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PART 2

REPORT OF THE NORTH SEA ROUNDFISH WORKING GROUP

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Table 20.1 Nominal catch (in tonnes) of WHITING in Division VIb, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
Denmark	-	-	...[2]	-	-	-	-	-[1]	-	...[2]
France	-	-	3	-	-	-	3	2	...[1,2]	...[2]
Germany, Fed.Rep.	-	-	-	-	-	-	-	-	-	...
Ireland	1	-	-	-	-	-	-	-	-	-
Spain	-	-	-	196	112	88	16	123	-	...
UK(Engl. & Wales)	5	1	+	-	-	+	2	+	5	1
UK(Scotland)	24	2	59	+	-	5	25	6	13	108
Total	30	3	62	196	112	93	46	131	18	109

[1] Provisional.
[2] Included in Division VIa.

Table 21.1.1 Nominal catch (in tonnes) of WHITING in Divisions VIId,e, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	85	92	85	102	101
Denmark	1	2,585	6	2	-
France	8,010	5,352	7,690	8,842	8,051
Ireland	12	-	13	-	-
Netherlands	2	1	2	2	70
UK (England & Wales)	1,038	930	839	1,136	1,222
Total	9,148	8,960	8,635	10,084	9,444

Country	1983	1984	1985	1986	1987[1]
Belgium	94	83	84	67	131
Denmark	-	-	-[1]	-	-
France	5,708	7,239	8,107	11,706[1,2]	11,018[2]
Ireland	-	-	-	-	-
Netherlands	399	-	-	124	-
UK (England & Wales)	1,210	811	604	809	995
Total	7,411	8,133	8,795	12,706	12,144

[1] Provisional.
[2] Includes all of Sub-areas VII (except Division VIIa) and VIII.

Table 21.1.2 Annual weight and numbers of whiting caught in Divisions VIId,e beteen 1978-1987.

	Weight (1000 tonnes)				Number (millions)			
Year	Total	H.Con	Disc	By-cat	Total	H.Con	Disc	By-cat
1978	9	9	0	0	37	37	0	0
1979	9	9	0	0	34	34	0	0
1980	9	9	0	0	32	32	0	0
1981	10	10	0	0	39	39	0	0
1982	9	9	0	0	39	39	0	0
1983	7	7	0	0	29	29	0	0
1984	8	8	0	0	35	35	0	0
1985	7	7	0	0	32	32	0	0
1986	8	8	0	0	31	31	0	0
1987	8	8	0	0	32	32	0	0

Table 21.1.3 Values of natural mortality rate and proportion mature at age.

Age	Nat Mor	Mat.
0	0.200	0.000
1	0.200	0.000
2	0.200	1.000
3	0.200	1.000
4	0.200	1.000
5	0.200	1.000
6	0.200	1.000
7	0.200	1.000

Table 21.1.4 Total international catch at age ('000) of whiting in Divisions VIId,e between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
0	96			14		2	3	141		4	0
1	19882	16254	8839	3096	7791	4860	3642	1560	382	3236	1
2	11976	12217	17649	12090	13022	14131	15539	15468	5704	11148	2
3	4541	3305	4553	11265	13632	6964	11384	12074	14290	4028	3
4	713	2006	659	7967	2652	2479	2402	1848	8577	12340	4
5	66	225	94	2702	1085	647	1368	661	1313	896	5
6	13	13	4	808	375	110	384	100	352	418	6
7		1		658	104	43	24	17	86	71	7

Table 21.1.5 Total international mean weight at age (Kg.) of whiting in Divisions VIId,e between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
0	0.210			0.180		0.532	0.156	0.137		0.123	0
1	0.218	0.215	0.232	0.171	0.171	0.197	0.157	0.170	0.171	0.187	1
2	0.258	0.279	0.273	0.242	0.208	0.232	0.203	0.182	0.201	0.218	2
3	0.304	0.351	0.320	0.264	0.281	0.287	0.265	0.270	0.236	0.296	3
4	0.434	0.366	0.390	0.287	0.347	0.346	0.353	0.338	0.272	0.294	4
5	0.786	0.515	0.536	0.301	0.407	0.380	0.285	0.319	0.321	0.373	5
6	1.039	1.068	1.184	0.391	0.421	0.445	0.314	0.380	0.343	0.324	6
7		0.496		0.363	0.415	0.448	0.450	0.578	0.448	0.364	7

Table 21.1.6 Total international fishing mortality rate at age of whiting in Divisions VIId,e between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
0	0.001			0.000		0.000	0.000	0.003		0.000	0
1	0.414	0.303	0.189	0.089	0.171	0.085	0.046	0.090	0.012	0.116	1
2	0.726	0.486	0.630	0.424	0.642	0.527	0.423	0.281	0.540	0.529	2
3	0.655	0.448	0.336	1.136	1.266	0.880	1.128	0.689	0.455	0.949	3
4	1.273	0.691	0.149	1.795	0.940	0.842	0.902	0.541	1.868	0.926	4
5	1.285	3.375	0.059	1.547	1.799	0.630	2.076	0.681	0.966	1.222	5
6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	6
7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	7

Table 21.1.7 Stock numbers at age ('000) of whiting in Divisions VIId,e between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
0	83406	69034	48953	66771	80128	108197	24417	44933	39751	56974	0
1	64246	68200	56520	40080	54655	65603	88583	19988	36661	32546	1
2	25293	34763	41229	38315	30022	37729	49327	69238	14958	29670	2
3	10312	10018	17514	17977	20525	12940	18236	26447	42780	7140	3
4	1070	4385	5239	10249	4728	4739	4394	4833	10869	22213	4
5	99	245	1798	3695	1395	1512	1672	1459	2303	1374	5
6	22	22	7	1388	644	189	659	172	604	718	6
7		2		1130	179	74	41	29	148	122	7

Table 21.1.8 **Whiting in Divisions VIId,e. Output from program RCRTINX2.**

Yearclass = 1985

Survey/ Series	Index Value	Slope	Inter- cept	Rsquare	No. Pts	Predicted Value	Sigma	Standard Error	Weight
IYFS	6.1247	7.616	-40.096	0.0096	9	6.5467	4.62765	4.99184	0.00436
EGFS	5.0291	1.901	-6.396	0.2449	9	3.1647	0.80087	0.89131	0.13687
DGFS	5.9532	4.477	-24.109	0.0287	6	2.5460	3.27735	3.60899	0.00835
SGFS	4.7185	0.000	0.000	0.0000	0	0.0000	0.00000	0.00000	0.00000
EGFS0	5.3033	1.969	-6.684	0.0870	8	3.7556	1.58010	1.68194	0.03844
DGFS0	6.7551	0.599	0.260	0.4473	5	4.3060	0.71414	0.80267	0.16877
IYFS2	6.3008	8.475	-43.065	0.0135	9	10.3351	3.90421	4.80783	0.00470
VPAIV	8.4000	3.342	-22.451	0.0800	9	5.6220	1.54662	1.74622	0.03566
MEAN						3.9857	0.42470	0.42470	0.60284

Yearclass = 1986

Survey/ Series	Index Value	Slope	Inter- cept	Rsquare	No. Pts	Predicted Value	Sigma	Standard Error	Weight
IYFS	6.5073	24.923	-141.063	0.0009	10	21.1181	14.55056	16.58197	0.00034
EGFS	5.4350	1.723	-5.384	0.2919	10	3.9810	0.69803	0.73474	0.17514
DGFS	7.6034	3.729	-19.320	0.0426	7	9.0365	2.46875	3.50062	0.00772
SGFS	4.9523	-2.075	13.308	0.4457	5	3.0347	0.72683	0.87579	0.12327
EGFS0	5.1017	2.014	-6.946	0.0899	9	3.3298	1.50528	1.60740	0.03659
DGFS0	7.4847	0.679	-0.351	0.3487	6	4.7316	0.78109	0.91790	0.11222
IYFS2	6.7405	******	107.188	0.0023	10	-16.4065	9.28403	12.33676	0.00062
VPAIV	8.4350	6.203	-45.397	0.0225	10	6.9246	2.95174	3.29275	0.00872
MEAN						3.9451	0.42024	0.42024	0.53538

Yearclass = 1987

Survey/ Series	Index Value	Slope	Inter- cept	Rsquare	No. Pts	Predicted Value	Sigma	Standard Error	Weight
IYFS	6.0753	33.406	-190.215	0.0005	10	12.7409	19.66027	20.99562	0.00033
EGFS									
DGFS									
SGFS									
EGFS0	4.7230	2.001	-6.878	0.0914	9	2.5749	1.51250	1.68301	0.05124
DGFS0	7.9571	0.680	-0.360	0.3501	6	5.0510	0.78423	0.98244	0.15038
IYFS2									
VPAIV									
MEAN						3.9408	0.42646	0.42646	0.79805

Yearclass		Weighted Average Prediction	Internal Standard Error	External Standard Error	Virtual Population Analysis		Ext.SE/ Int.SE
1985	4.01	54.92	0.33	0.25	3.63	37.66	0.76
1986	3.96	52.64	0.31	0.32			1.04
1987	4.04	56.86	0.38	0.31			0.83

Table 21.1.9 Mean fishing mortality, biomass and recruitment of whiting in Divisions VIId,e between 1977-1987.

	Mean Fishing Mortality			Biomass		Recruits	
	Ages 2 to 4		Ages 1 to 1	1000 tonnes		Age 0	
Year	H.Con	Disc	By-cat	Total	Sp St	Y.C.	Million
1977	1.322	0.000	0.000	21	11	77	78
1978	0.885	0.000	0.000	24	10	78	83
1979	0.542	0.000	0.000	30	15	79	69
1980	0.372	0.000	0.000	33	20	80	49
1981	1.118	0.000	0.000	26	19	81	67
1982	0.949	0.000	0.000	24	15	82	80
1983	0.750	0.000	0.000	28	15	83	108
1984	0.818	0.000	0.000	31	17	84	24
1985	0.504	0.000	0.000	25	22	85	45
1986	0.954	0.000	0.000	23	17	86	40
1987	0.801	0.000	0.000	22	16	87	57
Mean recruits at age 0 for period 1977 to 1987							64

Table 21.1.10 Input for catch prediction of whiting in Divisions VIId,e.

Age	1987 Stock and Fishing Mortality: Stock Number	Fishing Mortality: H.Con.	Fishing Mortality: Disc	Fishing Mortality: Ind	Values used in Prediction: F at age, Mean Wt. and Propn. Retained by Consumption Fishery: Scaled mean F 1983 to 1987: H.Con.	Scaled mean F 1983 to 1987: Disc	Scaled mean F 1983 to 1987: Ind	Mean values for period 1983 to 1987: Mean Weight (Kg.): H.Con.	Mean Weight (Kg.): Disc	Mean Weight (Kg.): Ind	Mean Weight (Kg.): Stock	Prop. Ret.
0	56973	0.000			0.001			0.237			0.237	1.000
1	32546	0.116			0.073			0.176			0.176	1.000
2	29670	0.529			0.482			0.207			0.207	1.000
3	7140	0.949			0.859			0.271			0.271	1.000
4	22213	0.926			1.063			0.321			0.321	1.000
5	1374	1.222			1.167			0.336			0.336	1.000
6	718	1.000			1.047			0.361			0.361	1.000
7	122	1.000			1.047			0.458			0.458	1.000

Mean F	Age 2 to 4	Age 1 1	Age 2 to 4	Age 1 1
Unscaled	0.801	0.000	0.765	0.000
Scaled			0.801	0.000

Recruits at age 0 in 1988 = 64000
Recruits at age 0 in 1989 = 64000
Recruits at age 0 in 1990 = 64000

M at age and proprtion mature at age are as shown in Table 21.1.3

Mean F for ages 2 to 4 in 1987 for human consumption landings + discards = 0.801 .
Human consumption + discard F-at-age values in prediction are mean values for the period 1983 to 1987 rescaled to produce a mean value of F for ages 2 to 4 equal to that for 1987

Mean F for ages 1 to 1 in 1987 for small-mesh fisheries = 0.000 .
Industrial fishery F-at-age in the prediction are averages for the period 1983 to 1987 .
rescaled to produce a mean value of F for ages 1 to 1 equal to that for 1987

Table 21.1.11 Predicted catches and biomasses ('000 t) of whiting in Divisions VII,d,e - 1988-1989.

	Year											
	1987	1988	1989									
Biomass 1 Jan of Year												
Total	22	20	22	22	22	22	22	22	22	22	22	22
Spawning	16	12	13	13	13	13	13	13	13	13	13	13
Mean F Ages												
Human Cons. 2 to 4	0.80	0.80	0.00	0.16	0.32	0.48	0.64	0.80	0.96	0.00	0.00	
Small-mesh 1 to 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean F(Year)/Mean F(1987)											F0.1	Fmax
Human Consumption	1.00	1.00	0.00	0.20	0.40	0.60	0.80	1.00	1.20	0.00	0.00	
Catch weight												
Human Consumption	8	6	0	2	3	4	5	6	7	0	0	
Discards	0	0	0	0	0	0	0	0	0	0	0	
Small-mesh Fisheries	0	0	0	0	0	0	0	0	0	0	0	
Total landings	8	6	0	2	3	4	5	6	7	0	0	
Total catch	8	6	0	2	3	4	5	6	7	0	0	
Biomass 1 Jan of Year+1												
Total	20	22	31	30	28	27	26	24	24	0	0	
Spawning	12	13	22	20	19	17	16	15	14	0	0	

Stock at start of and catch during 1988

Age	Stock No	H.Cons	Discards	By-catch	Total
0	64000	45	0	0	45
1	46642	2982	0	0	2982
2	23728	8287	0	0	8287
3	14309	7580	0	0	7580
4	2263	1366	0	0	1366
5	7207	4585	0	0	4585
6	331	198	0	0	198
7	216	129	0	0	129
Wt	20384	6415	0	0	6415

Stock at start of and catch during 1989
for F(1989) = F(1988)

Age	Stock No	H.Cons	Discards	By-catch	Total
0	64000	45	0	0	45
1	52358	3347	0	0	3347
2	35497	12397	0	0	12397
3	12001	6357	0	0	6357
4	4964	2997	0	0	2997
5	640	407	0	0	407
6	1837	1099	0	0	1099
7	157	94	0	0	94
Wt	22385	6429	0	0	6429

Table 21.2.1 Nominal catch (in tonnes) of WHITING in Divisions VIIb,c,k, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	-	-	-	-
France	419	444	656	516	204
Germany, Fed. Rep.	45	-	+	-	-
Ireland	1,160	2,589	3,499	3,550	4,011
Netherlands	-	1	1	21	78
Spain	-	-	-	-	85
UK (England and Wales)	-	-	-	67	49
UK (Scotland)	1	1	80	1	-
Total	1,625	3,035	4,236	4,155	4,427

Country	1983	1984	1985	1986	1987[1]
Belgium	-	-	-	4[1]	-
France	356	398	583	...[2]	...[2]
Germany, Fed. Rep.	-	-	-	-	-
Ireland	2,590	1,872	2,719	2,165[1]	2,519[3]
Netherlands	363	169	90	7	-
Spain	91	57	76	-	...
UK (England and Wales)	18	58	165	168[1]	38
UK (Scotland)	-	4	-	-	5
Total	3,418	2,558	3,633	2,344	2,562

[1] Provisional.
[2] Included in Divisions VIId,e.
[3] Divisions VIIb,c: 1,249 t; Divisions VIIg,h: 211 t; Divisions VIIj,h: 1,059 t.

Table 22.1 Nominal catch (tonnes) of SAITHE in Sub-area IV and Division IIIa, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	44	14	13	12	4
Denmark	10,372	10,461	10,370	6,454	10,114
Faroe Islands	213	407	1,020	614	746
France	38,122	40,983	37,306	42,649	47,064
German Dem. Rep.	2,404	1,504	925	-	-
Germany, Fed. Rep.	25,982	18,780	11,095	8,246	13,517
Ireland	88	-	-	-	-
Netherlands	5,135	1,466	245	123	36
Norway	17,627	17,575	47,959	55,882	72,669
Poland	5,661	6,104	2,404	698	793
Sweden	990	211	342	156	372
UK (England and Wales)	8,382	6,256	4,879	4,309	5,627
UK (Scotland)	14,330	6,257	6,525	6,529	8,136
USSR	10,161	2,015	-	-	-
Sub-total	139,511	114,033	123,083	125,672	159,078
By catch from industrial fisheries:					
Denmark[2]	72	493	-	-	-
Norway[2]	2,494	1,142	363	1,280	5,003
Total	142,077	115,668	123,446	126,952	164,081

Country	1983	1984	1985	1986	1987[1]
Belgium	7	32	31	16	14
Denmark	10,530	8,526	8,431[1]	10,342	7,806
Faroe Islands	806	-	895	224	-
France	38,782	43,592	42,200	56,826[1,3]	40,867[3]
German Dem. Rep.	-	-	-	-	-
Germany, Fed. Rep.	13,649	25,262	22,551	22,277	21,771
Ireland	-	-	-	-	-
Netherlands	89	181	233	134	334
Norway	81,330	88,420	101,808	62,125[1]	59,600
Poland	415	413	-	495	832
Sweden	548	522	1,764	1,987	1,502[4]
UK (England and Wales)	6,845	8,183	5,455	4,480	1,146
UK (Scotland)	6,321	6,970	9,932	15,520	11,794
USSR	-	-	-	-	-
Sub-total	159,322	182,101	193,300[1]	174,426[1]	145,666
By catch from industrial fisheries:					
Denmark[2]	-	-	-	-	...
Norway[2]	1,445	5,616	7,895	1,126	...
Total	160,767	187,717	201,195[1]	175,552[1]	

[1] Preliminary.
[2] Data from national labs.
[3] Includes Division IIa.
[4] Jan-Sep.

Table 22.2 Annual weight and numbers of saithe caught in Sub-area IV between 1971-1987.

	Weight (1000 tonnes)				Number (millions)			
Year	Total	H.Con	Disc	By-cat	Total	H.Con	Disc	By-cat
1971	253	218	0	35	176	143	0	33
1972	246	218	0	28	176	153	0	23
1973	226	195	0	31	169	142	0	27
1974	273	231	0	42	165	120	0	45
1975	278	240	0	38	189	142	0	47
1976	320	253	0	67	310	223	0	87
1977	202	196	0	6	129	125	0	4
1978	151	148	0	3	111	110	0	2
1979	126	124	0	2	79	78	0	1
1980	126	126	0	0	75	74	0	0
1981	136	135	0	1	78	76	0	2
1982	173	168	0	5	114	109	0	5
1983	173	171	0	1	115	114	0	1
1984	195	189	0	6	163	157	0	6
1985	199	191	0	8	203	192	0	11
1986	167	166	0	1	165	163	0	2
1987	147	143	0	4	163	156	0	7

Table 22.3 Values of natural mortality rate and proportion mature at age.

Age	Nat Mor	Mat.
1	0.200	0.000
2	0.200	0.000
3	0.200	0.000
4	0.200	0.150
5	0.200	0.700
6	0.200	0.900
7	0.200	1.000
8	0.200	1.000
9	0.200	1.000
10	0.200	1.000
11	0.200	1.000
12	0.200	1.000
13	0.200	1.000
14	0.200	1.000
15	0.200	1.000

Table 22.4 Total international catch at age ('000) of saithe in Sub-area IV between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	1588	930	1196	6487	1716	264	63	209	89	763	1
2	19788	24644	22962	19407	26020	34191	28225	5840	5240	26889	2
3	34487	11523	13173	20396	25709	23571	75257	117328	46412	28400	3
4	28645	14815	11564	9287	36640	18793	31760	58370	90496	86531	4
5	17312	12959	10105	7386	11206	26031	12164	13459	14833	14913	5
6	3901	8472	7164	4571	6985	4674	12616	4449	4646	2356	6
7	1220	3086	5354	3511	1960	4444	1337	2461	1608	1283	7
8	1185	966	1120	3667	1496	1261	1127	425	889	879	8
9	775	551	560	727	1098	895	269	236	284	753	9
10	800	330	466	318	325	303	189	71	172	230	10
11	694	469	526	430	115	205	98	62	103	130	11
12	457	400	203	381	139	103	80	52	134	47	12
13	223	172	233	477	105	89	29	21	31	35	13
14	94	53	155	278	154	38	41	13	32	35	14
15	110	115	85	378	152	102	56	39	35	55	15

Table 22.5 Total international mean weight at age (Kg.) of saithe in Sub-area IV between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	0.334	0.424	0.252	0.265	0.253	0.423	0.180	0.143	0.517	0.365	1
2	0.477	0.365	0.386	0.530	0.515	0.450	0.476	0.426	0.415	0.375	2
3	0.700	0.855	0.832	0.876	1.090	0.989	0.746	0.656	0.616	0.637	3
4	1.245	1.470	1.727	1.625	1.530	1.703	1.578	1.162	0.974	0.830	4
5	2.055	2.192	2.301	2.485	2.302	2.124	2.184	1.959	1.607	1.639	5
6	3.326	2.991	2.936	3.345	3.004	3.078	2.639	2.750	2.143	2.627	6
7	4.575	3.857	3.963	4.362	3.968	3.551	3.796	3.244	3.492	3.506	7
8	5.168	4.990	4.977	5.254	4.848	4.506	4.475	4.552	4.130	4.650	8
9	5.628	5.795	5.716	6.471	5.661	5.325	5.856	5.252	5.480	5.290	9
10	5.988	6.109	6.480	7.333	6.404	6.241	7.164	6.473	6.789	6.615	10
11	6.640	6.590	6.851	7.394	7.477	6.971	7.734	7.014	6.945	6.000	11
12	7.528	7.560	7.416	8.052	7.811	5.856	7.286	7.942	7.884	6.516	12
13	8.407	8.009	7.788	8.247	8.070	9.394	8.056	8.357	8.307	7.439	13
14	9.591	8.200	8.247	8.696	8.439	7.637	8.338	8.622	8.893	8.102	14
15	8.942	8.535	9.314	8.911	9.294	10.044	9.316	7.029	10.052	9.705	15

Table 22.6 Saithe in Sub-area IV. Summary statistics from Laurec/Shepherd tuning.

SUMMARY STATISTICS

Age 1

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-25.02	1.116	0.0000	0.0037	0.000	0.000	-25.023	0.407
2	-21.54	1.467	0.0000	0.0001	0.000	0.000	-21.543	0.523
3	-23.91	1.475	0.0000	0.0004	0.000	0.000	-23.912	0.526
4	-22.50	1.863	0.0001	0.0012	0.000	0.000	-22.496	0.664
5	-23.54	0.585	0.0000	0.0004	0.000	0.000	-23.542	0.208

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.000	0.450	0.525	0.525	1.364

SUMMARY STATISTICS

Age 2

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-17.58	2.631	0.0017	0.1334	0.000	0.000	-17.578	0.959
2	-16.61	0.645	0.0017	0.0824	0.000	0.000	-16.606	0.230
3	-20.26	1.084	0.0007	0.5402	0.000	0.000	-20.263	0.386
4	-18.41	0.809	0.0036	0.2800	0.000	0.000	-18.410	0.288
5	-18.85	2.904	0.0003	0.0298	0.000	0.000	-18.851	1.035

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.162	0.445	0.394	0.445	0.785

SUMMARY STATISTICS

Age 3

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-14.17	1.425	0.0506	0.2850	0.000	0.000	-14.168	0.520
2	-15.71	0.380	0.0041	0.3936	0.000	0.000	-15.714	0.135
3	-19.28	0.531	0.0018	0.2687	0.000	0.000	-19.276	0.190
4	-18.47	0.570	0.0033	0.4078	0.000	0.000	-18.473	0.203
5	-14.56	0.502	0.0225	0.3201	0.000	0.000	-14.560	0.179

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.348	0.236	0.804E-01	0.236	0.117

SUMMARY STATISTICS

Age 4

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-12.70	0.548	0.2186	0.5720	0.000	0.000	-12.705	0.200
2	-15.99	0.540	0.0031	0.3029	0.000	0.000	-15.986	0.192
3	-18.70	0.921	0.0032	0.1688	0.000	0.000	-18.701	0.328
4	-18.76	0.814	0.0025	0.2146	0.000	0.000	-18.762	0.290
5	-12.84	0.412	0.1255	1.0518	0.000	0.000	-12.844	0.147

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.518	0.255	0.329	0.329	1.658

SUMMARY STATISTICS

Age 5

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-12.81	0.396	0.1965	0.7729	0.000	0.000	-12.811	0.144
2	-16.01	0.342	0.0030	0.4766	0.000	0.000	-16.008	0.122
3	-18.48	0.780	0.0040	0.1613	0.000	0.000	-18.477	0.278
4	-18.89	0.635	0.0022	0.1721	0.000	0.000	-18.886	0.226
5	-12.36	0.251	0.2045	0.5033	0.000	0.000	-12.355	0.090

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.472	0.169	0.208	0.208	1.509

cont'd.

Table 22.6 cont'd.

Age 6

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-12.93	0.693	0.1741	0.8995	0.000	0.000	-12.933	0.253
2	-15.60	0.533	0.0046	0.2281	0.000	0.000	-15.604	0.190
3	-18.13	0.525	0.0056	0.2131	0.000	0.000	-18.128	0.187
4	-18.70	0.453	0.0027	0.1961	0.000	0.000	-18.697	0.162
5	-12.68	0.204	0.1474	0.3511	0.000	0.000	-12.683	0.073

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.314	0.162	0.173	0.173	1.148

Age 7

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.03	0.818	0.1584	0.5237	0.000	0.000	-13.027	0.298
2	-15.84	0.455	0.0036	0.1317	0.000	0.000	-15.840	0.162
3	-17.85	0.459	0.0074	0.2652	0.000	0.000	-17.845	0.164
4	-18.31	0.483	0.0039	0.2298	0.000	0.000	-18.305	0.172
5	-13.44	0.242	0.0694	0.1965	0.000	0.000	-13.436	0.086

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.207	0.176	0.143	0.176	0.665

Age 8

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.17	1.046	0.1375	0.2879	0.000	0.000	-13.168	0.381
2	-16.13	0.445	0.0027	0.1474	0.000	0.000	-16.132	0.159
3	-17.54	0.507	0.0101	0.4226	0.000	0.000	-17.540	0.181
4	-18.03	0.588	0.0052	0.2172	0.000	0.000	-18.030	0.210
5	-13.90	0.481	0.0438	0.2014	0.000	0.000	-13.897	0.172

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.225	0.242	0.194	0.242	0.640

Age 9

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.49	1.057	0.0993	0.1968	0.000	0.000	-13.494	0.385
2	-16.04	0.532	0.0029	0.2206	0.000	0.000	-16.044	0.190
3	-17.60	0.698	0.0095	0.3579	0.000	0.000	-17.600	0.249
4	-17.73	0.670	0.0070	0.4053	0.000	0.000	-17.731	0.239
5	-13.95	0.598	0.0413	0.2132	0.000	0.000	-13.954	0.213

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.266	0.295	0.141	0.295	0.230

cont'd.

Table 22.6 cont'd.

Age 10

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.47	1.045	0.1019	0.1905	0.000	0.000	-13.468	0.381
2	-16.43	0.854	0.0020	0.1144	0.000	0.000	-16.431	0.305
3	-17.40	0.477	0.0116	0.5326	0.000	0.000	-17.403	0.170
4	-17.98	0.695	0.0055	1.2599	0.000	0.000	-17.976	0.248
5	-13.81	0.284	0.0478	0.4778	0.000	0.000	-13.809	0.101

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.471	0.217	0.256	0.256	1.391

Age 11

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.69	1.127	0.0817	0.1862	0.000	0.000	-13.690	0.411
2	-16.31	0.813	0.0022	0.2908	0.000	0.000	-16.314	0.290
3	-16.93	0.483	0.0185	0.4013	0.000	0.000	-16.933	0.172
4	-17.76	0.861	0.0068	0.8796	0.000	0.000	-17.765	0.307
5	-13.57	0.396	0.0606	0.2814	0.000	0.000	-13.571	0.141

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.342	0.264	0.182	0.264	0.472

Age 12

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.29	1.197	0.1223	0.3026	0.000	0.000	-13.285	0.436
2	-15.74	1.053	0.0040	0.0465	0.000	0.000	-15.743	0.375
3	-16.91	0.609	0.0189	0.4449	0.000	0.000	-16.911	0.217
4	-17.56	0.719	0.0083	1.9442	0.000	0.000	-17.564	0.257
5	-13.65	0.551	0.0559	0.3750	0.000	0.000	-13.653	0.197

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.444	0.324	0.486	0.486	2.251

Age 13

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-13.96	1.798	0.0621	0.1671	0.000	0.000	-13.964	0.655
2	-15.95	0.794	0.0032	0.5619	0.000	0.000	-15.952	0.283
3	-17.18	0.416	0.0145	0.2541	0.000	0.000	-17.177	0.148
4	-17.80	1.124	0.0065	1.1462	0.000	0.000	-17.797	0.401
5	-14.20	0.894	0.0324	0.1416	0.000	0.000	-14.198	0.319

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.299	0.321	0.279	0.321	0.754

Table 22.7 Recruitment indices obtained by observers along the Norwegian coast (given on a sclae of 0-10 where 5 is average abundance).

