

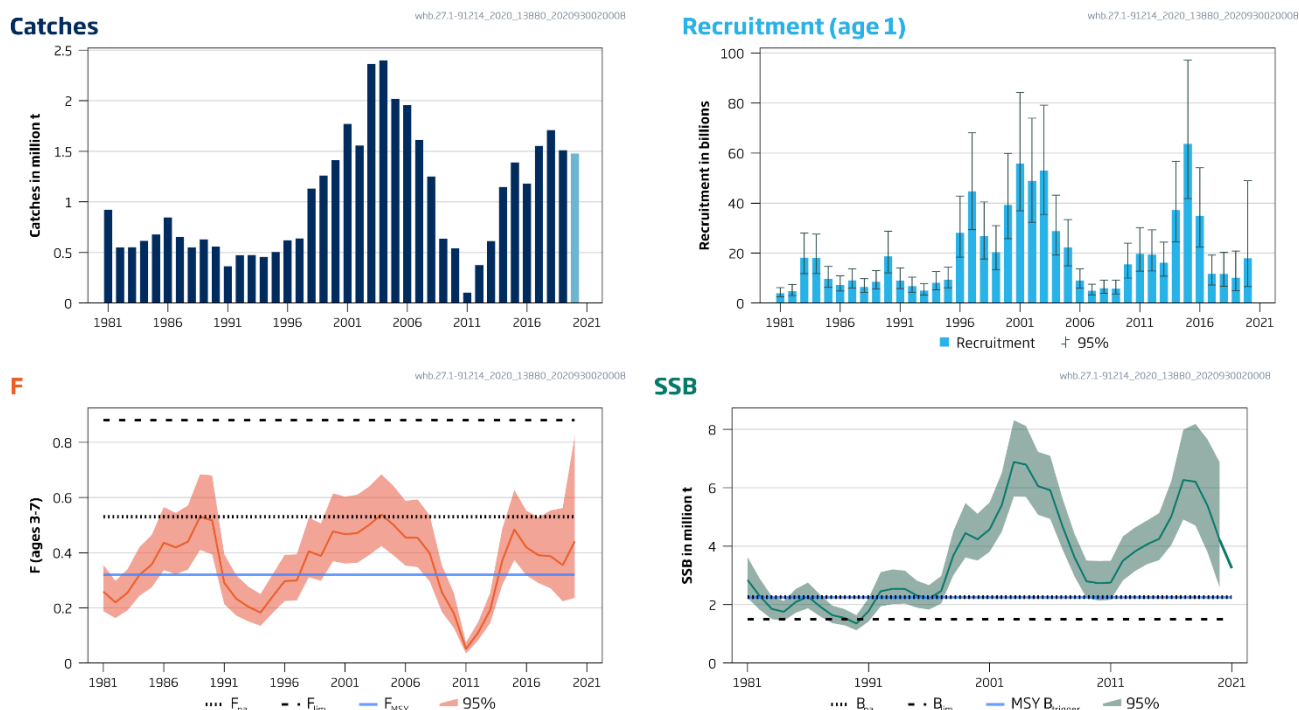
## Blue whiting (*Micromesistius poutassou*) in subareas 1–9, 12, and 14 (Northeast Atlantic and adjacent waters)

### 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 2021 should be no more than 929 292 tonnes.

### Stock development over time

Fishing mortality (F) is estimated to be above  $F_{MSY}$  since 2014. Spawning-stock biomass (SSB) has been decreasing since 2018; however, it is estimated to remain above  $MSY B_{trigger}$ . Recruitment (R) from 2017 to 2020 is estimated to be low, following a three-year period of high recruitment.



**Figure 1** Blue whiting in subareas 1–9, 12, and 14. Summary of the stock assessment. Catches for 2020 (pale blue) are preliminary from January to June. For this stock,  $F_{MGT\ TARGET} = F_{MSY}$  and  $B_{MGT} = B_{pa}$ .

### Stock and exploitation status

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

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

	Fishing pressure			Stock size						
	2018	2019	2020	2019	2020	2021				
Maximum sustainable yield	$F_{MSY}$	✗	✗	✗	Above	$MSY B_{trigger}$	✓	✓	✓	Above trigger
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓	Harvested sustainably	$B_{pa}, B_{lim}$	✓	✓	✓	Full reproductive capacity
Management plan	$F_{MGT}$	✗	✗	✗	Above	$B_{MGT}$	✓	✓	✓	Above

