Northwest Atlantic Fisheries Organization

Serial No. N7253 **NAFO SCR Doc. 21/050**

SCIENTIFIC COUNCIL MEETING – NOVEMBER 2021

New preliminary data on VME encounters in NAFO Regulatory Area (Divs. 3MNO) from EU; EU Spain and Portugal Groundfish Surveys (2021) and Canadian surveys (2020 Fall).

By

Sacau, M.[1], Neves, B.M.[2] , Wareham Hayes, V.[2], and Durán-Muñoz, P.[1]

1 Instituto Español de Oceanografía (IEO). C. O. Vigo. Subida a Radio Faro, 50. 36390 Vigo. Spain
2 Department of Fisheries and Oceans Canada (DFO), St. John's NL, A1C 5X1, Canada

1. Introduction

During the 14th NAFO Working Group on Ecosystem Science and Assessment (WGESA) virtual meeting new preliminary data on deep-water corals and sponges were presented from the 2021 EU; EU-Spain and Portugal and Canadian bottom trawl groundfish surveys. The data was made available to the NAFO WGESA to improve mapping of Vulnerable Marine Ecosystem (VME) indicator species in the NAFO Regulatory Area (Divs. 3LMNO).

During the 6th meeting of the NAFO Scientific Council WGESA, new quantitative spatial analyses were applied for corals and sponges for all the available data within the NAFO Regulatory Area (NAFO, 2013). Outcomes from those analyses produced the following thresholds for VME indicator species: 75 kg per tow for sponges, 0.6 kg per tow for large gorgonians, 0.15 kg per tow for small gorgonians, and 1.4 kg per tow for sea pens. Based on these thresholds, deep-water coral and sponge catches were identified and mapped, and overlaid with the current closed areas and VME polygons. New thresholds and VME polygons were presented at the 12th WGESA meeting using additional data since 2013 (NAFO, 2020). These are: 100 kg per tow for sponges, 0.6 kg per tow for large gorgonians, 0.2 kg per tow for small gorgonians, 1.3 kg per tow for sea pens, 0.35 for *Boltenia* sea squirts, 0.2 for bryozoans and 0.4 for black corals. Therefore, VME polygons illustrated on the figures below are the modified ones, accepted by SC.

2. Survey Data

Due to the pandemic situation during 2021, RV *Vizconde de Eza* only carried out two surveys in Division 3M and Divisions 3NO. In terms of the Canadian data, only the 2020 Fall data are presented, since spring data do not encompass the NRA. Therefore, data used in this study were collected from 3 surveys:

1. The EU-Spain and Portugal Flemish Cap groundfish survey, conducted by the IEO together with the Instituto de Investigaciones Marinas (IIM) and Instituto Português do Mar e da Atmosfera (IPMA), sampled the Flemish Cap (NAFO Div. 3M) between 130 -1416 m, with a total of 183 tows.

2. The EU-Spain 3NO groundfish survey, conducted by the Instituto Español de Oceanografía (IEO), sampled the Grand Bank of Newfoundland (NAFO Divs. 3NO) between 42 - 1359 m depth with a total of 117 tows.

3. The Canadian Multispecies Surveys, conducted by Fisheries and Oceans Canada (McCallum and Walsh, 1996), sampled the Grand Bank of Newfoundland (NAFO Divs. 3LNO) between mean depths of 46 – 670 m, with a total of 63 valid tows (Fall 2020).

There were 300 bottom trawl tows carried out during 2021 EU; EU-Spain and Portugal groundfish in the NRA (Figure 1A). Six of those tows were no valid due to technical problems during the fishing operation. 122 hauls out of 294 valid tows have shown cero catches of VME indicator species. This represents the 41.5% of the total valid hauls. A total of 68 tows were carried out in the NRA during the 2020 Canadian surveys (Figure 1B). Five of these were considered unsuccessful (invalid) tows (Figure 1B).

