Flounder (*Platichthys flesus*) in Subarea 4 and Division 3.a (North Sea, Skagerrak and Kattegat)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in each of the years 2024 and 2025 should be no more than 864 tonnes.

If discard rates do not change from the average of the last three years (2020–2022), this implies landings of no more than 640 tonnes in each of the years 2024 and 2025.

ICES advice on conservation aspects

ICES has not identified any conservation aspects.

Stock development over time

Fishing pressure on the stock is below the $F_{MSY\ proxy}$, and the stock size indicator is below $I_{trigger}$.

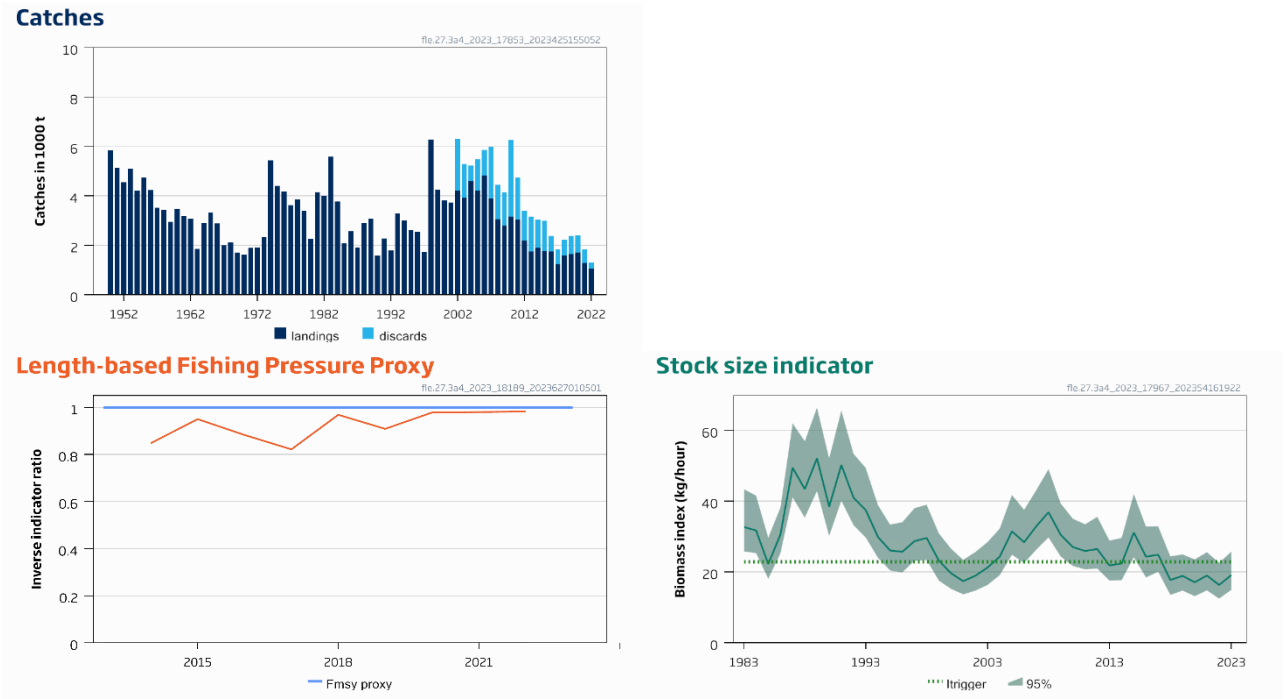

Figure 1 Flounder in Subarea 4 and Division 3.a. Summary of the stock assessment. Between 1984 and 1997, Dutch landings were not recorded. Discard data are only available since 2002. Indicator ratio $L_{F=M}/L_{mean}$ (inverse of the indicator ratio, *f*) from the length-based indicator (LBI) method is used for the evaluation of the exploitation status. The proxy fishing pressure is less than that corresponding to the $F_{MSY\ proxy}$ ($L_{F=M}$) when the indicator ratio value is lower than 1 (shown by the horizontal blue line). Stock size indicator (biomass index) from the North Sea International Bottom Trawl Survey Q1 (NS-IBTS).