Year	Index
1980	7.4
1981	4.7
1982	7.1
1983	2.7
1984	5.4
1985	7.0
1986	2.7
1987	6.1

Table 22.8 Total international fishing mortality rate at age of saithe in Sub-area IV between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	0.014	0.004	0.008	0.034	0.005	0.001	0.000	0.001	0.000	0.001	1
2	0.220	0.302	0.122	0.163	0.184	0.143	0.078	0.016	0.044	0.162	2
3	0.511	0.193	0.262	0.152	0.335	0.252	0.526	0.528	0.164	0.348	3
4	0.530	0.431	0.301	0.299	0.443	0.439	0.633	1.052	1.048	0.518	4
5	0.460	0.488	0.594	0.320	0.712	0.659	0.570	0.610	0.867	0.472	5
6	0.364	0.430	0.552	0.594	0.569	0.752	0.800	0.421	0.440	0.315	6
7	0.298	0.549	0.535	0.581	0.554	0.897	0.499	0.348	0.264	0.207	7
8	0.317	0.408	0.394	0.886	0.529	0.863	0.601	0.291	0.204	0.225	8
9	0.284	0.239	0.441	0.481	0.740	0.708	0.445	0.238	0.322	0.266	9
10	0.267	0.188	0.326	0.484	0.412	0.463	0.311	0.201	0.274	0.471	10
11	0.308	0.248	0.511	0.566	0.322	0.498	0.267	0.159	0.497	0.342	11
12	0.374	0.293	0.162	0.885	0.360	0.538	0.366	0.223	0.595	0.444	12
13	0.545	0.235	0.277	0.690	0.654	0.410	0.287	0.155	0.199	0.299	13
14	0.357	0.240	0.343	0.620	0.498	0.523	0.335	0.195	0.377	0.365	14
15	0.357	0.240	0.343	0.620	0.498	0.523	0.335	0.195	0.377	0.365	15

Table 22.9 Stock numbers at age ('000) of saithe in Sub-area IV between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	128357	269550	175136	215542	347934	505149	510741	165423	241727	842110	1
2	110110	103656	219848	142310	170615	283315	413342	418102	135248	197829	2
3	94344	72341	62716	159296	99029	116254	201145	312952	337039	106002	3
4	76197	46351	48852	39500	112042	57984	73977	97291	151158	234133	4
5	51387	36735	24662	29603	23992	58877	30620	32176	27822	43392	5
6	14025	26553	18464	11152	17600	9639	24943	14184	14307	9569	6
7	5199	7980	14141	8704	5041	8159	3721	9174	7622	7547	7
8	4784	3159	3772	6784	3985	2373	2725	1849	5301	4794	8
9	3440	2852	1719	2083	2289	1923	819	1223	1132	3539	9
10	3745	2120	1840	906	1054	894	776	430	789	672	10
11	2875	2347	1439	1088	457	572	461	465	288	491	11
12	1606	1731	1499	706	506	271	284	289	325	143	12
13	580	905	1057	1044	239	289	130	161	189	147	13
14	342	275	586	656	429	102	157	80	113	127	14
15	401	592	322	893	424	274	214	243	122	198	15

Table 22.10 Mean fishing mortality, biomass and recruitment of saithe in Sub-area IV between 1971-1987.

	Mean Fishing Mortality			Biomass		Recruits	
	Ages 3 to 6		Ages 1 to 4	1000 tonnes		Age 1	
Year	H.Con	Disc	By-cat	Total	Sp St	Y.C.	Million
1971	0.270	0.000	0.044	1205	412	70	236
1972	0.345	0.000	0.042	1007	457	71	245
1973	0.309	0.000	0.090	886	486	72	280
1974	0.393	0.000	0.148	1078	535	73	646
1975	0.350	0.000	0.103	1016	460	74	223
1976	0.589	0.000	0.114	882	338	75	162
1977	0.525	0.000	0.012	632	282	76	137
1978	0.458	0.000	0.005	542	263	77	128
1979	0.378	0.000	0.006	561	257	78	270
1980	0.426	0.000	0.002	510	235	79	175
1981	0.338	0.000	0.004	577	224	80	216
1982	0.500	0.000	0.015	639	188	81	348
1983	0.520	0.000	0.003	777	196	82	505
1984	0.615	0.000	0.016	735	170	83	510
1985	0.622	0.000	0.025	679	153	84	165
1986	0.626	0.000	0.003	699	150	85	279
1987	0.400	0.000	0.012	626	182	86	280
Mean recruits at age 1 for period 1971 to 1987							283

Table 22.11 Input for catch prediction of saithe in Sub-area IV.

	1987				Values used in Prediction						
	Stock and Fishing Mortality				F at age , Mean Wt. and Propn. Retained by Consumption Fishery						
					Scaled mean F			Mean values for period 1983 to 1987			
Age	Stock	Fishing Mortality			1983 to 1987			Mean Weight (Kg.)			Prop.
	Number	H.Con.	Disc	Ind	H.Con.	Disc	Ind	H.Con.	Disc	Ind	Stock	Ret.
1	280043	0.001		0.000	0.001		0.000	0.327		0.215	0.325	1.000
2	228091	0.138		0.001	0.059		0.001	0.429		0.372	0.428	1.000
3	106028	0.335		0.013	0.251		0.014	0.734		0.572	0.729	1.000
4	233994	0.485		0.033	0.507		0.032	1.261		1.010	1.250	1.000
5	43421	0.467		0.005	0.452		0.007	1.907		1.666	1.903	1.000
6	9582	0.315			0.391		0.001	2.647		2.790	2.647	1.000
7	7560	0.207			0.318		0.000	3.518		3.370	3.518	1.000
8	4804	0.224			0.313		0.001	4.462		5.085	4.463	1.000
9	3539	0.266			0.284		0.001	5.440		5.970	5.441	1.000
10	672	0.471			0.247		0.000	6.657		5.970	6.656	1.000
11	492	0.342			0.253			6.933			6.933	1.000
12	143	0.444			0.312			7.097			7.097	1.000
13	147	0.299			0.194			8.311			8.311	1.000
14	127	0.365			0.258			8.318			8.318	1.000
15	198	0.365			0.258			9.229			9.229	1.000

	Mean F	Age 3 to 6	Age 1 4	Age 3 to 6	Age 1 4
	Unscaled	0.400	0.012	0.557	0.012
	Scaled			0.400	0.012

Recruits at age 1 in 1988 = 283000
Recruits at age 1 in 1989 = 283000
Recruits at age 1 in 1990 = 283000

M at age and proprtion mature at age are as shown in Table 22.3

Mean F for ages 3 to 6 in 1987 for human consumption landings + discards = 0.400 .
Human consumption + discard F-at-age values in prediction are mean values for the period 1983 to 1987
rescaled to produce a mean value of F for ages 3 to 6 equal to that for 1987

Mean F for ages 1 to 4 in 1987 for small-mesh fisheries = 0.012 .
Industrial fishery F-at-age in the prediction are averages for the period 1983 to 1987 .
rescaled to produce a mean value of F for ages 1 to 4 equal to that for 1987

Table 22.12 Predicted catches and biomasses ('000 t) of saithe in Sub-area IV - 1988-1989.

	Year											
	1987	1988	1989									
Biomass 1 Jan of Year												
Total	626	742	761	761	761	761	761	761	761	761	761	761
Spawning	182	297	301	301	301	301	301	301	301	301	301	301
Mean F Ages												
Human Cons. 3 to 6	0.40	0.40	0.00	0.08	0.16	0.24	0.32	0.40	0.48	0.00	0.00	
Small-mesh 1 to 4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	
Mean F(Year)/Mean F(1987)										F0.1	Fmax	
Human Consumption	1.00	1.00	0.00	0.20	0.40	0.60	0.80	1.00	1.20	0.00	0.00	
Small-mesh Fishery	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	
Catch weight												
Human Consumption	143	165	0	38	74	107	137	166	192	0	0	
Discards	0	0	0	0	0	0	0	0	0	0	0	
Small-mesh Fisheries	4	4	5	5	4	4	4	4	4	0	0	
Total landings	147	168	5	43	78	111	141	170	196	0	0	
Total catch	147	168	5	43	78	111	141	170	196	0	0	
Biomass 1 Jan of Year+1												
Total	742	761	993	944	898	856	817	781	747	0	0	
Spawning	297	301	460	425	392	363	335	310	287	0	0	

Stock at start of and catch during 1988

Age	Stock No	H.Cons	Discards	By-catch	Total
1	283000	200	0	2	202
2	229029	11980	0	229	12209
3	162512	32652	0	1818	34470
4	61301	21985	0	1373	23357
5	114079	37739	0	588	38327
6	22183	6545	0	23	6568
7	5728	1422	0	2	1424
8	5034	1233	0	4	1237
9	3142	707	0	2	709
10	2221	442	0	1	443
11	344	70	0	0	70
12	286	70	0	0	70
13	75	12	0	0	12
14	89	18	0	0	18
15	72	15	0	0	15
Wt	741937	164841	0	3596	168437

Stock at start of and catch during 1989
for F(1989) = F(1988)

Age	Stock No	H.Cons	Discards	By-catch	Total
1	283000	200	0	2	202
2	231518	12110	0	231	12341
3	176496	35462	0	1975	37436
4	102052	36599	0	2285	38884
5	29277	9685	0	151	9836
6	59040	17420	0	61	17481
7	12268	3045	0	4	3049
8	3410	835	0	3	838
9	3010	678	0	2	680
10	1935	385	0	0	386
11	1420	289	0	0	289
12	218	53	0	0	53
13	171	28	0	0	28
14	51	11	0	0	11
15	102	21	0	0	21
Wt	761193	165592	0	3986	169579

Table 22.13

ASSESSMENT QUALITY CONTROL DIAGRAM 1

STOCK: Saithe in Sub-area IV and Div. IIIa (North Sea).

AVERAGE F(3-6,u)					
DATE OF ASSESSMENT	YEAR				
	1983	1984	1985	1986	1987
1984	0.25				
1985	0.41	0.41			
1986	0.64	0.71	0.69		
1987	0.62	0.84	0.88	0.74	
1988	0.52	0.62	0.62	0.63	0.40

REMARKS:

ESTIMATED TOTAL LANDINGS ('000 T) AT STATUS QUO F							
ASSESSED IN	YEAR						
	1983	1984	1985	1986	1987	1988	1989
FORECAST YR	n/a	n/a	195	289	200[1]	198	170
CURRENT YR	n/a	185	259	217[1]	223	168	
ACTUAL	-	172	190[1]	180	205		

$$\text{Actual SQC} \approx \text{Landings (t)} * \frac{\text{F(assumed)}}{\text{F(actual)}} * \exp\left[-\frac{1}{2}(\text{F(assumed)} - \text{F(actual)})\right]$$

REMARKS: [1] Status quo option for small mesh fishery.

cont'd.

Table 22.13 Cont'd

ASSESSMENT QUALITY CONTROL DIAGRAM 2

STOCK: Saithe in Sub-area IV and Div. IIIa (North Sea).

RECRUITMENT (AGE 1) UNIT: millions					
DATE OF ASSESSMENT	YEAR CLASS				
	1983	1984	1985	1986	1987
1984	210				
1985	258	n/a			
1986	233	250	255		
1987	252	242	242	242	
1988	510	165	279	280	283

REMARKS:

SPAWNING STOCK BIOMASS ('000 T)								
DATE OF ASSESSMENT	YEAR							
	1983	1984	1985	1986	1987	1988	1989	1990
1984	455	510	536[1]	634[1]				
1985	252	259	343	412[1]	555[1]			
1986	182	145	118	164	158[1,2]	144[1,2]		
1987	185	143	105	106	178	158[1]	136[1]	
1988	196	170	153	150	182	297	301[1]	310[1]

[1] Forecast. [2] Status quo option for small mesh fishery.

REMARKS: Change from knife-edge to maturity ogive in 1986.

Table 23.1 Nominal catch (tonnes) of SAITHE in Sub-area VI, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	-	1	2	2	-
Denmark	-	-	-	-	4
Faroe Islands	-	14	4	3	5
France	21,519	15,662	15,427	16,654	17,102
Germany, Fed. Rep.	604	131	49	581	441
Ireland	266	246	295	250	322
Netherlands	623	256	91	-	-
Norway	122	20	62	25	19
Spain	-	-	-	120	243
UK (England and Wales)	3,193	1,765	1,594	1,364	1,966
UK (Northern Ireland)	27	11	9	10	7
UK (Scotland)	5,181	3,602	2,902	3,117	2,141
Total	31,535	21,708	20,435	22,126	22,250

Country	1983	1984	1985	1986	1987[1]
Belgium	-	-	2	-	-
Denmark	-	-	-[1]	-	7
Faroe Islands	-	-	-	-	-
France	13,470	19,706	19,120	18,363[1,2]	17,019[2]
Germany, Fed. Rep.	179	713	838	2,345	2,037
Ireland	698	599	670	660	470
Netherlands	32	-	-	-	-
Norway	55	66	51	264[1]	236
Spain	330	882	624	824	...
UK (England and Wales)	2,760	1,800	1,349	1,259	124
UK (Northern Ireland)	12	49	15	21	26
UK (Scotland)	2,642	3,170	3,118	3,697	3,249
Total	26,178	26,985	25,787	27,433	23,168

[1] Preliminary.
[2] Includes Division Vb.

Table 23.2 Annual weight and numbers of saithe caught in Sub-area VI between 1971-1987.

	Weight (1000 tonnes)				Number (millions)			
Year	Total	H.Con	Disc	By-cat	Total	H.Con	Disc	By-cat
1971	20	20	0	0	11	11	0	0
1972	29	29	0	0	19	19	0	0
1973	34	34	0	0	23	23	0	0
1974	36	36	0	0	18	18	0	0
1975	31	31	0	0	16	16	0	0
1976	42	42	0	0	20	20	0	0
1977	27	27	0	0	13	13	0	0
1978	33	33	0	0	16	16	0	0
1979	22	22	0	0	7	7	0	0
1980	22	22	0	0	8	8	0	0
1981	24	24	0	0	11	11	0	0
1982	24	24	0	0	11	11	0	0
1983	29	29	0	0	14	14	0	0
1984	22	22	0	0	13	13	0	0
1985	27	27	0	0	14	14	0	0
1986	42	42	0	0	22	22	0	0
1987	31	31	0	0	17	17	0	0

Table 23.3 Values of natural mortality rate and proportion mature at age.

Age	Nat Mor	Mat.
1	0.200	0.000
2	0.200	0.000
3	0.200	0.000
4	0.200	0.000
5	0.200	1.000
6	0.200	1.000
7	0.200	1.000
8	0.200	1.000
9	0.200	1.000
10	0.200	1.000
11	0.200	1.000
12	0.200	1.000
13	0.200	1.000
14	0.200	1.000
15	0.200	1.000

Table 23.4 Total international catch at age ('000) of saithe in Sub-area VI between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	38	9	45	148	38	42	147	5	233	1	1
2	5047	969	1005	2449	1308	4026	2932	2224	747	1874	2
3	4634	1828	3335	3911	4491	4879	5484	4982	6444	2314	3
4	2411	1194	942	1977	1641	2624	2403	2992	7675	7158	4
5	1350	1151	677	588	1240	852	876	1454	3409	1996	5
6	715	708	632	410	568	775	681	1222	1263	1441	6
7	309	368	469	341	384	513	300	608	946	828	7
8	263	156	194	223	244	161	139	186	429	489	8
9	161	191	91	153	136	107	56	104	166	278	9
10	301	152	113	120	72	94	46	49	98	49	10
11	377	164	172	127	50	58	16	23	24	28	11
12	264	137	140	115	63	65	7	12	33	31	12
13	207	131	188	129	67	62	12	19	49	11	13
14	83	110	84	91	76	95	24	24	34	28	14
15	84	62	119	91	132	136	54	96	72	93	15

Table 23.5 Total international mean weight at age (Kg.) of saithe in Sub-area VI between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	0.412	0.513	0.417	0.400	0.432	0.378	0.472	0.405	0.672	0.453	1
2	0.490	0.700	0.650	0.676	0.717	0.665	0.723	0.707	0.757	0.607	2
3	1.091	1.323	1.165	1.096	1.078	1.246	1.109	1.056	0.978	0.960	3
4	1.674	1.980	1.932	1.699	1.779	1.833	1.786	1.677	1.524	1.183	4
5	2.583	2.405	2.651	2.963	2.736	3.074	2.663	2.613	2.514	1.999	5
6	3.813	3.366	3.560	4.047	3.946	3.642	3.503	3.237	3.345	3.086	6
7	4.657	4.609	4.560	5.115	5.348	5.036	4.714	4.316	4.188	4.450	7
8	5.278	5.815	5.531	6.240	6.197	6.285	5.791	6.002	4.683	5.693	8
9	5.979	6.967	6.524	7.222	7.765	6.975	7.609	7.377	6.380	7.263	9
10	6.853	7.559	7.902	8.304	9.148	8.160	9.028	8.940	7.687	8.147	10
11	7.692	8.387	8.680	8.473	9.374	8.802	8.832	9.717	7.644	8.610	11
12	9.072	9.187	9.482	9.311	10.411	9.827	9.988	9.419	8.921	10.838	12
13	10.030	10.154	9.753	10.121	10.580	11.254	11.291	10.377	10.903	10.340	13
14	10.961	11.091	10.774	10.978	10.779	12.055	11.598	12.092	10.896	10.799	14
15	9.548	11.734	11.957	12.314	12.130	13.153	12.452	12.634	14.048	13.233	15

Table 23.6 Saithe in Sub-area VI. Summary statistics from Laurec/Shepherd tuning.

SUMMARY STATISTICS

	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
Age 1	1	-19.22	1.893	0.0001	0.0003	0.000	0.000	-19.224	0.633
	2	-20.93	1.465	0.0000	0.0001	0.000	0.000	-20.932	0.490
	3	-20.05	0.938	0.0003	0.0003	0.000	0.000	-20.053	0.314
	4	-21.22	1.503	0.0002	0.0012	0.000	0.000	-21.220	0.502
	5	-22.82	0.419	0.0000	0.0001	0.000	0.000	-22.819	0.139

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.000	0.353	0.386	0.386	1.195

SUMMARY STATISTICS

	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
Age 2	1	-14.39	0.779	0.0074	0.4350	0.000	0.000	-14.386	0.261
	2	-16.68	1.100	0.0015	0.0220	0.000	0.000	-16.676	0.368
	3	-16.00	0.792	0.0148	0.0382	0.000	0.000	-16.004	0.265
	4	-17.55	0.551	0.0094	0.1104	0.000	0.000	-17.552	0.184
	5	-15.30	0.345	0.0259	0.1616	0.000	0.000	-15.297	0.115

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.129	0.252	0.354	0.354	1.970

SUMMARY STATISTICS

	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
Age 3	1	-14.68	0.477	0.0055	0.5135	0.000	0.000	-14.677	0.159
	2	-16.75	0.685	0.0014	0.2686	0.000	0.000	-16.751	0.229
	3	-15.37	0.547	0.0278	0.3521	0.000	0.000	-15.369	0.183
	4	-17.62	0.632	0.0088	0.4721	0.000	0.000	-17.624	0.211
	5	-12.96	0.199	0.2691	0.3992	0.000	0.000	-12.955	0.066

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.402	0.163	0.699E-01	0.163	0.184

SUMMARY STATISTICS

	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
Age 4	1	-15.82	0.863	0.0018	0.2891	0.000	0.000	-15.816	0.288
	2	-17.43	1.118	0.0007	0.6311	0.000	0.000	-17.432	0.374
	3	-16.01	0.669	0.0146	1.1367	0.000	0.000	-16.014	0.224
	4	-19.00	0.862	0.0022	1.3277	0.000	0.000	-18.995	0.288
	5	-12.70	0.268	0.3473	0.4079	0.000	0.000	-12.700	0.089

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.494	0.226	0.220	0.226	0.953

SUMMARY STATISTICS

	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
Age 5	1	-16.72	1.074	0.0007	0.2867	0.000	0.000	-16.722	0.359
	2	-17.64	0.986	0.0006	1.1437	0.000	0.000	-17.640	0.330
	3	-16.55	0.766	0.0085	0.6301	0.000	0.000	-16.553	0.256
	4	-20.07	1.639	0.0008	0.5074	0.000	0.000	-20.066	0.548
	5	-12.90	0.296	0.2839	0.3287	0.000	0.000	-12.901	0.098

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.385	0.255	0.181	0.255	0.506

cont'd.

Table 23.6 cont'd.

SUMMARY STATISTICS

Age	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
6	1	-16.03	0.763	0.0014	0.2586	0.000	0.000	-16.029	0.255
	2	-18.25	1.053	0.0003	0.2235	0.000	0.000	-18.253	0.352
	3	-16.70	0.839	0.0073	0.6609	0.000	0.000	-16.703	0.280
	4	-19.98	1.299	0.0008	1.1942	0.000	0.000	-19.983	0.434
	5	-12.91	0.252	0.2801	0.3342	0.000	0.000	-12.915	0.084

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.350	0.222	0.150	0.222	0.460

SUMMARY STATISTICS

Age	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
7	1	-16.16	1.061	0.0013	0.1306	0.000	0.000	-16.158	0.355
	2	-18.41	0.751	0.0003	0.1103	0.000	0.000	-18.405	0.251
	3	-17.03	0.613	0.0053	0.3368	0.000	0.000	-17.030	0.205
	4	-20.45	1.478	0.0005	0.4315	0.000	0.000	-20.447	0.494
	5	-12.96	0.319	0.2666	0.3199	0.000	0.000	-12.964	0.106

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.274	0.253	0.196	0.253	0.600

SUMMARY STATISTICS

Age	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
8	1	-16.07	0.813	0.0014	0.2253	0.000	0.000	-16.067	0.272
	2	-18.32	0.677	0.0003	0.1412	0.000	0.000	-18.325	0.226
	3	-17.85	0.958	0.0023	0.5711	0.000	0.000	-17.847	0.320
	4	-20.91	1.069	0.0003	0.7984	0.000	0.000	-20.914	0.357
	5	-13.37	0.361	0.1775	0.2137	0.000	0.000	-13.371	0.120

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.237	0.274	0.229	0.274	0.701

SUMMARY STATISTICS

Age	Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
9	1	-16.17	0.800	0.0012	0.1727	0.000	0.000	-16.174	0.267
	2	-18.37	1.112	0.0003	0.0193	0.000	0.000	-18.365	0.372
	3	-18.23	1.141	0.0016	0.1110	0.000	0.000	-18.228	0.381
	4	-21.01	0.478	0.0003	0.4126	0.000	0.000	-21.010	0.160
	5	-13.62	0.391	0.1378	0.1673	0.000	0.000	-13.625	0.130

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.192	0.267	0.358	0.358	1.803

cont'd.

Table 23.6 cont'd.

Age 10

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-15.93	1.023	0.0016	0.0774	0.000	0.000	-15.934	0.342
2	-18.72	0.694	0.0002	0.0477	0.000	0.000	-18.719	0.232
3	-19.02	1.172	0.0007	0.0356	0.000	0.000	-19.016	0.392
4	-20.92	0.465	0.0003	0.0795	0.000	0.000	-20.920	0.155
5	-13.89	0.290	0.1061	0.1625	0.000	0.000	-13.885	0.097

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.111	0.222	0.243	0.243	1.198

Age 11

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-17.06	0.825	0.0005	0.0718	0.000	0.000	-17.059	0.276
2	-18.62	0.666	0.0002	0.0302	0.000	0.000	-18.617	0.222
3	-19.00	0.857	0.0007	0.1032	0.000	0.000	-19.001	0.286
4	-20.90	0.547	0.0003	0.0462	0.000	0.000	-20.904	0.183
5	-14.41	0.739	0.0626	0.0834	0.000	0.000	-14.414	0.246

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.055	0.312	0.214	0.312	0.469

Age 12

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-16.63	1.011	0.0008	0.1224	0.000	0.000	-16.626	0.338
2	-18.56	0.739	0.0002	0.0353	0.000	0.000	-18.563	0.247
3	-19.05	0.987	0.0007	0.1083	0.000	0.000	-19.054	0.330
4	-20.89	0.432	0.0003	0.0520	0.000	0.000	-20.887	0.144
5	-14.51	0.818	0.0568	0.0734	0.000	0.000	-14.511	0.272

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.059	0.306	0.190	0.306	0.385

Age 13

SUMMARY STATISTICS

Fleet	Pred. q	SE(q)	Partial F	Raised F	SLOPE	SE Slope	INTRCPT	SE Intrcpt
1	-16.70	0.846	0.0007	0.0402	0.000	0.000	-16.704	0.283
2	-18.24	1.070	0.0003	0.0035	0.000	0.000	-18.237	0.358
3	-18.92	1.068	0.0008	0.0088	0.000	0.000	-18.915	0.357
4	-20.76	0.424	0.0004	0.0209	0.000	0.000	-20.763	0.142
5	-14.17	0.626	0.0801	0.1468	0.000	0.000	-14.167	0.208

Fbar	SIGMA(int.)	SIGMA(ext.)	SIGMA(overall)	Variance ratio
0.029	0.298	0.530	0.530	3.159

Table 23.7 Total international fishing mortality rate at age of saithe in Sub-area VI between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	0.002	0.000	0.001	0.005	0.001	0.001	0.003	0.000	0.012	0.000	1
2	0.353	0.061	0.050	0.097	0.052	0.134	0.097	0.062	0.084	0.129	2
3	0.442	0.208	0.307	0.275	0.260	0.280	0.271	0.237	0.253	0.402	3
4	0.313	0.193	0.157	0.301	0.178	0.238	0.216	0.233	0.694	0.494	4
5	0.256	0.241	0.160	0.139	0.314	0.132	0.116	0.197	0.452	0.385	5
6	0.231	0.207	0.203	0.137	0.193	0.330	0.148	0.235	0.262	0.350	6
7	0.115	0.178	0.205	0.160	0.184	0.267	0.205	0.191	0.289	0.274	7
8	0.081	0.078	0.134	0.142	0.165	0.109	0.107	0.189	0.199	0.237	8
9	0.046	0.078	0.060	0.150	0.121	0.101	0.051	0.109	0.258	0.192	9
10	0.099	0.056	0.060	0.105	0.097	0.115	0.057	0.057	0.143	0.111	10
11	0.162	0.072	0.082	0.089	0.058	0.105	0.025	0.036	0.036	0.055	11
12	0.148	0.082	0.081	0.072	0.059	0.099	0.018	0.024	0.067	0.059	12
13	0.109	0.102	0.154	0.100	0.055	0.075	0.025	0.058	0.130	0.029	13
14	0.113	0.078	0.088	0.104	0.078	0.103	0.038	0.062	0.139	0.101	14
15	0.113	0.078	0.088	0.104	0.078	0.103	0.038	0.062	0.139	0.101	15

Table 23.8 Stock numbers at age ('000) of saithe in Sub-area VI between 1978-1987.

Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Age
1	22008	27989	35516	34658	43302	42652	50327	12439	21110	14221	1
2	18635	17984	22907	29037	28242	35419	34882	41072	10180	17074	2
3	14212	10724	13850	17848	21565	21942	25369	25915	31620	7661	3
4	9844	7480	7134	8342	11096	13617	13577	15839	16735	20092	4
5	6574	5893	5049	4992	5053	7607	8788	8953	10276	6848	5
6	3813	4168	3790	3524	3557	3023	5459	6405	6021	5356	6
7	3127	2478	2775	2534	2516	2401	1779	3856	4144	3794	7
8	3708	2281	1698	1850	1767	1714	1505	1186	2609	2542	8
9	3973	2799	1728	1216	1314	1226	1258	1107	803	1750	9
10	3507	3107	2119	1332	857	953	908	980	812	508	10
11	2768	2600	2407	1634	982	637	696	702	757	577	11
12	2110	1927	1981	1815	1223	759	470	556	555	598	12
13	2208	1490	1454	1495	1382	944	563	378	444	425	13
14	858	1621	1102	1021	1108	1072	718	450	292	319	14
15	868	909	1558	1020	1934	1532	1594	1757	608	1060	15

Table 23.9 Mean fishing mortality, biomass and recruitment of saithe in Sub-area VI between 1971-1987.

	Mean Fishing Mortality			Biomass		Recruits	
	Ages		Ages	1000 tonnes		Age 1	
	3 to 6		1 to 1				
Year	H.Con	Disc	By-cat	Total	Sp St	Y.C.	Million
1971	0.120	0.000	0.000	273	183	70	45
1972	0.165	0.000	0.000	364	232	71	40
1973	0.204	0.000	0.000	352	260	72	35
1974	0.193	0.000	0.000	352	278	73	38
1975	0.230	0.000	0.000	357	284	74	29
1976	0.327	0.000	0.000	310	246	75	23
1977	0.297	0.000	0.000	261	213	76	23
1978	0.310	0.000	0.000	244	194	77	22
1979	0.212	0.000	0.000	235	179	78	28
1980	0.207	0.000	0.000	221	161	79	36
1981	0.213	0.000	0.000	210	143	80	35
1982	0.236	0.000	0.000	224	142	81	43
1983	0.245	0.000	0.000	222	130	82	43
1984	0.188	0.000	0.000	224	123	83	50
1985	0.226	0.000	0.000	216	128	84	12
1986	0.415	0.000	0.000	200	114	85	33
1987	0.408	0.000	0.000	174	112	86	33
Mean recruits at age 1 for period 1971 to 1987							33

Table 23.10 Input for catch prediction of saithe in Sub-area VI.

	1987 Stock and Fishing Mortality				Values used in Prediction: F at age, Mean Wt. and Propn. Retained by Consumption Fishery						
					Scaled mean F 1983 to 1987			Mean values for period 1983 to 1987 Mean Weight (Kg.)			Prop.
Age	Stock Number	Fishing Mortality H.Con.	Disc	Ind	H.Con.	Disc	Ind	H.Con.	Disc	Ind	Stock	Ret.
1	33072	0.003			0.003			0.476			0.476	1.000
2	26699	0.080			0.126			0.692			0.692	1.000
3	7661	0.402			0.397			1.070			1.070	1.000
4	20092	0.494			0.516			1.600			1.600	1.000
5	6848	0.385			0.353			2.573			2.573	1.000
6	5356	0.350			0.365			3.363			3.363	1.000
7	3794	0.274			0.337			4.541			4.541	1.000
8	2542	0.237			0.232			5.691			5.691	1.000
9	1750	0.192			0.196			7.121			7.121	1.000
10	508	0.111			0.133			8.393			8.393	1.000
11	577	0.055			0.071			8.721			8.721	1.000
12	598	0.059			0.073			9.798			9.798	1.000
13	425	0.029			0.087			10.833			10.833	1.000
14	319	0.101			0.122			11.488			11.488	1.000
15	1060	0.101			0.122			13.104			13.104	1.000

	Mean F	Age 3 to 6	Age 1 1	Age 3 to 6	Age 1 1
	Unscaled	0.408	0.000	0.296	0.000
	Scaled			0.408	0.000

Recruits at age 1 in 1988 = 33000
Recruits at age 1 in 1989 = 33000
Recruits at age 1 in 1990 = 33000

M at age and proprtion mature at age are as shown in Table 23.3

Mean F for ages 3 to 6 in 1987 for human consumption landings + discards = 0.408 .
Human consumption + discard F-at-age values in prediction are mean values for the period 1983 to 1987 rescaled to produce a mean value of F for ages 3 to 6 equal to that for 1987

Mean F for ages 1 to 1 in 1987 for small-mesh fisheries = 0.000 .
Industrial fishery F-at-age in the prediction are averages for the period 1983 to 1987 .
rescaled to produce a mean value of F for ages 1 to 1 equal to that for 1987

Table 23.11 Predicted catches and biomasses ('000 t) of saithe in Sub-area VI - 1988-1989.