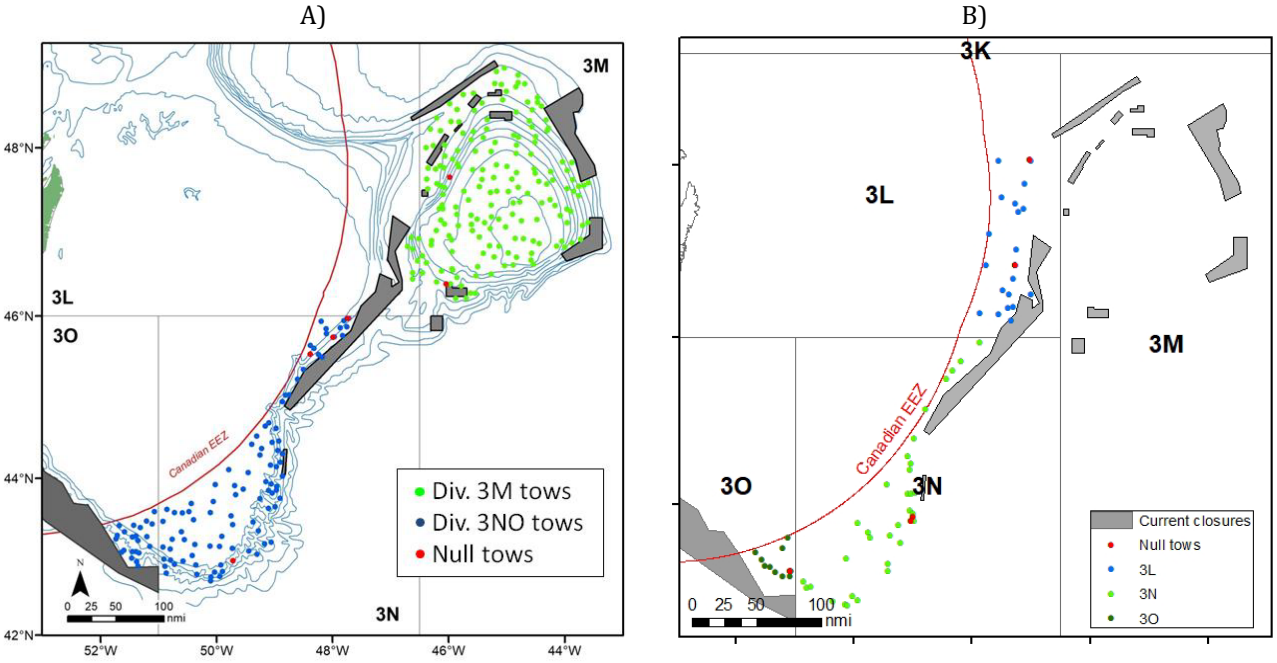

Figure 1. Distribution of sets (start positions) from A) 2021 EU; EU-Spain and Portugal groundfish survey (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO).

Following previous methodologies used by WGESA, deep water corals were grouped by VME species groups and include: large gorgonians (Order Alcyonacea), small gorgonians (Order Alcyonacea), sea pens (Order Pennatulacea), black corals (Order Antipatharia), sponges and bryozoans are shown at the phylum level (Phylum Porifera and Phylum Bryozoa), *Boltenia* sea squirts are shown as *Boltenia* sp.

3. Results

Distribution maps of presence (non-significant catches) for sponges, large gorgonians, small gorgonians, sea pens, black corals, sea squirts, and bryozoans are presented below (Figures 2-8). Black corals and bryozoans were not recorded during the 2020 Fall Canadian surveys. Location of each record was assigned by start position of each tow for 2021 EU; EU-Spain (Durán Muñoz *et al*., 2020) and Canadian groundfish surveys (McCallum and Walsh 1996).

3.1 Sponges

EU; EU-Spain and Portugal *2021 Data*: Sponges were recorded, with non significant concentrations, in 85 of the 294 valid tows (28.9% of the valid tows analyzed), with depths ranging between 61 - 1345 m (Figure 2A). Two Significant catches of sponges (≥ 100 kg/tow) were found.

Canadian surveys (DFO) 2020 Fall Data: Sponges were recorded in 19 of the 63 valid tows (30%), with mean depths ranging between 52 - 629 m (Figure 2B). There were no significant catches of sponges (≥ 100 kg/tow) in these tows (Figure 2B).