Conservation status

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

Catch scenarios

ICES framework for category 3 stocks was applied (*chr* rule, Method 2.2; ICES, 2022). The advice is based on the *chr* rule to provide MSY advice. A survey biomass index was used as an indicator of stock development. The advice is based on the

stock indicator from 2023, multiplied by a constant harvest rate, a biomass safeguard, and a precautionary multiplier. The stability clause was not applied because the most recent index value was below $I_{trigger}$. The discard rate (average 2020–2022) was 26% of the total catch.

Table 1 Flounder in Subarea 4 and Division 3.a. The basis for the catch scenarios. Catches are in tonnes.*

Previous catch advice A_y (advised catch for 2022 and 2023)	1650 tonnes
Biomass index	
I: most recent biomass index (I_{2023})	19.155
MSY proxy harvest rate	
$HR_{MSY\ proxy}$: MSY proxy harvest rate (average of the ratio of catch to biomass index for the years for which f > 1, where f = $L_{mean}/L_{F=M}$)	107.843
Biomass safeguard	
Index trigger value ($I_{trigger}$)	22.899
b: index relative to trigger value, min{$I_{2023}/I_{trigger}$, 1}	0.84
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability	
m: multiplier (generic multiplier based on life history)	0.5
chr calculation**	864 tonnes
Stability clause (+20%/−30% compared to A_y, only considered if b = 1)	Not applied
Discard rate	26%
Catch advice A_{y+1} for 2024 and 2025**	864 tonnes
Landings corresponding to the advice for 2024 and 2025***	640 tonnes
% advice change^	−48%

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Formula: $A_{y+1} = I \times HR_{MSY\ proxy} \times b \times m$, limited by stability clause if applicable.
*** A_{y+1} x (1 − Discard rate)
^ Advice value for 2024 and 2025 relative to the advice value for 2022 and 2023 (1650 tonnes).

The change in advice (−48%) is due to a low index ratio, and the change of the "2 over 3" rule to the *chr* rule.

Basis of the advice

Table 2 Flounder in Subarea 4 and Division 3.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for flounder in this area

Quality of the assessment

Discard information is available for the years 2002–2022 for the most important fisheries. However, no reliable data on discards are available for beam trawlers targeting brown shrimp. As most of the fishing effort of this fleet takes place in the coastal zone, which is the main distribution area of flounder, the discarding in these fisheries may have a considerable impact on the stock.

Issues relevant for the advice

Flounder is mainly a bycatch species in the demersal fisheries in coastal areas of the North Sea. Large effort reductions of about 60% in beam and otter trawl fisheries took place in the period 2003–2015 (STECF, 2016). The discard rate of the most recent three years was 26% of the total catch. Survival rates of discards are unknown.

In 2017, ICES advised that the risk of having no catch limits for the dab and flounder stocks was considered to be low and not inconsistent with the objectives of the Common Fisheries Policy (ICES, 2017). Dab and flounder are no longer managed under a TAC. ICES stated that this advice was valid as long as both species remained largely bycatch species, with the main fleets catching dab and flounder continuing to fish the target species (plaice and sole) sustainably within the F_{MSY} ranges provided by ICES. If this situation changes, or if flounder is no longer within safe biological limits, the advice to remove the TAC on flounder would need to be reconsidered.

Reference points

Table 3 Flounder in Subarea 4 and Division 3.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	$I_{trigger}$	22.899	1.4 x I_{loss}. I_{loss} is the lowest value of the stock size indicator based on NS-IBTS Q1 survey.	ICES (2023a)
	$HR_{MSY\ proxy}$	107.843	Average of the ratio of catch to stock size indicator for the years 2014–2022 for which the fishing pressure proxy relative to MSY proxy (f) > 1, where $f = L_{mean}/L_{F=M}$ (Table 8)	ICES (2023a)
	$F_{MSY\ proxy}$	$\frac{L_{mean}}{L_{F=M}} = 1$*	Relative value from LBI analysis, assuming M/K = 1.5. $L_{F=M}$ is based on L_c (length at 50% of modal abundance), which varies each year.	ICES (2023a)
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

* No reference points are defined for this stock in terms of absolute values. The LBI-estimated values of the ratio $L_{mean}/L_{F=M}$ are used to estimate exploitation status relative to the proxy MSY reference point.