## Catch scenarios

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

Variable	Value	Notes
F ages 3–7 (2020)	0.441	From the assessment (based on assumed 2020 catches)
SSB (2021)	3 248 023	From the forecast; in tonnes
R <sub>age 1</sub> (2020)	17 925 568	From the assessment; in thousands
R <sub>age 1</sub> (2021–2022)	14 751 018	GM (1981–2019); in thousands
Total catch (2020)	1 478 358	As estimated by ICES, based on declared national 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 (2021)	F (2021)	SSB (2022)	% SSB change *	% catch change **	% advice change ***
ICES advice basis						
Long-term management strategy Catch <sub>2021</sub> = TAC <sub>2020</sub> –20%	929292	0.36	3046216	–6.2	–37	–20
Other scenarios						
MSY approach: F <sub>MSY</sub>	841717	0.32	3127644	–3.7	–43	–28
F = 0	0	0.00	3921194	21	–100	–100
F <sub>pa</sub>	1265493	0.53	2735932	–16	–14.4	8.9
F <sub>lim</sub>	1810385	0.88	2243305	–31	23	56
SSB <sub>2022</sub> = B <sub>lim</sub>	2677773	1.81	1500000	–54	81	131
SSB <sub>2022</sub> = B <sub>pa</sub>	1802838	0.87	2250000	–31	22	55
SSB <sub>2022</sub> = MSY B <sub>trigger</sub>	1802838	0.87	2250000	–31	22	55
F = F <sub>2020</sub>	1095465	0.44	2892329	–11.0	–26	–5.7
SSB <sub>2022</sub> = SSB <sub>2021</sub>	712737	0.26	3248040	0	–52	–39
Catch <sub>2021</sub> = Catch <sub>2020</sub>	1478358	0.65	2541771	–22	0	27
Catch <sub>2021</sub> = Catch <sub>2020</sub> –20%	1182686	0.49	2811956	–13.4	–20	1.80
Catch <sub>2021</sub> = Catch <sub>2020</sub> +25%	1847948	0.91	2209901	–32	25	59
Catch <sub>2021</sub> = Advice <sub>2020</sub> –20%	929292	0.36	3046216	–6.2	–37	–20

\* SSB 2022 relative to SSB 2021.

\*\* Catch 2021 relative to expected catch in 2020 (1 478 358 tonnes).

\*\*\* Catch 2020 relative to advice for 2020 (1 161 615 tonnes).

SSB is declining and recent recruitments have been low, which caused a reduction in the advised TAC, capped at –20% applying the long-term management strategy (Anon., 2016).

## 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

The assessment uses data from one survey only, the International Blue Whiting Spawning Stock Survey (IBWSS), which was cancelled in 2020 due to the COVID-19 disruption. The lack of IBWSS 2020 data increases the uncertainties of the assessment results in the terminal year, especially for the youngest cohorts. Because the model estimate of recruitment in 2020 is only based on the catch numbers of age 1 in 2020, it is more uncertain than in previous years. However, additional surveys not included in the assessment model indicate that recruitments have been of a low magnitude since 2017, which is in line with the assessment results. The magnitude of the 2020 recruitment estimate has a minor effect on catch opportunities for 2021, as mature fish constitute the main part of the catches.

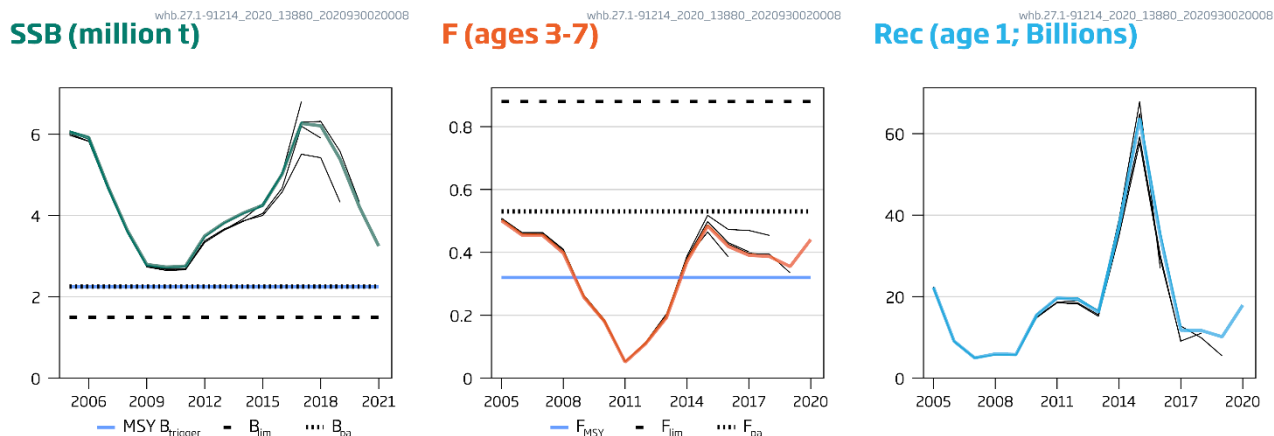


Figure 2 Blue whiting in subareas 1–9, 12, and 14. Historical assessment results.