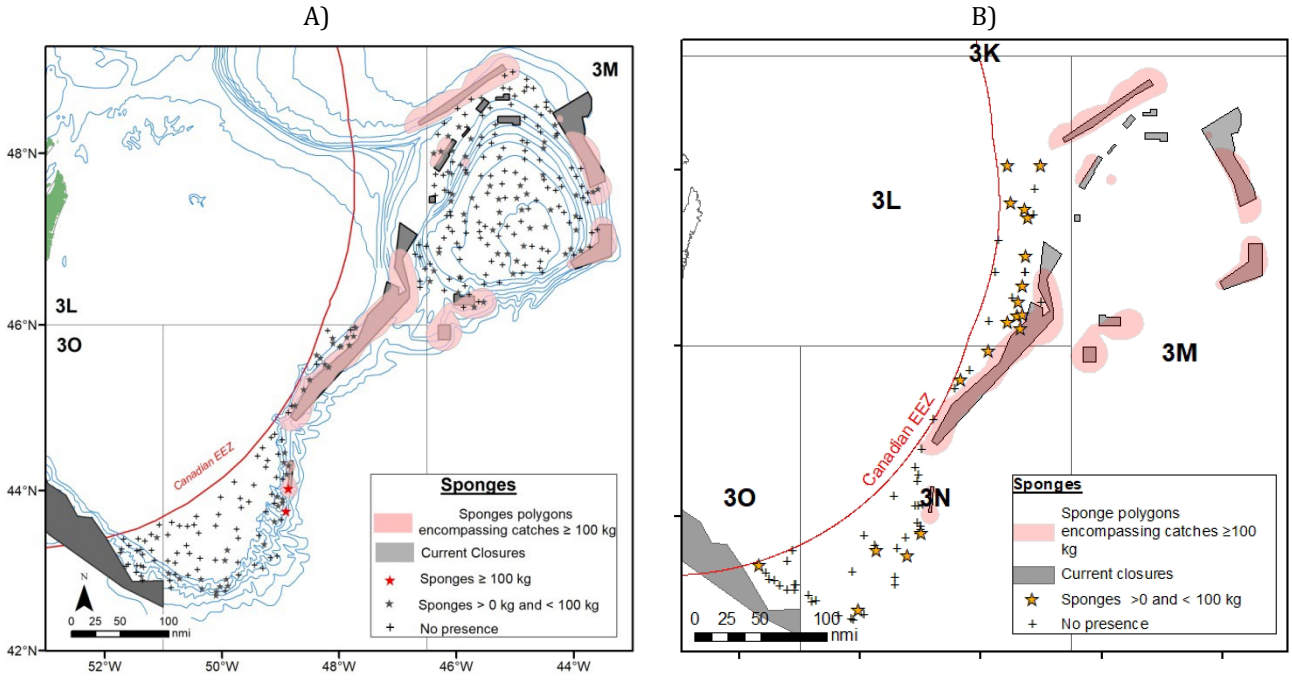

Figure 2. Distribution of catches of sponges in the study area from A) 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no sponge by-catch recorded (no presence).

3.2 Large Gorgonians

EU; EU-Spain and Portugal 2021 Data: Large gorgonians were recorded, with non significant concentrations, in 8 of the 294 valid tows (2.7% of valid tows analyzed), with depths ranging between 352-1161 m (Figure 3A). One of the tows had significant catches of large gorgonians (≥ 0.6 kg/tow).

Canadian surveys (DFO) 2020 Fall Data: Large gorgonians were recorded in 2 of the 63 valid tows (3.17% of total tows analyzed), at mean depths of 211 and 327 m (Figure 3B). None of these tows had significant catches (Figure 3B).

