

5.4.2 Spawning stock biomass and recruitment

Spawning stock biomass (Table 5.7 and Figure 5.1.B) since 1976 has fluctuated between 200 000 tonnes and 300 000 tonnes. Table 5.7 and Figure 5.1.C show recruitment at age 1. The year classes 1975-78 all appear to be below the long-term average. In the catch predictions, the 1979-1981 year classes are assumed to be equal to the long-term average.

5.5 Yield per Recruit

The yield per recruit curve was calculated using the new weight at age data for 1980 and the current exploitation pattern (Table 5.8). Due to the new set of weight at age data, $F_{\max}$ has changed from last year's value of 0.22 to 0.24 (Figure 5.1.D).

5.6 Catch Predictions

Input data for catch predictions are given in Table 5.8. The estimate of the 15+ group in 1980 was higher than the estimate of the 14+ group in 1979 (Table 5.4) and for predictions the 15+ group in 1980 was set at 500 000 fish to make it more consistent with the level in the preceding years. The TAC for 1981 is 127 000 tonnes, and the predicted catch in 1981 with unchanged fishing mortality is 120 000 tonnes.

Results of catch predictions are shown in Table 5.9 and Figure 5.2.

6. ICELANDIC SAITHE

6.1 Landings

Landings of saithe from Division Va are shown in Figure 6.1.A and in Tables 3.1 and 6.1. Catches increased from about 48 000 tonnes in the early 1960s to a peak of 137 000 tonnes in 1971. This increase in landings was connected with increasing year class strengths and an increase in effort. Since 1971 catches have been declining and in 1980 (58 000 tonnes) they were back at a level similar to that in the mid-1960s. Declining catches in the 1970s are due to a series of year classes of well below the long-term average strength.

6.2 Age Composition

As in recent years age composition data were available only for Icelandic catches which accounted for 90% of the total landings in 1980. The total catch in numbers used as input for the VPA (Table 6.2) was calculated by raising the other catches with the Icelandic age composition data. The 1979 data were revised and updated.

6.3 Weight at Age

In 1979 several thousands specimens of saithe were measured for length and weight. From these data the length/weight relationship was revised. Average weight at age in the Icelandic catches in 1979 and 1980 are given in Table 6.6. The 1979 weight at age data were used for the period 1974-79, when sum of products estimates were within 2% of the actual landings. In the period 1961-73, however, the sum of products using the 1979 data are in excess of the landing figures. 1980 weight at age data were used for that year and also for the catch predictions.

6.4 Fishing Mortality and Stock Values from VPA

6.4.1 Estimates of fishing mortality

The extension of the temporary fishing ban on cod in 1980 seems to have diverted the Icelandic trawler fleet more towards redfish than saithe, due to the increasing availability of redfish. On this basis no marked change in the effort on saithe was likely to have taken place in 1980 and, therefore, input F values for 1980 were the same as those used for 1979 at last year's meeting (Table 6.3). The unweighted mean fishing mortality in the age groups 5-10 which account on average for more than 75% of the catches, has been taken as a reference F in the presentation of the assessments.

6.4.2 Spawning stock biomass and recruitment

From 1960 to 1969 the spawning stock biomass increased from 120 000 tonnes to 446 000 tonnes (Table 6.5 and Figure 6.1.B). In the following years, it gradually decreased to 145 000 tonnes in 1980 due to the low recruitment in the 1970s. This level, however, is still in excess of that estimated for the early 1960s.

Recruitment levels for the year classes 1960-67 were higher than those for the year classes 1968-76. The abundances of year classes 1977 and 1978 at age 2 were assumed to be equal to the average value of 39 million fish for the year classes 1968-76.

Input Fs at age 2 and 3 in 1980 were adjusted to produce this result. For the predictions, abundances of year classes 1979 and 1980 were also assumed to be 39 million fish (32 million at age 3).

6.5 Yield per Recruit

The yield and spawning stock biomass per recruit curves are shown in Figure 6.1.D. Using the assumed 1980 exploitation pattern, the yield per recruit curve is flat-topped. F_{max} is about 0.5 and the current fishing mortality on age groups 5-10 is estimated to be $F_{5-10} = 0.35$.

