

SHORT NOTE ON ABUNDANCE OF *SEBASTES MENTELLA* IN THE 0-GROUP AND YOUNGFISH SURVEYS AS INDICATOR OF RECRUITMENT OVERFISHING

by

K. H. Nedreaas

Institute of Marine Research
P.O.Box 1870, 5024 Bergen, Norway

ABSTRACT

Abundance indices of 0-group *Sebastes mentella* from the international 0-group survey in the Barents Sea showed a sudden decrease from 1990 to 1991 to a low level which remained for three years. The strength of these weak yearclasses has been confirmed in later youngfish surveys, and is supposed to be a result of a historic low spawning stock. A big directed fishery in former years, and huge by-catches and discards of small *Sebastes mentella* in other fisheries have due to the late maturity of this species not until now resulted in a serious reduction of the spawning stock. A directed trawl fishery in more recent years on mature fish on new fishing grounds has probably speeded-up this negative development.

INTRODUCTION

Up to the middle of the 1980-ies, former USSR and GDR were the two countries taking most of the *Sebastes mentella* catches in ICES Sub-areas I and II (Anon. 1991). The fishery was mostly going on in the western part of the Barents Sea between the Malangen Bank and Bear Island (Kopytov area). Although it has been difficult to achieve reliable assessments of the *Sebastes mentella* stock, assessment based on information from the Barents Sea fishery, and biological data from this area, showed that at least this part of the stock was decreasing towards 1987 (Anon. 1991, 1994a). Despite this decrease, the abundance of 0-group in the Barents Sea and Svalbard areas maintained the same stable level as observed in all previous comparable years, i.e., back to 1979 (Anon. 1994b). In 1985-1987 a new fishery started along the continental slope, at around 500 meters depth, from the Malangen Bank and southwards beyond Møre (Figure 1). Only adult, mostly mature fish bigger than 28-30 cm inhabit these areas, where also spawning takes place. Fishing for *Sebastes mentella* on these grounds had never occurred before in history. Although the stock has not been reliably estimated, and no time series exists on survey results covering the entire area of the *Sebastes mentella* stock's distribution, this short note gives some indications of recruitment failure that should be kept

in mind and further investigated.

