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SOME SPRAT STOCK DATA: SKAGERAK AND KATTEGATT

by

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Information on age composition and growth of sprat exists since the end of the 1920ties. Additionally, there are a few earlier samples. In a number of papers the sprat fishery has been described. It has been regular since more than 100 years (LINDQUIST, 1964). There are also a number of papers on the spawning, migrations and growth of sprat (LINDQUIST, 1970, 1974).

The catches consist of a few year classes:

Growth period	2	60.2 %
	3	31.4 %
	4	6.9 %
	5	1.4 %
	6	0.1 %

Growth period 1, sprat < 10-11 cm, is incompletely represented in the catches.

Unfortunately, there are very limited possibilities for stock estimates as existing catch statistics since the end of the 1920ties are very incomplete. Only for the last decade estimates of number per year class are possible. Some preliminary results are dealt with.

It should be observed that the sprat of the Skagerak and Kattegatt lives in an "open system". The important spawning area is situtated between Denmark and Sweden and from here the larvae are drifting with the Baltic current, partly entering the Norwegian fjords, partly the Swedish and Danish coasts. In autumn and spring the juvenile and adult sprat move to and from the coast, respectively, and farther emigration in probable. - The figures calculated for this paper are based on the Swedish fishery and samples from this laboratory.

The determination of M is possible for the purse senine catches in the Gullmarfjord (and adjacent fjords), Tab. 1.

From Fig. 1 it is evident that these values give a M of 1.05. It is considered that this at the moment is the best value from Swedish waters.

In comparison, the M-value for sprat from the Baltic is lower, Tab. 2 (unpublished Swedish material, see also contribution H:3 to this meeting, p. 4).

No fishery on sprat is going on in the Gulf of Bothnia. Therefore, a value of M = 0.7 can be used. It should be recalled that there are very few predators of sprat in the Gulf of Bothnia.

For comparing long time means in the Skagerak and Kattegatt Z-values from the procentual distribution of the year classes have to be used. Long time means have also been calculated for L_{∞} and K. - In a previous paper (1974) we described that the sprat of the West coast has increased in size. Therefore, the same material as in that earlier contribution has been used for studying changes in F and the yield curves. - The data calculated are listed in Tab. 3.

Fig. 2 shows the yield curves for both areas in both periods. The present minimum size is 10 cm. - The increase in the "possible yield" in the Kattegatt may be the reaction of the stock to the increased F. In the case of the Gullmarfjord the situation is quite different. The fishing mortality has not increased, which is interesting in view of the introduction of artificial light in the purse seine fishery after 1960.

It may be argued that a value of M = 1.1 is too high (cf JOHNSON 1970, for sprat from the Wash, M = .9). In that case the next best value can be used for the construction of the yield curves, i.e. M = .7 from the Baltic. Fig. 3 shows those yield curves. It may be pointed out that in the Kattegatt, F is rather close to the point where L_c = 10 cm becomes horizontal.

REFERENCES

JOHNSON, P.O., 1970: The Wash sprat fishery. - Fish. Investig. II 26(4), 77pp. + App.

LINDQUIST, ARMIN, 1964: Zur Fischereihydrographie der Sprotte (Clupea sprattus) an der schwedischen Westküste. - Inst. Mar. Res., Lysekil, Ser. Biol., Rep. No. 15, 87 pp.

-"- 1970: Zur Verbreitung der Fischeier und Fischlarven im Skagerak in den Monaten Mai und Juni. - ibidem. No. 19, 82 pp.

-"- 1974: Growth and environment of sprat. - Medd. från Havsfiskelaboratoriet, Lysekil, No. 146, 3 pp + figs.

Tab. 1. Z for sprat in the Gullmarfjord as calculated from actual size of year class in numbers.

