

Cross-border coral habitat exploration (CroCHEt) - cruise report

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Cross-border coral habitat exploration (CroCHet) – cruise report

by

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ABSTRACT

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The Cross-border Coral Habitat Exploration (CroCHET) research cruise aimed at collecting new data on benthic communities in the Gulf of Maine and along the continental slope in collaboration with US scientists. The cruise took place on RV Henry B. Bigelow equipped with the Remotely Operated Vehicle (ROV) ROPOS, on 17-31 July 2024. The mission focused on informing monitoring practices, as well as documentation of unexplored areas, particularly Vulnerable Marine Ecosystems, such as deep-water corals, in Areas of Interest and in other effective area-based conservation measures (OECMs). A total of 11 ROV dives were completed, 5 in Canadian waters, covering 45,250 m of seabed, and described in detail here.

Dense aggregations of bubblegum coral, *Paragorgia arborea*, were found on vertical walls in Corsair Canyon, and soft corals in the shallower part of the canyon. Dives in the Northeast Channel were concentrated on revisiting specific areas that can be used for monitoring purposes, while also exploring the area outside the east boundary of the marine refuge, where derelict fishing lines were found. One dive in the Gulf of Maine revealed an extensive and dense aggregation of the gorgonian coral, *Paramuricea* sp., while fewer fauna and occasional marks on the seabed that could be trawl marks were observed in a second dive.

RÉSUMÉ

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La campagne océanographique CroCHET (Exploration transfrontalière des habitats coralliens) visait à recueillir de nouvelles données sur les communautés benthiques du golfe du Maine et du talus continental, en collaboration avec des scientifiques américains. Elle s'est déroulée du 17 au 31 juillet 2024 à bord du navire de recherche Henry B. Bigelow, équipé du véhicule sous-marin télécommandé (ROV) ROPOS. La mission était axée sur l'amélioration des pratiques de surveillance et la documentation des zones inexplorées, notamment les écosystèmes marins vulnérables, tels que les coraux d'eaux profondes, dans les zones d'intérêt et dans le cadre d'autres mesures de conservation efficaces par zone (MCE). Onze plongées du ROV ont été réalisées, dont cinq dans les eaux canadiennes, couvrant 45 250 m² de fond marin, et sont décrites en détail ci-après.

Des agrégations denses du corail « bubblegum » (*Paragorgia arborea*) ont été observées sur les parois verticales du canyon Corsair, ainsi que des coraux mous dans la partie moins profonde du canyon. Les plongées dans le chenal Nord-Est ont été principalement consacrées à la réexploration de zones spécifiques pouvant servir à la surveillance, ainsi qu'à l'exploration de la zone située au-delà de la limite orientale de la réserve marine, où des lignes de pêche abandonnées ont été découvertes. Les plongées dans le golfe du Maine ont révélé une importante et dense concentration de gorgones du genre *Paramuricea*, tandis qu'une seconde plongée a permis d'observer une faune moins abondante et quelques marques sur le fond marin pouvant correspondre à des traces de chalutage.

1. Introduction

The Gulf of Maine and the adjacent continental slope is a largely heterogeneous area in terms of topography and environmental conditions, that hosts a rich diversity of deep-water corals (Auster et al., 2013; Quattrini et al., 2015). It covers a wide bathymetric range (200 - < 2 000 m) and consists of a variety of topographic features including several banks, basins and canyons. It is also characterized by complex circulation, including prominent currents such as the Labrador Current and Gulf Stream (Townsend et al., 2015). Knowledge of deep-sea benthic habitats in this region has been growing steadily in the last two decades, due to ongoing collaborations between US and Canadian scientists.

Deep-water corals have been a focal study group as they qualify as indicator species of Vulnerable Marine Ecosystems because they are fragile, long-living colonial organisms that can take a long time to recover from disturbance (Althaus et al., 2009; FAO, 2009; Roark et al., 2009). Bottom-contact fisheries are regionally the main direct human activity that can affect these ecosystems, removing and damaging coral colonies and affecting a variety of organisms that use deep-water coral communities as nurseries, shelter or feeding areas (Clark et al., 2019; D'Onghia, 2019; Mortensen et al., 2005).

Better understanding of these habitats and their vulnerabilities, along with close collaboration between government agencies and science, has led to the establishment of several fisheries management measures in the area, which qualify as “other effective area-based conservation measures” (OECM): Corsair and Georges Canyons Marine Refuge and Jordan Basin Marine Refuge and Northeast Channel Marine Refuge (NCMR). NCMR forms part of the Fundian Channel-Browns Bank Area of Interest. These OECMs have a common conservation objective to protect deep-water corals by prohibiting all commercial bottom-contact fishing gear. To evaluate whether the marine refuges are meeting their objectives, monitoring is required, by revisiting the areas and comparing current status with baseline data. Additional exploration on adjacent areas is also important, to understand whether the marine refuge represents a habitat that spans a larger area or is distinct from its surroundings. This is particularly challenging for deep-sea habitats, due to their remoteness, with vast areas yet to be mapped to fully document the biodiversity and variety of habitats.

The Cross-border Coral Habitat Exploration (CroCHET) cruise aimed at answering several scientific and conservation questions about deep-water corals, and at maintaining successful scientific collaboration between US and Canadian scientists. The cruise took place onboard RV Henry B. Bigelow, with a corresponding internal cruise code HB2405 over 2 weeks (17-31 July 2024), starting and ending at the Naval Station Newport, Newport, RI, USA.

The main objectives of the cruise were to:

- 1) Employ the ROV ROPOS to conduct video surveys and collect specimens at various locations
- 2) Explore new areas that might be of interest for protection
- 3) Evaluate deep-water coral abundance and spatial distribution
- 4) Collect fauna for taxonomic, reproductive, age, and isotopic analyses
- 5) Collect data for long-term monitoring in marine refuges
- 6) Undertake onboard experiments on temperature tolerance of select coral species
- 7) Collect water samples for eDNA analysis
- 8) Collect multibeam data

The scientific crew of CroCHET cruise were:

- Martha Nizinski, PI – NOAA
- Anna Metaxas, co-PI – Dalhousie University
- Meri Bilan – Dalhousie University
- Craig Brown – Dalhousie University
- Javier Murillo – DFO
- Maria Rakka – Dalhousie University
- Dave Packer – NOAA
- Matthew Poti – NOAA
- Liz Shea – Delaware Museum of Natural History

This report will provide details on the ROV dives performed in Canadian waters, while information on other dives can be found in Nizinski & Shea (2025).

2. Materials and methods

2.1 Remotely operated vehicle (ROV) ROPOS

The remotely operated vehicle (ROV) ROPOS was equipped with two video recording cameras: a forward-looking (Insite Pacific Zeus-Plus HD camera, 10x Zoom 5.2 to 52 mm) and downward-looking one (Insite Pacific Mini-Zeus HD Camera, 10x Zoom 5.1 to 51 mm). A set of lasers 10 cm apart on each camera provided spatial reference. An additional camera was used to take 4K still images upon request. ROPOS was equipped with two manipulators and a suction device used for sample collection, four Niskin bottles (two on each side of the ROV) and four bioboxes subdivided into four compartments that were used to store collected specimens. Live video annotation was done onboard in Integrated Real-time Logging System (IRLS) 2.0. (provided by ROPOS crew), while the navigation was logged with LOKI Kalman filter. A total of 11 ROV dives were conducted during the research cruise (Table 1 and Fig. 1).

Table 1. ROPOS ROV dives conducted during the CroCHET cruise

Dive number	Date	Site
R2386	19 July 2024	Oceanographer Canyon (USA)
R2387	20 July 2024	Gilbert Canyon (USA)
R2388	21 July 2024	Heezen Canyon (USA)
R2389	22 July 2024	Corsair Canyon (Canada)
R2390	23 July 2024	Gulf of Maine (Canada)
R2391	24 July 2024	Northeast Channel (Canada)
R2392	25 July 2024	Northeast Channel (Canada)
R2393	27 July 2024	Jordan basin (Canada)
R2394	28 July 2024	Gulf of Maine (Transboundary transect)

R2395	28 July 2024	Gulf of Maine (Transboundary transect)
R2396	30 July 2024	Hydrographer Canyon (USA)

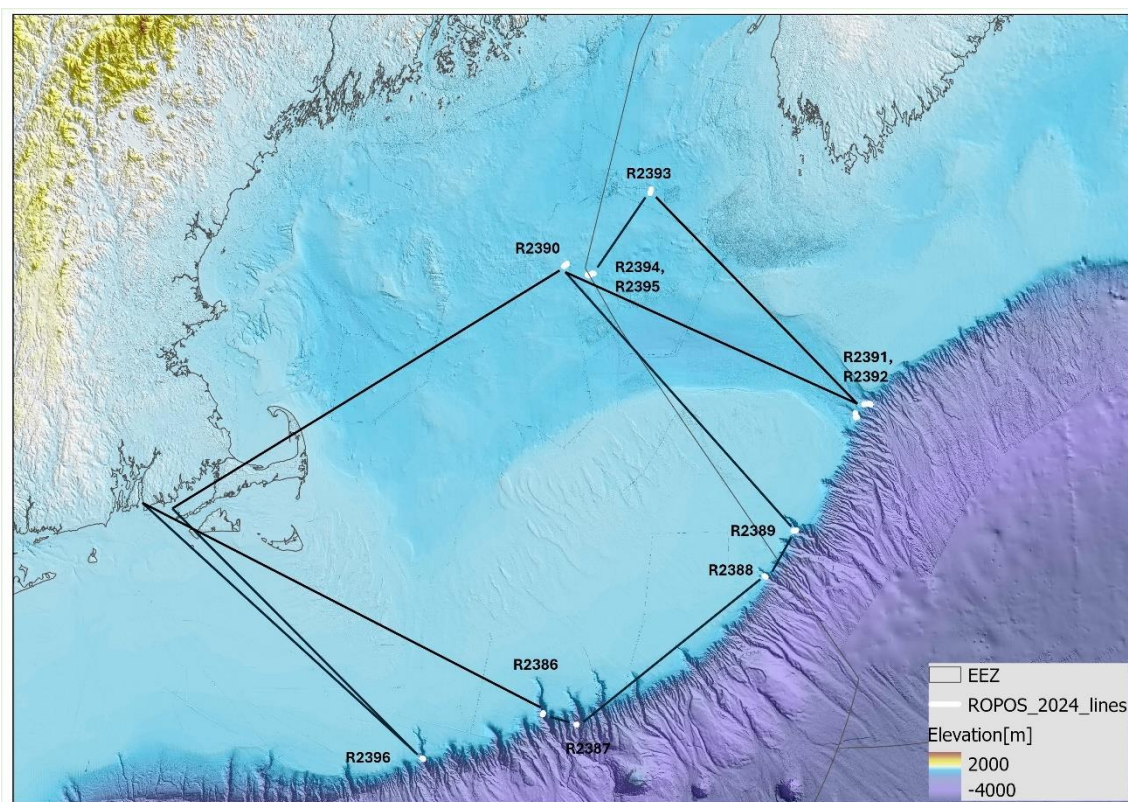


Figure 1. CroCHet cruise track with labelled ROV dives. Map prepared by SEAM lab.

2.2. CTD sampling

Water samples were collected throughout the water column with a rosette of 12 10-L Niskin bottles and equipped with SBE 11plus V 5.2 CTD probe with oxygen and fluorescence sensors. CTD casts were performed at least once at each dive site (Table 2) and water samples were taken for eDNA analysis, maintenance of live corals onboard and calibration of multibeam. Processing of CTD files and visualizations was done in SBE Data Processing Software 7.26.7.1.

