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New preliminary data on VME encounters in NAFO Regulatory Area (Divs. 3LMNO) from EU; EU-Spain Groundfish Surveys (2019) and Canadian surveys (2018 and spring 2019)

by

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During the 12th NAFO Working Group on Ecosystem Science and Assessment (WGESA) meeting new preliminary data on deep-water corals and sponges were presented from the 2019 EU and EU-Spain bottom trawl groundfish surveys[1]. 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. Therefore, polygons illustrated on the figures below are the ones that, at the present time, have been accepted by SC.

Data used in this study were collected from four surveys:

1. The EU-Spain 3NO groundfish survey, conducted by the Instituto Español de Oceanografía (IEO), sampled the Grand Banks of Newfoundland (NAFO Divs. 3NO) between 43 - 1438 m depth with a total of 115 tows.
2. 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 134 -1426 m, with a total of 183 tows.
3. The EU-Spain Fletán Negro-3L groundfish survey, conducted by the IEO, sampled northeast Grand Banks of Newfoundland (NAFO Div. 3L) between 120 - 1359 m depth, with a total of 97 tows.
4. 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 36 - 694 m, with a total of 226 valid tows (2018 and Spring 2019). The 2018 data was not presented at the 11th NAFO WG-ESA meeting.

[1] *Groundfish surveys have been co-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 advise regarding the Common Fisheries Policy.*
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There were 395 bottom trawl tows carried out during 2019 EU-Spain groundfish in the NRA for this report, and 226 tows 149 and 77 tows during 2018 and 2019 (Spring only) Canadian multispecies surveys, respectively, in the NRA for this report (Figure 1).

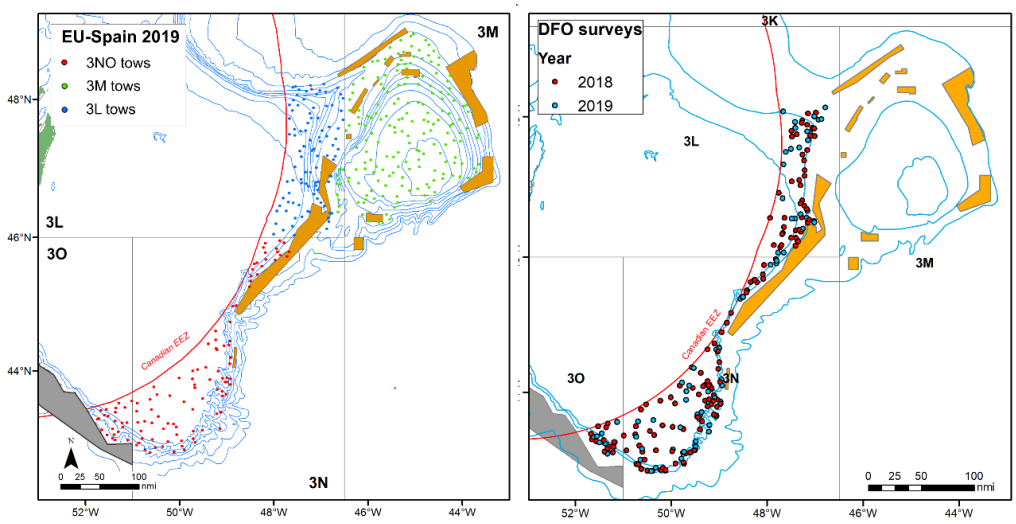

Figure 1. Distribution of sets (start positions) from 2019 EU-Spain groundfish surveys and 2018-2019 Canadian groundfish surveys (NAFO Divs. 3LNO).

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), and sponges (Phylum: Porifera).

Distribution maps of presence (non-significant and significant catches) for large gorgonians, small gorgonians, sea pens, and sponges are presented below (Figures 2-6). Locations of each coral and sponge records were assigned by start position of each tow for 2019 EU-Spain (Durán Muñoz et al. 2019) and Canadian groundfish surveys. For EU-Spain surveys depths is also displayed as the start depth. For the Canadian surveys, depth is displayed as mean depth. Coordinates and weights of the significant catches are provided in Table 1. A summary of deep-water corals and sponges records from these surveys is provided in Table 2.

