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SALMON RIVERS IN THE KOLA PENINSULA.
STATUS OF ATLANTIC SALMON STOCKS

by

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INTRODUCTION

There are 65 rivers over the Kola Peninsula with the length of more than 10 km, which have with certainty been identified as habitat of Atlantic salmon and which bear conditions suitable for reproduction of this species. Five of those rivers are more than 200 km in length: the Ponoy river - 425 km, Varzuga river 262 km, Tuloma river 236 km, Strelna river 213 km, Jokanga river 202 km (Fig. 1). These rivers except Strelna river are rivers of major salmon fisheries, conducted in rivers of the Kola Peninsula.

Until recently, salmon from the Varzuga river were only less numerous than salmon from the Pechora river. To date the salmon population in the Varzuga river is the largest in the north of the European part of Russia (mean yearly abundance of spawners for the recent 10 years was estimated at 66 000 fish).

Historically, it's indigenous people who were engaged in fishing for salmon over the Kola Peninsula. Industrial fishing for salmon (i.e. fishing for salmon for sales, commercial fishing) was initiated in the 16th century, at the time when the first big settlement was established on the coast of the Kola fjord. Fishing was conducted at so-called fences, which could be roughly regarded as a prototype of contemporary fishing facilities. However, as fishing gears the fences are assumed to have been used much earlier, although first record relates to 1575 (Minkin, 1976). In particular, the author cited a record book of the Varzuga volost (small rural district), where the fishing fences in rivers the Olenitsa, Inders, Chavanga, Kitsa, Varzuga, Pyalitsa, Niva, Ponoy, Tuloma, Kola and others were mentioned.

There are no comprehensive statistics on salmon catch for that period of time. It is, for instance, known, that in the 17th century the catch of salmon in the Kola District was as much as 400 t (Smirnov, 1914; here cited from Ovsynnikov, 1938), and 37 000 fish (Kalinin, 1929) or 118 t by weight in the Ponoy river. In view of this it is unlikely to evaluate the numbers of salmon in rivers of the Kola Peninsula in the 17th-18th centuries, but according to L.S.Berg (1935) in those times the impact of fisheries on salmon stocks could be considered neglectable, and they were under effects of only environmental factors.

Later, before 20s of the current century, the salmon catch from rivers of the Kola Peninsula was not recorded on a regular basis. There is only fragmentary information on catch available in the literature. For instance, in 1841 the catch was estimated at 500 t (Berg, 1935), in 1899 - 400 t (Monastyrsky, 1935) and in 1912 and 1914 - 220 t and 350 t, respectively. It is difficult to evaluate how accurate these estimates were. However, according to Soldatov (1906), it was intensive fishing in the end of the last century, which began to produce notable impact on the abundance of salmon, entering the rivers draining into the Kola fjord. According to V.V.Azbelev (1970) this process started in 40-50s of the current century. To date different fisheries and other antropogenic factors are producing quite considerable impact on numbers of salmon in rivers of the Kola Peninsula. This paper presents analysis of those factors and gives evaluation of status of Atlantic salmon stocks in rivers of the Kola Peninsula.

MATERIALS AND METHODS

The paper uses summarized data on salmon catch in rivers Pechenga, Titovka, Bolshaya Zapadnaya Litsa, Ura, Uritsa, Kulonga, Tuloma, Kola, Tyuva, Teriberka, Voronja, Belousikha, Drozdovka, Ivanovka, Kachkovka, Ponoy, Varzuga, Kitsa, Uмба, Kolvitsa, Luvenga (Fig. 1) and coastal areas of the Barents and White Seas for 1922-1992. Included are catch statistics for 1924-1934 given by L.S.Berg (1935), information on catch for 1922-23 and 1925, restored by V.V.Azbelev (1970) and besides, data on catch before 1967, borrowed from the same paper.

Data on catch for 1968-1992 have been borrowed from reports by MURMANRYBVOD. Reported catch and numbers of salmon in rivers Tuloma, Kola, Ponoy, Varzuga are given according to V.V.Azbelev (1960), M.N.Melnikova (1966), I.N.Grinyuk (1977), and MURMANRYBVOD. Norwegian catch for 1945-1961 is given according to Rosseland (1968). Most recent catch statistics have been borrowed from report of the ICES Atlantic Salmon Working Group (Anon., 1993).

RESULTS AND DISCUSSION

From 1922 to 1992 the catch of salmon from rivers and inshore areas of the Kola Peninsula varied from 130 to 740 t (Fig. 2). Average catch by decade was - 226 t in 1922-1930, 449 t in 1931-1940, 453 t in 1941-1950, 394 t in 1951-1960, 269 t in 1961-1970, 331 t in 1971-1980, 286 t in 1981-1990, the average

catch for the period from 1922 to 1990 was 340 t. Fig. 3 shows the dynamics of catch in 1945-1992 and dynamics of numbers of spawning migrants in 1958-1992, while Figs. 4-7 present relevant reported data for major commercially-important rivers: Kola, Tuloma, Ponoy, Varzuga.

According to L.S.Berg (1935, 1948) salmon numbers exhibit natural fluctuations with 9-11-year recurrency. This is confirmed by catch statistics (Fig. 2), which evidence, that the lowest catch occurred in 1921, 1932, 1942, 1951, 1963, 1972, 1982, 1992. V.V.Azbelev (1970) in this connection noted that, as a rule, minimal catch occurs in the first years of a decade, and long-term depression of stocks starts in the middle or in the end of a decade and persists until the mid of the next decade. He referred to L.S.Berg, who noted similar depression of stocks in Europe and Canada in 1878 to 1884, and besides, he pointed out long depression of salmon stocks originating from rivers of the Kola Peninsula in 1921-1932 and the other one, which, as he suggested, started in 1956 (from Figs. 2, 3 it is clear that it started somewhat later, in 1963, and finished in 1972).

Before 60s various fishing gears were used in salmon fisheries over the Kola Peninsula, of which most widely used were gill nets, set nets and drag sein. The fisheries were conducted at numerous rivers and sea fishing places. And although catch statistics can to some extent characterize certain regularities of abundance variations, however, it was uneasy to evaluate, in general, the status of stock of Atlantic salmon in rivers of the Kola Peninsula at that time, since there was no accurate technique of counting of adult fish ascending for spawning, while the commercial catch at that time was not steady, according to experimental fishing in the area of the Kolvitsa river it varied from 35 to 66% (Azbelev, 1960). The fishing pressure was, as a rule, growing when the numbers of salmon were declining.

