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

6.1 General

Flounder (*Platichthys flesus*) in Subarea 4 and Division 3.a was assessed until 2013 in the Working Group on Assessment of New MoU Species (ICES, 2013a). Because only official landings and survey data were available, flounder was defined as a category 3 species according to the ICES guidelines for data limited stocks (ICES, 2012). Biennial advice for flounder is given since 2013 by ICES (ICES, 2013b) based on survey trends. Since 2015 flounder was included in the official data call for the WGNSSK and discard estimates were included into the assessment. During the WGNSSK 2017 methods to determine MSY proxy reference points were tested. Only the Length Based Indicator method was accepted at that time and revealed that the North Sea flounder stock was fished at or below F_{MSY} proxy. Catch advice for flounder was prepared for 2018 and 2019 during the WGNSSK 2017 (ICES, 2017a). However, later in 2017 the combined TAC for dab and flounder was removed (EU COM, 2017/595), and North Sea flounder has become a non-target species with no TAC since then. ICES has not been requested to provide advice on fishing opportunities for flounder for the years 2020 and 2021. The assessment for flounder in Subarea 4 and Division 3.a was benchmarked in 2018 and a SPiCT model was set up to evaluate the stock status of flounder relative to MSY proxies (ICES, 2018a). However, updating the SPiCT assessment model new available data since then increased the uncertainties to unacceptable levels. Therefore, the LBI method was used again instead, as it was done for the previous advice (ICES, 2017b). In 2021 precautionary catch advice was again requested for the flounder North Sea stock. Therefore, catch data, survey indices, and the LBI method were updated and presented during the WGNSSK2021 meeting. As in previous years the NS-IBTS Q1 index was used as stock indicator on which the 2 over 3 rule was applied (ICES, 2012). The LBI method showed that the fishing pressure is below F_{MSY} proxy. However, the trend of the index was decreasing for the last years, with the lowest observed value in 2020, therefore the precautionary buffer was applied. This resulted in a catch advice of 1650 tonnes, based on the average catch of the recent three years, and corresponding landings of 1171 tonnes (discard rate = 29% last three year average).

6.1.1 Biology and ecosystem aspects

Flounder is a euryhaline flatfish: the life cycle of each individual usually includes marine, brackish, and freshwater habitats. It has a coastal distribution in the Northeast Atlantic, ranging from the White Sea and the Baltic in the north, to the Mediterranean and Black Sea in the south. Flounder can live in low salinity water but they reproduce in water of higher salinity.

Flounder feeds on a wide variety of small invertebrates (mainly polychaete worms, shellfish, and crustaceans), but locally the diet may include small fish species like smelt and gobies. The most intensive feeding occurs in the summer, while food is sparse in the winter.

In the North Sea, Skagerrak and Kattegat flounder spawn between February and April. The adults move further offshore to the 25–40 m deep spawning grounds, the most important of which are situated along the coasts of Belgium, the Netherlands, Germany, and Denmark. During autumn, both mature and immature flounder withdraw from the inshore and estuarine feeding areas. Juvenile flounder migrate into coastal areas, where they spend the winter.

6.1.2 Stock ID and possible assessment areas

There is no information about stock identity and possible stock assessment areas in the North Sea, Skagerrak and Kattegat. Within the North Sea there may exist a number of sub-populations (ICES, 2013a).

6.1.3 Management regulations

There is no minimum landing size for this species in EU waters.

Flounder is mainly a bycatch species in fisheries for plaice and sole. The discard rates for flounder can be (~40%). No minimum landing size is defined for flounder. According to EU-Regulations a precautionary TAC was given in EU waters of Division 2a and Subarea 4 together with dab (*Limanda limanda*). This combined TAC was never fully utilized. In 2017, the European Commission requested ICES to evaluate the possible effects on the stocks of flounder and dab having no TAC. ICES advised that given the current fishing patterns of the main fleets catching flounder and dab, which are the same fleets targeting plaice and sole, the risk of having no TAC for the flounder and dab stock is considered to be low (ICES, 2017b). Therefore, the European Commission removed the combined TAC for these two stocks (EU COM, 2017/595).

6.2 Fisheries data

6.2.1 Historical landings

In the North Sea and in the Skagerrak and Kattegat flounder is mainly a bycatch in the fishery for commercially more important flatfish such as sole and plaice and in the mixed demersal fisheries. The largest part of official landings is reported for Subarea 4, especially for the last decade (Figure 6.1; Table 6.5). Landings in ICES Subarea 4 and Division 3.a by country are shown in Figures 6.2 and 6.3 and in Tables 6.3 and 6.4. The apparent decrease in official landings between 1984 and 1997 is due to unreported landings by the Netherlands. Further, there seem to be an issue with Danish and German official landings in Subarea 4 which drastically dropped after 1997 (Figure 6.3, red and black bars). At least the drastic decline in Danish landings could be explained by a combined TAC for dab and flounder which was established in 1998, i.e. that before 1998 partly combined dab and flounder landings may have been reported by the Danish fishery. Another reason maybe misreporting to flounder from other quota species from the fishery in area 4 before the TAC came in force in 1998.

Since 1950, annual landings from the North Sea have fluctuated, without any clear pattern (Figure 6.1). During the last decade, landings declined considerably. This decline goes hand in hand with a reduction in fishing effort of bottom trawl fleets in the North Sea since 2000 (STECF, 2016). The lowest official landings were reported for 2017, since then it increases slightly again. For 2020, total official landings were reported with 1767 tonnes, compared to 1668 tonnes in 2019. In Division 3.a, annual landings in general have decreased sharply from mid of the 1980s until 2015. Official landings increased slightly since then, but they are still on low levels compared with earlier years (Figure 6.2).

Flounder is of relatively little commercial importance in the North Sea and the Skagerrak/Kattegat. Landings data may have been misreported in previous years. However, the amount of misreporting is not known. In addition, the official landings may not reflect the total catches, because flounder is often discarded and discarding is influenced by the prices and the availability of other, commercially more important species and therefore cannot be estimated for years without observations.

