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**OCCURRENCE OF DEEP-WATER CORALS AND SPONGES
WITHIN NAFO REGULATORY AREA BASED ON THE DATA OF OBSERVATIONS ONBOARD
RUSSIAN FISHING VESSELS DURING 2008-2013**

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Summary

Information, presented in the report, concerns the results of Russian studies of corals and sponges in the NAFO Regulatory Area (RA). The report contains maps of the Russian fishery areas during 2008-2013 and distribution of the vulnerable marine ecosystems (VME) indicator species in the NAFO RA according to observers' data. Results of the research are recommended to be applied in the improvement of protection measures of VME against the adverse impact of bottom fishing.

Introduction

The data on VME have been purposefully collected onboard Russian fishing vessels within NAFO RA since 2008 (Vinnichenko et al, 2009). In the following years these observations were continued on the regular basis (Vinnichenko, 2010; Vinnichenko et al, 2011; Vinnichenko and Sukhangelova, 2012; Vinnichenko and Kanishchev, 2013, Vinnichenko, Kanishchev, Fomin, 2014).

The purpose of the given report is to submit the results of studying the distribution of deep-sea corals and sponges conducted onboard Russian fishing vessels in the NAFO RA to NAFO Scientific Council (SC).

Material and methods

During preparation of the given document, the following sources were used:

- Reports by NAFO observers operated onboard Russian fishing vessels during 2008-2013;
- Data of vessel monitoring system (VMS) in the period 2008-2013.

Observers collected VME data during 22 cruises of commercial fishing vessels within the Grand Bank and Flemish Cap areas (Divs. 3LMNO). Totally, 2671 bottom hauls were performed. Hauls duration varied between 0.5-9.0 hours at vessel speed of 3.1-3.5 knots.

Observations included:

- Recording of VME indicator species in catches;
- Species identification using relevant manuals (Kenchington et al, 2009; Best et al, 2010) for corals and sponges;
- Weighing and measurement of indicator species;
- Photographing of corals and sponges for subsequent laboratory identification;
- Registration of the capture location of corals and sponges based on the data of the GPS navigation system.

Maps of the bottom trawl fishery were drawn according to the VMS data. Data contain information on the positions of vessels with increments of 0.5-8 hours, on average - about 1 hour. Bottom fishery tracks were identified as the path of ship movement at a speed of 2-4 knots. Due to the presence of errors, all information was refined, taking into account the distribution conditions of fishes and data on coordinates of bottom hauls from the PINRO database. Percentage of refined information was relatively low, about 5% of the total data.

Results

During 2008-2013 bottom trawling was conducted in the vast water area of the Flemish Cap, Flemish Pass and Grand Banks between 42°46'-48°52' N, 44°00'-51°50' W in the depth range of 60-1350 m (Figure 1, Table 1). The largest number of hauls was made in the area of Sackville Spur, on the north-eastern and south-eastern slopes of the Grand Banks in the depth range 700-1100 m, in the south-western part of the same bank at depths of 200-600 m and on the southern slopes of the Flemish Cap at depths of 200-700 m. Intensive fishing also occurred in the north-eastern and south-eastern part of the Flemish Pass (700-1000 m depth). On the northern and eastern slopes of the Flemish Cap with depths greater than 500 m, and in some shallow water areas and slopes of the Grand Banks, fishing intensity was relatively low.

Deep-water corals and sponges were registered mainly all over the studied area at 280-1300 m depth in small numbers (Vinnichenko, 2010; Vinnichenko et al, 2011; Vinnichenko and Sukhagulova, 2012; Vinnichenko and Kanishchev, 2013; Vinnichenko, Kanishchev, Fomin, 2014). In the catches, representatives of 4 orders of corals were found, including Alcyonacea (*Anthomastus* spp., *Duva florida*, *Nephtheidae*) and sea pens (*Anthoptilum* spp., *Pennatula aculeata*, *Pennatula borealis*) prevailed. Moreover, few numbers of *Gersemia* spp., *Halipteris* spp., *Radicipes gracilis*, *Stauropathes arctica* and *Pennatula phosphorea* were observed. By-catches of corals per haul varied from 1 to 2,500 g (mainly 10-70 g).