Since early 60s the fishing for salmon over the Kola Peninsula was concentrated at fish counting fences, installed in river's estuary. This facilitated to establish a direct counting of fish ascending for spawning.

With this new information available it has become possible to both estimate the numbers of fish, who entered a river for spawning in a given year, and forecast fairly accurate spawning runs two years in advance, evaluate salmon stocks in general and by region or river.

As it has been said before, in the 60s and early 70s salmon stocks in rivers over the Kola Peninsula experienced long depression, which manifested itself also in catch decline (Fig. 2). Besides environmental factors, main reasons behind were overfishing, deterioration of reproduction conditions, caused by economic activities, and complete loss of salmon populations in rivers Teriberka (average stock abundance of about 3000 salmon), Voronja (about 2500 salmon), Niva (about 1500 salmon), Kovda (about 1000 salmon) as a result of power plant regulation.

Overfishing was due to three reasons: too heavy national fishing, non-regulated international fishing in feeding areas and migration routes, illegal fishing for spawners during spawning run to the rivers.

The fact, that the pressure from Russian fisheries before early 60s, when sea fisheries were conducted, was heavy, does not need to be further evidenced. It is clear from analysis of variations of salmon numbers in principal commercially-important rivers, especially in the Varzuga river, where salmon are less affected by international fishing and where after-effects from Russian fisheries had considerable impact on stocks in the period from 1960 to 1980 (Fig. 7).

Until now still quite disputable remains the question related to the impact of the Norwegian and Faroese sea fisheries on salmon originating from rivers of the north-western part of Russia. Data available in the literature (Berg, 1935; Danilchenko, 1938; Novikov, 1953, 1956; Azbelev, Lagunov, 1956; Bakshtansky, 1970; Bakshtansky, Nesterov, 1973; Bakshtansky et al., 1985, 1991; Grinyuk, 1977; Yakovenko, 1977, 1987a,b; Antonova, Chuksina, 1985, 1987; Bugaev, 1987) indicate that this impact could be very heavy. For instance, salmon tagging experiments in a number of the White Sea rivers have provided evidence that about 22% of fish in origin from these rivers are being withdrawn in foreign fisheries (Yakovenko, 1977). E.L.Bakshtansky (1970) after having analysed materials from sea fisheries has concluded that 2/3 of the Norwegian catch near Finnmarken contain salmon originating from rivers in the north-west of Russia, and half of the Norwegian Sea catch contains, according to Bakshtansky et al. (1985, 1991), Russian salmon.

Fig. 8 confirms that the Russian catch is directly related to sea fishery. However, it is rather difficult to decide, how accurate the above estimates of the proportion of Russian salmon in the Norwegian and Faroese catch are. Nevertheless, the suggested estimates are unlikely to be groundless. To our mind, this can be evidenced by the changes in the percentage catch by each country, whose stocks are foraging in the Norwegian Sea (Fig. 9). The figure shows clearly that the Norwegian, Faroese catch and the Russian catch have opposite trends. A growth of about 10% in the Norwegian catch resulted in a decline of the Russian catch by about also 10%, i.e. about 1/3 of the catch, corresponding to not less than 200-300 t was lost every year.

The same relationship is clearly evident in the Faroese fishery, initiated in the 200-mile economic zone in 1979. An adverse impact from this fishery manifested itself in both Russian salmon stocks and stocks of salmon in Norway, Iceland and other countries. From calculations, Russian losses of catch averaged about 5-7% or about 100-140 t every year. Norwegian losses during this period were estimated at about 10-12% on the average or 300-350 t.

Besides, poaching in salmon rivers of the Kola Peninsula must also be mentioned as a rather serious problem. Observations have shown that illegal catch in rivers easy for access can be

pretty big. For instance, in the Uмба river it is estimated to be as big as 26%, in the Varzuga river 15% and in the Kola river, to reduce the pouching, most of the adult stock has to be fished and the production in this river is maintained through releases of hatchery-reared smolts.

Nevertheless, despite growing pressure from man activities (pouching, timber rafting, discharges from industries, sea fishing), introduction of concentrated fishing for salmon at counting fences contributed to stabilization of salmon stocks (as mentioned before, annual catch in 1951-1960 averaged 394 t, in 1961-1970, 1971-1980, 1981-1990 it was 263 t, 333 t and 288 t, respectively). In our opinion, limitation of fishing times, introduction of catch quota (not more than 60 t) in sea fishery, reduction of commercial catch in some river to 33-37% also gave positive effect.

Despite hydropower plant regulation, rivers of the Kola Peninsula have considerable production capacity. Total area of spawning and nursery grounds in 65 salmon rivers is estimated at around 3857 hectares (1104 hectares in the Barents Sea rivers and 2753 hectares in the White Sea rivers), which would allow, only through natural production, the numbers of adult salmon migrating into the Barents Sea rivers for spawning to grow to 90 000 fish and into the White Sea rivers to 265 000 fish.

In 1985-1992 the abundance of salmon running for spawning into the rivers draining into the Barents Sea varied from 20 to 41 thou. fish (average 34 thou.) and into the White Sea from 108 to 215 thou. fish (average 142 thou.), in other words, only 1/3 and 1/2 of the production capacity, respectively, was used.

Nowdays, the Kola Peninsula is the only region in the north of the European part of Russia, where salmon stocks are in a healthy condition and their numbers show an increasing trend (Figs. 3, 10, 11), particularly, in rivers Varzuga, Tuloma, Kola, Jokanga, Ponoy. According to our assessment (provided that the long-term mean ratio of females to progeny is 1:4) to ensure an enhanced production of salmon in rivers of the Kola Peninsula the number of spawning escapees should be not less than 60 000 fish. This target level is quite realistic to reach bearing in mind the current status of salmon stocks.