6.6 Catch Predictions

The input data for the catch predictions are shown in Table 6.7. The catch predictions are based on the 1980 exploitation pattern used as input into the VPA.

The TAC for 1981 recommended by ACFM is 72 000 tonnes. It is not likely, however, that fishing mortality rates on saithe in 1981 will increase above the 1980 level. This is because no further extension of the ban on cod fishing is currently envisaged for 1981 and therefore, no further fishing effort should be redirected at saithe. On this basis the Group assumed that fishing mortality in 1981 would be equal to that in 1980. This leads to a prediction of the 1981 landings of 60 000 tonnes. The associated spawning stock biomass in 1982 will be 173 000 tonnes. The results for catch in 1982 and total stock and spawning stock biomasses in 1983 are shown in Table 6.8 and Figure 6.2.

7. FAROE SAI THE

7.1 Landings and Changes in the Fisheries

Preliminary catch data indicate a total catch of 25 568 tonnes from the Faroe saithe stock in 1980 (Table 7.1 and Figure 7.1.A.). This is

Table 6.1. Nominal catch (tonnes) of SAITHE in Division Va, 1971-1980.
(Data for 1971-1979 from Bulletin Statistique.)

Country	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 [#]
Belgium	3 490	2 250	2 131	2 371	1 638	1 615	1 448	1 092	980	673
Faroe Islands	2 046	857	1 467	1 712	1 366	3 267	3 013	4 250	5 457	4 931
France	3 987	-	-	94	32	51	-	-	-	-
German Dem.Rep.	2 637	3 471	-	-	-	-	-	-	-	-
Germany, Fed.Rep.of	40 628	30 918	38 565	18 627	13 820	13 785	10 575	-	-	-
Iceland	60 080	59 945	56 567	65 169	61 430	56 811	46 973	44 327	57 066	52 171
Norway	-	-	-	-	6	5	4	3	1	1
Poland	113	150	-	-	-	-	-	-	-	-
Spain	59	-	-	-	-	-	-	-	-	-
U.K. (England & Wales)	21 767	13 152	11 874	8 845	8 643	6 024	13	-	-	-
U.K. (Scotland)	1 743	545	509	731	1 021	443	-	-	-	-
USSR	5	-	-	-	-	-	-	-	-	-
Total	136 555	111 288	111 113	97 549	87 956	82 001	62 026	49 672	62 504	57 776

Table 6.2 Icelandic SAITHE.
Input catch in numbers ('000) for VPA.

	1965	1966	1967	1968	1969	1970	1971	1972	1973
2	41	0,031	0,196	1	20	18	7	49	25
3	2003	0,940	1116	836	1572	287	476	565	219
4	4825	2090	3400	2605	4395	5622	3031	3786	1768
5	7589	3283	5591	3563	5706	4999	10221	6524	5155
6	2158	4117	4326	6318	6518	6126	6736	8646	7077
7	1324	1285	4931	3207	9136	6178	6694	4178	7372
8	642	0,739	1200	3008	2796	5934	5045	3320	2616
9	353	0,390	0,550	621	1843	1689	4272	2098	1635
10	164	0,235	0,330	343	461	1191	959	1421	871
11	102	0,133	0,169	215	100	299	887	361	412
12	85	0,069	0,073	103	110	171	349	328	231
13	81	0,102	0,104	79	32	92	96	79	80
14	52	0,073	0,065	41	44	70	63	68	22
15+	54	0,03	0,12	85	32	88	131	73	23
TOTAL	19473	13580	22177	21055	32765	32762	38967	31496	27506

	1974	1975	1976	1977	1978	1979	1980
2	111	16	29	5	0	0	0
3	1269	526	329	59	548	480	133
4	3404	2997	3234	2099	1145	3764	2281
5	2348	2479	3045	2858	2435	1991	4587
6	3164	1829	2530	1801	1556	3616	2526
7	3452	3496	2154	1036	1275	1566	2396
8	3384	2994	2367	1068	961	718	1596
9	1303	1434	1530	1528	537	292	478
10	824	710	1064	958	575	669	243
11	551	325	295	538	476	589	131
12	141	176	191	166	279	489	102
13	43	100	94	71	139	150	58
14	13	36	68	12	91	72	29
15+	20	61	18	49	55	0	22
TOTAL	19827	17179	16948	12248	10072	14396	14582

Table 6.3 Icelandic SALTHER.
Fishing mortalities from VPA (M = 0.2).