Table 2. Details of CTD sampling conducted during CroCHet cruise

CTD station	Site	Latitude	Longitude	Date	Time
1	Oceanographer Canyon	40.29	-68.12	19 July	10:16:27
2	Oceanographer Canyon	40.459	-68.143	20 July	1:19:12
3	Oceanographer Canyon	40.23	-67.857	20 July	9:57:40
4	Gilbert Canyon	41.062	-66.386	21 July	9:56:46
5	Corsair Canyon	41.307	-66.156	22 July	2:10:35
6	Corsair Canyon	41.331	-66.129	22 July	9:55:43
7	Gulf of Maine	42.918	-67.885	23 July	10:45:47
8	Northeast Channel	41.997	-65.646	24 July	10:52:47
9	Northeast Channel	42.107	-65.559	25 July	1:24:47
10	Northeast Channel	42.051	-65.566	25 July	9:57:29
11	Jordan Basin	43.527	-67.494	27 July	0:32:36
12	Jordan Basin	43.341	-67.21	27 July	9:57:11
13	Gulf of Maine (Transboundary transect)	42.88	-67.714	28 July	3:01:18
14	Gulf of Maine (Transboundary transect)	42.857	-67.669	28 July	10:30:54
15	Hydrographer Canyon	40.191	-69.1	30 July	4:14:07
16	Hydrographer Canyon	40.041	-69.038	30 July	10:07:38

2.3. Collected faunal samples

During the ROV dives, faunal specimens were collected for several studies, including taxonomy, onboard experiments and isotopic analyses. After each dive, the specimens were processed and preserved for the respective objectives or used in the experiment running onboard. The preserved samples are kept at the Smithsonian National Museum of Natural History and can be found online at <https://collections.nmnh.si.edu/search/iz/>. A list of collected samples, details of collection (date, position and depth) and their catalogue numbers can be found in Appendix 1.

2.4. On board experiment

Short term experiments were conducted onboard focusing on bubblegum coral, *Paragorgia arborea*, and seacorn coral, *Primnoa resedaeformis*, to evaluate their tolerance to acute temperature increases using respirometry and photogrammetry. The experimental laboratory was set up in the ship's freezer, where temperature was maintained at 2°C (Fig. 2). This data will be used for ongoing construction of physiological modeling of the two species.



Figure 2. Experimental setup in the freezer room on board ship with buckets containing freshly collected specimens ready for processing.

2.5. e-DNA

Water samples were collected at each site before the ROV dive with the CTD rosette, and during the ROV dives with Niskin bottles mounted on the ROV. The water samples were filtered and preserved for eDNA analysis, which is underway at National Oceanic and Atmospheric Administration (NOAA).

2.6. Multibeam acquisition

Multibeam sonar data were collected using the hull-mounted EM2040 Mk2 MBES and integrated IMU/GPS system aboard the RV Henry B. Bigelow. Data collected in Canadian waters was focused on unmapped areas, or areas of poor coverage, including Corsair Canyon, Northeast Channel, Jordan Basin, Transboundary Area and on all transits between survey locations (Fig. 3). Due to the limitations of the equipment, it was only possible to map areas shallower than 500 m. CTD data were used to validate a sound velocity profile for sound speed corrections. Planned survey lines were spaced evenly to provide 25-50% overlap. Processing of the collected data for bathymetry and backscatter is underway.

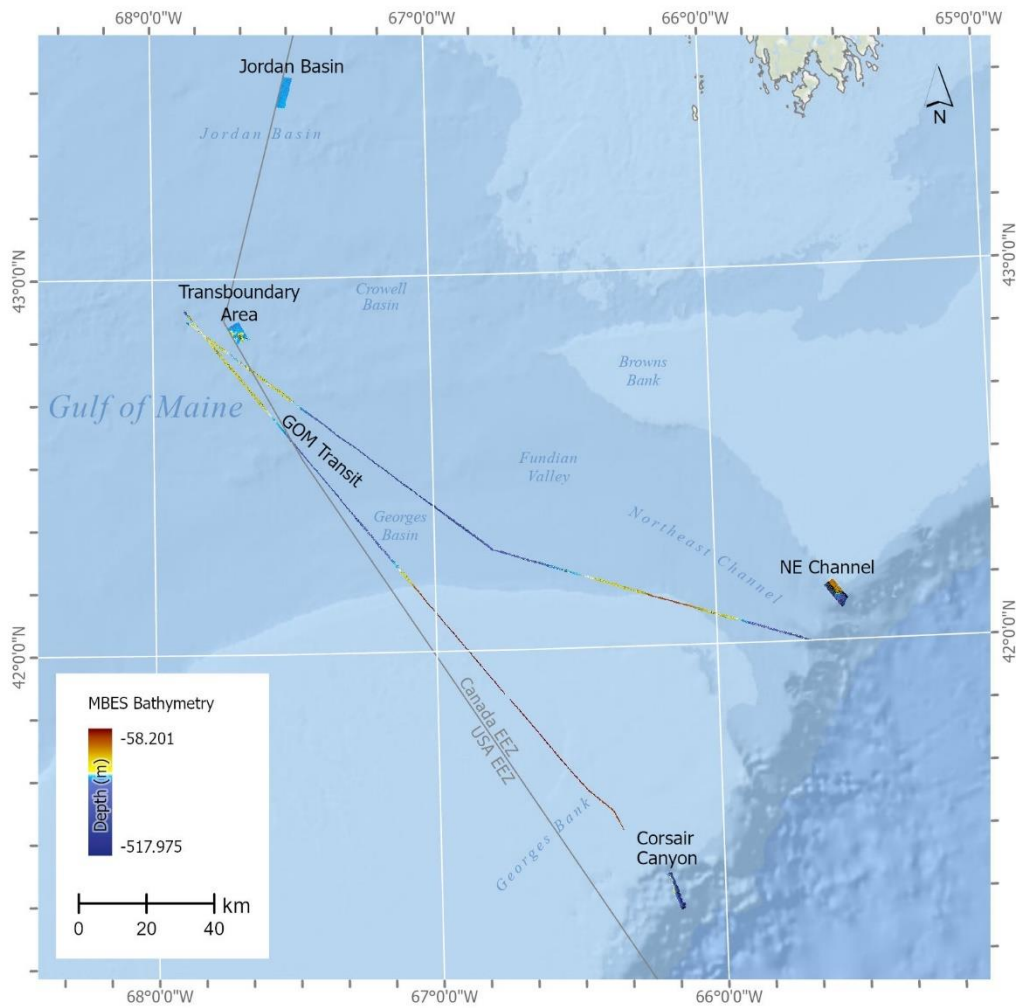


Figure 3. Preliminary data from multibeam collected in Canadian waters prepared by SEAM Lab.

2.7. Video and image analysis

Quantitative video analysis was done for the five dives conducted in Canadian waters (R2389, R2391, R2392, R2393, R2394) (Table 3). Firstly, images from the downward-looking camera were extracted every 15 s using multimedia player PotPlayer, and those with poor visibility (i.e., > 2.5 m above the seabed, lasers not visible, unsuitable camera angle, high turbidity) removed from further analysis. The track line of each dive was subdivided into 20-m segments in ArcGIS Pro, using the Divide tool. A single image was chosen for each 20-m segment for analysis using the annotation interface BIIGLE 2.0. (Langenkämper et al., 2017). Annotation was limited to all benthic species that were recognizable and larger than 2 cm, except for the brachiopods in the Gulf of Maine that were easily recognizable. A

morphospecies photo catalogue (Appendix 2) was assembled based on the subset of images used in this analysis, in which we allocated unique names for each morphospecies at the lowest taxonomic level possible (Command et al., 2024; de Alameida Alves-Júnior et al., 2019; Dinn, 2020; Gooday, 1988; Hestetun et al., 2017; Metaxas & Giffin, 2004; NOAA, 2024; Salgado & Etnoyer, 2020). A region of interest (ROI) was defined in each image, corresponding to a bounding box where the seafloor and laser points were clearly visible. The distance between the laser points (10 cm) was then used to estimate the area covered by the ROI. This approach was followed to avoid overestimation of the covered area, particularly in areas where the seabed was partially visible, e.g. on a sloping terrain where part of the image was not lit. Additionally, on dive R2394 a school of pollock were following the ROV for most of the dive, often partially obscuring the seabed. For that dive, pollock were annotated within the ROI using a magic SAM tool in BIIGLE. This tool contours areas of similar colour and was used to subtract the area covered by the fish, and in which it was not possible to annotate benthic species (Fig. 4). On dives R2391 and R2392 we performed three series of densely spaced transects organized in a grid for long term monitoring. For the purpose of reporting megafaunal distribution on broad scales, we only analysed a single image in the centre of each of the transect grids. Species densities were calculated in RStudio (2023.06.2), by dividing the number of individuals of each morphospecies in each image with the ROI area. Bar charts were done in RStudio, showing only species that were present in more than 1% of the total annotations. Maps were prepared in ArcGIS Pro (WGS 84/UTM zone 19N projection) based on available multibeam that was collected prior to the cruise and merged to a common 25m x 25m resolution grid. Contour lines (50-m interval) were produced in ArcGIS Pro using this grid, which revealed artefacts of the merged bathymetry (especially in NCMR).

Table 3. Details of CroCHET dives in Canadian waters and number of images used for image analysis.

Dive	Site	Date	Dive time	Dive length [m]	Lat/Long start	Lat/Long end	Depth start [m]	Depth end [m]	# images analysed
R2389	Corsair Canyon	22 July 2024	11h 46min	8940	41.329; -66.142	41.328; -66.160	906.8	461.9	258
R2391	Northeast Channel	24 July 2024	11h 42min	12850	41.998; -65.650	41.976; -65.639	431.4	859.5	90
R2392	Northeast Channel	25 July 2024	10h 55min	11214	42.046; -65.576	42.045; -65.527	479.2	771.9	182
R2393	Central Jordan Basin	27 July 2024	11h 36min	6203	43.338; -67.207	43.314; -67.216	223.2	211.6	84
R2394	Transboundary Elbow	28 July 2024	6h 34min	6043	42.852; -67.674	42.842; -67.710	220.5	185.6	211



Figure 4. Example of image annotation in BIIGLE for R2394. Two red dots in the bottom of the image are laser points set 10 cm apart; largest rectangle is the region of interest (ROI); pollock contoured in red with magic SAM tool, the blue dots are trawl marks, the dark green rectangles are Neoasteroidea and the light green rectangle is *Sclerasterias tanneri*.

2.8. Outreach

All dives were livestreamed on YouTube, allowing other researchers and the public to engage. An average of 40 individuals joining daily. The link was shared with several initiatives that have a specific interest in deep sea research, such as Challenger 150, DOSI, IOCARIBE, and the Jetzon network. An email address was established specifically for the cruise, where the viewers could send comments or questions about the dives. Highlights of each dive were sent to interested groups or individuals to share on social media and the compilation of all highlights can be found at <https://delmns.org/science-at-sea/>. The cruise was featured in Deep Sea Life (issue 23), which can be found here: https://www.dosi-project.org/wp-content/uploads/DSL23_final2_small.pdf

3. Results and interpretations

3.1. Corsair Canyon

One dive (R2389) was conducted in the Corsair and Georges Canyons Marine Refuge on 22 July 2024. The dive started near the Corsair canyon axis at 906 m depth and continued upslope the southwest canyon flank until 461 m depth, lasting 11 h and 46 min and covering 8940 m linear distance. Megafaunal analysis was based on 258 images, of which 218

contained recognizable fauna, for a total of 1844 m² of analysed seabed, and 6374 animals belonging to 49 morphospecies (Fig. 5).

