

Haddock (*Melanogrammus aeglefinus*) in Subarea 4, Division 6.a, and Subdivision 20 (North Sea, West of Scotland, Skagerrak)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, total catches in 2021 should be no more than 69 280 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2020 is attached as Annex 1.

Stock development over time

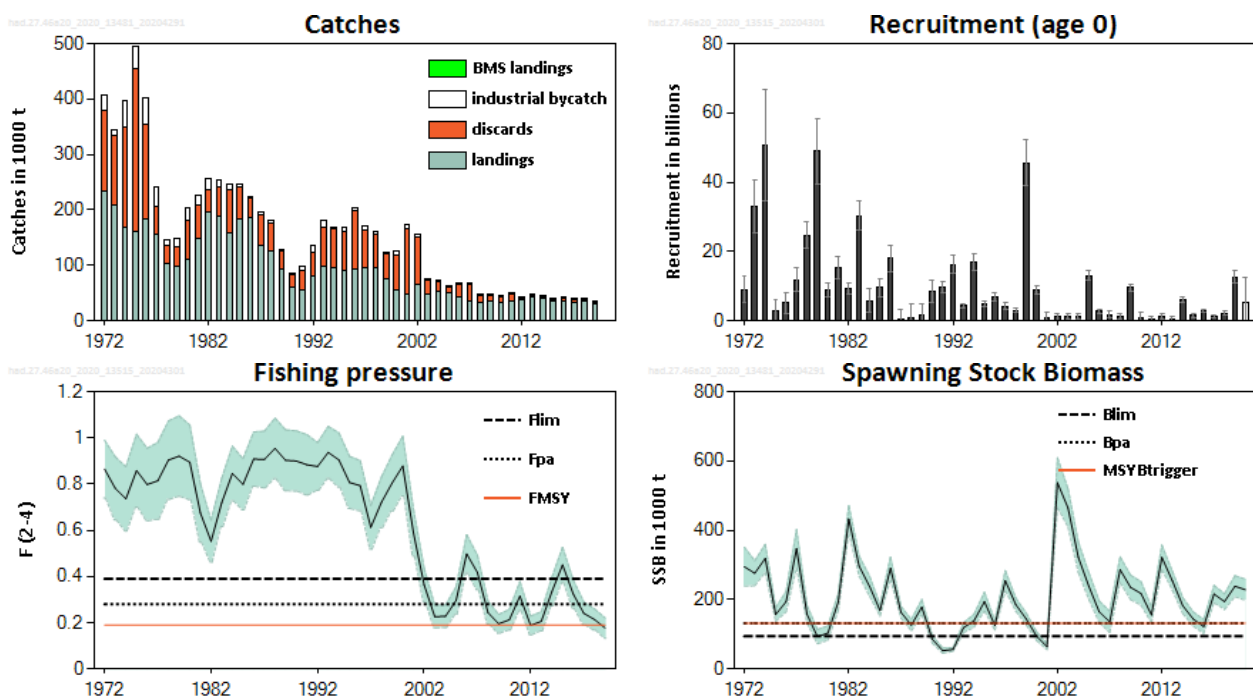


Figure 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Summary of the stock assessment. Shaded areas (F, SSB) and error bars (R) indicate 95% confidence intervals. The landings below minimum conservation reference size (BMS) are those officially reported. The unshaded recruitment is forecasted by the assessment model.

Stock and exploitation status

Table 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. State of the stock and the fishery relative to reference points.

	Fishing pressure			Stock size				
	2017	2018	2019	2018	2019	2020		
Maximum sustainable yield	F_{MSY}	✘	✘	✔	Below			
Precautionary approach	F_{pa}, F_{lim}	✔	✔	✔	Harvested sustainably			
Management plan	F_{MGT}	—	—	—	Not applicable			
				MSY $B_{trigger}$	✔	✔	✔	Above trigger
				B_{pa}, B_{lim}	✔	✔	✔	Full reproductive capacity
				B_{MGT}	—	—	—	Not applicable

Catch scenarios

Table 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assumptions made for the interim year and in the forecast. All weights are in tonnes, recruitment (R) is in thousands.

