

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 2024 should be no more than 1 579 tonnes.

The use of a combined species TAC for witch and lemon sole 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 and cover the entire stock distribution area (Subarea 4 and divisions 3.a and 7.d).

ICES advice on conservation aspects

ICES has not identified any conservation aspects.

Stock development over time

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

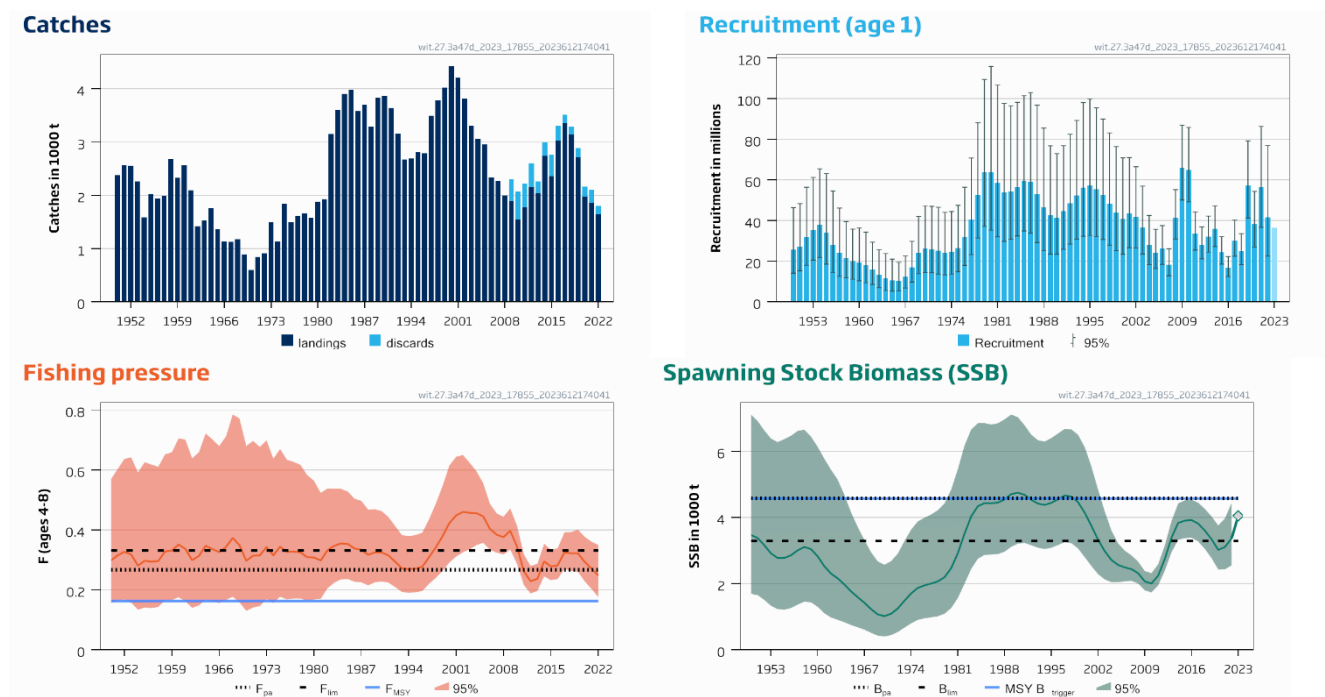


Figure 1 Witch in Subarea 4 and divisions 3.a and 7.d. Summary of the stock assessment. Discard information is included in the assessment since 2009 and includes below minimum size (BMS) landings. The assumed recruitment value for 2023 is shaded in a lighter colour. SSB is at spawning time (1 July), and the estimated value for 2023 is highlighted with a diamond.

Conservation status

ICES is not aware of any information on stock/species-specific conservation status.

