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SOME ASPECTS OF POSSIBLE CONSEQUENCES AFTER DECREASING A MINIMAL MESH SIZE OF PELAGIC TRAWLS IN REDFISH FISHERY IN DIVS. 3LN OF THE NAFO REGULATORY AREA

by

A.Pavlenko and A.Klyuev
PINRO

Abstract

Redfish species *Sebastes mentella* and *Sebastes fasciatus* from Divs. 3LN which are fished out by both bottom and pelagic trawls with minimal 130 mesh inside size are related to the important fishery objects in the NAFO Regulatory Area.

The paper shows that due to the mismatch of the minimal (130 mm) mesh size and the average mature redfish size a greater part of catch is lost; when hauling trawl to the surface the most part of redfish escape from codend. In accordance with principles of precautionary approach, it should be considered that all the fish escaping at this stage of hauling die because of the traumas and predators, increasing the unaccounted fishing mortality by this. Approximately, the effect of selectivity as a result of using the minimal 130 mm mesh size to regulate the pelagic fishery of redfish in Div.3N is 4-5% of the increase in catch size composition in relation to the stock size composition. This effect may be considered as minor because of small modal length in the stock size composition of the redfish studied.

According to the preliminary estimation, the minimal 130 mm mesh size applied to regulate fishing of *Sebastes mentella* and *Sebastes fasciatus* from Divs.3LN is highly great for selectivity of these redfish species and a reason of their higher unaccounted fishing mortality that has an extremely negative effect on their stock status. The specific composition of catches by pelagic trawl showed that diminishing minimal mesh size during the redfish pelagic fishery had no impact on bottom fish species since they were not taken by the pelagic trawl.

Introduction

Redfish species *Sebastes mentella* and *Sebastes fasciatus* from Divs. 3LN are related to important commercial objects in the NAFO Regulatory Area. Owing to their great morphometric similarity [1], in the fishery they are identified as one name, beaked redfish. This redfish is caught by both bottom and pelagic trawls with the minimal 130 mm internal mesh size. In different years, in this area (3LN), the redfish catch varied from 79 thousand t in 1987 to 451 t in 1996. From 1959 to 1964, the catches constantly lowered from 45 thousand to 10 thousand t and continued to vary at the level of 21 thousand t till 1985. In 1987, the yield suddenly grew to 79 thousand t and started permanent reduction to the minimal value of 451 t in 1996 during nine years. In 1998, NAFO Fisheries Commission introduced a moratorium on direct fishing of this stock redfish and since then the redfish yield was kept at the low level (450-3,000 t) as a by-catch in the fishery of blue halibut until 2009. Only since 2009, the Fisheries Commission again opened direct fishery of redfish from that stock with a total allowable catch (TAC) of 6,000 t for 2011-2012 гг. [2].

One of the main reasons of the stock status deterioration is a mismatch of the minimal trawl mesh size and the size of the fished redfish as a result of which the most part of the catch escape through a large mesh during the trawl hauling and die. This situation in fishery leads to the existence of unaccounted mortality which has a negative

influence on the whole exploited stock. In this connection, it is important to consider the choice of the optimal mesh size applied in the redfish *Sebastes mentella* fishery in Divs.3LN taking into consideration its impact on the size of fish traumatic death, fishing effort and efficiency. The mesh size should be consider as optimal if it provides the maximal escape of the small size fish with non-landing size. When substantiating the minimal mesh size of the codends in the *Sebastes mentella* fishery it is important to assess the amount of redfish escaping from the codend and dyeing when hauling from depth to surface.

Material and methods

To give the approximate estimation of redfish pelagic fishery in the trawl pelagic fishery in Div. 3N of the NAFO Regulatory Area (Figure 1) the observations were made from 7 to 30 June 2011 aboard a trawler M-0267 "Severny Okean".