Variable	Value	Notes
F _{ages 2-4} (2020)	0.197	F based on TAC for 2020 of 41819 tonnes, plus industrial bycatch of 77 tonnes
SSB (2021)	206064	Short-term forecast (STF)
R _{age 0} (2020)	5406360	Assessment model forecast
R _{age 0} (2021)	5406360	Assessment model forecast
Total catch, excluding industrial bycatch (2020)	41819	TAC 2020; TAC constraint applied to human consumption fishery catch only
Projected landings (2020)	28796	STF, relative contribution to total catch by age = average 2017–2019
Projected discards (2020)	13023	STF, relative contribution to total catch by age = average 2017–2019
Industrial bycatch (2020)	77	STF, relative contribution to total catch by age = average 2017–2019

Table 3 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Annual catch scenarios. All weights are in tonnes (t).

Basis	Total catch (2021)	Projected landings * (2021)	Projected discards ** (2021)	IBC *** (2021)	HCF *** catch (2021)	F _{total} (ages 2–4) (2021)	F _{projected landings} (ages 2–4) (2021)	F _{projected discards} (ages 2–4) (2021)	F _{IBC} (ages 2–4) (2021) **	SSB (2022)	% SSB change ^	% TAC change ^^	% advice change ^^
ICES advice basis													
MSY approach: F _{MSY}	69280	49061	20110	110	69170	0.194	0.158	0.035	0.00040	471256	129	66	66
Other scenarios													
F = MAP# F _{MSY lower}	60139	42609	17419	111	60028	0.167	0.136	0.030	0.00040	480443	133	44	44
F = MAP F _{MSY upper} ##	69280	49061	20110	110	69170	0.194	0.158	0.035	0.00040	471256	129	66	66
F = 0 (IBC only)	119	0	0	119	0	0	0	0	0.00040	542133	163	-100	-100
F _{pa}	95457	67474	27876	107	95350	0.274	0.224	0.050	0.00040	445065	116	128	128
F _{lim}	129323	91152	38069	102	129220	0.384	0.314	0.070	0.00040	411465	100	209	209
SSB (2022) = B _{lim}	493824	327191	166580	52	493771	2.66	2.17	0.49	0.00040	94000	-54	1081	1081
SSB (2022) = B _{pa} = MSY B _{trigger}	436337	293347	142930	61	436276	2.06	1.68	0.38	0.00040	132000	-36	943	943
F ₂₀₂₀	70253	49746	20397	110	70143	0.197	0.161	0.036	0.00040	470279	128	68	68
Rollover TAC	41818	29647	12057	114	41704	0.114	0.093	0.021	0.00040	498918	142	0	0

* Marketable landings.

** Including BMS landings, assuming recent discard rate.

*** IBC = industrial bycatch, HCF = human consumption fishery.

^ SSB 2022 relative to SSB 2021.

^^ Human consumption fishery (HCF) catch in 2021 relative to TAC in 2020: Subdivision 20 (2193 t) + Subarea 4 (35 653 t) + Division 6.a (3973 t) = 41 819 t.

^^^ Total catch 2021 relative to the advice value 2020 (41 818 t).

EU multiannual plan (MAP) for the North Sea (EU, 2018).

For this stock, F_{MSY upper} = F_{MSY}.

** F(IBC) is assumed to be constant in all scenarios at *status quo* value.

The change in advice (66%) is due to an incoming 2019 year class that is substantially larger than any of the the most recent recruitments for this stock.

Quality of the assessment

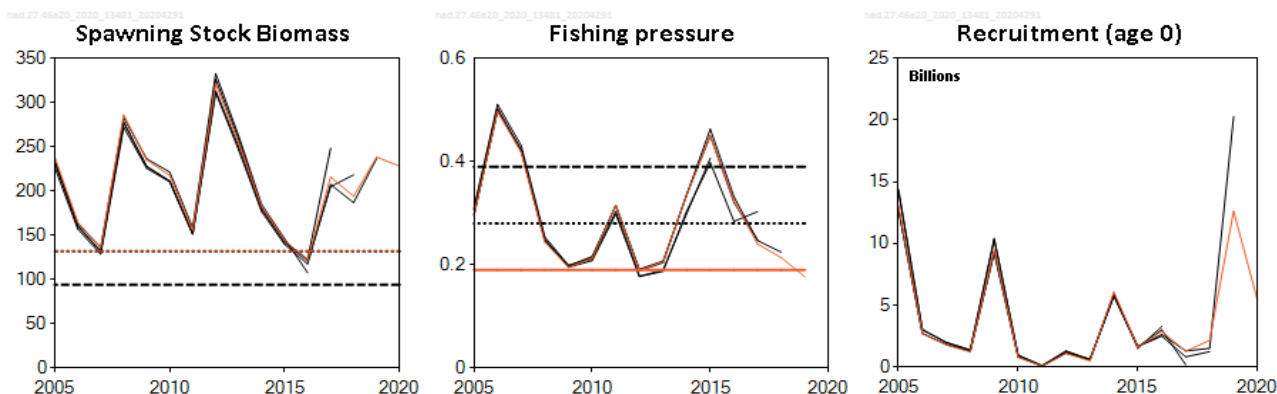


Figure 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year).

