

Blue whiting (*Micromesistius poutassou*) in subareas 1–9, 12, and 14 (Northeast Atlantic and adjacent waters)

ICES advice on fishing opportunities

ICES advises that when the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, and Norway is applied, catches in 2022 should be no more than 752 736 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and F_{pa} but below F_{lim} ; spawning-stock size is above $MSY B_{trigger}$, B_{pa} , and B_{lim} .

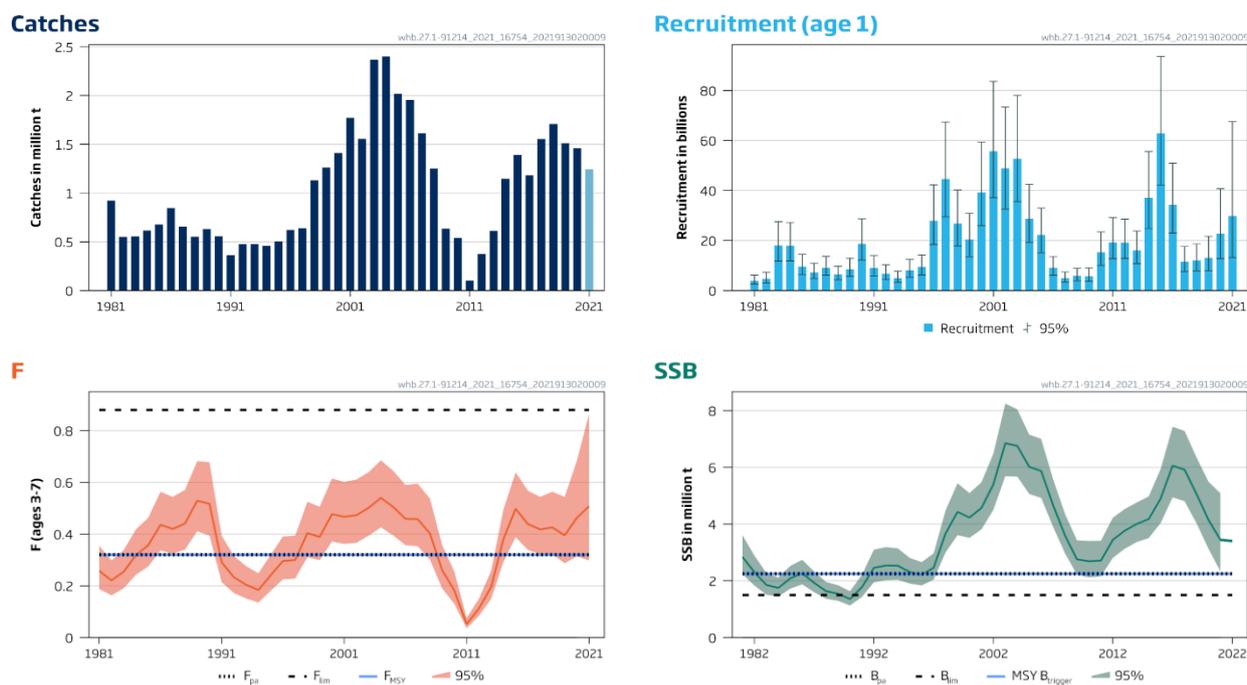


Figure 1 Blue whiting in subareas 1–9, 12, and 14. Summary of the stock assessment. Catches for 2021 (pale blue) are preliminary estimates. For this stock, $F_{mgt} = F_{MSY}$ and $SSB_{mgt} = B_{pa}$.

Catch scenarios

Table 1 Blue whiting in subareas 1–9, 12, and 14. The basis for the catch scenarios.

