

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 2020 should be no more than 1 161 615 tonnes.

Stock development over time

Fishing mortality (F) has decreased since 2015 but is estimated to be above F_{MSY} in 2019. Spawning-stock biomass (SSB) has decreased since 2018 but it is estimated to remain well above $MSY_{Btrigger}$. Recruitment (R) in 2017 to 2019 is estimated to be low, following a period of high recruitment.

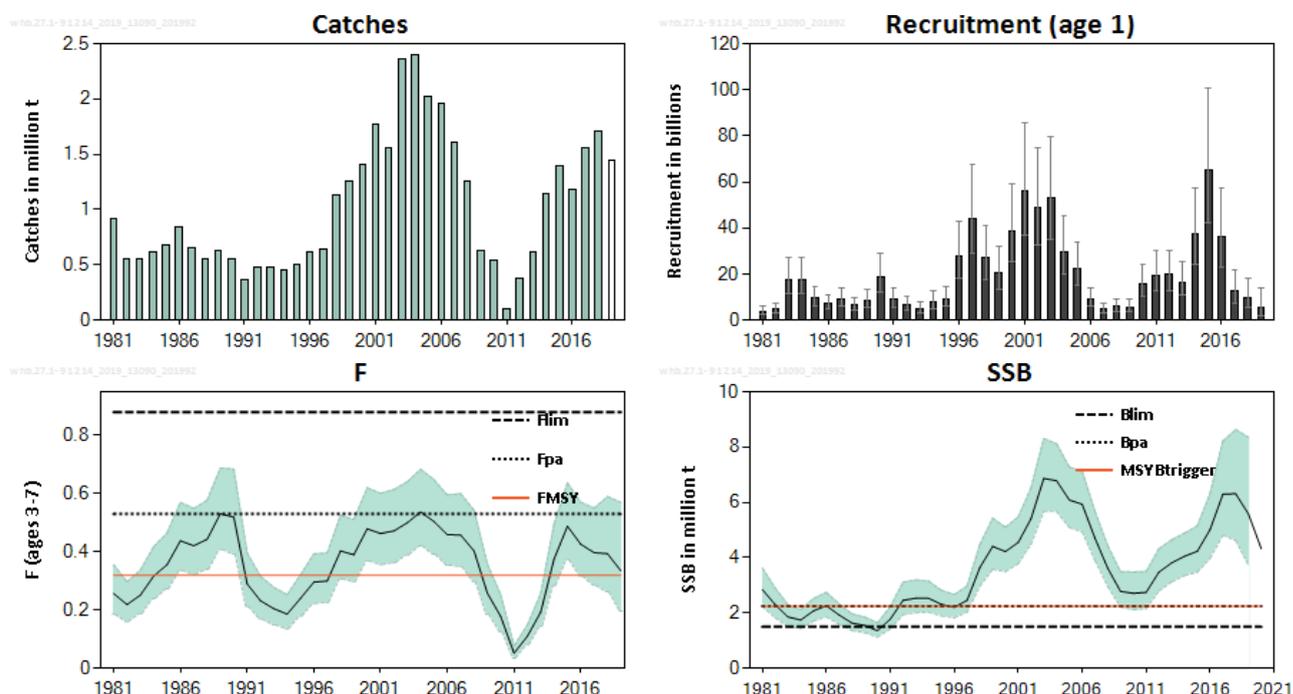


Figure 1 Blue whiting in subareas 1–9, 12, and 14. Summary of the stock assessment. Catches for 2019 (not shaded) are preliminary. For this stock, $F_{MGT} = F_{MSY}$ and $SSB_{MGT} = B_{pa}$; therefore, the horizontal lines representing these points in the graph would overlap. Confidence intervals (95%) are included in the recruitment, F, and SSB plots.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim} ; and spawning-stock size is above $MSY_{Btrigger}$ and above B_{pa} and B_{lim} .

Table 1 Blue whiting in subareas 1–9, 12, and 14. State of the stock and fishery relative to reference points.