Basis of the assessment

Table 4 Flounder in Subarea 4 and Division 3.a. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2023b)
Assessment type	Stock size indicator and applying the *chr* rule (ICES, 2022)
Input data	Catch statistics, catch length distributions, one survey index (delta GAM NS-IBTS Q1 [G1022])
Discards and bycatch	Discards were quantified for the years 2002–2022. Discards ranged between 12% and 49% of the total catch. In 2022, discard information was provided for 80% of the total landings.
Indicators	Length-based indicator (LBI) from commercial catch data (2014–2022). Growth parameters were estimated as L_∞ = 41.3 cm and K = 0.40. L_c is assumed time-varying.
Other information	This stock was last benchmarked in 2018 (WKNSEA; ICES 2018)
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 5 Flounder in Subarea 4 and Division 3.a. ICES advice, TACs, ICES catch estimates, and official landings. Weights are in tonnes.

Year	ICES advice	Corresponding to advice		Agreed TAC* in 2.a and 4, dab and flounder	Official landings in 4 and 3.a		ICES landings in 4 and 3.a, flounder	ICES discards in 4 and 3.a, flounder	ICES total catch in 4 and 3.a, flounder
		Landings	Catches		Dab and flounder	Flounder			
2006		-	-	17100	14923	5009	4837	1026	5863
2007		-	-	17100	14192	4065	3908	2082	5990
2008		-	-	18810	11791	3240	3067	1376	4443
2009		-	-	18810	10148	3088	2804	1342	4146
2010		-	-	18810	11195	3365	3166	3087	6253
2011		-	-	18434	10565	3193	3041	1694	4735
2012	No increase in catch	-	-	18434	9059	2310	2189	1205	3394
2013	No new advice, same as for 2012	-	-	18434	7960	1876	1750	1415	3165
2014	No more than 7% increase in landings	< 3160**	-	18434	7024	2067	1907	1127	3034
2015	No new advice, same as for 2014	< 3160**	-	18434	6425	1913	1762	1228	2990
2016	Precautionary approach (increase catches by no more than 20%)		< 5228***	18434	6692	1737	1750	628	2378
2017	Precautionary approach (same advised catch value as given for 2016)		< 5228***	no TAC		1343	1244	588	1832
2018	Precautionary approach (increase catches by no more than 20%)		< 6274	no TAC		1590	1587	657	2244
2019	Precautionary approach (increase catches by no more than 20%)		< 6274	no TAC		1670	1653	727	2380
2020	No catch advice requested		-	no TAC		1773	1715	679	2394
2021	No catch advice requested		-	no TAC		1328^	1293	543	1836
2022	Precautionary approach		≤ 1650	no TAC		1067^	1046	257	1303
2023	Precautionary approach		≤ 1650	no TAC					
2024	MSY approach		≤ 864						
2025	MSY approach		≤ 864						

* EU combined TAC for dab and flounder in EU waters of 2.a and 4.

** Advice based on landings.

*** Advice based on recent three years' average catch.

^ Preliminary.

History of the catch and landings

Table 6 Flounder in Subarea 4 and Division 3.a. Catch distribution by fleet in 2022 as estimated by ICES.

Catch	Landings				Discards
1303 tonnes	Beam trawl 76%	Gillnets 11%	Otter trawl 11%	Others 2%	257 tonnes
	1046 tonnes				

Table 7 Flounder in Subarea 4 and Division 3.a. History of commercial catch and landings; the official landings (1950–2022) and ICES estimates (2012–2022) are presented by area for each country participating in the fishery. Weights are in tonnes.