	Year											
	1987	1988	1989									
Biomass 1 Jan of Year												
Total	174	170	161	161	161	161	161	161	161	161	161	161
Spawning	112	107	88	88	88	88	88	88	88	88	88	88
Mean F Ages												
Human Cons. 3 to 6	0.41	0.41	0.00	0.08	0.16	0.24	0.33	0.41	0.49	0.00	0.00	
Small-mesh 1 to 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean F(Year)/Mean F(1987)										F0.1	Fmax	
Human Consumption	1.00	1.00	0.00	0.20	0.40	0.60	0.80	1.00	1.20	0.00	0.00	
Catch weight												
Human Consumption	31	32	0	7	14	20	25	31	36	0	0	
Discards	0	0	0	0	0	0	0	0	0	0	0	
Small-mesh Fisheries	0	0	0	0	0	0	0	0	0	0	0	
Total landings	31	32	0	7	14	20	25	31	36	0	0	
Total catch	31	32	0	7	14	20	25	31	36	0	0	
Biomass 1 Jan of Year+1												
Total	170	161	189	181	172	165	158	151	145	0	0	
Spawning	107	88	106	100	94	88	83	79	75	0	0	

Stock at start of and catch during 1988

Age	Stock No	H.Cons	Discards	By-catch	Total
1	33000	104	0	0	104
2	27009	2900	0	0	2900
3	20169	6035	0	0	6035
4	4196	1546	0	0	1546
5	10036	2719	0	0	2719
6	3815	1063	0	0	1063
7	3091	807	0	0	807
8	2361	445	0	0	445
9	1642	265	0	0	265
10	1182	134	0	0	134
11	372	23	0	0	23
12	447	29	0	0	29
13	462	35	0	0	35
14	338	35	0	0	35
15	236	25	0	0	25
Wt	170030	32349	0	0	32349

Stock at start of and catch during 1989
for F(1989) = F(1988)

Age	Stock No	H.Cons	Discards	By-catch	Total
1	33000	104	0	0	104
2	26924	2891	0	0	2891
3	19498	5834	0	0	5834
4	11098	4089	0	0	4089
5	2050	556	0	0	556
6	5775	1609	0	0	1609
7	2169	566	0	0	566
8	1806	340	0	0	340
9	1533	248	0	0	248
10	1105	125	0	0	125
11	848	52	0	0	52
12	284	18	0	0	18
13	340	26	0	0	26
14	347	36	0	0	36
15	416	43	0	0	43
Wt	161265	30893	0	0	30893

Table 23.12

ASSESSMENT QUALITY CONTROL DIAGRAM 1

STOCK: Saithe in Sub-area VI (W. of Scotland & Rockall).

AVERAGE F(3-6,u)					
DATE OF ASSESSMENT	YEAR				
	1983	1984	1985	1986	1987
1984	0.21				
1985	0.10	0.08			
1986	0.47	0.41	0.54		
1987	0.36	0.28	0.31	0.48	
1988	0.24	0.19	0.23	0.42	0.41

REMARKS:

ESTIMATED TOTAL LANDINGS ('000 T) AT STATUS QUO F							
ASSESSED IN	YEAR						
	1983	1984	1985	1986	1987	1988	1989
FORECAST YR	n/a	n/a	24	n/a	23	42	31
CURRENT YR	n/a	25	n/a	24	46	32	
ACTUAL	-	n/a	20	27	31		

$$\text{Actual SQC} \approx \text{Landings (t)} * \frac{\text{F(assumed)}}{\text{F(actual)}} * \exp\left[-\frac{1}{2}(\text{F(assumed)} - \text{F(actual)})\right]$$

REMARKS:

cont'd.

Table 23.12 Cont'd

ASSESSMENT QUALITY CONTROL DIAGRAM 2

STOCK: Saithe in Sub-area VI (W. of Scotland & Rockall).

RECRUITMENT (AGE 1) UNIT: millions					
DATE OF ASSESSMENT	YEAR CLASS				
	1983	1984	1985	1986	1987
1984	26				
1985	168	n/a			
1986	24	23	27		
1987	46	31	32	33	
1988	50	12	33	33	33

REMARKS:

SPAWNING STOCK BIOMASS ('000 T)								
DATE OF ASSESSMENT	YEAR							
	1983	1984	1985	1986	1987	1988	1989	1990
1984	131	195	130[1]	127[1]				
1985	195	173	n/a	n/a[1]	n/a[1]			
1986	46	33	36	29	26[1]	23[1]		
1987	63	52	56	58	79	77[1]	62[1]	
1988	130	123	128	114	112	107	88[1]	79[1]

[1] Forecast.

REMARKS:

Table 24.1 Nominal catch (in tonnes) of SAITHE in Sub-area VII, 1978-1987, as officially reported to ICES.

Country	1978	1979	1980	1981	1982
Belgium	9	9	19	12	13
Denmark	19	7	6	-	-
France	2,105	1,699	2,317	4,563	4,061
Germany, Fed. Rep.	16	3	46	-	-
Ireland	1,451	1,632	2,220	2,197	2,367
Netherlands	44	35	84	100	22
Norway	-	-	-	-	-
Spain	-	-	-	266	179
UK (England & Wales)	89	61	109	236	526
UK (Isle of Man)	-	41	19	36	34
UK (N. Ireland)	343	276	301	577	872
UK (Scotland)	106	34	56	94	119
Total	4,182	3,797	5,177	8,081	8,193

Country	1983	1984	1985	1986	1987[1]
Belgium	6	10	31[1]	25	23
Denmark	-	-	-	-	-
France	4,760	3,697	6,101	4,979[1,2]	6,065[2]
Germany, Fed. Rep.	11	5	-	-	-
Ireland	2,383	2,374	2,177	1,739	869
Netherlands	7	-	-	-	-
Norway	3	+	3	38[1]	-
Spain	70	118	118	-	...
UK (England & Wales)	235	974	722	648	158
UK (Isle of Man)	16	27	9	6	...
UK (N. Ireland)	668	411	665	635	573
UK (Scotland)	138	140	477	488	630
Total	8,297	7,756	10,303	8,558	8,318

[1] Preliminary.
[2] Includes Sub-area VIII.

Figure 10.1 Estimated log catchability through time for various ages of COD in Sub-division IV.

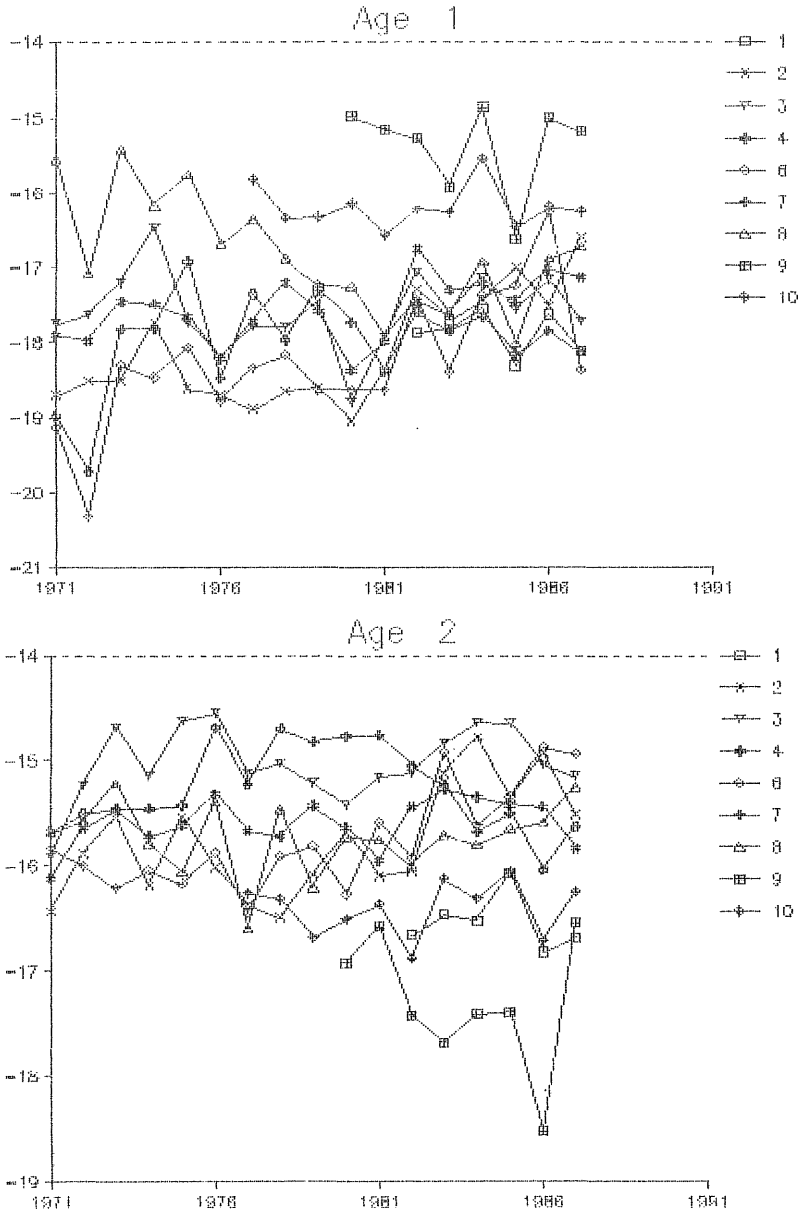
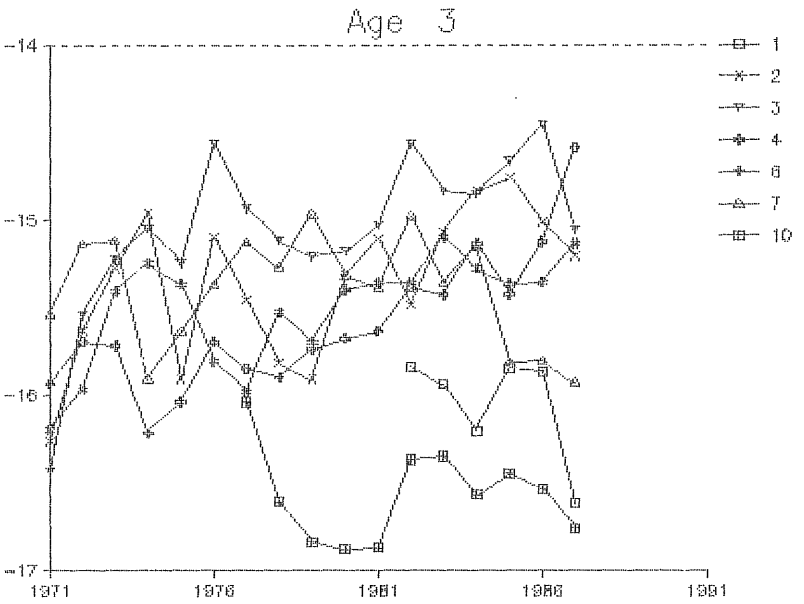


Figure 10.1 (cont'd)



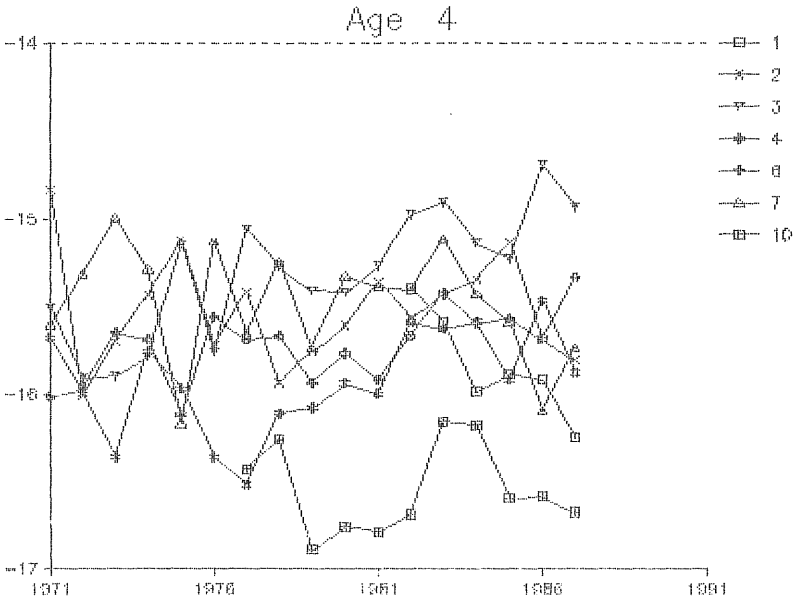
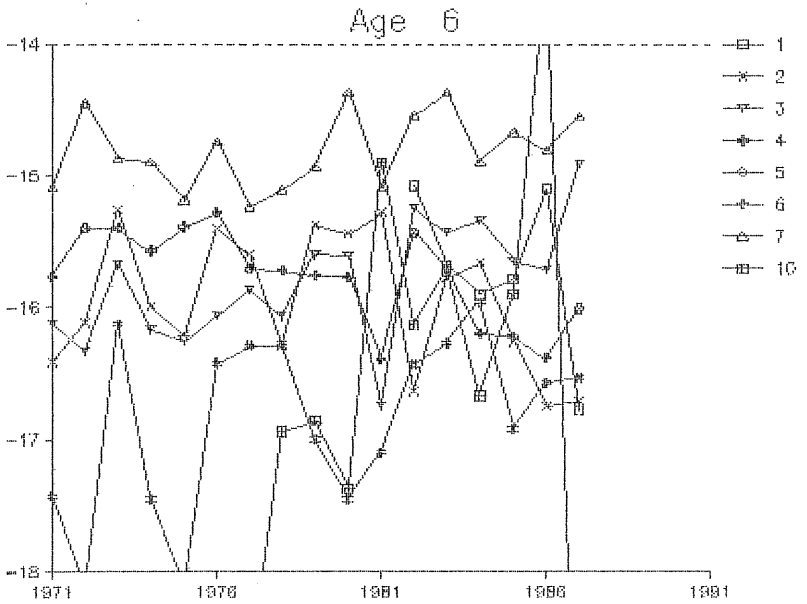


Figure 10.1 (cont'd)



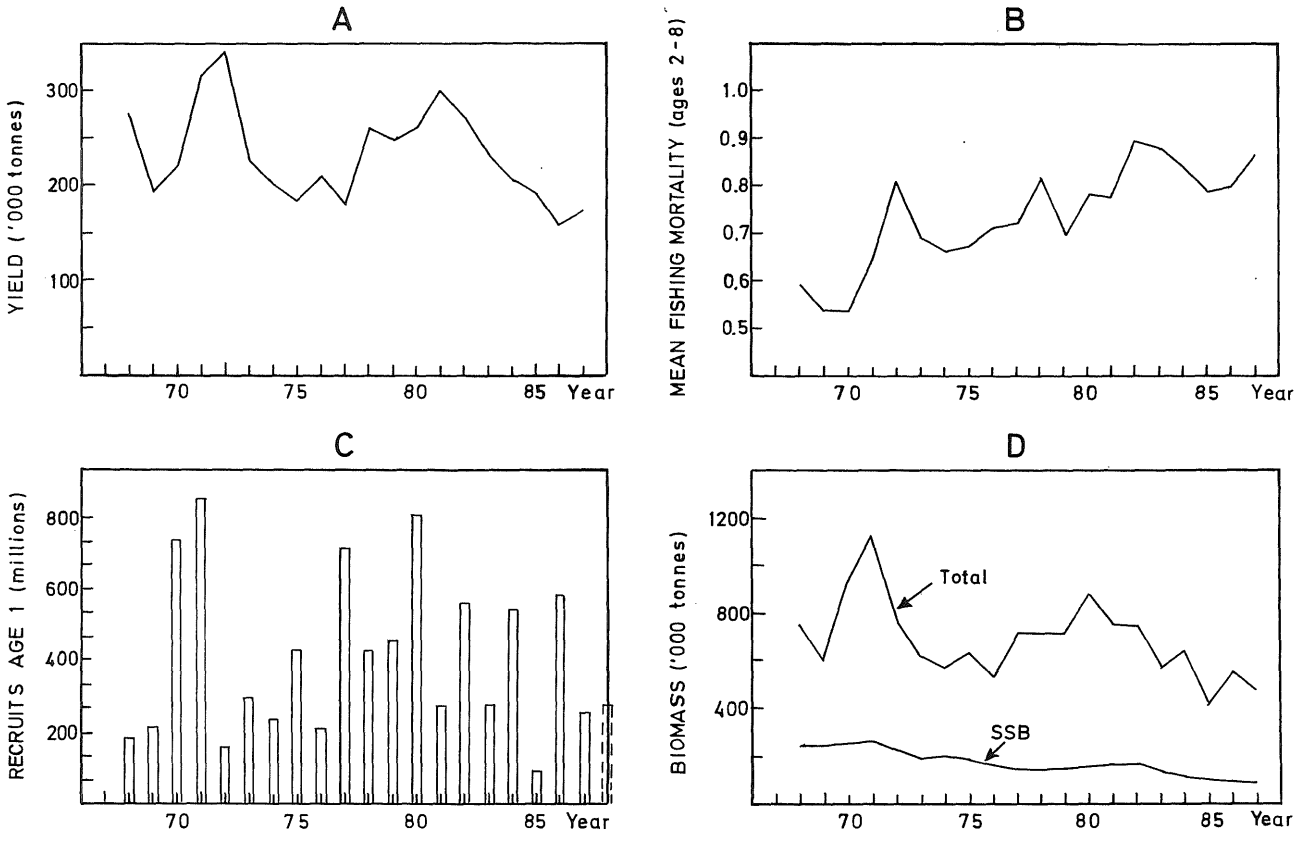


Figure 10.2 North Sea Cod.

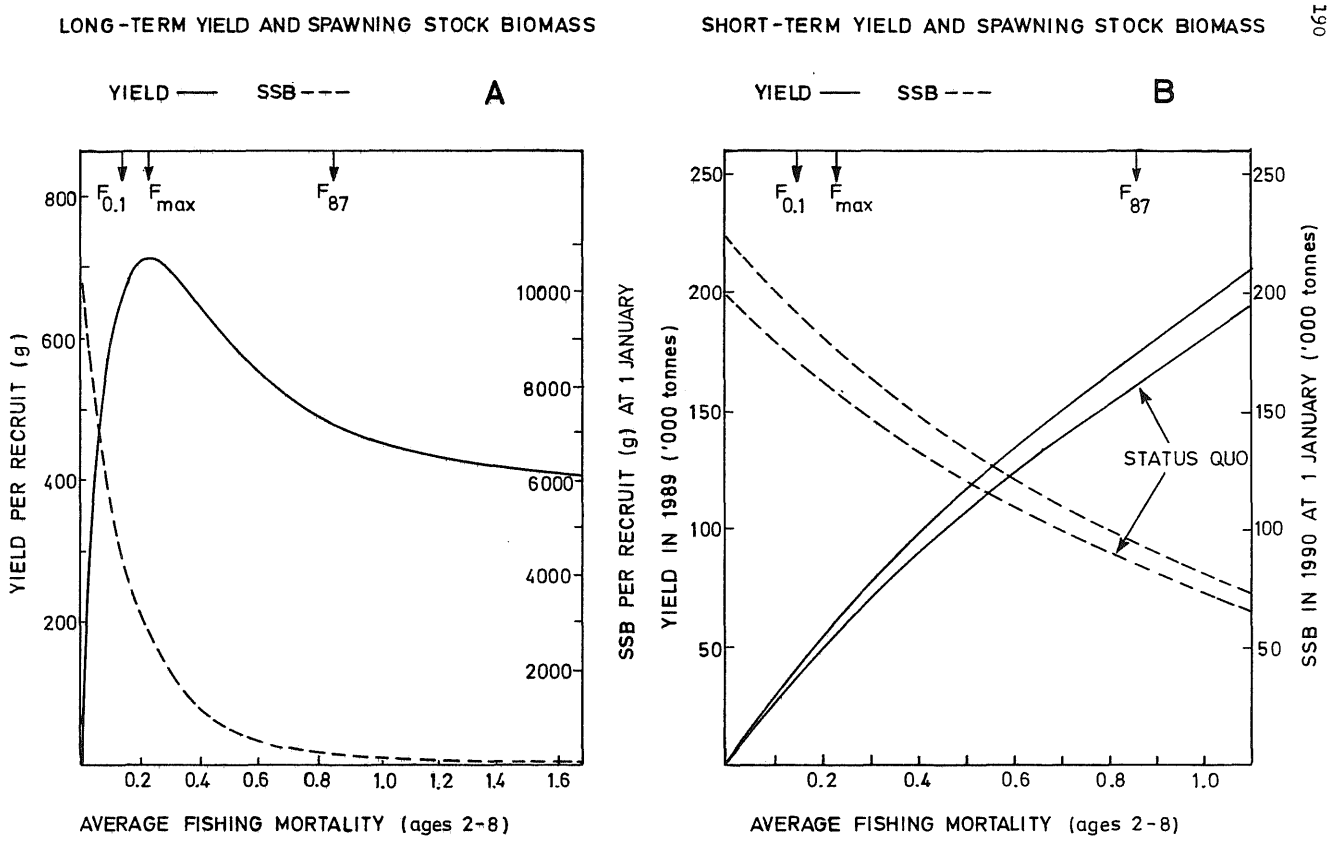
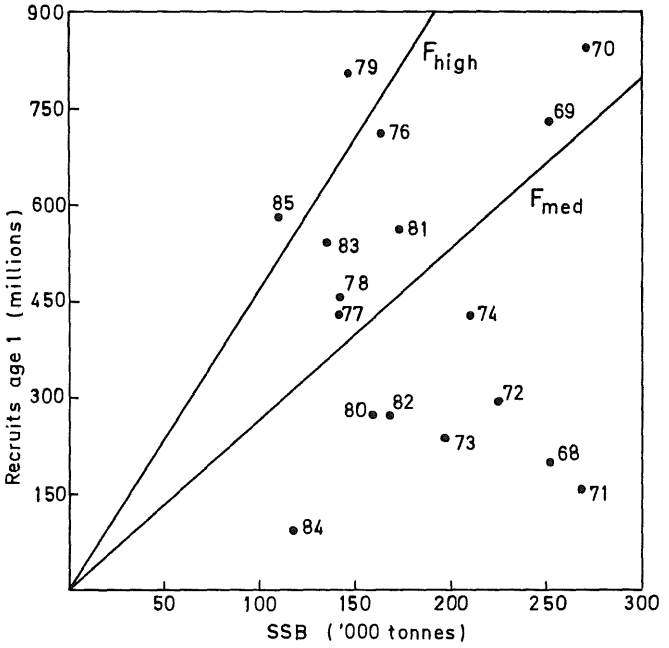


Figure 10.3 North Sea Cod.

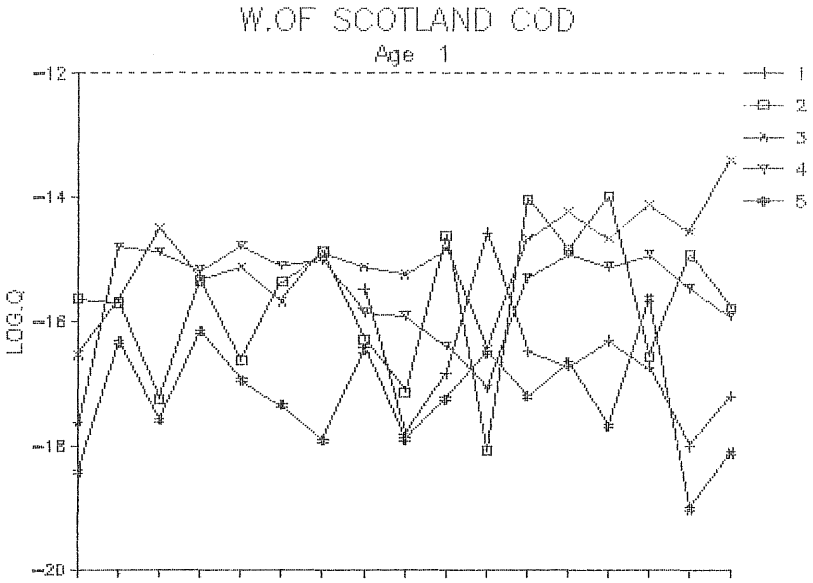
Figure 10.4 Relation between SSB and recruitment. North Sea Cod.

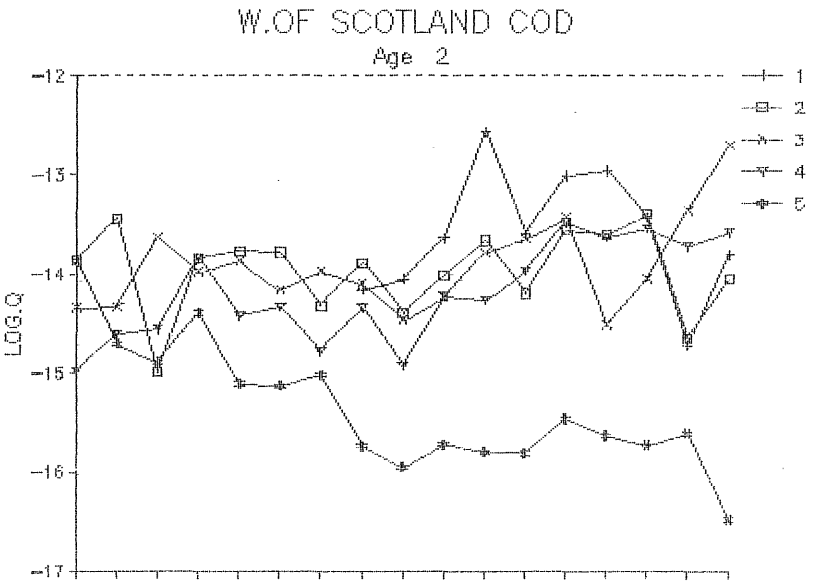


F_{med}: 0.376 SSB per recruit

F_{high}: 0.214 SSB per recruit

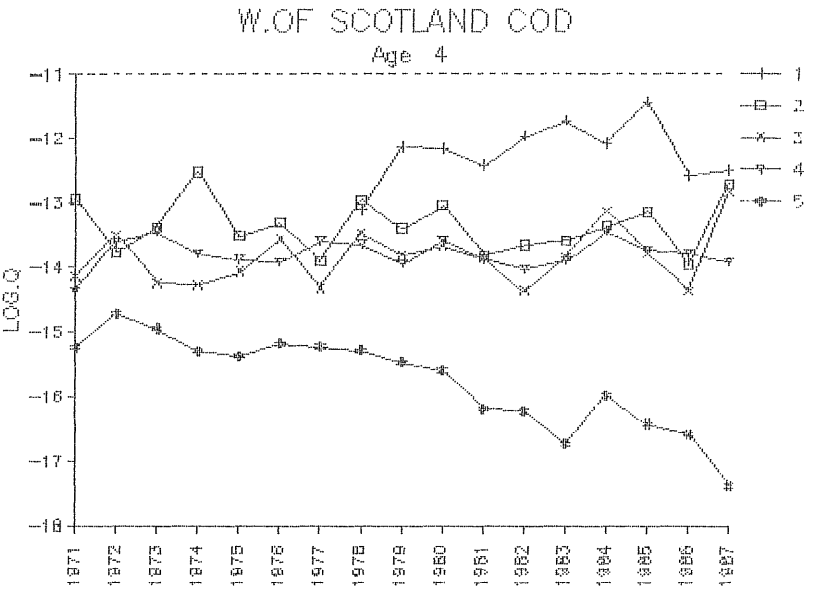
Figure 11.1 Estimated log catchability through time for various ages of COD in Division VIa.





