



SECOND AMENDMENT TO

REPORT OF THE BALTIC FISHERIES ASSESSMENT WORKING GROUP

ICES Headquarters, Copenhagen, Denmark

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International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

Palægade 2–4 DK-1261 Copenhagen K Denmark

Table 8.2.12

STOCK SUMMARY

Year	Recruits x10 ⁶	Total B tonnes	Spawn B tonnes	Landings 1000 tonnes	Yld/SSB	Ref. F Fbar 3- 6
1982	52618.	3102539.	1456802.	311.	.2136	.1464
1983	43310.	2875249.	1545035.	302.	.1955	.2001
1984	46424.	2693204.	1466120.	290.	.1977	.2175
1985	33404.	2410205.	1419940.	289.	.2039	.2180
1986	15426.	1999365.	1307225.	268.	.2052	.2765
1987	31694.	1964229.	1170969.	252.	.2152	.2373
1988	11614.	1838522.	1230249.	286.	.2325	.2385
1989	17813.	1765598.	1069765.	290.	.2739	.3065
1990	26316.	1756941.	996127.	244.	.2450	.2707
1991	19283.	1662337.	975452.	213.	.2184	.2423
1992	28406.	1667383.	1023660.	210.	.2130	.2297
1993	24881.	1733922.	1099811.	231.	.2100	.2236
1994	17809.	1724786.	1155945.	243.	.2102	.2297
1995	29121.	1643050.	1065630.	217.	.2035	.2145

PARAMETER ESTIMATES +/- SD

Separable Model: Reference F by year

1	1991	.2518	.2075	.3056
2	1992	.2387	.1955	.2915
3	1993	.2323	.1884	.2865
4	1994	.2387	.1898	.3003
5	1995	.2229	.1714	.2898

Separable Model: Selection (S) by age

6	1	.1735	.1408	.2139
7	2	.4701	.3904	.5661
8	3	.7782	.6577	.9207
9	4	.9134	.7830	1.0655
	5	1.0000	Fixed : Reference age	
10	6	1.1580	1.0175	1.3179
11	7	1.1266	.9924	1.2789
	8	1.0000	Fixed : last true age	

Separable Model: Populations in year 1995

12	1	29121480.	20276861.	41824059.
13	2	13440838.	10110260.	17868594.
14	3	13620225.	10763561.	17235052.

8.6 BALTIC HERRING - HUMAN CONSUMPTION AND INDUSTRIAL FISHERIES

8.6.1 General

Directed Baltic herring fishery is mainly conducted by pelagic trawls, bottom trawls, trapnets and gillnets. Baltic herring is also caught as a by-catch in sprat fisheries and cod trawl fisheries. The total catches have been about 350,000 tonnes in recent years in the Baltic Main Basin including Gulf of Riga, Gulf of Finland and Gulf of Bothnia. The catches are used for human consumption, industrial purposes and animal fodder.

IBSFC set the TAC for Baltic herring for the entire Baltic in 1996 to a level of 650,000 tonnes and this level has been agreed for the years 1995 and 1996. In 1994 the agreed TAC was 560,000 tonnes for the entire Baltic.

Baltic herring TACs have seldom been fully utilised. Practically none of the countries round the Baltic have fully utilised their herring fishing possibilities in various management areas and in 1994 only half of the agreed TAC was utilised.

Industrial fisheries for Baltic herring are conducted mainly by trawls, but in many countries round the Baltic industrial fishery is not conducted. As such, industrial fisheries for Baltic herring are at present rather limited in the Baltic Sea area and industrial catches amount to about 10–15% of the total catches annually.

8.6.2 Data on Baltic herring landings for human consumption and industrial purposes on stock basis

Baltic herring is assessed in four stock units, i.e. the western Baltic (SD 22–24) and Division IIIa, the Baltic Main Basin (SD 25–29) and the Gulf of Finland (SD 32) including the Gulf of Riga, the Bothnian Sea (SD 30) and the Bothnian Bay (SD 31).

The data from the human consumption fisheries are available from all these areas and some information from industrial landings in SD 22–24 and IIIa, in SD 25–29 and 32 and in SD 30 and 31. The industrial fisheries are conducted at least in the western Baltic and IIIa and in the Baltic Main Basin. In the northern part of the Baltic variable amounts of catches are used for other purposes than human consumption, i.e. as animal fodder.

In the western Baltic (SD 22 and 24) the catches have been about 65,000 tonnes in the last five years. The information of the share of industrial catches is limited and their amount is not known precisely.

