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New preliminary data on VME encounters in NAFO Regulatory Area (Div. 3M) from EU-Spain and Portugal Groundfish Surveys (2020) and Canadian surveys

By

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1. Introduction

During the 13th NAFO Working Group on Ecosystem Science and Assessment (WGESA) virtual meeting new preliminary data on deep-water corals and sponges were presented from the 2020 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) 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 SCS, 2013). Outcomes from those analyses produced the following thresholds for VME species groups: 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 data were identified and mapped, overlaid with the current closed areas, polygons for kernel density of sea pens and modified kernel density polygons for sponge grounds and large gorgonian VMEs. New thresholds and VME polygons were presented at the 12th WGESA meeting using additional data since 2013. 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, and 0.35 for *Boltenia* sea squirts. Therefore, polygons illustrated on the figures below are the modified ones, accepted by SC.

2. Survey Data

Due to the pandemic situation during 2020, R/V Vizconde de Eza only carried out one survey in Division 3M. Similarly, no Canadian surveys took place during the Spring of 2020 due to the pandemic, and only the Canadian data for the 2019 Fall survey were available. Therefore, data used in this study were collected from 2 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 137 -1470 m, with a total of 184 tows.



- The Canadian Multispecies Surveys, conducted by Fisheries and Oceans Canada (McCallum and Walsh, 1996), sampled the Grand Banks of Newfoundland (NAFO Divs. 3LNO) between mean depths of 42 - 684 m, with a total of 71 valid tows (Fall 2019). Spring surveys in 2020 were cancelled due to COVID-19 restrictions.

There were 184 bottom trawl tows carried out during 2020 EU-Spain and Portugal groundfish in the NRA (Figure 1A). Three of those tows were no valid due to technical problems during the fishing operation. All 71 valid tows carried out during the Canadian 2019 Fall survey were valid (Figure 1B).

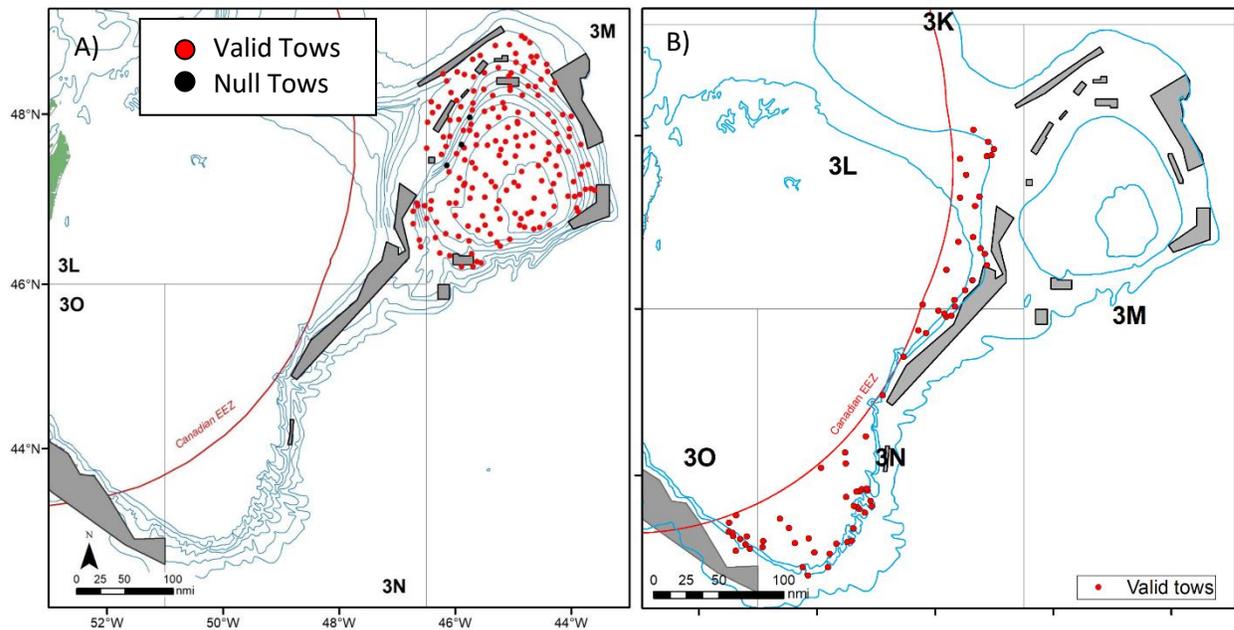


Figure 1. Distribution of sets (start positions) from A) 2020 EU-Spain and Portugal groundfish survey and B) 2019 Fall Canadian surveys (NAFO Div. 3LNO).