1 : FRAALL 2 : SCOTRL 3 : SCOSEI 4 : SCOLTR 5 : SCONTR

Figure 11.1 (cont'd)



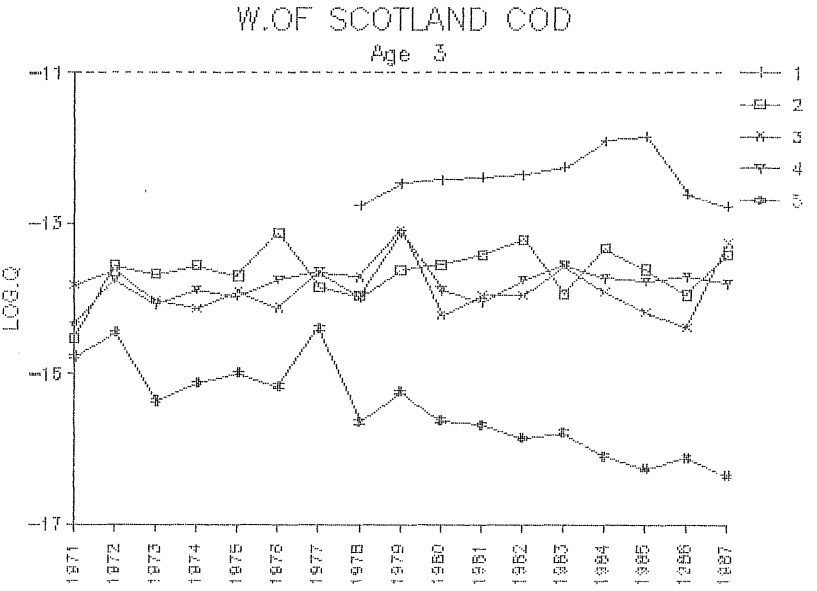
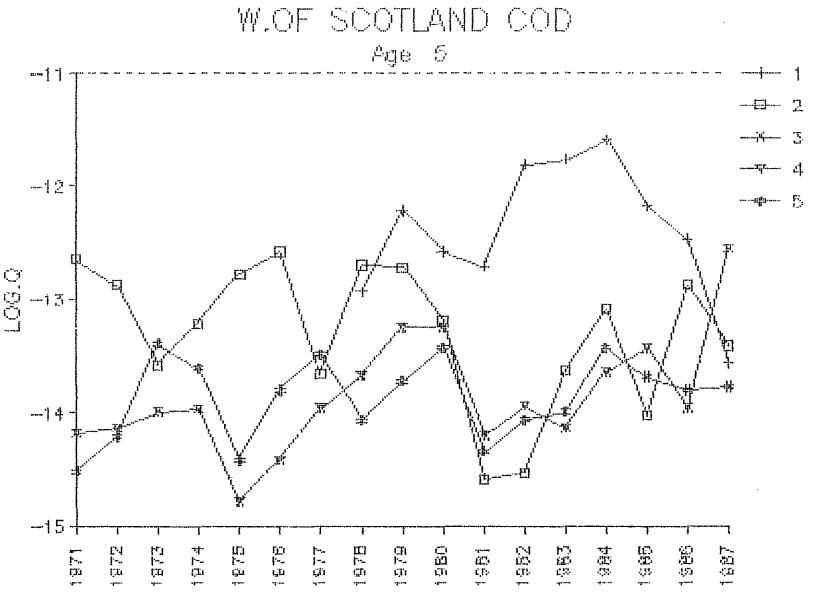


Figure 11.1 (cont'd)



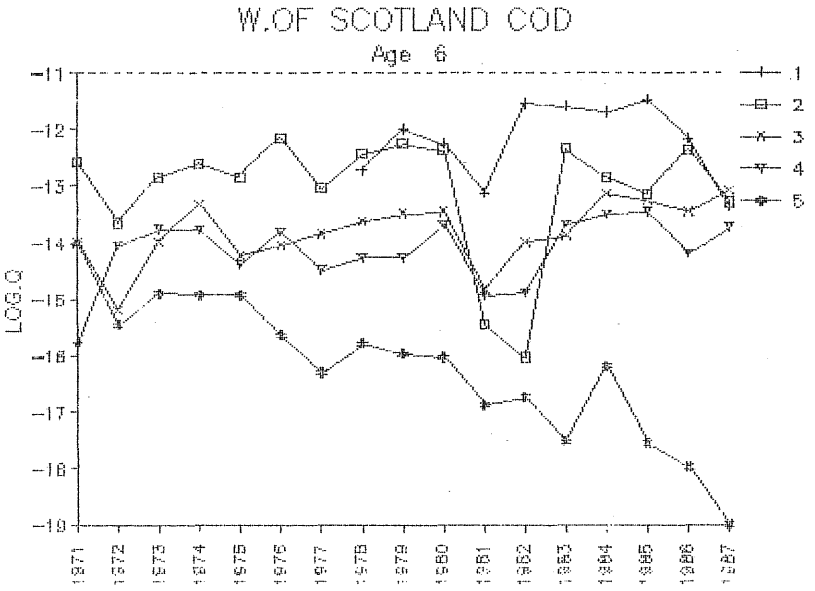
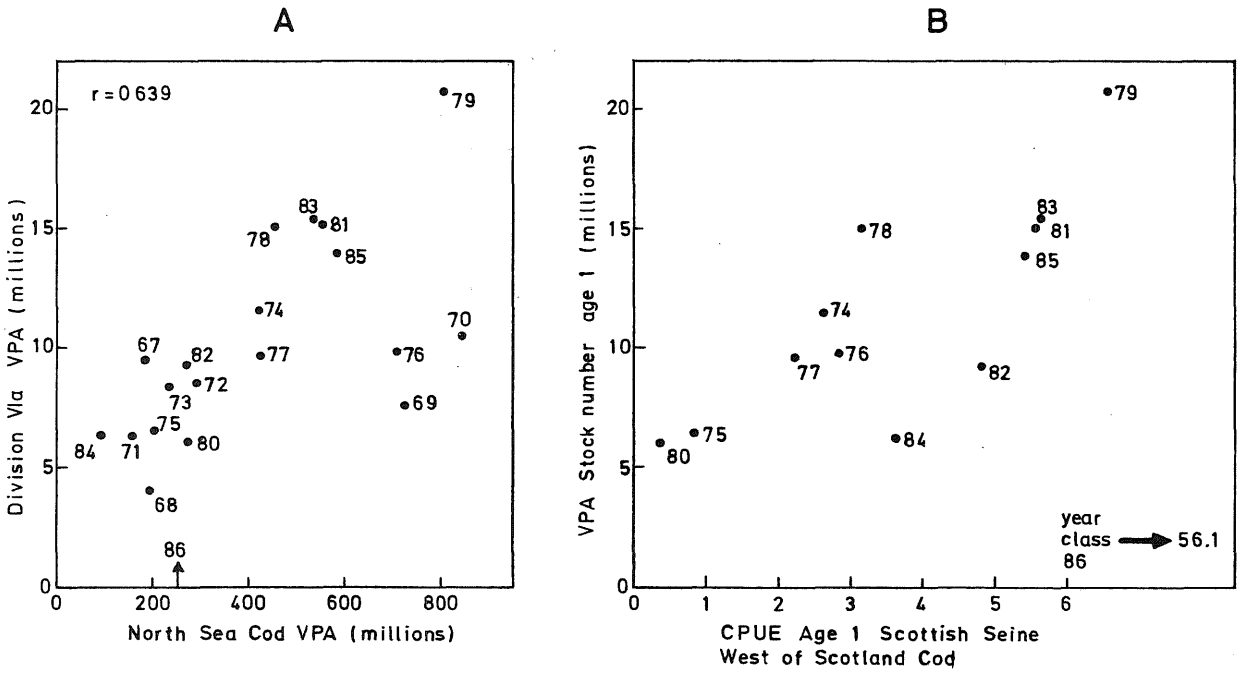
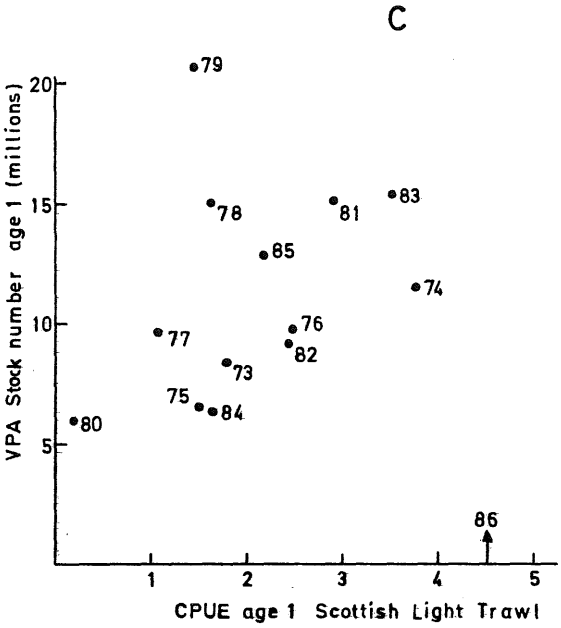


Figure 11.2 Cod in Division VIa.



(cont'd)

Figure 11.2 (cont'd)



West of Scotland Cod

(year classes indicated)

Regression equation:

$y = 2.22\ x + 6.04 \quad r = 0.61$

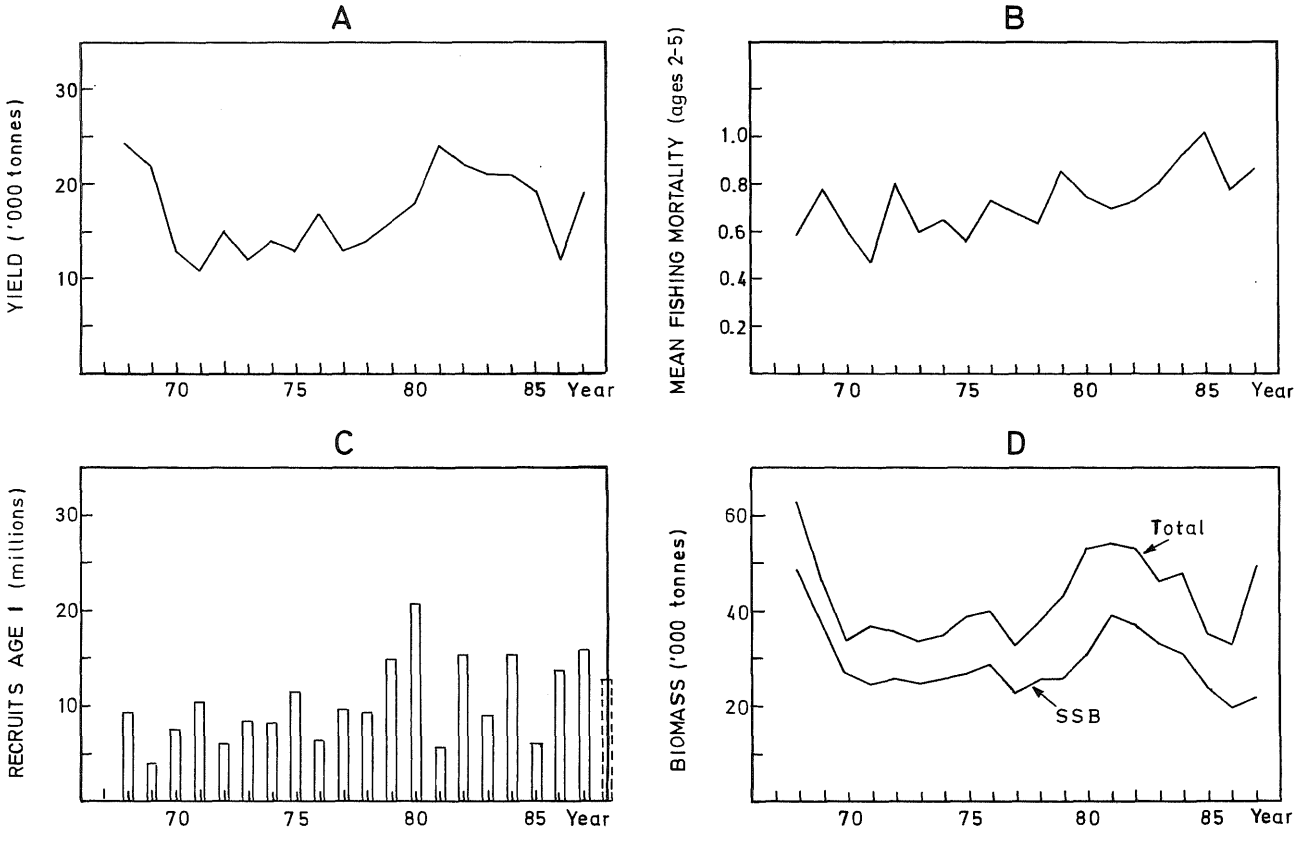


Figure 11.3 Cod in Division VIa (West of Scotland).

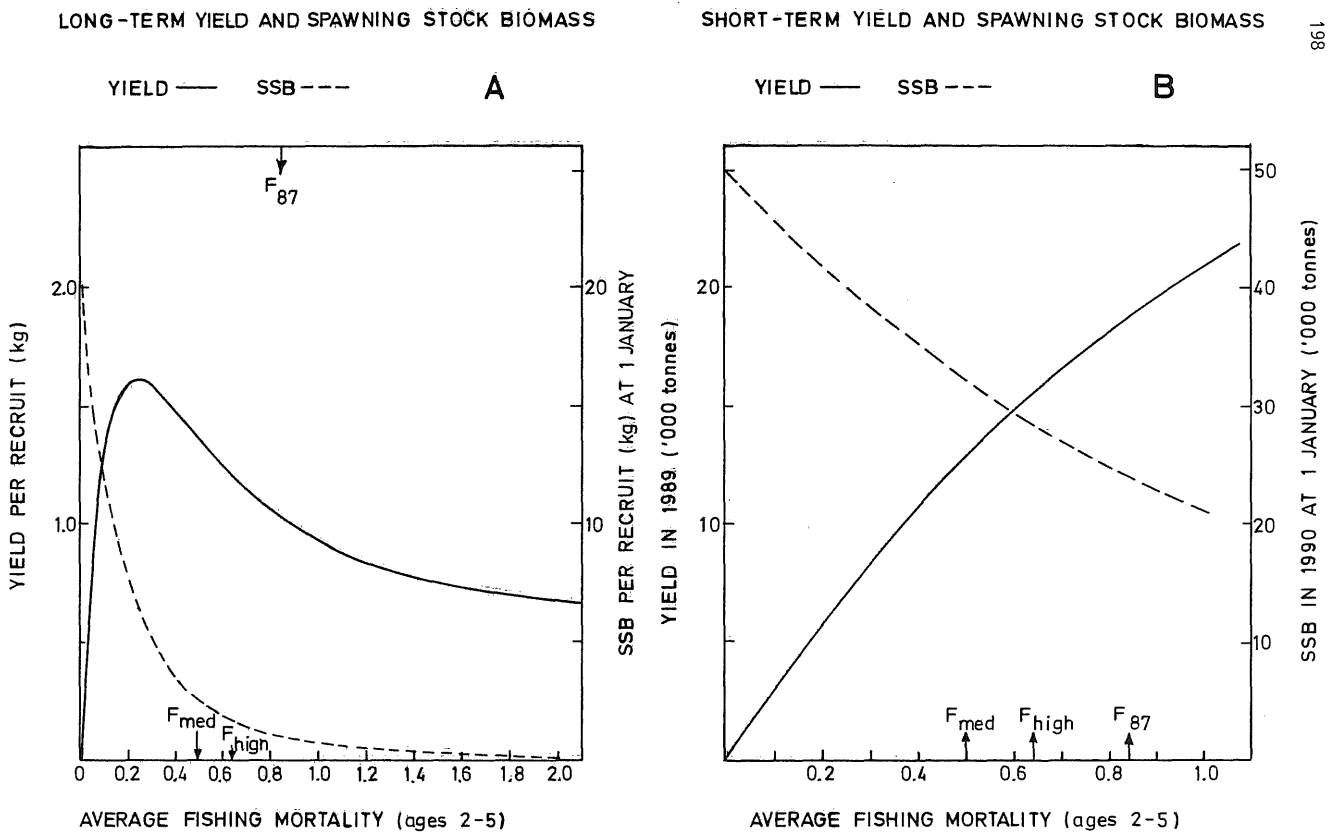
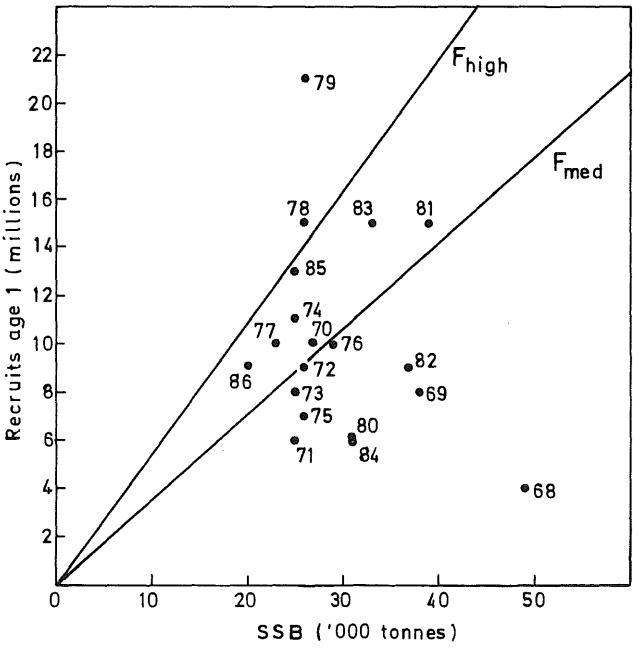


Figure 11.4 Cod in Division VIa.

Figure 11.5 Cod in Division VIa.
Relation between SSB and recruitment.



F_{med}: SSB/recr. 2.813 = 0.5

F_{high}: SSB/recr. 1.835 = 0.64

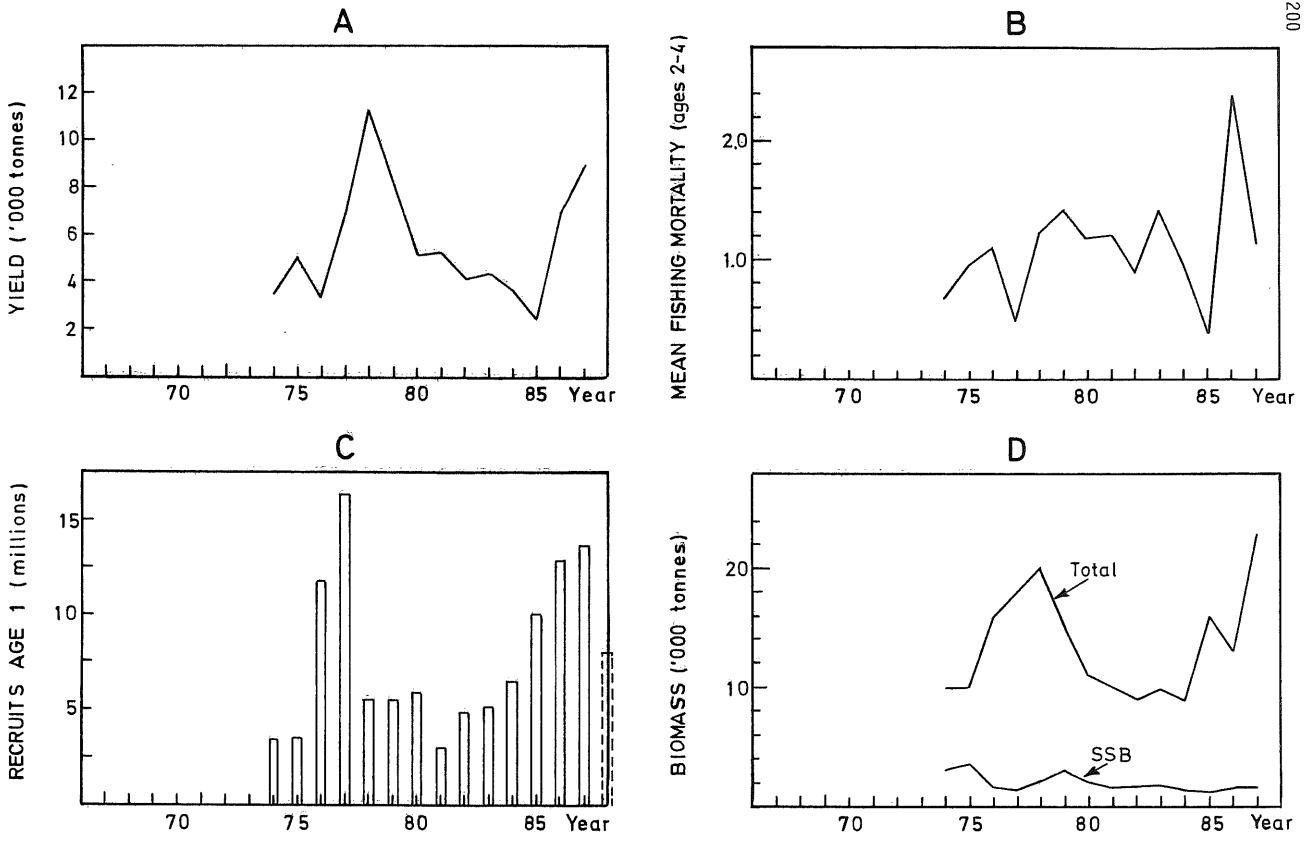


Figure 13.1.1 Cod in Divisions VIId,e.

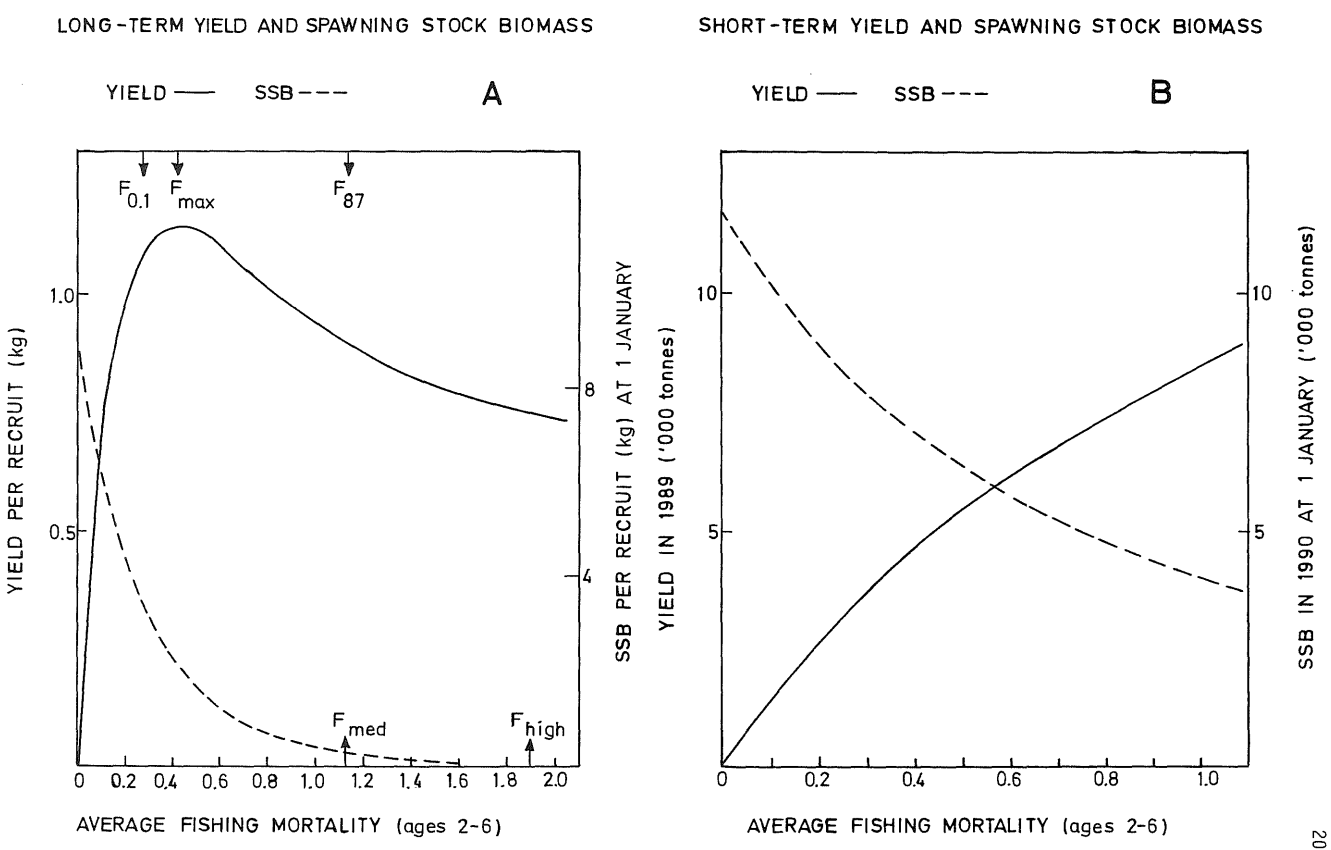
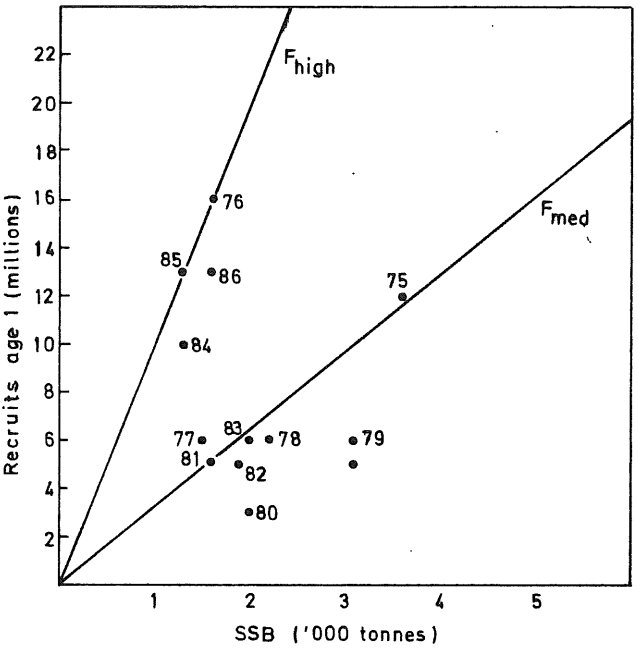


Figure 13.1.2 Cod in Divisions VIId,e.

Figure 13.1.3 Cod in Divisions VIId,e.
Relation between SSB and recruitment.



F_{med}: SSB/R 0.313 = 1.13

F_{high}: SSB/R 0.101 = 1.90

Figure 13.1.4 Cod in Divisions VIId,e.
Relation between cod in Divisions VIId,e and Sub-area IV.

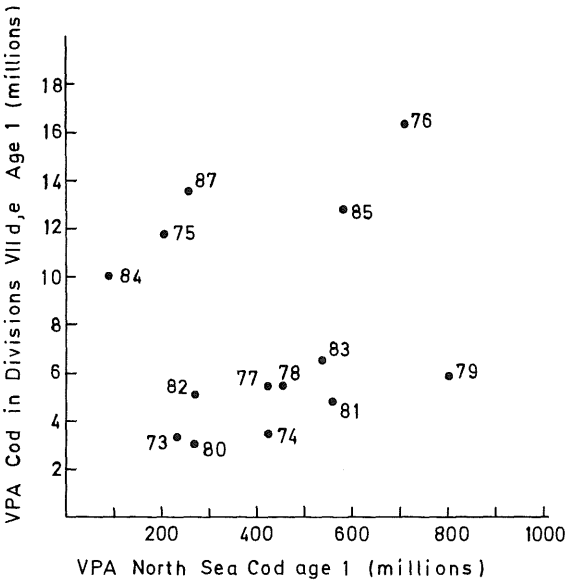


Figure 14.1 Estimated log catchability through time for various ages of HADDOCK in Sub-division IV.

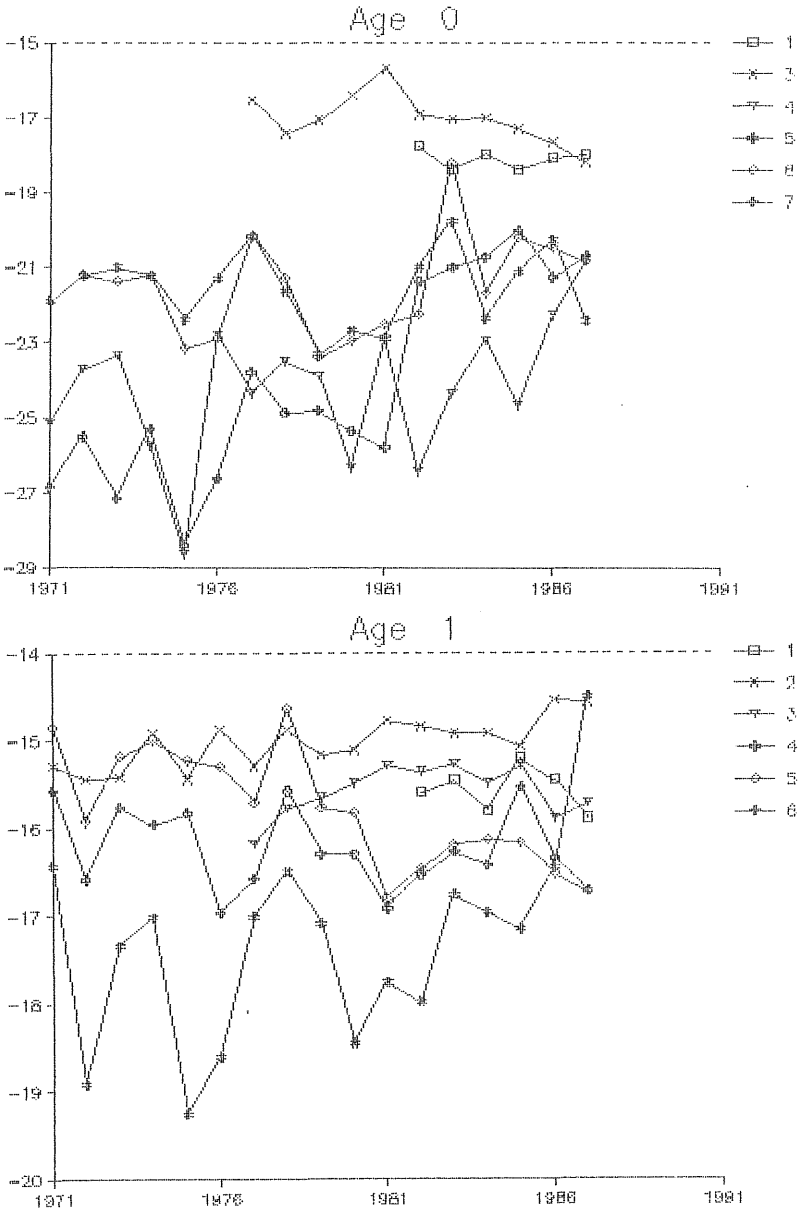


Figure 14.1 (cont'd)

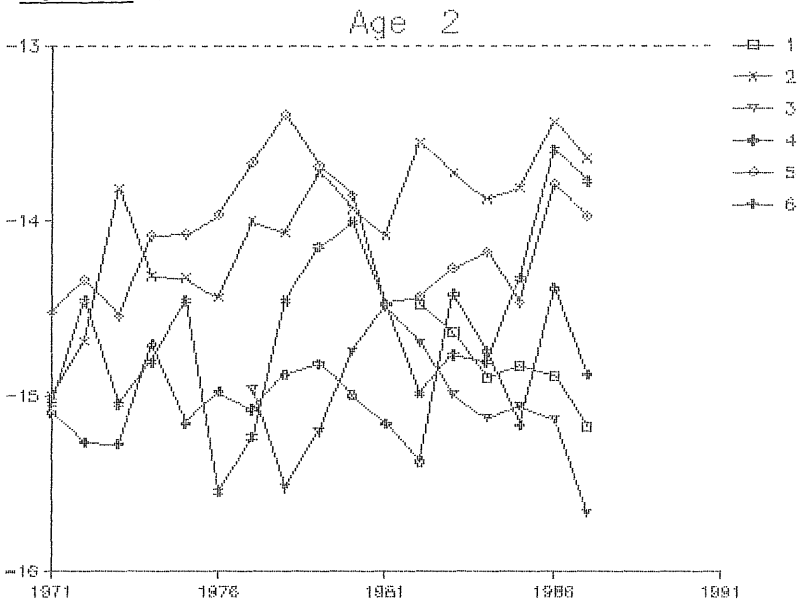
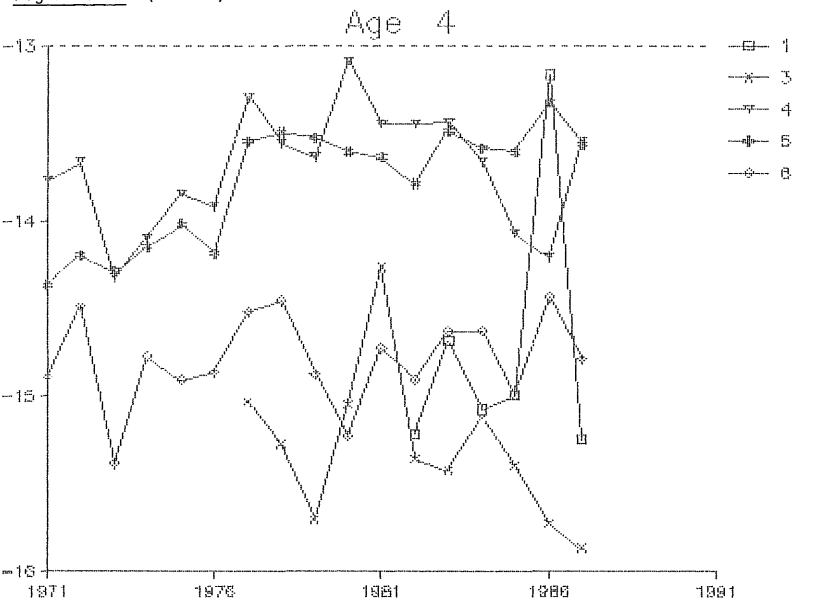
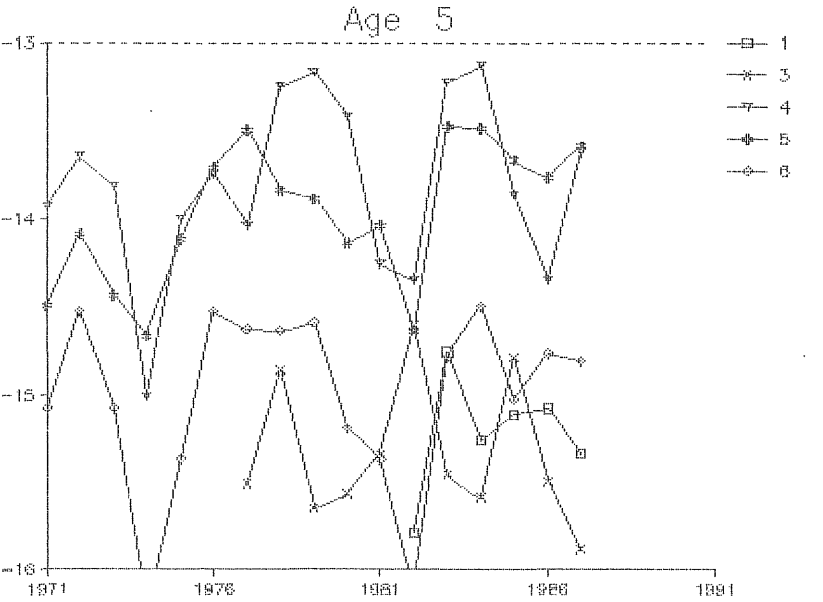