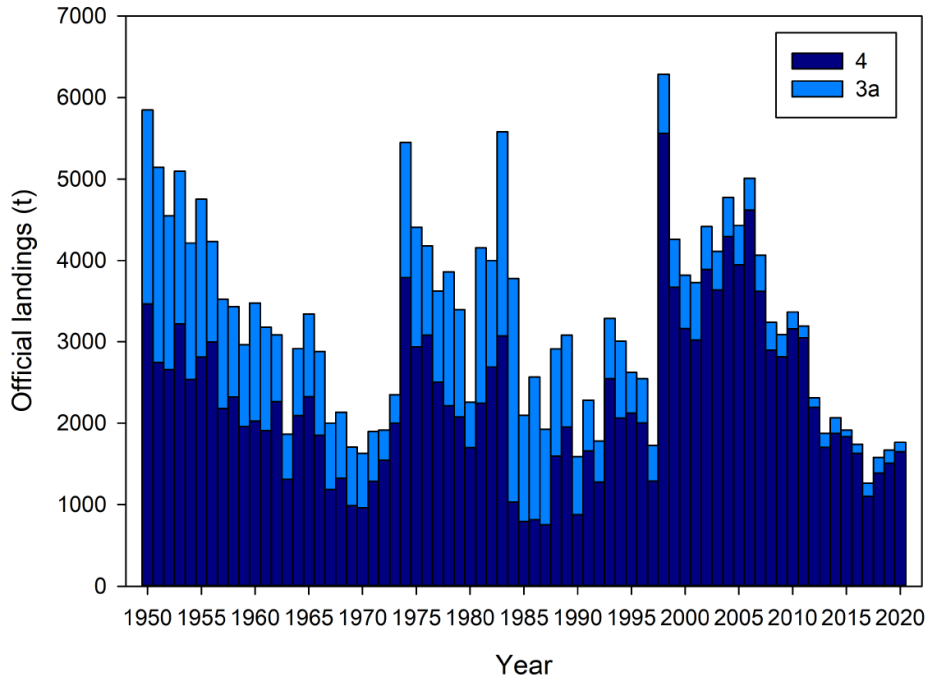

Figure. 6.1. Flounder in Subarea 4 and Division 3.a: Official landings in tonnes of flounder by area 1950–2020.

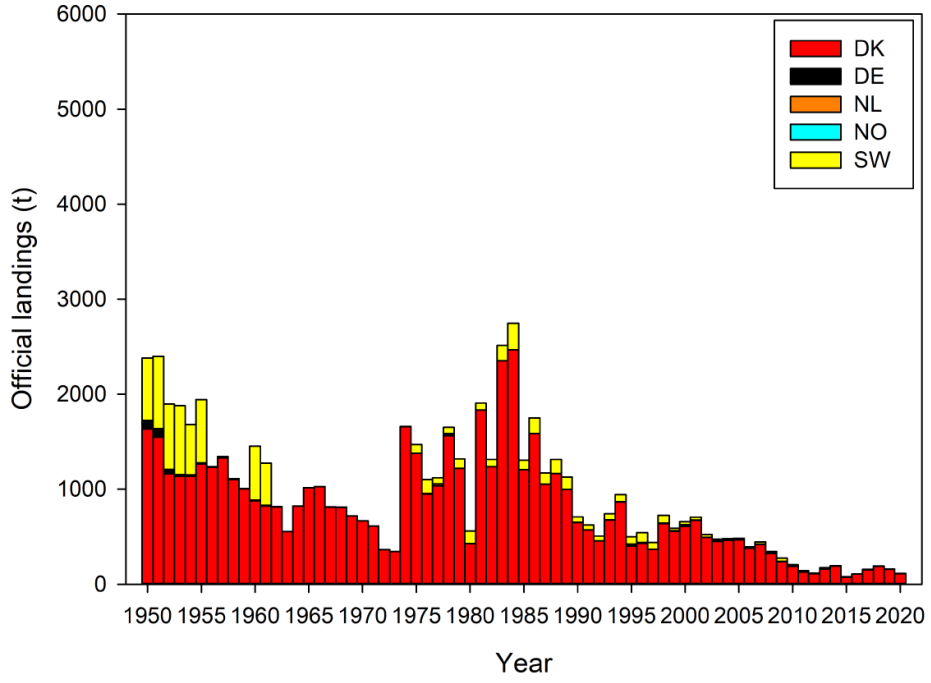

Figure 6.2. Flounder in Subarea 4 and Division 3.a: Official landings in tonnes of flounder in ICES Division 3.a by country 1950–2020.

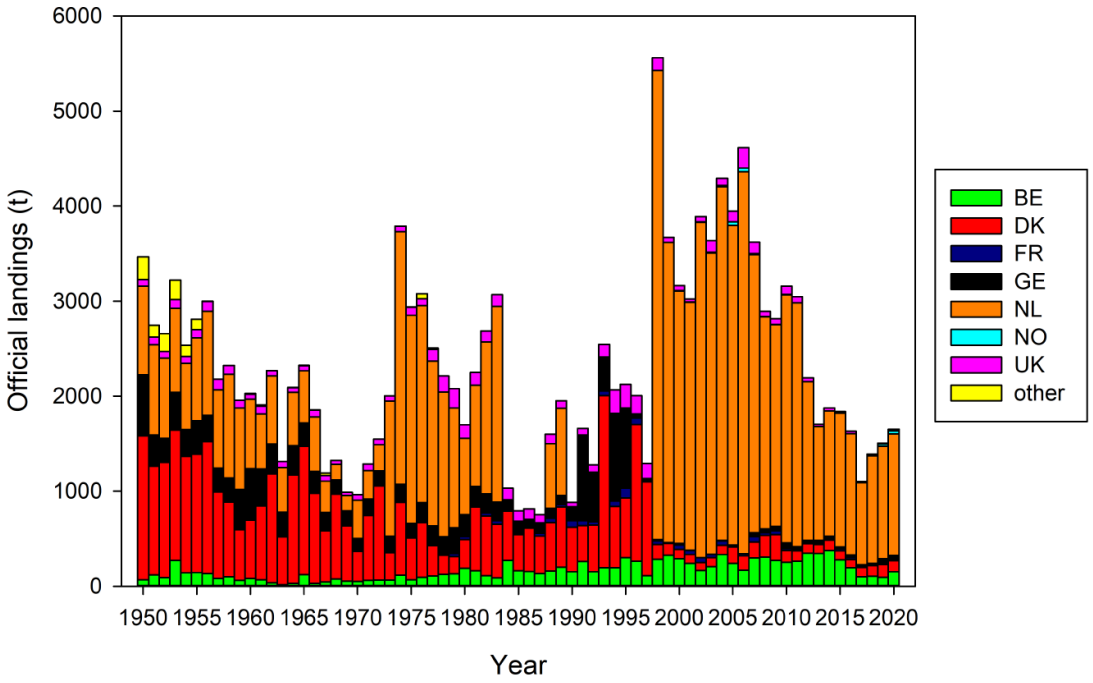

Figure 6.3. Flounder in Subarea 4 and Division 3.a: Official landings of flounder in ICES Subarea 4 by country 1950–2020.

6.2.2 InterCatch

Flounder landings and discards data from 2002–2020 were available in the InterCatch system for the current assessment year.

In general, it was tried only to raise equivalent or similar métiers with each other in InterCatch. Discard information was provided for 85% of all métiers in 2020 (Figure 6.4). However, for a number of métiers zero landings were reported. For these métiers no raising with InterCatch was possible. A further problem in the estimation of total flounder discards maybe the TBB_CRU_16-32_0_0_all métier targeting brown shrimp in coastal areas of the Southeastern North Sea.

