	ICES (2013a)
	F_{pa}	0.32	Based on F_{lim} and assessment uncertainties	ICES (2013a)

Basis of the assessment

Table 9.3.8.6 Blue whiting in Subareas I–IX, XII, and XIV. The basis of the assessment.

ICES stock data category	1 (ICES, 2015b).
Assessment type	Age-based analytical assessment (SAM; ICES, 2015a) that uses catches for the model and the forecast.
Input data	Commercial catches from international catches, ages and length frequencies from catch sampling. One survey index (International blue whiting spawning stock survey (IBWSS) 2004–2015, excluding 2010). Qualitative estimate of recruitment from surveys: Norwegian bottom trawl survey in the Barents Sea, International Ecosystem Survey in the Nordic Seas in May (IESNS; age groups 1 and 2), International Blue Whiting Spawning Stock survey (IBWSS; age groups 1 and 3), the Faroese bottom trawl surveys in spring, and the Icelandic bottom trawl survey in spring are used as qualitative indices of recruitment. Fixed maturity estimated in 1994 by combining maturity ogives from the southern and northern areas. Natural mortalities fixed at 0.2, derived in the 1980s from age compositions before the targeted fishery started.
Discards and bycatch	Discards included since 2014.
Indicators	None.
Other information	The stock was benchmarked in 2012 (WKPELA; ICES, 2012).
Working group	Working Group on Widely Distributed Stocks (WGWIDE).

Information from stakeholders

A pre-meeting between ICES scientists and representatives of the EU pelagic industry was held on 19 August 2015, to discuss information from the fishing industry and any ongoing development to address data needs. The EU industry reported that the fishery for blue whiting in 2015 was very good. High catch rates were maintained all through the season.

History of advice, catch, and management

Table 9.3.8.7 Blue whiting in Subareas I–IX, XII, and XIV. History of ICES advice, the agreed TAC, and ICES estimates of catch.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	ICES catch
1987	TAC for northern areas; no advice for southern areas	950	-	665
1988	TAC for northern areas; no advice for southern areas	832	-	558
1989	TAC for northern areas; no advice for southern areas	630	-	627
1990	TAC for northern areas; no advice for southern areas	600	-	562
1991	TAC for northern areas; no advice for southern areas	670	-	370
1992	No advice	-	-	475
1993	Catch at <i>status quo</i> F (northern areas); no assessment for southern areas	490	-	481
1994	Precautionary TAC (northern areas); no assessment for southern areas	485	650*	459
1995	Precautionary TAC for combined stock	518	650*	579
1996	Precautionary TAC for combined stock	500	650*	646
1997	Precautionary TAC for combined stock	540	-	672
1998	Precautionary TAC for combined stock	650	-	1125
1999	Catches above 650 000 t may not be sustainable in the long run	650	-	1256
2000	F should not exceed the proposed F_{pa}	800	-	1412
2001	F should not exceed the proposed F_{pa}	628	-	1780
2002	Rebuilding plan	0	-	1556
2003	F should be less than the proposed F_{pa}	600	-	2321
2004	Achieve 50% probability that F will be less than F_{pa}	925	-	2378
2005	Achieve 50% probability that F will be less than F_{pa}	1075	-	2027
2006	F old management plan	1500	2100**	1966
2007	F should be less than the proposed F_{pa}	980	1847***	1612
2008	F should be less than F_{pa}	835	1250^	1246
2009	Maintain stock above B_{pa}	384	606^^	636
2010	Follow the agreed management plan	540	548	540
2011	See scenarios	40–223	40	105
2012	Follow the agreed management plan	391	391	384
2013	Follow the agreed management plan	643	643	626
2014	Follow the agreed management plan	948.950	1200	1155
2015	Follow the agreed management plan	839.886	1260^^^	
2016	MSY approach	≤ 776.391		

Weights in thousand tonnes.

* NEAFC proposal for NEAFC regions 1 and 2.

** Agreed TAC from four Coastal States of 2 million tonnes, and an additional allocation to Russia in the international zone of 100 000 t.

*** Agreed TAC from four Coastal States of 1.7 million tonnes, and an additional allocation to Russia and Greenland of 147 000 t.

^ Agreed TAC from four Coastal States of 1.1 million tonnes, and an additional allocation to Russia and Greenland.