During the work, used was a pelagic trawl 182/640 of the Russian production with the Danish «Thyborøn» trawl boards. The trawl horizontal opening was 80-90 m and the vertical one - 60-80 m. The trawl codend is made of the polyethylene netting with the minimal 130 mm inside mesh size. The trawl run is controlled with the aid of the Scanmar Acoustic control system. The fishing-line was loaded by 500 kg weights on each wing (the total weight was 1,000 kg).

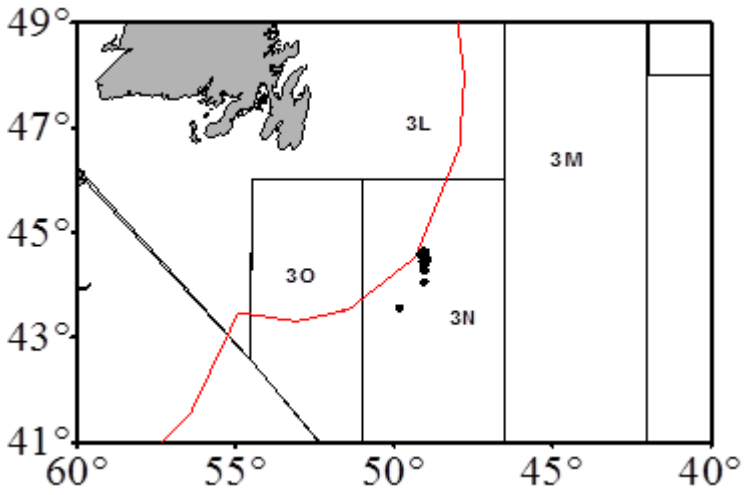

Figure 1 –Survey area of M-0267 "Severny Okean" from 7 to 30 June 2011.

In Div.3N, redfish *Sebastes fasciatus* predominated [1]. It was fished at 200-480 m depths, in 190-470 m layer. Redfish 18-37 cm in length with 20-23 cm mode (Figure 2) were caught. *Sebastes mentella, Sebastes marinus* and cod occurred in the by-catch as single specimens. The average length of *Sebastes fasciatus* in the catch by the trawl codend with 130 mm mesh size was 23.1 cm. During the cruise, there were 51 hauls performed, the biological analysis of 4 fish species was made, 4,171 redfish specimens were measured.

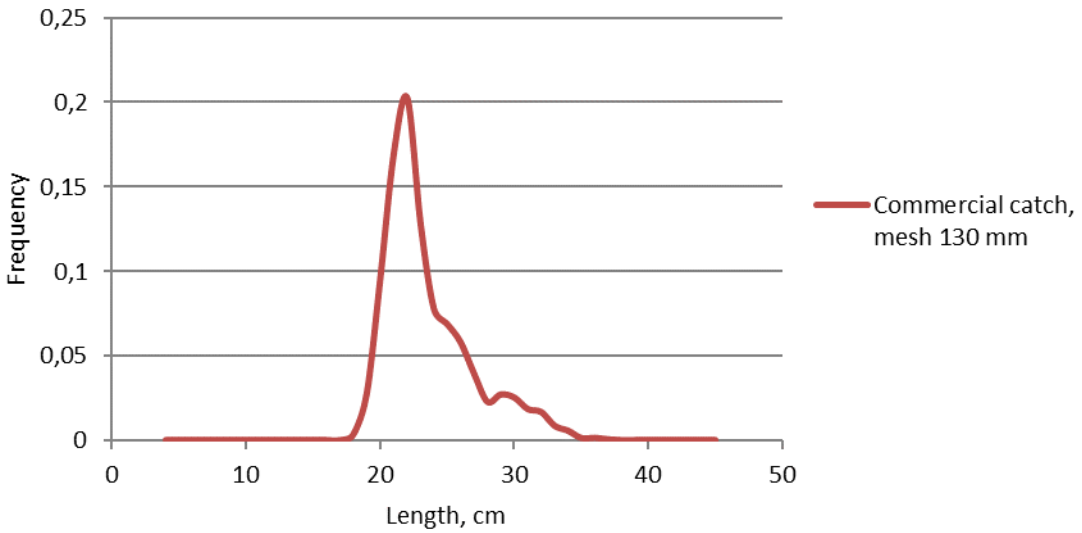

Figure 2 – Size composition of *Sebastes fasciatus* catches by trawl with minimal 130 mm mesh size