Subarea 4: Official landings

Year	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total
1950	67	1514	0	641	937	0	67	241	3467
1951	119	1143	0	329	949	0	81	127	2748
1952	91	1210	0	257	841	0	71	186	2656
1953	270	1372	0	397	886	0	92	203	3220
1954	142	1225	0	281	696	0	71	121	2536
1955	145	1244	0	353	871	0	88	109	2810
1956	132	1389	0	277	1097	0	102	2	2999
1957	81	910	0	250	825	0	112	0	2178
1958	99	784	0	257	1088	0	94	0	2322
1959	62	533	0	424	857	0	79	1	1956
1960	82	614	0	540	733	0	49	8	2026
1961	68	776	0	390	579	0	81	13	1907
1962	37	1146	0	313	717	0	53	2	2268
1963	16	501	0	263	467	0	65	0	1312
1964	30	1141	0	305	563	0	48	6	2093
1965	121	1349	0	248	549	0	54	3	2324
1966	32	946	0	229	573	0	71	2	1853
1967	43	540	0	193	331	0	57	25	1189
1968	75	894	0	152	160	0	43	1	1325
1969	54	582	0	158	161	0	33	0	988
1970	50	316	0	135	405	0	57	0	963
1971	60	685	0	173	297	0	70	0	1285
1972	63	991	0	159	275	0	60	0	1548
1973	63	290	0	172	1424	0	53	0	2002
1974	115	766	0	190	2661	0	58	0	3790
1975	68	437	0	155	2191	0	87	1	2939
1976	94	575	0	209	2077	0	70	54	3079
1977	107	320	0	208	1732	0	127	11	2505
1978	122	203	0	198	1519	0	169	0	2211
1979	129	181	31	275	1260	0	201	0	2077
1980	190	300	33	229	806	0	140	0	1698
1981	164	669	14	200	1068	0	133	0	2248
1982	110	630	31	200	1597	0	121	0	2689
1983	88	564	36	197	2059	0	125	0	3069
1984	272	518	15	103	0	0	122	0	1030
1985	163	379	14	128	0	0	109	0	793
1986	155	456	1	91	0	0	111	0	814
1987	132	394	32	106	0	0	90	0	754
1988	160	509	44	105	682	0	98	0	1598
1989	200	632	28	95	916	0	80	0	1951
1990	153	467	69	147	0	0	45	0	881
1991	260	377	51	902	0	0	69	0	1659
1992	152	492	35	521	0	0	76	0	1276
1993	194	1812	47	356	0	0	136	0	2545
1994	196	642	57	921	0	0	247	0	2063

Year	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total
1995	301	628	103	843	0	0	250	0	2125
1996	262	1439	68	43	0	0	193	0	2005
1997	110	988	10	25	0	0	157	0	1290
1998	283	154	40	13	4938	0	132	0	5560
1999	326	123	0	11	3158	0	54	0	3672
2000	289	100	46	17	2656	5	52	0	3165
2001	241	92	42	4	2608	3	32	0	3022
2002	165	83	51	2	3531	3	55	0	3890
2003	206	94	33	3	3172	9	120	0	3637
2004	335	96	46	5	3720	18	74	0	4294
2005	241	171	17	5	3363	38	111	0	3946
2006	168	152	19	2	4020	39	216	0	4616
2007	298	166	56	45	2925	11	119	0	3620
2008	306	228	30	39	2231	3	57	0	2894
2009	272	273	38	46	2124	3	59	0	2815
2010	251	126	20	58	2612	6	87	0	3160
2011	262	112	17	25	2566	1	65	0	3048
2012	348	100	11	23	1672	0	38	0	2192
2013	346	93	13	28	1199	0	24	0	1703
2014	376	107	15	30	1314	0	31	0	1873
2015	277	97	19	19	1409	0	0	0	1836
2016	193	87	20	27	1277	0	25	0	1629
2017	97	101	0	28	944	1	14	0	1185
2018	102	114	0	24	1139	1	18	0	1398
2019	94	133	9	48	1192	19	15	0	1510
2020	154	114	7	48	1287	30	18	0	1658
2021 *	134	93	19	21	947	2	19	1	1236
2022 *	109	35	6	17	772	0	30	0	969

*Preliminary catch statistics.