### Issues relevant for the advice

Even though the recruitment uncertainty is higher this year, low recruitment in the most recent years is confirmed by a number of other surveys. This low recruitment will result in a decrease in stock size, as well as a reduction in fishing opportunities in the coming years.

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 3 uses the latest TAC (ICES advice) as the basis from which to calculate the option relating to the –20% TAC constraint. The advice does not take into account consistent deviations from the plan as evident from the sum of unilateral quotas. 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, the current implementation of the long-term management strategy may no longer be precautionary.

### 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	$B_{lim} \exp(1.645 \times \sigma)$ , 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)
	$F_{pa}$	0.53	Based on $F_{lim}$ and assessment uncertainties. $F_{lim} \exp(-1.645 \times \sigma)$ , with $\sigma = 0.299$	ICES (2016a)
EU–Faroes–Iceland–Norway long-term management strategy	$B_{MGT lower}$	1500000 t	$B_{lim}$	Anon (2016)
	$B_{MGT}$	2250000 t	$B_{pa}$	
	$F_{MGT lower}$	0.05	Arbitrary low F	
	$F_{MGT TARGET}$	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, 2019).
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 (Q1-Q2) in which the assessment is carried out. One survey index (International Blue Whiting Spawning Stock Survey (IBWSS) ages 1–8, 2004–2019, excluding 2010, and no survey in 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: Norwegian bottom-trawl survey in the Barents Sea, International Ecosystem Survey in the Nordic Seas in May (IESNS), the Faroese bottom-trawl surveys and the Icelandic bottom-trawl survey in spring.
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 (WGWIDE).

## Information from stakeholders

No additional information is available.

## 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 estimated landings	ICES estimated discards <sup>§</sup>	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

Year	ICES advice	Catch corresponding to advice	TAC	ICES estimated landings	ICES estimated discards <sup>§</sup>	ICES catch
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	≤ 776391	1147000 ^^^	1178180	5007	1183187
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^^^			1478358 <sup>§§</sup>
2021	Long-term management strategy	929292				

\* 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 Russia 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 Russia and Greenland.

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

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

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

§ Discards estimates include BMS landings.

§§ Preliminary.

## History of the catch and landings

**Table 8** Blue whiting in subareas 1–9, 12, and 14. Catch distribution by fleet in 2019, as estimated by ICES.

Total catch (2019)	Landings		Discards
1515527 tonnes	99% pelagic trawl	1% bottom trawl	2570 tonnes
	1512957 tonnes		

**Table 9** 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
Denmark	41450	54663	48659	18134	248	140	165	340	2167	35256	45178	39395	60868	87348	68716
Faroes	266799	321013	317859	225003	58354	49979	16405	43290	85768	224700	282502	282416	356501	349838	336569
France	8046	18009	16638	11723	8831	7839	4337	9799	8978	10410	9659	10345	13369	16784	16095
Germany	22823	36437	34404	25259	5044	9108	278	6239	11418	24487	24107	20025	45555	47708	38244
Iceland	265516	309508	236538	159307	120202	87942	5887	63056	104918	182879	214870	186914	228934	292944	268356
Ireland	73488	54910	31132	22852	8776	8324	1195	7557	13205	21466	24785	27657	43238	49903	38836
Lithuania		4635	9812	5338						4717		1129	5300		
Netherlands	147783	102711	79875	78684	35686	33762	4595	26526	51635	38524	56397	58148	81156	121864	75020
Norway	738490	642451	539587	418289	225995	194317	20539	118832	196246	399520	489439	310412	399363	438426	351429
Poland													15889	12152	27185
Portugal	5190	5323	3897	4220	2043	1482	603	1955	2056	2150	2547	2586	2046	2497	3481
Spain	17643	15173	13557	14342	20637	12891	2416	6726	15274	32065	29206	31952	28920	24718	22782
Sweden	2960	101	464	4	3	50	1	4	199	2	32	42	90	16 **	54
UK (Eng. & W.)	7356	10035	12926	14147	6176	2475	27	1590	4100	11	131	1374 *	3447	1864	4062
UK (N. Ire.)									1232	2205	1119			4508	2899
UK (Scot.)	104539	72106	43540	38150	173	5496	1331	6305	8166	24630	30508	37173	64724	66682	54040
Russia	332226	329100	236369	225163	149650	112553	45841	88303	120674	152256	185763	173655	188449	170892	188006
Greenland									2133				20212	23333	19753
Unallocated								3499							
Total	2034309	1976176	1625255	1260615	641818	526357	103620	384021	628169	1155279	1396244	1181850	1558061	1711477	1515527

\* Updated in 2018.