Variable	Value	Notes
$F_{ages\ 3-7}$ (2021)	0.51	From the assessment (based on assumed 2021 catches)
SSB (2022)	3 403 663	From the forecast; in tonnes
$R_{age\ 1}$ (2021)	29 805 438	From the assessment; in thousands
$R_{age\ 1}$ (2022–2023)	20 982 149	GM (1996–2020); in thousands
Total catch (2021)	1 242 727	As estimated by ICES, based on declared national quotas and expected uptake; in tonnes

Table 2 Blue whiting in subareas 1–9, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	F (2022)	SSB (2023)	% SSB change *	% catch change **	% advice change ***
ICES advice basis						
Long-term management strategy $F = F_{MSY}$	752736	0.32	4052163	19.1	-39.4	-19.0
Other scenarios						
MSY approach: F_{MSY}	752736	0.32	4052163	19.1	-39.4	-19.0
$F = 0$	0	0	4738902	39.2	-100	-100
F_{pa}	752736	0.32	4052163	19.1	-39.4	-19.0
F_{lim}	1695700	0.88	3214818	-5.5	36.4	82.5
$SSB_{2023} = B_{lim}$	3797974	3.93	1500000	-55.9	205.6	308.7
$SSB_{2023} = B_{pa}$	2838799	2.03	2250000	-33.9	128.4	205.5
$SSB_{2023} = MSY B_{trigger}$	2838799	2.03	2250000	-33.9	128.4	205.5
$F = F_{2021}$	1113313	0.51	3728501	9.5	-10.4	19.8
$SSB_{2023} = SSB_{2022}$	1479984	0.73	3403629	0	19.1	59.3
$Catch_{2022} = Catch_{2021}$	1242727	0.58	3613292	6.2	0	33.7
$Catch_{2022} = Catch_{2021} -20\%$	994181	0.44	3834987	12.7	-20	7.0
$Catch_{2022} = Catch_{2021} +25\%$	1553409	0.78	3339158	-1.9	25	67.2
$Catch_{2022} = Advice_{2021} -20\%$	743434	0.32	4060575	19.3	-40.2	-20

* SSB 2023 relative to SSB 2022.

** Catch 2022 relative to expected catch in 2021 (1 242 727 tonnes).

*** Catch 2022 relative to advice for 2021 (929 292 tonnes).

The advice for 2022 is 19% lower than that for 2021 due to a lower advised F for 2022 of 0.32 compared to the advice for 2021, which was based on an F of 0.36 because the TAC constraint in the management plan was applied.

Basis of the advice

Table 3 Blue whiting in subareas 1–9, 12, and 14. The basis of the advice.

Advice basis	Long-term management strategy
Management plan	A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland, and Norway in 2016 (Anon, 2016). ICES has evaluated the strategy and found it to be precautionary (ICES, 2016a).

Quality of the assessment

The assessment uses data from one survey only, the International Blue Whiting Spawning Stock Survey, which was cancelled in 2020 due to the COVID-19 disruption but continued in 2021. The lack of 2020 survey data in this year's assessment has a limited impact on the uncertainty of assessments results compared to last year due to the availability of a survey estimate for 2021.

Recruitment estimates for 2022 and 2023 used for forecast are now based on the geometric mean of the historical recruitment 1996–2020, while previous years' forecast used the full time-series back to 1981. The change was made to better reflect the environmental changes and higher recruitment in general since 1996. This change had a minor effect on the predicted catch, e.g. a 1.3 % higher catch advice for the F_{MSY} option.

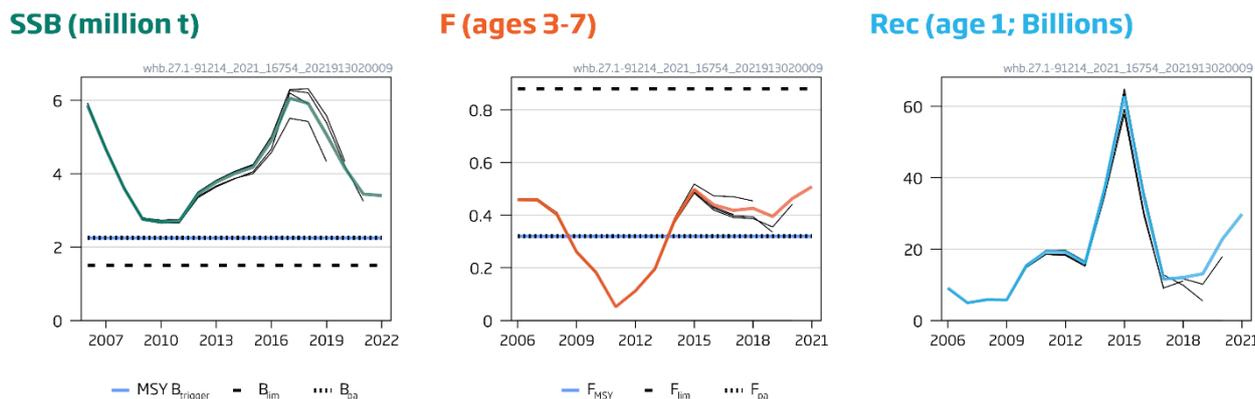


Figure 2 Blue whiting in subareas 1–9, 12, and 14. Historical assessment results.