	Fishing pressure			Stock size				
	2017	2018	2019	2018	2019	2020		
Maximum sustainable yield	F_{MSY}	✗	✗	✗	Above			
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	Harvested sustainably			
Management plan	F_{MGT}	✗	✗	✗	Above			
				$MSY_{Btrigger}$	✓	✓	✓	Above trigger
				B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity
				B_{MGT}	✓	✓	✓	Above

Catch scenarios

Table 2 Blue whiting in subareas 1–9, 12, and 14. The basis for the catch scenarios.

Variable	Value	Notes
$F_{\text{ages 3-7}}$ (2019)	0.335	From the assessment (preliminary 2019 catches).
SSB (2020)	4325386	From the forecast; in tonnes.
$R_{\text{age 1}}$ (2019)	5466776	From the assessment; in thousands.
$R_{\text{age 1}}$ (2020-2021)	14872450	GM (1981–2018); in thousands.
Total catch (2019)	1444301	Preliminary 2019 catches as estimated by ICES, based on declared quotas and expected uptake; in tonnes.

Table 3 Blue whiting in subareas 1–9, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2020)	F (2020)	SSB (2021)	% SSB change *	% Catch change **	% Advice change ***
ICES advice basis						
Long-term management strategy ($F = F_{\text{MSY}}$)	1161615	0.320	3435240	-20.6	-19.6	1.6
Other scenarios						
MSY approach: F_{MSY}	1161615	0.320	3435240	-20.6	-19.6	1.6
$F = 0$	0	0.000	4558202	5.4	-100.0	-100.0
F_{pa}	1738144	0.530	2887400	-33.2	20.3	52.0
F_{jim}	2464861	0.880	2210394	-48.9	70.7	115.5
SSB (2021) = B_{jim}	3258019	1.476	1500000	-65.3	125.6	184.9
SSB (2021) = B_{pa}	2421569	0.855	2250000	-48.0	67.7	111.7
SSB (2021) = MSY B_{trigger}	2421569	0.855	2250000	-48.0	67.7	111.7
$F = F$ (2019)	1207680	0.335	3391192	-21.6	-16.4	5.6
SSB (2021) = SSB (2020)	239207	0.058	4325386	-0.0	-83.4	-79.1
Catch (2020) = Catch (2019)	1444301	0.418	3165186	-26.8	0.0	26.3
Catch (2020) = Catch (2019) -20%	1155441	0.318	3441089	-20.4	-20.0	1.0
Catch (2020) = Catch (2019) +25%	1805376	0.558	2823952	-37.7	25.0	57.9
Catch (2020) = Advice (2019) -20%	914903	0.242	3671942	-15.1	-36.7	-20.0
Catch (2020) = Advice (2019) +25%	1429536	0.412	3179662	-26.5	-1.02	25.0

* SSB 2021 relative to SSB 2020 (4 325 386 tonnes).

** Catch in 2020 relative to catch in 2019 (1 444 301 tonnes, ICES estimate).

*** Advice value for 2020 relative to the advice value for 2019 (1 143 629 tonnes).

Although the recruitment has been low in the last three years, the advised catch is similar (1.6% higher) to last year's advice due to an upwards revision of SSB and a downward revision of F.

Basis of the advice

Table 4 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

Since 2016, the assessment has used a preliminary estimate of catch-at-age in the year in which the assessment is carried out to supplement information from the acoustic survey conducted in the spring. In recent years around 90% of the annual catches of the age 3+ fish were taken in the first half year, which makes it reasonable to estimate the total annual catch-at-age from preliminary data for the first half of the year.

In previous assessments a three-year average of the mean weights-at-age was used for the preliminary catch data. Due to a decreasing trend in mean weight for the main age classes in the fishery, these values were an overestimate compared to the final mean weights obtained in the following year. This gave a tendency to overestimate SSB and underestimate F. For 2019, the preliminary mean weights were used in the assessment. This has partly removed the previously observed bias in SSB and F.

The upward revision in SSB and downward revision in F this year are mainly due to a high survey index for the large 2014 year class.