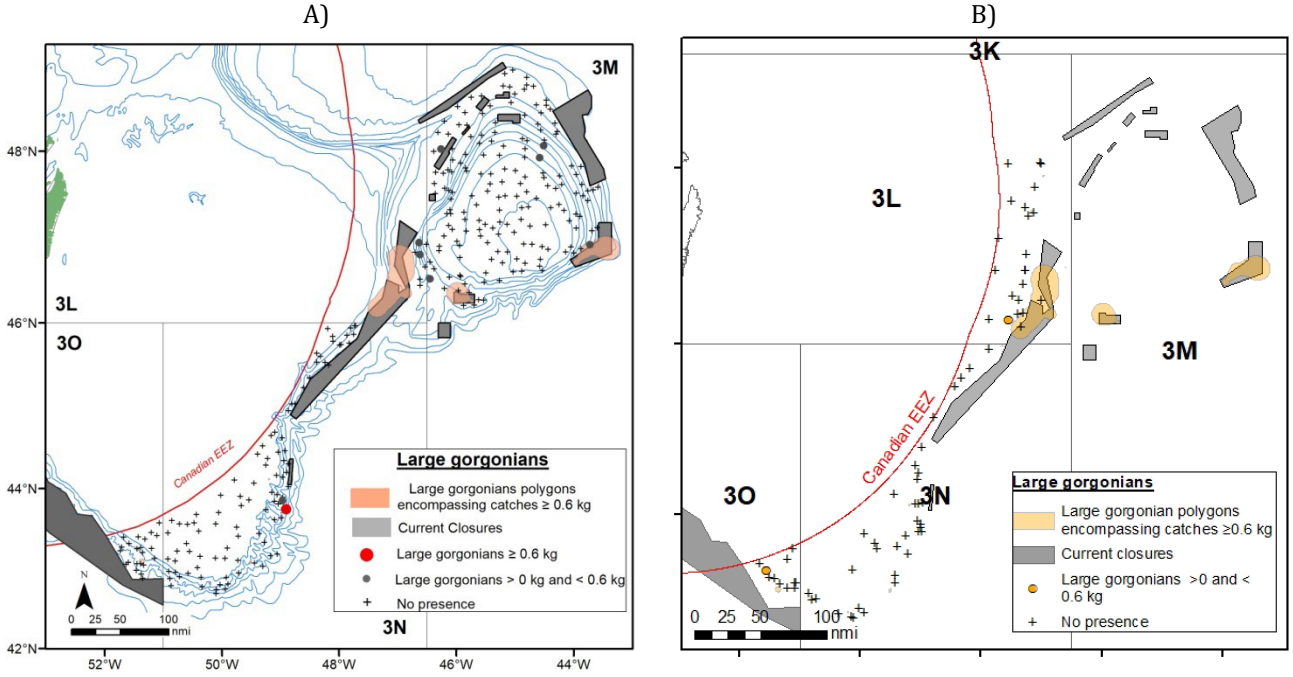

Figure 3. Distribution of catches of Large Gorgonians in the study area from A) 2021 EU; EU-Spain and Portugal (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no Large Gorgonians by-catch recorded (no presence).

3.3 Small Gorgonians

EU; EU-Spain and Portugal 2021 Data: Small gorgonians were recorded, with non significant concentrations, in 40 of the 294 valid tows (13.6% of valid tows analyzed), with depths ranging between 102- 1416 m (Figure 4A). None of the valid tows had significant catches of small gorgonians (≥ 0.2 kg/tow).

Canadian surveys (DFO) 2020 Fall Data: Small gorgonians were recorded with non-significant concentrations in 1 valid tow (1.59 % of total tows analyzed), from a mean depth of 609 m (Figure 4B). No significant catches (≥ 0.2 kg/tow) were recorded.