In the Baltic Main Basin and the Gulf of Finland the total catches have been about 250,000 tonnes in recent years. Sweden has reported that their total catches in 1995 were 47,000 tonnes (Table 8.6.1), of which 39,000 tonnes were industrial fishery and Finland reported industrial fishery catches of about 28,000 tonnes in 1995 out of a total of 36,000 tonnes catch. No other information was available to the Working Group.

In the management unit three (MU3), there were Finnish data available from 1985–1995 reporting catches in tonnes to human consumption and animal fodder. Data also include catch in numbers by various gears (Tables 8.6.2 and 8.6.3). Swedish industrial catches in this area are insignificant.

8.6.3 Fishing mortalities for the two types of landings and short- and medium-term effects of present exploitation pattern on Baltic herring stocks

The Working Group was not in a position to make any analytical assessments and estimate the partial fishing mortality rates for these two different types of landings because of the lack of detailed information on stock basis.

On the other hand the length distributions available from the Swedish fishery do not show bigger difference between human consumption landings and industrial landings by quarters (Figures 8.6.1 and 8.6.2). These data show that the main body of industrial catches is composed by 2–4 years old herring, but in practice all age groups are well represented and no difference between fisheries is observed (Figures 8.6.1 and 8.6.2). As a conclusion, it could be expected that the fishing mortality rate is proportional to the catches in tonnes for human consumption and industrial purposes, respectively.

The Finnish data available from Sub-divisions 30 and 31 stocks show that, also in these areas, industrial landings consist of many age groups, but the main body of landings is taken as age 2 to 4, although differences between various gears exist. Trapnet fishery is mainly a spawning fishery and thus exploits the mature component of the stock. Pelagic trawl fishery usually exploits a younger part of the stock than trapnets and bottom trawl (Tables 8.6.2 and 8.6.3).

Figures 8.6.3 and 8.6.4 give the information of the amount of the landings used for industrial purposes (animal fodder) and the share of catch in numbers taken by various gears.

The short- and medium-term effects of the present exploitation pattern on Baltic herring stocks are given in the corresponding sections in this Working Group Report. However, knowing that the exploitation rate of Baltic herring stocks in Sub-divisions 25–29 and 32 (including Gulf of Riga) is well inside safe biological limits as are the northern stocks in SD 30 and 31, the present amount of industrial catches taken (or catches used for other purposes than human consumption) do not have any major effects on Baltic herring stocks.

8.6.4 Possible effects of present Baltic herring fishery on other fish stocks managed by IBSFC

The present Baltic herring fishery may have some effects on Baltic sprat stock, because herring and sprat are caught in mixed fisheries and the avoidance of mixed catches is in practice very difficult. The bottom trawl fishery for Baltic herring may have some effects on cod stocks and flatfish stocks, because both cod (including undersized cod) and flatfishes are caught as by-catches. Pelagic herring trawls may catch Baltic salmon as a by-catch in the Main Basin and the northern Baltic, but the amount of these by-catches is not known at present. The evaluation of the effects of Baltic herring fishery on other stocks managed by IBSFC is at present not possible due to the limited amount of information.

Table 8.6.1 Swedish herring catches in 1995.

HERRING 1995

SWEDEN

Total Catches (ton)

SD	Year	Q - I	Q - II	Q - III	Q - IV
19	4180	0	1191	1251	1738
20	48497	8492	10369	22625	7011
21	30774	5013	4498	13206	8057
Sum 19-21	83451	13505	16058	37082	16806
23	235	0	0	28	207
24	15787	3759	3446	5659	2923
Sum 23-24	16022	3759	3446	5687	3130
25	15522	2911	7199	2762	2650
26	1796	1264	340	1	191
27	17680	12701	911	79	3989
28	9330	4795	654	414	3467
29	2878	713	394	525	1246
Sum 25-29	47206	22384	9498	3781	11543
30	2333	566	1010	348	409
31	547	2	116	182	247
Sum 30-31	2880	568	1126	530	656
Sum	149559	40216	30128	47080	32135

ConsumeCatches (ton)

Quarterly factors applied:

SD	Year	Q - I	Q - II	Q - III	Q - IV
19	3822	0	1042	1200	1580
20	21106	5774	4189	7148	3995
21	8898	1785	731	2380	4002
Sum 19-21	33826	7559	5962	10728	9577
23	235	0	0	28	207
24	8215	2127	2468	1686	1934
Sum 23-24	8450	2127	2468	1714	2141
25	6390	791	2535	1366	1698
26	63	62	0	1	0
27	967	457	282	43	185
28	140	121	19	0	0
29	278	101	167	3	7
Sum 25-29	7838	1532	3003	1413	1890
30	1964	391	820	346	407
31	284	2	116	96	70
Sum 30-31	2248	393	936	442	477
Sum	52362	11611	12369	14297	14085