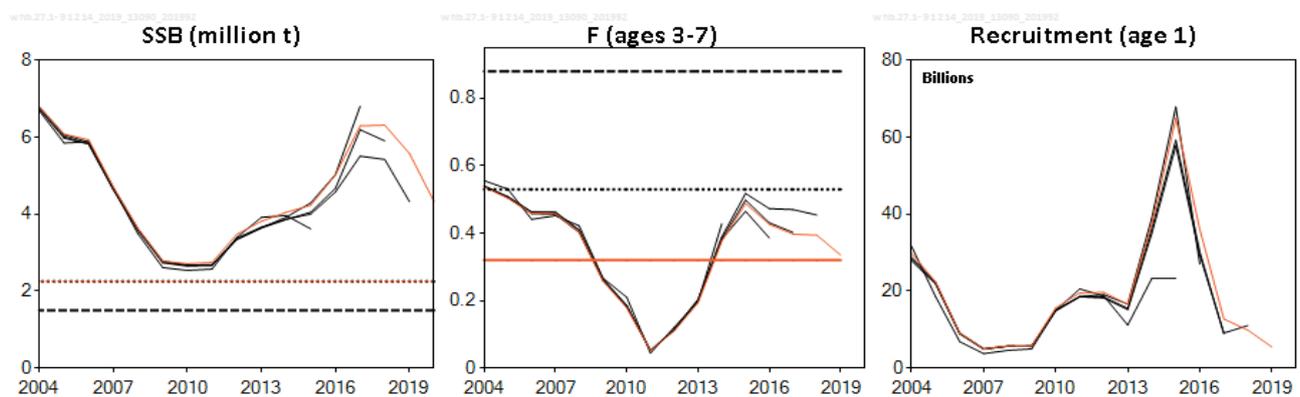


Figure 2 Blue whiting in subareas 1–9, 12, and 14. Historical assessment results. Since 2016, the SSB time-series includes the TAC year.

Issues relevant for the advice

The assessment estimates a low 2018 year class, which is confirmed by a series of surveys not used in the assessment model. This low recruitment in combination with low 2016–2017 year classes will result in a decrease in stock size, and a reduction in fishing opportunities when the 2016–2018 year classes are fully selected in the fishery.

The advice is based on the application of the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, and Norway and does not take into account the deviations from the plan as evident from the sum of unilateral quotas. In the last two catch scenarios presented in Table 3 the recommended catch from last year's application of the management plan is therefore used as the basis from which to calculate the option relating to a –20% and +25% TAC constraint.

Reference points

Table 5 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	ICES (2016a)
Precautionary approach	B_{lim}	1500000 t	Approximately B_{loss}	ICES (2013a, 2013b, 2016a)
	B_{pa}	2250000 t	$B_{\text{lim}} \exp(1.645 \times \sigma)$, with $\sigma = 0.246$	ICES (2013a, 2013b, 2016a)
	F_{lim}	0.88	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of ($SSB < B_{\text{lim}}$)	ICES (2016a)
	F_{pa}	0.53	Based on F_{lim} and assessment uncertainties. $F_{\text{lim}} \exp(-1.645 \times \sigma)$, with $\sigma = 0.299$	ICES (2016a)
EU–Faroese–Iceland–Norway long-term management strategy	$SSB_{\text{MGT_lower}}$	1500000 t	B_{lim}	Anon (2016)
	SSB_{MGT}	2250000 t	B_{pa}	
	$F_{\text{MGT_lower}}$	0.05	Arbitrary low F	
	F_{MGT}	0.32	F_{MSY}	

Basis of the assessment

Table 6 Blue whiting in subareas 1–9, 12, and 14. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical assessment (SAM; Berg and Nielsen, 2016) that uses catches in the model and the forecast.
Input data	Commercial catches, preliminary estimate of catch-at-age in the year in which the assessment is carried out. One survey index (International Blue Whiting Spawning Stock Survey (IBWSS) ages 1–8, 2004–2019, excluding 2010). 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: Norwegian bottom trawl survey in the Barents Sea, International Ecosystem Survey in the Nordic Seas in May (IESNS) and the International Ecosystem Summer Survey in the Nordic Seas in July (IESSNS), the Faroese bottom trawl surveys in spring, and the Icelandic bottom trawl survey in spring.
Other information	The stock was benchmarked in 2012 (WKPELA; ICES, 2012). An inter-benchmark protocol was conducted in the spring of 2016 (ICES, 2016b).
Working group	Working Group on Widely Distributed Stocks (WGWIDE)

Information from stakeholders

The EU industry reported that the fishery for blue whiting in 2019 was very good. High catch rates were maintained all through the season and the vessels had no difficulty catching their quota. A very large fishery took place west of Ireland in the Porcupine area and west of Scotland. Large blue whiting dominated the catch. Some of the fleets observed a larger number of small blue whiting on the fishing grounds in 2019 than in previous year.

