

## **4 FLOUNDER**

In the Baltic Sea there are several rather distinct flounder stocks (populations). The migrations between the mature flounder stocks are limited. Details can be found in the Quality Handbook (Appendix 6).

On average about 45%, 18% and 16% of the flounder landings are reported respectively from Subdivisions 24 + 25, 26 and 22. Total landings fluctuated between 8 421 t and 19 640 t (Table 4.1, Figure 4.1). Highest landings were recorded in 2002. During the mid-1990s flounder landings were misreported, mainly for Subdivisions 24 and 25. Total landings in 2003 were 15 118 t. The decrease compared to 2002 is mainly due to the longer summer ban for cod trawl fishery where flounder is landed as bycatch.

Experimental stock assessments were carried out only for flounder in Subdivisions 24 + 25. For the other stocks in Subdivisions 26, 28, 29, and 32 catch at age data and weight at age data were submitted but not for all landings.

### **4.1 Flounder in Subdivision 22**

#### **Landings**

The total landing amounted to 1 304 t in 2003. This means a further decrease compared to the high landings 2000 and 2001. The landings of Denmark and Germany decreased.

#### **Age composition**

Catch at age data were not available.

### **4.2 Flounder in Subdivisions 24 and 25**

#### **4.2.1 The fishery**

A general description of the fishery is given in the Quality Handbook (Appendix 6).

##### **4.2.1.1 Catch trends**

Total landings of the stock fluctuated between 4 121 t and 12 147 t (Table 4.1 and Figure 4.1). Some landings of the mid 90's are misreported from the cod fishery. The peak of the total landings was in 2002. In 2003 the landing dropped to 8 503 t. The decrease compared to 2002 is mainly due to the longer summer ban for cod trawl fishery and because German trawlers did not target flounder in 2003.

Nearly all Danish landings were given for Division IIID, but the data were not split by Subdivisions. The IIID landings were split by the WG according to the proportions between the landings given separately for Subdivisions 24, 25 and 26.

The Danish landings are mainly from the by-catch of the fishery directed towards cod. Germany and Poland have also a fishery directed towards flounder, Germany in Subdivision 24 (by trawl) and Poland in Subdivision 25 (mainly by gillnet). Further information is given in the Quality Handbook Appendix 6).

##### **4.2.1.2 Unallocated landings**

Unallocated landings were not reported.

##### **4.2.1.3 Discards**

Discard data were not available, but it is assumed that the amount discarded during the cod fisheries is high. Discard levels depend on the length composition in a given fishery and the minimum landing size (25 cm) as well as on the demand of the market (price, size category).

German investigations comparing the discard rate when using a 130 mm bottom trawl and the BACOMA net show an increase in discard rate by 26-60 %, depending on trawling time. This means that with the implementation of the

Fishery Rule to use only the BACOMA net in the cod trawl fishery from 2004 onwards the total discard rate will further increase.

#### **4.2.1.4 Effort and CPUE data**

No data were available.

### **4.2.2 Biological composition of the catch**

#### **4.2.2.1 Age composition**

For 2003 catch at age data were available from Germany for Subdivision 24 and from Poland for Subdivisions 24 and 25. The landings of the other countries were distributed according to the corresponding Subdivision (Table 4.2.4).

Catch at age data for 2002 were revised according to the revised landing data of Finland.

#### **4.2.2.2 Quality of catch and biological data**

69% of the landings for Subdivision 24 and 74 % for Subdivision 25 are covered by biological data.

Table 4.2.5 gives the whole time series of the catch in number. It can be seen that the number at age group 2 varied to an great extent. The reason could be

- biased sampling,
- non-reporting of undersized flounder in the first years up to 1987,
- discarding or landing of small flounder depending on market conditions (demand, price).

#### **4.2.3 Mean weight at age**

Mean weight at age data for the catch (Table 4.2.6) were available from Germany for Subdivision 24 and from Poland for Subdivisions 24 and 25. They were combined by weighting with the corresponding catch at age figures.

For the mean weights at age in the stock (Table 4.2.7) the data are taken from the German trawl surveys in Subdivisions 24 and 25 in February 1993-1996, 1998-2000. They are summarised by weighting them with index values of the catch in number at age for Subdivision 24 and Subdivision 25, respectively. For 1997 and the time series from 1978 to 1992 constant, mean values were used. From 2002 onwards the Polish and German BITS data from respectively Subdivisions 24 and 25 were included in the estimation.

#### **4.2.4 Maturity ogives**

Up to 2000 the maturity ogives (Table 4.2.8) are based on investigations of the German trawl surveys in Subdivisions 24 and 25 in February 1996, 1998 - 2000. The proportion mature at age in the two Subdivisions were combined by weighting the data with the corresponding index values of catch in number at age. For 1997 and the time series from 1978 to 1995 constant, mean values were used. From 2001 onwards the Polish and German BITS data from respectively Subdivisions 24 and 25 were included in the estimation of the ogives.

#### **4.2.5 Natural mortality**

Natural mortality was assumed to be  $M=0.2$  for all age groups and years.

#### **4.2.6 Catch-at-age analysis**

##### **4.2.6.1 Tuning fleets**

Since 2001 the Baltic international trawl survey (BITS) has been carried out using a new design and also new standard gears. In this frame Germany terminated its survey in Subdivision 25. Because about 50 % of the landings from the stock are taken from this area the data of the Polish BITS of the 1<sup>st</sup> quarter included in data base has been also used for tuning XSA since 2002. This survey was and will be carried out in the southern part of the Subdivision (ICES

rectangles 37G5, 38G5-7, 39G7). Up to 2000 the gear P 20/25 was used. The mean catch at age per hour of the depth strata 40-59 m, 60-79 m and 80-99 m were weighted by the corresponding areas to produce index values (Table 2.2.1). The data do not have to be converted to the TV3 #920 gear because the mean conversion factor between the two gears given by the WGBIFS (ICES 2001/H:2) was 1.

The data of the German stratified fixed station trawl surveys carried out in Subdivision 24 in November/December as well as in January/February are given in Table 4.2.2. and 4.2.3, respectively. From 2001 onwards the TV3 #520 gear is used. The mean catch at age per 0.5 hour per 10 m depth stratum from 30 m and deeper were weighted by the corresponding area within the total German survey area as was done in previous years. The data were not converted because the mean conversion factor between the two gears given by the WGBIFS (ICES 2001/H:2) was 1.

The index of the German survey in November 2003 seems to be unrealistic due to the special hydrographical situation in Subdivision 24 that prevented the flounder from concentrating. Therefore the index does not represent present good stock size (C.C. Frieß, Institute for Baltic Sea Fisheries Rostock, pers. inform.).

#### **4.2.6.2 XSA runs**

As proposed by ACFM 2003 age group 2 was excluded from the analysis. Several runs were carried out including/excluding age group 2 but using the same settings and fleets as last year.

The results are presented in the following text table. Here the corresponding results of the Working document No 2 are also shown. In this run the terminal year was 2002.