Catch scenarios

Table 1 Witch in Subarea 4 and divisions 3.a and 7.d. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{\text{ages 4-8}} (2023)$	0.25	$F_{\text{sq}} = F_{\text{ages 4-8}} (2022)$
SSB (2023)	4050	Short-term forecast (STF). SSB estimated at 1 July (i.e. spawning time); in tonnes.
$R_{\text{age 1}} (2023, 2024, 2025)$	36421	Resampled recruitments from the years 2009–2022 (geometric mean shown); thousands
Total catch (2023)	2296	STF; in tonnes
Projected landings (2023)	2100	STF; assuming average landings ratio by age 2020–2022; in tonnes
Projected discards (2023)	196	STF; assuming average discards ratio by age 2020–2022; in tonnes

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

Basis	Total catch (2024)	Projected landings (2024)	Projected discards* (2024)	F_{total} (ages 4–8) (2024)	SSB^ (2024)	SSB^€ (2025)	% SSB change**	% advice change***
ICES advice basis								
MSY approach: $F_{\text{MSY}} \times \text{SSB}(2023)/\text{MSY } B_{\text{trigger}}$	1579	1474	105	0.144	4987	5911	23	32
Other scenarios								
$F_{\text{MSY lower}} \times \text{SSB}(2023)/\text{MSY } B_{\text{trigger}}$	1098	1027	71	0.098	5106	6314	26	–8.3
$F = 0$	0	0	0	0	5355	7244	32	–100
F_{pa}	2764	2573	191	0.267	4699	5044	16.0	131
F_{lim}	3331	3091	240	0.331	4557	4650	12.5	177
$F = F_{2023}$	2588	2413	175	0.25	4740	5159	17.0	116
$\text{SSB}(2025) = B_{\text{lim}}$	5556	5119	437	0.63	3973	3293	–1.90	360
$\text{SSB}(2025) = B_{\text{pa}} = \text{MSY } B_{\text{trigger}}$	3443	3191	252	0.34	4525	4576	11.7	187
Rollover advice	1198	1120	78	0.108	5082	6332	25	0
F_{MSY}	1770	1650	120	0.163	4941	5769	22	48
$F_{\text{MSY lower}}$	1233	1153	80	0.111	5073	6198	25	2.9

* Including BMS landings. Assuming recent discard rate (average of 2020–2022).

** SSB in 2024 relative to SSB in 2023 (4050 tonnes).

*** Advice value for 2024 relative to revised advice value for 2023 (1198 tonnes).

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

€ Assuming same F_{total} (ages 4–8) in 2025 as in 2024.

The change in advice (32%) is mainly due to an increase of stock size and a higher F target (0.144) compared to last year's F target (0.116).

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. Norway and UK have not requested ICES to provide advice based on the EU MAP.

Quality of the assessment

Witch went through an interbenchmark process in 2021 (ICES, 2021), changing the perception of stock status and trends compared with previous advice. An issue in the assessment was identified in 2023 and corrected prior to WGNSSK 2023; therefore, new reference points were calculated and an updated advice for 2023 was issued.

Witch are generally distributed in deeper areas (> 200 m), and the current trawl surveys do not cover areas deeper than 200 m. Thus, some of its habitat is not covered (~15%). 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 included in the assessment from 2009 onwards, increasing the uncertainty of the assessment prior to 2009.

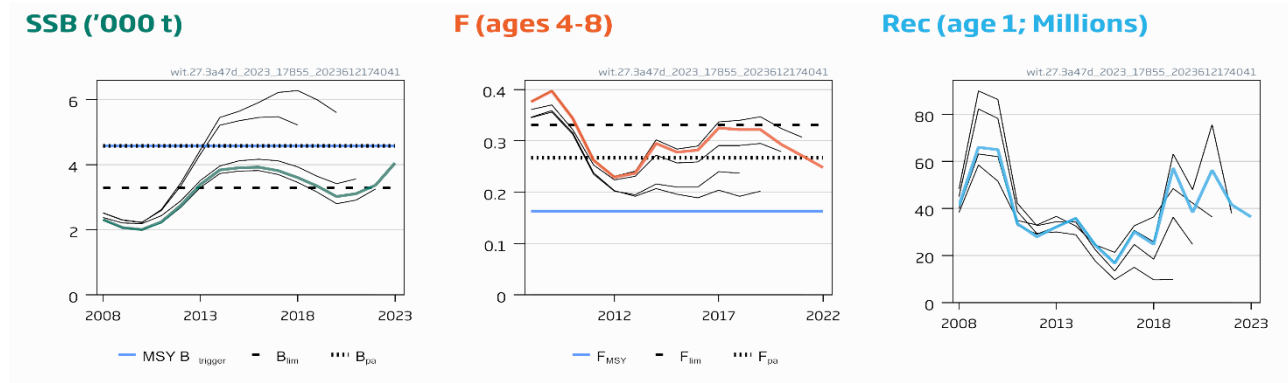


Figure 2 Witch in Subarea 4 and divisions 3.a and 7.d. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year). There was an update of the assessment and reference points in 2023, and only assessment results from the last two years should be compared with the reference points indicated.