In 2020, by far the largest proportion of landings (1351 tonnes, ~79% of total landings) was reported by Dutch beam trawlers (TBB_DEF_70_99_0_0_all), followed by the Belgium TBB_DEF_70-99_0_0_all metier (136 tonnes) and the Danish GNS_DEF_120-219_0_0_all (100 tonnes). Also the Dutch and Belgium shrimper fleets (TBB_CRU_16-31_0_0_all) landed a considerable amount of flounder with 87 tonnes in total. All other métiers did not land more than 15 tonnes each (Figure 6.5). The highest amount of discards in 2020 was reported for the Dutch TBB_DEF_70_99_0_0_all metier (150 tonnes) and the German shrimper fleet (104 tonnes; TBB_CRU_16-31_0_0_all). The Danish and Swedish OTB_CRU_90-119_0_0_all metiérs reported 94 tonnes discards together (Figure 6.6), the Scottish OTB_CRU_70-99_0_0_all reported 89 tonnes of discards.

The largest total catch estimated in 2020 was taken by the Netherlands (1413 tonnes), followed by Denmark (427 tonnes), Belgium (202 tonnes) and Germany (178 tonnes). All other countries catch less than 100 tonnes each (Figure 6.7). The total catch estimated with InterCatch was 2394 tonnes from which 1715 tonnes were landings (compared to 1767 tonnes reported official landings) and 679 tonnes discards (28% of the total catch). However, it should be noted that not all métiers were sampled in every quarter and that the raising procedure may not be adequate

for all cases. Further, no data from Norway were imported into InterCatch for 2020, while official landings are reported with 30 tonnes.

In general it was attempted to use the same groupings for discard raising as for the previous data years. However, this was not possible for all cases and compared to the previous year slight changes had to be made. The grouping is based on gear type and mesh size over areas and season. For the sample allocation scheme only one landing and one discard group was set up, because data availability did not allow for a higher resolution. The following groupings were used for the 2020 data discard raising:

Group 1: TBB_DEF_70-99_0_0_all and TBB_DEF_100-119_0_0_all raised with all other TBB_DEF_70-99_0_0_all

Group 2: MIS_MIS_0_0_0_HC raised with all other métiers because no MIS_MIS_0_0_0_HC data were available.

Group 3: all OTB, SSC, SDN, 70 – 119 raised with all other métiers of same mesh sizes.

Group 4: All passive gears raised with all passive gears (only SWE discard data available)

Group 5: OTB_DEF>=120 with all OTB_DEF_>=120

Group 6: SDN_SSC_DEF_>=120 with all other SDN_SSC_DEF_>120

Group 7: TBB_DEF_>=100_0_0_0_all raised with all TBB_DEF métiers

Group 8: all other métiers were raised with all métiers.

Length allocations for 2020 data: one discard group (including BMSL and LogBook D, excluding TBB_CRU_16-31_0_0_all data) and one landing group. In addition, one separate group for TBB_CRU_16-31_0_0_all discards.

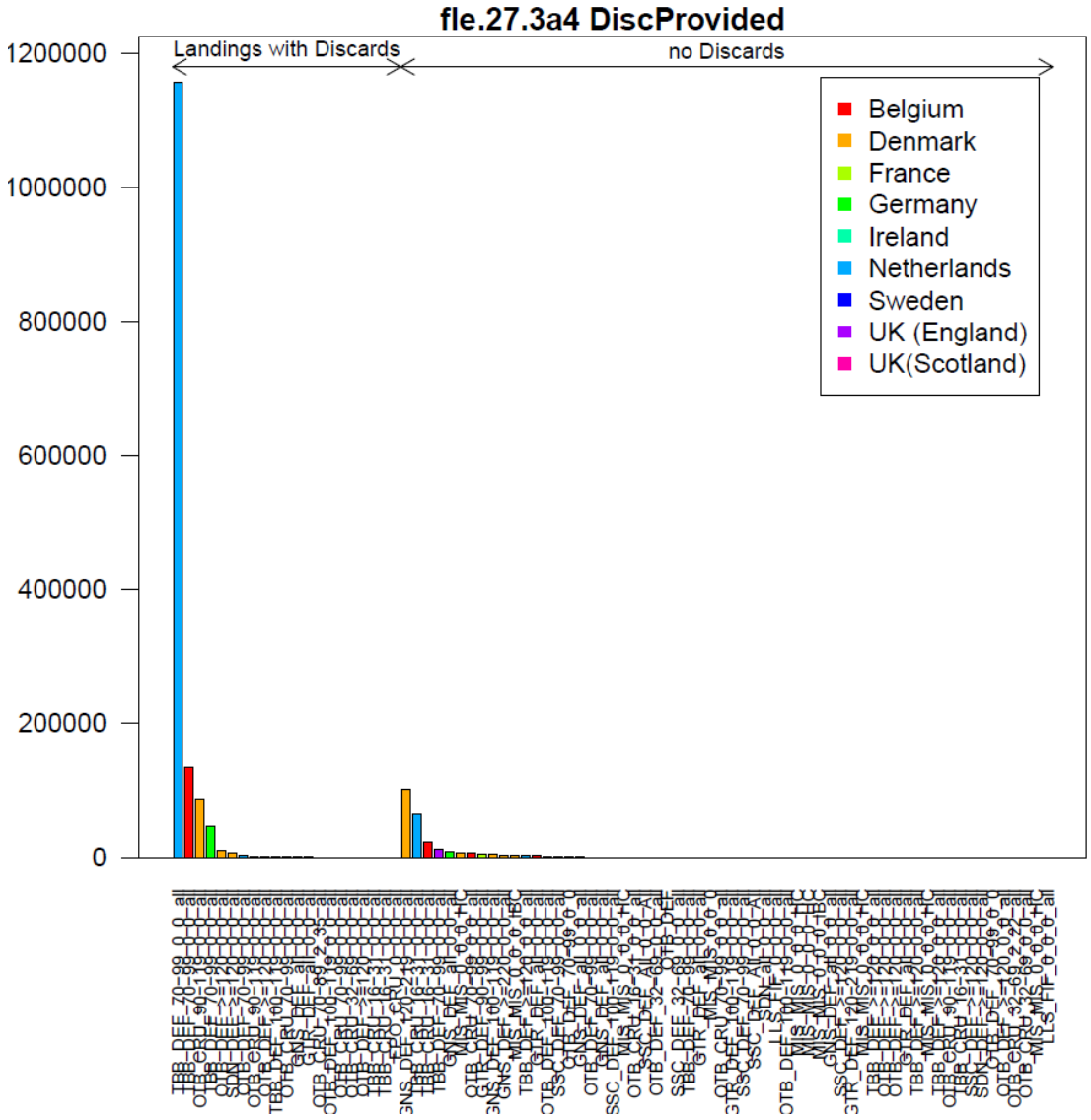

Figure 6.4. Flounder in Subarea 4 and Division 3.a: Provision of discards information by country and fleets imported to InterCatch for 2020 data.