\*\* Only landings.

**Table 10** 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

\* 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 11** 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

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 (thousands)(thousands)			SSBSSB			Catches (tonnes) *	F ages 3–7		
	Low	Value	High	Low	Value	High		Low	Value	High
1981	2540278	3957322	6164834	2232351	2845488	3627027	922980	0.188	0.26	0.36
1982	2978221	4693398	7396359	1826705	2301321	2899252	550643	0.163	0.22	0.30
1983	11793619	18181946	28030678	1505755	1855241	2285843	553344	0.191	0.26	0.34
1984	11824046	18057318	27576577	1447345	1753978	2125575	615569	0.24	0.32	0.42
1985	6333315	9628473	14638069	1722997	2092477	2541189	678214	0.27	0.36	0.46
1986	4795267	7242024	10937224	1876035	2273644	2755523	847145	0.34	0.44	0.56
1987	6010796	9098048	13770967	1597602	1933331	2339612	654718	0.32	0.42	0.54
1988	4242157	6425056	9731218	1366293	1639304	1966867	552264	0.34	0.44	0.57
1989	5599097	8511756	12939585	1293881	1547399	1850590	630316	0.41	0.53	0.68
1990	12067196	18623678	28742500	1123181	1355825	1636656	558128	0.39	0.52	0.68
1991	5764336	9002675	14060276	1421100	1775078	2217227	364008	0.21	0.29	0.40
1992	4360685	6723250	10365822	1940172	2456884	3111208	474592	0.172	0.23	0.32
1993	3203687	4998200	7797893	2016565	2542322	3205155	475198	0.151	0.20	0.28
1994	5271609	8148170	12594387	2033675	2536056	3162541	457696	0.135	0.183	0.25
1995	6120492	9362066	14320463	1896673	2311551	2817180	505176	0.181	0.24	0.32
1996	18370286	28034940	42784193	1831448	2210252	2667406	621104	0.23	0.30	0.39
1997	29370182	44725598	68109184	2039600	2466370	2982438	639681	0.23	0.30	0.39
1998	17662958	26724248	40434076	3002195	3682009	4515758	1131955	0.31	0.41	0.53
1999	13389190	20359418	30958253	3612411	4448140	5477216	1261033	0.30	0.39	0.51
2000	25751761	39255183	59839380	3510177	4235816	5111462	1412449	0.37	0.48	0.62
2001	36892189	55761819	84282894	3809022	4577749	5501620	1771805	0.36	0.47	0.60
2002	32317499	48895382	73977208	4490236	5405309	6506867	1556955	0.36	0.47	0.61
2003	35480553	52993568	79150916	5696134	6880604	8311376	2365319	0.39	0.50	0.64
2004	19202255	28800650	43196876	5684725	6791916	8114751	2400795	0.42	0.54	0.68
2005	14889744	22282661	33346241	5073301	6055782	7228528	2018344	0.39	0.50	0.64
2006	5992001	9064943	13713814	4935259	5917460	7095137	1956239	0.35	0.46	0.59
2007	3266725	4960888	7533665	3909457	4703578	5659008	1612269	0.35	0.45	0.59
2008	3862982	5944464	9147506	2973117	3630450	4433114	1251851	0.30	0.40	0.54
2009	3642868	5794358	9216523	2229162	2795836	3506565	634978	0.186	0.26	0.36
2010	9994421	15473168	23955257	2136290	2733239	3496996	539539	0.127	0.180	0.25
2011	12798884	19647386	30160426	2166841	2753922	3500066	103771	0.035	0.051	0.075
2012	12844864	19399347	29298453	2825110	3498827	4333209	375692	0.082	0.110	0.148
2013	10733154	16169499	24359353	3147113	3821120	4639476	613863	0.145	0.192	0.25
2014	24445788	37230666	56701895	3384144	4063545	4879342	1147650	0.28	0.37	0.49
2015	41772298	63695809	97125518	3521915	4251496	5132213	1390656	0.37	0.48	0.63
2016	22485578	34888644	54133253	4038626	5014269	6225606	1180786	0.32	0.42	0.55
2017	7189336	11735400	19156097	4913563	6266824	7992792	1555069	0.29	0.39	0.53
2018	6724704	11679974	20286662	4706773	6206072	8182958	1709856	0.27	0.39	0.55
2019	4949635	10145773	20796831	3790692	5387150	7655961	1512026	0.22	0.36	0.56
2020	6568567	17925568	48918733	2585528	4214250	6868966	1478358 ***	0.24	0.44	0.82
2021		14751018 **			3248023					

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

\*\* Geometric mean (1981–2019).

\*\*\* Preliminary catches.



## Sources and references

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