Industrial Catches (ton)

SD	Year	Q - I	Q - II	Q - III	Q - IV
19	358	0	149	51	158
20	27391	2718	6180	15477	3016
21	21876	3228	3767	10826	4055
Sum 19-21	49625	5946	10096	26354	7229
23	0				
24	7572	1632	978	3973	989
Sum 23-24	7572	1632	978	3973	989
25	9132	2120	4664	1396	952
26	1733	1202	340	0	191
27	16713	12244	629	36	3804
28	9190	4674	635	414	3467
29	2600	612	227	522	1239
Sum 25-29	39368	20852	6495	2368	9653
30	369	175	190	2	2
31	263	0		86	177
Sum 30-31	632	175	190	88	179
Sum	97197	28605	17759	32783	18050

Table 8.6.2 Catch in numbers and by different types of fisheries and catch in tonnes for human and industrial purposes in SD 30.

Catch in tonnes for human consumption and industrial purposes

Year	caton	hum caton	ind caton
1985	26120	5624	20496
1986	26489	6006	20483
1987	24520	5883	18637
1988	27650	6762	20888
1989	28658	7701	20957
1990	31282	10841	20441
1991	26219	11190	15029
1992	39310	10948	28362
1993	40179	11319	28860
1994	56380	13096	43284
1995	53797	9145	44652

Trapnet hum	1	2	3	4	5	6	7	8	9	10
1985	0	6	10	13	3	5	1	1	1	3
1986	0	6	18	9	7	2	2	0	0	1
1987	0	2	12	19	8	6	3	1	1	1
1988	0	4	3	9	13	6	4	1	1	1
1989	0	1	11	3	8	7	4	2	1	0
1990	0	14	6	14	3	8	9	3	2	1
1991	0	8	24	4	7	3	5	4	2	1
1992	0	4	15	11	4	4	2	2	1	0
1993	0	6	9	15	11	3	3	2	1	0
1994	0	7	9	7	12	10	2	3	1	1
1995	0	1	5	3	3	4	2	0	1	0

Trapnet ind	1	2	3	4	5	6	7	8	9	10
1985	3	20	35	46	10	18	3	4	5	10
1986	0	21	61	31	25	7	7	2	1	2
1987	0	6	36	58	26	20	9	3	2	2
1988	0	13	8	28	41	20	13	4	3	2
1989	0	3	27	7	19	19	9	5	2	1
1990	2	25	10	25	6	13	16	6	3	2
1991	0	11	31	5	9	4	6	5	3	1
1992	1	10	37	27	9	9	6	6	3	1
1993	2	15	22	34	27	7	7	5	1	1
1994	0	18	23	18	32	26	5	8	3	2
1995	0	6	23	16	14	18	11	2	3	1

Bottom t. hum	1	2	3	4	5	6	7	8	9	10
1985	0	1	2	1	1	0	0	0	0	0
1986	0	2	2	2	2	1	1	0	0	0
1987	0	2	4	4	1	1	1	0	0	0
1988	0	5	1	4	3	1	1	0	0	0
1989	0	4	7	1	6	4	1	1	0	0
1990	0	25	4	9	2	6	6	3	1	0
1991	0	30	29	5	11	6	10	5	2	1
1992	0	17	38	25	6	5	7	4	2	1
1993	0	24	16	29	23	5	6	4	3	1
1994	0	33	26	16	24	22	5	7	3	1
1995	0	7	15	11	8	9	6	1	2	1

Bottom t. ind	1	2	3	4	5	6	7	8	9	10
1985	3	4	6	3	3	2	0	1	0	2
1986	1	7	8	7	6	3	2	1	1	1
1987	8	5	13	13	4	2	2	1	1	0
1988	2	14	4	11	9	3	2	1	0	1
1989	17	10	17	3	14	10	4	2	1	1
1990	27	44	6	15	4	11	11	4	1	1
1991	19	39	38	7	14	8	13	6	3	2
1992	32	43	97	62	14	14	17	11	5	2
1993	56	55	38	67	53	11	13	8	6	3
1994	27	87	69	43	64	59	13	18	8	4
1995	9	35	72	54	39	45	30	6	10	3