<b>Flounder in SD 24 and 25: Overview. XSA diagnostics and summary results.</b>				
	<b>Ass.2003 Final</b>	<b>Ass.2004 SPALY</b>	<b>WD No 2 Exp. Run</b>	<b>Ass.2004 Final</b>
Terminal year	2002	2003	2002	2003
Age groups included	2 - 8+	2 - 8+	3 - 8+	3 - 8+
Nr iter for convergance	13	15	14	18
SE(log q) (range) DEU surv	.25 - .70	.43 - .82	.25 - .63	.43 - .82
POL surv	.32 - .80	.31 - .72	.33 - .80	.32 - .72
Regression statistics				
slopes (range) DEU surv	-5.6 - .61	.74 - 11.26	.74 - 4.51	.83 - 10.24
POL surv	.68 - 12.53	-3.4 - 1.74	.67 - 11.41	-3.4 - 1.85
corr.coeff. (range) DEU surv	.01 - .83	.00 - .23	.02 - .84	.00 - .22
POL surv	.00 - .45	.04 - .43	.00 - .45	.04 - .43
Reg SE (range) DEU surv	.17 - 3.59	.52 - 6.79	.17 - 2.0	.54 - 4.73
POL surv	.42 - 7.47	.36 - 1.9	.42 - 6.8	.36 - 1.91
Internal s.e. DEU/POL				
Per age group 2	.74 / -	.68 / -		
3	.43 / .70	.49 / .62	.51 / .73	.70 / .62
4	.30 / .32	.35 / .31	.32 / .32	.39 / .31
5	.28 / .31	.32 / .30	.29 / .31	.35 / .29
6	.29 / .32	.31 / .29	.30 / .32	.33 / .29
7	.22 / .29	.32 / .30	.22 / .29	.33 / .30
Stock output				
Recr 1992	44 562	45 097	37 395	37 467
Recr 1997	47 657	48 480	30 794	31 293
Recr 2002	64 939	25 683	94 820	42 382
RTC3 recruits				
Year-class 1999			44 810	44 542
Year-class 2000			35 399	36 136
SSB 1992	28 530	26 927	26 295	24 413
SSB 1997	23 970	27 215	21 535	22 237
SSB 2002	31 735	25 683	28 870	23 043
FBAR 4-6 1992	0.45	0.44	0.45	0.44
FBAR 4-6 1997	0.64	0.61	0.63	0.61
FBAR 4-6 2002	0.60	0.53	0.58	0.52

Comparing the regression results of the different runs, no remarkable gain was achieved when excluding age group 2 from the analysis. But because the catch in number at age group 2 is biased and produced a biased stock size at this age group, the WG decided to take the run where age group 2 is excluded as the final run. The tuning results of this run are given in Table 4.2.9. Log catchability residuals show no trend (Figure 4.2.1).

The fishing mortalities (Tables 4.2.10, 4. 2.12) of the fully recruited age groups (mean of age groups 4–6) varied between 0.33 (1978) and 0.76 (1995), in 2003 it was  $F_{(4-6,u)}=0.61$ . The trend of the fishing mortality can be seen in Figure 4.2.2. On an average the fishing mortality amounted to  $F_{(4-6,u)}=0.51$ . This is on the level of  $F_{med}=0.51$  estimated from the stock-recruitment plot and the yield per recruit curve (chapter 9.2.12, ICES 2000/ACFM:14).

#### 4.2.7 Recruitment estimates

The number of recruits at age 3 are given in Table 4.2.12. It can be seen that in 2003 the number of recruits at age group 3 was the lowest estimated. But according to young fish investigations in Subdivision 24 and from the fishery (C.C. Frieß, Institute for Baltic Sea Fisheries Rostock, pers. inform.) the year-class 2000 must be above the average. Therefore a RCT3 analysis including the latest stock size estimates of age group 3 and the survey indices of age group 3 and also of age group 2 of the German survey was carried out. The number of recruits at age group 3 of the year-classes 1999 and 2000 are included in the text table above. Taking into account the RCT3 estimate of the year-class 2000, this year-class is somewhat above the mean of the year-classes 1975-1999 (34 500 recruits). The stock-recruitment relationship (Fig. 4.2.2) suggests that recruitment has varied independently of the past range of spawning stock biomass.

#### 4.2.8 Historical stock trends

The stock size in number is given in Table 4.2.11. The total and spawning stock biomass are presented in Table 4.2.12. Figure 4.2.2 shows the trend of the spawning stock biomass. The value for 2003 was adjusted to the new number of recruits, because 90 % of the flounder of age group 3 are already spawners. The biomass fluctuated around a mean of 24 000 t.

#### 4.2.9 Quality of assessment

The insignificant regression diagnostics of XSA are mainly due to variable discarding of size classes and a biased sampling of the landings.

The new survey design introduced in 2001 resulted in a different distribution of stations within depth strata in Subdivisions 24 and 25 in comparison with the former random fixed station design of German surveys.

#### 4.2.10 Comparison with previous assessment

The comparison between main input parameters for assessment and the results of XSA of 2002 and 2003 are presented in text table below.

Category	Parameter	Assessment 2003 *	Assessment 2004	Diff. (+/-) %
<b>XSA inputs</b>	<b>Settings</b>			
	Catchability dependent on stock	no	no	no
	Catchability independent of age	$\geq 4$	$\geq 4$	no
	Shrinkage, final years	5	5	no
	oldest ages	3	3	no
	SE in shrinkage	0.5	0.5	no
	<b>Tuning fleets</b>	German survey: Nov., SD 24, AGs 3-7, gear: HG20/25; gear: from 2001 TV3#520;	German survey: Nov., SD 24, AGs 3-7 gear: HG20/25, from 2001 TV3#520;	Polish survey: 1 <sup>st</sup> quarter SD 25, , AGs 3-7, gear: P20/25 from 2001 TV3#930
<b>XSA results</b>	<b>SSB 2002 (Tonnes)</b>	28 870	23 043	- 20.2
	<b>F (4-6) 2002</b>	0.5787	0.5138	- 11.2
	<b>Recruitment in 2002 (Thousands)</b>	94 820	42 382	- 55.3

\*To make the results comparable the results of the Working document (Müller, WGBFAS 2004/WD No 2) were taken. The assessment was made with the same settings as in the final run of 2003 but the age range was the same as in 2004.

#### **4.3 Flounder in Subdivision 26**

##### **Landings**

In 2003 the total landings were 4 175 t and therefore almost as high as in 2001 and 2002. The main fishing countries in this area are Poland, Russia and Lithuania. As in the previous years the Polish fishery was mainly a gillnet fishery along the coast whereas the Russian landings were bycatches mainly in the mixed bottom trawl fishery.

##### **Catch at age in number and mean weight at age**

Poland and Russia supplied catch at age data and weight at age data in the catch. This means a coverage of 68 % of the total landing. The landings of the other countries were distributed to the number at age according to the age distribution in the Russian trawl fishery.

#### **4.4 Flounder in Subdivision 28**

##### **Landings**

The total landings amounted to 530 t in 2003, which represents a 26 % decrease compared with 2001, and small increase compared with 2002. In comparison to the period 1973 – 1981 (mean landings about 2000 t) the landings are on a low level.

##### **Catch at age in number and mean weight at age**

Estonia and Latvia supplied catch in number and weight at age data by quarter. It means that 97 % of the total landing is covered.

#### **4.5 Flounder in Subdivisions 29 and 30**

##### **Landings**

In Subdivision 29 the flounder fishery is only carried out by Finland and Estonia. In 2003 the total landings were 295 t and similar to landings in 2002. Landings in 2003 and 2002 are much lower than landings in 2001 and most previous years.

The procedure for estimating the proportion of recreational landings relative to commercial landings has been revised in 2002. This revision is based on the results of an angler survey in Finland in 2002. This survey showed that approximately 80 % of the Finnish landings from Subdivisions 29 and 30 are from non-commercial (i.e., angling) catches. The new proportion has been applied since 2002.

69 t were reported for Subdivision 30.

##### **Catch at age in numbers and mean weight at age**

Estonia supplied catch in number and weight at age data by quarter for Subdivision 29.

#### **4.6 Flounder in Subdivision 32**

##### **Landings**

The flounder fishery in this area is carried out by Finland and Estonia.

The total landings were 247 t in 2002 (revised) and 150 t in 2003. This is a large decrease compared to the years before. It is due to the reduced proportion (about 68 %) of non-commercial landings to the total Finnish landing as estimated by the enquiry in 2002 (see also Section 4.5).

**Catch at age in numbers and mean weight at age**

Catch at age in number and mean weight at age data by quarter were only provided by Estonia.