Sponges were mainly encountered when trawling on the Flemish Cap at depths of 200-510 m. Among sponges, *Phakellia* spp., *Lophon piceum*, *Polymastia* spp., *Forcepia thielei* and *Homaxinella* spp. dominated. By-catch of sponges within NAFO RA exceeded 1 kg per haul only once, when in 2009, a catch of *Geodia* spp. was taken on the Grand Banks, weighing up to 5 kg at depths 950-1020 m.

Discussion and conclusion

The data on VME species indicators occurrence have been regularly collected in the NAFO RA onboard of Russian fishing vessels for six years. Observations covered a wide area of bottom fishing in the open part of the Newfoundland area. However, the colonies of deep-water corals and sponges were not found there. In the traditional fishing areas, the catches of VME indicator species were considerably lower than the threshold established by the NAFO Fisheries Commission (NAFO FC). Thus, the results of the long-term Russian research brings us to a preliminary conclusion about the absence of VME at the traditional bottom fishing grounds in the Newfoundland part of NAFO RA. At the same time, to make a final conclusion on this issue, a study of the data from similar observations onboard foreign fishing vessels is required.

In November 2013, during the preparation of response to NAFO FC request № 13, the Working Group on Ecosystem Science and Assessment (WGESAs) assessed the VME indicator species distribution and identified locations of their significant concentrations within NAFO RA (NAFO, 2013). However, comparative analysis of the WGESAs' data and working results of NAFO observers onboard Russian fishing vessels (Fig. 3) does not confirm the presence of the VME significant concentrations in areas of bottom fishing. This circumstance should certainly be taken into account when developing recommendations for NAFO FC, with intention of improving measures to protect VME from adverse impacts of bottom fishing. In particular, recommendations for extending the bottom fishing closures shall not include areas of the intensive Russian fishery.

References

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Table 1

Areas of VME study onboard Russian commercial fishing vessels in the NAFO RA during 2008-2013

Year	Positions		Fishing depths, m	Number		By-catch weight, g	
	N	W		Cruises	Hauls	Corals	Sponges
2008	43°10'-48°50'	45°25'-50°49'	240-1350	3	402	< 500	
2009	45°23' -48°44'	46°30'-48°30'	770-1300	2	378	1-820	5020
2010	42°46'-48°12'	46°35'-50°03'	280-1275	4	319	4-2190	
2011	42°27'-48°15'	44°00'-51°48'	290-1205	4	330	6-2500	
2012	42°50'-48°19'	44°30'-51°50'	125-1250	5	649	< 1000	
2013	42°50'-48°52'	44°10'-51°41'	60-1145	4	593	< 1000	< 1000