Table 1. Significant catches of corals and sponges in the NRA (Divs. 3LMNO) with their corresponding depth and weight. Note that tow positions are in decimal degrees. Coordinates and depth correspond to start tow positions for the EU-Spain surveys (Durán Muñoz et al. 2019). In Canadian surveys, depths is shown as mean depth.

EU-Spain surveys			**Start position**			
VME Indicator Species	**Year**	**Survey**	**Lat (N)**	**Lon (W)**	**Depth (m)**	**Weight (kg)**
SPONGES >= 75 kg	2019	3L	46.2872	-46.8385	1,286	134.21
	2019	3M	46.2682	-45.5352	1,000	165.55
	2019	3NO	45.2677	-48.5152	1,334	289.77
Canadian surveys			**Start position**		**Mean**	
VME Indicator Species	**Year**	**Survey**	**Lat (N)**	**Lon (W)**	**Depth (m)**	**Weight (kg)**
LARGE GORGONIANS >= 0.6 kg	2018	3N	42.820	-50.215	460	1.44
	2019	3N	44.115	-49.195	119	0.9
SMALL GORGONIANS >= 0.15 kg	2019	3O	43.07	-51.323	586	0.39

Sponges

EU-Spain 2019 Data: Sponges were recorded in 100 of the 395 tows (25.3% of the total tows analyzed), with depths ranging between 156 - 1359 m (Figure 2).

Significant catches of sponge (≥ 75 kg/tow) were found in three tows (see Table 1 and Figure 2). Two of these catches were located in Flemish Pass area inside the KDE sponge polygon and inside closure area number 2.The third record was found besides closed area number 13 inside the KDE sponge polygon. Sponge catches for these tows ranged between 134.21 - 289.77 kg.

Canadian surveys (DFO) 2018-2019 Data: Sponges were recorded in 73 of the 139 valid tows (52.5% of the total tows analyzed), with mean depths ranging between 47 - 668 m (Figure 2).

There were no significant catches of sponges (≥ 75 kg/tow) in these tows (see Table 1 and Figure 2). In 2019 (Spring only) sponges were recorded in 35 of the 71 valid tows (49.3% of the total tows analyzed), with mean depths ranging between 52 - 685 m (Figure 2). No significant catches of sponge (≥ 75 kg/tow) were found in these tows (see Table 1 and Figure 2).

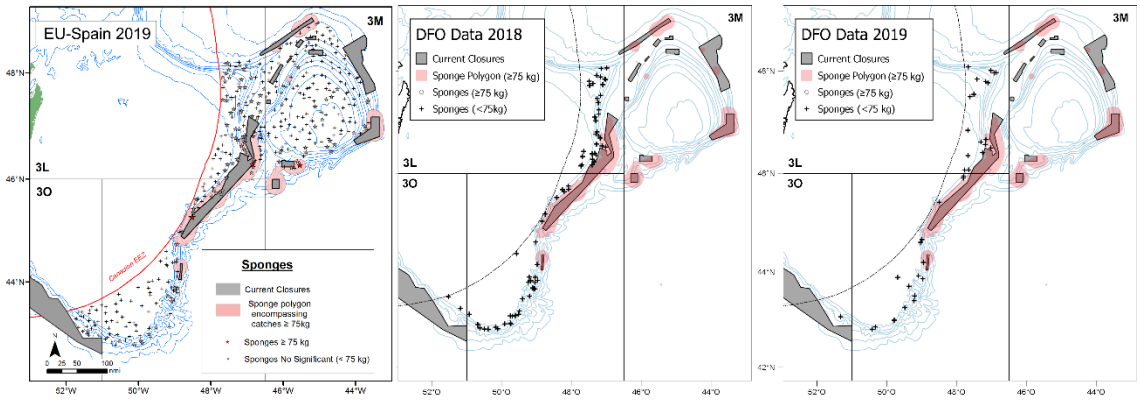

Figure 2. Distribution of significant and non-significant catches of sponges in the study area from 2019 EU-Spain surveys (NAFO Divs. 3LMNO) and 2018-2019 Canadian groundfish surveys (NAFO Divs. 3LNO). Black crosses represent tows with no sponge by-catch recorded.