**Table 4.1 Flounder in the Baltic Sea: Total landings (tons) by sub-division and country. (There are some gaps in the information. Therefore "Total" is preliminary.)**

Year	Denmark <sup>1</sup>			Finland			German Dem. Rep. <sup>2</sup>			Germany, Fed. Rep.			Poland			Sweden <sup>3</sup>						
	22	23	24,25	24	25	26	27	28	29	30	31	22	23	24	25	26	27	28	29	30	31	
1973	1,983		386																			
1974	2,097		2,578																			
1975	1,992		1,678																			
1976	2,038		482																			
1977	1,974		389																			
1978	2,965		415																			
1979	2,451		405																			
1980	2,185		286																			
1981	1,964		548																			
1982	1,563		257																			
1983	1,714		450																			
1984	1,733		306																			
1985	1,561		649																			
1986	1,525		1,558																			
1987	1,208		1,007																			
1988	1,162		990																			
1989	1,321		1,062																			
1990	941		1,389																			
1991	925		1,497																			
1992	713		975																			
1993	649		635																			
1994	882		1,016																			
1995	859		2,110																			
1996	1,041		2,306																			
1997	1,356		2,421																			
1998	1,372		2,393																			
1999	1,473		1,206																			
2000	1,896		1,757																			
2001	2,030		3,048																			
2002	1,490		2,883																			
2003 <sup>5</sup>	1,063		1,786																			

continued

continued

**Table 4.1 Flounder in the Baltic Sea: Total landings (tons) by sub-division and country. (There are some gaps in the information. Therefore "Total" is preliminary.)**

Year	USSR			Estonia			Latvia			Lithuania <sup>8</sup>			Russia			Total										Total 22-32			
	26	28	29	32	25	26	28	29	32	25	26	28	26	26	28	22	23 <sup>1</sup>	24	25 <sup>4</sup>	26	27	28	29	30	31		32		
1973	2610														2,513		2,014	3,598	2,070		2,610								12,805
1974	2510														2,566		4,063	2,759	2,473		2,510								14,371
1975	6455														2,624		3,148	2,677	2,585		6,455		113	22					17,671
1976	471	1779	409	359											2,604		2,040	2,850	2,760		1,779		527	23					13,001
1977	210	1081	321	414											2,922		3,101	3,583	2,299		1,081		436	32					13,924
1978	288	1290	334	395											3,790		2,988	1,342	2,394		1,290		508	61					12,923
1979	158	1170	330	1012											2,899		2,917	1,545	2,018		1,170		522	54					12,290
1980	93	798	334	1080											2,535		3,078	1,659	1,473		20		979	69					11,618
1981	58	742	445	1078											2,586		3,165	1,181	1,599		21		936	706	56				11,463
1982	195	665	615	1121											2,074	104	3,482	2,517	1,818		65		681	837	58				12,901
1983	209	551	497	1114											2,412	115	4,095	1,936	1,114		212		603	687	67				12,475
1984	145	202	286	1226											2,453	85	3,044	2,498	1,433		53		215	462	108				11,712
1985	268	189	265	806											1,996	130	3,922	2,087	1,570		47		201	424	97				11,417
1986	442	159	281	556											1,777	65	4,426	3,061	2,226		60		174	483	128				13,137
1987	1315	203	279	397											1,393	122	3,131	2,556	3,060		51		216	440	106				11,615
1988	578	439	257	331											1,387	125	3,999	1,763	1,870		68		456	437	118				10,713
1989	783	512	214	214											1,569	83	4,702	1,930	1,872		66		528	392	122				11,641
1990	752	390	144	141											1,176		3,021	1,737	1,351		390		363	81					8,421
1991															1,171		3,335	2,039	2,418		88		354	371	81				10,075
1992															940	185	2,988	1,965	2,527		86		722	455	40				10,581
1993															884	220	1,892	3,339	1,554		83		451	524	57				9,742
1994															926	265	5,298	3,195	1,503		33		458	33					12,136
1995															1,145	289	4,963	7,639	1,856		81		396	450	28				17,013
1996															1,232	285	3,729	6,788	3,659		114		299	464	78				17,064
1997															2,011	42	4,465	4,201	2,883		105		769	379	69				15,348
1998															1,783	61	4,171	4,418	3,403		70		537	363	59				15,249
1999															1,983	37	3,055	4,111	3,133		15		457	436	57				13,724
2000															2,556	41	3,910	3,556	3,593		73		395	426	43				14,994
2001															2,488	52	4,974	4,773	4,119		90		690	385	28				18,090
2002															1,807	42	4,988	7,159	4,130		90		514	308	82				19,367
2003 <sup>9</sup>															1,304	33	3,323	5,180	4,175		57		532	295	69				15,118

**Table 4.2.1 Flounder in SD 24 and 25: catches per hour at age (weighted mean by areas of the depth strata,40-, 60-,80-) of the Polish bottom trawl survey in SD 25 in the 1st quarter. Gear: P20/25, in 2001 TV3 930 meshes. (FLT06)**

Year	Catch in number							
	Total	AG 2	AG 3	AG 4	AG 5	AG 6	AG 7	AG 8+
1993	99.11	0.00	15.39	25.40	53.08	4.54	0.52	0.18
1994	105.42	3.46	26.87	35.60	20.67	17.19	1.06	0.58
1995	166.48	0.00	4.08	69.32	44.56	29.05	13.44	6.03
1996	21.45	0.00	5.05	5.37	6.33	3.00	1.26	0.45
1997	102.46	8.22	35.22	42.97	9.07	3.73	2.17	1.08
1998	125.32	0.00	21.51	38.46	40.59	15.04	6.66	3.06
1999	204.36	0.99	74.89	77.81	27.91	14.36	2.50	5.90
2000	77.30	0.13	14.49	34.04	16.35	8.17	2.43	1.69
2001	199.30	0.52	46.70	80.96	51.13	13.47	5.33	1.19
2002	217.44	0.20	38.08	81.64	67.57	11.23	14.36	4.37
2003	80.38	0.00	17.27	33.83	17.80	5.83	3.10	2.55

**Table 4.2.2 Flounder in SD 24 and 25: catches per half an hour (mean of the strata means 30-39m and 40-49m weighted by stratum areas) of the German bottom trawl surveys in ICES SD 24 in November/December. Gear: HG20/25, in 2001 TV3 520 meshes. (FLT02)**

Year	Catch [kg]	Catch in number							
		Total	AG 2	AG 3	AG 4	AG 5	AG 6	AG 7	AG 8+
1983	7.11	16.7	0.3	1.1	6.3	4.6	2.5	1.5	0.4
1984	6.87	20.1	1.1	3.1	8.8	4.2	1.9	0.5	0.5
1985	13.28	42.1	0.4	13.4	14.2	8.7	3.0	0.2	2.1
1986	5.19	16.5	0.0	1.2	8.7	3.7	1.3	0.9	0.7
1987	7.80	30.7	4.7	12.4	8.3	3.4	0.7	0.7	0.5
1988	2.70	12.0	0.2	8.0	2.7	0.5	0.2	0.2	0.2
1989	6.59	21.1	1.0	6.4	8.8	3.3	0.9	0.5	0.0
1990	59.63	213.0	28.3	78.8	52.2	37.5	10.4	4.3	1.5
1991	12.22	44.0	2.2	11.1	19.4	7.1	2.7	0.7	0.8
1992	11.00	34.5	3.4	20.1	7.9	2.0	0.7	0.3	0.0
1993	19.48	59.4	5.3	33.0	12.8	6.7	0.9	0.4	0.3
1994	12.07	37.3	1.3	17.3	11.5	5.0	1.4	0.7	0.2
1995	8.87	21.0	1.4	7.0	5.5	3.4	1.8	1.0	0.9
1996	8.68	19.6	0.6	4.4	5.3	3.6	1.9	1.4	1.9
1997	6.40	22.9	3.3	10.9	4.9	2.0	1.0	0.5	0.3
1998	7.75	23.1	1.1	11.9	6.6	2.5	0.4	0.3	0.3
1999	21.46	57.1	1.4	29.5	19.0	4.8	1.1	0.7	0.6
2000	9.20	23.7	0.8	10.6	7.9	2.8	0.6	0.4	0.6
2001	14.28	42.4	1.4	25.2	10.1	3.2	1.4	0.5	0.6
2002	29.76	77.4	1.4	47.5	19.9	3.8	1.8	1.2	1.2
2003	7.52	20.6	1.4	8.2	7.7	1.8	0.5	0.2	0.2