History of the advice, catch, and management

Table 4a Haddock in Subarea 4, Division 6.a, and Subdivision 20. **North Sea (Subarea 4)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest thousand tonnes.

Year	ICES advice	Landings corresp. to advice	Total catch corresp. to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards ^^	ICES industrial bycatch	ICES total
1987	80% of F(85)	105000		140000	109000	108000	59000	4000	172000
1988	77% of F(86); TAC	185000		185000	105000	105000	62000	4000	171000
1989	Reduce decline in SSB; TAC; protect juveniles	68000		68000	64000	76000	26000	2000	104000
1990	80% of F (88); TAC	50000		50000	43000	51000	33000	3000	87000
1991	70% of effort (89)			50000	45000	45000	40000	5000	90000
1992	70% of effort (89)			60000	51000	70000	48000	11000	129000
1993	70% of effort (89)			133000	80000	80000	80000	11000	170000
1994	Significant reduction in effort; mixed fishery			160000	87000	81000	65000	4000	150000
1995	Significant reduction in effort; mixed fishery			120000	75000	75000	57000	8000	140000
1996	Mixed fishery to be taken into account			120000	75000	76000	73000	5000	154000
1997	Mixed fishery to be taken into account			114000	73000	79000	52000	7000	138000
1998	No increase in F	100300		115000	72000	77000	45000	5000	128000
1999	Reduction of 10% F (95–97)	72000		88600	64000	64000	43000	4000	111000
2000	F less than F _{pa}	< 51700		73000	47000	45000	47000	8000	100000
2001	F less than F _{pa}	< 58000		61000	40000	39000	118000	8000	165000
2002	F less than F _{pa}	< 94000		104000	54000	53000	45000	4000	101000
2003	No cod catches	-		52000	42000	42000	23000	1000	76000
2004	Mixed-fisheries considerations / F should be below F _{pa}	No forecast *		85000	48000	47000	17000	1000	65000
2005	Mixed-fisheries considerations / F should be below F _{pa}	92000*		66000	31000	48000	10000	0	57000
2006	Mixed-fisheries considerations / F < 0.3	39000*		52000	36000	36000	17000	0	55000

Year	ICES advice	Landings corresp. to advice	Total catch corresp. to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards ^^	ICES industrial bycatch	ICES total
2007	Mixed-fisheries considerations / F < 0.3	55400*		55000	31000	31000	30000	0	61000
2008	Mixed-fisheries considerations / 15% TAC reduction	49300 **,**		46000	30000	29000	13000	0	42000
2009	Mixed-fisheries considerations / Apply management plan	44700 **,**		42000	31000	31000	10000	0	41000
2010	Mixed-fisheries considerations / Apply management plan	38000 **,**		36000	28000	28000	10000	0	38000
2011	See scenarios	-		34000	26000	34000	11000	0	46000
2012	Apply management plan	41575 **,**		39000	30000	30000	4000	1000	35000
2013	Apply management plan	47811 **,**		45041	37000 ***	39000 ***	2000 ***	0 ***	41000 ***
2014	Apply management plan	38201 *		38284	35000	35000	4000	65 ***	39000
2015	(November update) MSY approach		68690	40711	30276	30015	4650	17	34682
2016	MSY approach		≤ 59945	61933	30162	29647	6243	30	35920
2017	MSY approach		≤ 39461	33643	30051	28563	5341	16	33921
2018	MSY approach		≤ 48990	41767	29195	29277	3425	1	32703
2019	MSY approach		≤ 33956	28950	25453	25616	3575	177	29369
2020	MSY approach		≤ 41818	35653					
2021	MSY approach		≤ 69280						

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

** Including industrial bycatch.

*** Subarea 4 and Subdivision 20 combined.

^ Catch advice since 2015 is provided for Subarea 4, Division 6.a, and Subdivision 20.

^^ Since 2016 discards estimated by ICES include BMS landings.

Table 4b Haddock in Subarea 4, Division 6.a, and Subdivision 20. **Skagerrak (Subdivision 20)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest hundred tonnes.