Large Gorgonians

EU-Spain 2019 Data: Large gorgonians were recorded in 6 of the 395 tows (1.52% of total tows analyzed), with depths ranging between 207 - 1155 m (Figure 3). None of the tows have significant catches of large gorgonians (≥ 0.6 kg/tow).

Canadian surveys (DFO) 2018-2019 Data: In 2018, large gorgonians were recorded in 8 of the 139 valid tows (5.8% of total tows analyzed), with mean depths ranging between 96 - 668 m (Figure 3). Only 1 tow had significant catches of gorgonian corals (≥ 0.6 kg/tow), located on the tail of Grand Bank (460 m - 1.4 kg), outside of the corresponding VME KDE polygon (Table 1).

In 2019 (Spring), large gorgonians were recorded in 2 of the 139 valid tows (2.8% of total tows analyzed), with mean depths ranging between 119-608 m (Figure 3). Only 1 tow had significant catches of gorgonian corals (≥ 0.6 kg/tow), located near area 1 (119 m – 0.9 kg), outside of the corresponding VME KDE polygon (Figure 3, Table 1).

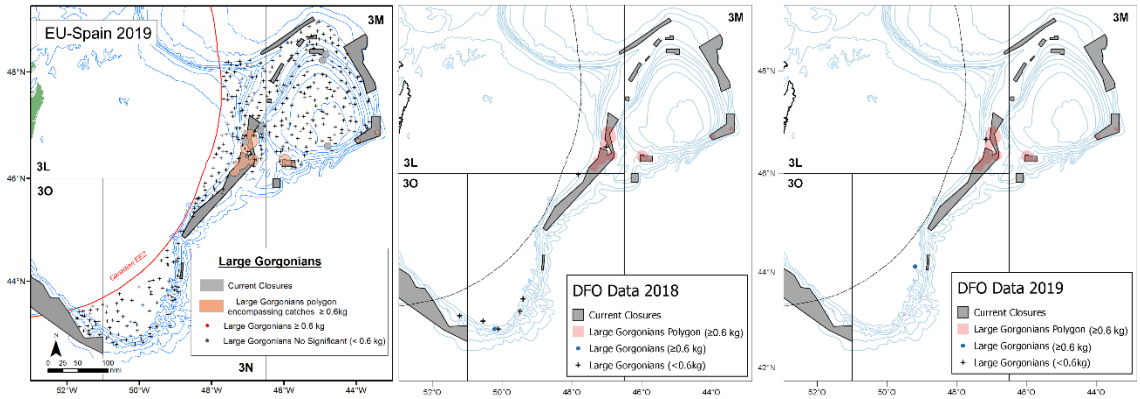

Figure 3. Distribution of significant and non-significant catches of large gorgonians in the study area from EU-Spain 2019 surveys (NAFO Divs. 3LMNO) and 2018-2019 Canadian groundfish surveys (NAFO Divs. 3LNO). Black crosses represent tows with no large gorgonians by-catch recorded.

Small Gorgonians

EU-Spain 2019 Data: Small gorgonians were recorded in 41 tows (10.37 % of total tows analyzed), with depths ranging between 262 - 1438 m (Figure 4). No significant catches (≥ 0.15 kg/tow) were recorded.

Canadian (DFO) 2019 Data: Small gorgonians were not recorded in the 2018 tows, and in only one of the 71 valid tows in 2019 (1.4% of total tows analyzed, Spring only), at a mean depth of 586 m (Figure 4). This tow had a significant catch of small gorgonian corals (≥ 0.15 kg/tow), and it is located close to the 3O closure (586 m – 0.39 kg), outside of the corresponding VME KDE polygon (Table 1).