The typical feature of redfish behavior in that period was well-pronounced vertical daily migrations. The echo records registered redfish concentrations by fishable mid-water trawl in the morning (from 6 to 9 a.m.) and evening (from 6 to 8 p.m.) (Figure 3). In those time periods, the redfish formed concentrations by 20-50 m development, and the catches amounted to 15-60 t per 1.5-3.0 hours. The average vessel fishing efficiency was equal to 25.4 t per a fishing day. The fishing was executed, on the average, at the distance of 60 ± 13 m above the ground that caused a practical absence of bottom fish species in the catches by pelagic trawl as in the given Div.3N as in Div.3M [3].

In accordance with visual observations, a great number of redfish (by approximate estimate, 30-50% of the total catch) escape through codend meshes to sea surface during the trawl hauling and towing with catch to the vessel board, that was proved by the previous researches [4; 5]. At this stage of fishing, the mesh thread tension is minimal, as a result of which the codend meshes are opened and let redfish freely escape from a catch (Figure 3). Probably, it happens since the average size of fished redfish is much less than the minimal allowable mesh inside size.

In accordance with the principles of the precautionary approach, one should consider that all the fish having escaped at this hauling stage die because of traumatizing and predator attacks [5].

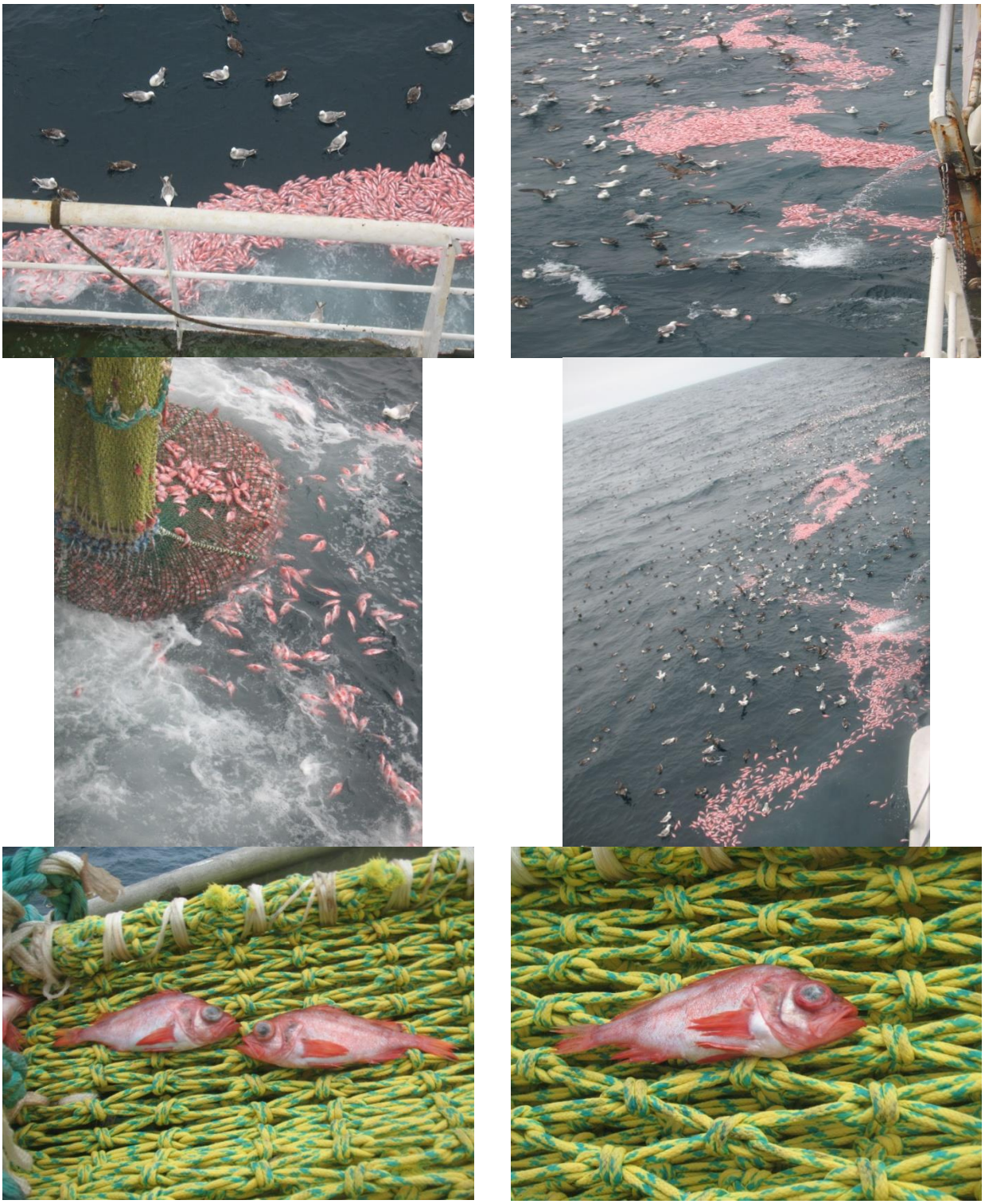

Figure 3 – Inevitable losses as a result of using codends with 130 mm mesh size aboard M-0267 “Severny Okean” in June 2011.

The efficiency of using the minimal 130 mm mesh size to regulate redfish pelagic fishery selectivity in Div.3N.

The size composition of catches by the commercial trawl with the minimal 130 mm inside mesh size was characterized by 20-23 cm mode and the average length of 23.1 cm. At the same time, by the data from the spring estimation of redfish stocks from Divs.3LN [2], the size composition was characterized by 19-22 cm mode and the average length of 22.6 cm (Figure 4).
As the comparison of these data shows, the approximate effect of 130 mm mesh selectivity was 4-5% increase in the modal group of the catch size composition and 2% enhancement of the mean length in relation to the size composition of the redfish stock to study.

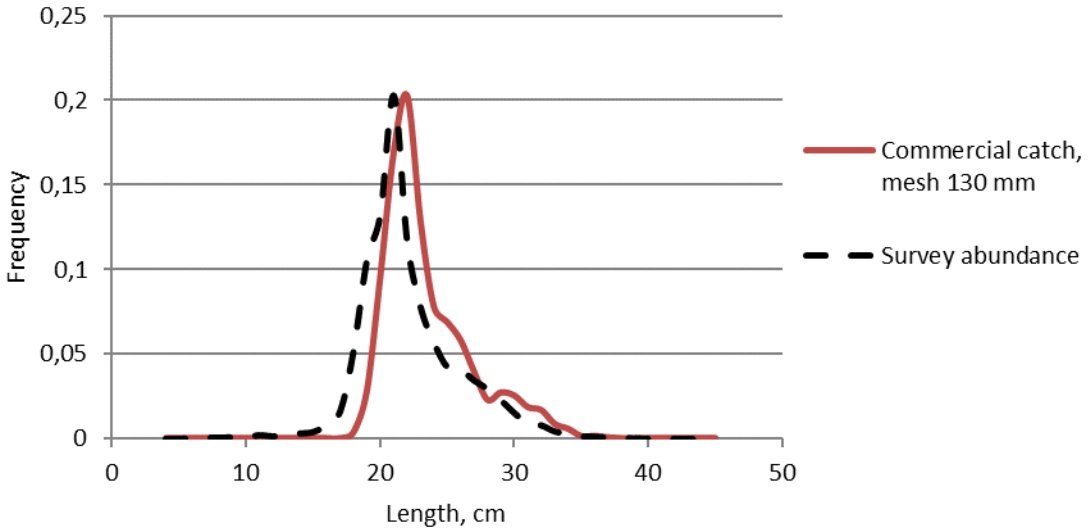

Figure 4 – Size compositions of redfish (*Sebastes fasciatus*) catch by the trawl with the minimal inside 130 mm mesh size and the stock from Divs.3LN.