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). Sponges are shown at the phylum level (Phylum: Porifera), *Boltenia* sea squirts are shown as *Boltenia* sp. No bryozoans were recorded for neither the Spanish or Canadian surveys presented here.

3. Results

Distribution maps of presence (non-significant catches) for large gorgonians, small gorgonians, sea pens, and sponges are presented below (Figures 2-6). Small gorgonians were not caught during the 2019 Fall Canadian surveys. Locations of each coral and sponge records were assigned by start position of each tow for 2020 EU-Spain (Durán Muñoz *et al.*, 2020) and Canadian groundfish surveys (McCallum and Walsh 1996). There were no significant catches for either Spanish or Canadian surveys.

3.1 Sponges

EU-Spain and Portugal 2020 Data: Sponges were recorded in 47 of the 184 tows (25.5% of the total tows analyzed), with depths ranging between 141 - 1166 m (Figure 2A). No Significant catches of sponge (≥ 100 kg/tow) were found.

Canadian surveys (DFO) 2019 Fall Data: Sponges were recorded in 35 of the 71 valid tows (49% of the total tows analysed), with mean depths ranging between 68 - 649 m (Figure 2B). There were no significant catches of sponges (≥ 100 kg/tow) in these tows (Figure 2B).

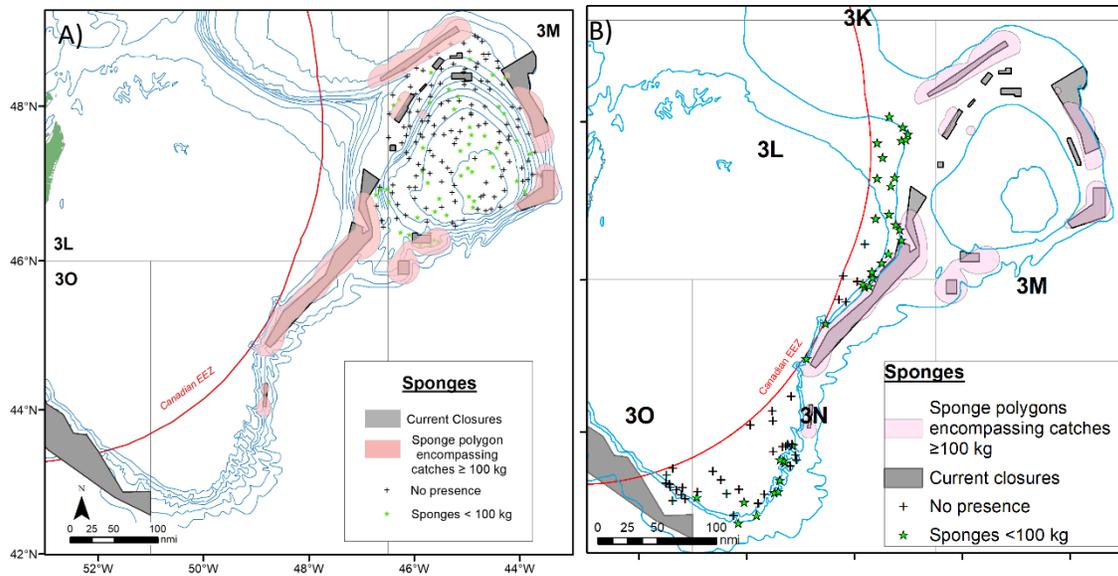


Figure 2. Distribution of catches of sponges in the study area from A) 2020 EU-Spain and Portugal survey (NAFO Div. 3M) and B) 2019 Fall Canadian surveys (NAFO Div. 3LNO). Black crosses represent tows with no sponge by-catch recorded (no presence).

3.2 Large Gorgonians

EU-Spain and Portugal 2020 Data: Large gorgonians were recorded in 2 of the 184 tows (1% of total tows analyzed), with depths ranging between 806 - 940 m (Figure 3A). None of the tows had significant catches of large gorgonians (≥ 0.6 kg/tow).

