

Witch (*Glyptocephalus cynoglossus*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak and Kattegat, eastern English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 1206 tonnes.

Management of witch and lemon sole under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species. ICES advises that management should be implemented at the species level in the entire stock distribution area (Subarea 4 and divisions 3.a and 7.d).

Stock development over time

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

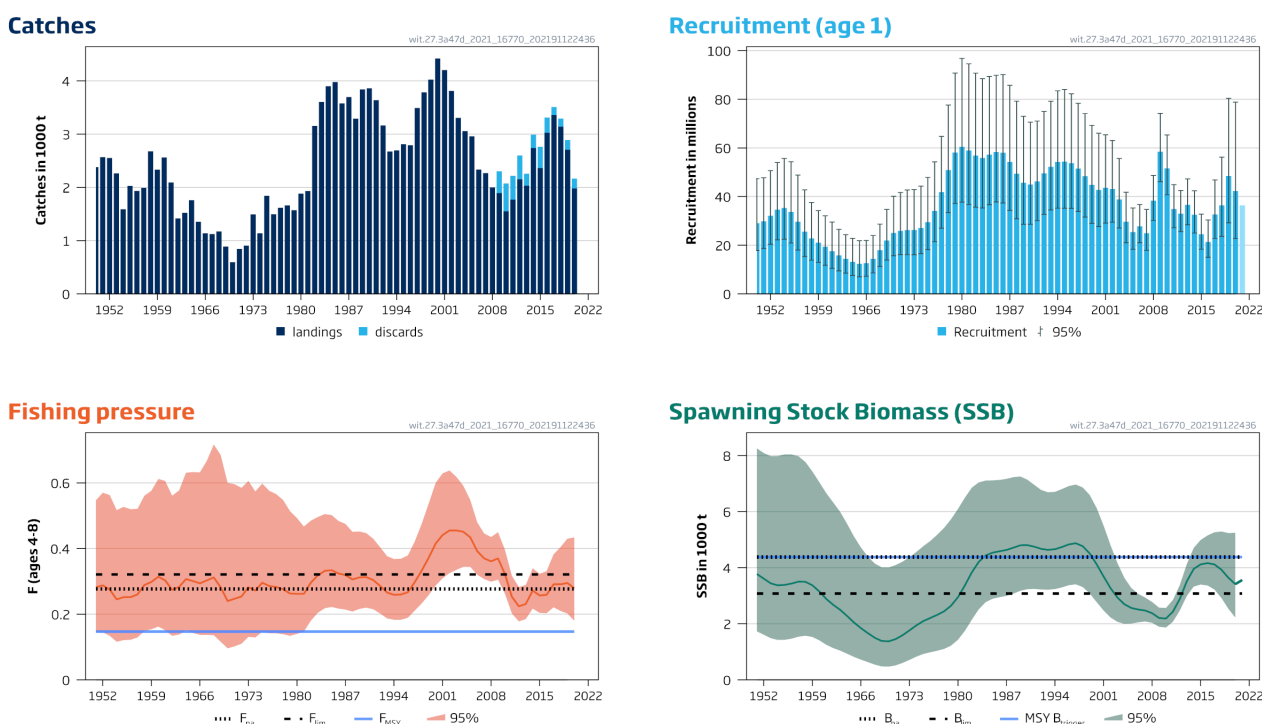


Figure 1 Witch in Subarea 4 and divisions 3.a and 7.d. Official landings and discards (in thousand tonnes); discard information is included in the assessment since 2009. The assumed recruitment value for 2021 is shaded in a lighter colour.

Catch scenarios

Table 1 Witch in Subarea 4 and divisions 3.a and 7.d. Assumptions made for the interim year and in the forecast. All weights are in tonnes, recruitment is in thousands.

Variable	Value	Notes
F_{4-8} (2021)	0.28	$F_{sq} = F_{4-8}$ (2020)
SSB (2021)	3562	SSB at the middle of the year (i.e. spawning time) before the TAC year
$R_{age\ 1}$ (2021, 2022, 2023)	36419	Median of the resampled recruitment estimates of 2009–2020
Total catch (2021)	2309	Short-term forecast (STF)
Projected landings (2021)	2152	STF; assuming average landings ratio by age 2018–2020
Projected discards (2021)	157	STF; assuming average landings ratio by age 2018–2020