^^ Agreed TAC from four Coastal States of 0.59 million tonnes, and an additional allocation to Russia (0.016 million tonnes).

^^^ Agreed TAC by the Coastal States, no agreement on the share between the parties, total catch in 2015 (1 300 000 t) estimated by ICES.

History of catch and landings

Table 9.3.8.8 Blue whiting in Subareas I–IX, XII, and XIV. Catch distribution by fleet in 2014 as estimated by ICES.

Total catch	Landings		Discards
	98% pelagic trawl	2% bottom trawl	
1155 kt	1148 kt		7 kt

Table 9.3.8.9 Blue whiting in Subareas I–IX, XII, and XIV. History of catches, ICES estimated values are presented by country. Discards included since 2014.

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Denmark	89500	41450	56979	48659	18134	248	140	165	340	2167	35256
Estonia											
Faroes	322322	266799	321013	317859	225003	58354	49979	16405	43290	85768	224700
France		8046	18009	16638	11723	8831	7839	4337	9799	8978	10410
Germany	15293	22823	36437	34404	25259	5044	9108	278	6239	11418	24487
Iceland	379643	265516	309508	236538	159307	120202	87942	5887	63056	104918	182879
Ireland	75393	73488	54910	31132	22852	8776	8324	1195	7557	13205	21466
Japan											
Latvia											
Lithuania			4635	9812	5338						4717
Netherlands	95311	147783	102711	79875	78684	35686	33762	4595	26526	51635	38524
Norway	957684	738490	642451	539587	418289	225995	194317	20539	118832	196246	399520
Poland											
Portugal	3937	5190	5323	3897	4220	2043	1482	603	1955	2056	2150
Spain	15612	17643	15173	13557	14342	20637	12891	2416	6726	15274	32065
Sweden	19083	2960	101	467	4	3	50	1	4	199	2
UK (England + Wales)	2593	7356	10035	12926	14147	6176	2475	27	2866	4100	11
UK (Northern Ireland)										1232	2205
UK (Scotland)	57028	104539	72106	43540	38150	173	5496	1331	6305	8166	24630
USSR / Russia	346762	332226	329100	236369	225163	149650	112553	45841	88303	120674	152256
Greenland										2133	
Unallocated									3499		
TOTAL	2377568	2026953	1968456	1612330	1246465	635639	523832	103592	385297	626036	1155279

Table 9.3.8.10 Blue whiting in Subareas I–IX, XII, and XIV. Catches (tonnes) by main areas.

Area	Norwegian Sea fishery (SAs 1+2; Divs. Va, XIVA–b)	Fishery in the spawning area (SA XII; Divs. Vb, VIa–b, VIIa–c)	Directed- and mixed fisheries in the North Sea (SA IV; Div. IIIa)	Total northern areas	Total southern areas (SAs VIII+IX; Divs. VIId–k)	Grand total
1988	55829	426037	45143	527009	30838	557847
1989	42615	475179	75958	593752	33695	627447
1990	2106	463495	63192	528793	32817	561610
1991	78703	218946	39872	337521	32003	369524
1992	62312	318081	65974	446367	28722	475089
1993	43240	347101	58082	448423	32256	480679
1994	22674	378704	28563	429941	29473	459414
1995	23733	423504	104004	551241	27664	578905
1996	23447	478077	119359	620883	25099	645982
1997	62570	514654	65091	642315	30122	672437
1998	177494	827194	94881	1099569	29400	1128969
1999	179639	943578	106609	1229826	26402	1256228
2000	284666	989131	114477	1388274	24654	1412928
2001	591583	1045100	118523	1755206	24964	1780170
2002	541467	846602	145652	1533721	23071	1556792
2003	931508	1211621	158180	2301309	20097	2321406
2004	921349	1232534	138593	2292476	85093	2377569
2005	405577	1465735	128033	1999345	27608	2026953
2006	404362	1428208	105239	1937809	28331	1966140
2007	172709	1360882	61105	1594695	17634	1612330
2008	68352	1111292	36061	1215704	30761	1246465
2009	46629	533996	22387	603012	32627	635639
2011	20599	72279	7524	100401	3191	103592
2012	24391	324545	5678	354614	29401	384016
2013	31759	481356	8749	521864	103973	625837
2014	45580	885483	28596	959659	195620	1155279

Summary of the assessment

Table 9.3.8.11 Blue whiting in Subareas I–IX, XII, and XIV. Assessment summary with weights (in tonnes). Recruitment in thousands.