Pelagic t. hum	1	2	3	4	5	6	7	8	9	10
1985	0	57	24	11	5	4	1	1	1	2
1986	0	63	39	16	8	4	3	0	0	2
1987	0	6	25	21	9	5	3	1	1	1
1988	0	30	7	24	20	9	4	2	1	1
1989	0	12	28	6	18	15	7	3	2	1
1990	0	79	8	12	4	12	13	5	2	1
1991	0	51	56	11	14	8	10	8	4	1
1992	0	35	53	33	7	7	6	5	3	2
1993	0	55	22	31	22	4	5	2	2	1
1994	0	54	49	31	46	37	5	8	3	3
1995	0	14	31	28	21	35	24	5	7	2

Pelagic t. ind	1	2	3	4	5	6	7	8	9	10
1985	79	202	84	37	19	15	4	2	4	9
1986	12	214	130	55	28	12	9	1	1	8
1987	22	18	76	66	29	16	9	4	3	2
1988	4	91	23	73	62	28	13	6	3	3
1989	81	31	71	16	47	38	18	7	5	2
1990	146	137	15	21	6	21	22	8	4	2
1991	26	66	73	14	18	11	13	10	5	1
1992	38	87	134	83	17	17	15	13	7	5
1993	124	126	51	72	51	9	11	6	4	2
1994	46	145	132	83	122	101	14	21	8	8
1995	37	69	148	133	102	170	115	25	34	11

total canum	1	2	3	4	5	6	7	8	9	10
1985	85	297	163	114	40	46	11	10	13	27
1986	12	316	260	121	77	30	24	5	5	14
1987	30	38	168	184	80	52	27	10	7	7
1988	6	157	47	149	149	68	37	14	8	8
1989	98	63	170	39	117	97	45	20	12	5
1990	175	344	52	102	26	75	82	30	14	9
1991	46	209	256	47	75	41	58	39	19	7
1992	70	200	383	246	57	57	53	43	22	11
1993	182	300	170	264	200	41	48	30	18	9
1994	73	348	312	199	304	257	44	64	28	19
1995	46	134	297	247	189	283	191	39	58	18

Table 8.6.3 Catch in numbers and by different types of fisheries and catch in tonnes for human and industrial purposes in SD 31.

Catch in tonnes for human consumption and industrial purposes

Year	caton	ind caton	hum caton
1985	9321	7314	2007
1986	9090	7029	2061
1987	8108	6163	1945
1988	8768	6624	2144
1989	4437	3245	1192
1990	7818	5108	2710
1991	6800	3898	2902
1992	6540	4719	1821
1993	9167	6585	2582
1994	4476	3276	1200
1995	3780	3137	643

Trapnet hum	1	2	3	4	5	6	7	8	9	10
1985	0	2	3	1	0	1	0	0	0	0
1986	0	1	1	2	0	0	1	0	0	0
1987	0	1	1	1	2	0	0	0	0	0
1988	0	1	0	0	1	1	0	0	0	0
1989	0	0	1	0	0	0	0	0	0	0
1990	0	3	0	1	0	0	1	0	0	0
1991	0	2	4	0	0	0	0	0	0	0
1992	0	1	1	1	0	0	0	0	0	0
1993	0	0	1	1	2	0	0	0	0	0
1994	0	3	1	1	1	1	0	0	0	0
1995	0	1	1	0	0	0	0	0	0	0

Trapnet ind	1	2	3	4	5	6	7	8	9	10
1985	0	5	11	3	1	3	0	1	0	1
1986	1	2	4	6	1	1	2	0	0	0
1987	0	2	2	3	5	1	1	1	0	0
1988	0	4	1	1	2	2	0	0	0	0
1989	0	1	2	1	0	1	1	0	0	0
1990	2	5	1	2	1	1	1	1	0	0
1991	0	2	6	0	0	0	0	0	0	0
1992	0	1	2	2	0	0	0	0	0	0
1993	1	1	2	3	4	1	0	0	0	0
1994	0	7	3	1	3	2	0	0	0	0
1995	0	5	5	1	1	1	1	0	0	0

Bottom t. hum	1	2	3	4	5	6	7	8	9	10
1985	0	6	12	2	2	4	1	0	0	1
1986	0	2	7	9	1	2	4	0	1	1
1987	0	6	5	6	6	1	2	1	1	0
1988	0	7	4	3	6	5	1	1	1	1
1989	0	1	4	2	2	3	2	1	0	0
1990	0	28	1	6	2	2	4	3	1	1
1991	0	8	24	1	6	3	3	3	2	1
1992	0	3	9	17	1	2	2	2	1	0
1993	0	13	5	10	16	1	1	1	1	1
1994	0	7	7	3	4	6	0	0	0	0
1995	0	2	4	2	1	2	2	0	0	0