Issues relevant for the advice

The advice is based on the application of the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, and Norway. The recommended catch scenario in Table 2 uses the latest TAC (ICES advice) as the basis from which to calculate the option relating to the –20% TAC constraint. This year the TAC advice for 2022 is 19% lower than the TAC advice for 2021 and the TAC constraint was not applied.

The advice does not take into account consistent deviations from the long-term management strategy as evident from the sum of unilateral quotas since 2018. During the evaluation of the management strategy (ICES, 2016a), the implementation error in the form of a consistent overshoot of the TAC was not included. Therefore, failing to adhere to the advised catches as derived from the application of the current implementation of the long-term management strategy may no longer be precautionary in the long term.

Recruitment in 2020–2021 is estimated to be higher than recruitment in the three previous years. These recruits will mature and contribute to the SSB in 2023.

Reference points

Table 4 Blue whiting in subareas 1–9, 12, and 14. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2250000 t	B_{pa}	ICES (2013a, 2013b, 2016a)
	F_{MSY}	0.32	Stochastic simulations with segmented regression stock–recruitment relationship capped to F_{P05}	ICES (2016a)
Precautionary approach	B_{lim}	1500000 t	Approximately B_{loss}	ICES (2013a, 2013b, 2016a)
	B_{pa}	2250000 t	$B_{lim} \exp(1.645 \times \sigma)$, with $\sigma = 0.246$	ICES (2013a, 2013b, 2016a)
	F_{lim}	0.88	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of ($SSB < B_{lim}$)	ICES (2016a)
	F_{pa}	0.32	F_{P05} ; the F that leads to $SSB \geq B_{lim}$ with 95% probability	ICES(2016a, 2021a)
EU–Faroes–Iceland–Norway long-term management strategy	SSB_{mgt_lower}	1500000 t	B_{lim}	Anon (2016)
	SSB_{mgt}	2250000 t	B_{pa}	
	F_{mgt_lower}	0.05	Arbitrary low F	
	F_{mgt}	0.32	F_{MSY}	

Basis of the assessment

Table 5 Blue whiting in subareas 1–9, 12, and 14. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b)
Assessment type	Age-based analytical assessment (SAM; ICES, 2021a) that uses catches in the model and the forecast
Input data	Commercial catches, preliminary estimate of catch-at-age in the year (Q1–Q2) in which the assessment is carried out. One survey index (International Blue Whiting Spawning Stock Survey (A1142 [IBWSS]) ages 1–8, 2004–2021, excluding 2010 and 2020). Fixed maturity estimated in 1994 by combining maturity ogives from the southern and northern areas. Natural mortality fixed at 0.2, derived in the 1980s from age compositions before the targeted fishery started.
Discards and bycatch	Discard data since 2014 have been included in the assessment
Indicators	Estimates of recruitment from surveys: Joint Norwegian-Russian survey Barents Sea (G5348), International Ecosystem Survey in the Nordic Seas in May (A3675, [IESNS]), the Faroese bottom-trawl surveys (G1264 [FO-GFS-Q1], G3284 [FO-GFS-Q3]) and the Icelandic bottom-trawl survey in spring (G3239 [IS-SMB]).
Other information	The stock was benchmarked in 2012 (WKPELA; ICES, 2012). An interbenchmark protocol was conducted in the spring of 2016 (ICES, 2016b).
Working group	Working Group on Widely Distributed Stocks (WGWISE)