Year	Recruitment (Age 1)	High	Low	SSB	High	Low	Total Catch	Mean F (Ages 3–7)	High	Low
1981	4106000	6592000	2558000	2917000	3638000	2339000	923000	0.278	0.354	0.219
1982	5554000	8924000	3456000	2318000	2852000	1883000	550000	0.222	0.28	0.175
1983	21617000	34410000	13580000	1901000	2275000	1589000	553000	0.264	0.328	0.212
1984	20978000	32910000	13372000	1860000	2213000	1563000	616000	0.323	0.397	0.262
1985	10252000	16020000	6561000	2251000	2695000	1881000	678000	0.342	0.417	0.281
1986	7074000	10878000	4601000	2390000	2817000	2028000	847000	0.46	0.555	0.38
1987	8598000	13201000	5600000	1918000	2252000	1634000	665000	0.425	0.516	0.35
1988	6274000	9670000	4071000	1615000	1878000	1389000	558000	0.434	0.527	0.358
1989	8521000	13165000	5515000	1550000	1801000	1335000	627000	0.511	0.619	0.421
1990	17418000	27392000	11075000	1334000	1569000	1135000	562000	0.541	0.67	0.436
1991	9426000	14955000	5941000	1732000	2145000	1399000	370000	0.264	0.338	0.207
1992	7297000	11460000	4646000	2546000	3196000	2028000	475000	0.232	0.297	0.181
1993	5325000	8429000	3365000	2637000	3277000	2121000	481000	0.207	0.263	0.162
1994	7467000	11640000	4790000	2523000	3083000	2065000	459000	0.192	0.243	0.152
1995	9830000	15302000	6315000	2294000	2732000	1927000	579000	0.248	0.309	0.198
1996	28948000	44831000	18692000	2180000	2565000	1853000	646000	0.307	0.38	0.248
1997	45627000	70591000	29491000	2471000	2940000	2077000	672000	0.3	0.368	0.244
1998	28233000	43345000	18390000	3757000	4534000	3112000	1125000	0.418	0.509	0.344
1999	20999000	32530000	13556000	4611000	5601000	3796000	1256000	0.356	0.433	0.292
2000	36763000	57058000	23687000	4291000	5031000	3659000	1412000	0.471	0.57	0.39
2001	55450000	85652000	35898000	4648000	5441000	3971000	1780000	0.457	0.552	0.378
2002	46782000	72603000	30144000	5184000	6099000	4405000	1556000	0.502	0.606	0.415
2003	49625000	76721000	32099000	6934000	8219000	5850000	2321000	0.471	0.567	0.392
2004	31611000	49805000	20063000	6689000	7815000	5725000	2378000	0.556	0.666	0.464
2005	18532000	29268000	11734000	5850000	6885000	4971000	2027000	0.531	0.643	0.438
2006	6859000	10862000	4331000	5885000	6948000	4986000	1966000	0.441	0.539	0.362
2007	3734000	5958000	2340000	4672000	5521000	3953000	1612000	0.452	0.559	0.366
2008	4574000	7376000	2837000	3489000	4183000	2909000	1246000	0.422	0.535	0.333
2009	4965000	8352000	2952000	2610000	3241000	2103000	636000	0.267	0.349	0.204
2010	15007000	24964000	9021000	2538000	3244000	1986000	540000	0.21	0.28	0.158
2011	20563000	34694000	12187000	2572000	3357000	1970000	105000	0.044	0.059	0.033
2012	18718000	32540000	10767000	3396000	4416000	2611000	384000	0.121	0.158	0.092
2013	11162000	20881000	5966000	3918000	5298000	2897000	626000	0.197	0.272	0.143
2014	23271000*	**	**	3965000	5746000	2736000	1146000	0.428	0.669	0.274
2015	23271000*									
Average				3277286			952265	0.350		

* Version 2: 75% percentile of recruitment 1981-2012.

** Version 2: no high-low estimates available.

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