Figure 14.1 (cont'd)





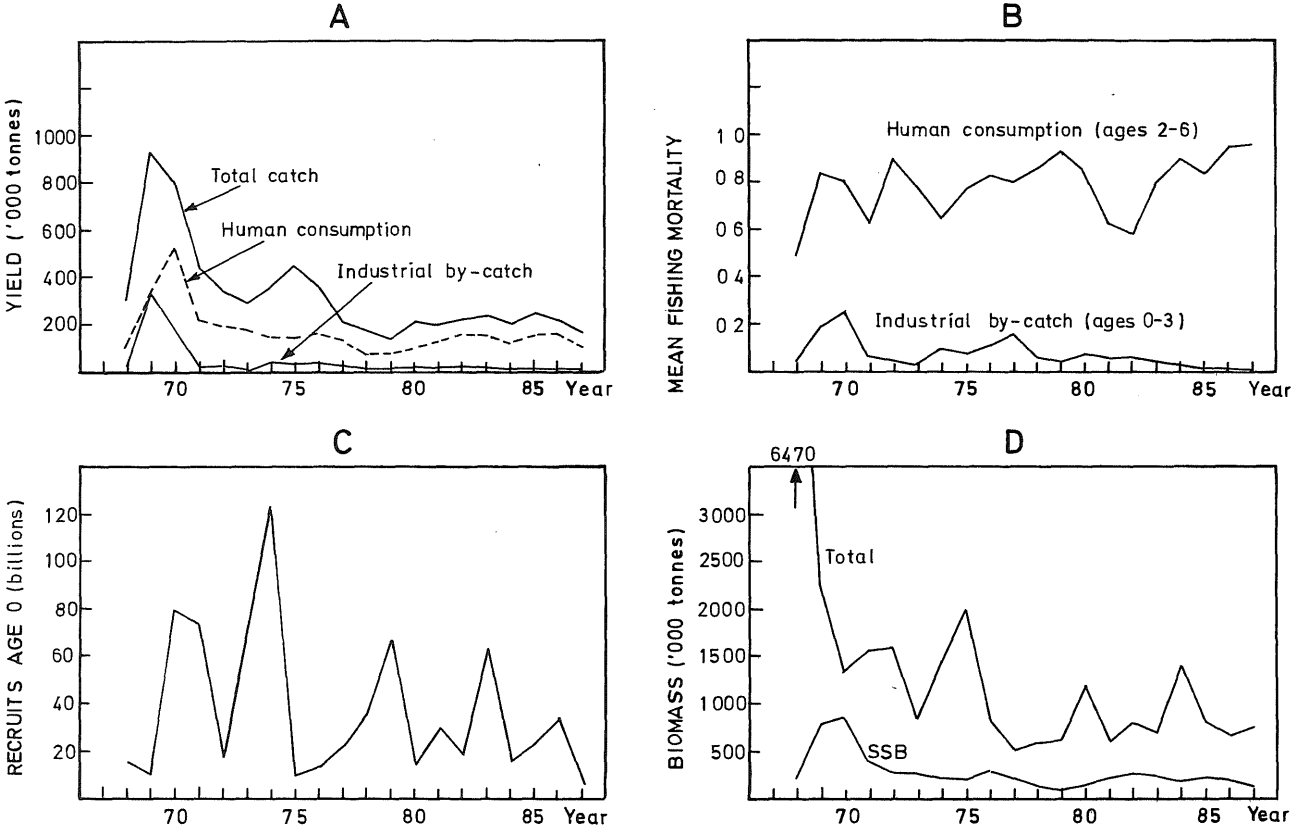


Figure 14.2 North Sea Haddock.

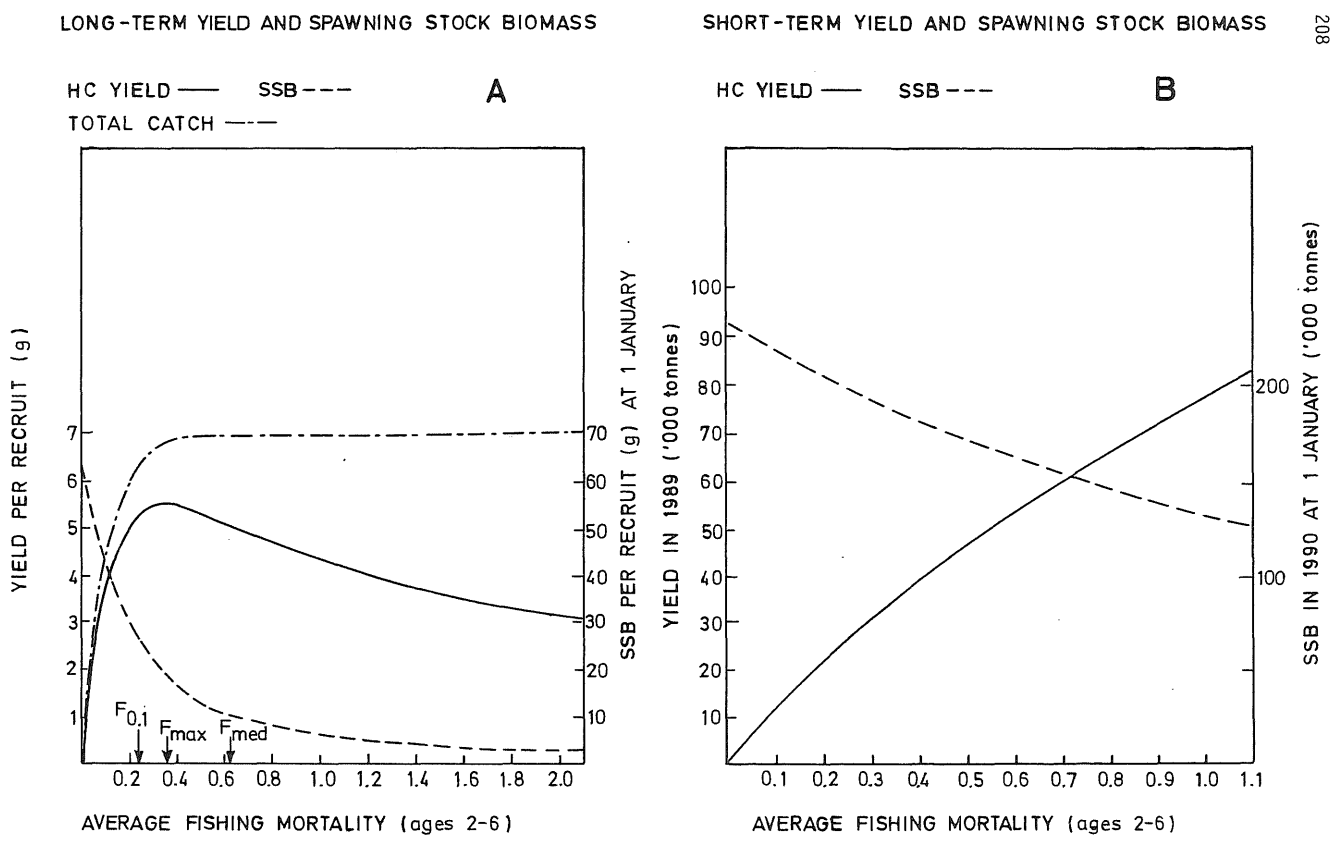


Figure 14.3 North Sea Haddock.

Figure 14.4 North Sea Haddock.
Relation between SSB and recruitment.

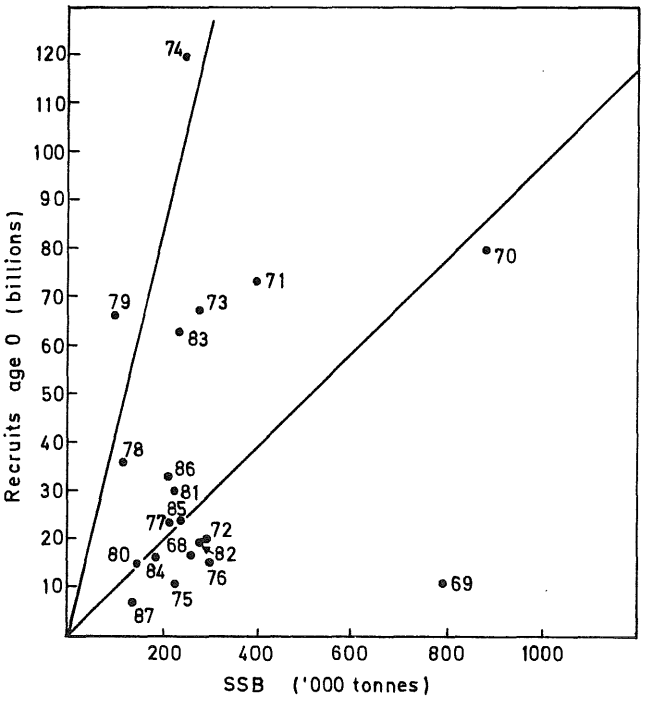
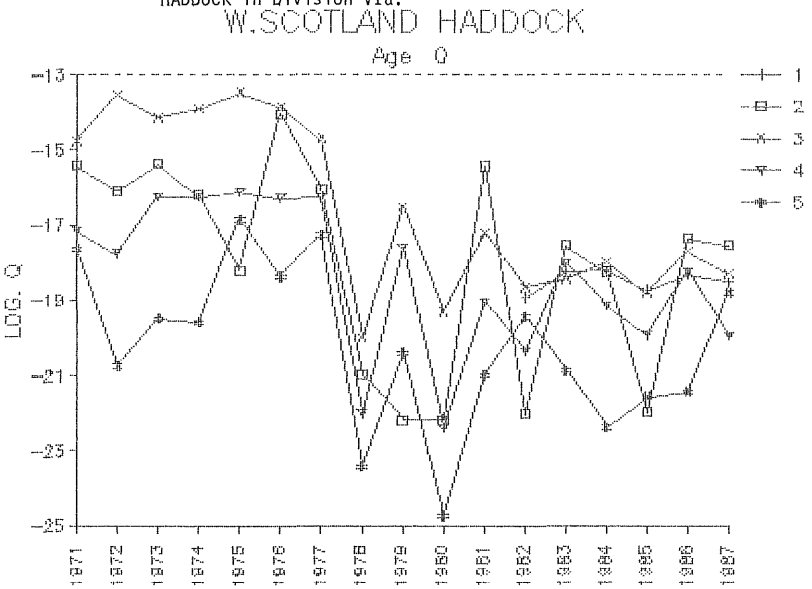
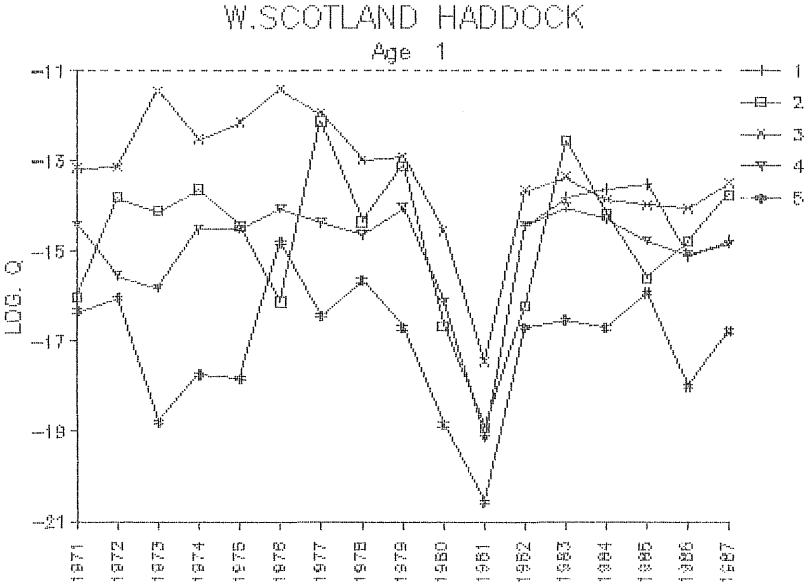


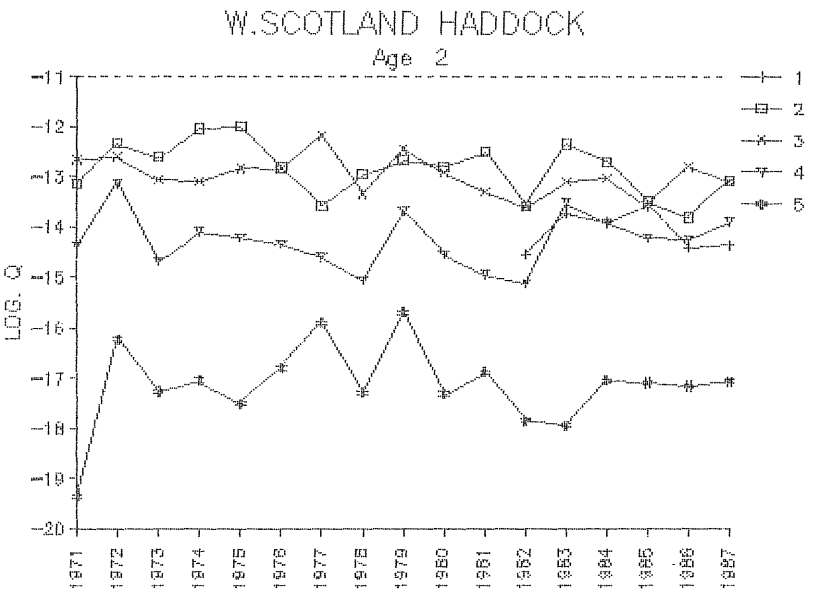
Figure 15.1 Estimated log catchability through time for varioua ages of HADDOCK in Division VIa.





1 : FRAALL 2 : SCOTRL 3 : SCOSEI 4 : SCOLTR 5 : SCONTR

Figure 15.1 (cont'd)



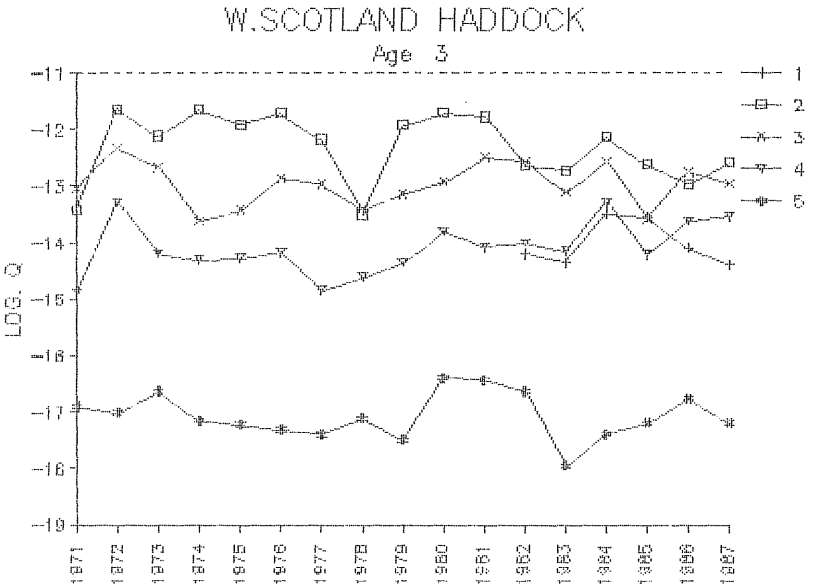
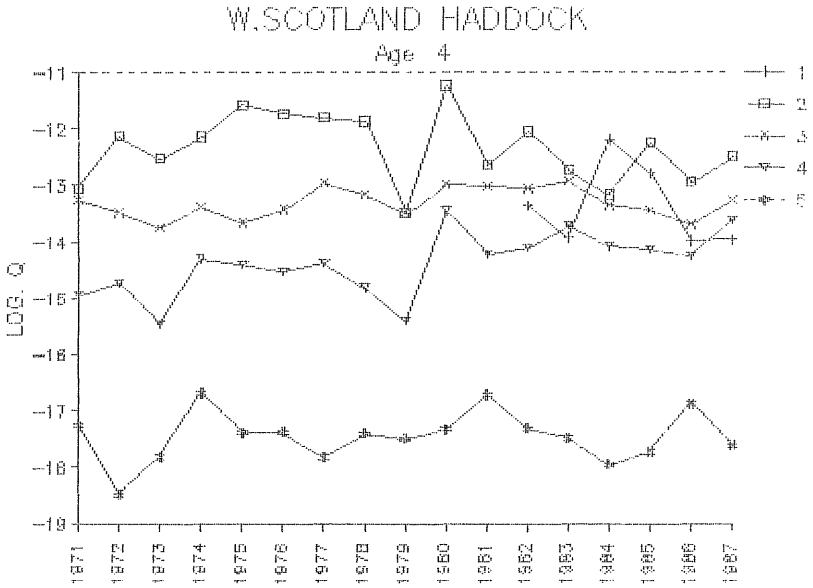


Figure 15.1 (cont'd)



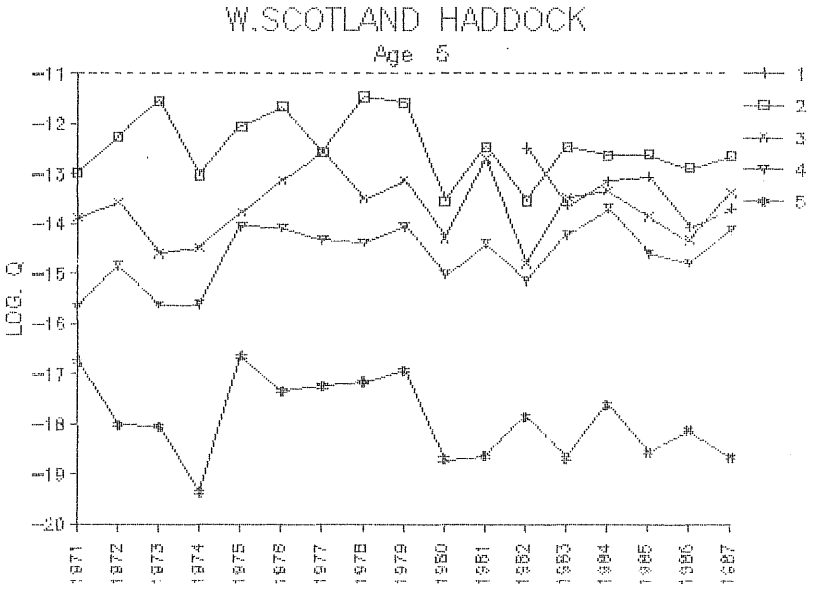


Figure 15.2 Haddock in Division VIa. Partial F and effort plotted against year for Scottish gears.

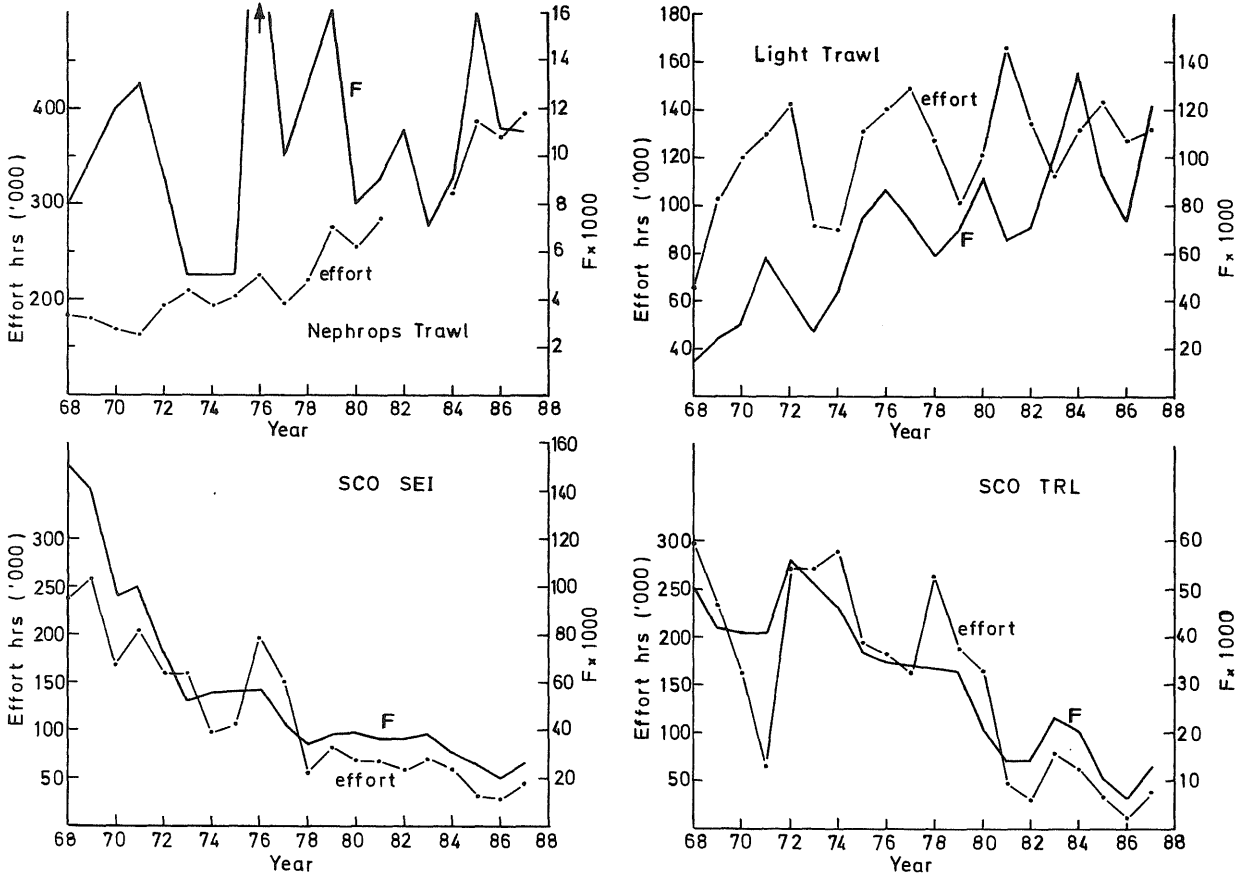
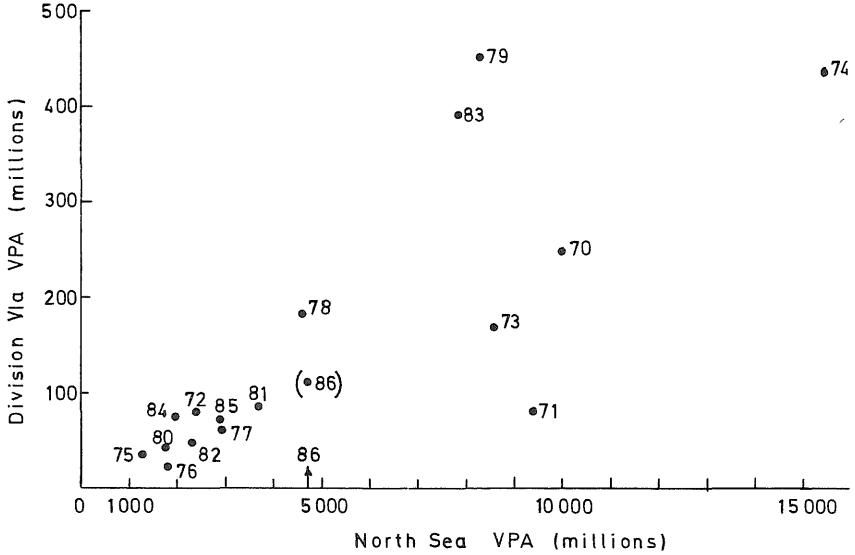


Figure 15.3a Relationship between North Sea Haddock CPA at age 1 and VPA at age 1 in Division VIa. Indices refer to year classes.



$N_{VIa} = -99.25 + 0.0285\ N_{IV}$ $N_{VIa\ pred}\ (86) = 135.0$ million

$r = 0.7949$

Figure 15.3b Haddock in Division VIa. VPA against Scottish seine CPUE.

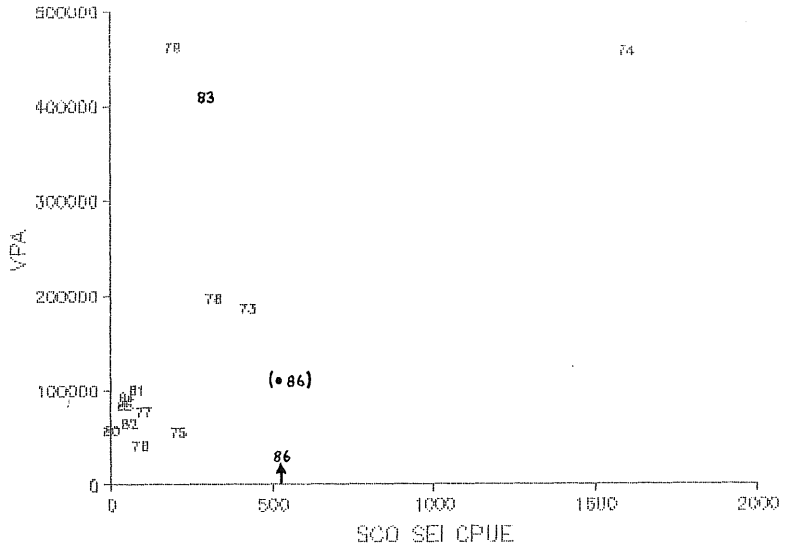
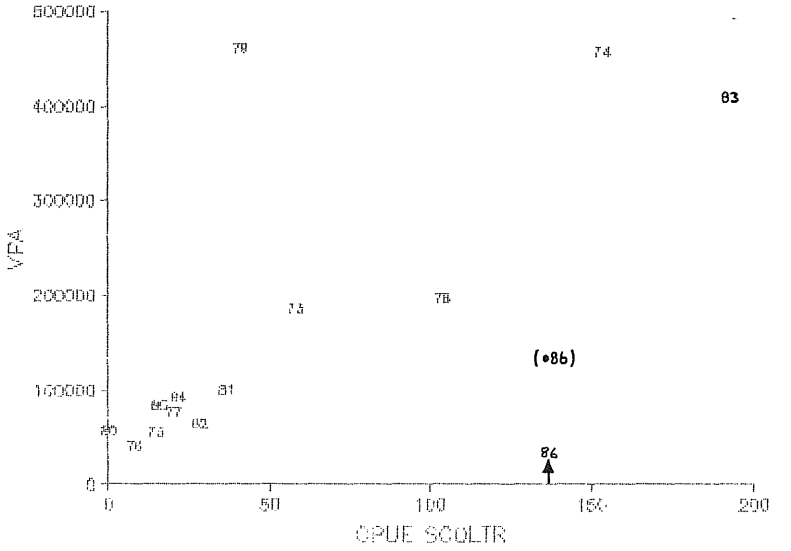


Figure 15.3c Haddock in Division VIa. VPA plotted against Scottish Light trawl CPUE.