Bottom t. ind	1	2	3	4	5	6	7	8	9	10
1985	1	22	43	8	9	15	3	1	1	5
1986	7	8	24	31	5	7	13	1	2	3
1987	13	20	15	19	19	4	5	4	2	1
1988	7	21	14	10	18	17	4	3	3	2
1989	7	3	10	5	5	8	6	2	1	1
1990	11	52	2	10	4	4	7	6	1	1
1991	1	10	32	2	8	4	4	4	3	1
1992	14	7	23	43	3	5	5	5	3	1
1993	17	31	11	26	40	4	4	3	2	2
1994	11	19	18	7	11	16	1	1	0	0
1995	33	7	18	11	3	7	8	1	1	1

Pelagic t. hum	1	2	3	4	5	6	7	8	9	10
1985	0	6	6	1	0	1	0	0	0	0
1986	0	2	4	5	1	1	2	0	0	0
1987	0	1	2	2	3	1	1	0	0	0
1988	0	1	1	2	2	2	0	1	0	0
1989	0	1	2	1	1	1	1	0	0	0
1990	0	11	1	2	1	2	2	1	0	0
1991	0	5	14	1	2	1	1	1	1	0
1992	0	2	3	6	0	1	1	1	1	0
1993	0	3	2	4	9	1	1	0	0	0
1994	0	1	1	0	1	3	0	1	0	0
1995	0	0	1	0	0	0	0	0	0	0

Pelagic t. ind	1	2	3	4	5	6	7	8	9	10
1985	6	23	21	3	2	4	1	1	0	1
1986	0	7	14	18	3	3	6	1	1	1
1987	1	4	5	8	9	2	2	1	1	1
1988	0	3	4	5	6	6	1	2	1	0
1989	4	2	4	1	2	3	3	1	0	0
1990	2	20	2	4	2	3	4	2	1	1
1991	1	6	18	1	3	1	1	2	1	0
1992	1	5	8	15	1	3	2	2	2	1
1993	1	6	4	9	21	2	2	1	1	1
1994	0	2	2	1	3	8	1	2	1	1
1995	6	1	3	2	1	2	1	0	0	0

total canum	1	2	3	4	5	6	7	8	9	10
1985	8	64	97	17	15	29	5	3	2	10
1986	8	22	54	72	12	14	27	4	4	5
1987	14	35	29	40	44	9	11	8	4	3
1988	7	38	25	21	33	34	6	7	5	3
1989	10	9	23	11	11	16	14	4	2	2
1990	15	121	8	26	12	13	21	14	3	4
1991	2	33	98	6	20	9	10	10	8	2
1992	15	21	48	85	6	11	11	10	7	2
1993	19	56	24	55	94	10	9	7	5	4
1994	11	40	34	13	24	36	3	4	2	1
1995	38	19	35	18	6	14	14	2	2	1

Figure 8.6.1 Swedish industrial catches by quarter according to length and age.