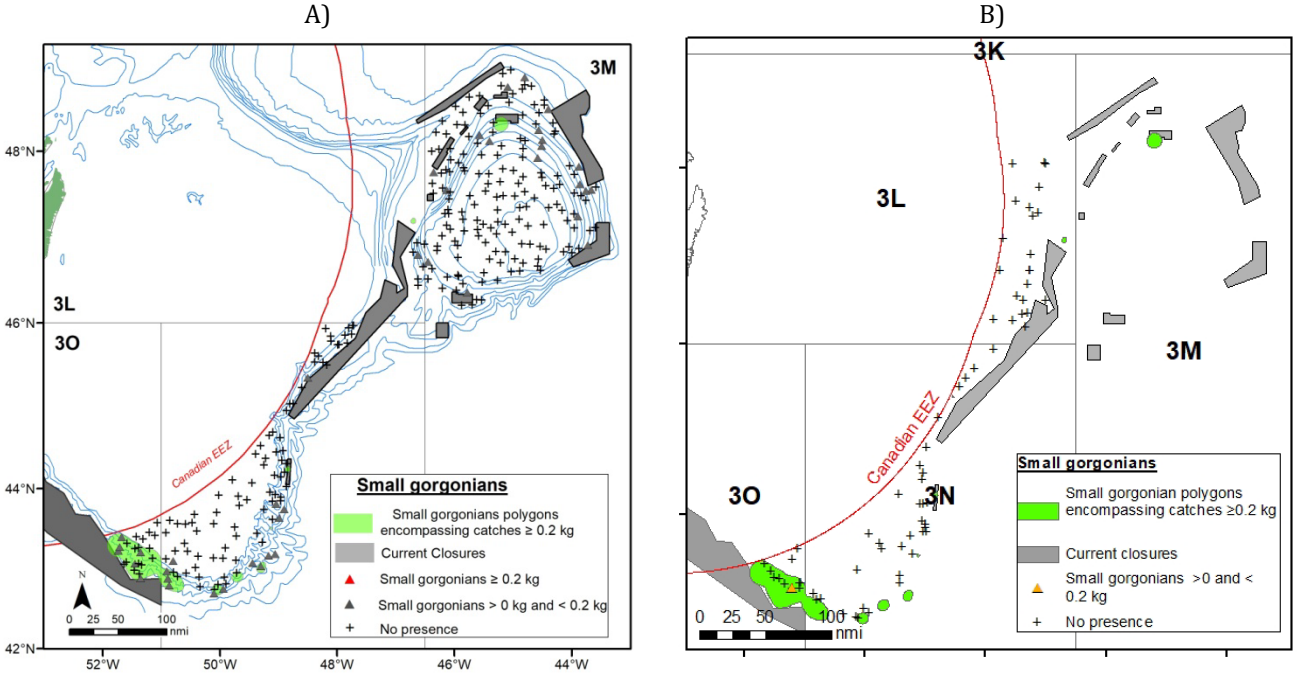

Figure 4. Distribution of catches of Small Gorgonians in the study area from A) 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no Small Gorgonians by-catch recorded (no presence).

3.4 Sea Pens

EU; EU-Spain and Portugal 2021 Data: Sea pens were recorded, with non significant concentrations, in 9 2 tows (31.3% of valid tows analyzed), with depths ranging between 61 - 1416 m (Figure 5A). One significant catch (≥ 1.3 kg/tow) was recorded.

Canadian surveys (DFO) 2020 Fall Data: Sea pens were recorded in 6 of the 63 valid tows (9.5% of total tows analyzed), with mean depths ranging between 222 - 610 m (Figure 5B). No tows had significant catches of sea pens (≥ 1.3 kg/tow).

