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Preliminary evalutation of stock size and some stock parameters of the Rügen spring spawning herring

by

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Fishery:

The waters around Rügen, especially the Greifswalder Bodden, are the spawning area of an important Baltic herring stock.

Since som years this stock has formed the main basis of the fishery of fishermen's cooperatives along the GDR's coast. The catch especially by passive gears such as nets and traps increased since 1969. The augmentation of yields of the passive gears reached 308 percent in 1974 compared with 1969 in area 24. Normally the fishery season lasted from March/April up to the end of May but from 1973 to 1975 the season has been advanced more and more as a result of mild winters without ice in coastal waters. In 1975 the season started in the second half of January.

A trawl fishery on prespawning herring shoals and shoals leaving the coastal waters after spawning is carried out, too.

The part of adult Rügen spring spawners of the catches is insignificant during the feeding period of herring from July to September in areas 24 and 25.

Since 1972 we have a prespawning trawl herring fishery in the Arkona Basin beginning in November.

Stock parameters:

In the average from 1964 to 1974 the age groups 4 and 3 formed the main basis of catches. The age group 5 was not so numerous but important for the results of fisheries. The age groups 6 and 7 were numerous in some years. Spawning of the Rügen spring spawner begins in the age of 2 years and most of the fish spawn in the age of 3 years. But it seems the recruitment to the spawning stock lasts up to the age groups 4 or 5.

Investigations on growth of prespawning and spawning stock resulted in the following parameters:

$L_{inf.}$ 28.482 , k 0.426, t_o -0.513.

The total mortality rate was estimated by age composition for the period 1964 - 1974 according to Chapman & Robson. The estimated values of Z are shown in table 1.

Table 1 Total mortality rate of Rügen spring spawning herring

year	Z	age [1]
1964	0.76	6 and older
1965	0.79	5 and older
1966	-	-
1967	0.96	7 and older
1968	0.83	5 and older
1969	0.76	4 and older
1970	0.77	6 and older
1971	-	-
1972	1.10	5 and older
1973	1.08	5 and older
1974	1.31	4 and older
1964-1974	0.69	5 and older
1970-1974	0.73	4 and older

1) age of full recruitment according to the age composition

Stock calculations were made by V. P. A. Input data were:

1. Catches

year	total catch (1000 tons)
1964	5.8
1965	8.4
1966	12.7
1967	17.7
1968	15.4
1969	13.5
1970	18.6
1971	22.4
1972	31.1
1973	42.5
1974	45.6

Total catches were summed up according to the international statistic and the situation of herring stocks.

2. Mean weight per age groups

age group	2	3	4	5	6	7	8	9	10
6	48	75	97	115	131	149	174	196	224

3. Age composition

Only G. D. R. - samples

4. Natural mortality

M : 0.3

5. Fishing mortality

F_{4+} for 1974 : 0.75

The table 2 shows the fishing mortality rate and stock size for age group 2 and older. Age group 1 is without importance for the fishery.

Table 2 Fishing mortality rate and stock size

year	F 1)	stock size millions	stock size 1000 metric tons
1964	0.07	957.4	76.9
1965	0.10	888.8	77.2
1966	0.15	1027.3	83.8
1967	0.19	1131.3	89.2
1968	0.22	1186.6	89.4
1969	0.14	1335.1	99.5
1970	0.19	1673.1	120.6
1971	0.17	1793.7	134.9
1972	0.21	2145.5	153.3
1973	0.29	2871.0	220.8
1974	0.21	3456.8	227.9

1) weighted by stock size

The increased stock size seems to be the cause of increased catches because the fishing mortality has not increased significantly.

Reference:

Chapman, D. C. & Robson, D. The analyses of a catch curve Biometrics, 16, (1960), pp.351-368