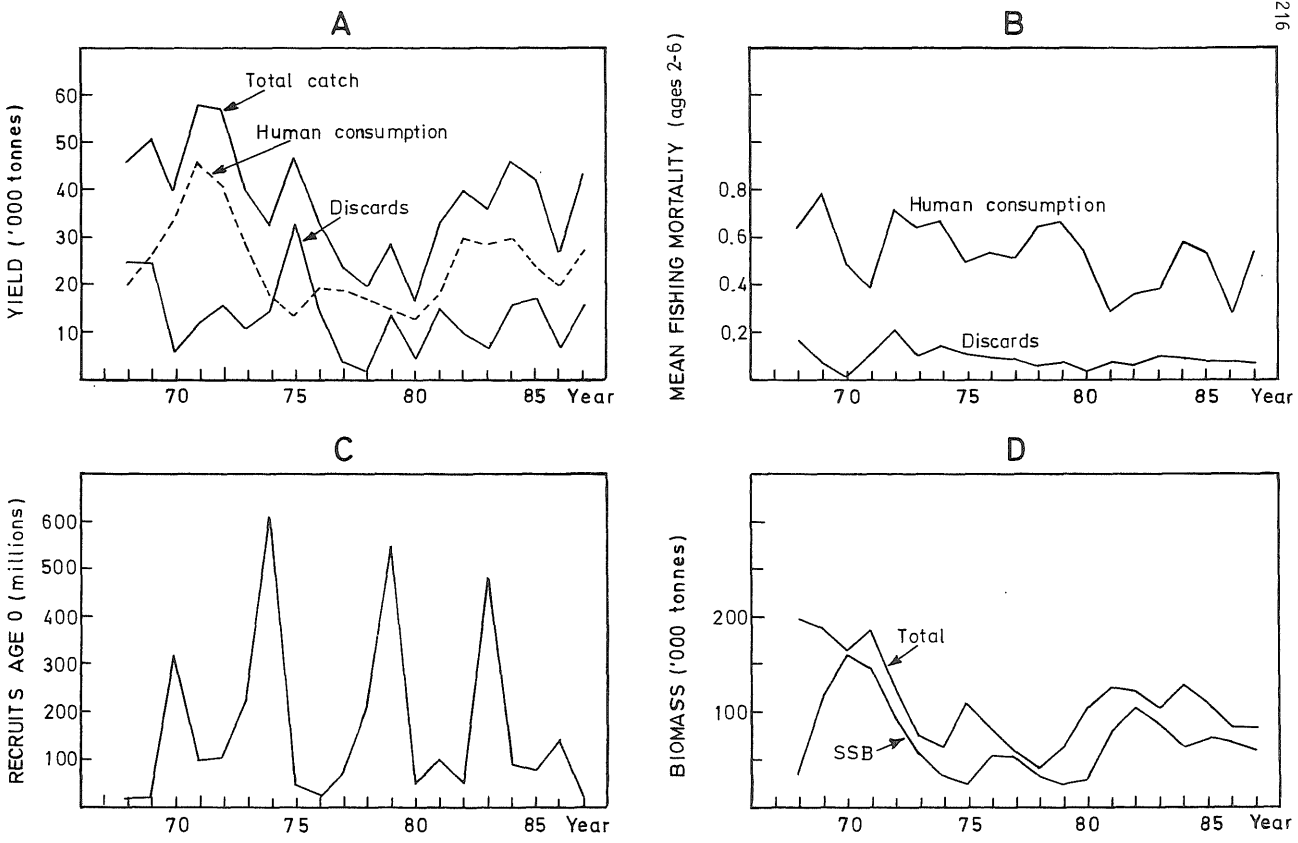
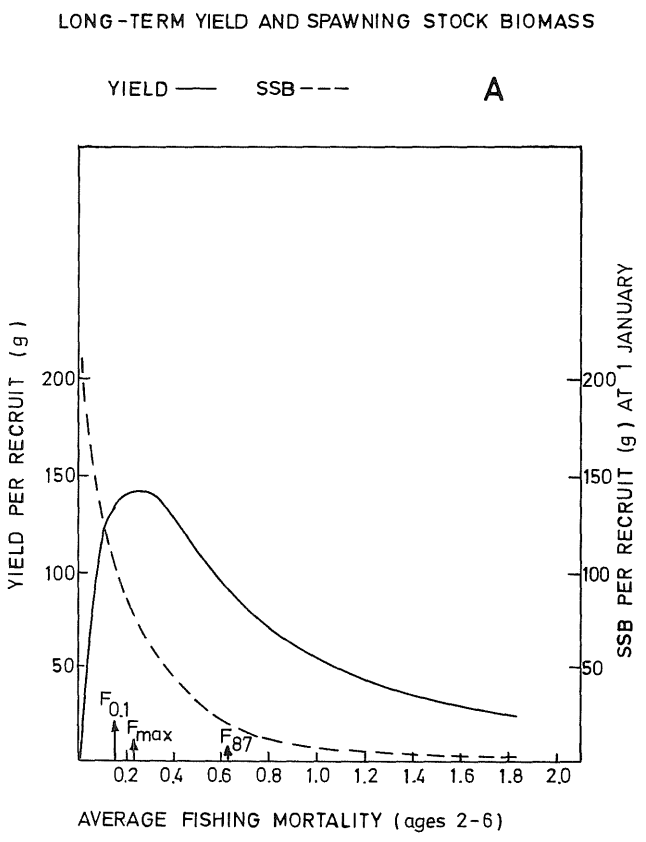


Figure 15.4 Haddock in Division VIa.



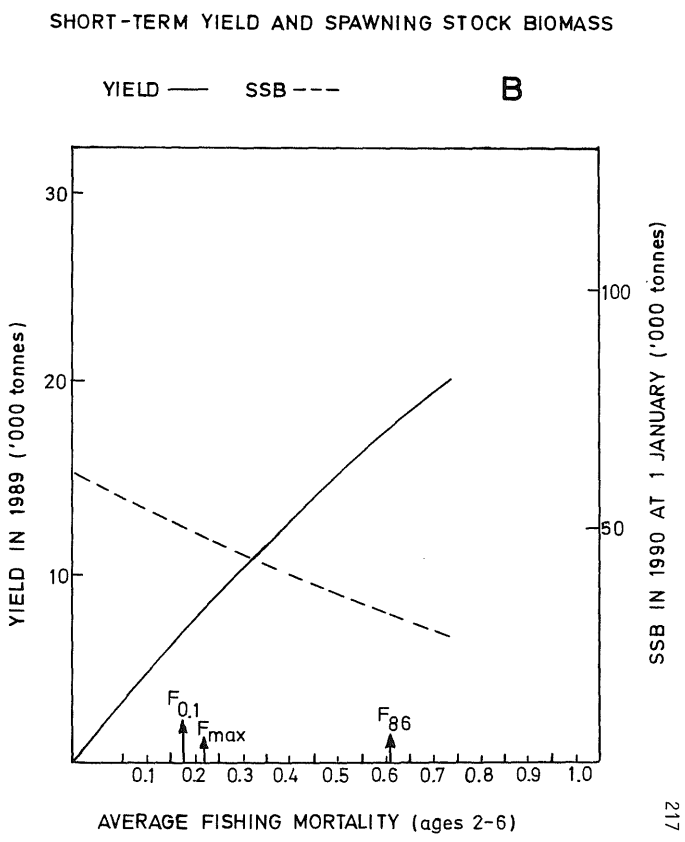
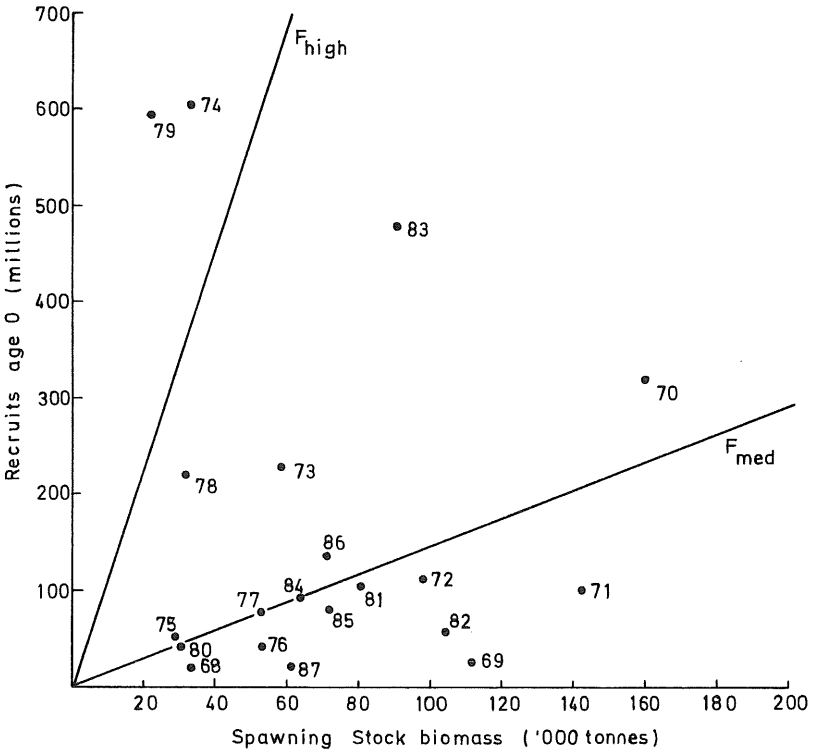


Figure 15.5 Haddock in Division VIa.

Figure 15.6 Haddock in Division VIa.
Scatter plot of stock and recruitment.



F_{high} = 0.00235

F_{med} = 0.2667

Figure 16.1 Haddock in Division VIb.
Estimated relative recruitment (i.e., year class) effect as estimated from SRMCM, plotted against year.

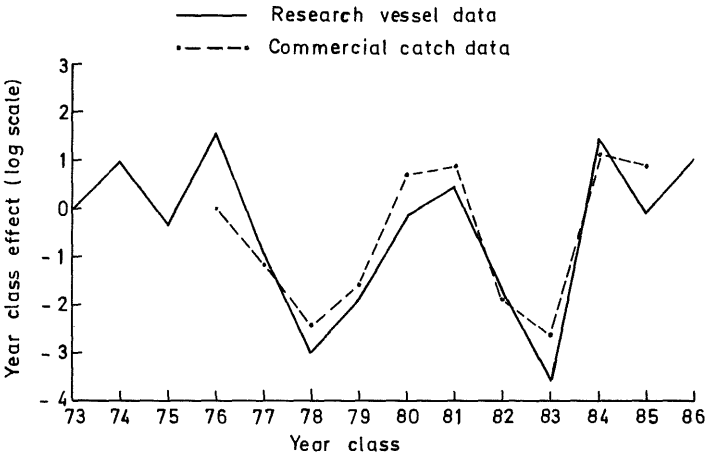
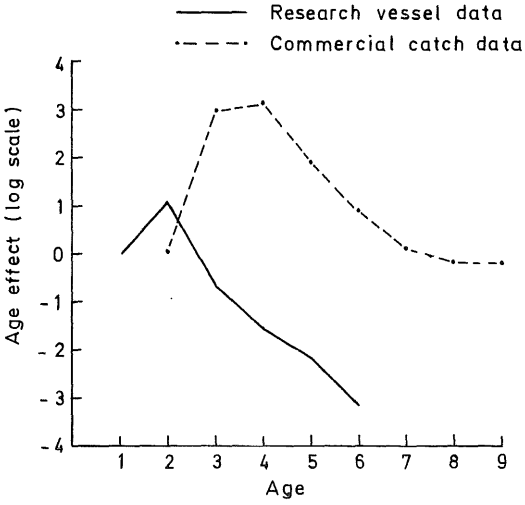


Figure 16.2 Haddock in Division VIb.
Estimated age effects from SRMCM, plotted against age.



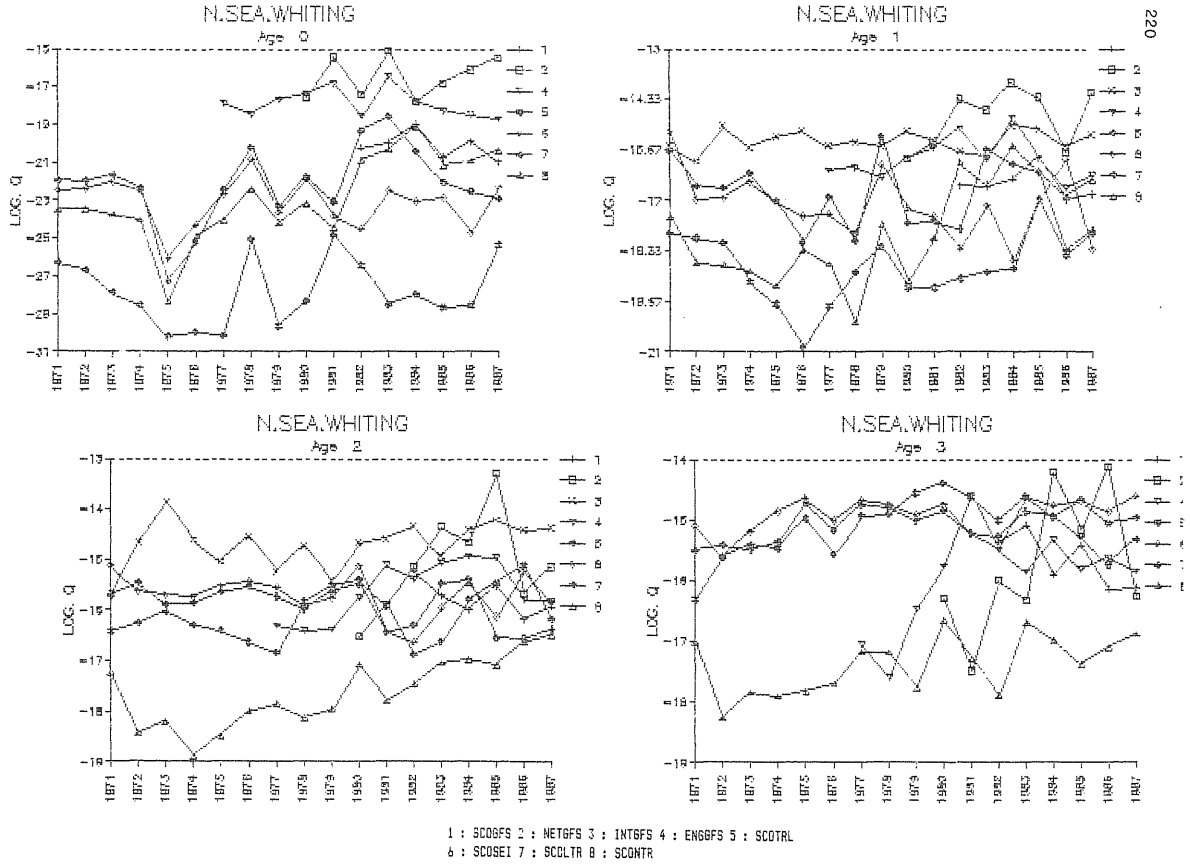
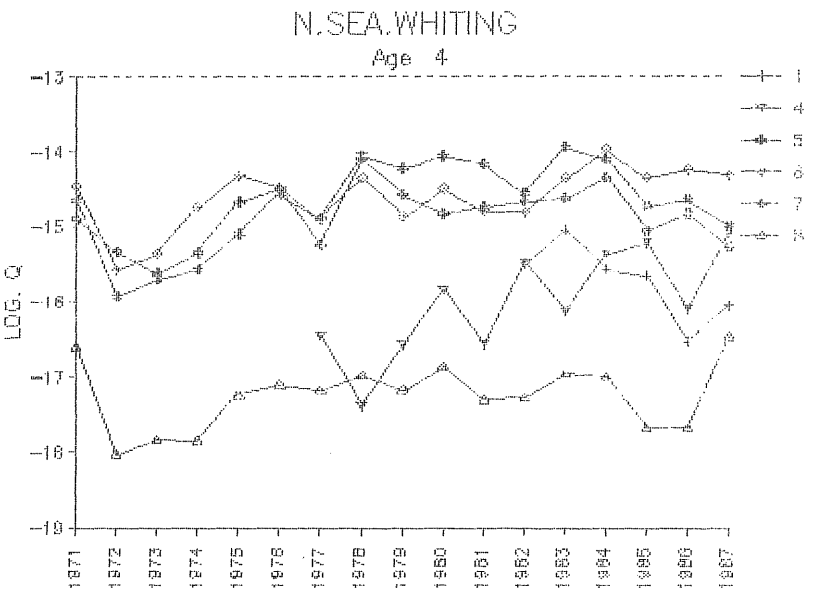
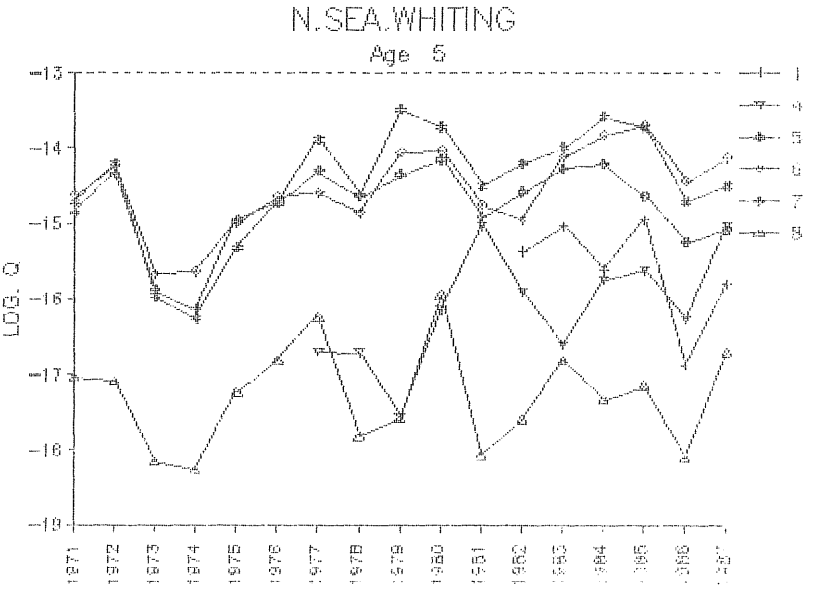


Figure 18.1 Estimated log catchability through time for various ages of WHITING in Sub-area IV.

Figure 18.1 (cont'd)





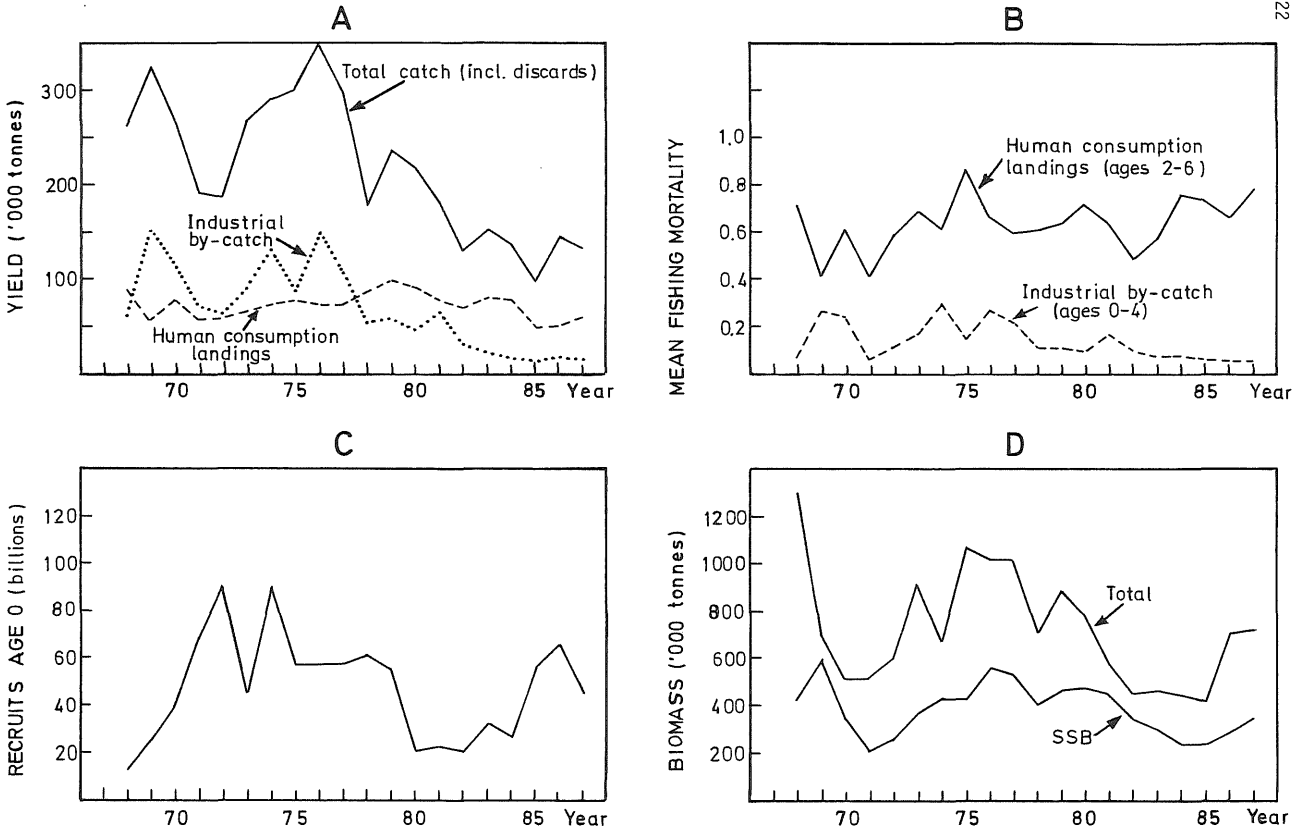


Figure 18.2 Whiting in Sub-area IV.

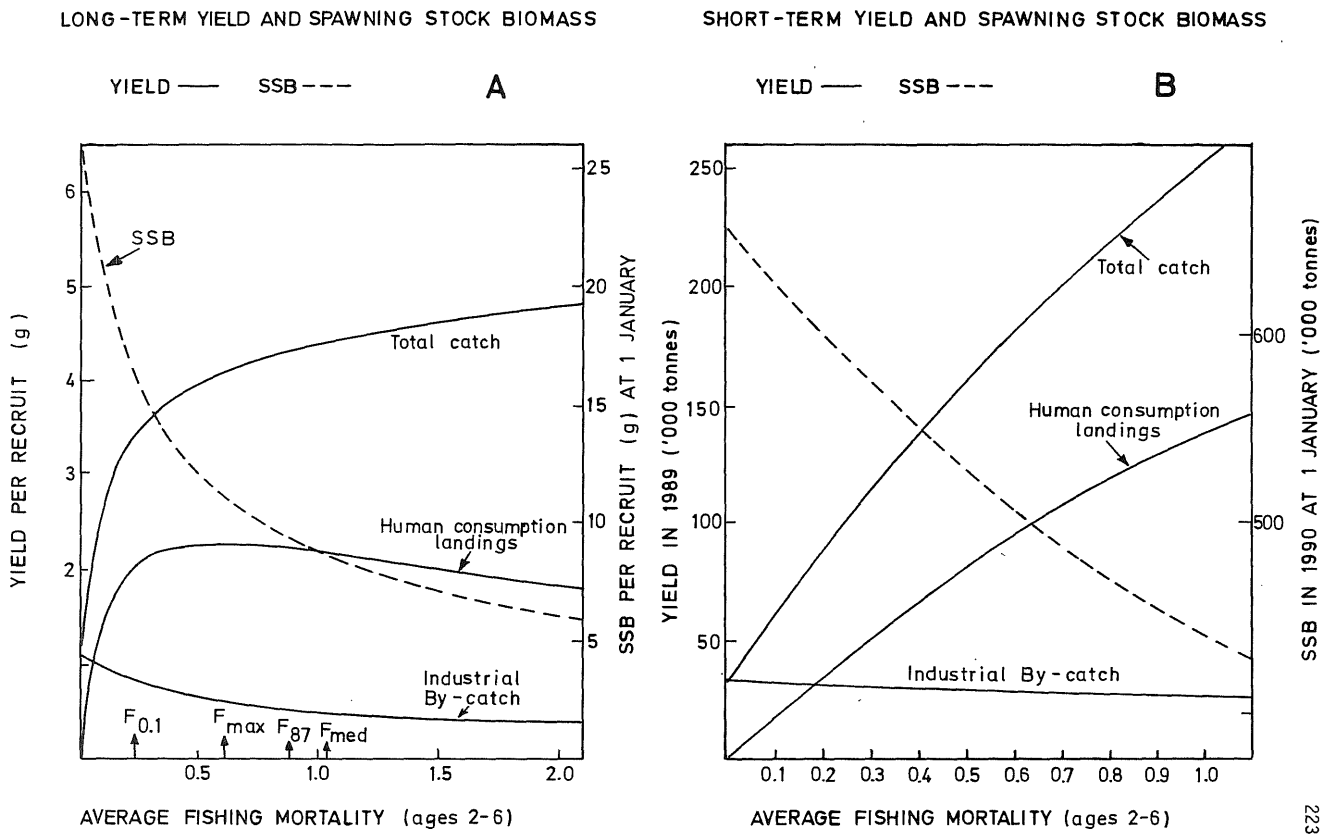


Figure 18.3a North Sea Whiting in Sub-area IV.

Figure 18.4 Whiting in Sub-area IV. Spawning stock vs. recruitment. Relation between SSB and recruitment.

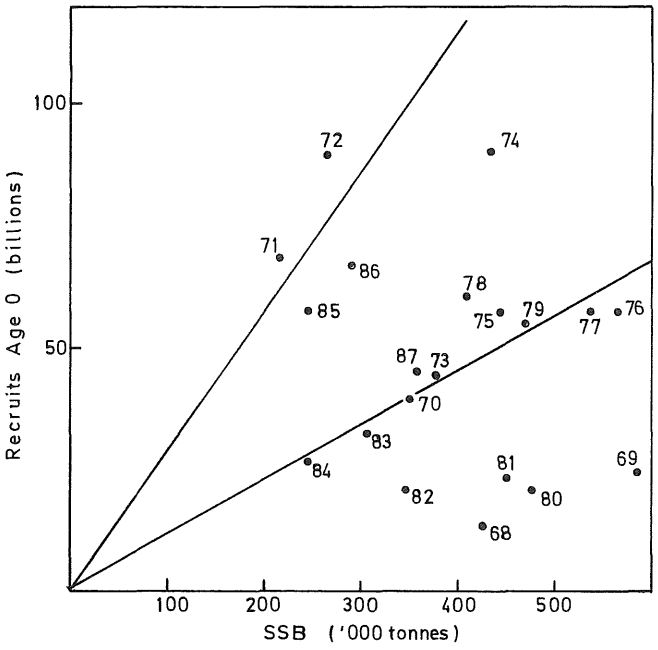
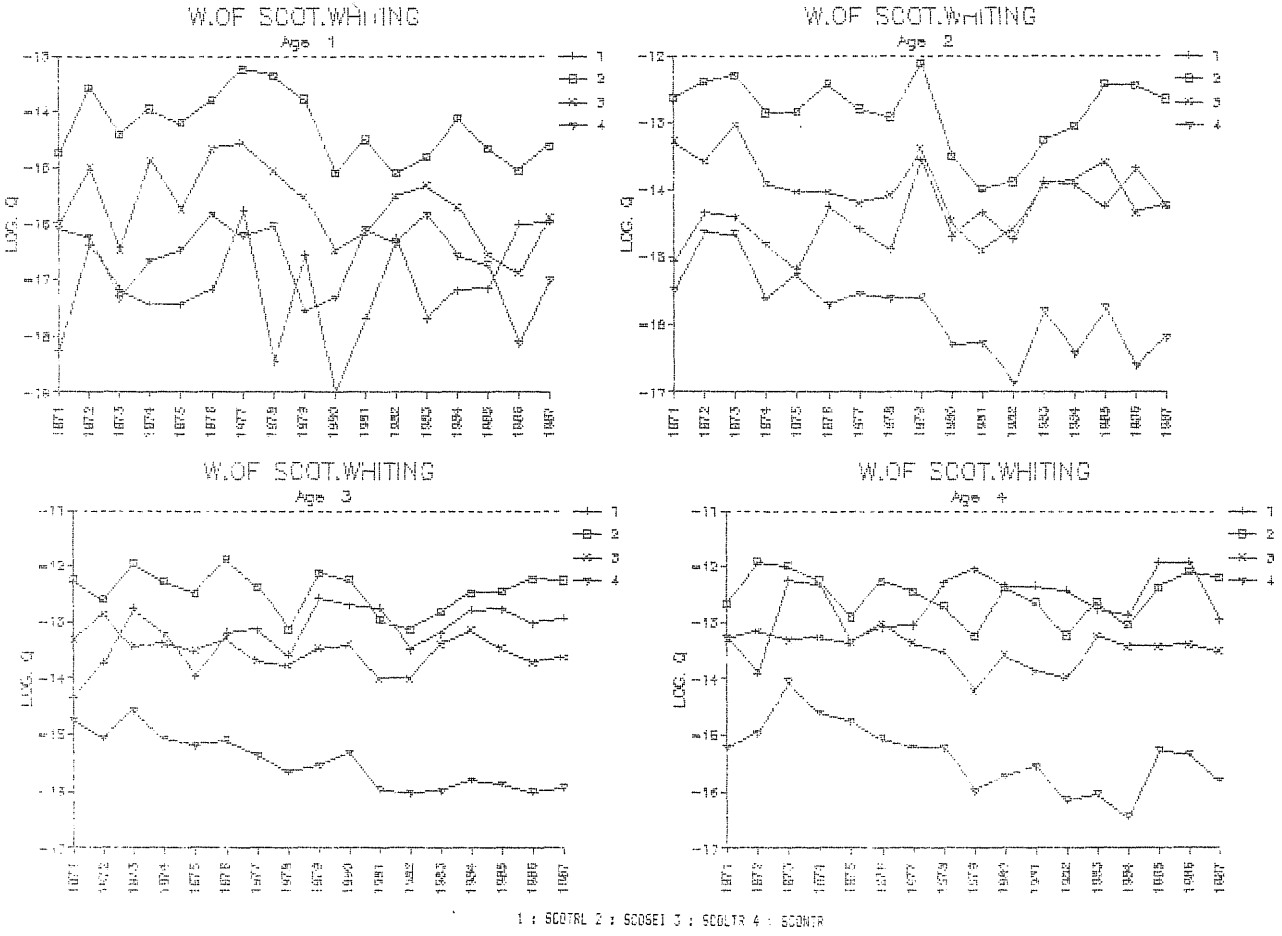


Figure 19.1 Estimated log catchability through time for various ages of WHITING in Division VIa.



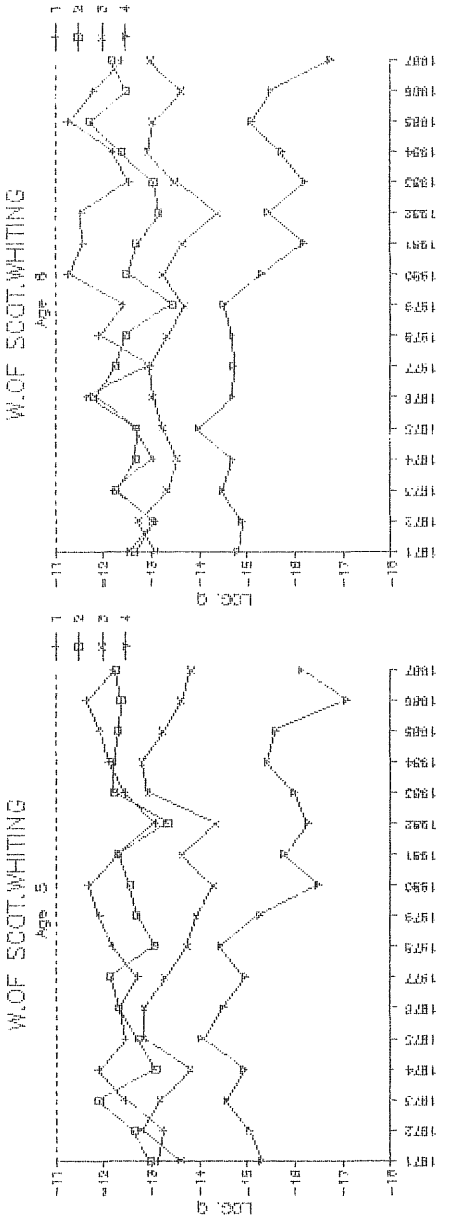


Figure 19.1 (cont'd)

Figure 19.2a Division VIa Whiting.
North Sea VPA values plotted against Division VIa values.