	1965	1966	1967	1968	1969	1970	1971	1972	1973
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.02	0.01	0.02	0.02	0.02	0.00	0.01	0.02	0.01
4	0.13	0.03	0.07	0.05	0.10	0.09	0.07	0.11	0.10
5	0.23	0.13	0.11	0.09	0.16	0.17	0.24	0.20	0.21
6	0.24	0.18	0.24	0.17	0.25	0.25	0.35	0.33	0.34
7	0.27	0.22	0.35	0.28	0.40	0.40	0.48	0.39	0.51
8	0.24	0.24	0.32	0.37	0.43	0.48	0.67	0.46	0.45
9	0.23	0.22	0.29	0.27	0.41	0.50	0.79	0.66	0.44
10	0.19	0.23	0.30	0.29	0.33	0.50	0.60	0.67	0.64
11	0.18	0.23	0.26	0.32	0.13	0.37	0.90	0.47	0.41
12	0.16	0.17	0.19	0.25	0.27	0.34	1.02	1.06	0.63
13	0.15	0.29	0.43	0.32	0.12	0.39	0.32	0.68	0.83
14	0.20	0.20	0.30	0.30	0.30	0.40	0.50	0.40	0.40
15+	0.20	0.20	0.30	0.30	0.30	0.40	0.50	0.40	0.40
FC 5-10), U	0.23	0.20	0.27	0.25	0.33	0.38	0.52	0.45	0.43

	1974	1975	1976	1977	1978	1979	1980
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.06	0.02	0.01	0.00	0.01	0.02	0.0046
4	0.22	0.19	0.15	0.09	0.07	0.12	0.10
5	0.18	0.24	0.30	0.20	0.15	0.16	0.20
6	0.20	0.21	0.42	0.29	0.16	0.34	0.30
7	0.28	0.35	0.41	0.30	0.35	0.24	0.40
8	0.47	0.42	0.42	0.37	0.51	0.34	0.40
9	0.42	0.37	0.40	0.54	0.32	0.28	0.40
10	0.42	0.42	0.53	0.46	0.40	0.86	0.40
11	0.59	0.29	0.31	0.56	0.44	0.95	0.40
12	0.24	0.67	0.27	0.29	0.64	1.18	0.40
13	0.23	0.27	0.97	0.15	0.42	0.87	0.40
14	0.30	0.30	0.30	0.30	0.30	0.40	0.40
15+	0.30	0.30	0.30	0.30	0.30	0.40	0.40
FC 5-10), U	0.33	0.34	0.41	0.36	0.31	0.37	0.55

Table 6.4 Icelandic SAITHE.
Stock size in numbers ('000) from VPA.