Table 2 Witch in Subarea 4 and divisions 3.a and 7.d. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022) ^^	Projected landings (2022)	Projected discards * (2022)	F _{total} ages 4–8 (2022 & 2023)	SSB ^ (2022)	SSB ^ (2023)	% SSB change **	% advice change ***
ICES advice basis								
MSY approach: F _{MSY} × SSB(2021)/MSY B _{trigger}	1206	1131	75	0.120	4141	5158	25	-30
Other scenarios^^								
F _{MSY lower} × SSB(2021)/MSY B _{trigger}	875	822	53	0.085	4213	5412	28	-50
F = 0	0	0	0	0.00	4397	6123	39	-100
F _{pa}	2608	2438	170	0.28	3811	4135	8.5	50
F _{lim}	2925	2729	196	0.32	3727	3914	5.0	69
F _{sq}	2600	2431	169	0.28	3813	4140	8.6	50
SSB (2023) = B _{lim}	4284	3976	308	0.51	3380	3078	-8.9	147
SSB (2023) = B _{pa}	2257	2113	144	0.24	3896	4381	12.4	30
SSB (2023) = MSY B _{trigger}	2257	2113	144	0.24	3896	4381	12.4	30
Rollover advice	1733	1627	106	0.177	4019	4838	20	0.00
F _{MSY}	1462	1372	90	0.147	4083	4958	21	-15.6
F _{MSY lower}	1067	1001	66	0.105	4174	5268	26	-38

* Including BMS landings, assuming recent discard rate (average of 2018–2020).

** SSB in 2023 relative to SSB in 2022.

*** Advice value for 2022 relative to advice value for 2021 (1733 tonnes).

^ SSB is estimated at spawning time (1 July).

^^ Other scenarios do not include F_{MSY upper} because SSB(2021) < MSY B_{trigger}.

The 30% decrease in advice is the result of a downward revision of the SSB and an upward revision of the F as a result of the interbenchmark process (ICES, 2021a), and the application of the ICES advice rule which reduces the F when the SSB in 2021 is lower than MSY B_{trigger}.

Basis of the advice

Table 3 Witch in Subarea 4 and divisions 3.a and 7.d. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in the North Sea (EU, 2018a) and adjacent waters applies to bycatches of this stock

Quality of the assessment

Witch went through an interbenchmark process in 2021 (ICES, 2021a), changing the perception of stock status and trends compared with previous advice.

Witch are generally distributed in deeper areas, and the current trawl survey does not cover some of that habitat. A fisheries-independent survey using gears suitable for catching large flatfish and covering the entire distribution of the stock would improve the assessment.

Age information is only available from 2009 onwards, increasing the uncertainty prior to 2009 in the assessment.

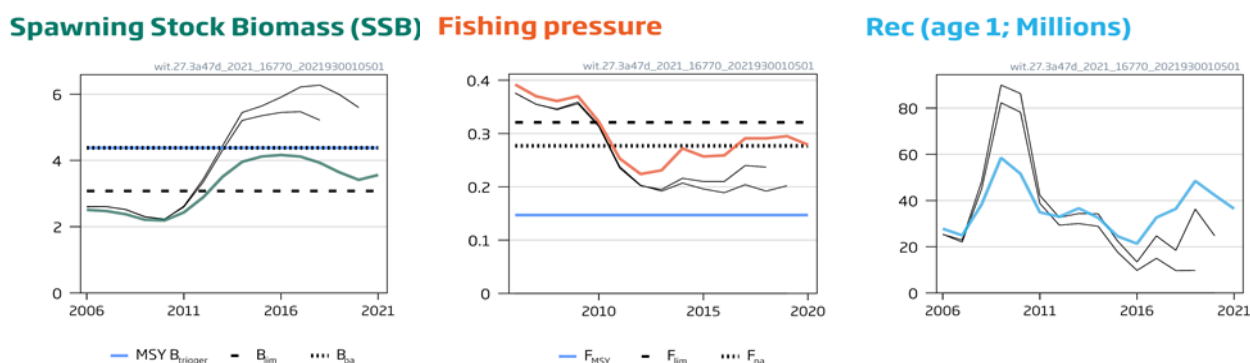


Figure 2 Witch in Subarea 4 and divisions 3.a and 7.d. Historical assessment results (final-year recruitment included for each line, corresponding to the assumed recruitment in the interim year). The assessment was benchmarked in 2021, and only assessment results from the last years should be compared with the reference points indicated.