**Table 4.2.3 Flounder in SD 24 and 25: catches per half an hour (mean of the strata means 30-39m and 40-49m weighted by stratum areas) of the German bottom trawl surveys in ICES SD 24 in February. Gear: HG20/25, in 2001 TV3 520 meshes.**

Year	Catch [kg]	Catch in number							
		Total	AG 2	AG 3	AG 4	AG 5	AG 6	AG 7	AG 8+
1992	20.87	90.9	0.2	14.2	37.4	24.1	9.4	3.4	2.2
1993	21.92	80.4	4.3	38.9	24.9	10.4	1.3	0.5	0.1
1994	17.39	58.1	1.6	28.9	17.2	7.0	2.2	0.7	0.5
1995	26.65	89.0	5.0	36.5	27.8	13.2	3.8	2.2	0.5
1996	10.62	35.0	3.9	13.1	8.3	5.9	2.1	1.0	0.7
1997	8.72	36.5	4.1	16.0	10.4	4.0	1.1	0.5	0.4
1998	11.65	50.9	3.9	31.0	11.3	3.0	0.7	0.5	0.6
1999	7.51	36.4	3.1	25.8	6.1	1.2	0.1	0.1	
2000	29.99	124.6	10.7	69.7	31.9	9.6	1.8	0.5	0.3
2001	8.47	36.0	10.4	15.8	7.1	1.2	0.4	0.3	0.3
2002	21.58	92.2	10.3	67.8	9.6	2.1	0.7	0.5	1.2
2003	13.96	57.9	10.1	31.9	12.7	1.7	0.6	0.4	0.4

**Table 4.2.4 Flounder in SD 24 and 25: catch in number (thousands) by sub-division and country.**

<b>SUB-DIV. 24 and 25</b>		<b>Country: All</b>		<b>Year: 2003</b>				
		<b>SD 24</b>						
<b>Age</b>	<b>GFR</b>		<b>POL</b>		<b>SWE, DEN, FIN (GFR data)</b>		<b>Total landings</b>	
	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	Mean weight (g)
1							0.000	0
2	191.542	180	0.448	119	155.044	180	347.034	180
3	2221.065	272	50.781	183	1797.842	272	4069.688	271
4	1171.789	339	347.924	241	948.505	339	2468.218	325
5	93.484	499	660.383	324	75.671	499	829.538	360
6	16.931	651	591.882	416	13.705	651	622.518	428
7	6.500	719	330.720	533	5.261	719	342.481	539
8+	2.193	1031	251.552	650	1.775	1031	255.520	656
SOP(t)	1101.042		893.090		890.759		2884.891	
Landing (t)	1100.994		898.300		891.200		2890.494	
								-0.002

<b>SUB-DIV. 24 and 25</b>		<b>Country: All</b>		<b>Year: 2003</b>				
		<b>SD 25</b>						
<b>Age</b>	<b>POL</b>		<b>DEN, FIN, FRG, SWE (POL data)</b>		<b>SWE, DEN, FIN (GFR data)</b>		<b>Total landings</b>	
	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	mean w eight [g]	numbers*10 <sup>-3</sup>	Mean weight (g)
1							0.000	0
2	9.678	119	3.351	119			13.029	119
3	401.118	183	138.869	183			539.987	183
4	2147.611	241	743.515	241			2891.126	241
5	3508.670	324	1214.722	324			4723.392	324
6	2775.490	416	960.891	416			3736.381	416
7	1331.969	533	461.135	533			1793.104	533
8+	875.142	644	302.979	644			1178.121	644
SOP(t)	4157.424		1439.325		0.000		5596.749	
Landing (t)	4169.280		1443.429				5612.709	
								-0.003

**Table 4.2.5 Flounder in Sub-divisions 24 and 25:  
CANUM: Catch in numbers (Thousands).**

Year	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8+
1978	0	1210	5030	3834	2356	874	552
1979	0	2503	6059	3797	4057	1869	962
1980	0	940	5100	4997	1944	861	817
1981	0	1431	4472	3874	2138	1075	1073
1982	0	3450	5493	3156	2943	1436	1316
1983	0	3528	10712	4416	2096	976	726
1984	0	3348	5519	4847	2556	1170	1007
1985	0	5388	5286	3777	1605	1192	862
1986	0	4432	7830	4864	1975	1628	1635
1987	0	2712	5440	3218	1999	1018	1007
1988	12	5188	5240	4452	2038	870	872
1989	15	5123	9923	3135	1589	723	738
1990	41	5640	6081	2719	1188	529	533
1991	246	4865	7984	3185	1489	728	434
1992	0	1851	5031	3485	1605	665	727
1993	127	1946	6276	7138	3106	685	380
1994	0	4329	5949	4570	2746	748	450
1995	1125	8053	16108	8892	4869	1244	603
1996	640	6757	8354	5553	3180	1959	1620
1997	73	6584	8192	4251	2073	1237	1415
1998	1737	10609	8959	3306	1911	1201	487
1999	1211	8033	5384	2729	1743	940	1192
2000	892	10024	8132	3779	1452	460	270
2001	243	10693	11822	6761	2960	804	462
2002	1046	19464	15718	5344	2157	1327	603
2003	360	4610	5359	5553	4359	2136	1434

**Table 4.2.6 Flounder in Sub-divisions 24 and 25:  
WECA: Mean weight in Catch (Kilograms).**

Year	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8+
1978	0.103	0.209	0.242	0.298	0.393	0.519	0.598
1979	0.103	0.203	0.260	0.313	0.362	0.445	0.509
1980	0.103	0.207	0.253	0.320	0.394	0.498	0.521
1981	0.103	0.195	0.246	0.313	0.413	0.458	0.537
1982	0.103	0.232	0.265	0.328	0.396	0.492	0.628
1983	0.103	0.233	0.268	0.325	0.390	0.497	0.640
1984	0.103	0.227	0.253	0.314	0.394	0.493	0.642
1985	0.103	0.216	0.253	0.310	0.381	0.461	0.593
1986	0.103	0.216	0.253	0.310	0.381	0.461	0.593
1987	0.103	0.243	0.302	0.374	0.427	0.541	0.764
1988	0.170	0.233	0.273	0.318	0.329	0.520	0.671
1989	0.080	0.238	0.286	0.348	0.410	0.464	0.672
1990	0.121	0.196	0.262	0.315	0.390	0.474	0.623
1991	0.103	0.212	0.261	0.328	0.394	0.466	0.631
1992	0.103	0.217	0.239	0.310	0.399	0.465	0.630
1993	0.230	0.193	0.225	0.291	0.306	0.437	0.517
1994	0.218	0.225	0.278	0.338	0.360	0.479	0.641
1995	0.190	0.253	0.275	0.328	0.390	0.534	0.693
1996	0.156	0.254	0.317	0.412	0.489	0.673	0.821
1997	0.112	0.252	0.291	0.349	0.434	0.530	0.553
1998	0.180	0.242	0.290	0.372	0.441	0.574	0.708
1999	0.212	0.241	0.301	0.396	0.464	0.594	0.820
2000	0.193	0.257	0.296	0.340	0.397	0.542	0.802
2001	0.194	0.243	0.280	0.364	0.461	0.575	0.831
2002	0.133	0.223	0.232	0.346	0.443	0.599	0.650
2003	0.178	0.261	0.280	0.329	0.418	0.534	0.640

**Table 4.2.7 Flounder in Sub-divisions 24 and 25:  
WEST: Mean weight in Stock (Kilograms)**

Year	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8+
1978	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1979	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1980	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1981	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1982	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1983	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1984	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1985	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1986	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1987	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1988	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1989	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1990	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1991	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1992	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1993	0.120	0.196	0.291	0.426	0.598	0.693	0.795
1994	0.109	0.207	0.275	0.370	0.456	0.668	0.834
1995	0.115	0.215	0.293	0.413	0.597	0.675	0.974
1996	0.101	0.205	0.301	0.406	0.512	0.650	0.914
1997	0.103	0.204	0.287	0.393	0.528	0.678	0.862
1998	0.074	0.223	0.265	0.330	0.457	0.668	0.858
1999	0.100	0.177	0.298	0.412	0.545	0.711	0.800
2000	0.105	0.198	0.276	0.401	0.616	0.764	0.910
2001	0.082	0.154	0.236	0.373	0.561	0.574	1.007
2002	0.104	0.164	0.209	0.245	0.517	0.503	0.852
2003	0.100	0.185	0.238	0.377	0.543	0.623	0.813