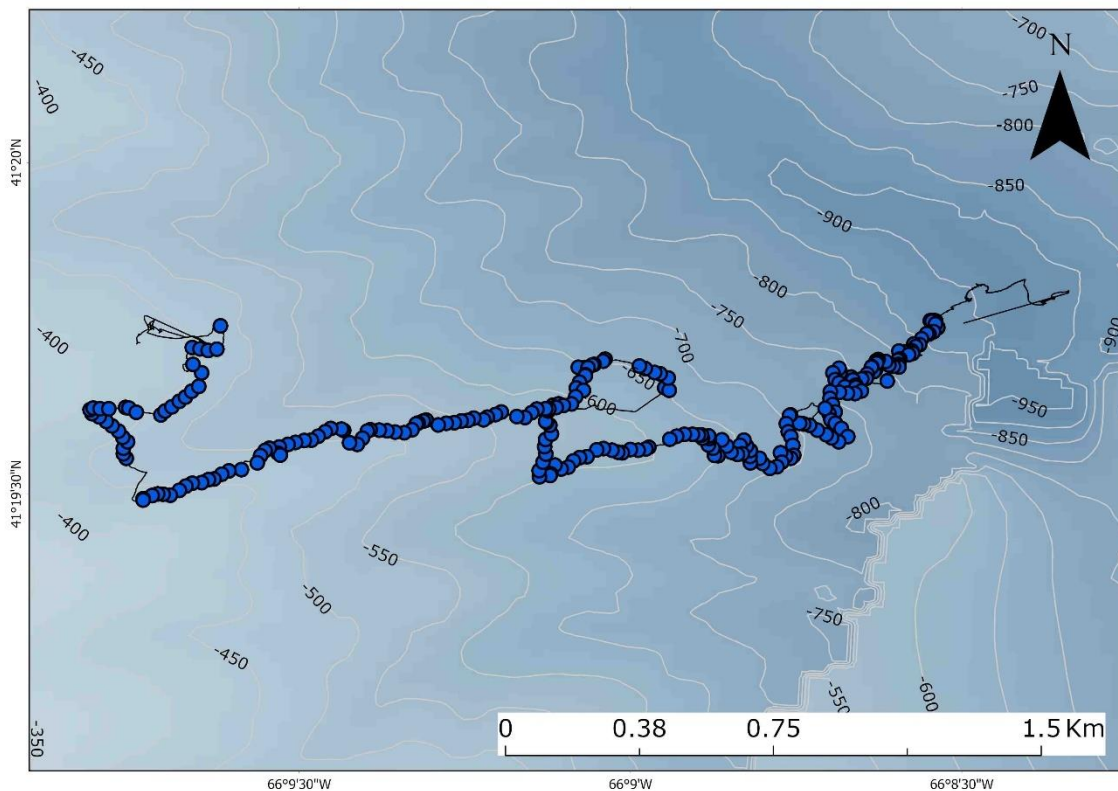


Figure 5. ROV transect (line) and positions of analysed images (blue points) for dive R2389 in Corsair Canyon.

3.1.1. Water column profile

Two CTD casts were performed in Corsair Canyon. An increase in salinity was found below 120 m depth, while temperature slowly decreased with depth (Fig. 6). The oxygen minimum zone was found at approximately 200 m, and in larger depths oxygen gradually increased with depth (Fig. 6).

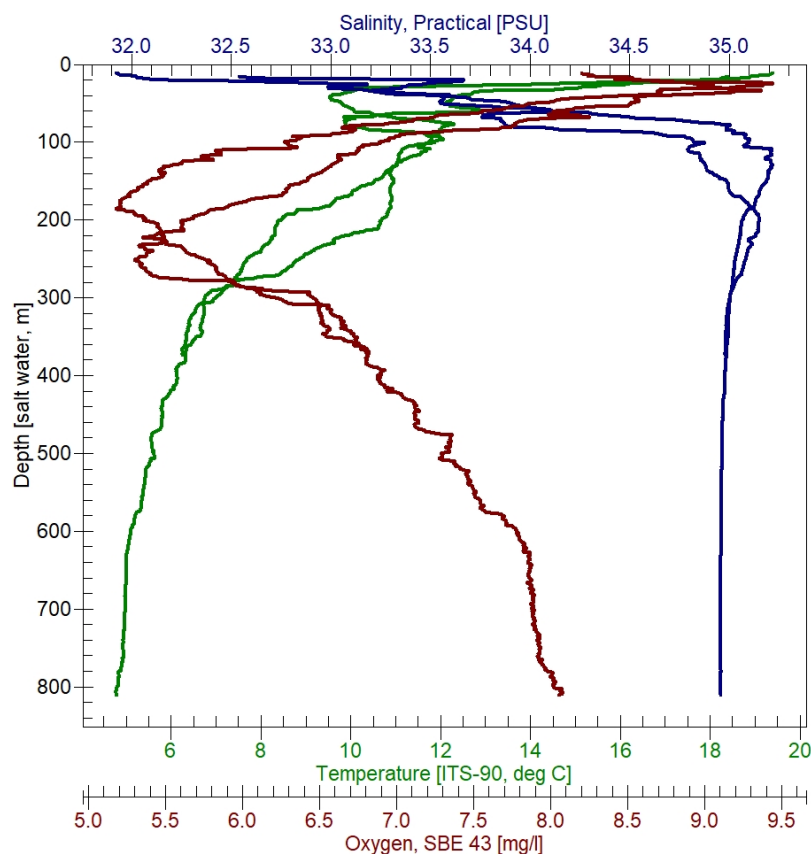


Figure 6. Temperature (green line), salinity (blue line) and oxygen (red line) depth profiles from the CTD casts at Corsair canyon.

3.1.2. Description of dive R2389

The beginning of the dive was characterized by several vertical walls, dislodged blocks of rock and boulders where several deep-water corals and sponges were found. The dominant species was the bubblegum coral *P. arborea*, with large colonies protruding from the vertical walls at high densities (Fig. 7A). Mushroom soft corals of the subfamily Anthomastinae and purple Scleralcyonacea were occasionally found amidst colonies of *P. arborea*. In the crevices and overhangs, it was common to find the cup coral *Desmophyllum dianthus*, *Anthothela grandiflora* and a flabellate white sponge, while *Desmophyllum pertusum*, *Acanthogorgia* sp., *P. resedaeformis* were sparser. Particularly, a total of seven small colonies of white coral *D. pertusum* and six small colonies of *Solenosmilia variabilis* were found between 807-897 m, on overhangs or on vertical walls (Fig. 7B, C); however, most of these colonies were not recorded in the megafaunal analysis presented here, as they were not captured within the sampled images. Below high sloping areas it was common to find toppled colonies of *P. arborea* (referred to as *Paragorgia* skeleton), likely detached from the walls

due to their size. Small white round sponges, and white and grey encrusting sponges were often found on rocky substrates throughout the dive. Occasionally, the deep gorgonian *Paramuricea* sp.1 (characterized by a dark yellow colour) and the bamboo coral *Keratoisis grayi*. were found on vertical walls, although they were more common on relatively flat areas with rocky boulders or flat bedrock, usually covered with a layer of soft sediment. Most of the dive was spent exploring gentler slope areas characterized by consolidated soft sediment with cobbles, pebbles and patches of sand. In these areas soft coral belonging to the family Capnellidae was the most abundant morphotaxon found at high densities and covering an extensive area (Fig. 7D). It is probable that density values are underestimated for this species as it is relatively small, and a light pink/purple colour, rendering it difficult to distinguish in the collected ROV images. This species was occasionally found close to flabellate yellow sponges. In this area, occasional larger drop stones were colonized by large gorgonians *P. arborea*, *P. resedaeformis* and bamboo coral *Keratosia* sp., along with the soft coral Capnellidae (Fig. 7E). It was common to find burrows carved into the consolidated soft sediment, which were probably made by crustaceans such as red deep-sea crab, *Chaceon quinquedens* (Fig. 7F). In areas of unconsolidated soft sediment, the foraminiferan *Bathysyphon* sp., the carnivorous sponge *Asbestopluma pennatula* and the seapen, *Pennatula aculeata*, were present. The most common anemone was *Phelliactis* sp. and was present in most of the analysed images at low densities (Fig. 7E).

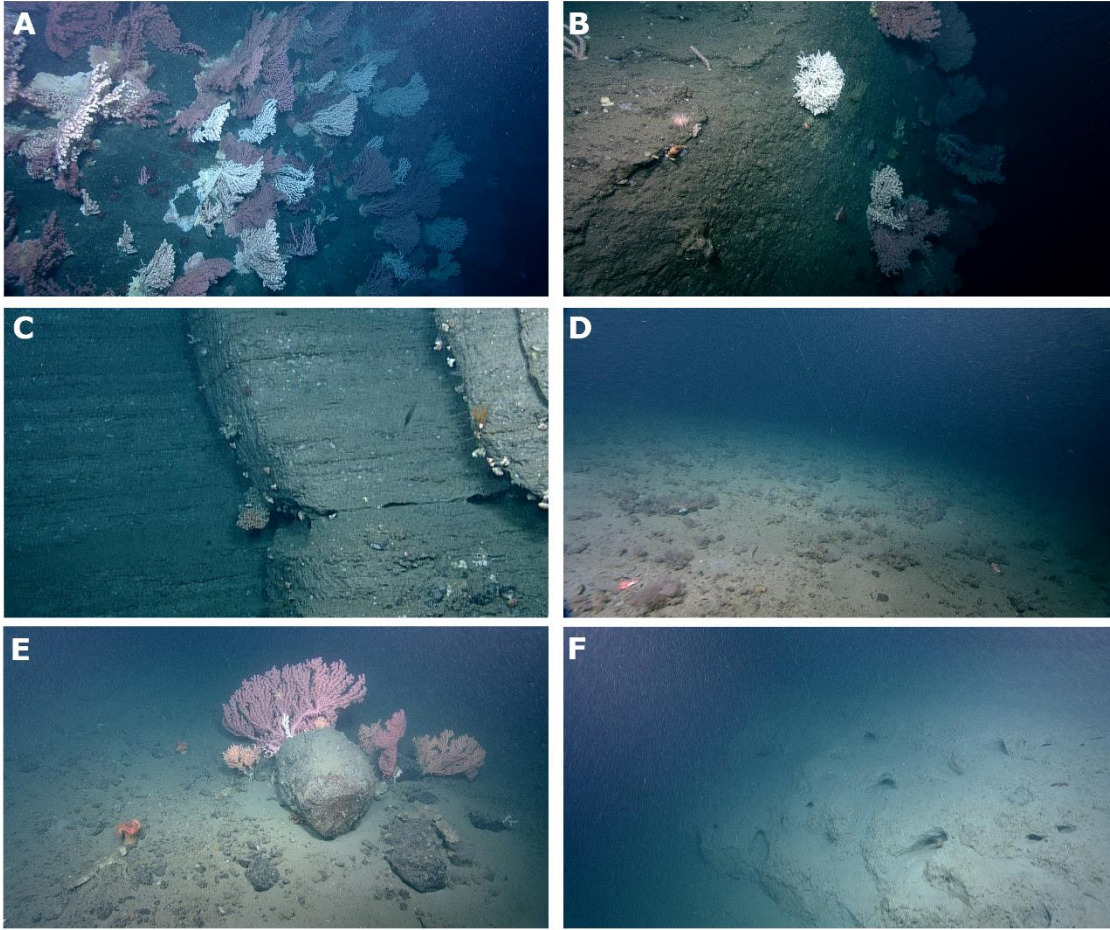


Figure 7. Video frames from dive R2389 showing (A) Vertical wall covered in large colonies of the bubblegum coral, *P. arborea*, and the mushroom soft coral *Anthomastinae*; (B) White coral, *D. pertusum*, on vertical wall; (C) *S. variabilis* on a vertical wall (D) Soft coral, *Capnellidae*, densely growing on cobbles, pebbles and consolidated soft sediment; (E) Boulders colonized by the large gorgonians, *P. arborea*, *P. resedaeformis*, *A. grandiflora* and *Phelliactis* sp.; (F) Burrows carved in consolidated soft sediment with the red deep-sea crab, *C. quinquedens*, visible in one of the borrows.