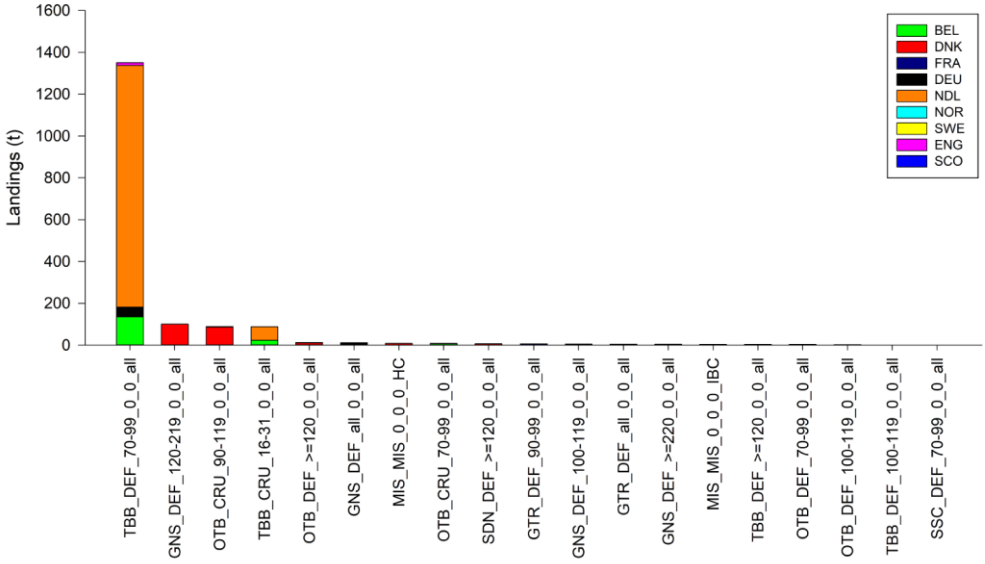

Figure 6.5. Flounder in Subarea 4 and Division 3.a: Flounder landings by métier and country in 2020 as uploaded to Inter-Catch.

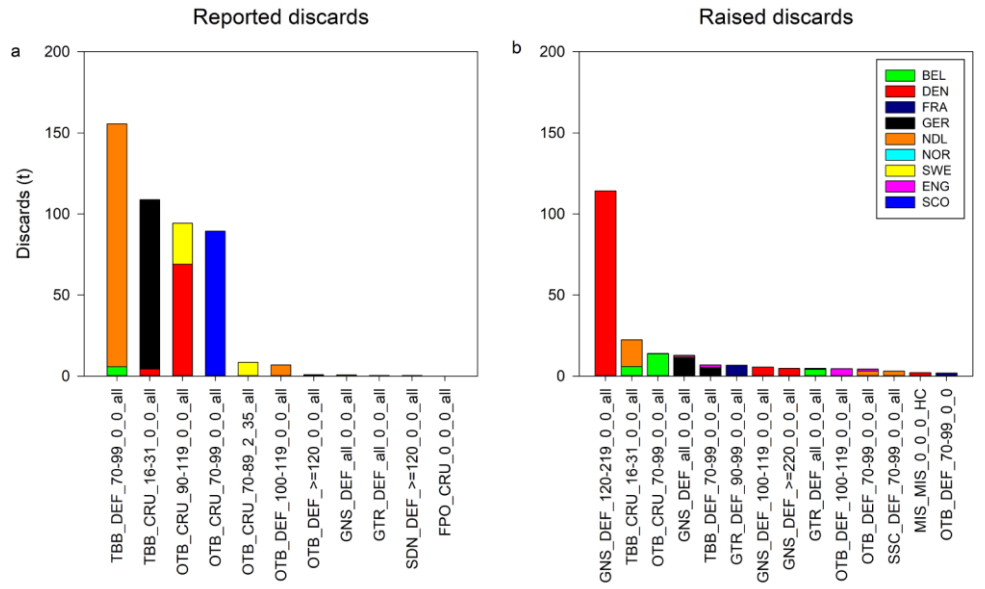

Figure 6.6. Flounder in Subarea 4 and Division 3.a: Flounder discards by métier and country in 2020. Reported discards panel (a), raised discards panel (b).

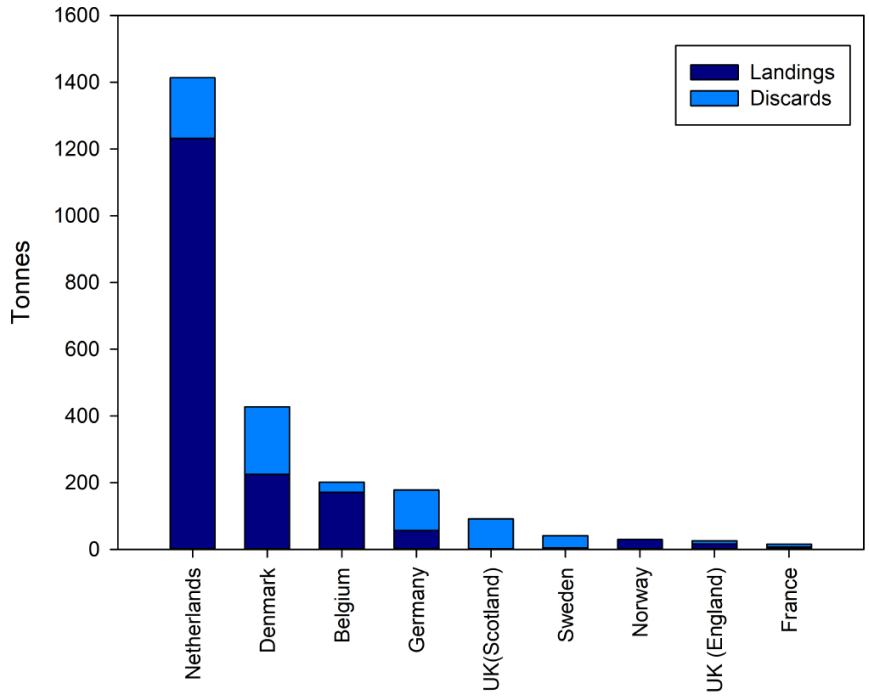

Figure 6.7. Flounder in Subarea 4 and Division 3.a: Flounder landings and discards by country in 2020 estimated with InterCatch.