**Table 4.2.8 Flounder in Sub-divisions 24 and 25:  
MATPROP: Proportion of Mature at Year Start.**

Year	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8+
1978	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1979	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1980	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1981	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1982	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1983	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1984	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1985	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1986	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1987	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1988	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1989	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1990	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1991	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1992	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1993	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1994	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1995	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1996	0.7	1.0	1.0	1.0	1.0	1.0	1.0
1997	0.5	0.9	1.0	1.0	1.0	1.0	1.0
1998	0.2	0.9	1.0	1.0	1.0	0.9	1.0
1999	0.6	0.9	1.0	1.0	1.0	1.0	1.0
2000	0.8	0.9	1.0	1.0	1.0	1.0	1.0
2001	0.5	1.0	1.0	1.0	1.0	1.0	1.0
2002	0.7	0.7	1.0	1.0	1.0	1.0	1.0
2003	0.8	0.9	1.0	1.0	1.0	1.0	1.0

**Table 4.2.9 Flounder in SD 24 and 25: XSA tuning diagnostics.**

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Lowestoft VPA Version 3.1
14/04/2004 18:04
Extended Survivors Analysis
Flounder in Sub-divisions 24 and 25, WGBFAS 2004 file: FLE04_1X
CPUE data from file c:\ices_software\vpa\data\fleet2s3.low
Catch data for 26 years. 1978 to 2003. Ages 3 to 8.
Fleet,          First, Last, First, Last, Alpha, Beta
          ,      year, year, age , age
FLT02: DEU BTS Nov. SD24, 1991, 2003, 3, 7, .870, .960
FLT06: POL BTS 1q, SD25, 1997, 2003, 3, 7, .120, .170

Time series weights :
Tapered time weighting applied
Power = 3 over 20 years
Catchability analysis :
Catchability independent of stock size for all ages
Catchability independent of age for ages >= 4
Terminal population estimation :
Survivor estimates shrunk towards the mean F
of the final 5 years or the 3 oldest ages.
S.E. of the mean to which the estimates are shrunk = .500
Minimum standard error for population
estimates derived from each fleet = .300
Prior weighting not applied
Tuning converged after 18 iterations

Regression weights
, .751, .820, .877, .921, .954, .976, .990, .997, 1.000, 1.000

Fishing mortalities
Age, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003
3, .112, .287, .280, .265, .351, .227, .243, .247, .708, .320
4, .263, .772, .546, .650, .700, .302, .379, .506, .698, .426
5, .328, .795, .674, .600, .600, .474, .359, .630, .452, .572
6, .670, .703, .756, .577, .600, .753, .501, .533, .419, .841
7, .456, .750, .696, .770, .804, .681, .449, .579, .487, .993

XSA population numbers (Thousands)
AGE
YEAR , 3, 4, 5, 6, 7,
1994 , 4.52E+04, 2.85E+04, 1.81E+04, 6.22E+03, 2.26E+03,
1995 , 3.57E+04, 3.31E+04, 1.79E+04, 1.07E+04, 2.61E+03,
1996 , 3.06E+04, 2.20E+04, 1.25E+04, 6.62E+03, 4.32E+03,
1997 , 3.13E+04, 1.89E+04, 1.04E+04, 5.23E+03, 2.55E+03,
1998 , 3.96E+04, 1.97E+04, 8.10E+03, 4.68E+03, 2.40E+03,
1999 , 4.37E+04, 2.29E+04, 7.99E+03, 3.64E+03, 2.10E+03,
2000 , 5.13E+04, 2.85E+04, 1.38E+04, 4.07E+03, 1.40E+03,
2001 , 5.40E+04, 3.29E+04, 1.60E+04, 7.92E+03, 2.02E+03,
2002 , 4.24E+04, 3.46E+04, 1.63E+04, 6.97E+03, 3.80E+03,
2003 , 1.86E+04, 1.71E+04, 1.41E+04, 8.47E+03, 3.75E+03,
Estimated population abundance at 1st Jan 2004
, 0.00E+00, 1.10E+04, 9.14E+03, 6.50E+03, 2.99E+03,
Taper weighted geometric mean of the VPA populations:
, 3.67E+04, 2.44E+04, 1.23E+04, 5.68E+03, 2.42E+03,
Standard error of the weighted Log(VPA populations) :
, .2917, .2532, .3037, .3375, .3425,

Log catchability residuals.
Fleet : FLT02: DEU BTS Nov.S
Age , 1991, 1992, 1993
3 , -.32, .11, .62
4 , .83, -.35, -.03
5 , .93, -.82, .36
6 , .38, -.56, -.54
7 , -.06, 1.07, -.29
Age , 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003
3 , -.18, -.69, -1.00, -.13, -.20, .50, -.67, .14, 1.44, .16
4 , -.12, -.55, -.38, -.22, .09, .63, -.40, -.18, .63, .13
5 , -.44, -.39, -.09, -.56, -.09, .47, -.73, -.49, -.50, -.99
6 , -.34, -.59, -.02, -.58, -1.37, .03, -.92, -.70, -.43, -1.52
7 , -.21, .27, .05, -.38, -.80, .06, -.30, -.33, -.17, -1.48

Mean log catchability and standard error of ages with catchability
independent of year class strength and constant w.r.t. time
Age , 3, 4, 5, 6, 7
Mean Log q, -6.7129, -6.5732, -6.5732, -6.5732, -6.5732,
S.E(Log q), .6687, .4272, .6058, .8204, .6319,

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continued

**Table 4.2.9 Flounder in SD 24 and 25: output from XSA.**

**Regression statistics :**

Ages with q independent of year class strength and constant w.r.t. time.

Age	Slope	t-value	Intercept	RSquare	No Pts	Reg s.e.	Mean Q
3,	.83,	.277,	7.37,	.22,	13,	.58,	-6.71,
4,	1.20,	-.286,	5.86,	.18,	13,	.54,	-6.57,
5,	10.24,	-1.843,	-16.87,	.00,	13,	4.73,	-6.88,
6,	1.54,	-.688,	6.36,	.15,	13,	.83,	-7.17,
7,	1.35,	-.467,	6.49,	.17,	13,	.80,	-6.83,

**Fleet : FLT06:POL BTS 1q,SD2**

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
3	99.99	99.99	99.99	.33	-.39	.75	-1.05	.06	.17	.15
4	99.99	99.99	99.99	.08	-.06	.43	-.61	.14	.12	-.09
5	99.99	99.99	99.99	-.88	.86	.48	-.62	.42	.65	-.52
6	99.99	99.99	99.99	-1.10	.41	.65	-.06	-.23	-.30	-1.09
7	99.99	99.99	99.99	-.87	.31	-.57	-.24	.21	.57	-.88

**Mean log catchability and standard error of ages with catchability**

independent of year class strength and constant w.r.t. time

Age	3	4	5	6	7
Mean Log q,	-7.0524,	-6.0421,	-6.0421,	-6.0421,	-6.0421,
S.E(Log q),	.5766,	.3197,	.7051,	.7199,	.6276,

**Regression statistics :**

Ages with q independent of year class strength and constant w.r.t. time.