3.1.3. Megafaunal analysis of dive R2389

Deep-water corals were the most abundant faunal group in this dive, belonging to 17 morphospecies and accounting for 67% of annotations (Fig. 8). *Capnellidae* was the most common morphospecies, with mean density of $4.77 \pm 5.34 \text{ col} \cdot \text{m}^{-2}$, reaching a maximum density of $25.14 \text{ col} \cdot \text{m}^{-2}$ at 672 m depth (Table 4, Fig. 9). This morphospecies is relatively small and does not have a rigid skeleton, which minimizes drag under high current, and possibly allows it to reach such high densities on consolidated soft sediment or cobbles/pebbles. The flabellate yellow sponge was occasionally found growing on

cobbles/pebbles in between Capnellidae, reaching a mean density of $0.2 \pm 0.15 \text{ col}\cdot\text{m}^{-2}$ (Fig. 10), while a white small round sponge was found along the dive track on rocky surfaces at a mean density of $1.06 \pm 1.09 \text{ col}\cdot\text{m}^{-2}$ (Fig. 11).

The second most common coral on this dive was *P. arborea* (Fig. 8), with 226 colonies annotated. Most colonies were found densely arranged on several vertical walls at the beginning of the dive, at 840-897 m depth (Fig. 12). Density was comparatively low (mean density $0.48 \pm 0.47 \text{ col}\cdot\text{m}^{-2}$, maximum density $1.87 \text{ col}\cdot\text{m}^{-2}$), however this species can grow large (over 1 m in height and width) (Table 4). Smaller colonies of *P. arborea* and *P. resedaeformis* were occasionally found on steep consolidated soft sediment at shallower depths (654-709 m) (Fig. 12 and Fig. 13). Thirty-seven fragments of *P. arborea* skeletons were found toppled below vertical walls, at various stages of decomposition, including newly detached colonies with open polyps as well as pieces of skeleton without live tissue (Fig. 14). As growing colonies become heavier and produce more resistance to strong currents, they eventually detach from the substrate. Vertical walls were often inhabited by diverse faunal assemblages, mainly corals such as the armoured sea fan coral, *Acanthogorgia* sp., as well as *A. grandiflora*, *D. dianthus* (Fig. 15), *D. pertusum*, cf. *Javania cailleti*, Anthomastinae (Fig. 16), *Paramuricea* sp.1 (Fig. 17), *Keratoisis* sp. (Fig. 18) and sponges. The latter included a white round sponge, which was the second most common species accounting for 12% of all animals annotated, (Fig. 8), a flabellate white sponge, as well as white and grey encrusting sponges. Lastly, sea stars were common on vertical walls, particularly the red cushion sea star, *Porania pulvillus*, which may have been feeding on coral (Fig. 19) (Ericsson & Hansson, 1973).

P. arborea was also found along the shallower part of the dive (494-648 m depth) on larger boulders amidst soft sediment, often with seacorn coral *P. resedaeformis* and *A. grandiflora*, which were found at lower mean densities ($0.17 \pm 0.13 \text{ col}\cdot\text{m}^{-2}$ and $0.15 \pm 0.06 \text{ col}\cdot\text{m}^{-2}$ respectively, Table 4). Additionally, throughout the dive, anemones were often found on boulders, cobbles and pebbles. *Phelliactis* sp. was the most common anemone, found at a mean density of $0.23 \pm 0.13 \text{ ind}\cdot\text{m}^{-2}$, reaching its maximum of $0.58 \text{ ind}\cdot\text{m}^{-2}$ at 514 m depth (Table 4, Fig. 20).

At shallower depths (< 600 m), several species were found along wide areas of soft sediment. The foraminiferan, *Bathysiphon* sp.1, had a mean density of $2.48 \pm 3.28 \text{ ind}\cdot\text{m}^{-2}$ and a maximum density of $14.36 \text{ ind}\cdot\text{m}^{-2}$ at 439 m (Fig. 21). The carnivorous sponge, *A. pennatula*, was found only on two occasions at $0.98 \text{ col}\cdot\text{m}^{-2}$ at 617 m, and its maximum ($1.71 \text{ col}\cdot\text{m}^{-2}$) was found at 601 m (Table 4). The sea pen, *P. aculeata*, was found on soft sediment at the shallowest part of the dive (419-479 m) with a mean density of $1.13 \pm 1.10 \text{ col}\cdot\text{m}^{-2}$, reaching a maximum density of $3.74 \text{ col}\cdot\text{m}^{-2}$ (Table 4, Fig. 22).

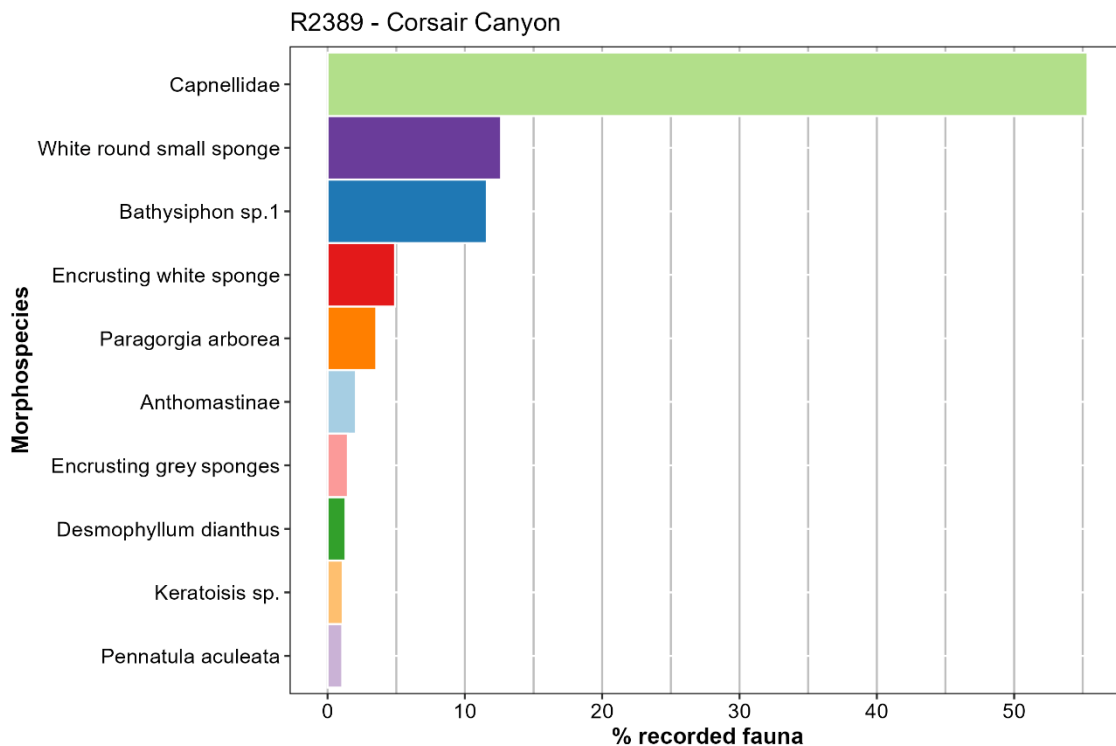


Figure 8. Bar chart with the main morphospecies for R2389 (representing 95% of all recorded fauna). Only morphospecies that contributed more than 1% of all annotations are included.

Table 4. Morphospecies found at dive R2389 in Corsair Canyon, with number of individuals or colonies counted, mean density $\pm$ standard deviation (SD), maximum density and depth range (minimum and maximum).

Morphospecies (R2389)	Individuals counted	Density (mean) [col, ind·m ⁻²]	Density (SD) [col, ind·m ⁻²]	Density (Max) [col, ind·m ⁻²]	Depth (Min) [m]	Depth (Max) [m]
<i>Foraminifera</i>						
<i>Bathysiphon</i> sp.1	739	2.48	3.28	14.36	418	794
Xenophyophore	3	0.28	0.23	0.45	802	803
<i>Porifera</i>						
<i>Asbestopluma</i> (A.) <i>pennatula</i>	11	1.35	0.51	1.71	601	617
Cup white sponge	2	0.15	NA	0.15	709	709
Encrusting grey sponge	94	0.43	0.25	0.82	798	897
Encrusting orange sponge	4	0.21	0.04	0.25	664	803
Encrusting white sponge	313	0.49	0.51	2.51	523	891
Encrusting yellow sponge	10	0.17	0.1	0.41	646	874
Flabellate white sponge	1	0.03	NA	0.03	897	897

Flabellate yellow sponge	22	0.2	0.15	0.75	576	787
White round small sponge	805	1.06	1.09	4.22	559	897
<i>Cnidaria</i>						
Anthomastinae	131	0.33	0.33	1.51	751	897
<i>Paragorgia arborea</i>	226	0.48	0.47	1.87	494	897
<i>Paragorgia</i> skeleton	37	0.28	0.25	0.84	438	897
<i>Anthothela grandiflora</i>	13	0.15	0.06	0.27	540	840
<i>Acanella arbuscula</i>	5	0.14	0.08	0.24	654	831
<i>Keratoisis</i> sp.	70	0.31	0.35	1.57	672	896
<i>Pennatula aculeata</i>	68	1.13	1.1	3.74	419	479
<i>Primnoa resedaeformis</i>	19	0.17	0.13	0.49	540	897
cf. <i>Telestula septentrionalis</i>	1	0.03	NA	0.03	897	897
Scleralcyonacea purple	12	0.15	0.16	0.48	819	890
<i>Acanthogorgia</i> sp.	4	0.08	0.04	0.13	807	840
<i>Paramuricea</i> sp.1	30	0.14	0.15	0.68	817	897
Capnellidae	3528	4.77	5.34	25.14	494	891

<i>Pachycerianthus borealis</i>	3	0.78	NA	0.78	471	471
Actiniidae sp.2	5	0.26	0.09	0.32	438	444
cf. <i>Actinoscyphia</i> sp.	3	0.06	0.006	0.06	841	843
Actinostolidae sp.1	7	0.12	0.12	0.34	804	897
<i>Phelliactis</i> sp.	26	0.23	0.13	0.58	438	803
Hormathiidae sp.3	7	0.12	0.06	0.22	799	860
Hormathiidae sp.5	3	0.14	0.03	0.17	516	802
Actiniaria sp.1	1	0.2	NA	0.2	776	776
<i>Desmophyllum dianthus</i>	83	0.26	0.25	0.85	709	897
<i>Desmophyllum pertusum</i>	1	0.13	NA	0.13	891	891
cf. <i>Javania cailleti</i>	14	0.12	0.11	0.42	804	843
<i>Epizoanthus</i> brown	4	0.2	0.02	0.22	605	762
<i>Epizoanthus</i> yellow	7	0.72	0.83	1.31	646	647
Yellow Zoanthid on <i>Paramuricea</i>	1	0.061	NA	0.06	819	819
Hydroids	3	0.17	NA	0.17	706	706
<i>Mollusca</i>						