Canadian surveys (DFO) 2019 Fall Data: Large gorgonians were recorded in 2 of the 71 valid tows (2.8% of total tows analyzed), at mean depths of 59 and 79 m (Figure 3B). None of these tows had significant catches (Figure 3B).

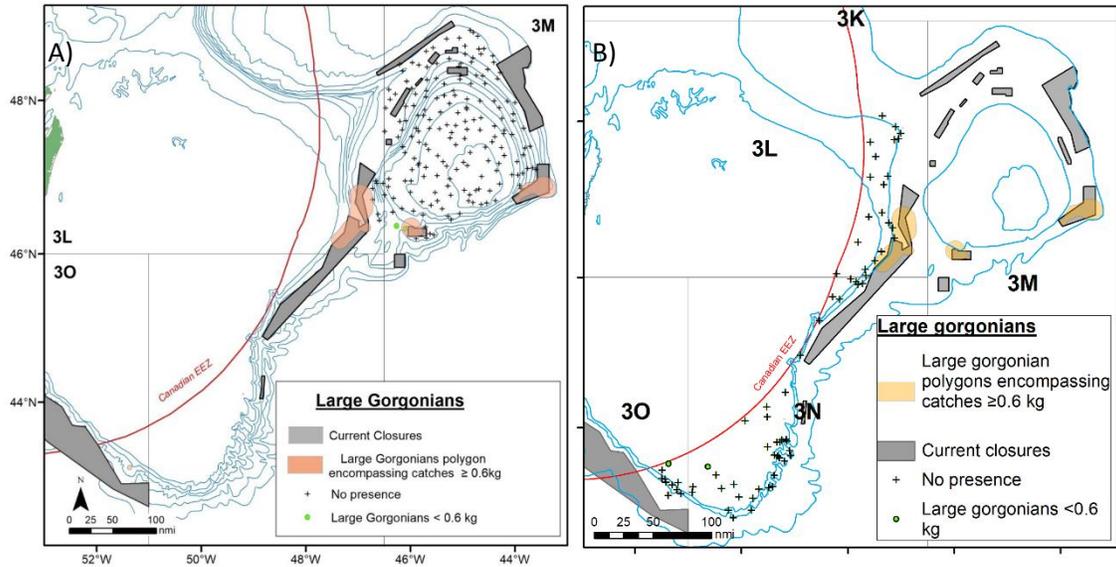


Figure 3. Distribution of catches of Large Gorgonians in the study area from A) 2020 EU-Spain and Portugal (NAFO Div. 3M) and B) 2019 Fall Canadian surveys (NAFO Div. 3LNO). Black crosses represent tows with no Large Gorgonians by-catch recorded (no presence).

3.3 Small Gorgonians

EU-Spain and Portugal 2020 Data: Small gorgonians were recorded in 15 tows (8.15 % of total tows analyzed), with depths ranging between 567 - 1250 m (Figure 4). No significant catches (≥ 0.2 kg/tow) were recorded.

No small gorgonians were caught during the 2019 Fall *Canadian surveys* (DFO).