Issues relevant for the advice

Witch is mainly a bycatch species in mixed demersal fisheries. ICES (2022) advised that removing the TAC for witch would generate a high risk of the stock being exploited unsustainably. Furthermore, management of catches of lemon sole and witch under a combined species TAC may hinder effective management of the exploitation rates of the individual species. 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.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	4576	B_{pa} ; in tonnes	ICES (2023a)
	F_{MSY}	0.163	EqSim simulation of long-term yield	ICES (2023a)
Precautionary approach	B_{lim}	3293	Breakpoint in a segmented regression, based on recruitment 1950–2020; in tonnes	ICES (2023a)
	B_{pa}	4576	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.2$; in tonnes	ICES (2023a)
	F_{lim}	0.331	Simulation using B_{lim} and B_{pa} with no assessment and advice noise	ICES (2023a)
	F_{pa}	0.267	The F that provides a 95% probability for SSB to be above B_{lim} ($F_{P,05}$ with advice rule [AR])	ICES (2023a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	4576	MSY $B_{trigger}$; in tonnes	ICES (2023a)
	MAP B_{lim}	3293	B_{lim} ; in tonnes	ICES (2023a)
	MAP F_{MSY}	0.163	F_{MSY}	ICES (2023a)
	MAP range F_{lower}	0.111–0.163	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2023a)
	MAP range F_{upper}	0.163–0.222	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2023a)

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

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, 2023b)
Assessment type	Age-based analytical assessment (SAM; ICES, 2023a; Nielsen and Berg, 2014) that uses catches and surveys in the model and in the forecast
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); total biomass until 2008, age-based from 2009–2022. 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, BMS landings, and bycatch	Discard information included in the assessment since 2009. Discards ranged between 9.5% and 23.3% of the total catches. Below minimum size (BMS) landings, where reported to ICES, are included with discards in the assessment since 2018.
Indicators	None
Other information	Benchmarked in 2018 (ICES, 2018b), interbenchmarking in 2021 (ICES, 2021) and revised in 2023 (ICES, 2023a)
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, ICES catches and landings, and official landings. 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
				Division 2.a and Subarea 4	Subarea 4 and divisions 3.a and 7.d	Subarea 4 and divisions 3.a and 7.d			
2006				6175	6593	2304	2335	296	2631
2007				6175	6725	2237	2271	199	2470
2008				6793	5929	1953	1999	318	2317
2009				6793	5212	1817	1863	455	2319
2010				6521	4690	1489	1531	559	2090
2011				6391	5575	1530	1567	547	2114
2012	Reduce catches			6391	5967	1896	1952	555	2507
2013	No new advice; same as for 2012			6391	5756	1993	2013	254	2267
2014	Decrease landings by 4% (average of the last three years)	< 1574**		6391	6341	2649	2685	307	2992
2015	No new advice; same as for 2014	< 1574**		6391	5676	2196	2240	449	2690
2016	Precautionary approach (increase catches by no more than 20%)		≤ 2212	6391	6492	2685	2744	390	3135
2017	Precautionary approach (same advised catch value as given for 2016)		≤ 2212	6391	6208	2865	2850	236	3085
2018	Precautionary approach (increase catches by no more than 8%)		≤ 2390	6391	6026	3006	3010	199	3209
2019	Precautionary approach (same advised catch value as given for 2018)		≤ 2390	7874	5808	2567	2580	217	2797
2020	Precautionary approach		≤ 1651	6785	4589	1933	1937	198	2135
2021	MSY approach		≤ 1733	5428	3928^	1824^	1827	279	2105
2022	MSY approach		≤ 1206	4287	3103^	1590^	1593	200	1793
2023	MSY approach		≤ 1198	3140					
2024	MSY approach		≤ 1579						

* 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 since 2018.

^ Preliminary.

History of the catch and landings

Table 7 Witch in Subarea 4 and divisions 3.a and 7.d. Catch distribution by fleet in 2022 as used in the assessment model.

Catch	Landings		Discards*
1793 tonnes	Bottom otter trawl 93.2%	Others 6.8%	200 tonnes
	1593 tonnes		

* Discards include BMS landings from EU and UK fleets.