<i>cf. Illex illecebrosus</i>	6	0.15	0.06	0.23	802	874
<i>Bathypolypus bairdii</i>	1	0.11	NA	0.11	479	479
<i>Arthropoda</i>						
<i>Cancer borealis</i>	1	0.26	NA	0.26	482	482
<i>Chaceon quinquedens</i>	26	0.17	0.08	0.41	438	880
<i>Chirona hameri</i>	2	0.33	0.23	0.49	641	648
<i>Echinodermata</i>						
<i>Henricia</i> sp. yellow	2	0.06	0.01	0.07	828	843
<i>Hippasteria phrygiana</i>	1	0.06	NA	0.06	880	880
<i>cf. Novodinia americana</i>	1	0.04	NA	0.04	840	840
<i>Porania (P.) pulvillus</i> red	15	0.13	0.05	0.22	631	897
<i>Strongylocentrotus pallidus</i>	3	0.08	0.04	0.14	817	823

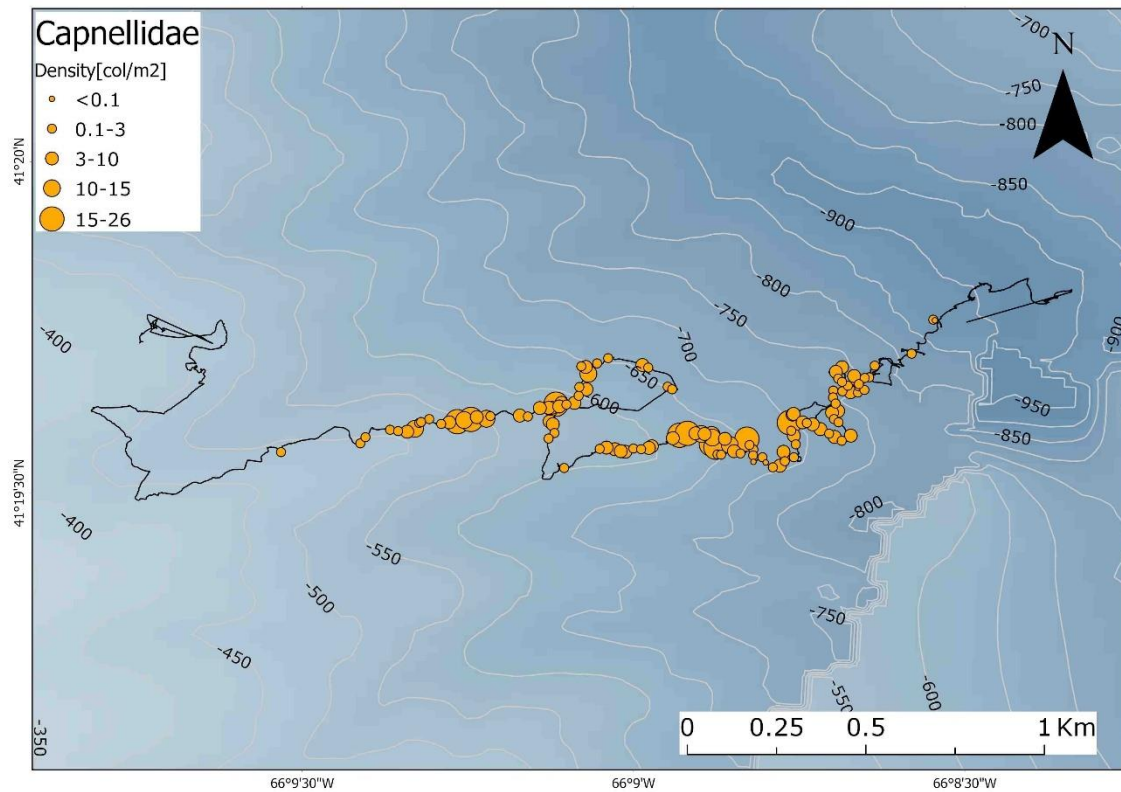


Figure 9. Density distribution of soft coral belonging to the family Capnellidae found along the track of dive R2389 in Corsair Canyon.

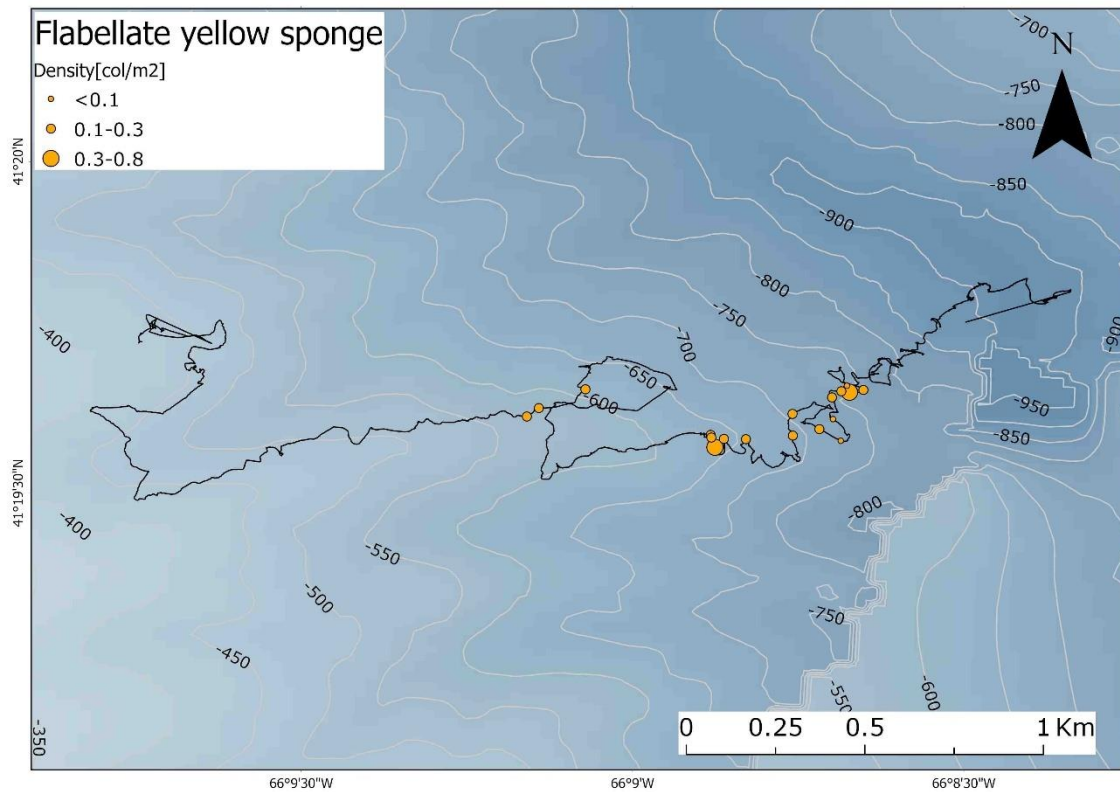


Figure 10. Density distribution of a flabellate yellow sponge found along the track of dive R2389 in Corsair Canyon.

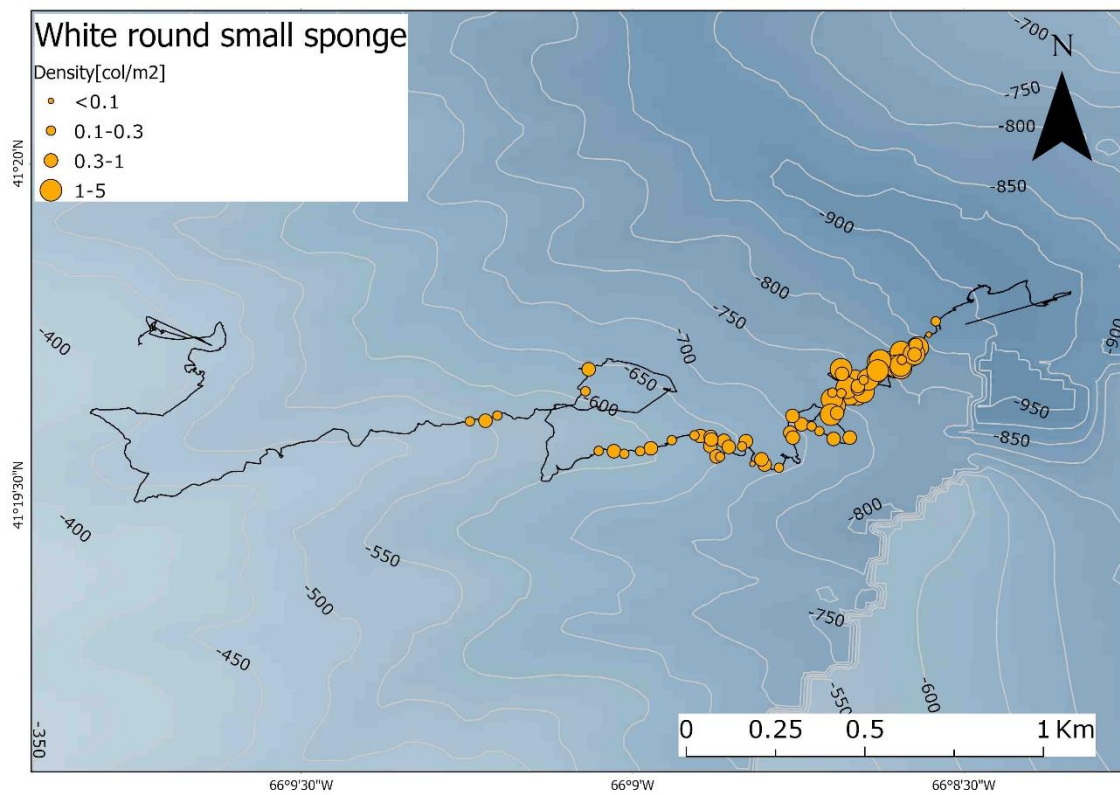


Figure 11. Density distribution of a white round small sponge found along the track of dive R2389 in Corsair Canyon.

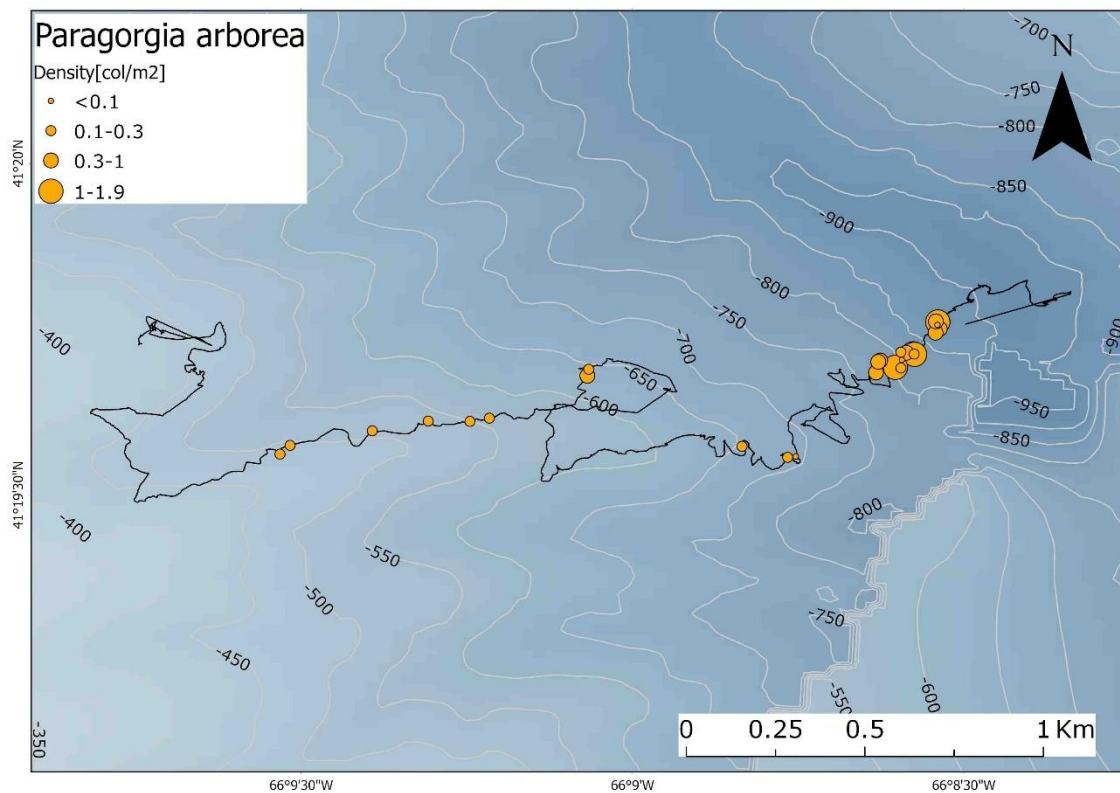


Figure 12. Density distribution of the bubblegum coral, *Paragorgia arborea*, found along the track of dive R2389 in Corsair Canyon.