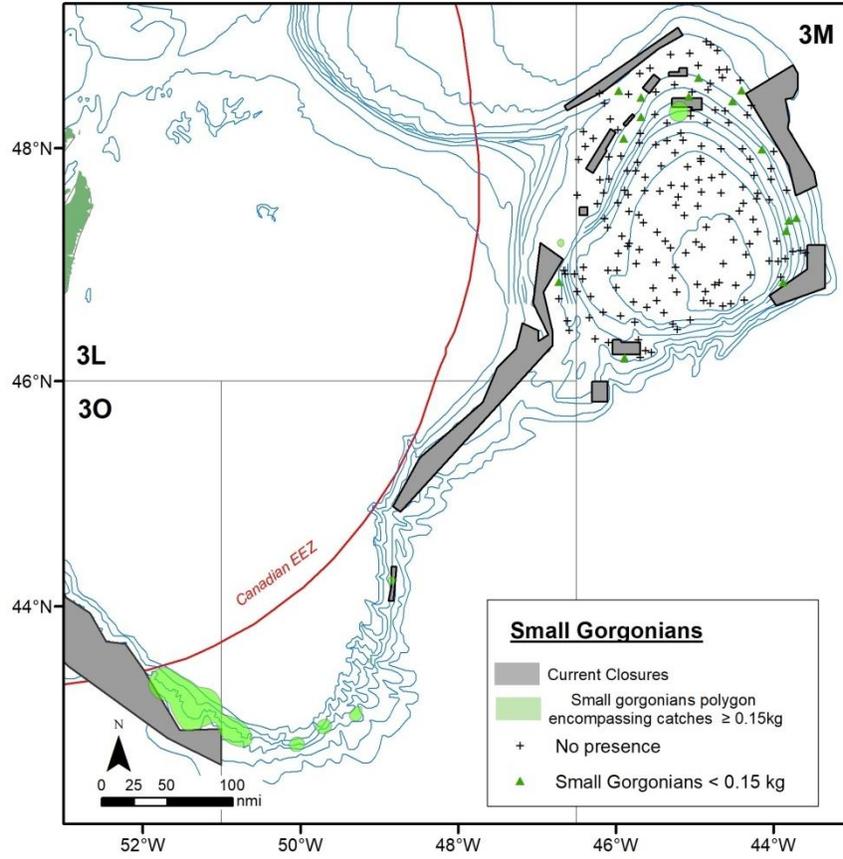


Figure 4. Distribution of catches of Small Gorgonians in the study area from 2020 EU-Spain and Portugal survey (NAFO Div. 3M). Black crosses represent tows with no Small Gorgonians by-catch recorded (no presence). No small gorgonians were caught during the 2019 Fall Canadian surveys (DFO).

3.4 Sea Pens

EU-Spain and Portugal 2020 Data: Sea pens were recorded in 59 tows (32% of total tows analyzed), with depths ranging between 182 - 1423 m (Figure 5A). No significant catches (≥ 1.3 kg/tow) were recorded.

DFO 2019 Fall Data: Sea pens were recorded in 10 of the 71 valid tows (14% of total tows analyzed), with mean depths ranging between 104 - 650 m (Figure 5B). No tows had significant catches of sea pens (≥ 1.3 kg/tow). However, one tow had a biomass of 1.28 kg.

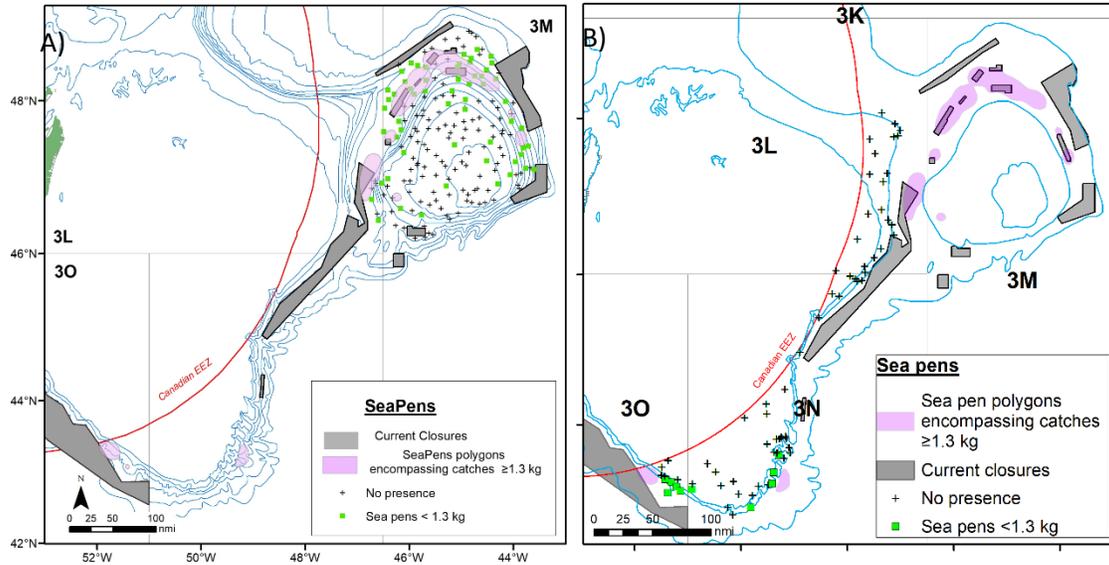


Figure 5. Distribution of catches of Sea Pens in the study area from A) 2020 EU-Spain and Portugal survey (NAFO Div. 3M) and B) 2019 Fall Canadian surveys (NAFO Div. 3LNO). Black crosses represent tows with no Sea Pens by-catch recorded (no presence).