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

Year	Belgium	Germany		Denmark		Faroe Islands	France	Netherlands		Norway		Sweden		UK	Total landings	BMS landings	ICES estimates (4, 3.a, 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				

Year	Belgium	Germany		Denmark		Faroe Islands	France	Netherlands		Norway		Sweden		UK	Total landings	BMS landings	ICES estimates (4, 3.a, 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
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
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	2304		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	1817		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	1896		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	683	2649		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	2685		2744	390	3135
2017	9	0	8	945	542	0	0	3	70	27	107	214	1	939	2865	< 0.5	2850	236	3086
2018	16	1	15	795	499	0	0	2	108	20	255	160	1	1133	3006	< 0.5	3010	199	3209
2019	23	0	18	571	640	0	0	0	108	11	213	115	3	864	2567	1	2580	216	2797
2020	16	7	9	526	371	0	0	0	85	13	124	79	8	697	1933	1	1937	198	2135
2021*	3	2	5	505	282	0	0	0	54	8	124	33	6	803	1824	< 0.5	1827	279	2105
2022*	8	1	8	631	140	0	0	0	22	11	60	36	6	665	1590	< 0.5	1593	200	1793

* Official landings are preliminary.

Summary of the assessment

Table 9 Witch in Subarea 4 and divisions 3.a and 7.d. Assessment summary. Recruitment is in thousands, weights in tonnes. High and Low refer to 95% confidence intervals.

Year	Recruitment (Age 1)			Spawning-stock biomass**			Catches***		Fishing pressure (ages 4–8)		
	Low	R	High	Low	SSB	High	Landings	Discards^	Low	F	High
1950	14139	25611	46390	1693	3471	7113	2379		0.156	0.30	0.57
1951	15271	27168	48331	1653	3382	6919	2568		0.165	0.32	0.60
1952	18008	31873	56412	1509	3165	6637	2554		0.168	0.33	0.64
1953	20545	35472	61244	1332	2917	6388	2263		0.157	0.32	0.64
1954	21879	37850	65479	1228	2777	6280	1590		0.134	0.28	0.59
1955	18561	34237	63152	1212	2778	6367	2027		0.141	0.30	0.63
1956	14412	28037	54546	1262	2857	6470	1936		0.139	0.29	0.62
1957	12547	24077	46200	1366	3006	6615	1991		0.143	0.30	0.61
1958	11802	21599	39529	1452	3109	6655	2678		0.165	0.33	0.65
1959	11147	19974	35792	1436	3044	6449	2333		0.166	0.33	0.66
1960	10317	19373	36379	1301	2826	6139	2563		0.175	0.35	0.71
1961	9416	17969	34293	1106	2528	5779	2093		0.162	0.34	0.70
1962	8527	15824	29365	976	2306	5446	1419		0.140	0.30	0.64
1963	6976	13391	25705	907	2161	5147	1523		0.148	0.31	0.66
1964	5567	11503	23769	833	1977	4693	1760		0.167	0.35	0.72
1965	5245	10513	21073	750	1767	4160	1356		0.161	0.34	0.70
1966	5480	10322	19442	681	1591	3720	1137		0.156	0.33	0.68
1967	6800	12400	22612	609	1423	3326	1125		0.166	0.34	0.71
1968	9681	16985	29798	514	1232	2953	1174		0.177	0.37	0.79
1969	13836	24125	42065	429	1072	2676	891		0.158	0.35	0.77
1970	14466	26140	47235	403	1018	2573	597		0.130	0.30	0.68
1971	14344	25972	47027	445	1092	2682	843		0.141	0.31	0.70
1972	13681	25239	46562	536	1249	2907	908		0.146	0.32	0.68
1973	13263	24176	44071	669	1484	3290	1494		0.169	0.34	0.70
1974	13645	24628	44451	799	1704	3635	1138		0.156	0.32	0.64
1975	14801	26517	47506	904	1873	3882	1841		0.177	0.34	0.67
1976	17954	31833	56442	950	1948	3993	1496		0.168	0.33	0.63
1977	23222	40545	70791	982	2005	4093	1618		0.171	0.33	0.63
1978	31437	52647	88167	1013	2068	4222	1664		0.171	0.33	0.62
1979	37128	63743	109437	1090	2196	4426	1572		0.164	0.31	0.58
1980	35293	63947	115864	1259	2470	4845	1883		0.168	0.31	0.56
1981	32020	58454	106711	1564	2923	5465	1933		0.170	0.30	0.52
1982	29771	53942	97735	1995	3512	6180	3155		0.21	0.33	0.54
1983	30767	54488	96498	2442	4034	6663	3606		0.22	0.35	0.54
1984	32413	56419	98206	2752	4342	6850	3903		0.24	0.36	0.54
1985	34880	59490	101466	2868	4434	6853	3979		0.24	0.35	0.53
1986	33785	58986	102986	2879	4428	6810	3579		0.23	0.34	0.50
1987	29187	53153	96800	2892	4451	6849	3700		0.23	0.33	0.50
1988	25122	46356	85539	2964	4545	6969	3290		0.22	0.32	0.47
1989	23469	42460	76819	3112	4705	7113	3841		0.23	0.33	0.47
1990	23499	41400	72937	3208	4749	7030	3862		0.23	0.33	0.46
1991	25866	44593	76878	3231	4683	6787	3641		0.22	0.32	0.44
1992	28445	48444	82504	3159	4533	6504	3164		0.21	0.29	0.41
1993	30785	52428	89285	3084	4420	6336	2673		0.193	0.27	0.38
1994	32255	56248	98087	3046	4379	6296	2696		0.190	0.27	0.38
1995	32682	57103	99773	3084	4443	6401	2810		0.192	0.27	0.38
1996	32168	55411	95448	3166	4550	6540	2790		0.196	0.28	0.39
1997	30657	52516	89960	3255	4663	6679	3494		0.22	0.31	0.44
1998	27881	48143	83130	3223	4634	6664	3786		0.24	0.34	0.49
1999	25235	43915	76423	3063	4462	6502	4024		0.26	0.38	0.55
2000	23395	40725	70892	2799	4143	6131	4422		0.29	0.42	0.62
2001	26622	43480	71015	2531	3747	5546	4206		0.31	0.45	0.64