Subarea 4: ICES estimates of landings and discards

Year	Landings	Discards
2002	3690	1115
2003	3447	800
2004	4122	612
2005	3728	946
2006	4445	811
2007	3472	1195
2008	2727	1176
2009	2535	958
2010	2965	2680
2011	2899	721
2012	2072	954
2013	1579	1073
2014	1714	420
2015	1685	954
2016	1644	544
2017	1090	335
2018	1395	362
2019	1493	573
2020	1600	558
2021	1201	198
2022	948	170

Division 3.a: Official landings

Year	Denmark	Germany	Netherlands	Norway	Sweden	Total
1950	1632	92	0	0	657	2381
1951	1548	88	0	0	759	2395
1952	1161	48	0	0	683	1892
1953	1135	17	0	0	724	1876
1954	1138	13	0	0	528	1679
1955	1265	11	0	0	667	1943
1956	1229	6	0	0	0	1235
1957	1331	12	0	0	0	1343
1958	1099	12	0	0	0	1111
1959	1003	3	0	0	0	1006
1960	875	10	0	0	566	1451
1961	821	9	0	0	442	1272
1962	812	3	0	0	0	815
1963	554	0	0	0	0	554
1964	822	1	0	0	0	823
1965	1016	0	0	0	0	1016
1966	1027	0	0	0	0	1027
1967	811	3	0	0	0	814
1968	808	2	0	0	0	810
1969	721	0	0	0	0	721
1970	667	0	0	0	0	667
1971	611	1	0	0	0	612
1972	365	0	0	0	0	365
1973	346	0	0	0	0	346
1974	1656	2	0	0	0	1658
1975	1377	1	0	0	89	1467
1976	949	2	4	0	144	1099
1977	1036	0	19	0	64	1119
1978	1560	10	14	0	64	1648
1979	1219	0	0	0	100	1319
1980	426	0	0	0	135	561
1981	1831	0	0	0	74	1905
1982	1236	0	0	0	75	1311
1983	2352	0	0	0	160	2512
1984	2463	0	0	0	283	2746
1985	1203	0	0	0	102	1305
1986	1585	0	0	0	166	1751
1987	1050	0	0	0	119	1169
1988	1164	0	0	0	149	1313
1989	996	0	0	0	133	1129
1990	650	1	0	0	57	708
1991	574	0	0	0	50	624
1992	455	0	0	0	52	507
1993	673	3	0	0	67	743
1994	865	1	0	0	77	943
1995	403	19	0	0	76	498
1996	429	9	0	0	104	542
1997	367	2	0	0	68	437
1998	637	5	0	0	83	725
1999	558	6	0	0	24	588
2000	609	17	0	0	30	656
2001	672	2	0	1	30	705
2002	493	0	0	1	30	524
2003	452	3	0	0	18	473
2004	462	2	0	0	14	478
2005	467	0	0	0	15	482
2006	380	0	0	0	13	393

Year	Denmark	Germany	Netherlands	Norway	Sweden	Total
2007	419	3	1	0	22	445
2008	326	4	0	0	16	346
2009	238	2	0	0	33	273
2010	188	0	0	0	17	205
2011	129	0	0	0	16	145
2012	110	0	0	0	8	118
2013	162	0	0	0	11	173
2014	190	0	0	1	4	194
2015	74	0	0	0	3	77
2016	106	0	0	0	3	109
2017	153	0	0	1	5	159
2018	189	0	0	0	3	192
2019	155	0	2	0	3	160
2020	111	0	0	0	4	115
2021*	90	0	0	0	2	92
2022*	96	0	0	0	2	98

* Preliminary catch statistics.

Division 3.a: ICES estimates of landings and discards

Year	Landings	Discards
2002	526	969
2003	475	569
2004	480	26
2005	485	319
2006	391	216
2007	436	887
2008	341	200
2009	269	385
2010	201	408
2011	142	973
2012	117	251
2013	171	342
2014	193	707
2015	77	274
2016	106	84
2017	154	253
2018	193	295
2019	160	154
2020	115	122
2021	91	345
2022	98	87

Summary of the assessment

Table 8 Flounder in Subarea 4 and Division 3.a. Assessment summary. Weights are in tonnes. Catch, stock size indicator, harvest rate (Catch/stock size indicator) and length-based fishing pressure proxy (inverse $f = L_{F=M}/L_{mean}$) are given for the years used for the application of the *chr* rule. L_{mean} refers to the mean length above length at first capture (L_c), and $L_{F=M}$ refers to the target reference length. Low and High represent 95% confidence intervals.