Year	ICES advice	Landings corresp. to advice	Catch corresp. to advice **	Agreed TAC	Official landings	ICES landings	ICES discards ^	ICES industrial bycatch	ICES total catch
1987	Precautionary TAC	-		11500		3800		1400	5300
1988	Precautionary TAC	-		10000		2900		1500	4300
1989	Precautionary TAC	-		10000		4100		400	4500
1990	Precautionary TAC	-		10000		4100		2000	6100
1991	Precautionary TAC	4600		4600		4100		2600	6700
1992	TAC	4600		4600		4400		4600	9000
1993	Precautionary TAC	-		4600		2000		2400	4400
1994	Precautionary TAC	-		10000		1800		2200	4000
1995	If required, precautionary TAC; link to North Sea	-		10000		2200		2200	4400
1996	If required, precautionary TAC; link to North Sea	-		10000		3100		2900	6100
1997	Combined advice with North Sea	-		7000		3400		600	4000
1998	Combined advice with North Sea	4700		7000		3800		300	4000
1999	Combined advice with North Sea	3400		5400		1400		300	1700
2000	Combined advice with North Sea	< 1800		4500		1500		600	2100
2001	Combined advice with North Sea	< 2000		4000		1900		200	2100
2002	Combined advice with North Sea	< 3000		6300		4100		60	4100
2003	Combined advice with North Sea	-		3200		1800	200	n/a	1800

Year	ICES advice	Landings corresp. to advice	Catch corresp. to advice **	Agreed TAC	Official landings	ICES landings	ICES discards ^	ICES industrial bycatch	ICES total catch
2004	Combined advice with North Sea / F should be below F_{pa}	No forecast		4900		1400	100	n/a	1400
2005	Combined advice with North Sea / F should be below F_{pa}	-		4000		800	200	0	800
2006	Combined advice with North Sea / $F < 0.3$	-		3200		1500	1000	0	1500
2007	Combined advice with North Sea / $F < 0.3$	-		3400		1600	800	0	2500
2008	Combined advice with North Sea / 15% TAC reduction	2900		2900		1400	600	0	2000
2009	Combined advice with North Sea / Apply management plan	-		2600		1500	600	0	2100
2010	Combined advice with North Sea / Apply management plan	-		2200		1300	600	0	1900
2011	See scenarios	-		2100		9900	1700	0	11600
2012	Apply management plan North Sea	-		2095	2500	2600	700	0	3300
2013	Apply management plan North Sea	-		2770	2000	*	*	*	*
2014	Apply management plan North Sea	2438		2355	2200	2300	100	*	2400
2015	(November update) MSY approach		68690	2504	1432	1411	96	4	1512
2016	MSY approach		≤ 59945	3926	1213	1201	38	7	1246
2017	MSY approach		≤ 39461	2069	1012	1078	105	1	1183
2018	(November update) MSY approach		≤ 48990	2569	717	787	53	4	844
2019	MSY approach		≤ 33956	1780	550	613	75	3	691
2020	MSY approach		≤ 41818	2193					
2021	MSY approach		≤ 69280						

* Subarea 4 and Subdivision 20 combined (see Table 4a).

** Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

^ Since 2016, discards estimated by ICES include BMS landings.

Table 4c Haddock in Subarea 4, Division 6.a, and Subdivision 20. West of Scotland (Division 6.a). ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values for the period from 1987 to 2014 are presented to the nearest thousand (official landings) or nearest hundred (ICES landings, discards, and total) tonnes.

Year	ICES advice/Single-stock exploitation boundaries from 2004 onwards *	Landings corresp. to advice	Catch corresp. to advice ^^	Agreed TAC	Official landings	ICES landings	ICES discards #	ICES industrial bycatch	ICES total catch
1987	Reduce F towards F_{max}	20000		32000	27000	27000	16200		43200
1988	No increase in F; TAC	25000		35000	21000	21200	9500		30700
1989	80% of F (87); TAC	15000		35000	24000	16700	3000		19700
1990	80% of F (88); TAC	14000		24000	13000	10100	5400		15500
1991	70% of effort (89)	-		15200	10000	10600	8700		19200
1992	70% of effort (89)	-		12500	7000	11400 **	9300 **		20500 **
1993	70% of effort (89)	-		17600	13000	19100 **	16800 **		35900 **
1994	30% reduction in effort	-		16000	9000	14200 **	11100 **		25000 **
1995	Significant reduction in effort	-		21000	13000	12400	8600		20900
1996	Significant reduction in effort	-		22900	13000	13500	11400		24800
1997	Significant reduction in effort	-		20000	13000	12900	6500		19300
1998	No increase in F	20800 ***		25700	14000	14400	5500		19900