	1965	1966	1967	1968	1969	1970	1971	1972	1973
2	85894	84628	73957	107652	77741	60262	31789	28950	30007
3	95139	70287	69259	60373	88137	63631	49522	26020	23658
4	42821	76085	56697	55697	48675	70741	51857	39952	20794
5	41400	30709	60406	43352	43250	35888	52847	39706	29296
6	11291	27066	22183	44415	32280	30269	24879	34071	26634
7	6055	7303	18452	14270	30672	20565	19271	14320	20127
8	3324	3767	4822	10678	8800	16913	11293	9779	7974
9	1898	2144	2419	2870	6042	4697	8530	4739	5030
10	1051	1236	1404	1486	1791	3293	2332	3174	2005
11	691	713	800	853	908	1052	1629	1052	1329
12	641	474	464	503	505	654	593	544	537
13	630	448	326	314	319	315	381	176	154
14	315	443	275	174	186	233	175	226	73
15+	328	564	534	402	136	286	304	243	76
TOTAL SPAWN. ST.	291479 26225	305867 44158	312000 51680	345040 75966	339443 81640	508798 78276	255244 69449	202950 68323	167695 63941
	1974	1975	1976	1977	1978	1979	1980	1981	1970-1978
2	37973	39275	29799	57632	40034	39050	0	*****	39525
3	24545	30990	32142	24371	47180	32777	31972	0	35762
4	19171	18951	24897	26018	19900	38133	26402	26056	32473
5	15430	12632	12817	17470	19409	15260	27827	19559	26166
6	19345	10518	8112	7756	11730	13696	10700	18653	19257
7	15450	12990	6965	4372	4731	8202	7966	6490	15199
8	9875	9546	7495	3770	2648	2729	5306	4372	8810
9	4183	5052	5130	4013	2128	1307	1589	2912	4833
10	2652	2256	2849	2827	1918	1260	808	872	2589
11	863	1432	1210	1379	1456	1054	436	443	1267
12	719	393	880	725	648	765	339	239	633
13	234	462	164	549	445	281	193	186	320
14	55	152	288	51	385	239	96	106	182
15+	85	258	76	208	233	0	73	93	203
TOTAL SPAWN. ST.	150579 53460	144906 43058	132824 33169	151142 25651	152845 26322	154754 29533	113706 27505		

take

Table 6.5 Iceland SAITHE

Spawning stock biomass ('000 tonnes) at the beginning of each year and recruitment estimates from VPA of population size (millions) at 1 year old of each year class. (Estimates of year class strength of the most recent year classes are less reliable.)

Year/Year class	Spawning stock biomass (6-15+)	Recruitment
1960	120	126
1961	130	83
1962	147	142
1963	155	105
1964	142	104
1965	155	90
1966	237	132
1967	283	95
1968	398	73
1969	446	39
1970	443	35
1971	403	37
1972	376	46
1973	354	48
1974	321	37
1975	280	71
1976	226	49
1977	177	
1978	167	
1979	172	
1980	145	

Table 6.6 Icelandic SAITHE
Weight at age, Icelandic landings in 1979
and 1980.

Age	1979 ¹⁾	1980	Previously used by WG 2)
3	1.12	1.44	1.12
4	1.76	1.89	1.96
5	2.73	2.68	3.05
6	4.29	3.87	4.34
7	5.54	5.32	5.38
8	7.27	6.14	6.55
9	8.42	6.84	7.64
10	9.41	8.23	8.63
11	10.00	9.06	9.52
12	10.56	9.30	10.29
13	11.87	10.50	10.97
14	13.12	11.37	11.55
15+	-	12.50	12.80

1) Used for calculation of spawning stock
biomass in 1974-79.

2) Used for calculation of spawning stock
biomass 1961-73.

Table 6.7 Icelandic SAITHE.
Input data for catch predictions.

Age group	Stock number 1981 ('000)	Relative fishing mortality	Average weight (kg)
3	32 000	0.0286	1.44
4	26 362	0.286	1.89
5	19 559	0.57	2.68
6	18 653	0.86	3.87
7	6 490	1.14	5.32
8	4 372	1.14	6.14
9	2 912	1.14	6.84
10	872	1.14	8.23
11	443	1.14	9.06
12	239	1.14	9.30
13	186	1.14	10.50
14	106	1.14	11.37
15+	93	1.14	12.50

Recruitment of 1977, 1978 and 1979 year classes is based on the average for year classes 1968-76.

Table 6.8 Icelandic SAITHE
Catch and biomass predictions ('000 tonnes)

Year	Spawning stock biomass 1 January	$\bar{F}_{5-10}$	Landings	Total stock biomass
1980	145	0.35	58	316
1981	171	0.35	60	320
1982	173	0.35	62	320
$\bar{F}_{82}/\bar{F}_{80}$	$\bar{F}_{5-10}$ in 1982	Landings 1982	Total biomass 1983	SSB 1983
0.1	.035	7	378	226
0.2	.07	14	370	219
0.5	.175	33	348	199
0.8	.28	51	328	181
0.9	.315	57	322	175
1.0	.35	62	316	170
1.2	.42	72	305	159
1.5	.525	86	288	145