The Pelagic AC has carried out a study of the blue whiting management strategy during 2019. The Pelagic AC is following this up with the EU Commission.

History of the advice, catch, and management

Table 7 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 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^^^	1396244
2016	MSY approach	≤ 776391	1147000^^^	1181850
2017	MSY approach	≤ 1342330	1675400^^^	1558061
2018	Long-term management strategy	≤ 1387872	1727964^^^	1711477
2019	Long-term management strategy	≤ 1143629	1483208^^^	1444301 [§]
2020	Long-term management strategy	≤ 1161615		

* NEAFC proposal for NEAFC regions 1 and 2.

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

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

^ 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 of 16 000 t to Russia.

^^^ No agreed TAC by the Coastal States, sum of unilateral quotas.

§ Preliminary.

History of the catch and landings

Table 8 Blue whiting in subareas 1–9, 12, and 14. Catch distribution by fleet in 2018 as estimated by ICES.

Total catch (2018)	Landings		Discards
1711477 tonnes	99% pelagic trawl	1% bottom trawl	4309 tonnes
	1707168 tonnes		

Table 9 Blue whiting in subareas 1–9, 12, and 14. Catches inside and outside NEAFC regulatory area. All weights are in tonnes.

Year	Catches inside NEAFC RA	Catches outside NEAFC RA	Total catches
2018	176399	1535078	1711477

Table 10 Blue whiting in subareas 1–9, 12, and 14. History of commercial catch and landings; 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
Denmark	41450	54663	48659	18134	248	140	165	340	2167	35256	45178	39395	60868	87348
Faroes	266799	321013	317859	225003	58354	49979	16405	43290	85768	224700	282502	282416	356501	349838
France	8046	18009	16638	11723	8831	7839	4337	9799	8978	10410	9659	10345	13369	16784
Germany	22823	36437	34404	25259	5044	9108	278	6239	11418	24487	24107	20025	45555	47708
Iceland	265516	309508	236538	159307	120202	87942	5887	63056	104918	182879	214870	186914	228934	292944
Ireland	73488	54910	31132	22852	8776	8324	1195	7557	13205	21466	24785	27657	43238	49903
Lithuania		4635	9812	5338						4717		1129	5300	
Netherlands	147783	102711	79875	78684	35686	33762	4595	26526	51635	38524	56397	58148	81156	121864
Norway	738490	642451	539587	418289	225995	194317	20539	118832	196246	399520	489439	310412	399363	438426
Poland													15889	12152
Portugal	5190	5323	3897	4220	2043	1482	603	1955	2056	2150	2547	2586	2046	2497
Spain	17643	15173	13557	14342	20637	12891	2416	6726	15274	32065	29206	31952	28920	24718
Sweden **	2960	101	464	4	3	50	1	4	199	2	32	42	90	16
UK (England & Wales)	7356	10035	12926	14147	6176	2475	27	1590	4100	11	131	1374*	3447	1864
UK (Northern Ireland)									1232	2205	1119			4508
UK (Scotland)	104539	72106	43540	38150	173	5496	1331	6305	8166	24630	30508	37173	64724	66682
Russia	332226	329100	236369	225163	149650	112553	45841	88303	120674	152256	185763	173655	188449	170892
Greenland									2133				20212	23333
Unallocated								3499						
Total	2034309	1976176	1625255	1260615	641818	526357	103620	384021	628169	1155279	1396244	1181850	1558061	1711477

* Updated in 2018.

** For 2018 only landings.

Table 11 Blue whiting in subareas 1–9, 12, and 14. ICES estimated catches (tonnes) by main fishing areas.