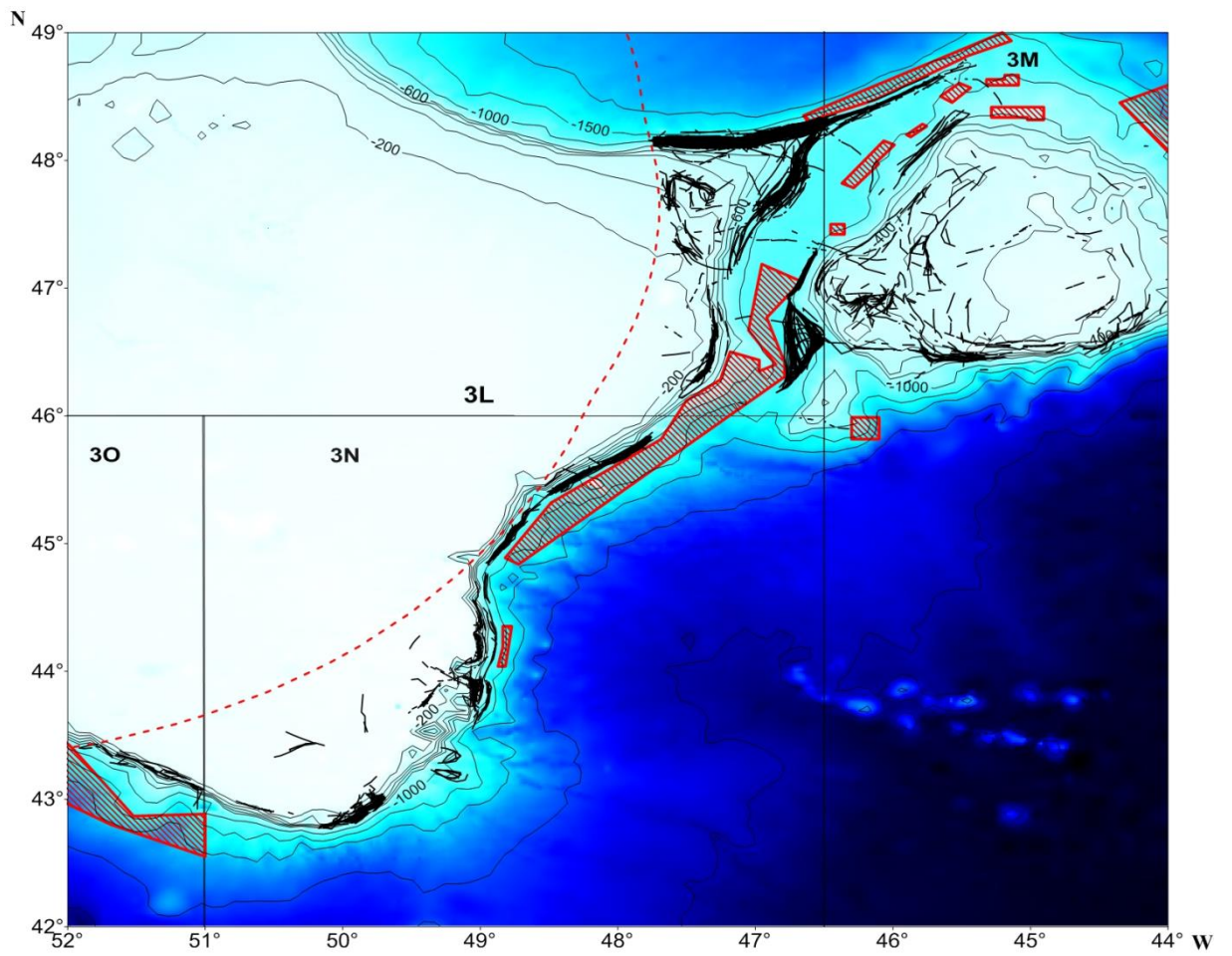


Figure 1. Haul tracks (VMS data) of the Russian commercial fishing vessels with observers onboard in the NAFO RA in 2008-2013.