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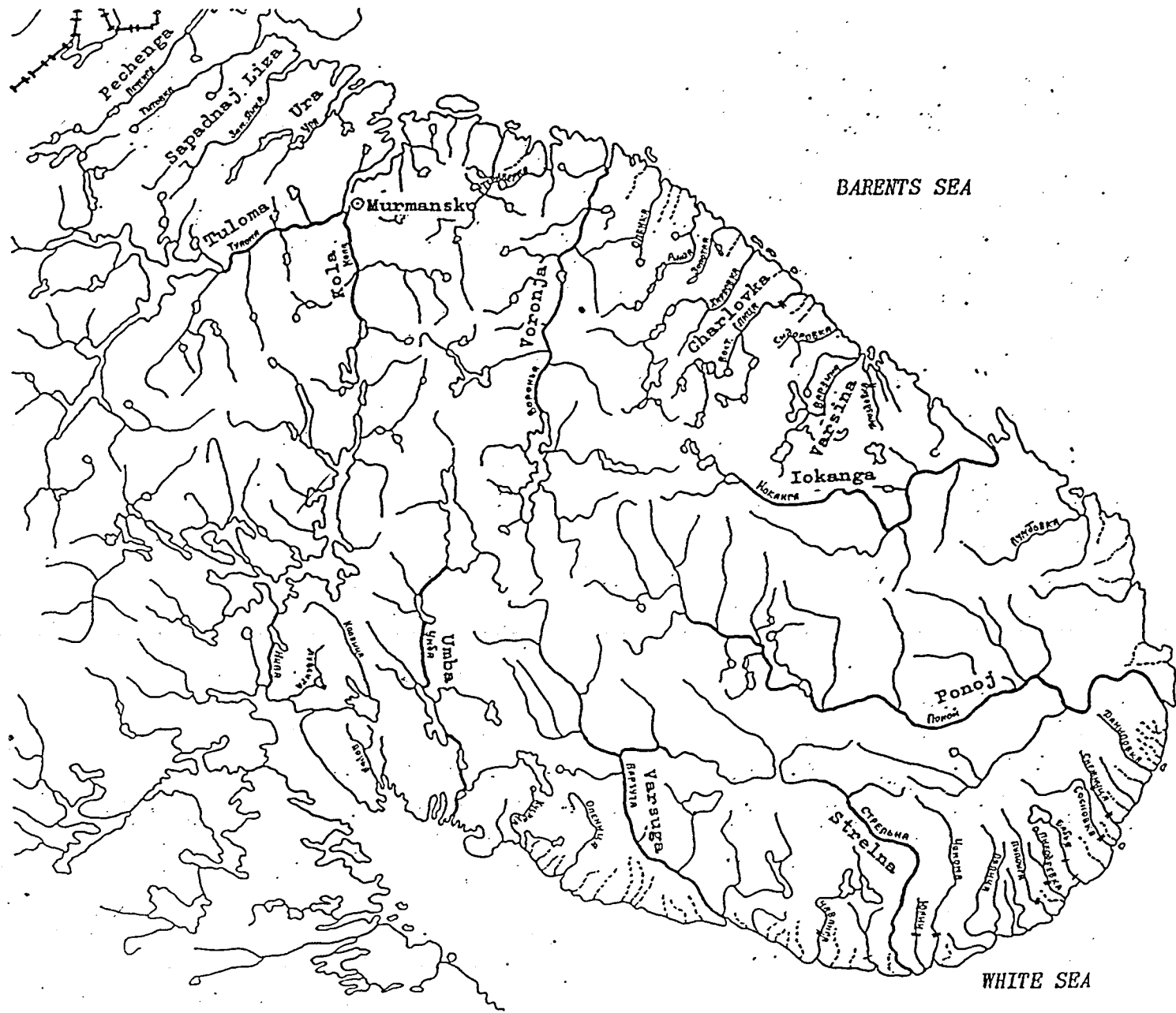