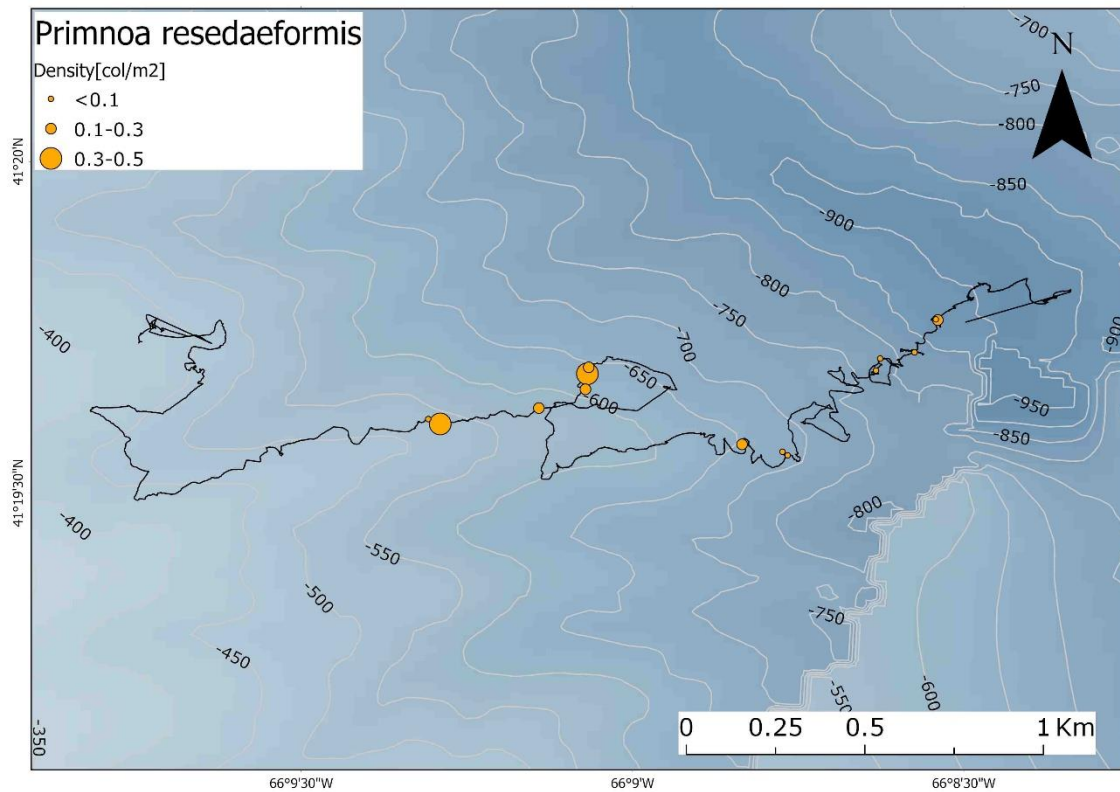


Figure 13. Density distribution of the seacorn coral, *Primnoa resedaeformis*, found along the track of dive R2389 in Corsair Canyon.

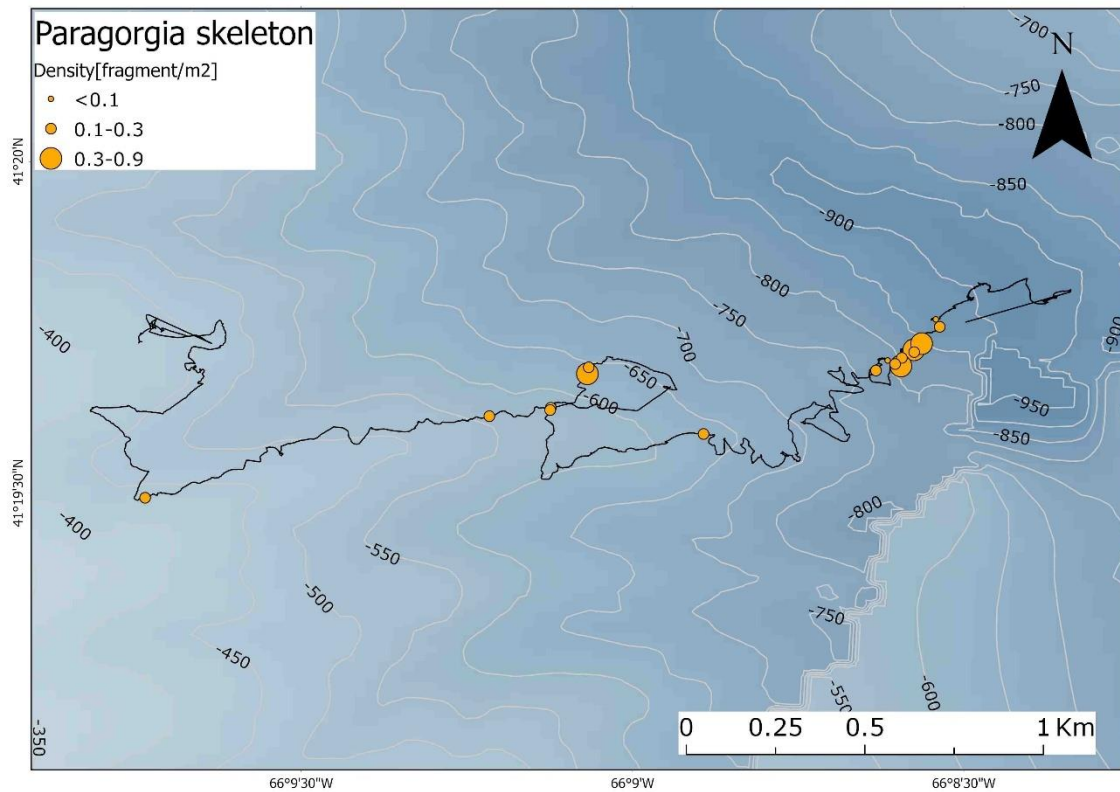


Figure 14. Density distribution of *Paragorgia* skeleton fragments found along the track of dive R2389 in Corsair Canyon.

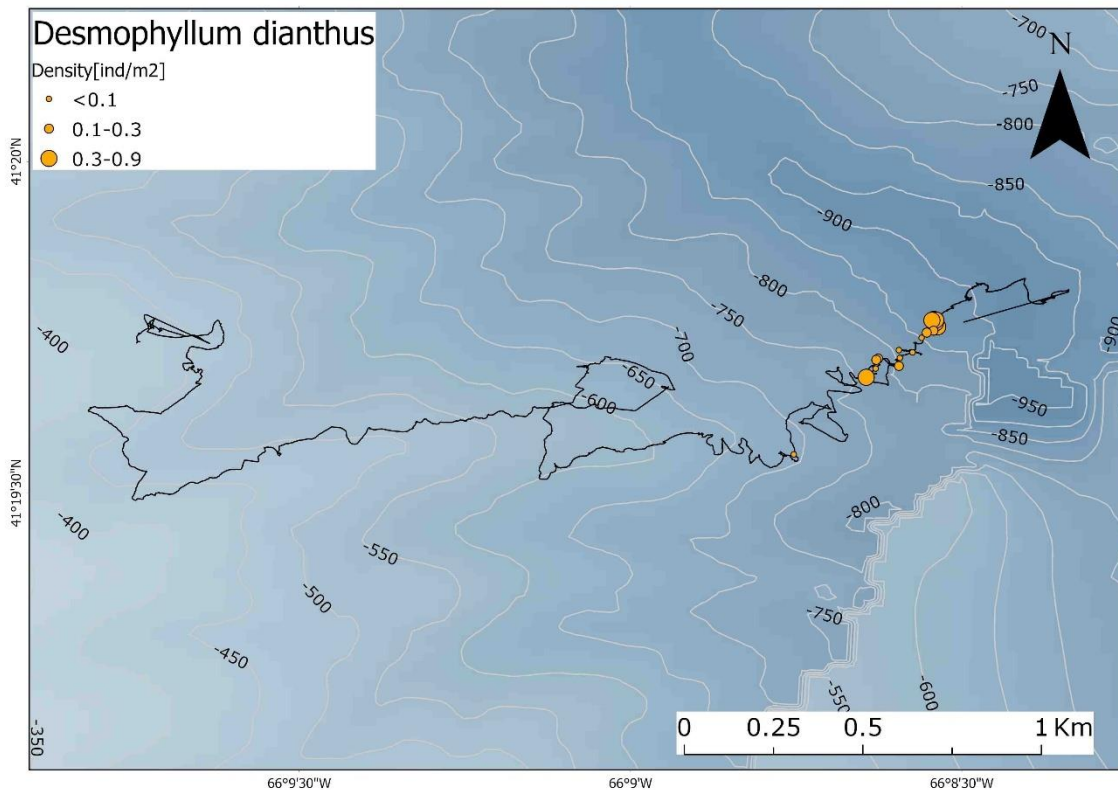


Figure 15. Density distribution of the cup coral, *Desmophyllum dianthus*, found along the track of dive R2389 in Corsair Canyon.

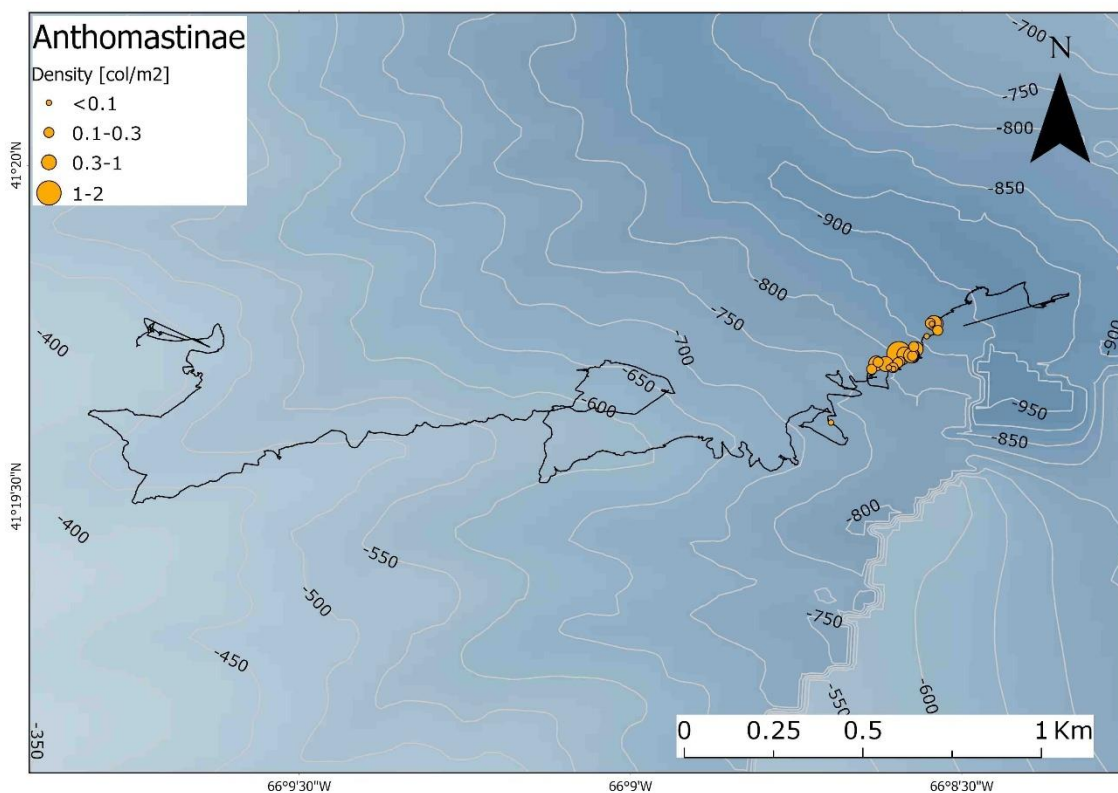


Figure 16. Density distribution of mushroom soft coral belonging to subfamily Anthomastinae found along the track of dive R2389 in Corsair Canyon.