6.3 Survey data/recruit series

Several surveys in the North Sea, Skagerrak and Kattegat provide information on distribution, abundance and length composition of flounder. The most relevant survey for flounder is probably the North Sea International Bottom Trawl Survey in quarter 1 (NS-IBTSQ1) because it covers the whole distribution area of the stock and shows even a higher catchability compared to the beam trawl surveys conducted in quarter 3 (BTS). However, the NS-IBTSQ1 uses a bottom trawl which is not very well suited to catch demersal flatfishes. Further, it should be noted here that the NS-IBTSQ1 was not fully standardized before 1983. Therefore, index data before this year should be interpreted with caution and are not presented in this report. The beam trawl surveys (BTS) use a beam trawl and are designed for catching flatfish. However, they are carried out in quarter 3, in a time of year in which flounder is distributed in more coastal, shallow and brackish waters in the river estuaries and the wadden sea areas. Biological data available from the NS-IBTSQ1 survey is displayed in Figure 6.9. and Figure 6.10.

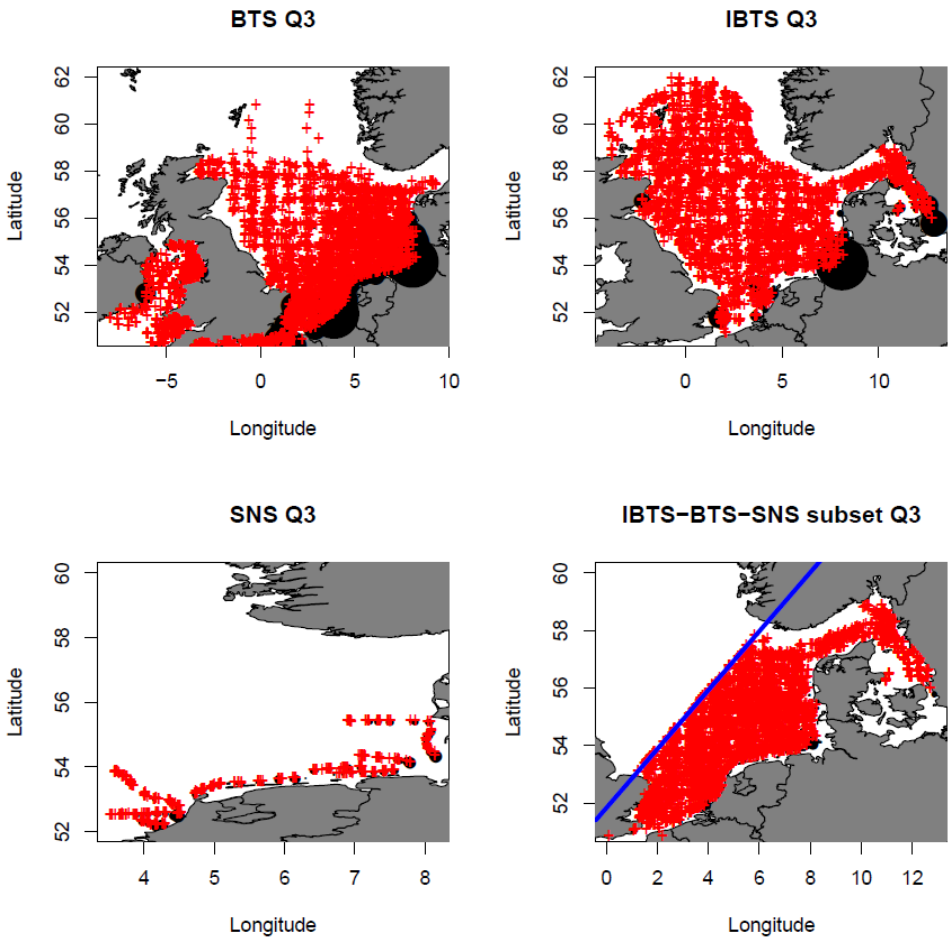

Figure 6.8. Flounder in Subarea 4 and Division 3.a: Distribution of flounder derived from different bottom trawl surveys in Subarea 4 and Division 3.a and the defined index area (lower right panel).

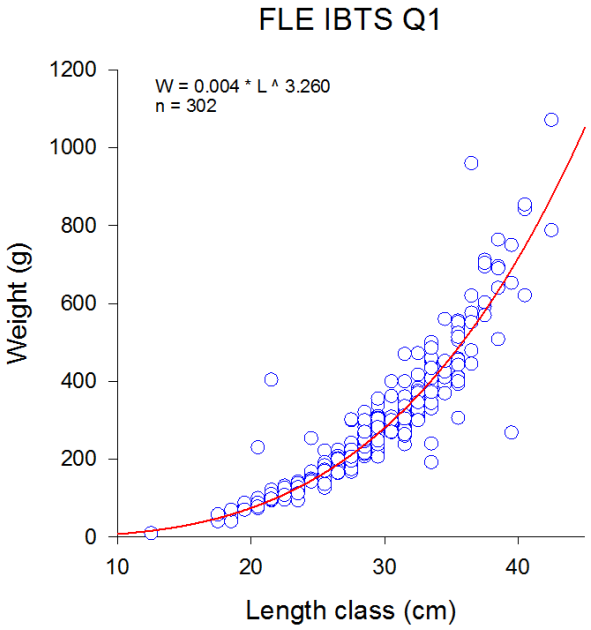

Figure 6.9. Flounder in Subarea 4 and Division 3.a: Length weight relationship of flounder derived from NS-IBTSQ1 data.

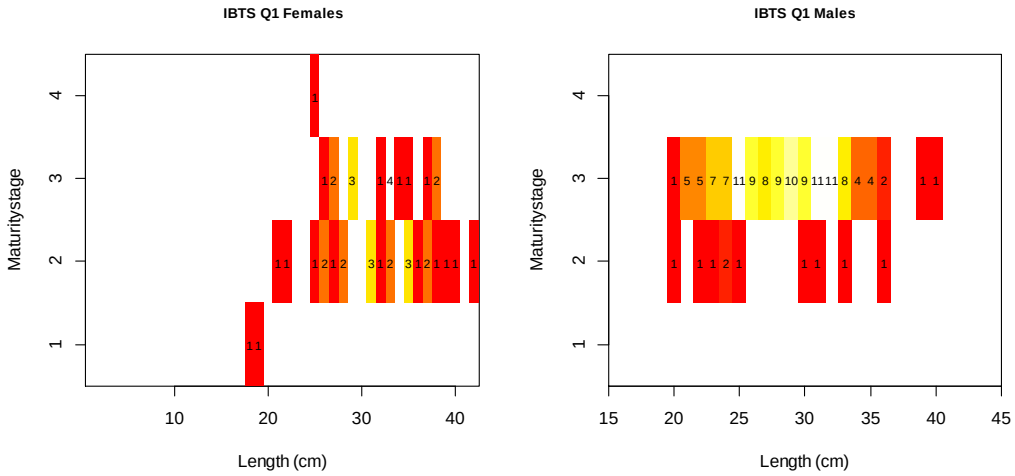

Figure 6.10. Flounder in Subarea 4 and Division 3.a: Maturity at length of female and male flounder derived from IBTS–Q1 data.