Year	Recruitment (Age 1)			Spawning-stock biomass**			Catches***		Fishing pressure (ages 4–8)		
	Low	R	High	Low	SSB	High	Landings	Discards^	Low	F	High
2002	26429	41920	66492	2285	3328	4848	3813		0.33	0.46	0.65
2003	23556	36635	56976	2126	2983	4187	3308		0.34	0.46	0.62
2004	18325	27906	42497	2042	2716	3613	3059		0.35	0.46	0.60
2005	16417	24207	35694	2044	2565	3219	2960		0.36	0.45	0.56
2006	18422	26297	37538	2069	2491	2999	2335		0.33	0.40	0.49
2007	12825	18302	26117	2082	2439	2857	2271		0.32	0.38	0.46
2008	30917	41308	55192	2006	2315	2670	1999		0.32	0.38	0.44
2009	50085	65993	86955	1795	2068	2382	1894	409	0.33	0.40	0.47
2010	49190	64986	85855	1734	2006	2321	1550	524	0.29	0.34	0.41
2011	25492	33587	44253	1945	2244	2588	1772	448	0.22	0.26	0.32
2012	21204	27977	36913	2394	2752	3164	2153	447	0.188	0.23	0.28
2013	24480	32140	42196	2948	3390	3898	2033	225	0.196	0.24	0.29
2014	27192	35841	47242	3323	3836	4428	2741	251	0.25	0.30	0.35
2015	18558	24418	32128	3374	3905	4519	2363	399	0.23	0.28	0.33
2016	12445	16660	22302	3389	3922	4539	3025	287	0.24	0.28	0.34
2017	22456	30074	40276	3271	3814	4447	3360	150	0.27	0.33	0.39
2018	18298	24770	33533	3046	3602	4260	3141	152	0.26	0.32	0.39
2019	41277	57185	79225	2768	3342	4035	2707	183	0.26	0.32	0.40
2020	26992	38306	54361	2424	3020	3761	1980	184	0.23	0.29	0.38
2021	36716	56313	86370	2432	3109	3975	1857	245	0.20	0.27	0.36
2022	22546	41647	76931	2551	3369	4447	1643	161	0.176	0.25	0.35
2023		36421*			4050^^						

* Geometric mean of the recruitment estimates from 2009 to 2022.

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

*** Any differences between catches values in Table 9 and others in the advice are due to sum of product (SOP) correction.

^ Since 2018, discards include BMS landings from EU and UK fleets.

^^ Short-term forecast.

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