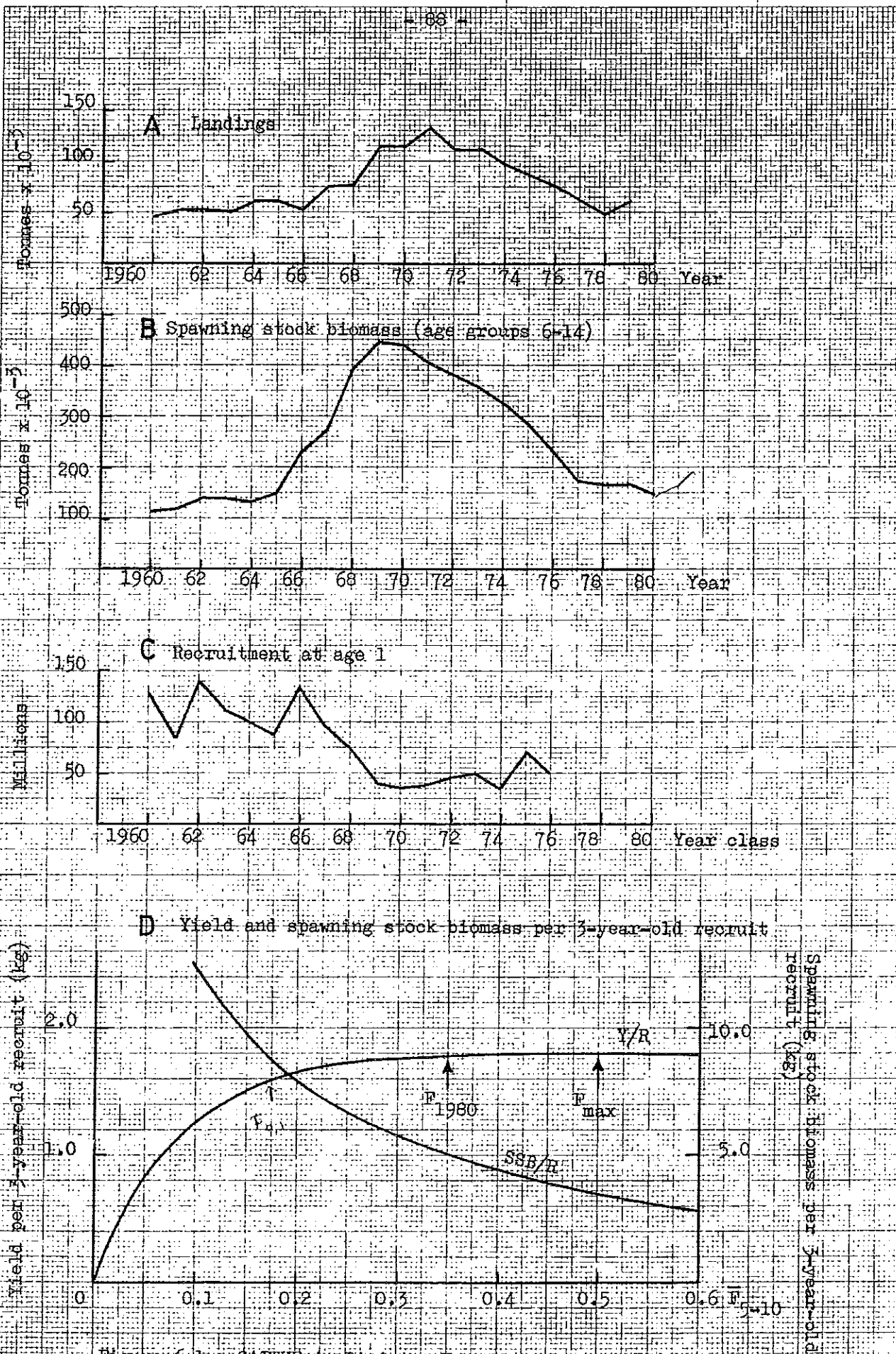


Figure 6.1. SAITHE in Division Va.