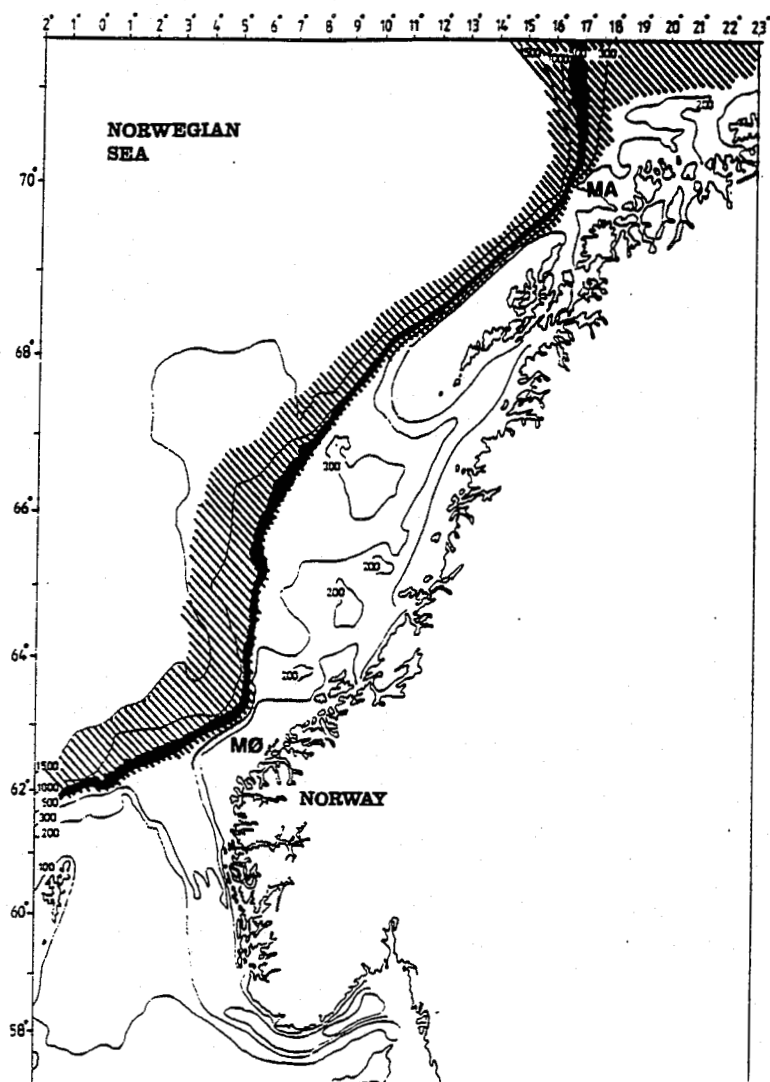


Figure 1. Distribution of *Sebastes mentella* along the continental slope south of 70°30' N. Spawning area has been emphasized (black area around 500 meters depth). When the bottom depth become greater than approximately 550-600 meters the *Sebastes mentella* are found pelagic at 450-600 meters depth from the slope and outwards some distance into the Norwegian Sea. The main fishing areas are north of 65°N and southwest of Møre. MA - Malangen Bank, MØ - Møre.

RESULTS AND DISCUSSION

The fishery on these new fishing grounds increased towards 1991. This is illustrated by the Norwegian *Sebastes mentella* landings which mainly were taken along the slope from south of Bear Island to beyond Møre (Figure 2). At the international 0-group survey in the Barents Sea and Svalbard areas in 1991, approximately 5 years after the new fishery began, the 0-group index of redfish suddenly decreased to only 1/4 of the stable historic level in 1979-1990 (Figure 3). Although not splitted on redfish species as a routine, genetic analyses which have been conducted have shown that the bulk of this 0-group are *Sebastes mentella* (Nedreaas and Nævdal 1991). This low 0-group level, even down to 20% of the historic level, was observed in three subsequent years, i.e., 1991-1993 (Anon. 1994b), hence indicating a suddenly and

alarming change in the reproduction of the *Sebastes mentella* stock. The 0-group survey in 1994 showed, however, a slight increase, but only to a level 58% of the stable level in 1979-1990.

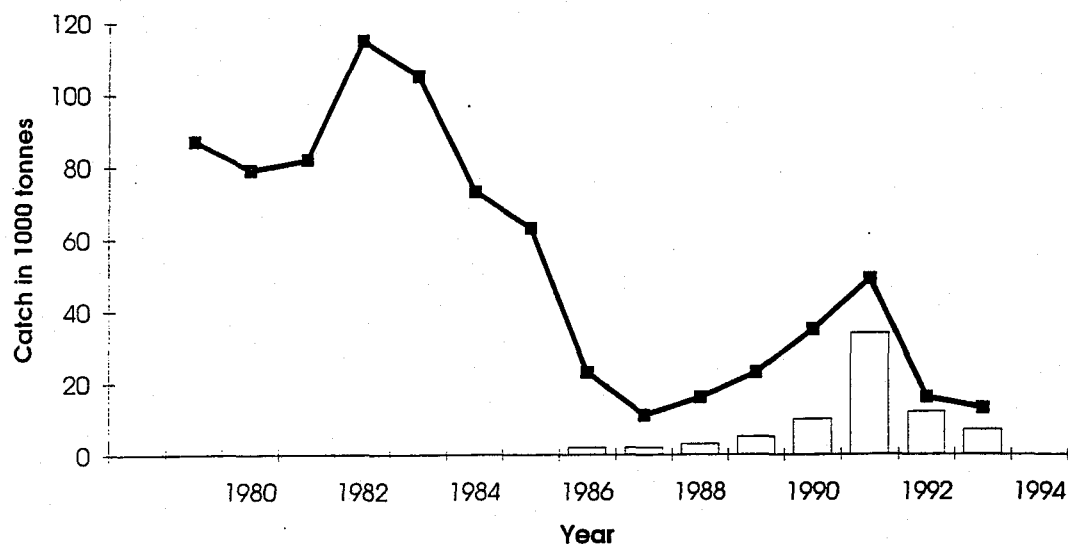


Figure 2. Total international catch of *Sebastes mentella* in ICES Sub-areas in I and II (solid line) and the Norwegian catch (columns).