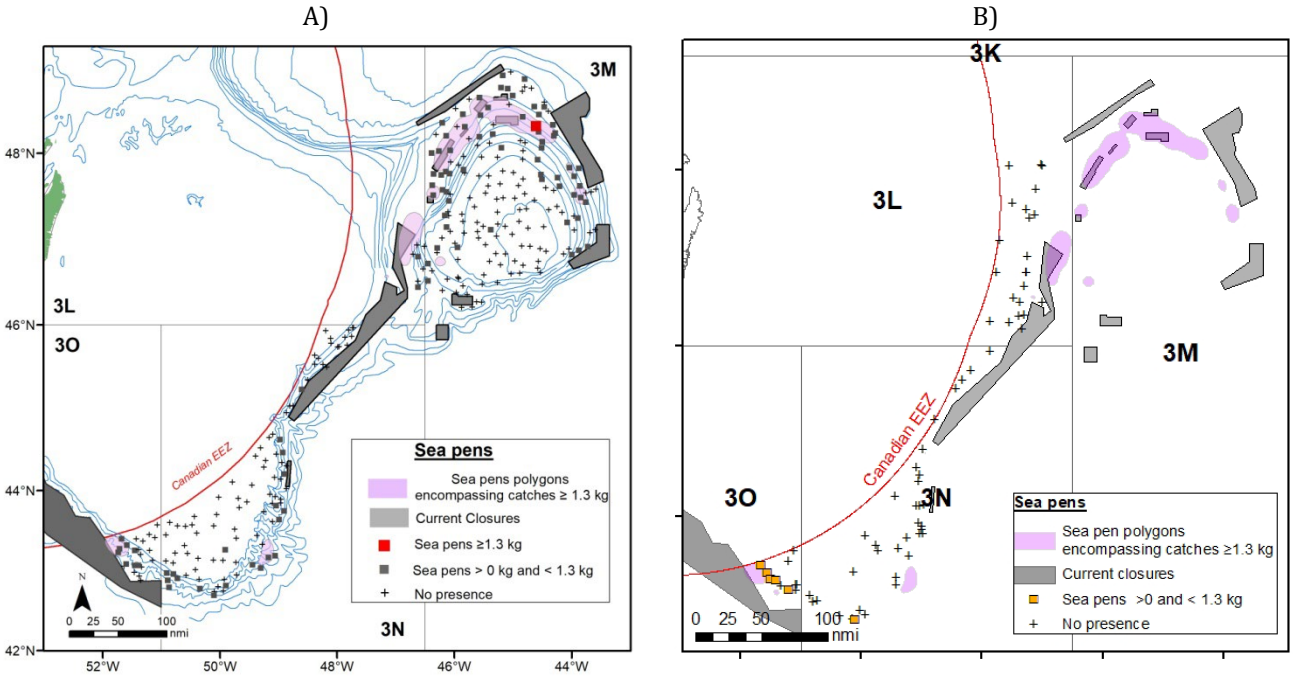

Figure 5. Distribution of catches of Sea Pens in the study area from A) 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no Sea Pens by-catch recorded (no presence).

3.5 Black corals

EU; EU-Spain and Portugal 2021 Data: Black corals were recorded, with non significant concentrations, in 9 tows (3% of valid tows analyzed), with depths ranging between 401 - 1221 m (Figure 6). No significant catches ($\geq$ 0.4 kg/tow) were recorded.

No black corals were recorded during the DFO 2020 Fall surveys.

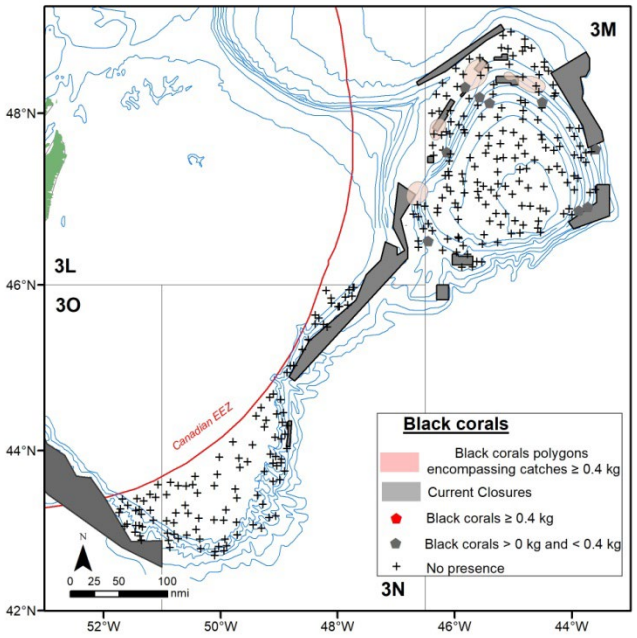

Figure 6. Distribution of catches of Black corals in the study area from the 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO). No black corals were recorded during the 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no Black corals by-catch recorded (no presence).

3.6 Sea squirts (*Boltenia ovifera*)

EU; EU-Spain and Portugal 2021 Data: Boltenia ovifera was recorded, with non significant concentrations, in 1 1 tows (3.7% of valid tows analyzed), with depths ranging between 50 – 315 m (Figure 7A). Four significant catches (≥ 0.35 kg/tow) were recorded.

Canadian surveys (DFO) 2020 Fall Data: *Boltenia ovifera* was recorded in 7 of the 63 valid tows (11.1% of total tows analyzed), with mean depths ranging between 56 - 428 m (Figure 7B). Of these, a total of three tows had significant catches of *Boltenia* (≥ 0.35 kg/tow), of which all three were found inside the *Boltenia* VME polygon (Figure 7B). These significant catches were: 0.352, 1.025, and 4.68 kg.