Season (September to March)	Z between growth periods 2/3	3/4	4/5	Mean	No of landings
1967/8	1.07	1.39	1.97	1.48	599
1968/9	.75	1.44	1.51	1.23	653
1969/70	.52	1.26	2.19	1.32	301
1970/1	.7	1.26	2.89	1.62	616
1971/2	1.9	2.38	1.59	1.95	767
1972/3	1.22	1.53	2.4	1.72	462
1973/4	.78	1.22	1.86	1.29	370
Mean	.99	1.49	2.06	1.51	

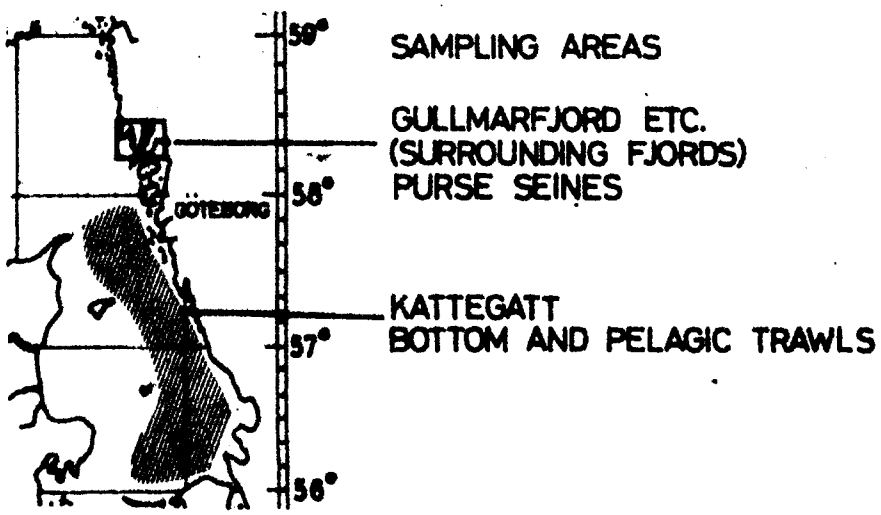
Tab. 2. Z for sprat from the Baltic a calculated from the procentual distribution of 4 consecutive year classes (2/3 to 5/6).

Area	Time	Z	M	F
Gulf of Bothnia	1961/2-1972/3	.7	.7	.0
Baltic proper	1923/4-1937/8	.9	.7	.2
	1958/9-1972/3	1.0	.7	.3

Tab. 3. Mortality and growth data: two long term means

Area	Time	Z	M	F	L_{∞}	K
Kattegatt (trawl)	1930/1-1948/9	1.3	1.1	.2	16.311	.606
	1951/2-1972/3	1.7	1.1	.6	16.380	.775
Gullmarfjord (purse seine)	1918/9-1948/9	1.4	1.1	.3	14.719	.821
	1951/2-1972/3	1.4	1.1	.3	16.03	.95

Fig. 1


58°
SAMPLING AREAS
GULLMARFJORD ETC.
(SURROUNDING FJORDS)
PURSE SEINES
GÖTEBORG
58°
KATTEGATT
BOTTOM AND PELAGIC TRAWLS
57°
56°