Fig. 1

Fig.2. Catch of atlantic salmon
on Kola Peninsula in 1922-1992

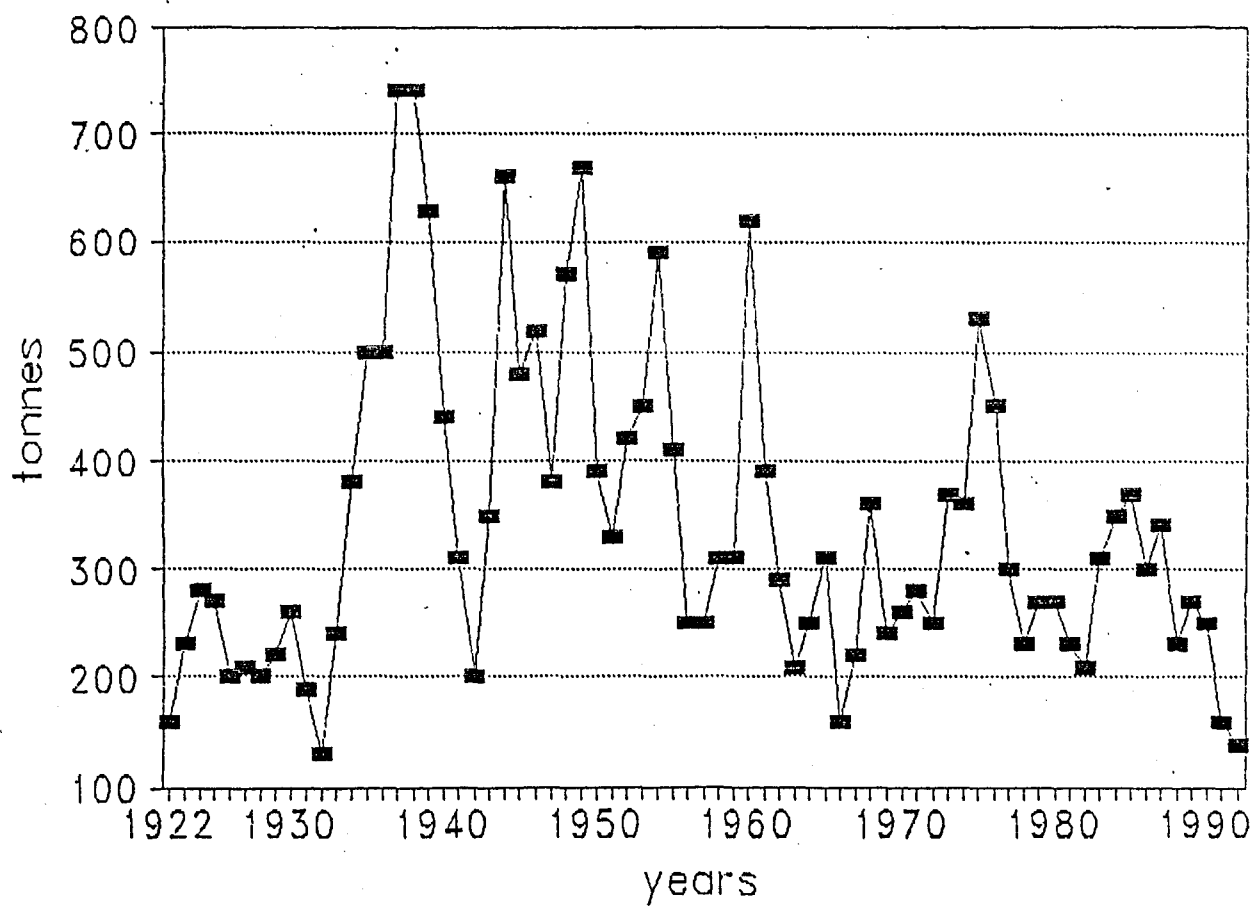


Fig.3. Catches and stocks abundance of salmon in Kola Peninsula in 1945-1992

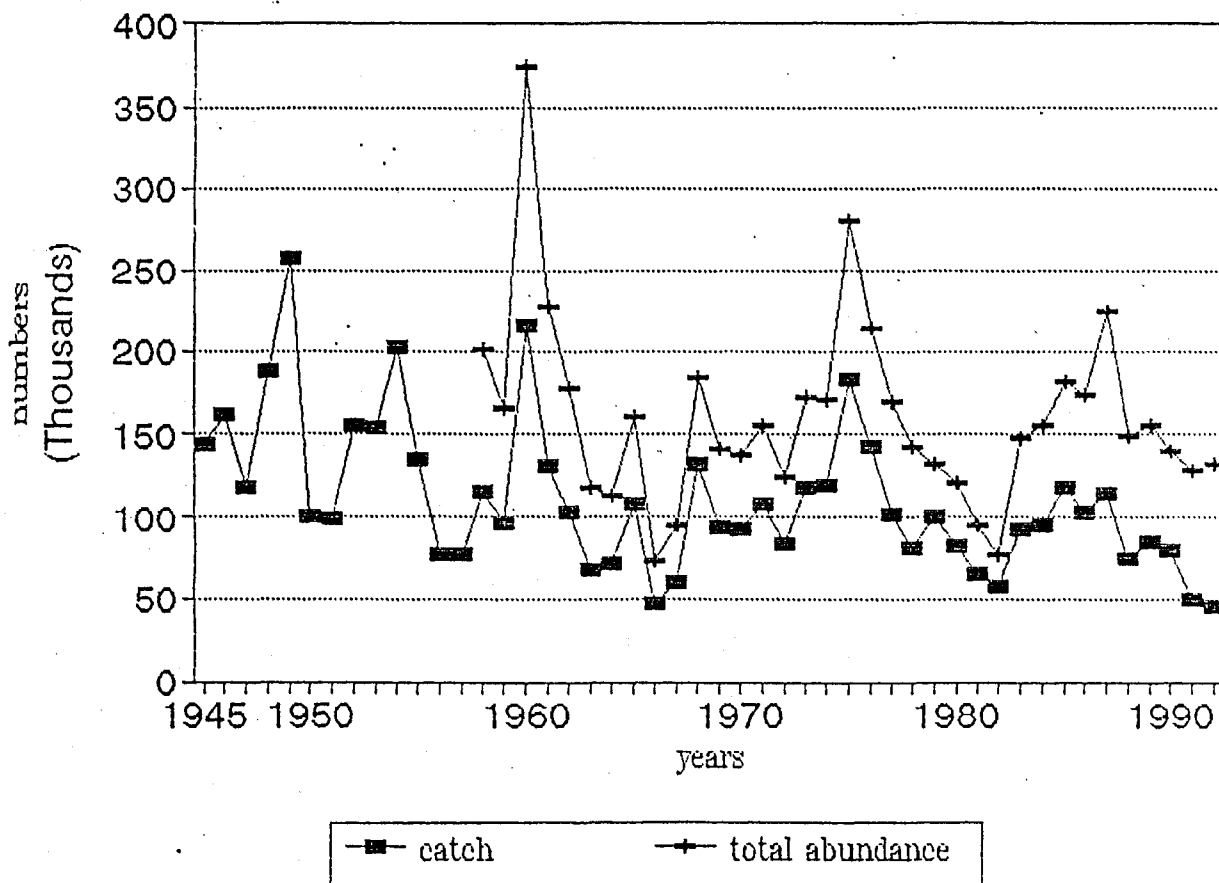