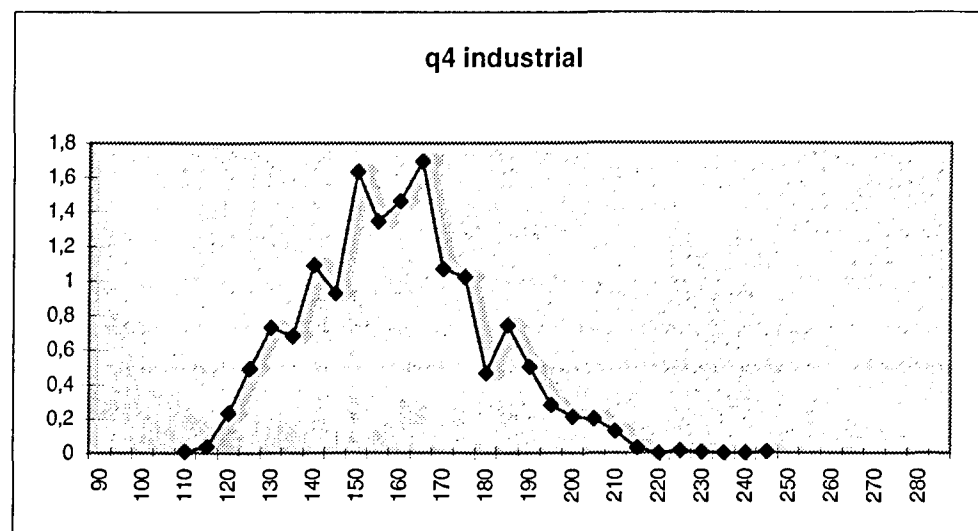
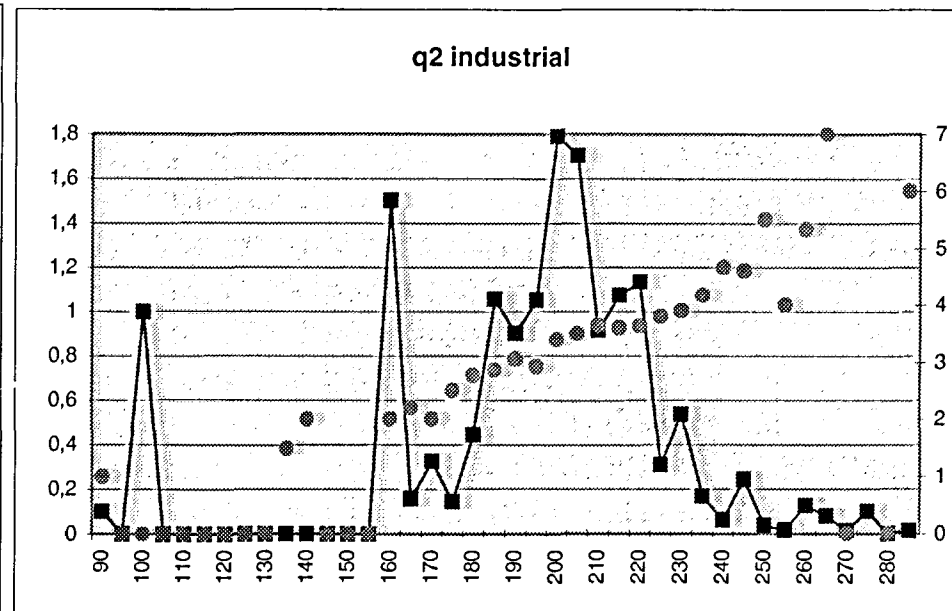
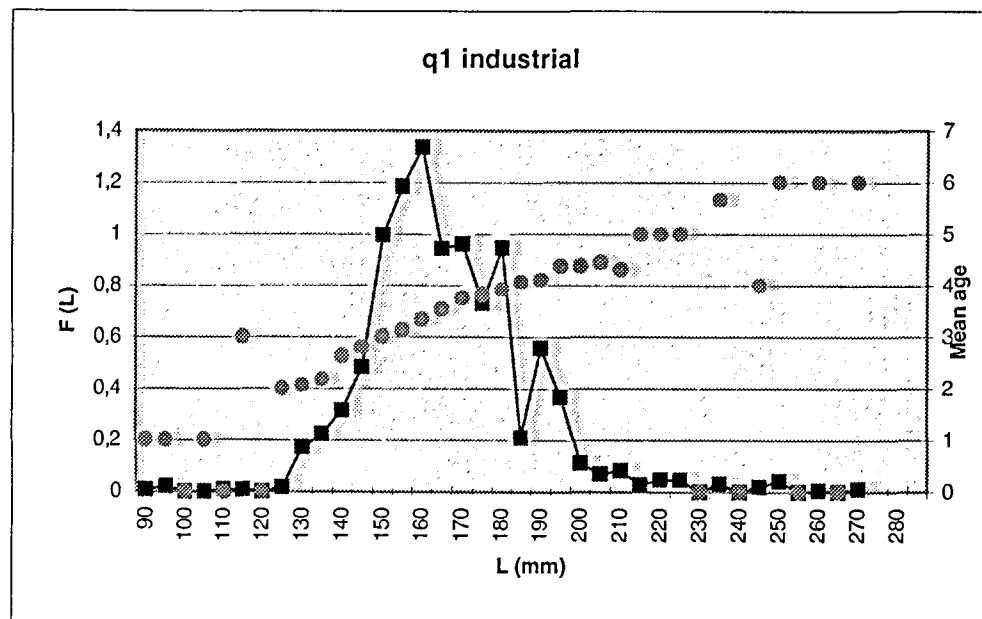


Figure 8.6.2 Swedish human consumption catches by quarter according to length and age.