Age	Slope	t-value	Intercept	RSquare	No Pts	Reg s.e.	Mean Q
3,	1.80,	-.650,	4.26,	.12,	7,	1.09,	-7.05,
4,	1.02,	-.036,	5.97,	.43,	7,	.36,	-6.04,
5,	1.85,	-.449,	3.09,	.05,	7,	1.40,	-5.98,
6,	-3.40,	-1.866,	16.60,	.04,	7,	1.91,	-6.29,
7,	.99,	.014,	6.26,	.27,	7,	.64,	-6.25,

**Fleet disaggregated estimates of survivors :**

**Age 3** Catchability constant w.r.t. time and dependent on age

Year class = 2000

FLT02: DEU BTS Nov.S

Age,	3,
Survivors,	12912.,
Raw Weights,	1.488,

FLT06:POL BTS 1q,SD2

Age,	3,
Survivors,	12812.,
Raw Weights,	1.904,

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
FLT02: DEU BTS Nov.S,	12912.,	.698,	.000,	.00,	1,	.201,	.280
FLT06:POL BTS 1q,SD2,	12812.,	.617,	.000,	.00,	1,	.258,	.282
F shrinkage mean ,	9706.,	.50,,,,,				.541,	.358

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	, Ratio,		
11042.,	.34,	.15,	3,	.425,	.320

**Age 4** Catchability constant w.r.t. time and dependent on age

Year class = 1999

FLT02: DEU BTS Nov.S

Age,	4,	3,
Survivors,	10449.,	38706.,
Raw Weights,	3.282,	.659,

FLT06:POL BTS 1q,SD2

Age,	4,	3,
Survivors,	8331.,	10833.,
Raw Weights,	5.576,	.844,

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
FLT02: DEU BTS Nov.S,	13009.,	.389,	.489,	1.25,	2,	.274,	.317
FLT06:POL BTS 1q,SD2,	8623.,	.308,	.089,	.29,	2,	.447,	.446
F shrinkage mean ,	7092.,	.50,,,,,				.279,	.521

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	, Ratio,		
9142.,	.22,	.18,	5,	.815,	.426

continued

**Table 4.2.9 Flounder in SD 24 and 25: output from XSA.**

**Age 5** Catchability constant w.r.t. time and age (fixed at the value for age) 4

Year class = 1998

FLT02: DEU BTS Nov.S

Age,	5,	4,	3,
Survivors,	2412.,	12185.,	7511.,
Raw Weights,	1.409,	1.409,	.448,

FLT06:POL BTS 1q,SD2

Age,	5,	4,	3,
Survivors,	3869.,	7357.,	6929.,
Raw Weights,	.990,	2.394,	.574,

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
FLT02: DEU BTS Nov.S,	5670.,	.348,	.538,	1.55,	3,	.291,	.635
FLT06:POL BTS 1q,SD2,	6210.,	.294,	.194,	.66,	3,	.353,	.593
F shrinkage mean	, 7612.,	.50,,,,				.356,	.507

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	, Ratio,		
6503.,	.23,	.19,	7,	.829,	.572

**Age 6** Catchability constant w.r.t. time and age (fixed at the value for age) 4

Year class = 1997

FLT02: DEU BTS Nov.S

Age,	6,	5,	4,	3,
Survivors,	655.,	1817.,	2505.,	1527.,
Raw Weights,	.588,	.685,	.829,	.263,

FLT06:POL BTS 1q,SD2

Age,	6,	5,	4,	3,
Survivors,	1002.,	5754.,	3431.,	1042.,
Raw Weights,	.726,	.482,	1.409,	.337,

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
FLT02: DEU BTS Nov.S,	1548.,	.331,	.301,	.91,	4,	.254,	1.266
FLT06:POL BTS 1q,SD2,	2407.,	.288,	.388,	1.35,	4,	.317,	.970
F shrinkage mean	, 5184.,	.50,,,,				.429,	.566

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	, Ratio,		
2991.,	.25,	.28,	9,	1.140,	.841

**Age 7** Catchability constant w.r.t. time and age (fixed at the value for age) 4

Year class = 1996

FLT02: DEU BTS Nov.S

Age,	7,	6,	5,	4,	3,
Survivors,	259.,	742.,	697.,	767.,	1870.,
Raw Weights,	.851,	.332,	.323,	.442,	.142,

FLT06:POL BTS 1q,SD2

Age,	7,	6,	5,	4,	3,
Survivors,	470.,	842.,	1727.,	621.,	2399.,
Raw Weights,	.821,	.410,	.227,	.751,	.181,

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
FLT02: DEU BTS Nov.S,	513.,	.334,	.306,	.92,	5,	.246,	1.562
FLT06:POL BTS 1q,SD2,	726.,	.300,	.253,	.84,	5,	.282,	1.298
F shrinkage mean	, 2258.,	.50,,,,				.472,	.618

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	, Ratio,		
1138.,	.26,	.31,	11,	1.183,	.993

**Table 4.2.10 Flounder in Sub-divisions 24 and 25. Output from XSA: Fishing mortality (F) at age.**

**Table 8 Fishing mortality (F) at age**

<b>YEAR</b>	<b>1978</b>	<b>1979</b>	<b>1980</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>						
<b>Age 2</b>												
<b>3</b>	0.0426	0.1023	0.0433	0.0531	0.1044	0.1521						
<b>4</b>	0.3064	0.3096	0.3119	0.2973	0.2952	0.5399						
<b>5</b>	0.3546	0.4013	0.4549	0.4149	0.3545	0.4112						
<b>6</b>	0.344	0.7987	0.3692	0.3581	0.6485	0.4233						
<b>7</b>	0.3371	0.5072	0.3812	0.3591	0.4358	0.4615						
<b>+gp</b>	0.3371	0.5072	0.3812	0.3591	0.4358	0.4615						
<b>FBAR 4-6</b>	0.335	0.5032	0.3787	0.3568	0.4327	0.4581						
<b>YEAR</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>		
<b>Age 2</b>												
<b>3</b>	0.1453	0.2239	0.2059	0.1454	0.1962	0.2458	0.2023	0.1654	0.0561	0.0600		
<b>4</b>	0.3766	0.3591	0.5894	0.4197	0.4609	0.7062	0.5175	0.4904	0.2578	0.2733		
<b>5</b>	0.5035	0.4817	0.6647	0.5159	0.7365	0.5584	0.4208	0.5685	0.4116	0.7124		
<b>6</b>	0.4456	0.3075	0.5029	0.6420	0.7387	0.6436	0.4248	0.4307	0.6371	0.8083		
<b>7</b>	0.4451	0.3853	0.5907	0.5301	0.6512	0.6418	0.4577	0.5045	0.3477	0.6245		
<b>+gp</b>	0.4451	0.3853	0.5907	0.5301	0.6512	0.6418	0.4577	0.5045	0.3477	0.6245		
<b>FBAR 4-6</b>	0.4419	0.3828	0.5857	0.5259	0.6454	0.6361	0.4544	0.4965	0.4355	0.5980		
<b>YEAR</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>FBAR 00-03</b>	
<b>Age 2</b>												
<b>3</b>	0.1119	0.2866	0.2796	0.2647	0.3506	0.2271	0.2434	0.2468	0.7084	0.3205	0.4252	
<b>4</b>	0.2627	0.772	0.5456	0.6497	0.7003	0.3015	0.3788	0.5057	0.6982	0.4256	0.5432	
<b>5</b>	0.3279	0.7951	0.6736	0.5997	0.5996	0.4738	0.3591	0.6304	0.4516	0.5725	0.5515	
<b>6</b>	0.6696	0.7033	0.7563	0.5769	0.5998	0.7528	0.5007	0.5332	0.4189	0.8410	0.5977	
<b>7</b>	0.4556	0.7500	0.696	0.7702	0.8036	0.6807	0.4494	0.5789	0.4873	0.9925	0.6862	
<b>+gp</b>	0.4556	0.7500	0.696	0.7702	0.8036	0.6807	0.4494	0.5789	0.4873	0.9925		
<b>FBAR 4-6</b>	0.4201	0.7568	0.6585	0.6088	0.6332	0.5094	0.4128	0.5564	0.5229	0.613		