Fig.4. Catches and stocks abundance of salmon in Kola R. in 1945-1992

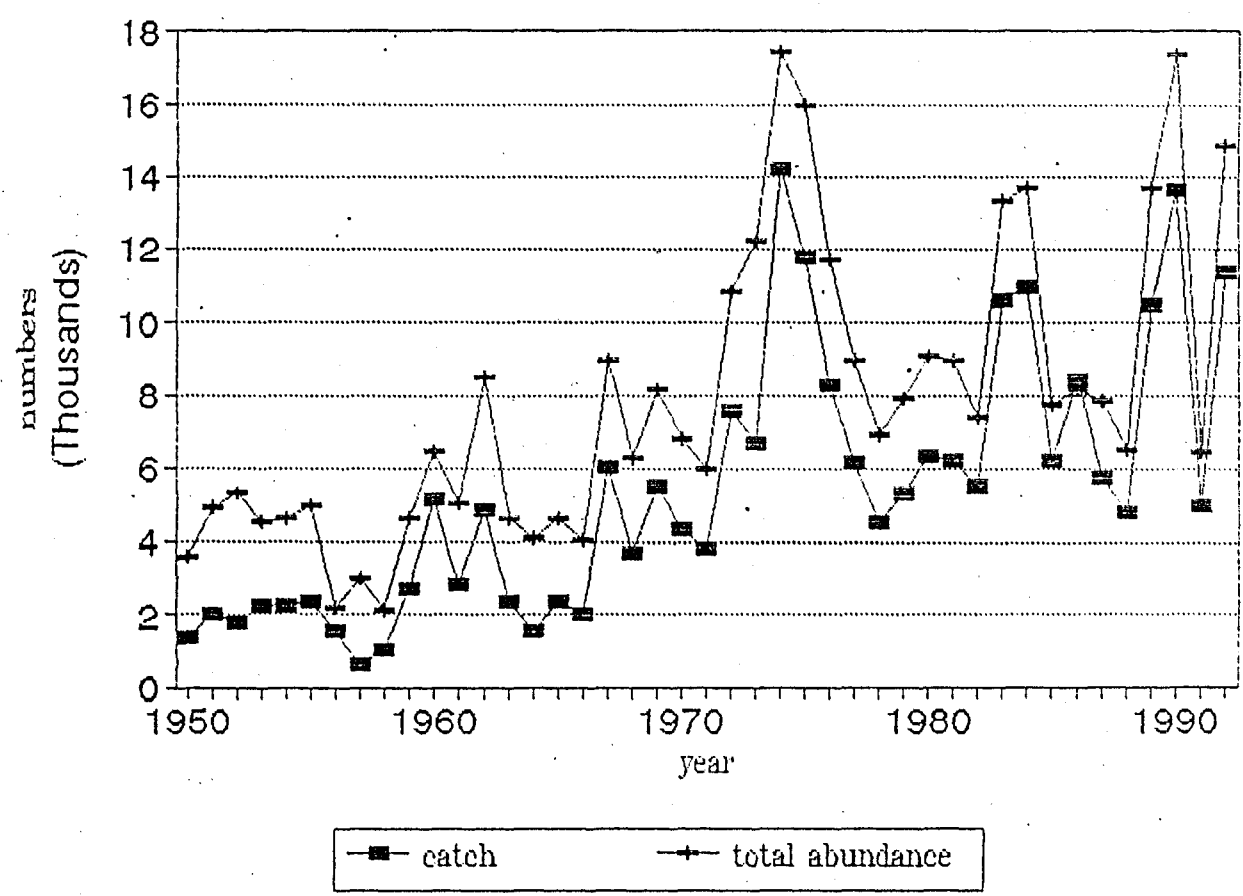


Fig.5. Catches and stocks abundance of salmon in Tuloma R. in 1945-1992

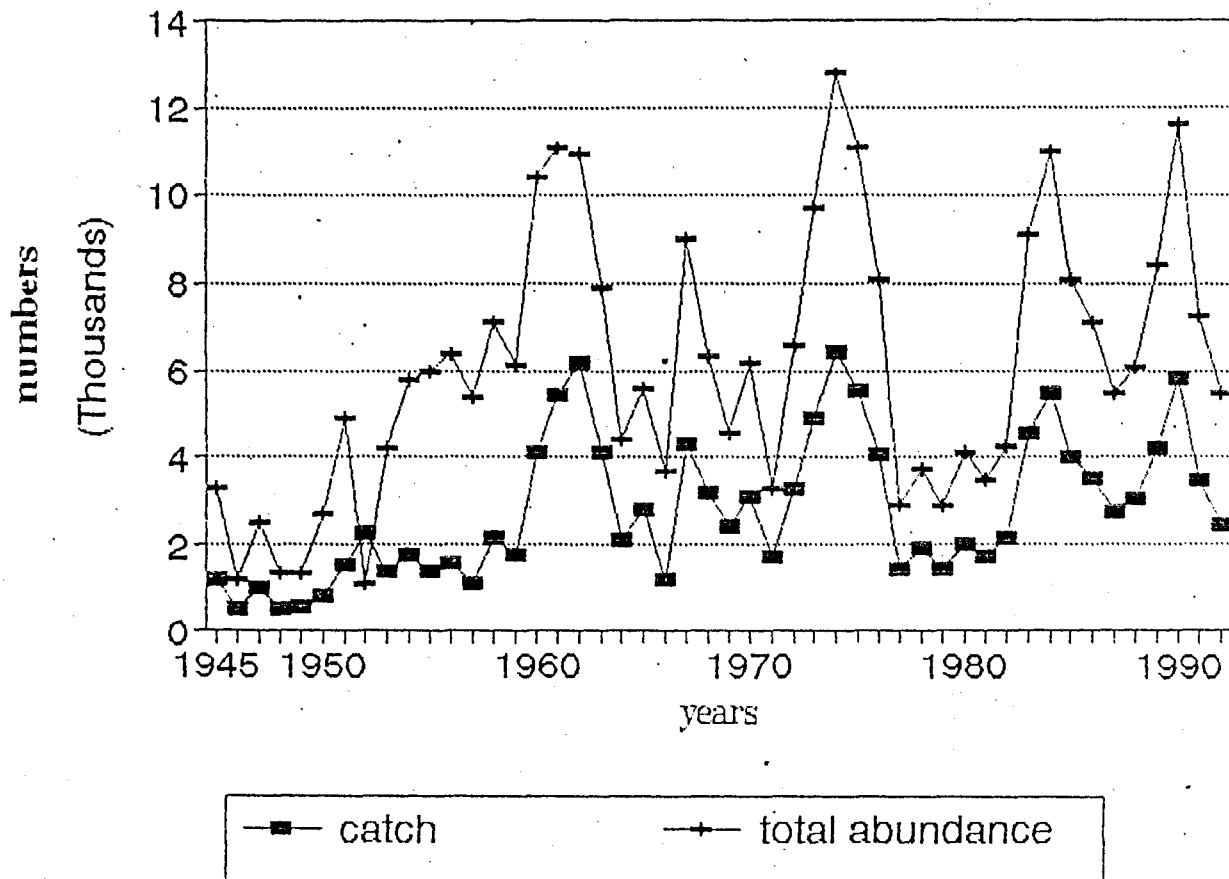