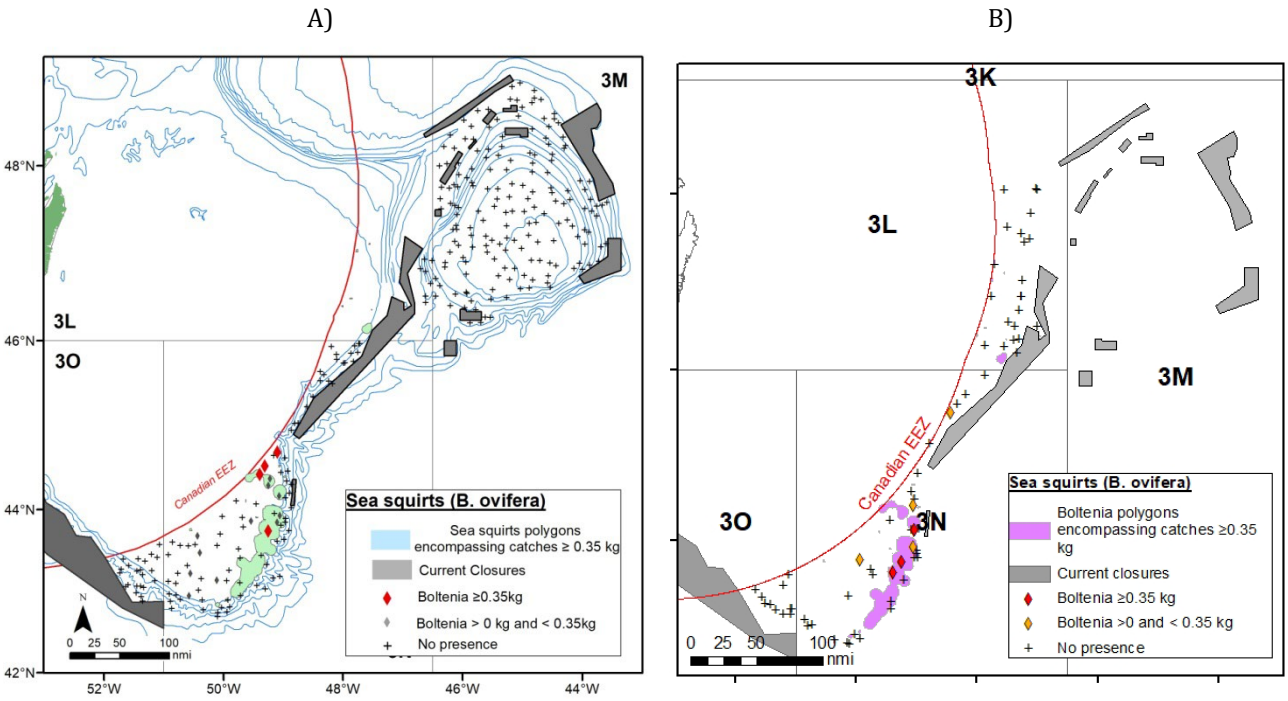

Figure 7. Distribution of catches of Sea squirts (*Boltenia ovifera*) in the study area from A) 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO) and B) 2020 Fall Canadian surveys (NAFO Divs. 3LNO). Black crosses represent tows with no Sea squirts by-catch recorded (no presence).

3.7 Bryozoans

EU; EU-Spain and Portugal 2021 Data: Bryozoans were recorded, with non significant concentrations, in 7 tows (2.4% of valid tows analyzed), with depths ranging between 54 - 681 m (Figure 8A). No significant catches (≥ 0.2 kg/tow) were recorded.

No bryozoans were recorded during the DFO 2020 Fall surveys.

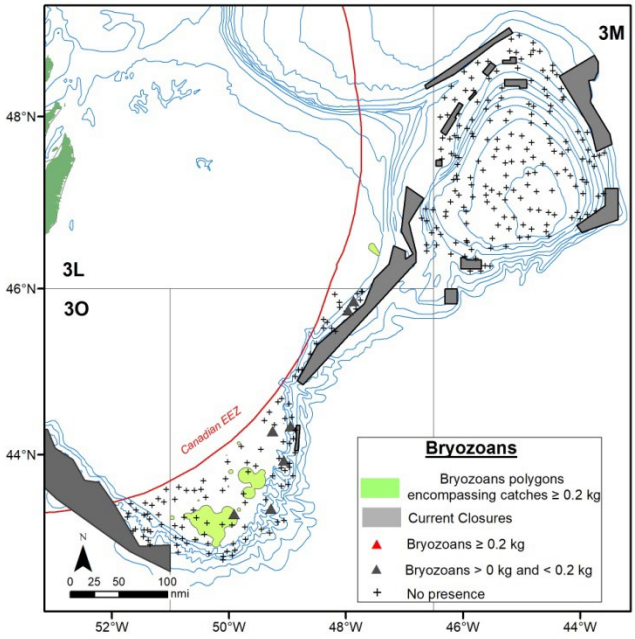

Figure 8. Distribution of catches of Bryozoans in the study area from 2021 EU; EU-Spain and Portugal survey (NAFO Divs. 3MNO). Black crosses represent tows with no Bryozoans by-catch recorded (no presence).