**Table 4.2.11 Flounder in Sub-divisions 24 and 25. Output from XSA: Stock number at age (thousands).**

Table 10 Stock number at age (start of year)		Numbers*10**-3										
YEAR	1978	1979	1980	1981	1982	1983	1984					
<b>Age 2</b>												
3	32058	28458	24510	30593	38473	27639	27351					
4	21066	25152	21035	19216	23752	28377	19436					
5	14192	12696	15111	12607	11687	14476	13541					
6	8946	8151	6959	7850	6816	6713	7857					
7	3376	5193	3002	3938	4492	2918	3599					
<b>+gp</b>	2117	2646	2826	3901	4081	2150	3070					
<b>TOTAL</b>	81755	82295	73442	78105	89301	82273	74854					
<b>YEAR</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>		
<b>Age 2</b>												
3	29688	26324	22151	32179	25981	34039	35265	37467	36910	45206		
4	19364	19431	17542	15682	21652	16636	22765	24471	29000	28459		
5	10919	11071	8824	9440	8098	8748	8118	11415	15483	18065		
6	6700	5522	4663	4313	3700	3793	4702	3764	6192	6217		
7	4120	4034	2734	2009	1687	1592	2031	2503	1630	2259		
<b>+gp</b>	2955	4005	2677	1989	1701	1589	1199	2716	893	1347		
<b>TOTAL</b>	73747	70387	58591	65612	62819	66397	74080	82335	90108	101553		
<b>YEAR</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004 ST</b>	<b>78-03 AMST</b>	<b>78-03</b>
<b>Age 2</b>												
3	35716	30612	31293	39646	43693	51282	54039	42382	18581	0	33337	34191
4	33095	21955	18949	19663	22860	28504	32916	34568	17088	11042	22486	22957
5	17917	12521	10416	8102	7992	13844	15979	16252	14080	9142	11757	12136
6	10655	6623	5226	4682	3642	4074	7915	6965	8471	6503	5796	6070
7	2606	4318	2545	2403	2104	1404	2022	3802	3751	2991	2678	2855
<b>+gp</b>	1246	3524	2870	960	2634	817	1149	1711	2474	1889		
<b>TOTAL</b>	101234	79553	71301	75456	82925	99926	114020	105681	64444	31566		

Table 4.2.12

## Flounder in Sub-divisions 24 and 25. Output from XSA: Summary.

Table 16 Summary (without SOP correction)

Run title : FLE04\_1

Terminal Fs derived using XSA (With F shrinkage)

YEAR	RECRUITS	TOTALBIOM	TOTSPBIOM	LANDINGS	YIELD/SSB	FBAR 4-6
	<b>Age 3</b>					
1978	32,058	27,000	26,346	4,960	0.1883	0.3350
1979	28,458	28,118	27,538	5,593	0.2031	0.5032
1980	24,510	25,121	24,621	5,058	0.2054	0.3787
1981	30,593	26,888	26,264	4,532	0.1726	0.3568
1982	38,473	29,421	28,636	6,002	0.2096	0.4327
1983	27,639	26,848	26,284	5,926	0.2255	0.4581
1984	27,351	25,714	25,156	5,554	0.2208	0.4419
1985	29,688	24,784	24,178	5,664	0.2343	0.3828
1986	26,324	24,401	23,864	6,404	0.2684	0.5857
1987	22,151	19,645	19,193	5,687	0.2963	0.5259
1988	32,179	20,129	19,472	5,762	0.2959	0.6454
1989	25,981	19,260	18,730	6,632	0.3541	0.6361
1990	34,039	19,608	18,914	4,607	0.2436	0.4544
1991	35,265	21,811	21,092	5,374	0.2548	0.4965
1992	37,467	25,178	24,413	4,121	0.1688	0.4355
1993	36,910	27,812	27,088	5,745	0.2121	0.5980
1994	45,206	29,335	28,399	8,493	0.2991	0.4201
1995	35,716	34,109	33,341	12,603	0.3780	0.7568
1996	30,612	27,386	27,386	10,516	0.3840	0.6585
1997	31,293	22,875	22,237	8,667	0.3898	0.6088
1998	39,646	21,294	20,249	8,589	0.4242	0.6332
1999	43,693	23,426	22,653	7,166	0.3163	0.5094
2000	51,282	27,899	26,883	7,465	0.2777	0.4128
2001	54,039	28,808	28,808	9,747	0.3383	0.5564
2002	42,382	25,128	23,043	12,147	0.5271	0.5229
2003	18,581	21,760	21,416	8,503	0.3970	0.6130
<b>Arith. Mean</b>	33,905	25,145	24,469	6,981	0.2879	0.5138
<b>Units</b>	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)		

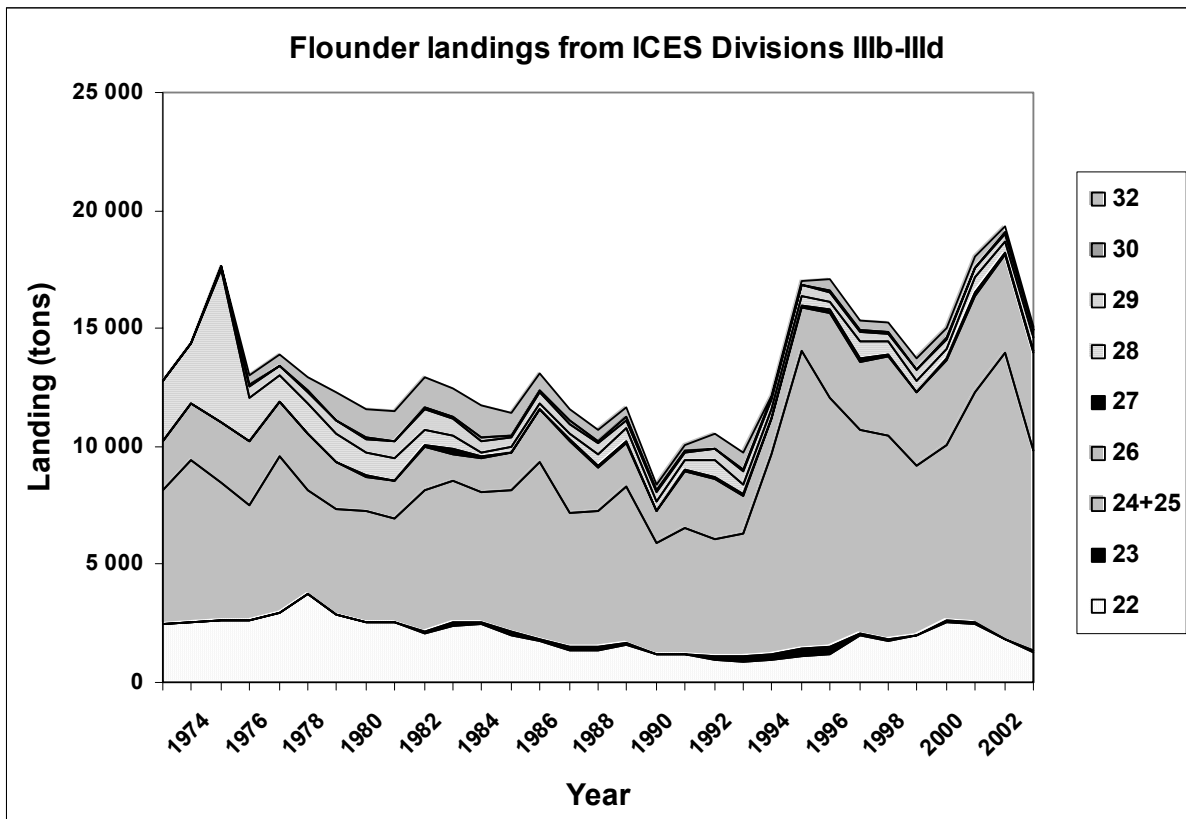


Figure 4.1 Flounder in the Baltic Sea.