History of the advice, catch, and management

Table 6 Blue whiting in subareas 1–9, 12, and 14. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	TAC	ICES estimated landings	ICES estimated discards [§]	ICES catch
1987	TAC for northern areas; no advice for southern areas	950000	-			655000
1988	TAC for northern areas; no advice for southern areas	832000	-			557847
1989	TAC for northern areas; no advice for southern areas	630000	-			627447
1990	TAC for northern areas; no advice for southern areas	600000	-			561610
1991	TAC for northern areas; no advice for southern areas	670000	-			369524
1992	No advice	-	-			475026
1993	Catch at <i>status quo</i> F (northern areas); no assessment for southern areas	490000	-			480679
1994	Precautionary TAC (northern areas); no assessment for southern areas	485000	650000 *			459414
1995	Precautionary TAC for combined stock	518000	650000 *			578905
1996	Precautionary TAC for combined stock	500000	650000 *			645982
1997	Precautionary TAC for combined stock	540000	-			672437
1998	Precautionary TAC for combined stock	650000	-			1128969
1999	Catches above 650 000 t may not be sustainable in the long run	650000	-			1256228
2000	F should not exceed the proposed F_{pa}	800000	-			1412927
2001	F should not exceed the proposed F_{pa}	628000	-			1780170
2002	Rebuilding plan	0	-			1556792
2003	F should be less than the proposed F_{pa}	600000	-			2321406
2004	Achieve 50% probability that F will be less than F_{pa}	925000	-			2380161
2005	Achieve 50% probability that F will be less than F_{pa}	1075000	-			2034309
2006	F old management plan	1500000	2100000 **			1976176
2007	F should be less than the proposed F_{pa}	980000	1847000 ***			1625255
2008	F should be less than F_{pa}	835000	1250000 ^			1260615
2009	Maintain stock above B_{pa}	384000	606000 ^^			641818
2010	Follow the agreed management plan	540000	548000			526357
2011	See scenarios	40100– 223000	40000			103620
2012	Follow the agreed management plan	391000	391000			384021
2013	Follow the agreed management plan	643000	643000			628169
2014	Follow the agreed management plan	948950	1200000			1155279
2015	Follow the agreed management plan	839886	1260000 ^^^	1389953	6291	1396244
2016	MSY approach	≤ 76391	1147000 ^^^	1178180	5007	1183187

Year	ICES advice	Catch corresponding to advice	TAC	ICES estimated landings	ICES estimated discards [§]	ICES catch
2017	MSY approach	≤ 1342330	1675400 ^{^^^}	1556030	2030	1558061
2018	Long-term management strategy	≤ 1387872	1727964 ^{^^^}	1707152	4325	1711477
2019	Long-term management strategy	≤ 1143629	1483208 ^{^^^}	1512922	2604	1515527
2020	Long-term management strategy	≤ 1161615	1478358 ^{^^^}	1492420	2828	1495248
2021	Long-term management strategy	929292	1157604 ^{^^^}			1242727 ^{§§}
2022	Long-term management strategy	≤ 752736				

* NEAFC proposal for NEAFC regions 1 and 2.

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

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

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

^^ Agreed TAC from the four Coastal States of 0.59 million tonnes, and an additional allocation of 16 000 tonnes to Russian Federation.

^^^ Sum of unilateral quotas (Note: The Coastal States agree a TAC of 1 161 615 tonnes for 2020, and of 929 292 tonnes for 2021).

§ Discards estimates include BMS landings.

§§ Preliminary.

History of the catch and landings

Table 7 Blue whiting in subareas 1–9, 12, and 14. Catch distribution by fleet in 2020, as estimated by ICES.

Total catch (2020)	Landings		Discards
1495248 tonnes	98% pelagic trawl	2% other gears	2828 tonnes
	1492420 tonnes		

Table 8 Blue whiting in subareas 1–9, 12, and 14. History of commercial catch; ICES estimated values are presented for each country participating in the fishery. Discard data are included since 2014. All weights are in tonnes.