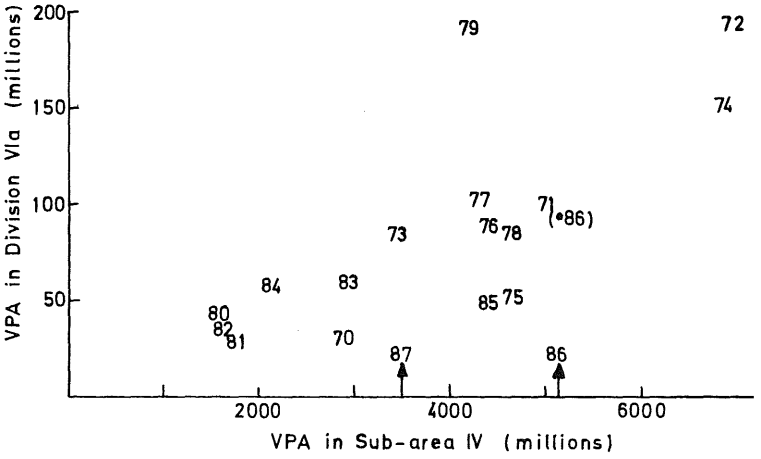


Figure 19.2b Whiting in Division VIa.
VPA values plotted against Scottish seine CPUE.

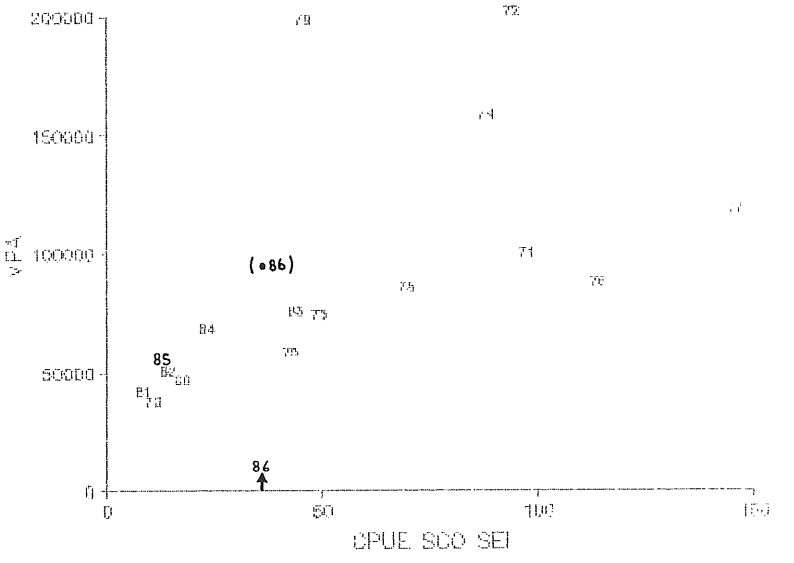
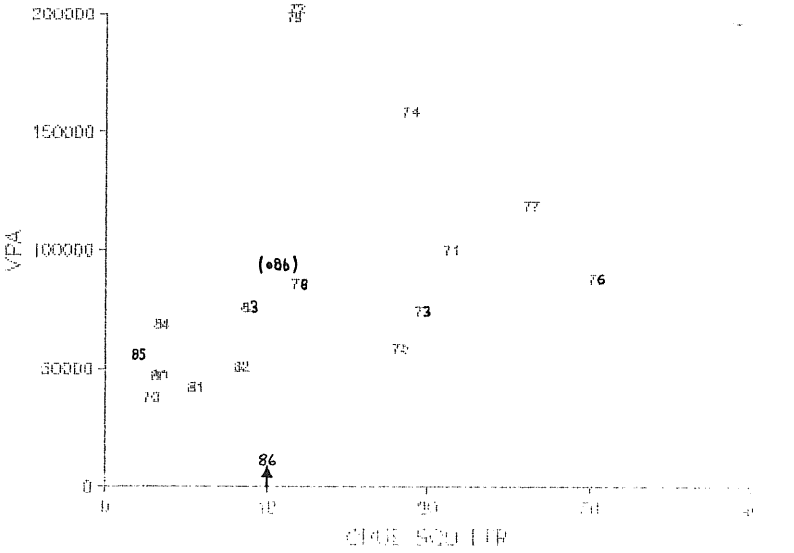


Figure 19.2c Whiting in Division VIa.
VPA plotted against Scottish light trawl CPUE.



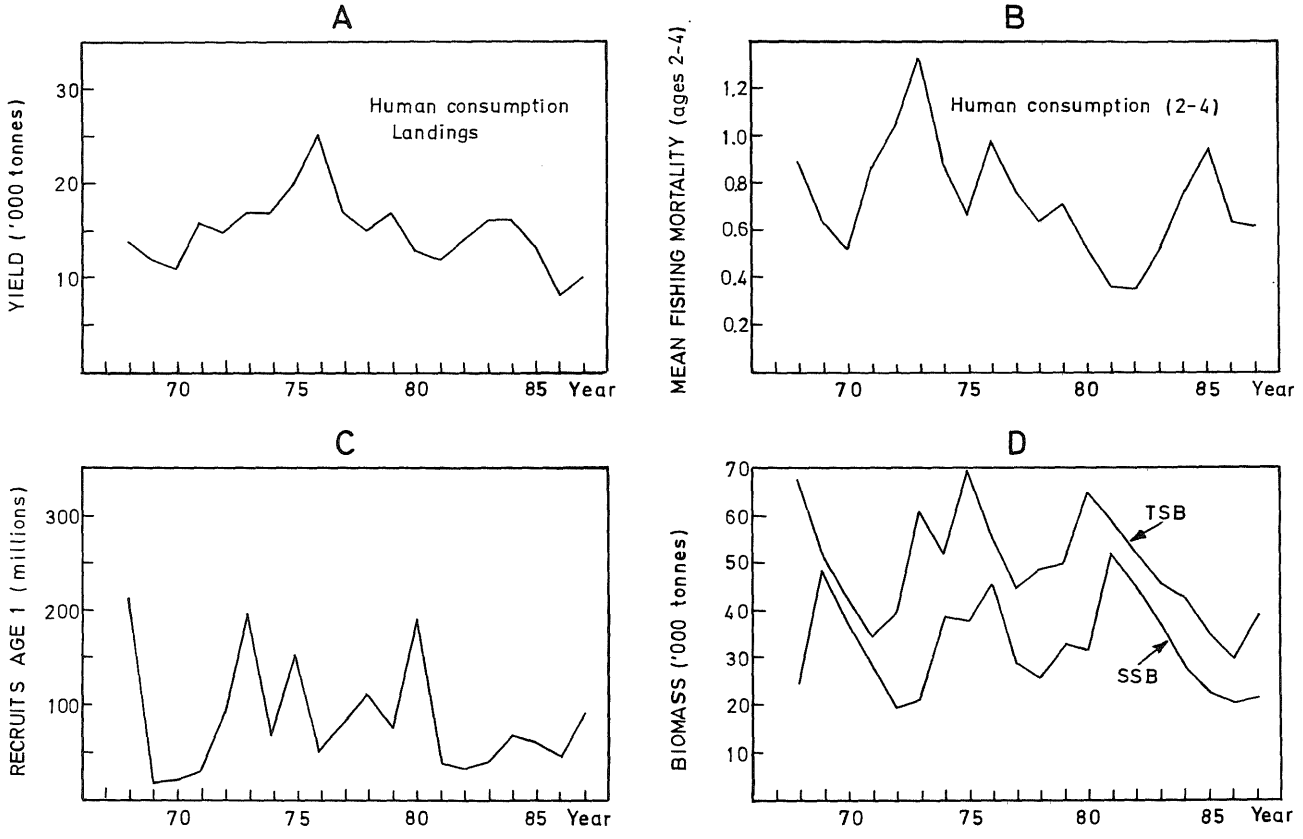


Figure 19.3 Whiting in Division VIa.

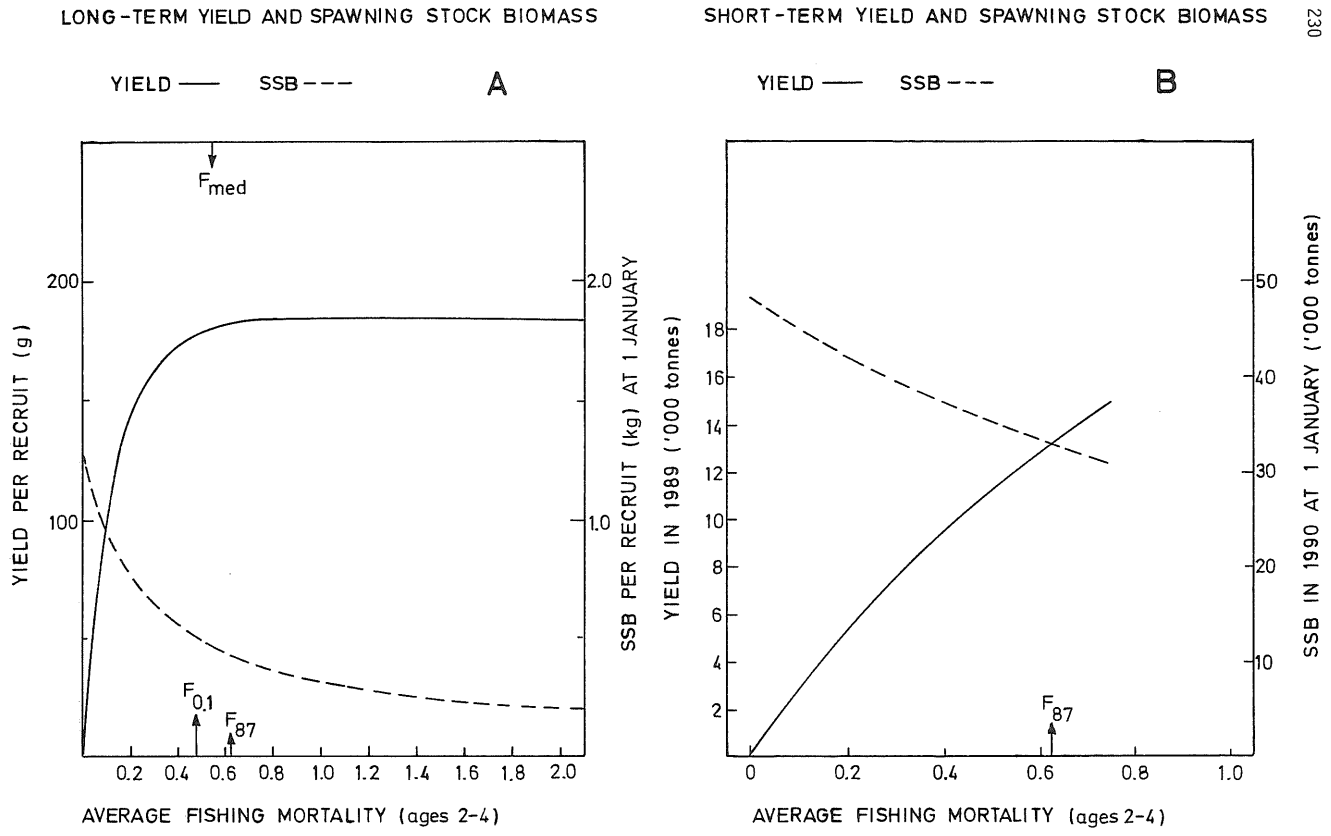


Figure 19.4 Whiting in Division VIa.

Figure 19.5 Whiting in Division VIa.

Relation between SSB and recruitment.

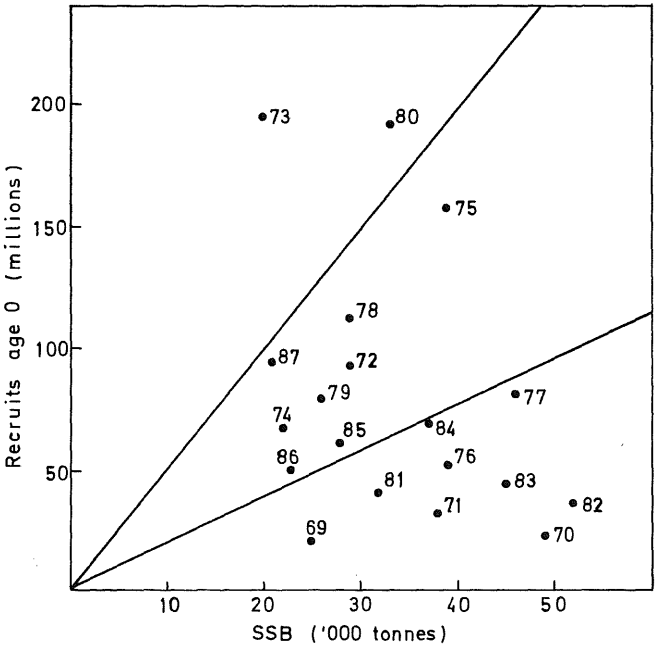
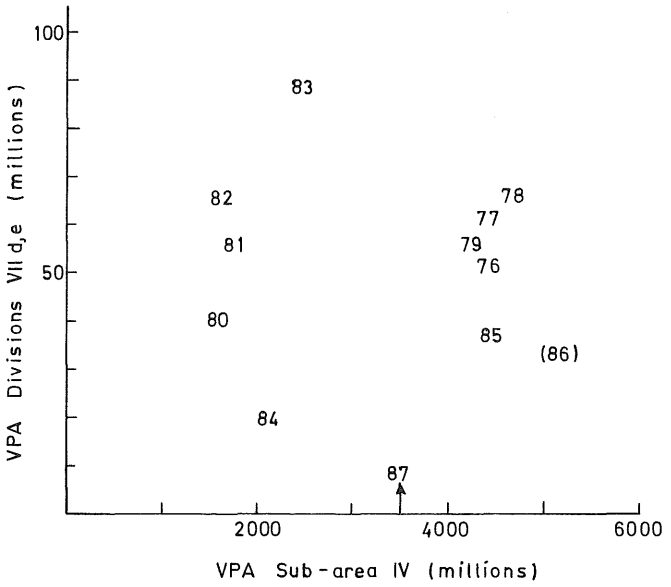


Figure 21.1.1 Whiting in Divisions VIId,e.
Relationship between Divisions VIId,e and Sub-area IV.



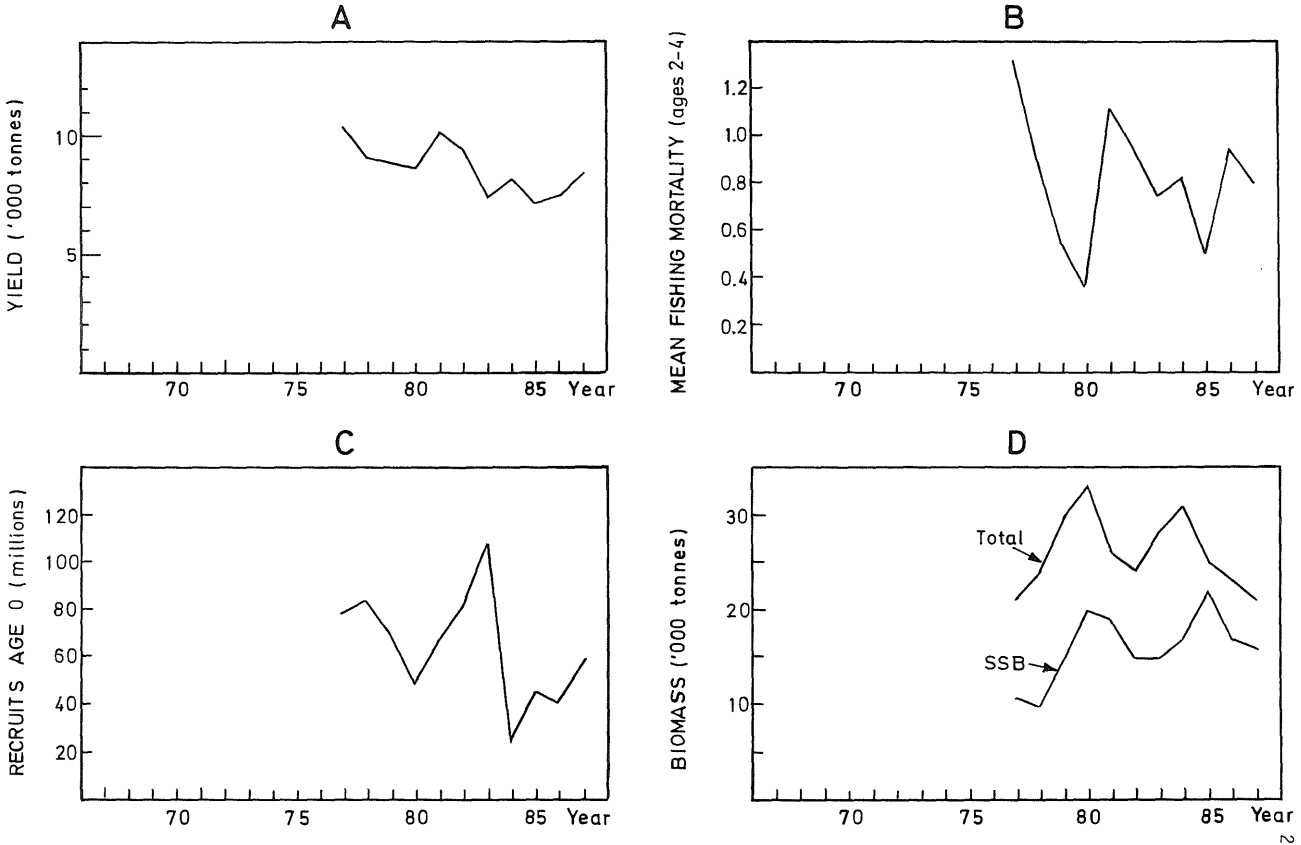


Figure 21.1.2 Whiting in Divisions VIId,e.

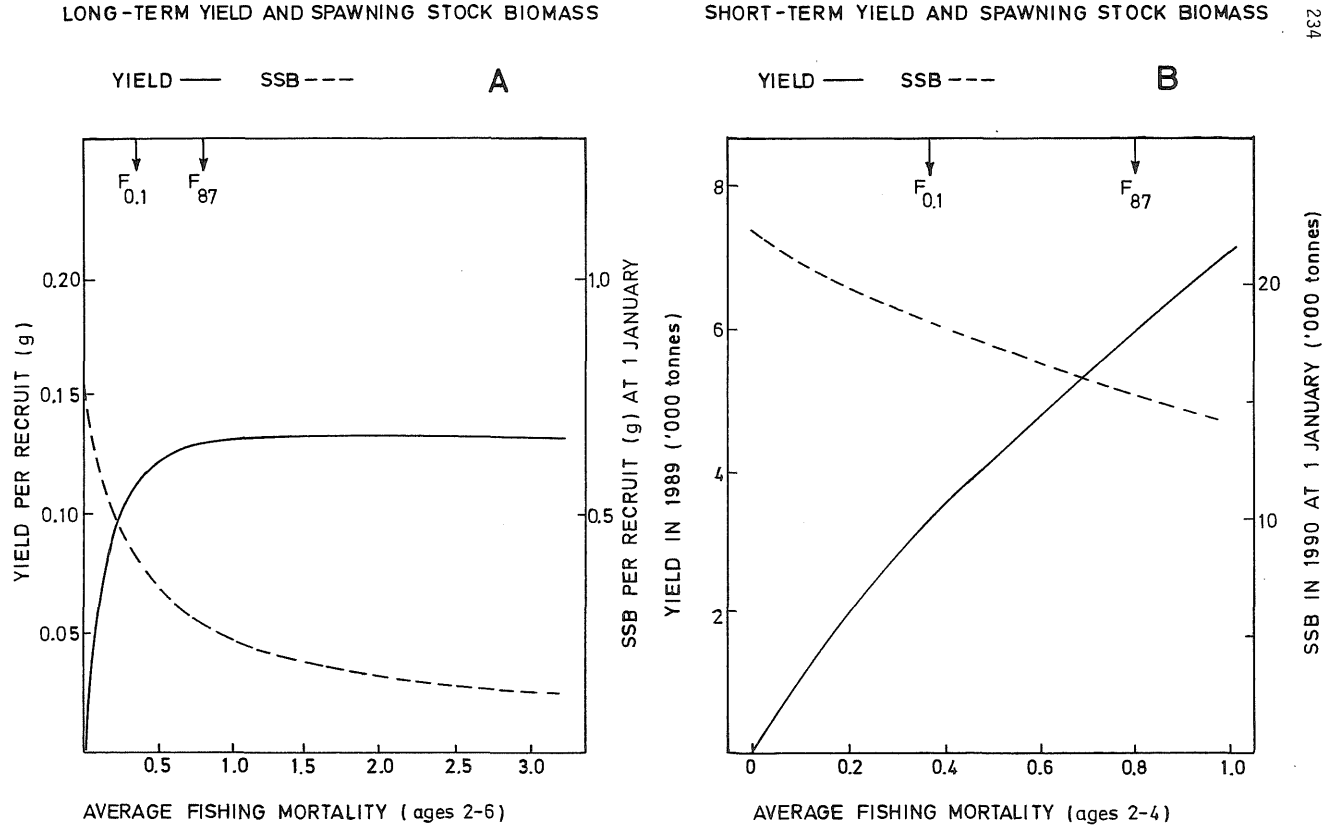
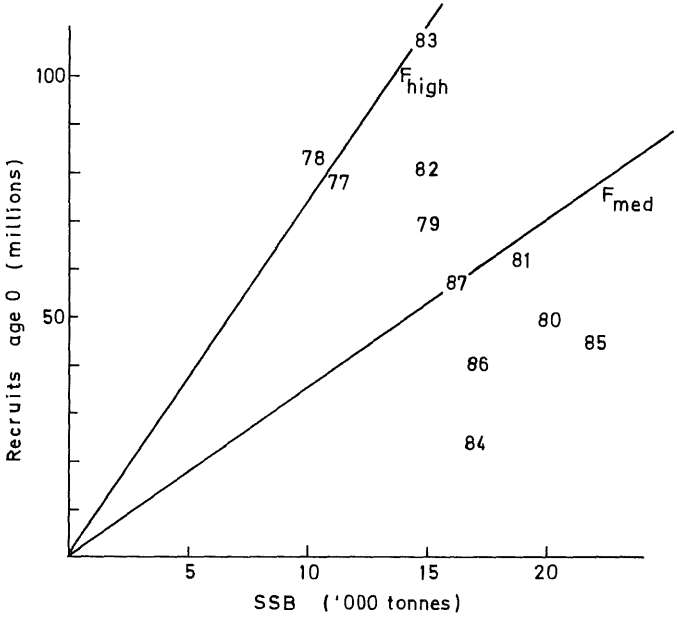


Figure 21.1.3 Whiting in Divisions VIId,e.

Figure 21.1.4 Whiting in Divisions VIId,e.
Stock-recruitment relationship.

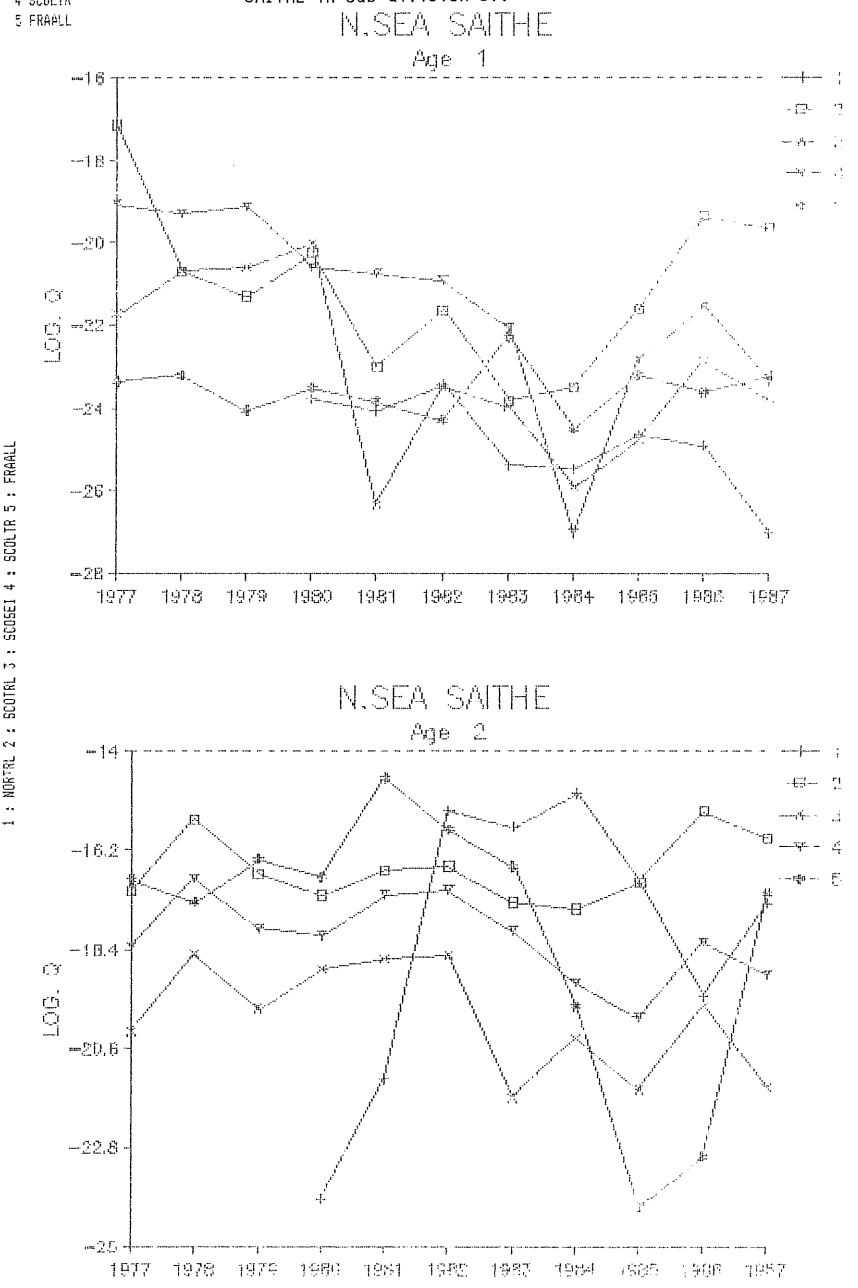


F_{med} = 0.286 SSB per recruit

F_{high} = 0.136 SSB per recruit

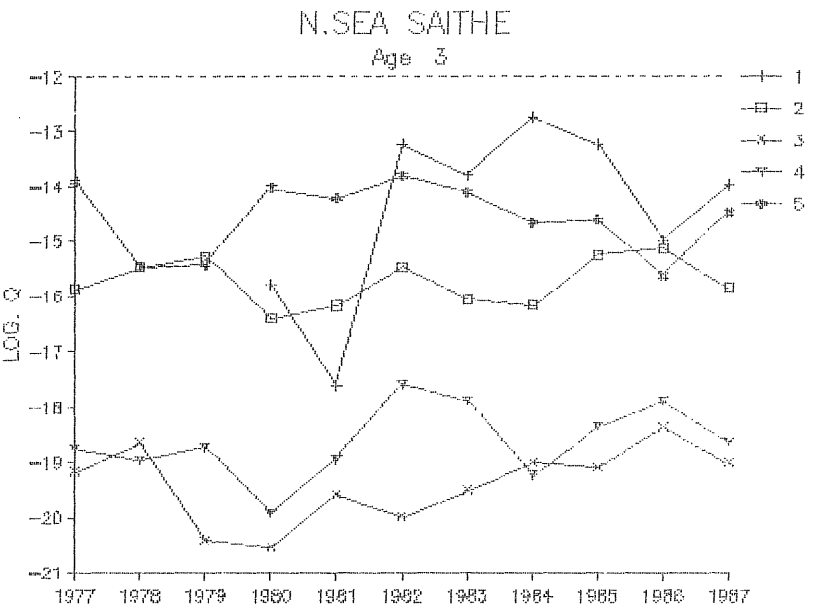
Fleet 1 NORTRL
Fleet 2 SCOTRL
Fleet 3 SCOSEI
Fleet 4 SCOLTR
Fleet 5 FRAALL

Figure 22.1 Estimated log catchability through time for various ages of SAITHE in Sub-division IV.