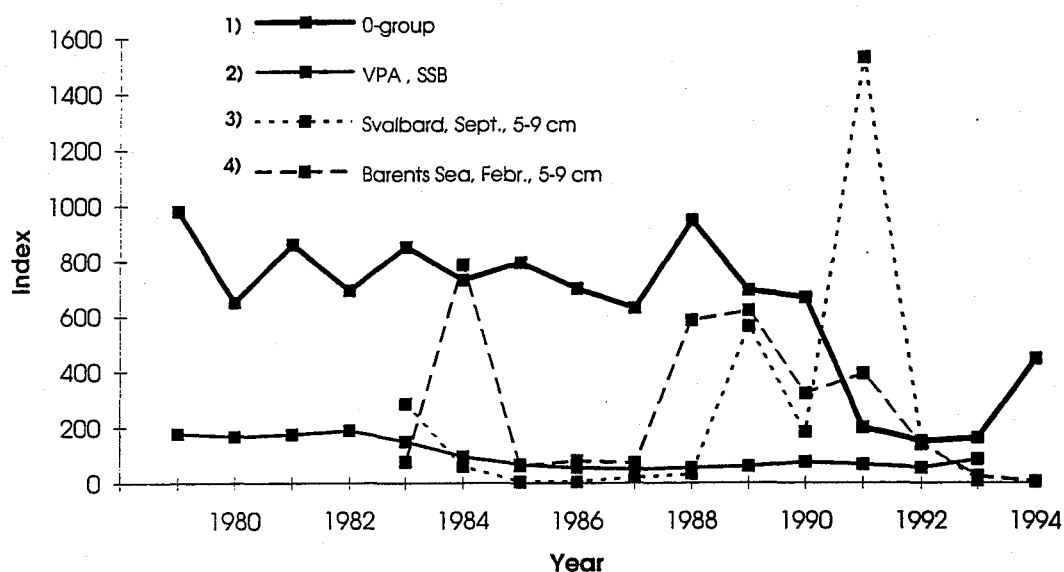


Figure 3. *Sebastes mentella* in ICES Sub-areas I and II. Diagram showing 1) the 0-group index (Anon. 1994b), 2) the spawning stock biomass estimated by VPA (Anon. 1994a, although not accepted by ACFM), the abundance of 5-9 cm fish in two Norwegian stratified bottom trawl surveys 3) in September at Svalbard (Hysten *et al.* 1993) and 4) in February in the Barents Sea (Mehl and Nakken 1994).

If the 0-group survey is representative for the recruitment, then a decrease in the abundance of juveniles, 1-group and older, should be observed in the routine youngfish surveys one or more years later. Since no age data are available from the Norwegian bottom trawl survey time series at present, swept area estimates for 5-9 cm *Sebastes mentella* from the survey in February in the Barents Sea and the survey in September at Svalbard are shown in Figure 3. Although low abundance of 5-9 cm fish was observed during these surveys in 1985-1987 when the 0-group index still was at the high stable level, a clear decrease is observed after 1991, thus confirming the three most recent years' low level in the 0-group survey. This is

also confirmed by Russian survey results (Anon. 1994a, Drevetnyak 1995). By-catches of small redfish in fisheries for other species, mainly shrimp, should be looked upon when searching for explanations for the low 5-9 cm indices in 1985-1987 (Hysten and Jacobsen 1988). The descent of young *Sebastes mentella* from a pelagic to a more near-bottom habitat may not take place before the fish is at least two years old, and it may also differ from year to year and with year-class strength (Drevetnyak 1995). This may therefore be a part of the explanation for the low 5-9 cm indices that should be looked closer upon.

An explanation for why a reduction in the 0-group index was not observed although the stock (or more correct, the Barents Sea/Svalbard component) decreased towards 1987, is that a certain part of the spawning stock was living outside the fishing area and thereby serving as a buffer, i.e. continuing giving birth to a lot of larvae. However, when the fishing then started on these grounds never harvested until the middle of the 1980-ies, then after 5-6 years of fishing, a sudden reduction in the 0-group abundance was observed. The hypothesis is that we by doing so might have hit the "Achilles' tendon" of the *Sebastes mentella* stock. However, it started already in the Barents Sea when a lot of small redfish in previous years were taken as by-catch in other fisheries (Hysten and Jacobsen 1988), and 80 000 - 200 000 tonnes were taken in the directed *Sebastes mentella* fishery (Anon. 1994a). An increasing cod stock in recent years has also preyed upon small redfish (Bogstad and Mehl 1991, Dolgaya and Tretyak 1991). Then the fishery started on the new fishing grounds, on a part of the stock which now seems to have been the last straw.

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