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Denmark	41450	54663	48659	18134	248	140	165	340	2167	35256	45178	39395	60868	87348	68716	58997
Faroes	266799	321013	317859	225003	58354	49979	16405	43290	85768	224700	282502	282416	356501	349838	336569	343372
France	8046	18009	16638	11723	8831	7839	4337	9799	8978	10410	9659	10345	13369	16784	16095	13769
Germany	22823	36437	34404	25259	5044	9108	278	6239	11418	24487	24107	20025	45555	47708	38244	42362
Iceland	265516	309508	236538	159307	120202	87942	5887	63056	104918	182879	214870	186914	228934	292944	268356	243725
Ireland	73488	54910	31132	22852	8776	8324	1195	7557	13205	21466	24785	27657	43238	49903	38836	40135
Lithuania		4635	9812	5338						4717		1129	5300			9543
Netherlands	147783	102711	79875	78684	35686	33762	4595	26526	51635	38524	56397	58148	81156	121864	75020	62309
Norway	738490	642451	539587	418289	225995	194317	20539	118832	196246	399520	489439	310412	399363	438426	351429	354033
Poland													15889	12152	27185	47616
Portugal	5190	5323	3897	4220	2043	1482	603	1955	2056	2150	2547	2586	2046	2497	3481	2819
Spain	17643	15173	13557	14342	20637	12891	2416	6726	15274	32065	29206	31952	28920	24718	22782	23676
Sweden	2960	101	464	4	3	50	1	4	199	2	32	42	90	16 *	54	25
UK (Eng. & W.)	7356	10035	12926	14147	6176	2475	27	1590	4100	11	131	1374	3447	1864	4062	7458
UK (N. Ire.)									1232	2205	1119			4508	2899	2958
UK (Scot.)	104539	72106	43540	38150	173	5496	1331	6305	8166	24630	30508	37173	64724	66682	54040	41344
Russian Federation	332226	329100	236369	225163	149650	112553	45841	88303	120674	152256	185763	173655	188449	170892	188006	181496
Greenland									2133				20212	23333	19753	19611
Unallocated								3499								
Total	203430	197617	162525	126061	641818	526357	103620	384021	628169	115527	139624	118185	155806	171147	151552	149524

* Only landings.

Table 9 Blue whiting in subareas 1–9, 12, and 14. ICES estimated catches by main fishing areas. All weights are in tonnes.

Area	Norwegian Sea fishery (subareas 1 and 2; divisions 5.a, 14.a–b)	Fishery in the spawning area (Subarea 12; divisions 5.b, 6.a–b, 7.a–c)	Directed- and mixed fisheries in the North Sea (Subarea 4; Division 3.a)	Total northern areas	Total southern areas (subareas 8, 9; divisions 7.d–k)	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	318018	65974	446367	28722	475026
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
2010	36214	441521	17545	495280	28552	523832
2011	20599	72279	7524	100401	3191	103592
2012	24391	324545	5678	354614	29402	384016 *
2013	31759	481356	8749	521864	103973	625837 **
2014	45580	885483	28596	959659	195620	1155279
2015	150828	895684	44661	1091173	305071	1396244
2016	59744	905087	55774	1020604	162583	1183187 ***
2017	136565	1284105	45474	1466144	91917	1558061
2018	143204	1445957	43484	1632646	78831	1711477
2019	68593	1271883	44856	1385333	130194	1515527
2020	92084	1059197	64327	1215608	279640	1495248

* Official catches by area from Sweden are not included (2012).

** Official catches by area from Sweden and Greenland are not included (2013).

*** Grand total includes only 1336 tonnes from UK (England + Wales; 2016 total catch from UK [England + Wales] = 1374 tonnes).

Table 10 Blue whiting in subareas 1–9, 12, and 14. Landings inside and outside the NEAFC Regulatory Area (RA), as estimated by ICES, as well as total landings. Weights are in tonnes.

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total catches	Percentage inside the NEAFC RA
2017	263019	1295042	1558061	17
2018	176399	1535078	1711477	10
2019	340062	1175465	1515527	22
2020	246412	1248836	1495248	16

Summary of the assessment

Table 11 Blue whiting in subareas 1–9, 12, and 14. Assessment summary. Weights are in tonnes and recruitment is in thousands.