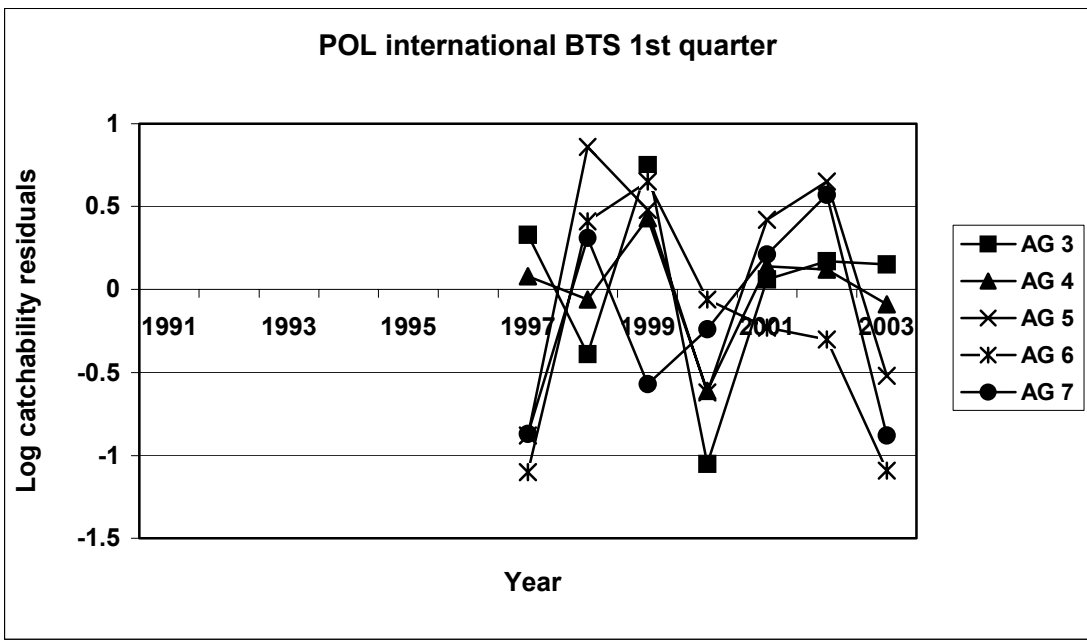
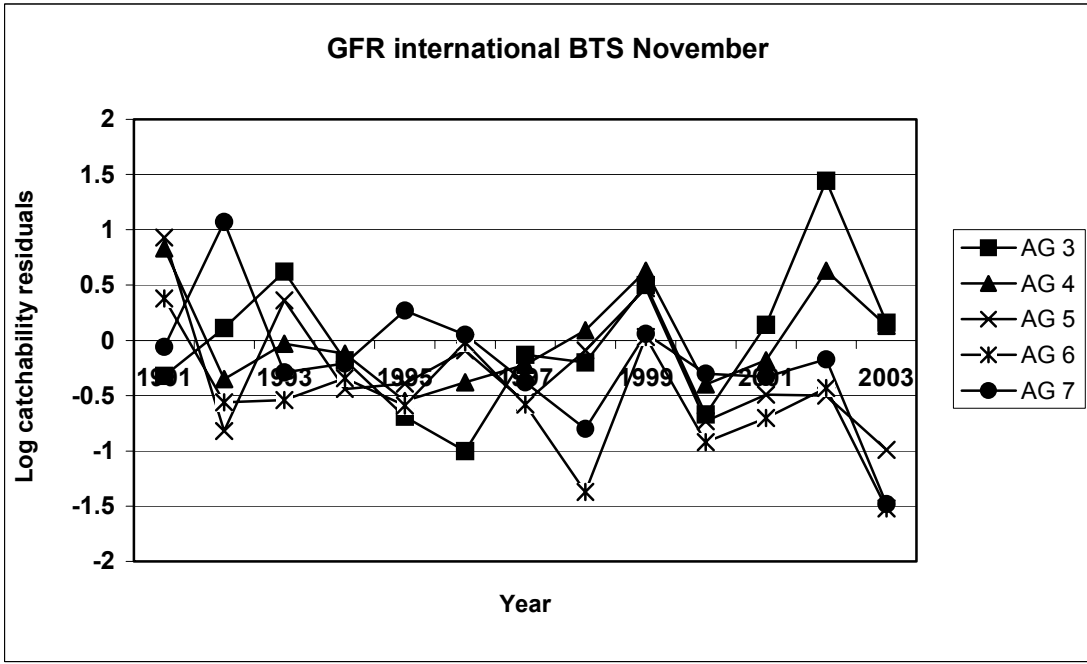
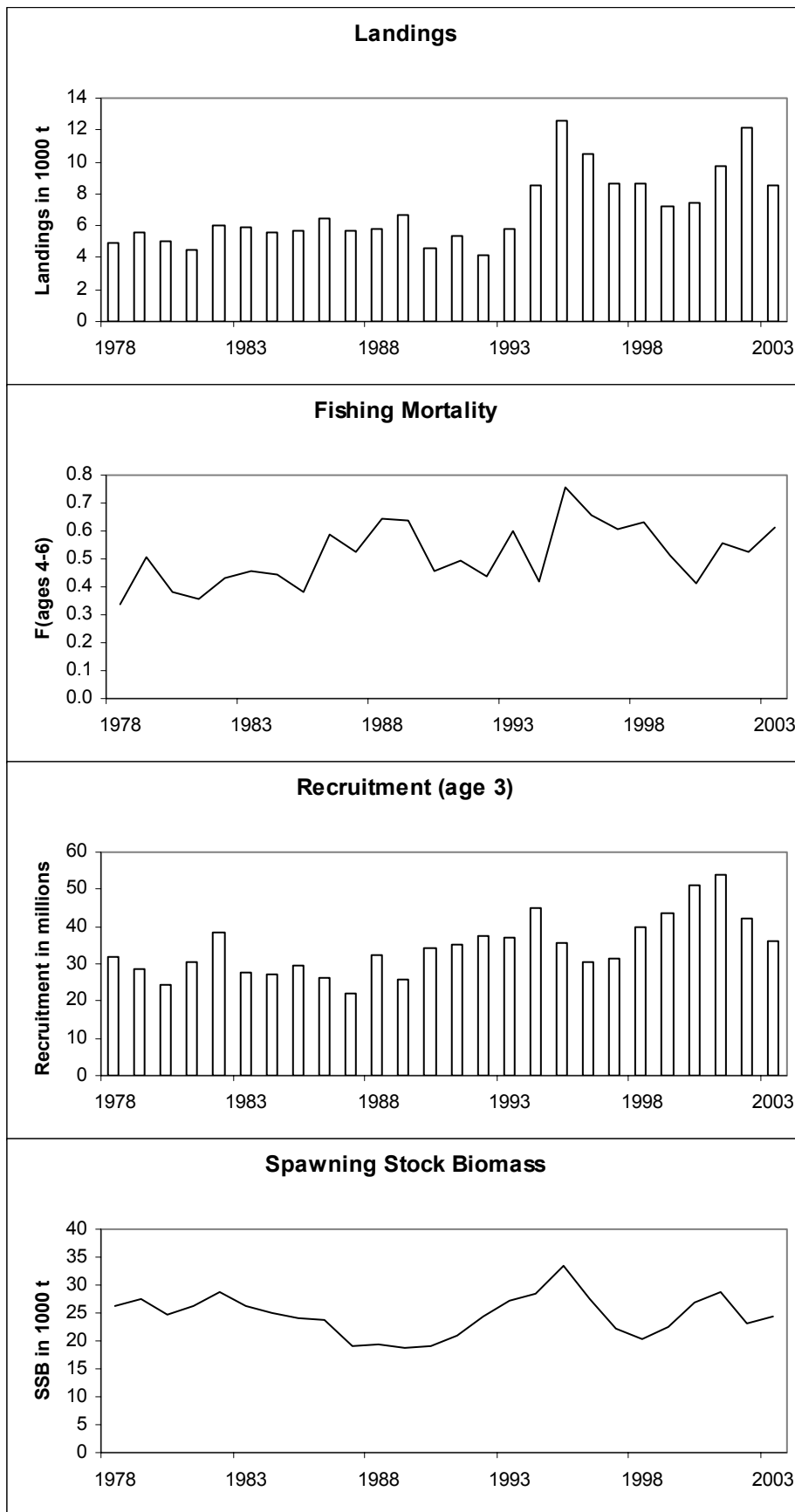


Figure 4.2.1 Flounder in SD 24+25: Log catchability residuals.



**Figure 4.2.2 Flounder in Sub-divisions 24 and 25. Stock trends.**

continued

Figure 4.2.2 Flounder in Sub-divisions 24 and 25. Stock trends.