Year	ICES advice/Single-stock exploitation boundaries from 2004 onwards *	Landings corresp. to advice	Catch corresp. to advice ^{^^}	Agreed TAC	Official landings	ICES landings	ICES discards #	ICES industrial bycatch	ICES total catch
1999	F reduced to F_{pa}	14300 ***		19000	11000	10500	4900		15300
2000	Maintain F below F_{pa}	< 14900 ***		19000	7000	7000	7900		14900
2001	Reduce F below F_{pa}	< 11200 ***		13900	7000	6870	6600		13400
2002	Reduce F below F_{pa}	< 14100 ***		14100	7000	7100	8900		16000
2003	No cod catches	-		8700	4900	5300	4100		9400
2004	F_{pa} *	12200		6500	3000	3900	3700		7600
2005	$0.75 \times F_{pa}$ *	7600		7600	3200	3800	2900		6700
2006	$0.7 \times F_{pa}$ *	8000		7810	5700	6300	4600		10900
2007	$0.87 \times F_{pa}$ *	7200		7200	3700	3800	4000		7700
2008	$SSB > B_{pa}$ *	4200		6120	2800	2800	1200		4100
2009	No fishing and recovery plan*	0		3520	2800	2900	1600		4500
2010	No fishing and recovery plan	0		2670	2900	3000	2800		5800
2011	See scenarios	0		2005	1700	1700	1500		3300
2012	MSY framework	5600		6015	5000	5100	500		5600
2013	MSY framework	3100		4211	4700	4600	1000		5600
2014	MSY approach	6432 [^]		3988	4000	4000	800		4800
2015	(November update) MSY approach		68690	4536	3889	3868	1509	0	5377
2016	MSY approach		≤ 59945	6462	4265	4209	1669	0	5878
2017	MSY approach		≤ 39461	3697	3251	3186	1584	2	4772
2018	(November update) MSY approach		≤ 48990	4654	4171	4272	1190	0	5462
2019	MSY approach		≤ 33956	3226	3545	3575 [†]	1861	0	5436
2020	MSY approach		≤ 41818	3973					
2021	MSY approach		≤ 69280						

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

** Adjusted for misreporting.

*** For Division 6.a only.

[^] This value (6432 t) refers to total catch, including discards. Therefore, it is not directly comparable to the value advised for 2013 (3100 t), which referred only to landings.

^{^^} Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

Since 2016, discards estimated by ICES include BMS landings.

Summary of the assessment

Table 5 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assessment summary. Recruitment is in thousands, weights are in tonnes. High and low refers to 95% confidence intervals.

Year	Recruitment (age 0)			SSB			Landings *	Discards*	Industrial bycatch *	Official BMS landings	Fishing pressure (ages 2–4)		
	Age 0	High	Low	SSB	High	Low					Ages 2–4	High	Low
	thousands			tonnes			tonnes						
1972	8941713	12809948	5073479	294819	351203	238436	234019	144366	29585		0.86	0.99	0.74
1973	32856987	40525033	25188941	276036	312074	239999	207489	126105	11267		0.78	0.92	0.65
1974	50756003	66766140	34745865	318979	359455	278503	167528	181802	47505		0.74	0.87	0.60
1975	2869166	5992459	0	156812	176525	137099	160271	293321	41487		0.86	1.02	0.70
1976	5251127	8270385	2231868	194021	223555	164488	184421	169776	48163		0.80	0.95	0.64
1977	11858343	15337736	8378949	347174	401908	292441	156639	48732	35022		0.81	0.98	0.65
1978	24668248	28383402	20953094	157566	183073	132059	102970	32860	10903		0.90	1.07	0.73
1979	48898245	58354262	39442228	93041	113665	72417	97896	35054	16240		0.92	1.09	0.75
1980	9044090	11018847	7069333	103242	123825	82658	111371	68831	22472		0.89	1.06	0.73
1981	15377061	18540607	12213515	193204	217897	168510	147806	61683	17041		0.67	0.80	0.55