Fig.6. Catches and stocks abundance of salmon in Ponoy R. in 1923-1992

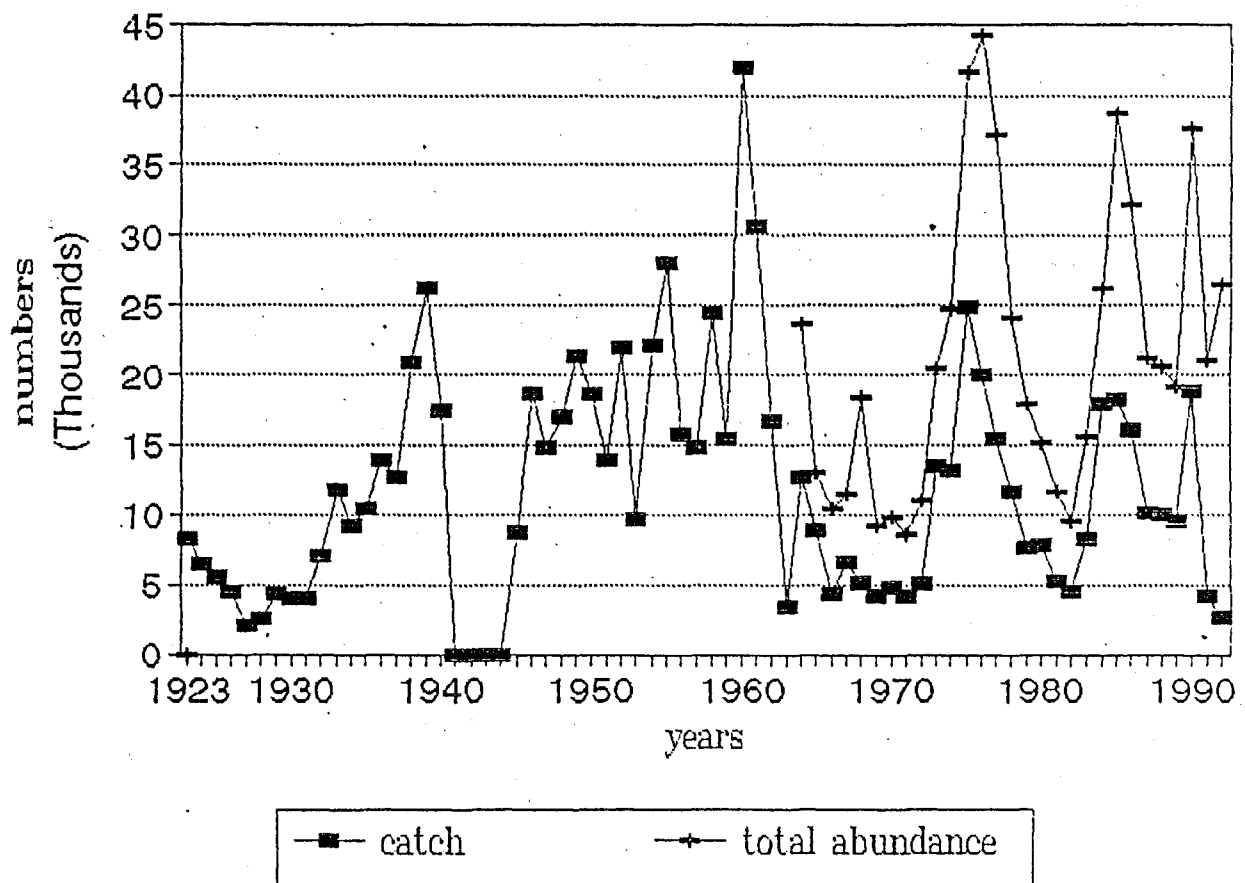


Fig.7. Catches and stocks abundance of salmon in Varzuga R. in 1958-1992