Issues relevant for the advice

Witch is mainly a bycatch species in mixed demersal fisheries. Witch and lemon sole are largely caught by different fisheries in different areas. Management of lemon sole and witch under a combined species TAC may hinder effective management of the single-species exploitation rates and could potentially lead to the overexploitation of witch. A single-species TAC for witch, covering the entire stock area, would be more appropriate.

Reference points

Table 4 Witch in Subarea 4 and divisions 3.a and 7.d. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	4 381	Set equal to B_{pa}	ICES (2021a)
	F_{MSY}	0.147	EQsim simulation of long-term yield	ICES (2021a)
Precautionary approach	B_{lim}	3 077	Breakpoint in a segmented regression, based on recruitment 1950–2020	ICES (2021a)
	B_{pa}	4 381	$B_{lim} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.215$ is the standard deviation of the $\ln(SSB[2020])$	ICES (2021a)
	F_{lim}	0.32	Simulation using B_{lim} and B_{pa} with no assessment and advice noise	ICES (2021a)
	F_{pa}	0.28	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05} with advice rule [AR])	ICES (2021a)

Basis of the assessment

Table 5 Witch in Subarea 4 and divisions 3.a and 7.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b)
Assessment type	Age-based analytical assessment (SAM; ICES, 2018b)
Input data	Commercial catches (international landings and ages from catch sampling by métier, raised in Intercatch). Three survey indices (IBTS Q1 [G1022] from 1983, IBTS Q3 [G2829] from 1991, and BTS Q3 [B2453] from 1991); age-based from 2009–2020, total biomass until 2008. Assumed constant natural mortality (over ages and years) and maturity ogive (over years). SSB is estimated at the middle of the year (i.e. spawning time).
Discards and bycatch	Discards information included in the assessment since 2009. Discards ranged between 9.5% and 23.3% of the total catches.
Additional indicators	None
Other information	Benchmarked in 2018 (ICES, 2018b); interbenchmark in 2021 (ICES, 2021a)
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6 Witch in Subarea 4 and divisions 3.a and 7.d. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Witch		Witch and lemon sole		Witch			
		Predicted landings corresponding to advice	Predicted catches corresponding to advice	Agreed TAC*	Official landings	Official landings	ICES landings	ICES discards***	ICES catch
				Div. 2.a and Subarea 4	Subarea 4 and divs. 3.a and 7.d	Subarea 4 and divisions 3.a and 7.d			
2006				6175	6593	2303	2335	296	2631
2007				6175	6725	2237	2271	199	2470
2008				6793	5929	1954	1999	318	2317
2009				6793	5212	1818	1863	455	2319
2010				6521	4691	1490	1531	559	2090
2011				6391	5552	1530	1567	547	2114
2012	Reduce catches			6391	5922	1896	1952	555	2507
2013	No new advice; same as for 2012			6391	5754	1993	2013	254	2267
2014	Decrease landings by 4% (average of the last three years)	< 1574**		6391	6335	2646	2685	307	2992
2015	No new advice; same as for 2014	< 1574**		6391	5752	2359	2240	449	2690
2016	Precautionary approach (increase catches by no more than 20%)		≤ 2212	6391	6463	2658	2744	390	3135
2017	Precautionary approach (same advised catch value as given for 2016)		≤ 2212	6391	6064	2811	2850	236	3085
2018	Precautionary approach (increase catches by no more than 8%)		≤ 2390	6391	5966	3001	3010	199	3209
2019	Precautionary approach (same advised catch value as given for 2018)		≤ 2390	7874	5806	2568	2580	217	2797
2020	Precautionary approach		≤ 1651	6785	4589	1931	1937	198	2135
2021	MSY approach		≤ 1733	5428					
2022	MSY approach		≤ 1206						

* A combined TAC for witch and lemon sole in EU waters of Subarea 4 and Division 2.a. up to 2020 and in United Kingdom and European Union waters of 4; United Kingdom waters of 2.a thereafter.

** Advice based on official landings.

*** Includes BMS landings from 2019.

History of the catch and landings

Table 7 Witch in Subarea 4 and divisions 3.a and 7.d. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings		Discards
	Bottom otter trawl 91.3%	Others 8.7%	
2135 tonnes	1937 tonnes		198 tonnes

Table 8 Witch in Subarea 4 and divisions 3.a and 7.d. History of official landings (3.a and 4), and ICES estimates of landings, catches, and discards (Division 3.a, Subarea 4, and Division 7.d). All weights are in tonnes.