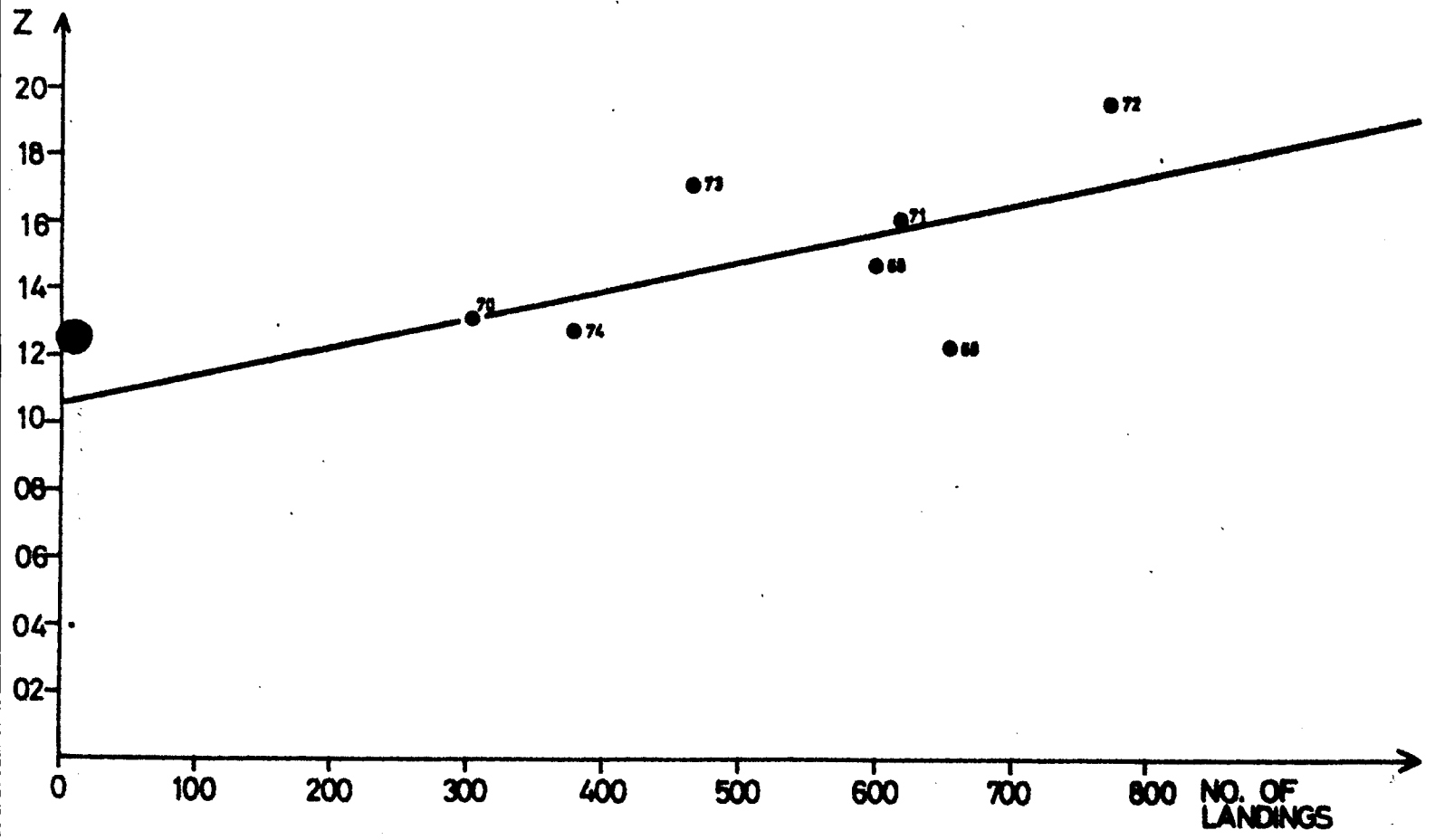
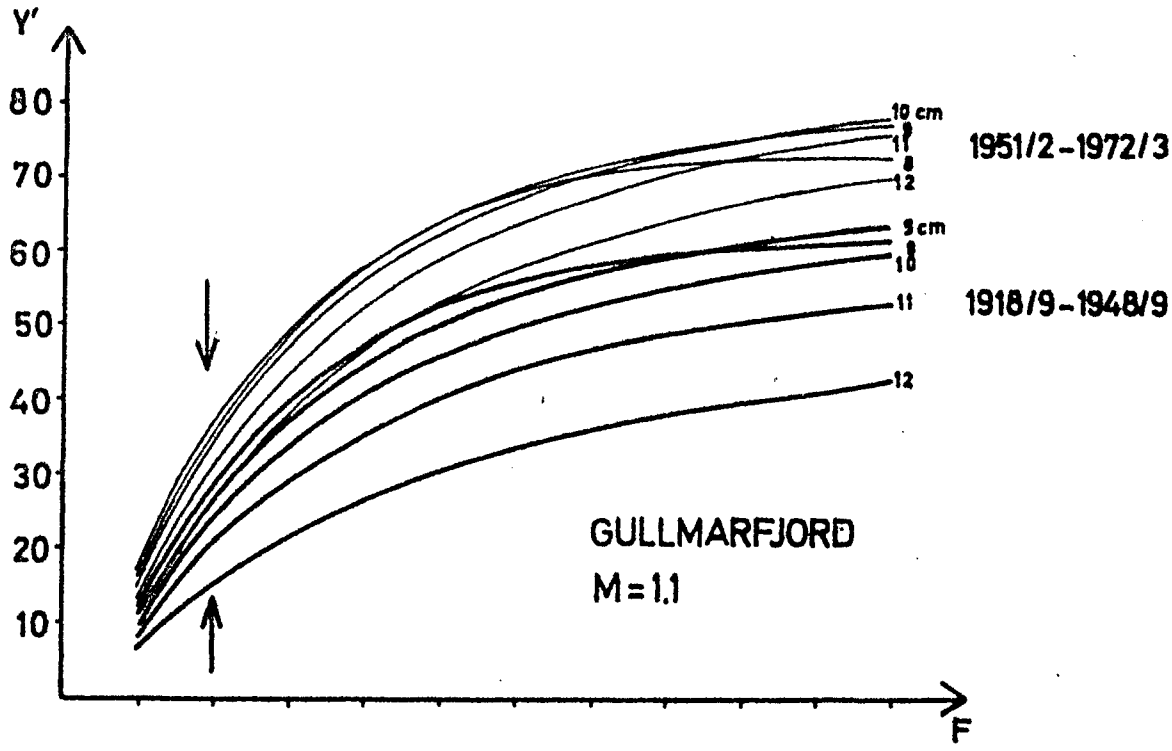