MW 01/5 of 0.175

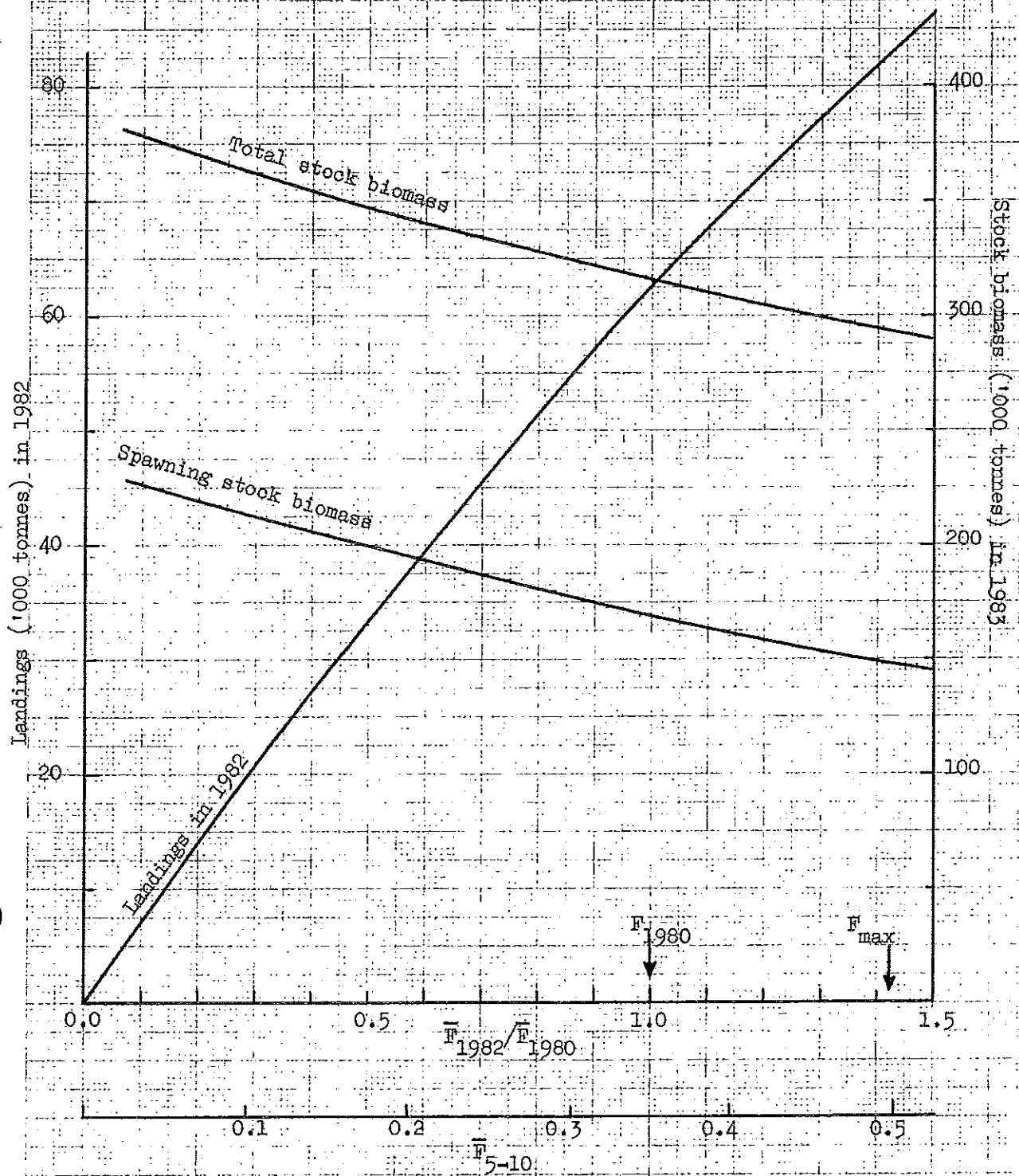


Figure 6.2. Icelandic SALTMS. Predictions for landings in 1982 and spawning and total stock biomass in 1985.