Year	Belgium	Germany		Denmark		Faroe Islands	France	Netherlands		Norway		Sweden		UK	Total landings	ICES estimates (3.a, 4, 7.d)		
	4	3.a	4	3.a	4	4	4	3.a	4	3.a	4	3.a	4	4	3.a and 4	landings	discards	catches
1968	15	0	21	173	108	0	0	0	0	12	5	0	0	840	1174			
1969	3	0	9	150	153	0	0	0	0	6	7	0	0	563	891			
1970	5	0	5	108	112	0	0	0	0	10	9	0	0	348	597			
1971	6	0	6	142	191	0	0	0	0	20	16	0	0	462	843			
1972	0	0	12	219	221	0	0	0	0	16	16	0	0	424	908			
1973	0	0	25	253	215	0	0	0	0	24	516	0	0	461	1494			
1974	0	0	18	291	221	0	0	0	0	13	3	0	0	592	1138			
1975	0	0	20	484	242	0	0	0	0	14	2	474	20	585	1841			
1976	0	0	24	441	175	0	0	0	0	18	3	319	5	511	1496			
1977	0	0	73	444	92	0	0	0	0	13	2	281	0	713	1618			
1978	0	0	37	473	87	0	1	0	0	14	1	232	0	819	1664			
1979	0	0	7	456	91	0	3	0	0	21	1	201	0	792	1572			
1980	0	0	23	569	111	0	2	0	0	49	2	256	0	871	1883			
1981	0	0	17	643	123	0	0	0	0	94	2	307	0	747	1933			
1982	0	0	16	953	495	0	0	0	0	79	2	421	4	1185	3155			
1983	0	0	19	1108	685	0	5	0	0	99	2	391	1	1296	3606			
1984	0	0	11	1158	687	0	4	0	0	158	3	480	3	1399	3903			
1985	0	0	21	1374	460	0	1	0	0	98	2	449	3	1571	3979			
1986	0	0	18	992	436	0	12	0	0	82	2	352	3	1682	3579			
1987	0	0	7	894	571	0	35	0	0	86	5	272	3	1827	3700			
1988	0	0	6	810	447	0	13	0	9	74	9	326	3	1593	3290			
1989	0	0	5	963	452	0	14	0	10	164	15	393	4	1821	3841			
1990	0	0	3	994	532	0	20	0	4	157	40	347	6	1759	3862			
1991	0	0	3	789	512	0	9	0	2	160	75	352	12	1727	3641			
1992	0	0	5	609	460	0	13	0	7	134	46	494	5	1391	3164			
1993	0	0	3	453	383	0	14	0	13	100	52	397	3	1255	2673			
1994	0	0	5	400	458	1	2	0	14	61	57	310	3	1385	2696			
1995	0	0	9	513	384	4	0	0	7	86	14	340	2	1451	2810			
1996	0	0	7	563	434	0	0	0	0	66	14	273	2	1431	2790			
1997	0	0	9	1074	488	1	0	0	1	76	10	352	3	1480	3494			
1998	0	0	13	1430	476	1	0	0	4	112	27	444	4	1275	3786			
1999	0	1	8	1629	486	1	0	0	9	111	23	499	2	1256	4025			
2000	0	0	13	1821	517	0	0	0	7	85	12	571	8	1388	4422			
2001	0	0	8	1304	744	0	0	0	1	72	16	563	12	1486	4206			
2002	0	0	5	1364	543	0	0	0	0	66	16	576	8	1062	3640	3813	1529	5341
2003	0	0	2	1036	771	0	0	0	0	64	23	546	3	836	3281	3308	349	3657