⬡ - boundary of 200-mile zone, ▨ - closed areas, — - haul tracks

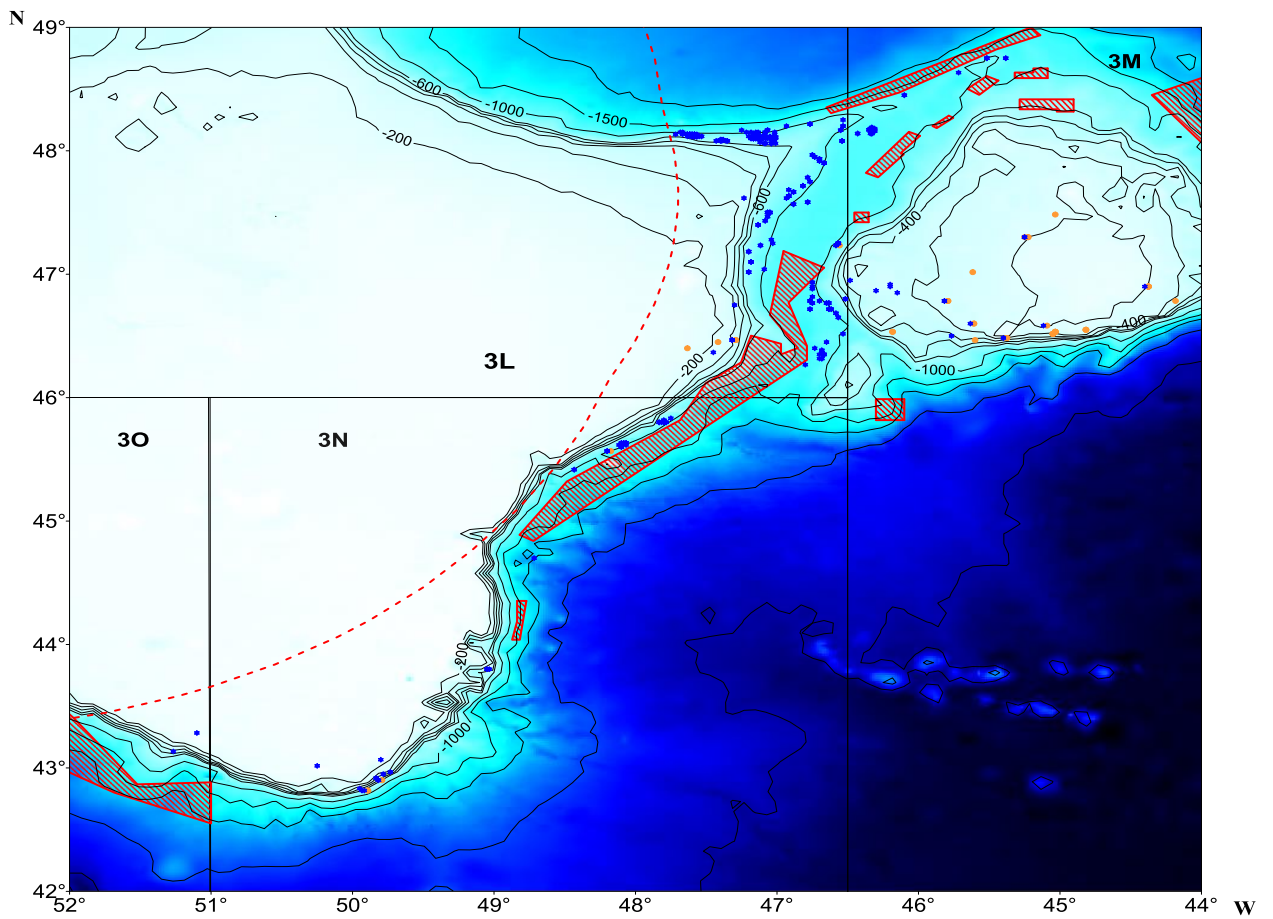


Figure 2. Occurrence of deep-water corals and sponges within NAFO RA in 2008-2013.