Z
20
18
16
14
12
10
08
06
04
02
72
73
71
79
74
0
100
200
300
400
500
600
700
800
NO. OF
LANDINGS

Fig. 2


Y'
80
70
60
50
40
30
20
10
10 cm
9
11
8
12
9 cm
8
10
11
12
1951/2-1972/3
1918/9-1948/9
GULLMARFJORD
M=1.1
F

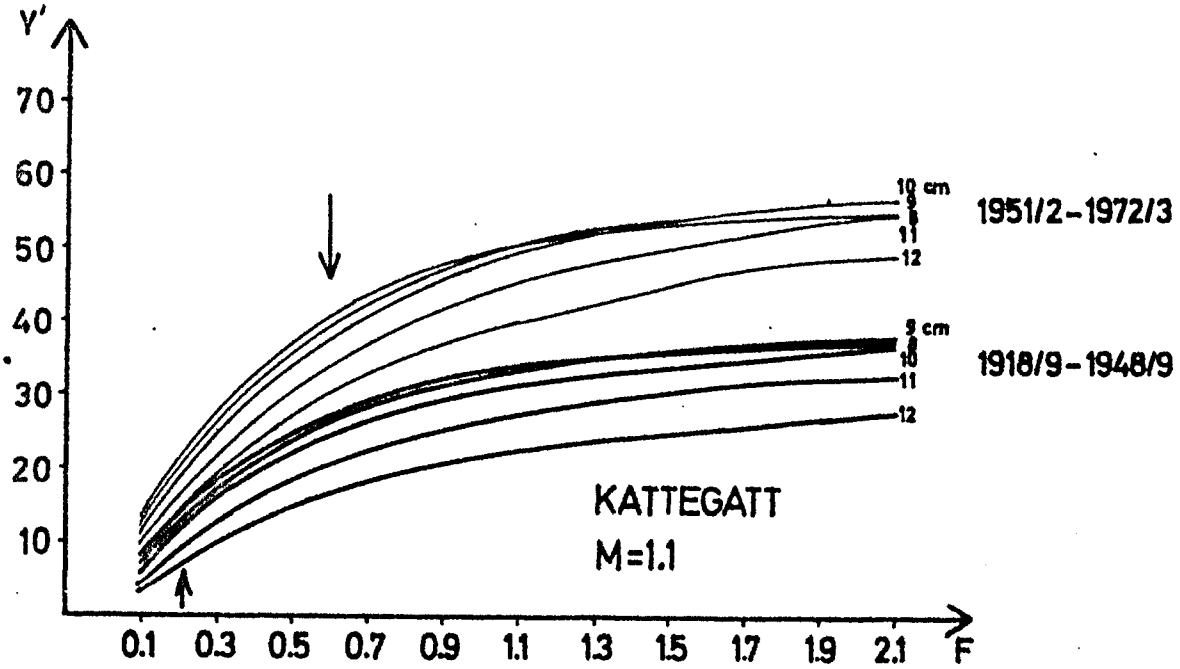
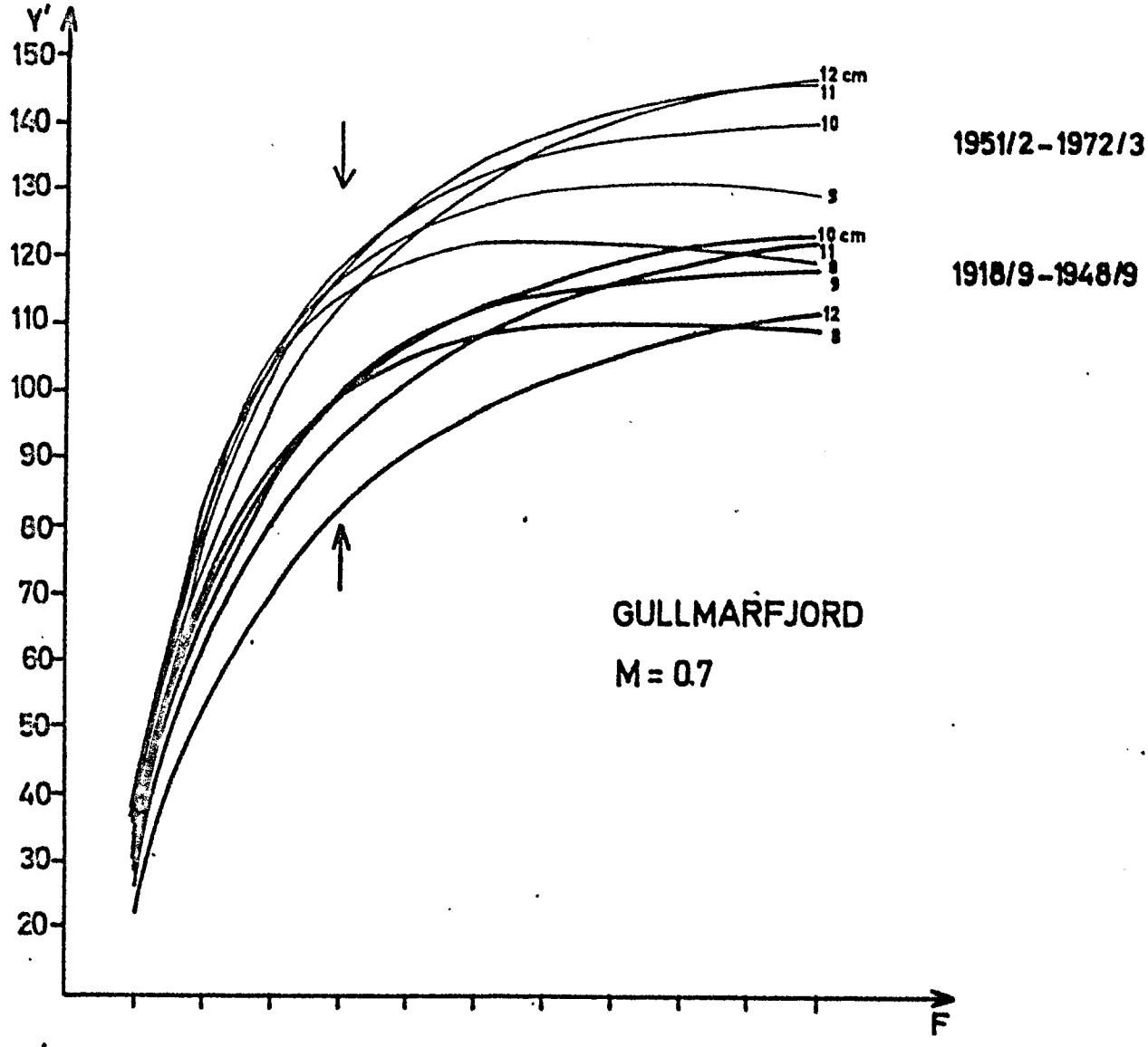