Survey indices

The flounder assessment was benchmarked in 2018 and two survey indices were constructed: a NS-IBTSQ1 and a combined quarter 3 index (IBTS, BTS, SNS), both indices modelled with the deltaGAM method (Berg *et al.*, 2014). For both indices the index area was defined, based on the species distribution from the hauls (Figure 6.8 lower right panel) which is restricted to the south-eastern part of the North Sea and Division 3.a. In quarter 3, four gear types were used in the different beam trawl surveys (BT8, BT7, BT6, and BT4) and the GOV in the NS-IBTS survey. Therefore, a gear effect was included to model a combined quarter 3 index for flounder. The following models where formulated:

Quarter 1

$$g(\mu_i) = Year(i) + f_1(lon_i + lat_i) + f_2(depth_i) + \log(HaulDur_i)$$

Quarter 3 – with gear effect

$$g(\mu_i) = Year(i) + Gear(i) + f_1(lon_i + lat_i) + f_2(depth_i) + log(HaulDur_i)$$

The new NS-IBTSQ1 index shows higher values at the beginning of the time series (Figure 6.11 blue line). Since 2000, the index was increasing again until 2008. Since then, the index was in general decreasing, with the lowest observed value in 2020. The combined quarter 3 index (Figure 6.11 red line) does not show any clear trends and follows the trend of the NS-IBTSQ1 index only partly. However, it seems that the overall trend of both indices is similar with higher observed values at the beginning of the time series and an overall decreasing trend from 2008 onwards.

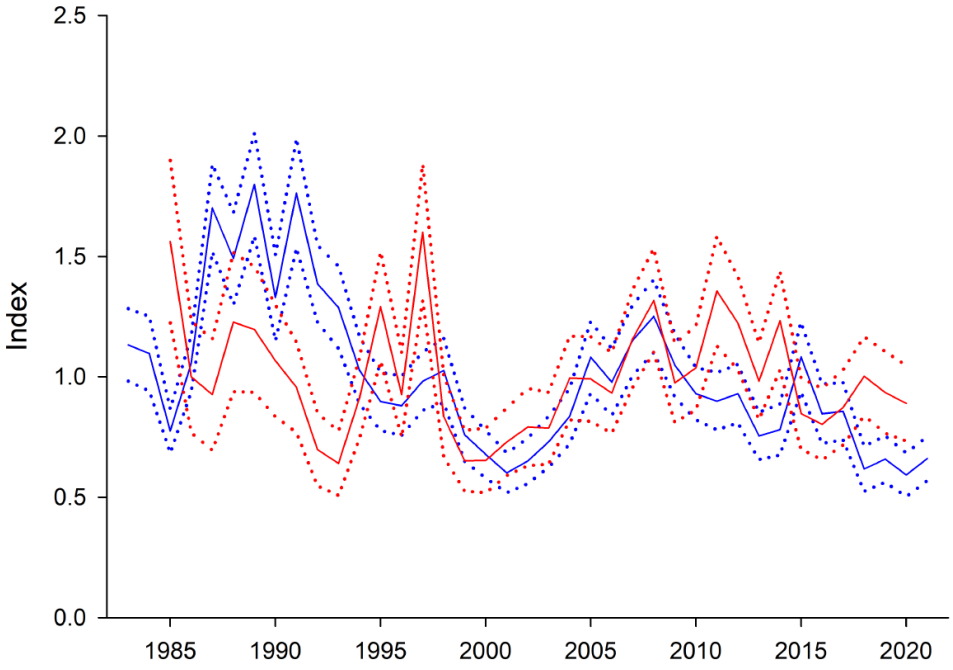

Figure 6.11. Flounder in Subarea 4 and Division 3.a: IBTS Quarter 1 biomass index (blue line) and combined quarter 3 biomass index (red line). Dotted lines display sd.

6.4 MSY Proxy analyses for flounder in Subarea 4 and Division 3.a.

6.4.1 Length based indicators

Flounder length samples (sex combined) from commercial catches were provided in InterCatch format for the years 2014–2020. These data were used for the analyses of MSY proxies applying the Length Based Indicator method (LBI; ICES 2017). The commercial length data show incoming recruitment peaks for some of the years (Figure 6.12). Since the LBI method assumes constant recruitment, the data sets were reduced by length classes below 16 cm (corresponding to ages below 2 years) for the analyses. Further, the length distributions were binned to 20 mm length classes. The method also requires growth parameters, which were taken either from literature (Froese and Sampang, 2013; Table 6.1) or estimated based on the available survey or InterCatch data. The L_{inf} was recalculated this year using InterCatch length distribution and the empirical formula by Garcia et al. (2016):

$\log_{10}L_\infty = 0.068260\ (\pm 0.010451) + 0.969112\ (\pm 0.006318)\ \log 10 L_{max}$,

where L_{max} is defined as the 99% percentile of the commercial length distribution (39.5 cm; Figure 6.13). This resulted in the applied L_{inf} of 41.3cm.

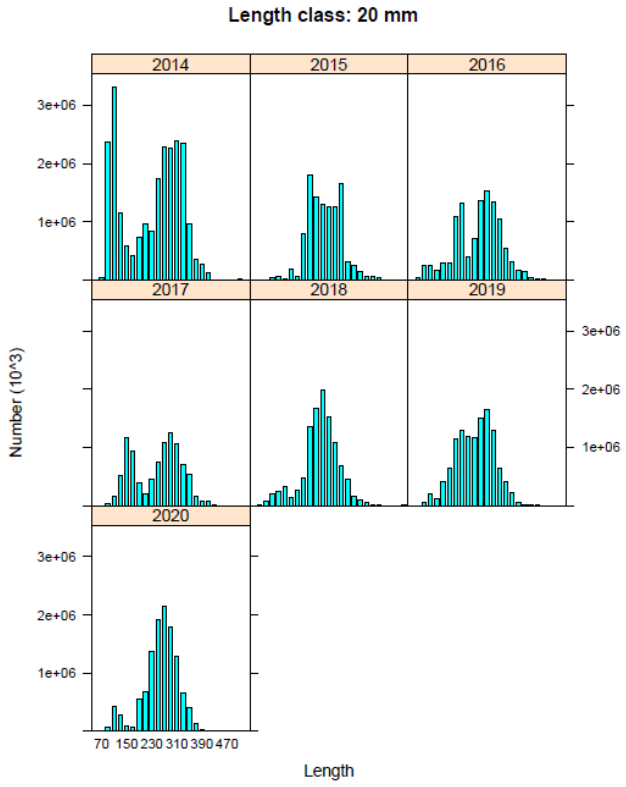

Figure 6.12. Flounder in Subarea 4 and Division 3.a. Left panel: Length distribution (20 mm length classes) from InterCatch 2014–2019. Right panel: Binned to 20 mm and reduced by incoming recruits (>150 mm, right panel) as used in the analyses.