[†] Version 2: Value updated

Year	Recruitment (age 0)			SSB			Landings *	Discards*	Industri- al bycatch *	Official BMS landings	Fishing pressure (ages 2–4)		
	Age 0	High	Low	SSB	High	Low					Ages 2–4	High	Low
	thousands			tonnes							tonnes		
1982	9306638	10924948	7688327	432638	471542	393734	195456	41297	19383		0.55	0.64	0.46
1983	30219066	34427145	26010988	295992	324944	267041	188754	51584	12898		0.72	0.82	0.62
1984	5826765	9138640	2514890	238145	267042	209248	158205	79012	10080		0.85	0.96	0.73
1985	9625296	12272230	6978362	168465	184885	152045	182946	58373	5998		0.80	0.91	0.69
1986	17987671	21886119	14089223	290467	322216	258717	185137	36063	2643		0.91	1.03	0.79
1987	79389	3098256	0	163595	180491	146698	135022	55674	4410		0.91	1.03	0.78
1988	1014139	4925480	0	126323	142808	109838	126227	49833	4002		0.95	1.09	0.82
1989	1827160	5041685	0	178201	200094	156308	92840	32453	2410		0.90	1.03	0.77
1990	8502452	11726368	5278536	85636	96835	74438	61605	22548	2589		0.90	1.03	0.77
1991	9801333	11335967	8266698	52493	60115	44871	55208	36610	5386		0.88	1.01	0.75
1992	16230725	18762348	13699102	56284	61659	50909	81566	42477	10927		0.88	0.98	0.77
1993	4268959	5018183	3519736	118876	133314	104437	98631	70748	10766		0.94	1.05	0.82
1994	16903435	19173710	14633161	138804	157632	119976	95141	70668	3576		0.90	1.02	0.79
1995	4763322	5515807	4010837	194125	220893	167358	89859	71262	7695		0.81	0.92	0.69
1996	6836616	7972154	5701078	125241	139043	111439	92615	107207	5000		0.79	0.90	0.68
1997	4157570	5117099	3198041	254546	283455	225637	95391	67879	6684		0.61	0.71	0.52
1998	3059710	3728818	2390601	185567	204420	166713	95472	61399	5101		0.72	0.83	0.61
1999	45622975	52188989	39056961	144157	161273	127041	76009	43562	3835		0.80	0.93	0.68
2000	9041729	10257176	7826283	94108	106590	81627	54504	64185	8134		0.88	1.01	0.75
2001	903938	2533261	0	64113	72891	55334	47592	117882	7879		0.59	0.69	0.49
2002	1162427	2153221	171633	537246	609060	465432	65405	86051	3717		0.36	0.44	0.29
2003	1315777	2157786	473769	464994	520009	409980	47282	25975	1150		0.23	0.28	0.178
2004	1220531	1928530	512532	321439	365404	277473	51896	20020	554		0.23	0.28	0.179
2005	13065429	14482608	11648251	238917	277467	200367	51528	12389	168		0.30	0.35	0.24
2006	2720422	3373852	2066992	164779	195873	133685	43334	23094	535		0.50	0.58	0.41
2007	1786130	2807717	764542	135822	166656	104987	34672	32651	48		0.42	0.49	0.34
2008	1215987	2082933	349041	286240	323499	248981	33058	14503	199		0.24	0.29	0.194
2009	9530774	10517225	8544322	235235	270477	199993	35590	12326	52		0.195	0.24	0.155
2010	787912	2406214	0	217642	251709	183574	31940	13071	431		0.21	0.26	0.168
2011	56297	1427226	0	155802	178297	133307	36570	13067	24		0.32	0.38	0.25
2012	1093372	1881380	305364	321728	356927	286529	38162	5032	1		0.188	0.23	0.148
2013	490182	1259107	0	254516	281649	227383	43734	3305	54		0.21	0.25	0.165
2014	6082750	6774876	5390624	182682	205570	159793	41143	5090	65		0.33	0.40	0.27
2015	1594467	2165535	1023400	144035	164567	123502	35295	6255	21		0.45	0.53	0.37
2016	2879410	3327413	2431407	122029	142535	101524	35058	7950 **	37	0	0.32	0.39	0.26
2017	1273838	1642278	905399	215992	240931	191053	32827	7029 **	19	0	0.24	0.29	0.191
2018	2150928	2741136	1560720	193999	216621	171376	34404	5008 **	5	17	0.21	0.26	0.168
2019	12622694	14430006	10815382	238515	268758	208271	30743	5348 **	186	176	0.177	0.22	0.133
2020	5406363 ^	12318231	0	228239	258742	197736							

* ICES estimates, presented as the sum of product (SOP) values from the catch and weight-at-age used in the assessment model.

** Since 2016, the discards correspond to discards minus BMS landings from EU fleets, as officially reported in logbooks.

^ In 2020, recruitment is the time-series analysis (TSA) estimate for 2020.

Sources and references

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