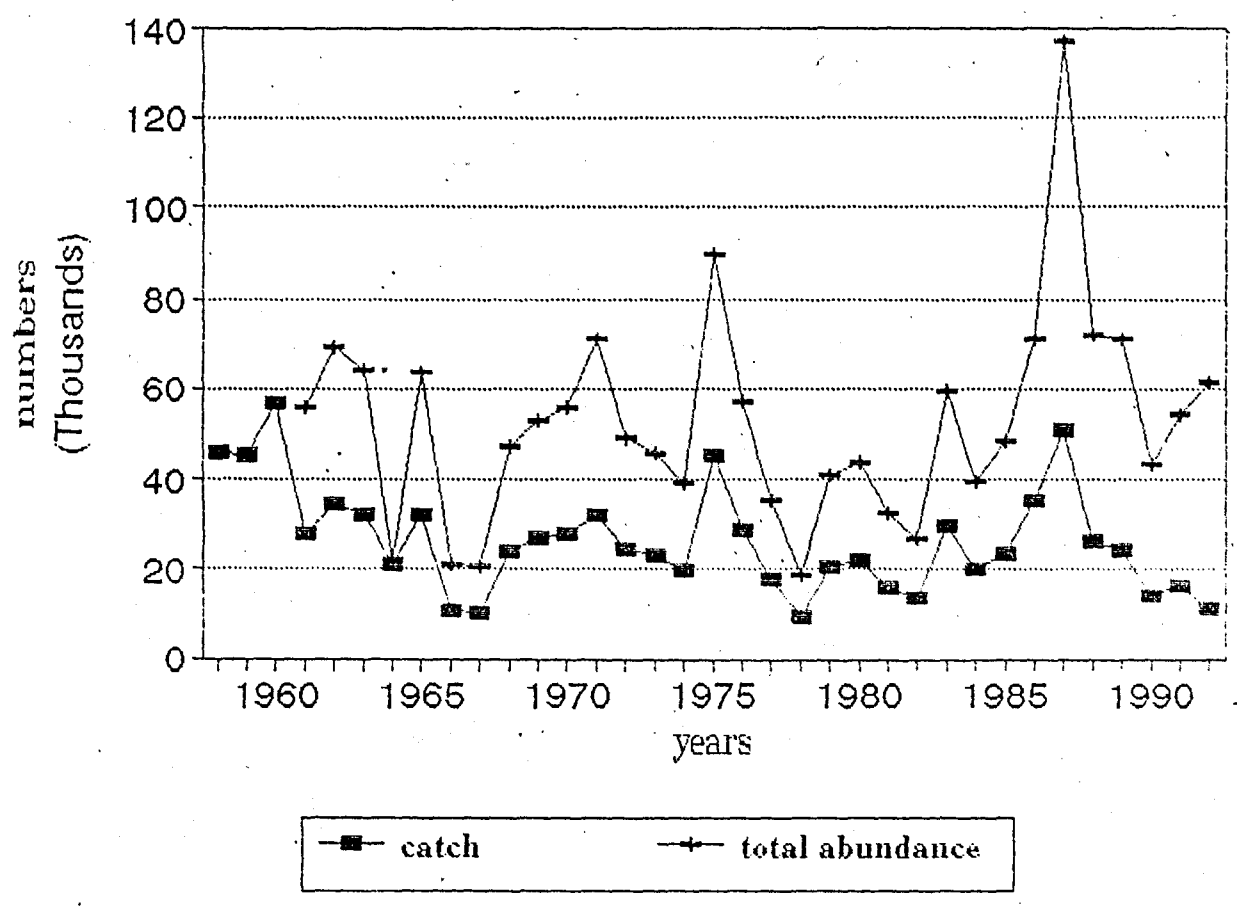


Fig.8. Catches in Norway, Faroese and Kola Peninsula in 1945-1992

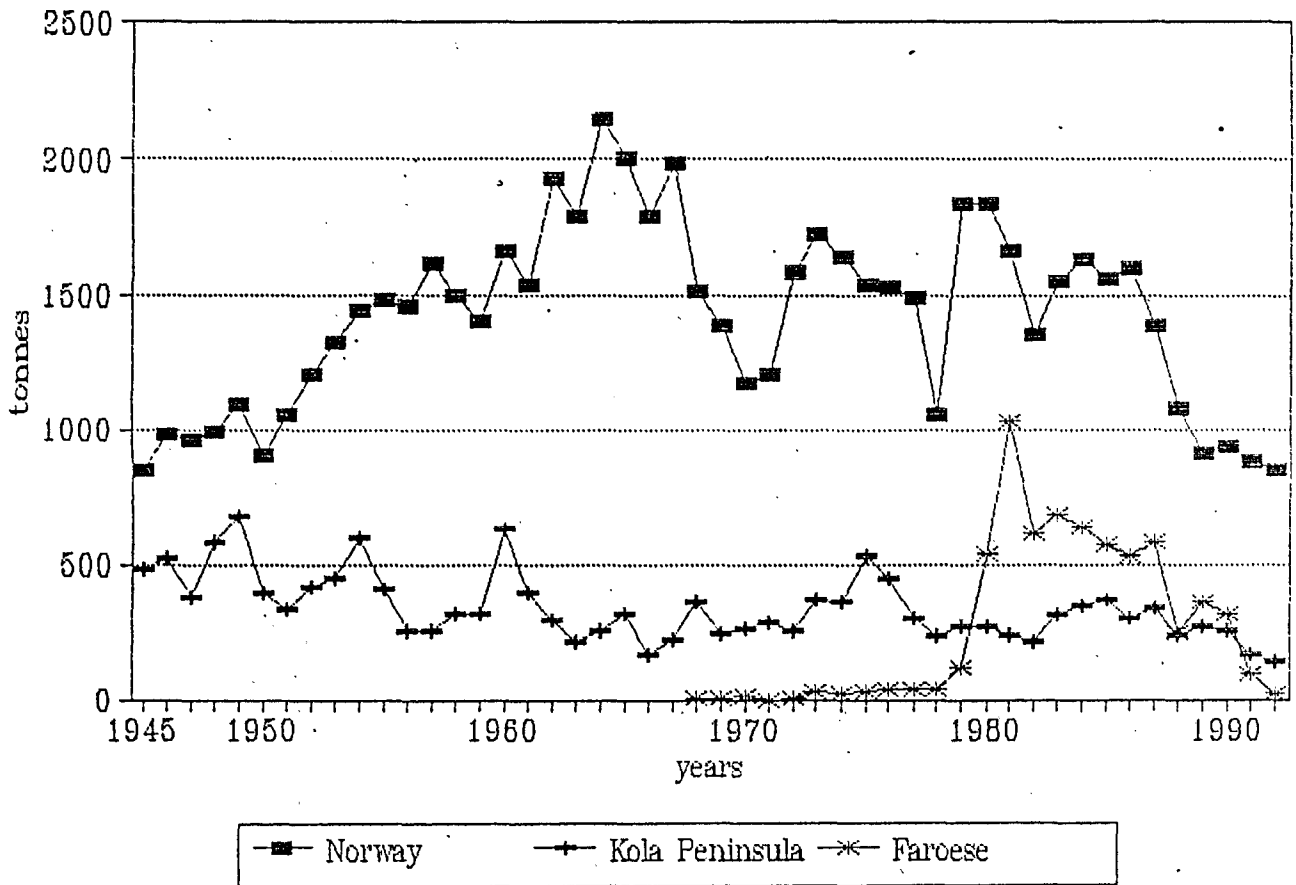


Fig.9. Ratio catches in Norway, Russia, Faroese, Iceland in 1960-1992