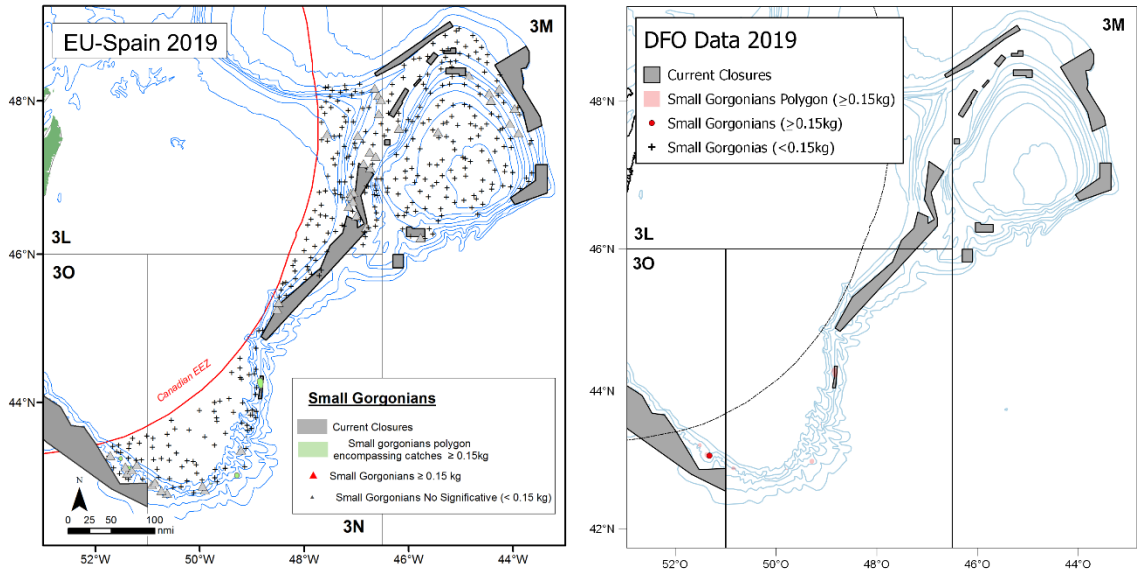

Figure 4. Distribution of significant and non-significant catches of small gorgonians in the study area from EU-Spain 2019 surveys (NAFO Divs. 3LMNO) and 2019 Canadian groundfish surveys (Spring, NAFO Divs. 3LNO). Black crosses represent tows with no small gorgonian by-catch recorded. Only one Canadian tow had small gorgonians.

Sea Pens

EU-Spain 2019 Data: Sea pens were recorded in 1 2 2 tows (30.88% of total tows analyzed), with depths ranging between 109 - 1438 m (Figure 5). No significant catches (≥ 1.4 kg/tow) were recorded.

DFO 2018-2019 Data: In 2018, sea pens were recorded in 14 of the 139 valid tows (10.1% of total tows analyzed), with mean depths ranging between 116 - 634 m (Figure 5). No tows had significant catches of sea pens (≥ 1.4 kg/tow).

In 2019 (Spring only), sea pens were recorded in 6 of the 71 valid tows (8.5% of total tows analyzed, Spring only), with mean depths ranging between 111 - 646 m (Figure 5).