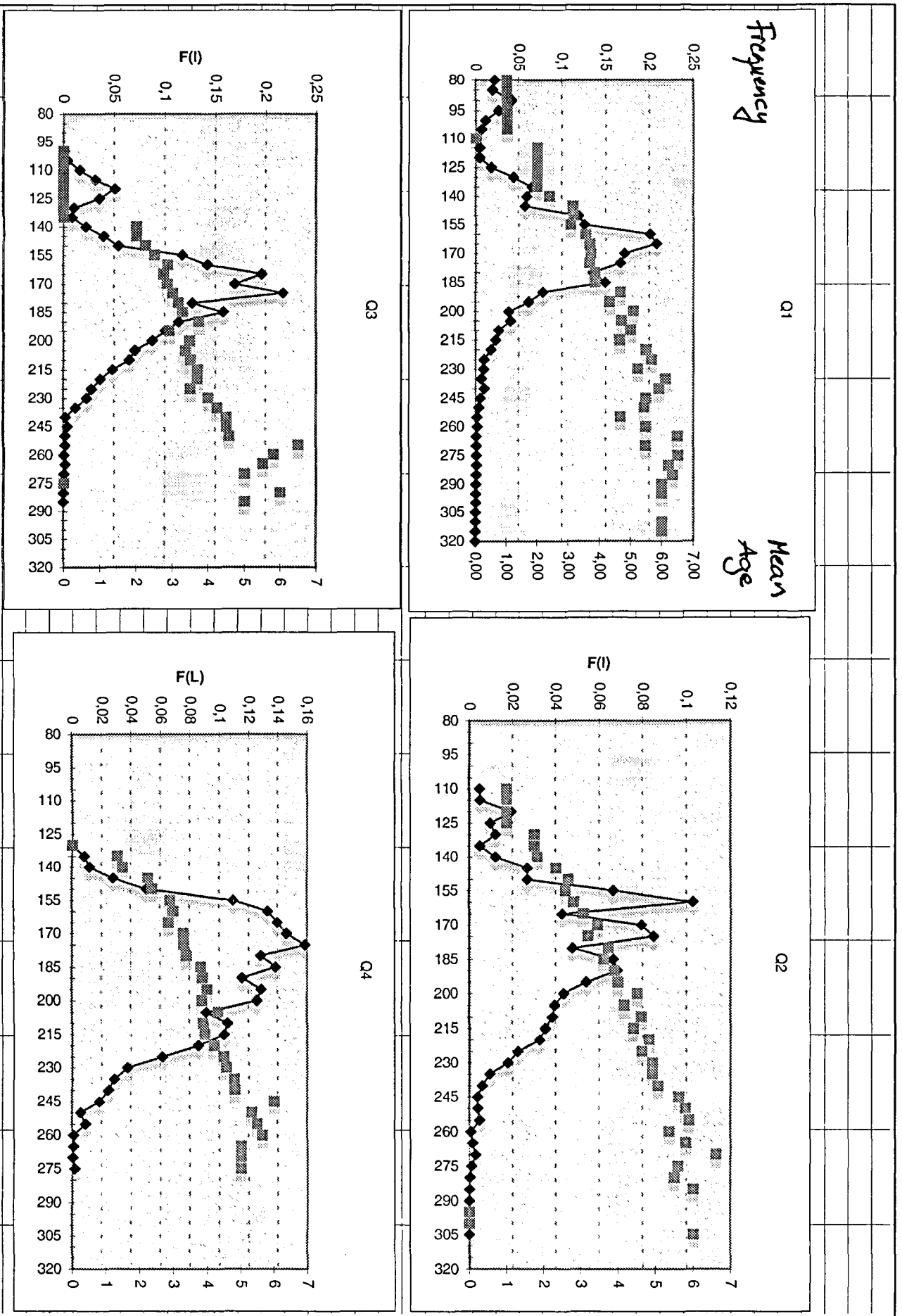


Figure 8.6.3

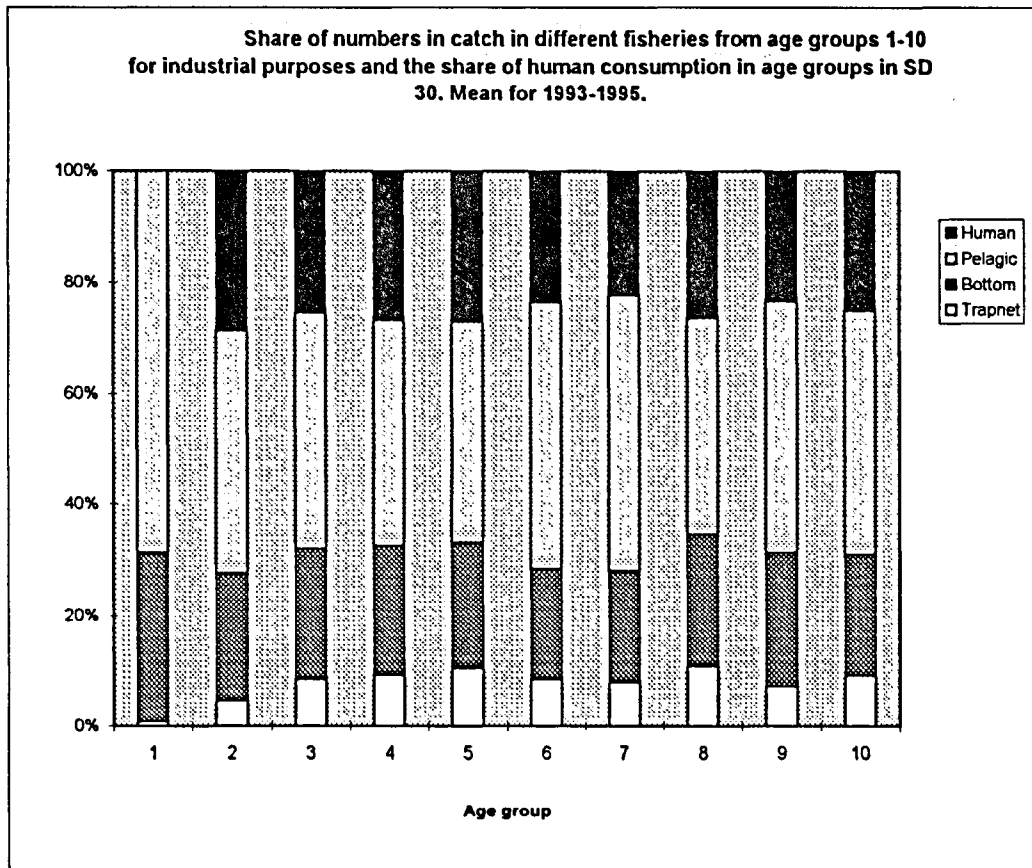