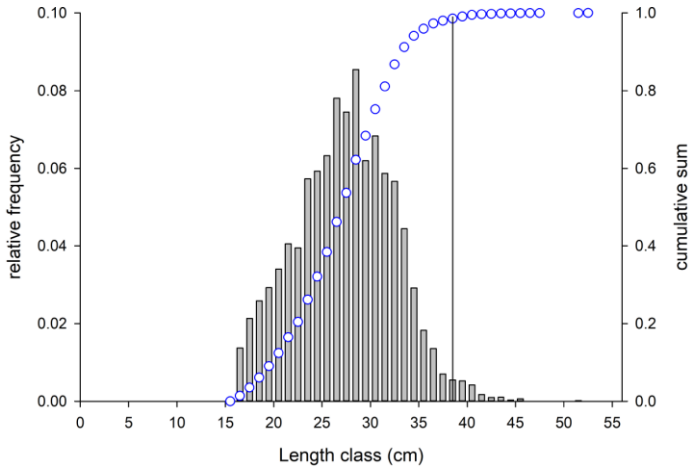

Figure 6.13. Flounder in Subarea 4 and Division 3.a. InterCatch relative length distribution (2014–2020) with the cumulative sum. Vertical line displays the 99% percentile of the distribution (39.5 cm).

The results of the LBI method showed that most of the indicators are above the reference points for 2020 (Table 6.2). Only the P_{mega} indicator decreased since 2014 and dropped below the 30% reference point since 2018. The L_C / L_{mat} ratio fluctuated around 1 but was above in 2020. In terms of the F_{MSY} proxy $L_{mean}/L_{F=M}$ the indicator ratio is above 1 for all the years (Table 6.2; Figure 6.20). From these results it was concluded that flounder is currently exploited below F_{MSY}.

Table 6.1. Flounder in Subarea 4 and Division 3.a. Parameters used as input for the LBI method.

Parameter	Sex combined
von Bertalanffy L∞ (cm)	41.3
von Bertalanffy k (yr^{-1})	0.36
Length-weight a	0.00867
Length weight b	3.06
Natural mortality M (yr^{-1})	0.2
Length-at-maturity (mm)	21
Natural mortality M	0.2

Table 6.2. Flounder in Subarea 4 and Division 3.a. Length Based Indicator table displaying the reference points and indicators based in InterCatch length sample data 2014–2020.

	Conservation				Optimizing Yield	MSY
	LC/L_{mat}	$L_{25\%}/L_{mat}$	$L_{max5\%}/L_{inf}$	P_{mega}	L_{mean}/L_{opt}	$L_{mean}/L_{F=M}$
Ref	**>1**	**>1**	**>0.8**	**>30%**	**~1(>0.9)**	**≥1**
2014	0.90	1.21	0.93	0.42	1.05	1.18
2015	1.10	1.12	0.94	0.36	1.05	1.05
2016	0.90	1.02	0.96	0.35	1.01	1.13
2017	0.81	1.17	0.93	0.37	1.02	1.22
2018	1.10	1.17	0.91	0.26	1.03	1.03
2019	0.90	1.02	0.89	0.24	0.98	1.10
2020	1.10	1.17	0.87	0.23	1.02	1.02

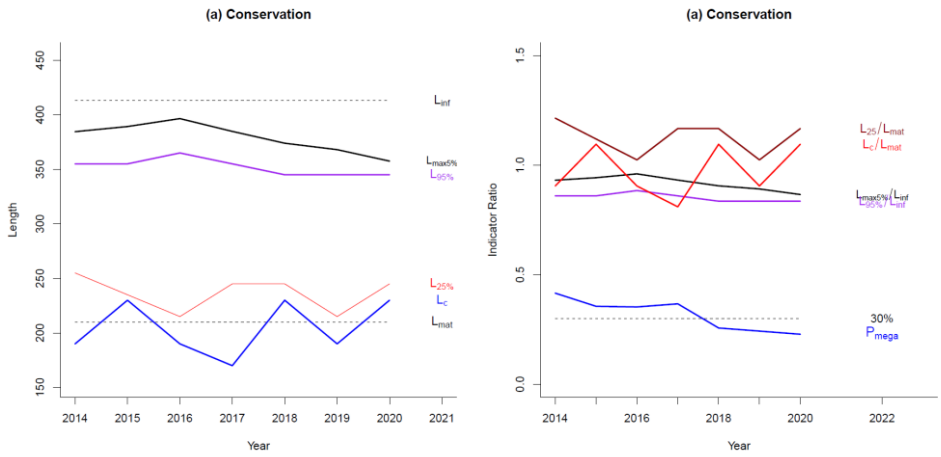

Figure 6.14. Flounder in Subarea 4 and Division 3.a. Conservation indicators (left panel) and indicator ratios (right panel).

Figure 6.15. Flounder in Subarea 4 and Division 3.a. Optimum yield indicators (left panel) and indicator ratios (right panel).

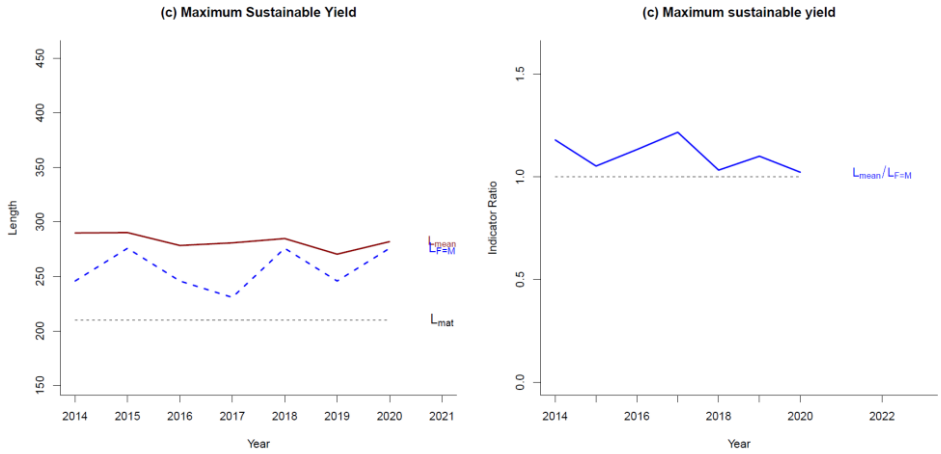

Figure 6.16. Flounder in Subarea 4 and Division 3.a. Maximum sustainable yield indicator (left panel) and indicator ratio (right panel).