Year	Recruitment age 1			SSB			Catches (tonnes) *	F ages 3–7		
	Low	Value	High	Low	Value	High		Low	Value	High
1981	2551853	3946080	6102055	2239591	2843799	3611014	922980	0.188	0.26	0.36
1982	3008509	4696923	7332898	1834150	2302366	2890108	550643	0.163	0.22	0.30
1983	11775650	18021467	27580072	1510944	1856506	2281099	553344	0.191	0.26	0.34
1984	11823410	17927420	27182717	1448333	1750611	2115976	615569	0.24	0.32	0.42
1985	6344090	9575365	14452447	1723059	2086876	2527512	678214	0.28	0.36	0.46
1986	4832635	7251591	10881347	1877212	2269479	2743714	847145	0.34	0.44	0.56
1987	6058765	9110901	13700566	1599576	1930865	2330768	654718	0.32	0.42	0.54
1988	4280013	6440989	9693041	1367908	1637715	1960738	552264	0.34	0.44	0.57
1989	5656169	8544270	12907066	1296180	1547055	1846487	630316	0.41	0.53	0.68
1990	12204475	18706545	28672664	1128574	1358764	1635905	558128	0.39	0.52	0.68
1991	5832076	9030557	13983178	1429332	1778560	2213114	364008	0.21	0.29	0.39
1992	4385689	6712684	10274357	1949402	2458361	3100202	474592	0.172	0.23	0.32
1993	3228601	4997346	7735075	2023037	2540185	3189531	475198	0.151	0.20	0.28
1994	5285973	8107500	12435091	2039662	2534082	3148352	457696	0.135	0.184	0.25
1995	6166052	9366200	14227206	1902342	2311535	2808745	505176	0.181	0.24	0.32
1996	18407554	27896658	42277400	1836492	2210376	2660377	621104	0.23	0.30	0.39
1997	29460840	44565707	67414990	2044176	2464353	2970896	639681	0.23	0.30	0.39
1998	17791745	26745578	40205497	3001545	3669862	4486986	1131955	0.31	0.40	0.53
1999	13544156	20454274	30889878	3610899	4432233	5440387	1261033	0.30	0.39	0.51
2000	25926555	39231005	59362755	3514368	4230752	5093167	1412449	0.37	0.48	0.62
2001	37101728	55702658	83629152	3811227	4568522	5476291	1771805	0.36	0.47	0.60
2002	32563927	48895878	73418876	4498373	5400006	6482357	1556955	0.37	0.47	0.61
2003	35556956	52676531	78038651	5686857	6849571	8250010	2365319	0.39	0.50	0.64
2004	19265060	28616022	42505797	5672809	6755492	8044810	2400795	0.43	0.54	0.69
2005	15018310	22242605	32942020	5061918	6018029	7154734	2018344	0.40	0.51	0.65
2006	6072432	9091134	13610481	4920034	5870609	7004839	1956239	0.36	0.46	0.59
2007	3298315	4952577	7436530	3899972	4666706	5584181	1612269	0.35	0.46	0.60
2008	3846303	5842915	8875965	2963508	3593810	4358168	1251851	0.30	0.40	0.54
2009	3675852	5763280	9036107	2218803	2758087	3428445	634978	0.190	0.26	0.36
2010	10024968	15334306	23455530	2122772	2689104	3406527	539539	0.130	0.182	0.26
2011	12696647	19236335	29144431	2156951	2713450	3413526	103771	0.036	0.052	0.076
2012	12878334	19175444	28551649	2808274	3445804	4228064	375692	0.084	0.112	0.150
2013	10807867	16039501	23803549	3131928	3768379	4534165	613863	0.149	0.196	0.26
2014	24799212	37131235	55595662	3366398	4004460	4763460	1147650	0.29	0.38	0.50
2015	42154778	62818315	93610758	3506095	4177415	4977273	1390656	0.39	0.50	0.64
2016	22968425	34221938	50989175	4039993	4900689	5944752	1180786	0.34	0.44	0.57
2017	7599119	11565966	17603565	4940280	6058300	7429336	1555069	0.32	0.42	0.54
2018	7806099	12061390	18636342	4806789	5916510	7282428	1709856	0.32	0.43	0.56
2019	7890921	13079208	21678799	4030938	5061219	6354834	1512026	0.29	0.40	0.54
2020	12759097	22788112	40700221	3134696	4151143	5497181	1460507	0.31	0.46	0.68
2021	13152311	29805438	67544339	2332874	3444751	5086562	1242727 ***	0.30	0.51	0.87
2022		20982149 **			3403663					

* Catches presented are the sum of product (SOP) values from catch- and weight-at-age used in the assessment model.

** Geometric mean (1996–2020).

*** Preliminary catches.

Sources and references

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