Year	Belgium	Germany		Denmark		Faroe Islands	France	Netherlands		Norway		Sweden		UK	Total landings	ICES estimates (3.a, 4, 7.d)		
	4	3.a	4	3.a	4	4	4	3.a	4	3.a	4	3.a	4	4	3.a and 4	landings	discards	catches
2004	0	1	3	1188	623	0	0	0	1	51	36	549	3	575	3030	3059	369	3428
2005	0	3	4	1006	715	0	0	0	4	42	40	557	2	443	2816	2960	419	3379
2006	0	2	6	635	654	0	0	0	3	37	31	369	2	564	2303	2335	296	2631
2007	0	2	10	618	531	0	0	0	7	45	28	284	6	706	2237	2271	199	2470
2008	0	1	6	476	351	0	0	0	19	46	58	260	19	717	1953	1999	318	2317
2009	0	0	5	593	350	0	0	0	12	28	57	152	6	615	1816	1863	455	2319
2010	0	1	7	537	251	0	0	0	9	25	40	112	1	507	1489	1531	559	2090
2011	0	1	25	565	245	0	0	0	18	23	25	104	1	523	1530	1567	547	2114
2012	0	0	4	921	246	0	0	0	19	31	20	153	2	499	1895	1952	555	2507
2013	5	1	6	803	252	0	0	0	21	28	89	169	1	618	1993	2013	254	2267
2014	15	1	7	1275	237	0	0	2	24	24	119	260	1	681	2646	2685	307	2992
2015	12	0	7	943	291	0	0	2	12	25	92	282	0	532	2196	2240	449	2690
2016	12	0	10	989	534	0	0	10	20	39	164	210	2	694	2684	2744	390	3135
2017	9	0	8	945	542	0	0	3	70	27	107	214	1	939	2865	2850	236	3086
2018	16	1	15	795	499	0	0	2	108	20	255	160	1	1129	3001	3010	199	3209
2019	23	1	18	571	641	0	0	0	108	11	213	115	3	863	2567	2580	216	2797
2020	16	7	9	525	371	0	0	0	85	13	123	79	8	695	1931	1937	198	2135

Summary of the assessment

Table 9 Witch in Subarea 4 and divisions 3.a and 7.d. Assessment summary. Weights are in tonnes, recruitment is in thousands.

Year	Recruitment			Spawning-stock biomass***			Catches^		Fishing pressure			Official BMS landings
	R (age 1)	High	Low	SSB	High	Low	Landings	Discards	F (ages 4–8)	High	Low	
	thousands			tonnes			tonnes					tonnes
1950	29065	47324	17851	3881	8397	1794	2379		0.27	0.52	0.141	
1951	29811	47749	18612	3778	8258	1728	2568		0.28	0.55	0.146	
1952	32116	50654	20363	3609	8092	1610	2554		0.29	0.57	0.145	
1953	34617	54000	22191	3443	7983	1485	2263		0.28	0.56	0.134	
1954	35344	55666	22441	3372	7984	1424	1590		0.25	0.52	0.116	
1955	33673	54310	20878	3388	8044	1427	2027		0.25	0.53	0.121	
1956	29653	48833	18006	3435	8042	1468	1936		0.25	0.52	0.122	
1957	25612	42730	15352	3504	7977	1540	1991		0.26	0.52	0.129	
1958	22818	37561	13862	3498	7772	1574	2678		0.29	0.56	0.149	
1959	21057	34230	12954	3374	7435	1531	2333		0.30	0.58	0.154	
1960	19398	32081	11729	3154	7053	1410	2563		0.31	0.61	0.162	
1961	17572	29535	10454	2889	6664	1253	2093		0.30	0.61	0.151	
1962	15838	26542	9451	2679	6333	1133	1419		0.27	0.56	0.134	
1963	14422	24317	8554	2501	5999	1043	1523		0.28	0.58	0.138	
1964	13149	22822	7576	2281	5575	933	1760		0.31	0.63	0.150	
1965	12349	21873	6971	2047	5118	819	1356		0.30	0.63	0.143	
1966	12632	21974	7262	1847	4725	722	1137		0.29	0.63	0.137	
1967	14375	23981	8617	1668	4400	633	1125		0.30	0.67	0.137	
1968	17980	28696	11265	1502	4152	544	1174		0.31	0.72	0.136	
1969	21948	34704	13881	1388	4016	479	891		0.28	0.69	0.116	
1970	25069	40142	15656	1374	4011	471	597		0.24	0.60	0.096	
1971	25927	41656	16138	1452	4094	515	843		0.25	0.60	0.102	
1972	26222	42688	16108	1592	4217	601	908		0.25	0.59	0.110	
1973	26270	42863	16100	1764	4375	711	1494		0.28	0.61	0.131	
1974	27101	44290	16583	1943	4562	827	1138		0.27	0.57	0.129	
1975	29507	47917	18170	2098	4770	922	1841		0.30	0.60	0.147	
1976	34091	54277	21413	2206	4952	983	1496		0.29	0.58	0.142	
1977	41829	64762	27017	2317	5175	1037	1618		0.28	0.57	0.142	
1978	50905	77608	33390	2445	5423	1102	1664		0.28	0.55	0.139	
1979	58106	90761	37200	2644	5730	1221	1572		0.26	0.51	0.134	
1980	60432	96782	37735	2949	6095	1427	1883		0.26	0.49	0.140	
1981	58930	94557	36726	3370	6501	1746	1933		0.26	0.47	0.147	
1982	56863	90757	35627	3834	6857	2144	3155		0.30	0.49	0.180	
1983	55891	88492	35300	4209	7044	2515	3606		0.32	0.50	0.20	
1984	57238	89390	36650	4438	7110	2771	3903		0.33	0.51	0.22	
1985	58287	89900	37790	4537	7116	2893	3979		0.33	0.50	0.22	
1986	58026	90152	37348	4586	7132	2949	3579		0.32	0.48	0.22	
1987	54234	85743	34304	4634	7171	2995	3700		0.32	0.48	0.21	
1988	49434	79238	30840	4715	7231	3074	3290		0.31	0.45	0.21	
1989	45694	73011	28598	4801	7256	3176	3841		0.31	0.45	0.22	
1990	44958	70584	28636	4806	7143	3233	3862		0.31	0.45	0.22	
1991	46234	71045	30087	4751	6958	3244	3641		0.30	0.43	0.22	
1992	49519	74993	32699	4672	6773	3223	3164		0.29	0.40	0.20	
1993	52277	79204	34505	4638	6691	3215	2673		0.27	0.38	0.187	
1994	54223	83471	35224	4661	6709	3238	2696		0.26	0.37	0.183	
1995	54388	84056	35191	4739	6807	3299	2810		0.26	0.37	0.183	
1996	53757	82273	35124	4832	6915	3376	2790		0.27	0.38	0.189	
1997	51498	78363	33842	4873	6969	3408	3494		0.30	0.42	0.21	
1998	48392	74156	31579	4766	6863	3309	3786		0.33	0.48	0.23	
1999	44815	69284	28987	4509	6598	3082	4024		0.37	0.54	0.26	
2000	42720	66044	27632	4124	6134	2773	4422		0.42	0.60	0.29	