Area	Norwegian Sea fishery (Sfishery) (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

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

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

Summary of the assessment

Table 12 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 *	F (ages 3–7)		
	Low	Value	High	Low	Value	High		Low	Value	High
1981	2489342	3896876	6100263	2233607	2846619	3627870	922980	0.186	0.26	0.36
1982	2936887	4630424	7300526	1828845	2304898	2904869	550643	0.161	0.22	0.30
1983	11403660	17678275	27405360	1506437	1858580	2293040	553344	0.188	0.25	0.34
1984	11541642	17723928	27217758	1437627	1744170	2116077	615569	0.24	0.32	0.42
1985	6250679	9543383	14570604	1710733	2078674	2525752	678214	0.27	0.36	0.47
1986	4790094	7272374	11041000	1866673	2263816	2745452	847145	0.34	0.44	0.57
1987	6002314	9132926	13896362	1591061	1926457	2332555	654718	0.32	0.42	0.55
1988	4223292	6437259	9811850	1362246	1635851	1964409	552264	0.34	0.44	0.58
1989	5630452	8612583	13174180	1292158	1546980	1852055	630316	0.41	0.53	0.69
1990	12073288	18742380	29095370	1126775	1360972	1643846	558128	0.39	0.52	0.68
1991	5714284	8944058	13999334	1423554	1779798	2225191	364008	0.21	0.29	0.40
1992	4336390	6715037	10398447	1941223	2458820	3114427	474592	0.170	0.23	0.32
1993	3256529	5089008	7952642	2012814	2536460	3196336	475198	0.150	0.21	0.28
1994	5173862	8033603	12474003	2029095	2529314	3152848	457696	0.136	0.186	0.25
1995	6095731	9374009	14415341	1894920	2309839	2815609	505176	0.180	0.24	0.32
1996	18077467	27736116	42555304	1829036	2208021	2665534	621104	0.22	0.30	0.39
1997	28775928	44065482	67478857	2031284	2457528	2973214	639681	0.23	0.30	0.40
1998	17716639	26947826	40988888	2968036	3643947	4473784	1131955	0.31	0.40	0.53
1999	13560362	20741960	31726948	3577162	4406105	5427141	1261033	0.30	0.39	0.51
2000	25326341	38741897	59263774	3496188	4222027	5098557	1412449	0.37	0.48	0.62
2001	36978866	56204092	85424468	3785445	4552790	5475682	1771805	0.36	0.46	0.60
2002	32310079	49118731	74671737	4487435	5408962	6519731	1556955	0.36	0.47	0.61
2003	35189022	52873853	79446489	5676958	6867451	8307598	2365319	0.39	0.50	0.64
2004	19758274	29806946	44966176	5666909	6783789	8120791	2400795	0.42	0.54	0.68
2005	14867884	22383995	33699701	5088722	6084043	7274042	2018344	0.39	0.50	0.65
2006	5935661	9029595	13736226	4943004	5934656	7125252	1956239	0.36	0.46	0.60
2007	3209526	4912498	7519066	3904871	4706700	5673177	1612269	0.35	0.46	0.60
2008	3738612	5795362	8983607	2959058	3619929	4428398	1251851	0.30	0.40	0.54
2009	3587927	5717271	9110325	2211779	2779726	3493512	634978	0.186	0.26	0.36
2010	10039318	15629189	24331487	2115726	2713336	3479746	539539	0.126	0.178	0.25
2011	12632711	19530150	30193579	2156219	2747257	3500305	103771	0.035	0.052	0.077
2012	12933873	19666112	29902563	2797733	3477167	4321604	375692	0.081	0.110	0.149
2013	10904850	16561619	25152773	3126908	3812909	4649409	613863	0.145	0.193	0.26
2014	24357428	37382298	57372075	3357100	4050639	4887455	1147650	0.28	0.38	0.50
2015	41984711	64931228	100419038	3475339	4229586	5147528	1390656	0.37	0.49	0.64
2016	22678031	36012234	57186666	3981388	5017692	6323733	1180786	0.32	0.43	0.57
2017	7579852	12772968	21523998	4822504	6295525	8218476	1555069	0.29	0.40	0.55
2018	5319672	9856549	18262697	4620979	6315041	8630149	1709856	0.26	0.39	0.59
2019	2151558	5466776	13890231	3722192	5576649	8355027	1444301***	0.197	0.34	0.57
2020		14872450**			4325386					

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

** Geometric mean (1981–2018).

*** Based on preliminary catches.

Sources and references

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