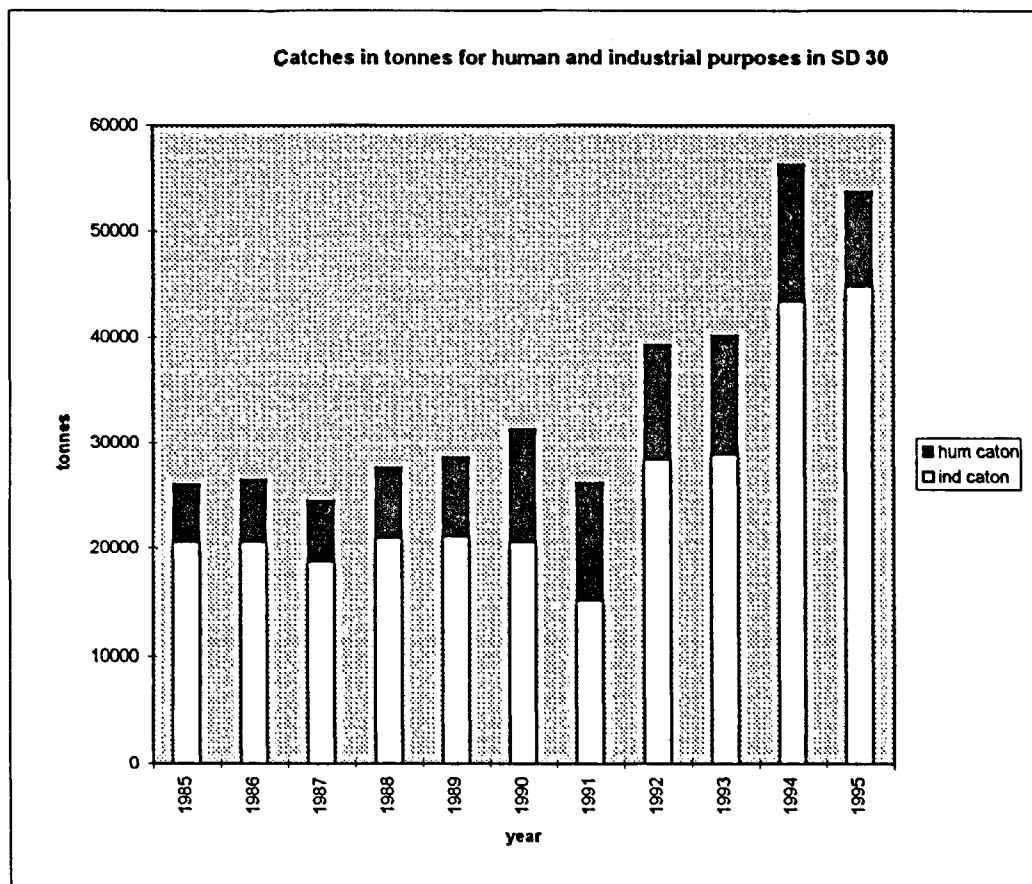


Figure 8.6.4