Year	Recruitment			Spawning-stock biomass***			Catches^		Fishing pressure			Official BMS landings
	R (age 1)	High	Low	SSB	High	Low	Landings	Discards	F (ages 4–8)	High	Low	
	thousands			tonnes			tonnes					tonnes
2001	43621	65416	29088	3690	5506	2473	4206		0.44	0.63	0.31	
2002	43110	63060	29471	3272	4811	2225	3813		0.46	0.64	0.33	
2003	38816	55668	27065	2937	4168	2069	3308		0.46	0.62	0.34	
2004	29631	41807	21001	2698	3641	1999	3059		0.45	0.59	0.34	
2005	25439	35306	18329	2566	3280	2008	2960		0.43	0.55	0.34	
2006	27796	36762	21017	2510	3070	2052	2335		0.39	0.48	0.32	
2007	24932	34712	17908	2473	2936	2083	2271		0.37	0.45	0.31	
2008	38313	48702	30140	2378	2779	2035	1999		0.36	0.44	0.30	
2009	58489	74182	46115	2209	2577	1893	1894	409	0.37	0.45	0.31	
2010	51592	65329	40744	2188	2566	1866	1550	524	0.32	0.40	0.26	
2011	34908	44892	27144	2432	2851	2073	1772	448	0.25	0.32	0.20	
2012	32987	42485	25613	2891	3384	2470	2153	447	0.22	0.28	0.178	
2013	36634	47265	28393	3512	4125	2989	2033	225	0.23	0.29	0.185	
2014	32553	42388	25000	3958	4709	3327	2741	251	0.27	0.34	0.22	
2015	24529	32776	18357	4119	4990	3400	2363	399	0.26	0.32	0.20	
2016	21361	30359	15030	4165	5153	3366	3025	287	0.26	0.33	0.20	
2017	32642	46835	22750	4117	5266	3219	3360	150	0.29	0.38	0.22	< 1
2018	36419	56167	23615	3930	5294	2917	3141	152	0.29	0.40	0.21	< 1
2019	48472	80414	29218	3643	5237	2535	2707	183	0.30	0.43	0.20	1
2020	42309	78854	22700	3415	5247	2222	1980	184	0.28	0.43	0.180	1
2021	36419*			3562								

* Median of the resampled recruitment estimates of 2009–2020.

** Since 2017, discards minus BMS landings from EU fleets officially reported in logbooks.

*** SSB is estimated at spawning time.

^ Any differences between catches values in Table 9 and others in the advice are due to SOP correction.

Sources and references

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