★ - corals, ● - sponges, (---) - boundary of 200-mile zone, ▨ - closed areas

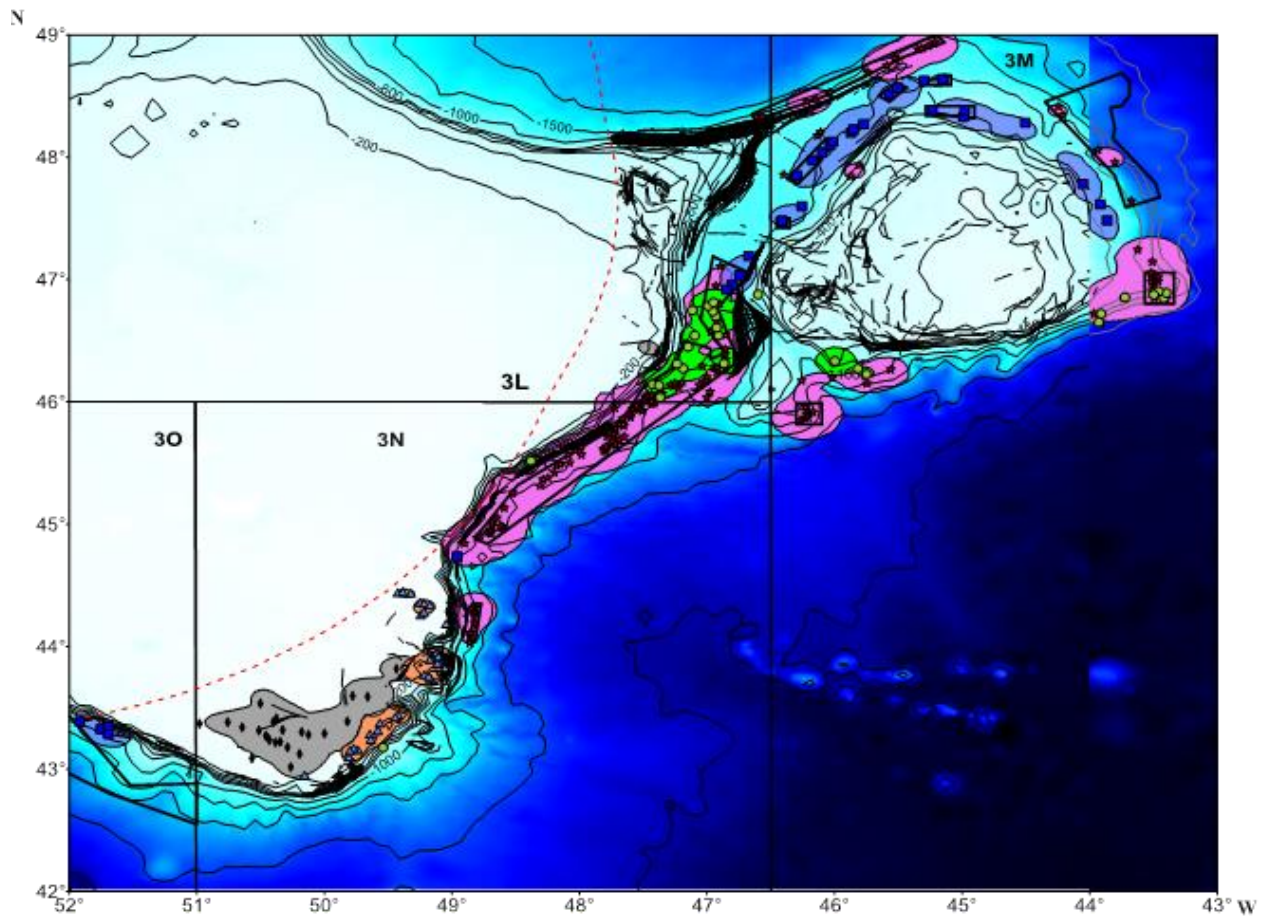


Figure 3. Haul tracks of the Russian fishing vessels with observers onboard (VMS data) within NAFO RA and location of the VME significant concentrations based on WGESA report (NAFO, 2013)

⬡ - boundary of 200-mile zone, ▨ - closed areas, — - haul tracks

Polygons encompassing the VME indicator species distribution
 ● - sea pens, ● - sponges, ● - gorgonians, ● - sea squirt, ● - bryozoan

Significant catches of VME indicator species
 ■ - sea pens, ★ - sponges, ● - gorgonians, ▲ - sea squirt, ◆ - bryozoan