1 : NORTRL 2 : SCOTRL 3 : SCOSEI 4 : SCOLTR 5 : FRAALL

Figure 22.1 (cont'd)



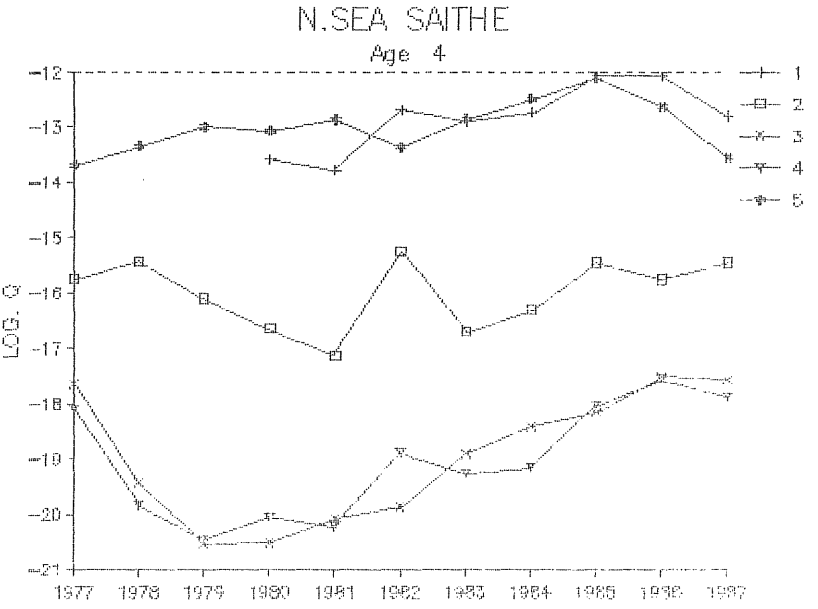
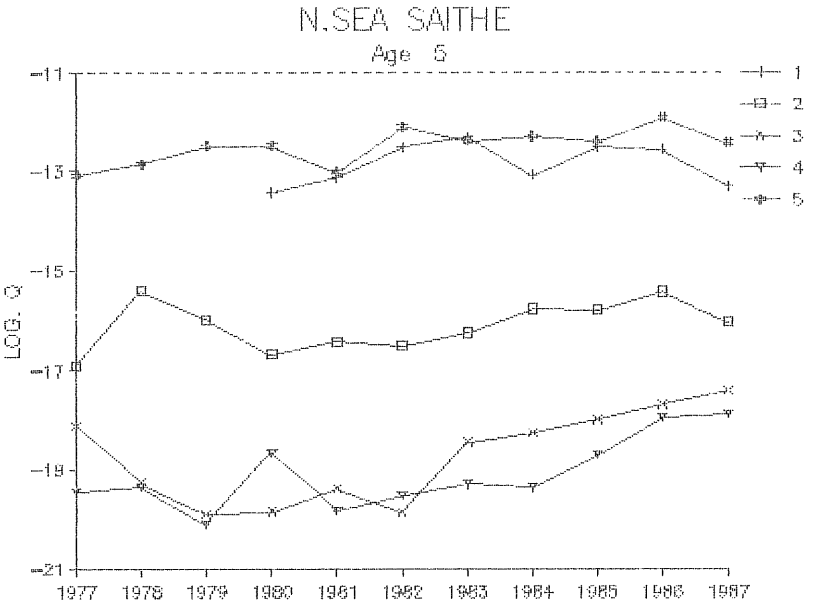
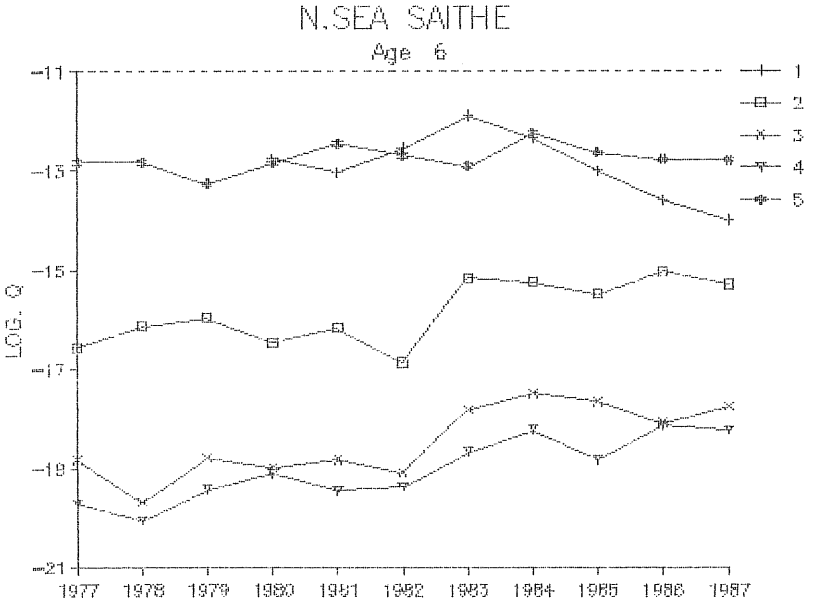


Figure 22.1 (cont'd)





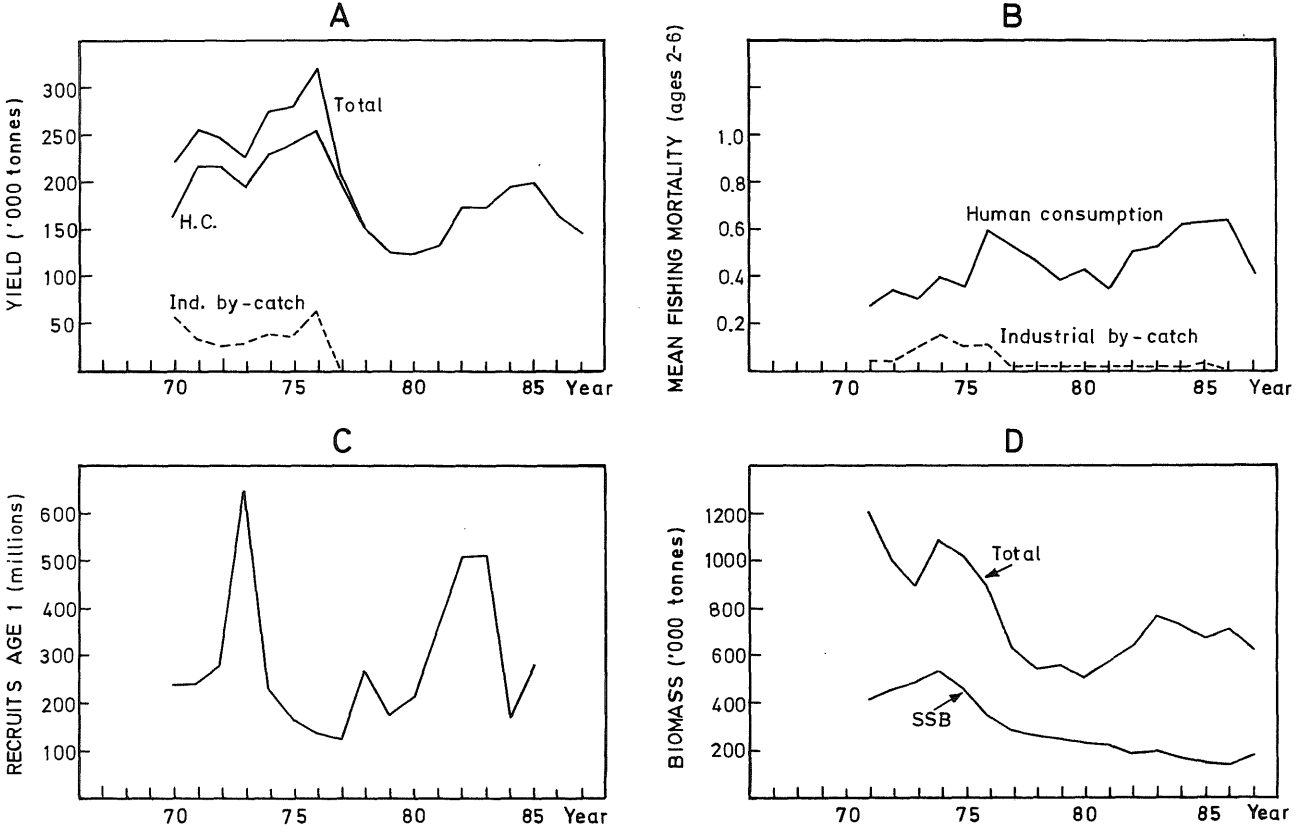


Figure 22.2 North Sea Saithe.

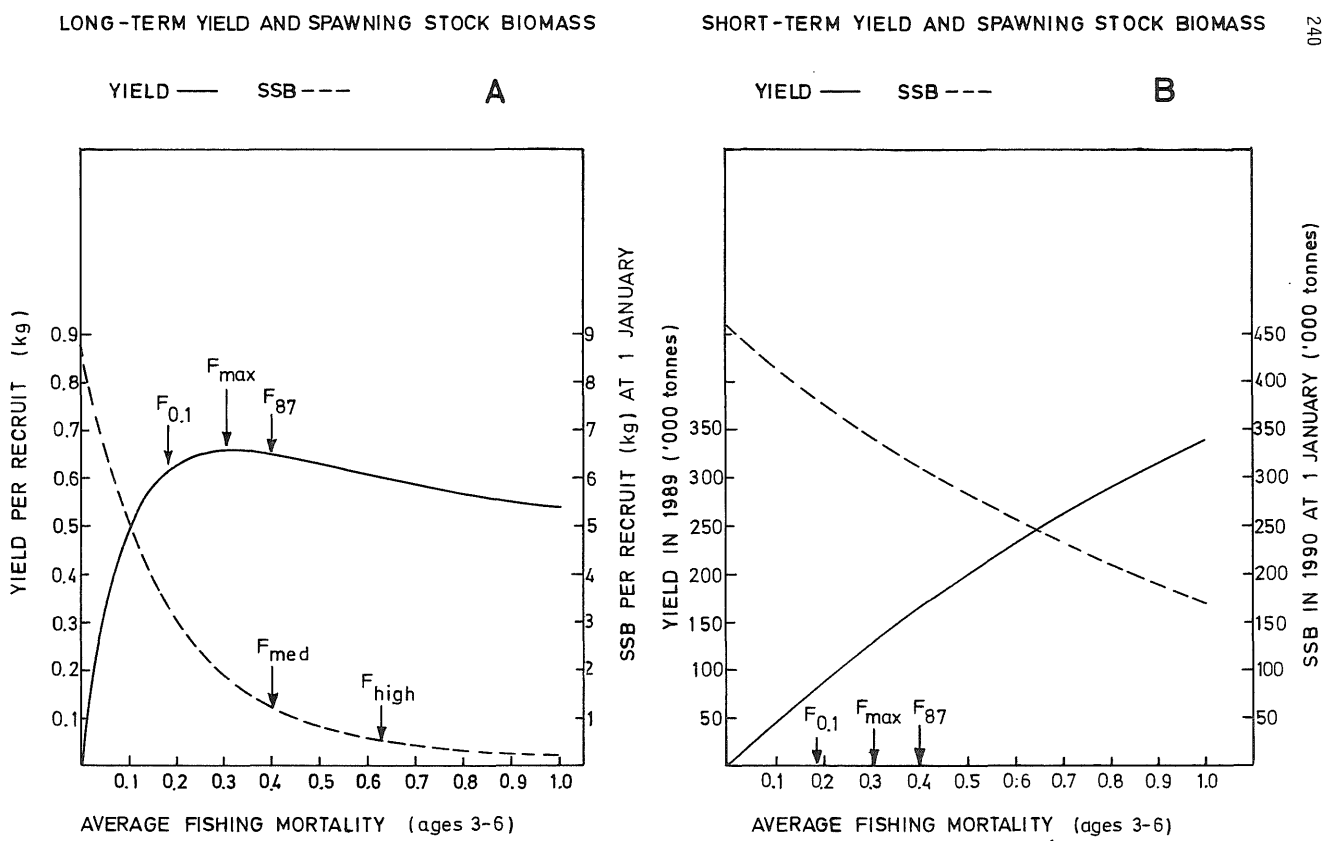


Figure 22.3 North Sea Saithe.

Figure 22.4 North Sea Saithe.

Relation between SSB and recruitment.

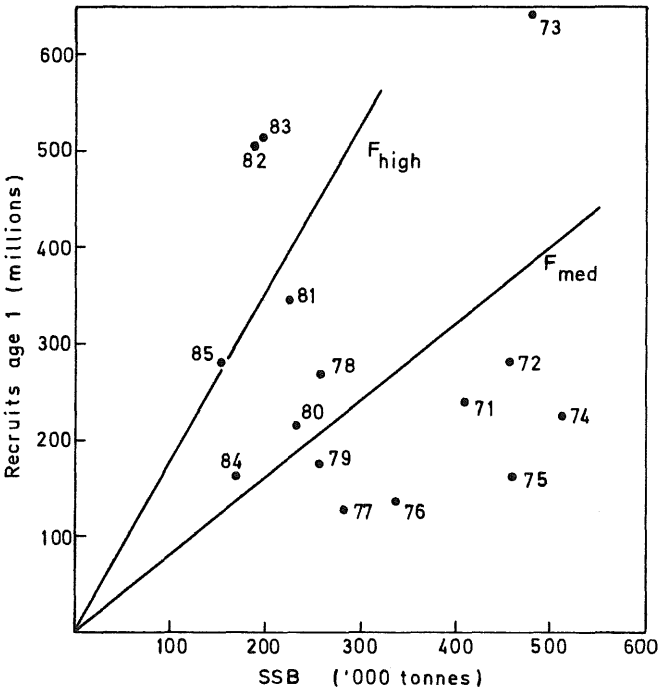
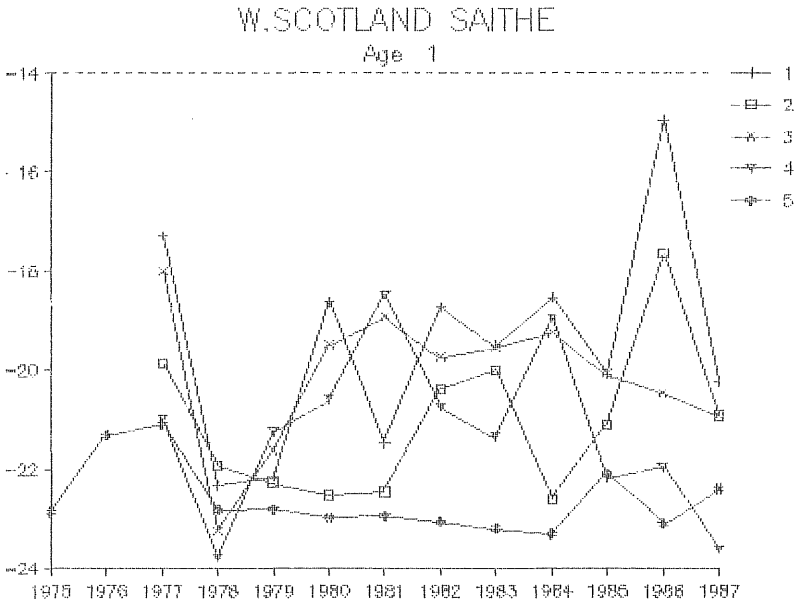


Figure 23.1 Estimated log catchability through time for various ages of SAITHE in Division VIa.



1 : SCOTRL 2 : SCOSEI 3 : SCOLTR 4 : SCONTR 5 : FRAALL

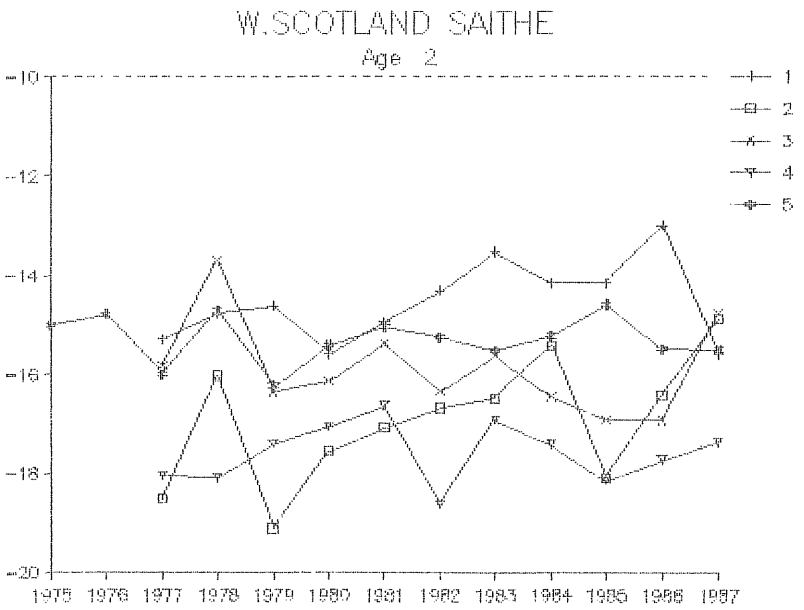
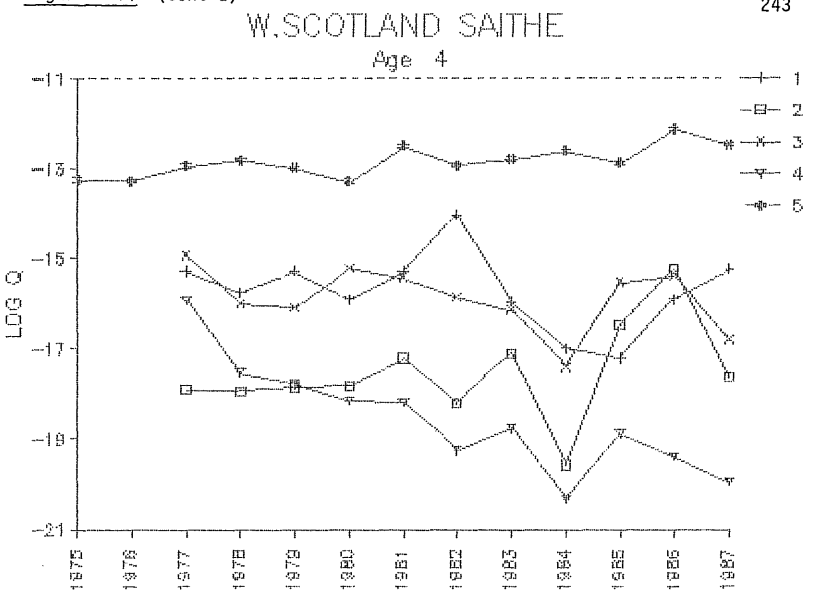


Figure 23.1 (cont'd)



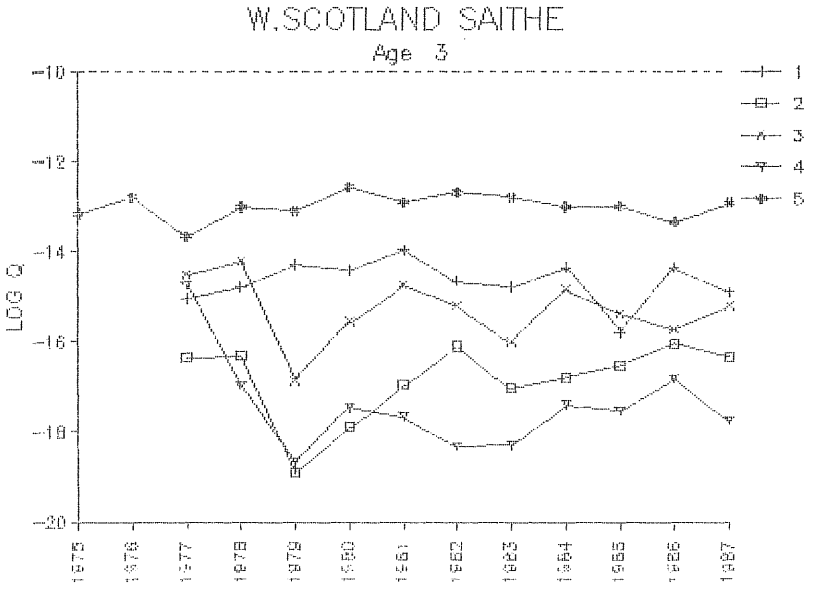
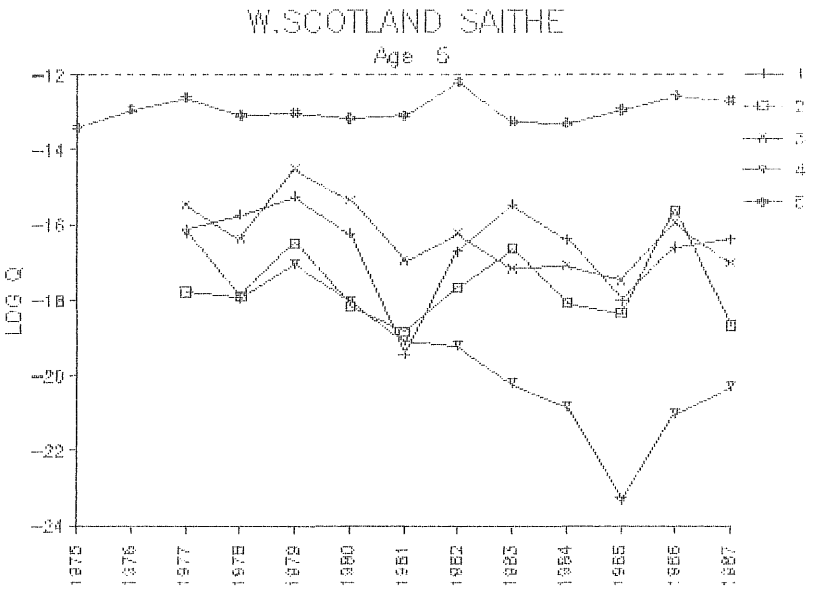


Figure 23.1 (cont'd)



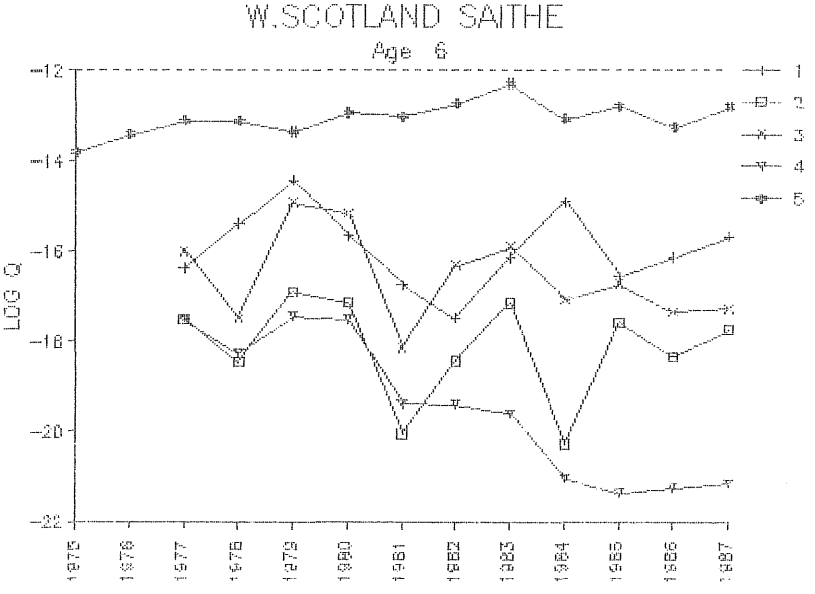
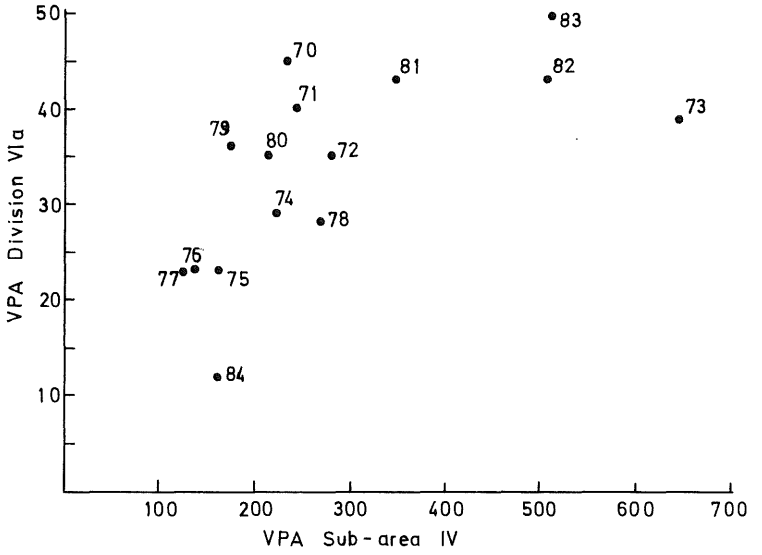


Figure 23.2 Saithe in Sub-area VI.
Relationship between Division VIa and Sub-area IV.



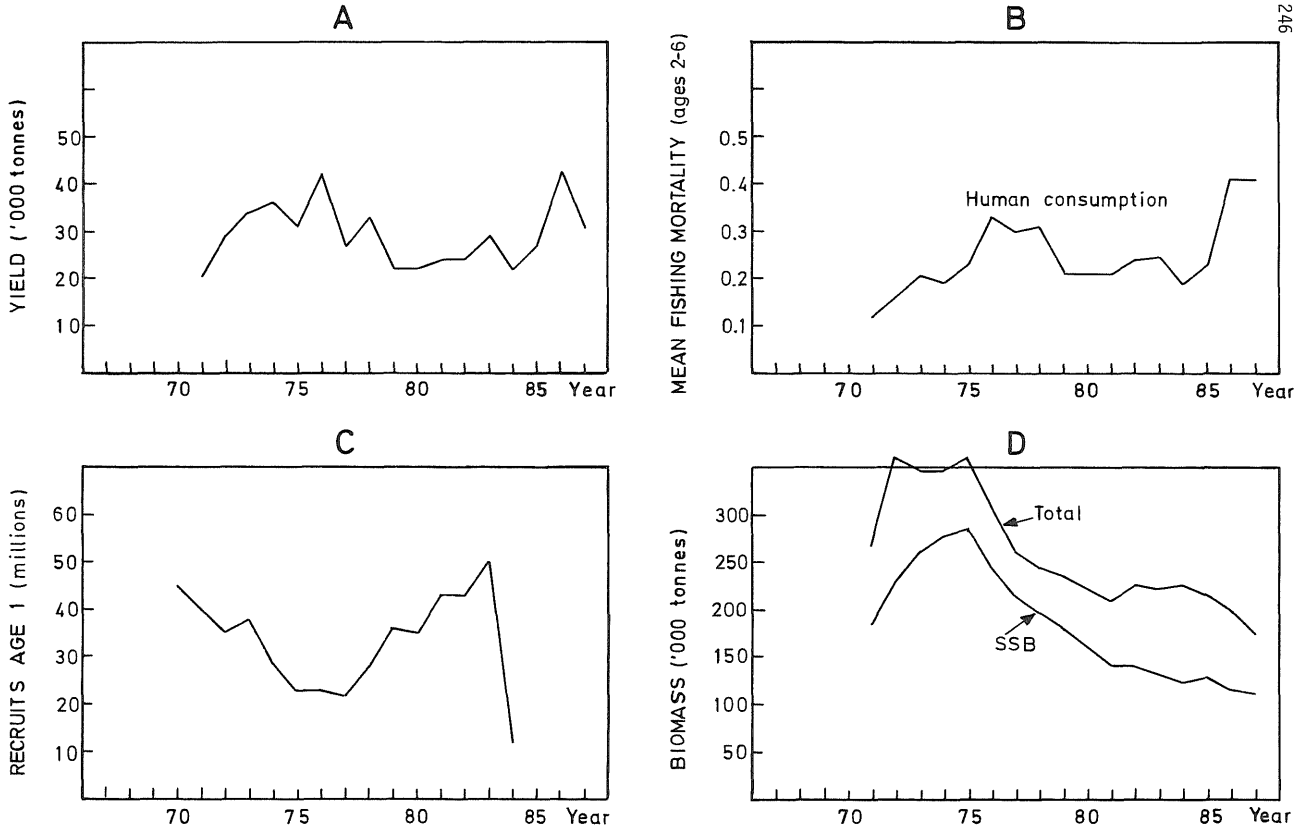
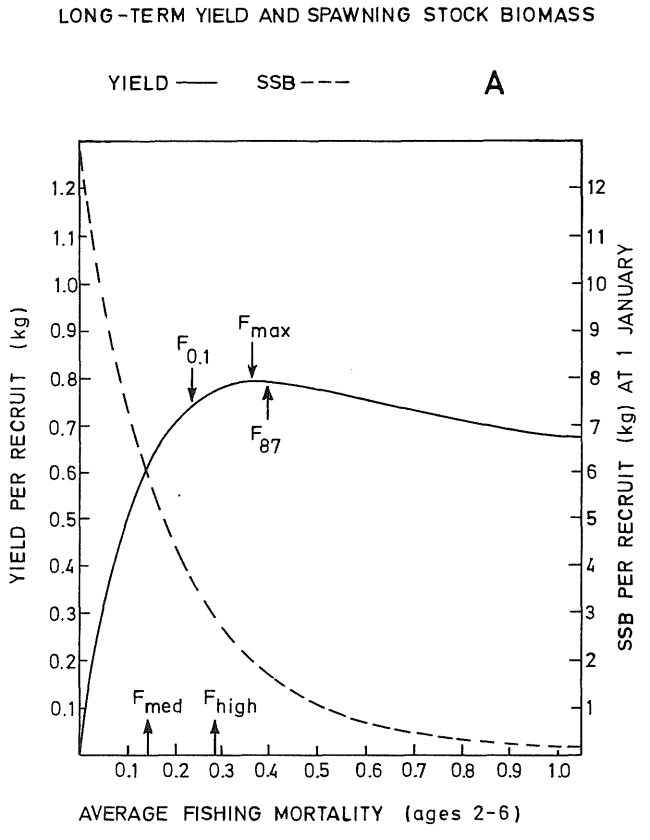


Figure 23.3 Saithe in Sub-area VI.



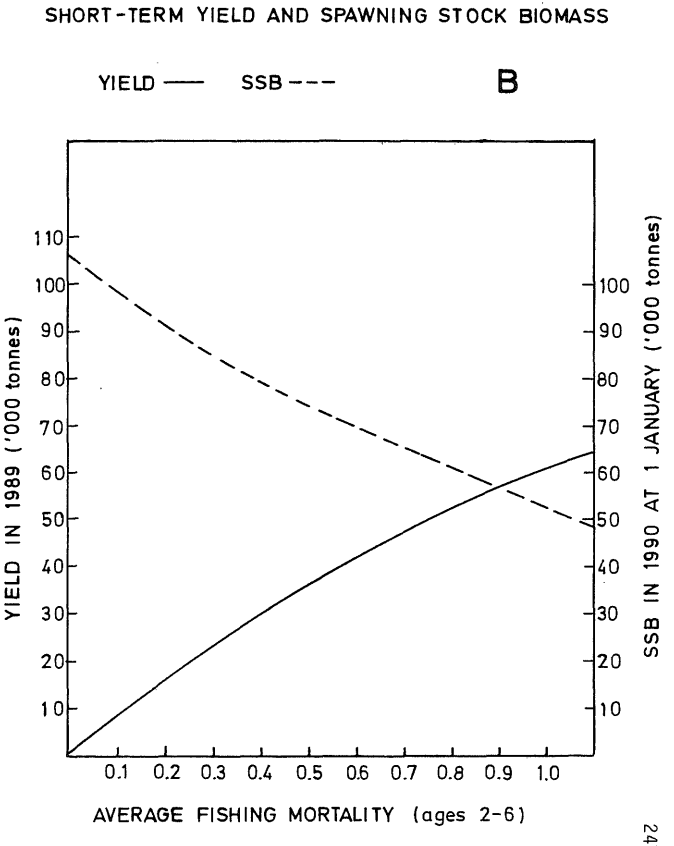


Figure 23.4 Saithe in Sub-area VI.

Figure 23.5 Saithe in Sub-area VI.
Relation between SSB and recruitment.