Year	Landings*	Discards	Catch	Stock size indicator			Harvest rate	Length-based fishing pressure proxy** ($L_{F=M}/L_{mean}$)
				Low	Value	High		
1950	5848							
1951	5143							
1952	4548							
1953	5096							
1954	4215							

Year	Landings*	Discards	Catch	Stock size indicator			Harvest rate	Length-based fishing pressure proxy** ($L_{F=M}/L_{mean}$)
				Low	Value	High		
1955	4753							
1956	4234							
1957	3521							
1958	3433							
1959	2962							
1960	3477							
1961	3179							
1962	3083							
1963	1866							
1964	2916							
1965	3340							
1966	2880							
1967	2003							
1968	2135							
1969	1709							
1970	1630							
1971	1897							
1972	1913							
1973	2348							
1974	5448							
1975	4406							
1976	4178							
1977	3624							
1978	3859							
1979	3396							
1980	2259							
1981	4153							
1982	4000							
1983	5581			25.83	32.72	43.41		
1984	3776			25.33	31.76	41.62		
1985	2098			18.10	22.26	29.75		
1986	2565			25.25	30.60	38.25		
1987	1923			41.08	49.47	62.05		
1988	2911			35.36	43.42	56.97		
1989	3080			42.86	52.14	66.50		
1990	1589			30.16	38.49	52.16		
1991	2283			40.11	50.26	65.67		
1992	1783			33.24	41.00	53.44		
1993	3288			29.74	37.52	49.45		
1994	3006			24.04	29.93	38.97		
1995	2623			20.45	26.11	33.42		
1996	2547			19.88	25.73	34.09		
1997	1727			23.17	28.73	38.06		
1998	6285			23.39	29.63	39.05		
1999	4260			17.58	23.24	30.96		
2000	3821			15.24	19.67	26.63		
2001	3727			13.70	17.43	23.45		
2002	4217	2084	6301	14.73	18.97	25.68		
2003	3922	1370	5292	16.35	21.29	28.50		
2004	4601	637	5238	19.11	24.36	32.32		
2005	4214	1265	5479	24.89	31.49	41.79		
2006	4837	1026	5863	22.55	28.44	37.60		
2007	3908	2082	5990	26.31	32.95	43.17		
2008	3067	1376	4443	29.77	36.90	49.10		
2009	2804	1342	4146	24.38	30.53	39.41		

Year	Landings*	Discards	Catch	Stock size indicator			Harvest rate	Length-based fishing pressure proxy** ($L_{F=M}/L_{mean}$)
				Low	Value	High		
2010	3166	3087	6253	21.71	27.04	35.08		
2011	3041	1694	4735	20.75	25.96	33.50		
2012	2189	1205	3394	20.99	26.51	35.62		
2013	1750	1415	3165	17.58	21.87	28.91		
2014	1907	1127	3034	17.68	22.43	29.64	135	0.85
2015	1762	1228	2990	24.17	31.16	42.09	96	0.95
2016	1750	628	2378	18.46	24.34	32.83	98	0.88
2017	1244	588	1832	20.10	24.90	32.94	74	0.82
2018	1587	657	2244	13.52	17.76	24.44	126	0.97
2019	1653	727	2380	14.76	18.93	24.99	126	0.91
2020	1715	679	2394	13.17	17.12	23.58	140	0.98
2021	1293	543	1836	14.83	19.02	25.64	97	0.98
2022	1046	257	1303	12.48	16.36	22.62	80	0.98
2023				14.96	19.16	25.77		

* Official landings statistics 1950–2001, ICES-estimated landings 2002–2022.

** Only harvest rates in years where the inverse *f* ratio ($L_{F=M}/L_{mean}$) is below 1 are included in the calculation of $HR_{MSY\ proxy}$.

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