3.5 Black corals

No black corals were caught during either the 2020 *Spanish* or 2019 *Fall Canadian* surveys.

3.6 *Boltenia*

EU-Spain and Portugal 2020 Data: There were no *Boltenia* catches in these surveys.

DFO 2019 Fall Data: *Boltenia* sp. were recorded in 7 of the 71 valid tows (9.9% of total tows analyzed), with mean depths ranging between 42 - 230 m (Figure 6). A total of four tows had significant catches of *Boltenia* (≥ 0.35 kg/tow), of which four were found inside the *Boltenia* KDE polygon (Figure 6).

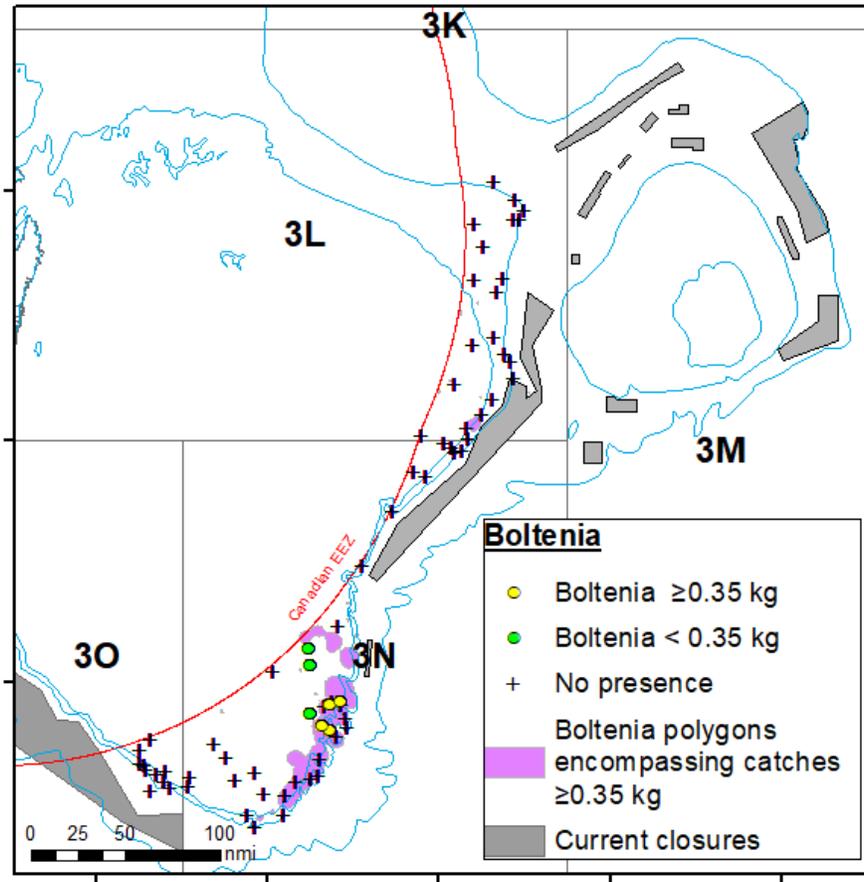


Figure 6. Distribution of catches of sea squirts *Boltenia* sp. in the study area from the 2019 Fall Canadian surveys (NAFO Div. 3LNO). Black crosses represent tows with no *Boltenia* sp. by-catch recorded (no presence).

Table 2. Summary of deep-water corals and sponges records for the NRA from 2020 EU-Spain and Portugal survey and 2019 Fall Canadian surveys.

EU-Spain and Portugal data 2020	Presence Significant and Non-Significant (# of tows)	Total Tows (% of tows)	Significant Concentrations (# of tows)	Significant Concentrations (% of tows)	Significant Concentrations inside KDE corresponding polygon
Sponges	47	25.5%	0	0%	0
Large Gorgonians	2	1%	0	0%	0
Small Gorgonians	15	8.15%	0	0%	0
Sea Pens	59	32%	0	0%	0
Canadian data 2019 (Fall)					
Sponges	35	49%	0	0%	0
Large gorgonians	2	2.8%	0	0%	0
Sea Pens	10	14%	0	0%	0
Boltenia	7	9.9%	4	5.6%	4

Acknowledgements

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References:

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