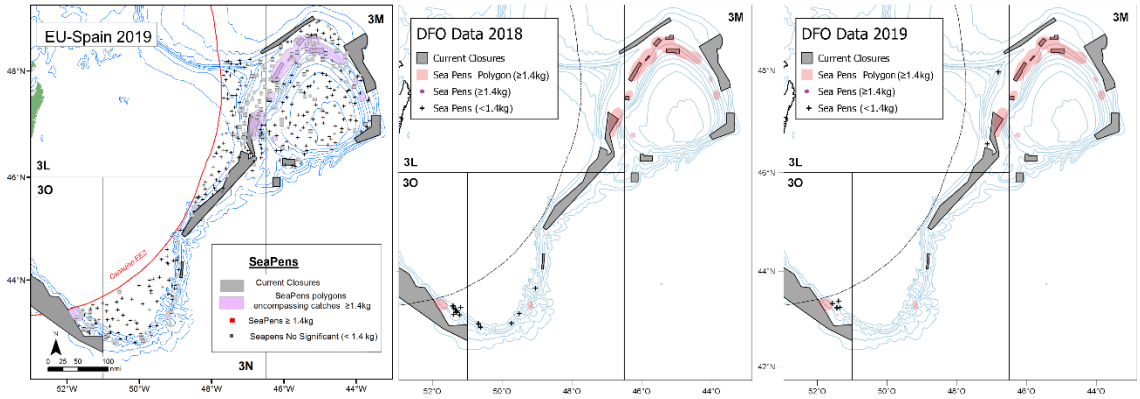

Figure 5. Distribution of significant and non-significant catches of sea pens in the study area from EU-Spain 2019 surveys (NAFO Divs. 3LMNO) and 2018-2019 Canadian groundfish surveys (NAFO Divs. 3LNO). Black crosses represent tows with no sea pen by-catch recorded.

Black corals

DFO 2018-2019 Data: Black corals were recorded in 2 of the 139 valid tows (1.4% of total tows analyzed), with depths ranging between 441-609 m (Figure 6). No black corals were recorded in 2019 tows (Spring only).

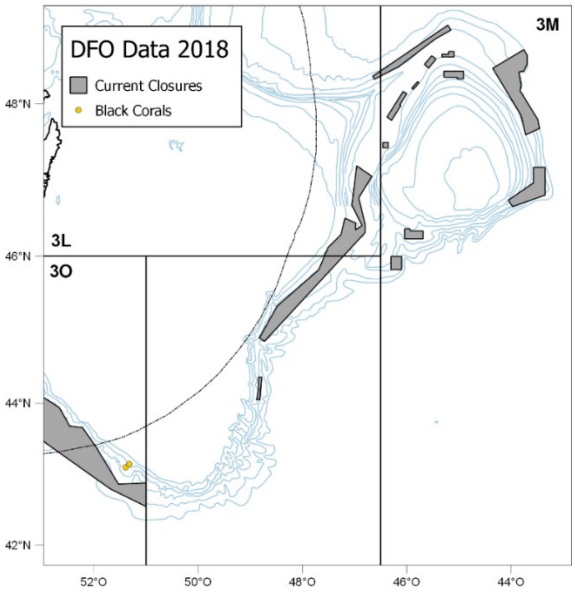

Figure 6. Distribution of black corals catches in the study area from 2018 Canadian groundfish surveys (NAFO Divs. 3LNO). There were no records of black corals from the 2019 Spring surveys.

Table 2. Summary of deep-water corals and sponges records for the NRA from 2019 EU-Spain surveys and 2018-2019 Canadian surveys.

EU-Spain data 2019	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	100	25.3%	3	0.76%	3
Large Gorgonians	6	1.52%	0	0%	0
Small Gorgonians	41	10.37%	0	0%	0
Sea Pens	122	30.88%	0	0%	0
Canadian data 2018					
Sponges	73	52.5%	0	0	0
Large Gorgonians	8	5.8%	1	0.72%	0
Small Gorgonians	0	0%	0	0%	0
Sea Pens	14	10.1%	0	0%	0
Black Corals*	2	1.4	na	na	na
Canadian data 2019 (Spring)					
Sponges	35	49.3%	0	0%	0
Large Gorgonians	2	2.8%	1	1.4%	0
Small Gorgonians	1	1.4%	1	1.4%	0
Sea Pens	6	8.5%	1	1.4%	0
Black Corals*	0	0	na	na	na

*Threshold values for black corals not available before 2019.

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