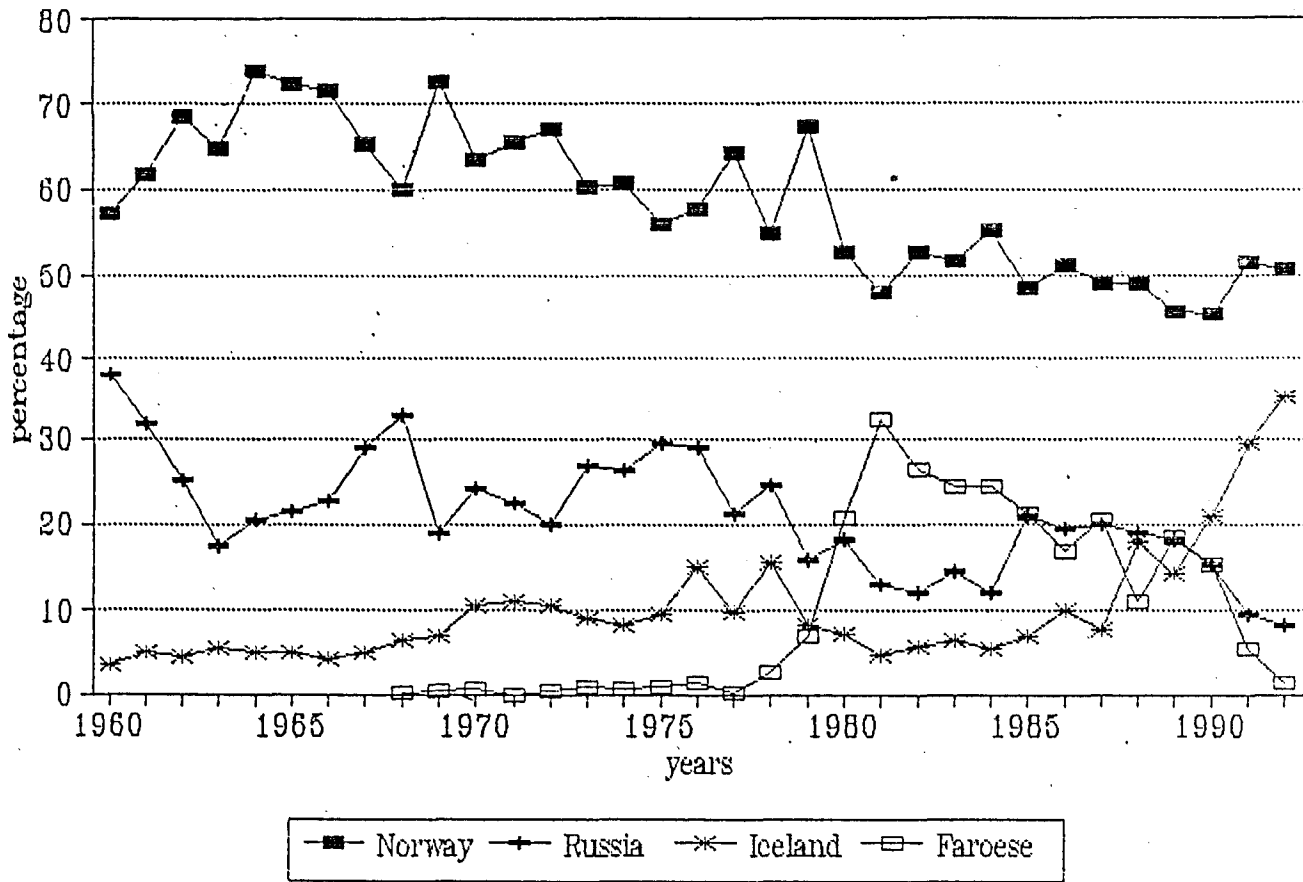


Fig.10. Catches and stocks abundance of salmon in Barents sea in 1945-1992

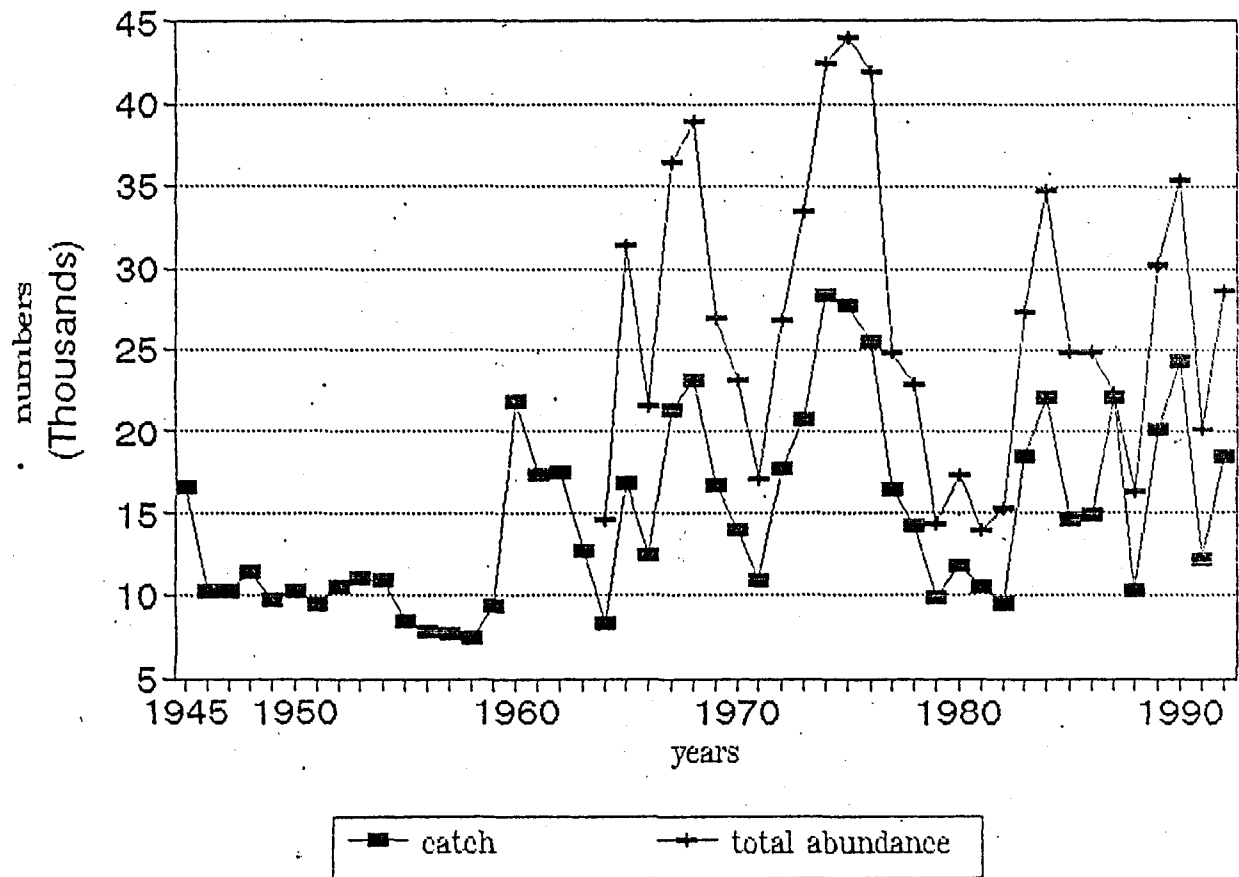


Fig.11. Catches and stocks abundance of salmon in White sea in 1945-1992