6.5 Issues List

- Métiers with zero landings but no discards reported. No raising possible for these cases. What is the possible impact on catch estimation? Are there other ways to estimate discards for these métiers?
- No suitable data available for the shrimper fleets operating in coastal waters. Raising highly uncertain for these fleets. What is the possible impact on catch estimation? Is there another way to estimate the discards of these fleets?
- Investigate what could be done/changed to improve the SpiCT model.
- Investigate the use of alternative stock indices (DYFS, DFS, others?) which are able to better reflect the stock status.
- Investigate the HCR rules based on life history parameters suggested by WKLIFE X (ICES, 2020)

6.6 References

Berg, C., Nielsen, A., Christensen, K., 2014. Evaluation of alternative age-based methods for estimating relative abundance from survey data in relation to assessment models. Fisheries Research 151: 91–99.

Com (EU) 2017/595. Council Regulation (EU) 2017/595 of 27 March 2017 amending Regulation (EU) 2017/127 as regards certain fishing opportunities.

García-Carreras, B., Jennings, S., Le Quesne, W.J.F., 2016. Predicting reference points and associated uncertainty from life histories for risk and status assessment. ICES Journal of Marine Science 73(2): 483-493.

ICES 2012. ICES implementation of advice for data limited stocks in 2012. Report in support of ICES advice. ICES CM2012/ACOM:68.

ICES 2013a. Report of the Working Group on Assessment of New MoU Species (WGNEW), 18-22 March 2013, ICES HQ, Copenhagen, Denmark. ACOM.

ICES 2013b. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES CM 2013/ACOM:13.

ICES 2017a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2017, ICES HQ Copenhagen, Denmark. ICES CM 2017/ACOM:21.

ICES 2017b. EU request on a combined dab and flounder TAC and potential management measures besides catch limits. ICES Special Request Advice, Greater North Sea Ecoregion, sr.2017.04. Published 10 March 2017: 8 pp.

ICES 2018a. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA 2018). 5-9 February, ICES HQ Copenhagen, Denmark. ICES CM 2018/ACOM:33.

ICES 2018b. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 24 April–03 May 2018, Oostende, Belgium. ICES CM 2018/ACOM:22.

ICES 2019. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports. 1:7. 1271 pp. http//doi.org/10.17895/ices.pub.5402

ICES 2020. Tenth Workshop on the Development of Quantitative Assessments Methodologies based on LIFE-history traits, exploitation characteristics, and other relevant parameters for data-limited stocks (WKLIFE X). ICES Scientific Reports. 2.98. 72 pp. http://doi.org/10.17895/ices.pub.5985

Pedersen, M. W., Berg C. W., 2017. A stochastic surplus production model in continuous time. Fish and Fisheries, 18: 226-243. DOI: 10.1111/faf.12174.

STECF. 2016. Fisheries dependent information. Scientific, Technical and Economic Committee for Fish-eries (STECF-16-20). Publications Office of the European Union, Luxembourg. EUR 27758 EN. https://doi.org/10.2788/502445

Table 6.3. Flounder in Subarea 4 and Division 3.a: Flounder official landings by country in ICES Subarea 4.

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

Year	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total
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
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	15	0	1836
2016	192	87	20	27	1277	0	25	0	1628
2017	97	101	0	28	943	1	14	0	1184
2018	104	114	n.a.	23	1130	1	18	0	1390
2019*	94	136	9	48	1186	19	15	0	1507
2020*	154	114	7	48	1280	30	18	0	1651

***Preliminary catch statistics**

Table 6.4. Flounder in Subarea 4 and Division 3.a: Flounder official landings by country in ICES Division 3.a.

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

Year	Denmark	Germany	Netherlands	Norway	Sweden	Total
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
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	0	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*	156	0	2	0	3	161
2020*	111	0	0	0	5	116

*** preliminary catch statistics**

Table 6.5. Flounder in Subarea 4 and Division 3.a: Flounder total official landings by ICES areas.

Year	Division 3.a	Subarea 4	Total
1950	2381	3467	5848
1951	2395	2748	5143
1952	1892	2656	4548
1953	1876	3220	5096
1954	1679	2536	4215
1955	1943	2810	4753
1956	1235	2999	4234
1957	1343	2178	3521
1958	1111	2322	3433
1959	1006	1956	2962
1960	1451	2026	3477
1961	1272	1907	3179
1962	815	2268	3083
1963	554	1312	1866
1964	823	2093	2916
1965	1016	2324	3340
1966	1027	1853	2880
1967	814	1189	2003
1968	810	1325	2135
1969	721	988	1709
1970	667	963	1630
1971	612	1285	1897
1972	365	1548	1913
1973	346	2002	2348
1974	1658	3790	5448
1975	1467	2939	4406
1976	1099	3079	4178
1977	1119	2505	3624
1978	1648	2211	3859
1979	1319	2077	3396
1980	561	1698	2259
1981	1905	2248	4153
1982	1311	2689	4000
1983	2512	3069	5581
1984	2746	1030	3776
1985	1305	793	2098
1986	1751	814	2565
1987	1169	754	1923
1988	1313	1598	2911

Year	Division 3.a	Subarea 4	Total
1989	1129	1951	3080
1990	708	881	1589
1991	624	1659	2283
1992	507	1276	1783
1993	743	2545	3288
1994	943	2063	3006
1995	498	2125	2623
1996	542	2005	2547
1997	437	1290	1727
1998	725	5560	6285
1999	588	3672	4260
2000	656	3165	3821
2001	705	3022	3727
2002	524	3890	4414
2003	473	3637	4110
2004	478	4294	4772
2005	482	3946	4428
2006	393	4616	5009
2007	445	3620	4065
2008	346	2894	3240
2009	273	2815	3088
2010	205	3160	3365
2011	145	3048	3193
2012	118	2192	2310
2013	173	1703	1876
2014	194	1873	2067
2015	77	1836	1913
2016	109	1628	1737
2017	159	1184	1343
2018	192	1398	1590
2019*	161	1507	1668
2020*	116	1651	1767

*** preliminary catch statistics**

Table 6.6. Flounder in Subarea 4 and Division 3.a: Total official landings, InterCatch landings, discards and total catch.

Year	Official landings	IC landings	IC discards	IC total catch	Discard rate
2002	4414	4217	2084	6301	33.07%
2003	4110	3922	1370	5292	25.89%
2004	4772	4601	637	5238	12.16%
2005	4428	4214	1265	5479	23.09%
2006	5009	4837	1026	5863	17.50%
2007	4065	3908	2082	5990	34.76%
2008	3240	3067	1376	4443	30.97%
2009	3088	2804	1342	4146	32.38%
2010	3365	3166	3087	6253	49.37%
2011	3193	3041	1694	4735	35.77%
2012	2310	2189	1205	3394	35.49%
2013	1876	1750	1415	3165	44.71%
2014	2062	1907	1127	3034	37.15%
2015	1883	1762	1228	2990	41.07%
2016	1738	1750	628	2378	26.41%
2017	1262	1244	588	1832	32.10%
2018	1582	1587	657	2244	29.28%
2019*	1668	1653	727	2380	33.55%
2020*	1767	1715	679	2395	28.35%

***preliminary catch statistics**