Results

In Div.3N, 99% of the catches by the pelagic trawl consist of redfish species. Cod occur in by-catch as single fish. Due to high probability of pelagic trawl damage and loss during its contact with the ground the tactics of redfish fishery by the pelagic trawl in Div.3N condition making hauls at the distance of, on the average, 60±13 m above the ground. This fishing tactics permits us to avoid the by-catch of bottom fish in the pelagic trawl catches.

Due to the lack of correspondence between the minimal mesh size (130 mm) and the average size of mature fish a great part of the catch is lost. Even according to the visual estimation, when hauling the trawl to the sea surface the most part of redfish disappear from codend. In accordance with precautionary approach principles, it should be considered that all the fish having escaped at this trawling stage die because of traumatizing and predator attacks that increases unaccounted fishing mortality

Tentatively, the selectivity effect as a result of using the minimal 130 mm mesh size to regulate pelagic fishery of redfish in Div.3N is 4-5% of the catch size composition increase in relation to the stock size composition. This result may be considered as minor due to a small modal length in the stock size composition of redfish studied.

Conclusions

By the preliminary estimation, the minimal 130 mm mesh size applied to regulate fishery of *Sebastes mentella* and *Sebastes fasciatus* in Div.3LN, is very large for selectivity of these fish species and a reason of their unaccounted fishing mortality that has a very negative impact on their stock status. The specific composition of catches by pelagic trawl showed that diminishing mesh minimal size in the redfish fishery had no impact on bottom fish species since they were not taken by pelagic trawl.

In order to determine an optimal mesh size exactly the full-scale trial runs to estimate redfish selectivity in their pelagic fishery in Divs.3LN are needed.

References

Anon., 2004. Study of ecosystems in fishery water bodies, collection and processing of data on water biological resources, technics and technology of their harvesting and processing. Issue 1. Instructions and methodical recommendations to collect and process biological data in the seas of the European North and the North Atlantic. Edition 2, revised and supplemented. M.: VNIRO Press, 2004, 300 p. (in Russian)

Anon., 2006. Methodical materials to identify deep-water fish of the North Atlantic. A.Vaskov (compiler) et al., Murmansk, PINRO Press, 2006. 201 pp. (in Russian)

Anon., 2011. Conservation and Enforcement Measures, NAFO/FC Doc. 11/1, Serial No. N5867, Dartmouth, NS. Canada 2011.

Anon., 2011. Methodical manual for observers in NAFO Regulatory Area. Murmansk, PINRO, 2011. 119 pp. (in Russian)

A. M. Ávila de Melo, R. Alpoim, and Diana González Troncoso. An ASPIC Based Assessment of Redfish (S. mentella and S. fasciatus) in NAFO Divisions 3LN (can a surplus production model cope with bumpy survey data?). NAFO SCR Doc. 12/032, Serial No. N6059, 63 pp.

Breen, M., Huse, I., Ingolfsson, O.A., Madsen, N. and Soldal, A.V., 2007. SURVIVAL: An assessment of mortality in fish escaping from trawl codends and its use in fisheries management. EU Contract Q5RS-2002-01603, Final Report.

A.A. Pavlenko, A.S. Ostrovskii, I.A. Skriabin. Preliminary review of data on selectivity of square mesh codend of pelagic trawl for redfish (Sebastes mentella) and value of by-catch in Russian pelagic fishing of redfish (Sebastes mentella) in Div. 3M of the NAFO Regulatory Area. NAFO SCR Doc. 10/49, Serial No. N5818, 5 pp.

A.A. Pavlenko, and M. V. Pochtar. Some aspects of choosing the optimal mesh size in codends in beaked redfish fishery in Div. 3M of the NAFO Regulatory Area. NAFO SCR Doc. 10/20, Serial No. N5776, 9 pp.