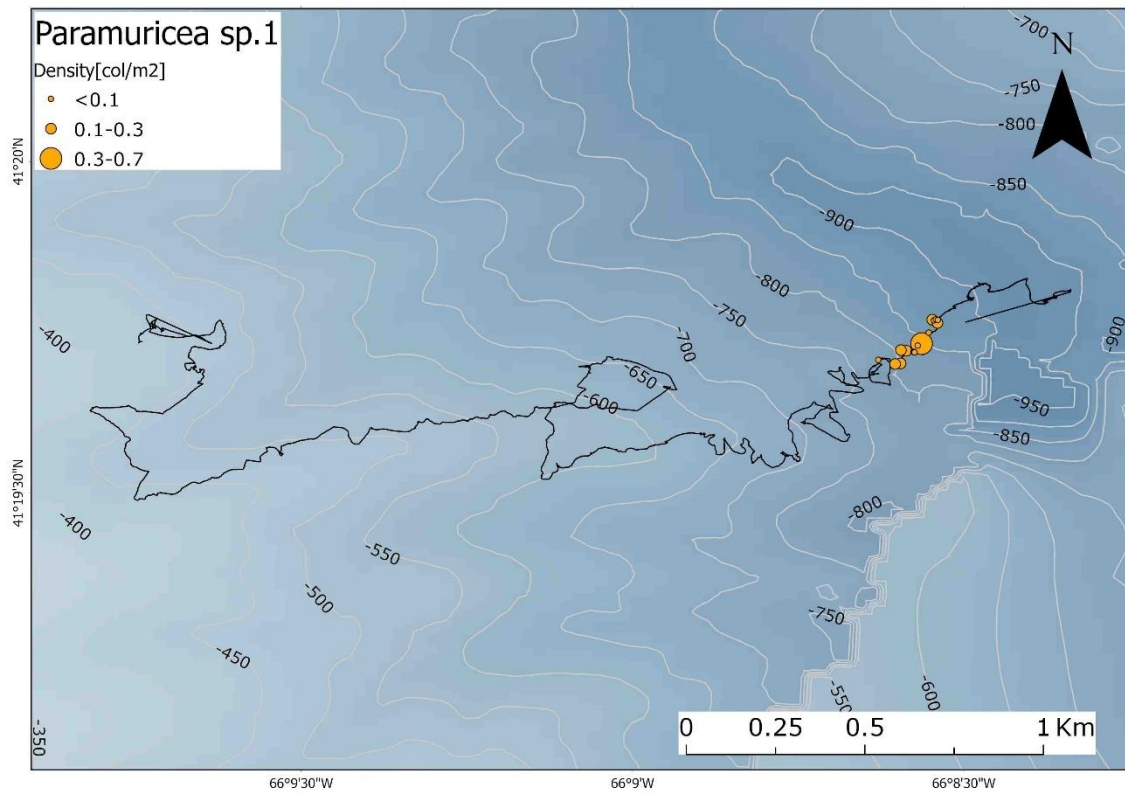


Figure 17. Density distribution of the large gorgonian, *Paramuricea* sp.1, found along the track of dive R2389 in Corsair Canyon.

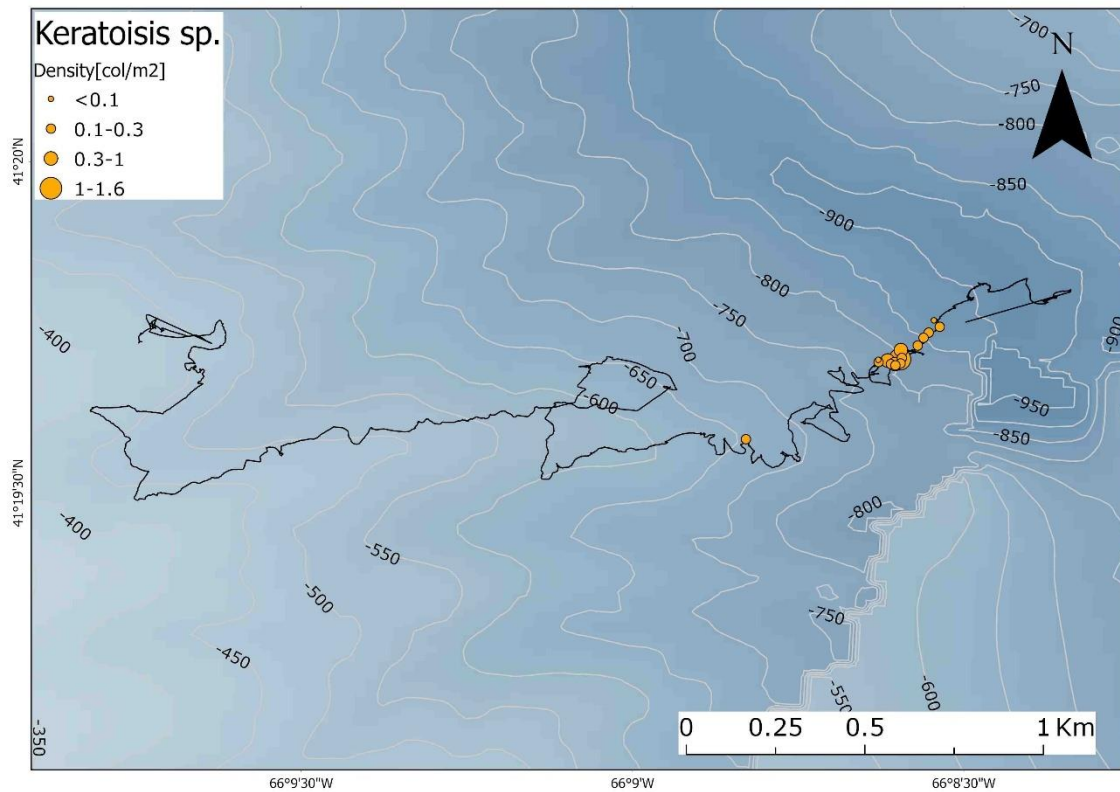


Figure 18. Density distribution of the bamboo coral, *Keratoisis* sp., found along the track of dive R2389 in Corsair Canyon.

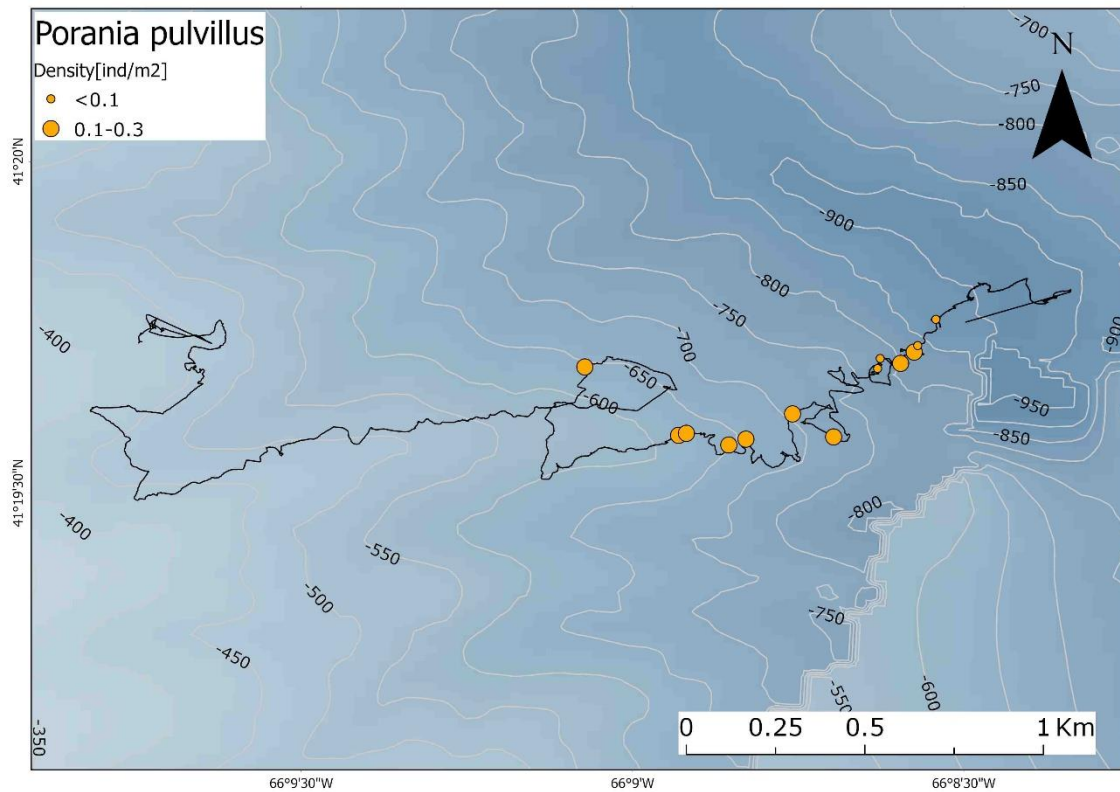


Figure 19. Density distribution of the red cushion sea star, *Porania pulvillus*, found along the track of dive R2389 in Corsair Canyon.