Table 1. Summary of deep-water corals and sponges records for the NRA from 2021 EU; EU-Spain and Portugal surveys and 2020 Fall Canadian surveys. Calculations were done using valid tows.

EU; EU-Spain and Portugal data 2021	Presence Significant and Non-Significant (# of tows)	Valid Tows (% of valid tows)	Significant Concentrations (# of tows)	Significant Concentrations (% of tows)	Significant Concentrations inside VME corresponding polygon
Sponges	87	29.6%	2	0.68%	1
Large Gorgonians	9	2.7%	1	0.34%	0
Small Gorgonians	40	13.6%	0	0%	0
Sea Pens	93	31.6%	1	0.34%	1
Black corals	9	3%	0	0%	0
Sea squirts (*B. ovifera*)	15	5.1%	4	1.36%	2
Bryozoans	7	2.4%	0	0%	0
Canadian data 2020 (Fall)					
Sponges	19	30%	0	0%	0
Large gorgonians	2	3.17%	0	0%	0
Small gorgonians	1	1.59%	0	0%	0
Sea Pens	6	9.5%	0	0%	0
Black corals	0	0%	0	0%	0
Sea squirts (*B. ovifera*)	7	11.1%	3	4.76%	3
Bryozoans	0	0 %	0	0%	0

Table 2. Significant catches of VME indicator species in the NRA (Divs. 3MNO) with their corresponding depth (m) and weight (kg). Note that tow positions are in decimal degrees.

EU; EU-Spain and Portugal 2021 Surveys	Start position			
VME indicator species	**Latitude (N)**	**Longitude (W)**	**Depth (m)**	**Weight (kg)**
Sponges >=100 kg	43.74	-48.90	1306	127.8
	44.02	-48.86	1330	285.6
Large Gorgonians >=0.6 kg	43.74	-48.90	1306	1.31
Sea Pens >=1.3 kg	48.30	-44.60	749	2.22
Sea Squirts (*B.ovifera*) >= 0.35 kg	43.74	-49.24	187	5.45
	44.41	-49.38	54	0.40
	44.52	-49.30	58	1.08
	44.68	-49.09	109	0.9

Canadian 2020 Fall Surveys	Start position			
VME indicator species	**Latitude (N)**	**Longitude (W)**	**Depth (m)***	**Weight (kg)**
Sea Squirts (*B.ovifera*) >= 0.35 kg	43.62	-49.39	135	0.352
	43.74	-49.24	184	4.68
	44.13	-49.03	193	1.025

*Mean depth

Acknowledgements

The collection of the EU; EU-Spain and Portugal Groundfish Surveys used in this paper has been funded by the EU through the European Maritime and Fisheries Fund (EMFF) within the National Program of collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy. This output reflects only the author's view (MS & PDM) and the European Union cannot be held responsible for any use that may be made of the information contained therein. BMN and VWH acknowledge DFO-NL personnel and Canadian Coast Guard captain and crew for DFO data collection.

References:

Durán Muñoz, P., Sacau, M., García-Alegre, A. and Román, E. (2020) Cold-water corals and deep-sea sponges by-catch mitigation: Dealing with groundfish survey data in the management of the northwest Atlantic Ocean high seas fisheries, Marine Policy. Volume 116, June 2020, 103712, DOI: 10.1016/j.marpol.2019.103712.

McCallum, P.R. Walsh, S.J. (1996). Groundfish Survey Trawls Used at the Northwest Atlantic Fisheries Centre, 1971-Present. NAFO SCR Doc. 96/50.

NAFO 2013. Report of the 6th Meeting of the NAFO Scientific Council Working Group on Ecosystem Science and Assessment (WGESA) [Formely WGEAFM]. NAFO SCS Doc. 13/24. Serial No. N6277. Dartmouth, NS.

NAFO 2020. Report of the 12th Meeting of the NAFO Scientific Council Working Group on Ecosystem Science and Assessment (WGESA) [Formely WGEAFM]. NAFO SCS Doc. 19/25. Serial No. N7027. Dartmouth, NS.