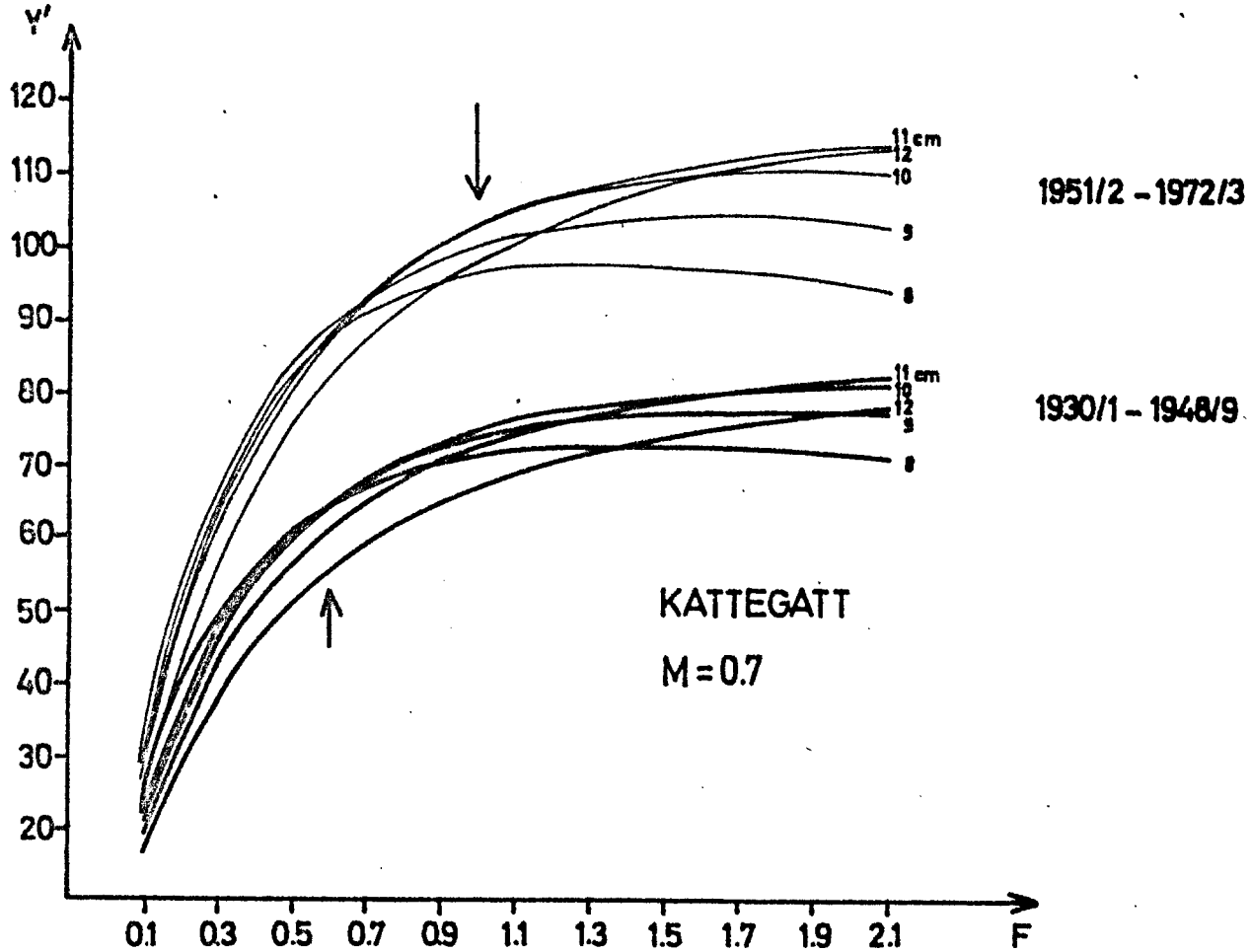

Y'
70
60
50
40
30
20
10
10 cm
9
8
11
12
9 cm
8
10
11
12
1951/2-1972/3
1918/9-1948/9
KATTEGATT
M=1.1
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.9
2.1
F

Fig. 3


Y'
150
140
130
120
110
100
90
80
70
60
50
40
30
20
12 cm
11
10
9
10 cm
11
8
9
12
8
1951/2 - 1972/3
1918/9 - 1948/9
GULLMARFJORD
M = 0.7
F


Y'
120
110
100
90
80
70
60
50
40
30
20
11 cm
12
10
9
8
11 cm
10
12
9
8
1951/2 - 1972/3
1930/1 - 1948/9
KATTEGATT
M = 0.7
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.9
2.1
F