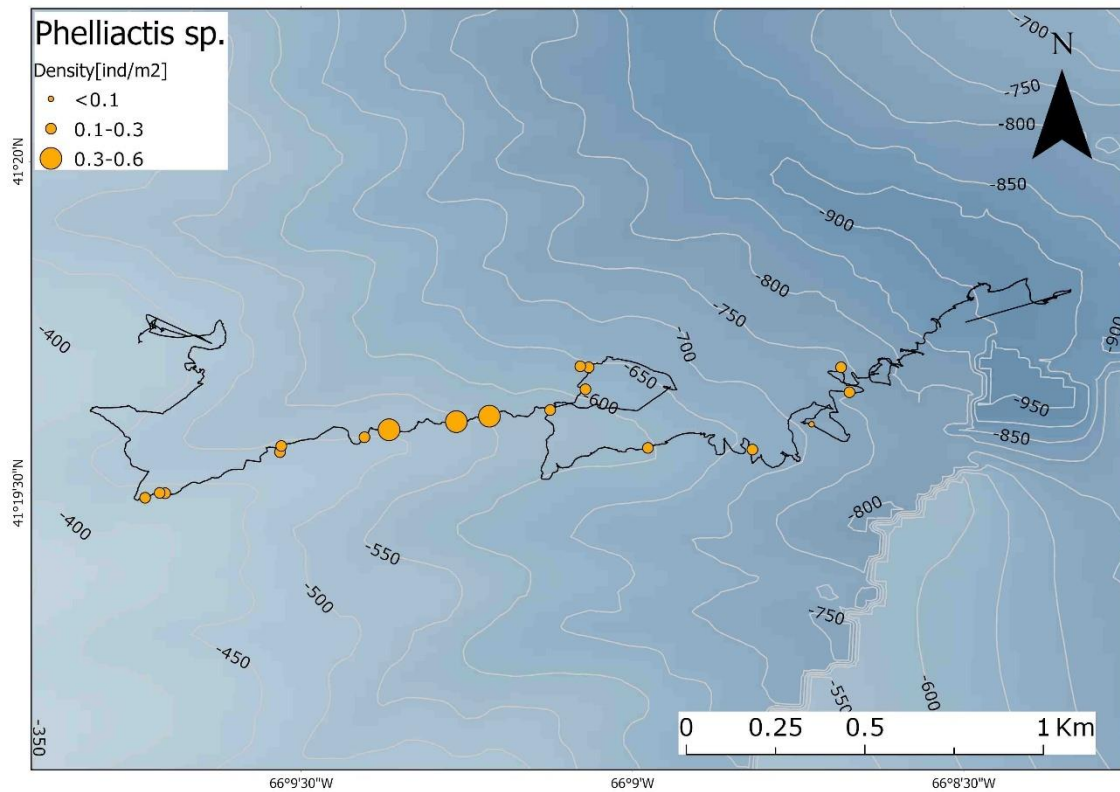


Figure 20. Density distribution of the anemone, *Phelliactis* sp., found along the track of dive R2389 in Corsair Canyon.

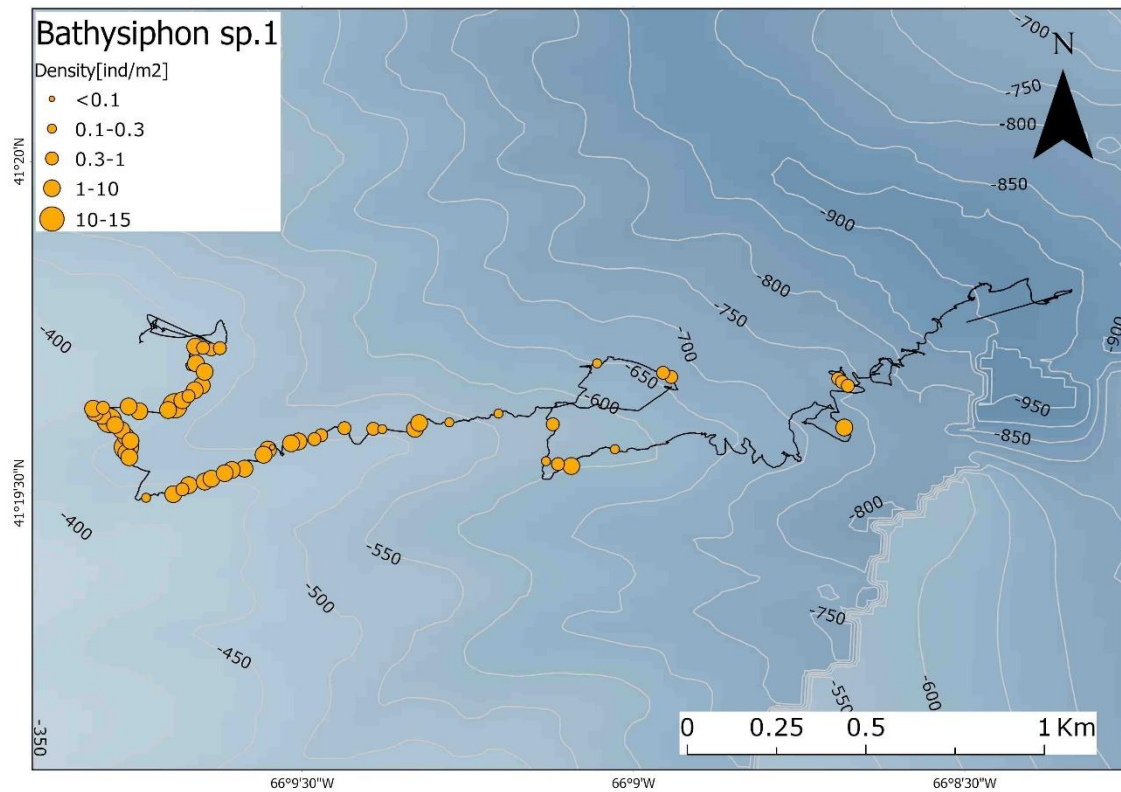


Figure 21. Density distribution of the foraminiferan, *Bathysiphon* sp.1, found along the track of dive R2389 in Corsair Canyon.

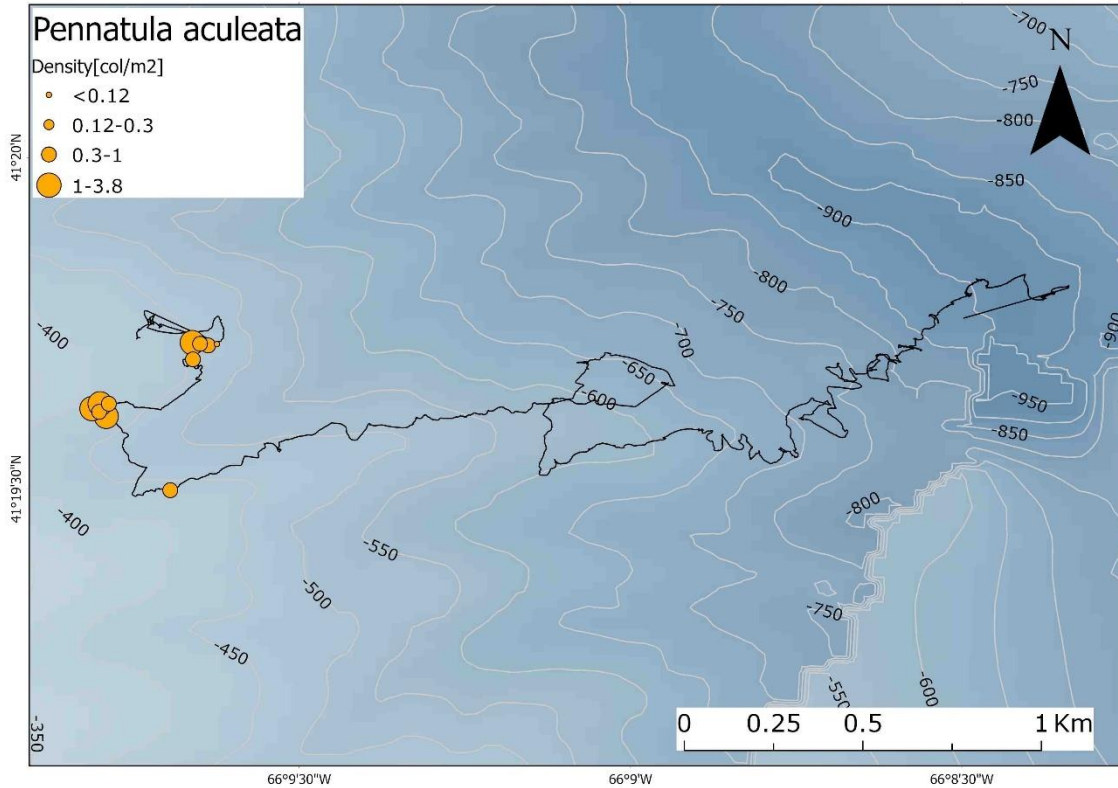


Figure 22. Density distribution of the sea pen, *Pennatula aculeata*, found along the track of dive R2389 in Corsair Canyon.

3.2.Northeast Channel

Two dives were conducted in the Northeast Channel Marine Refuge, on 24 (R2391) and 25 July 2024 (R2392). Dive R2392 started within the marine refuge and ended 1.3 km east of the boundary, while R2391 was entirely done within the marine refuge.

R2391 started at 431 m depth, following a south trajectory and ending at 859 m depth, lasting 11 h and 42 min and covering 12,850 m in linear distance. Out of 90 images that were used for the megafaunal analysis, 44 contained recognizable fauna, for a total of 543 m² of analysed seabed, and 723 animals belonging to 22 morphospecies (Fig. 23).

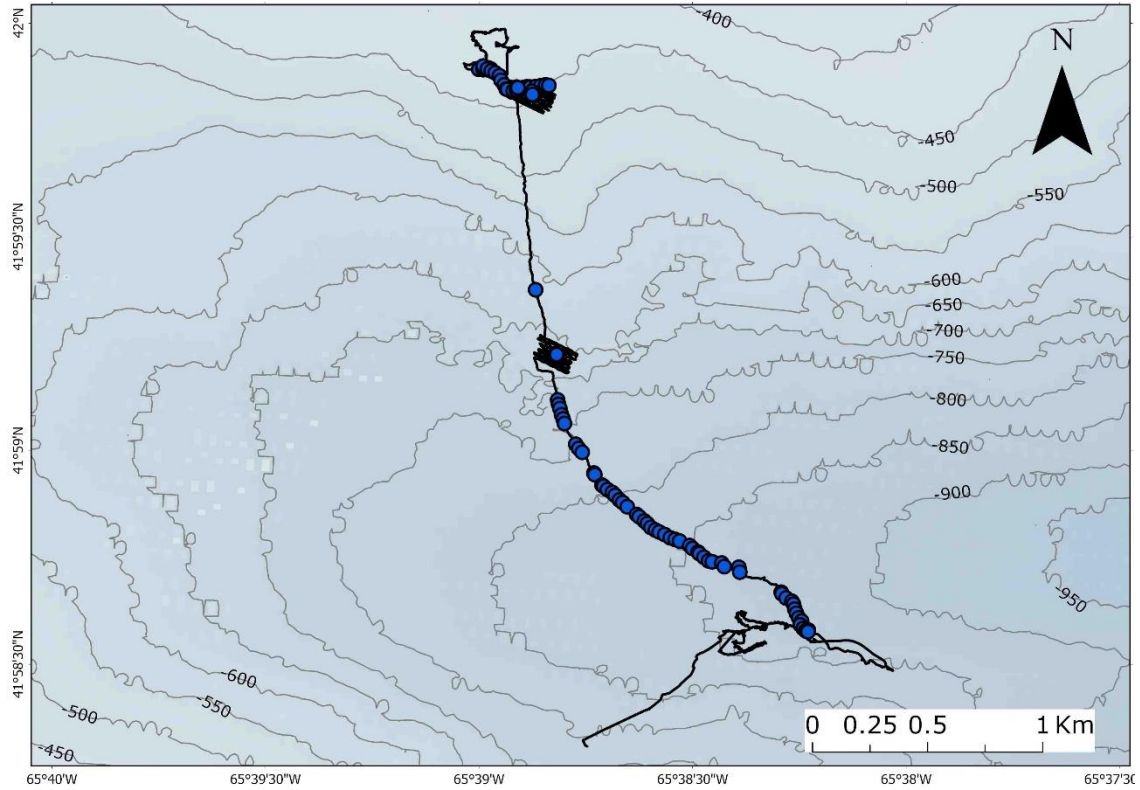


Figure 23. ROV transect (line) and positions of analysed images (blue points) for dive R2391 in Northeast Channel.

The second dive (2392) in this area started at 479 m depth and continued eastwards until the end of the dive at 771 m depth. This dive covered 11,214 m of linear distance in 10 h 55 min. Megafaunal analysis was based on 182 images, resulting in 122 images with recognizable fauna, for a total of 1925 m² analyzed seabed, and 5866 animals belonging to 31 morphospecies (Fig. 24).

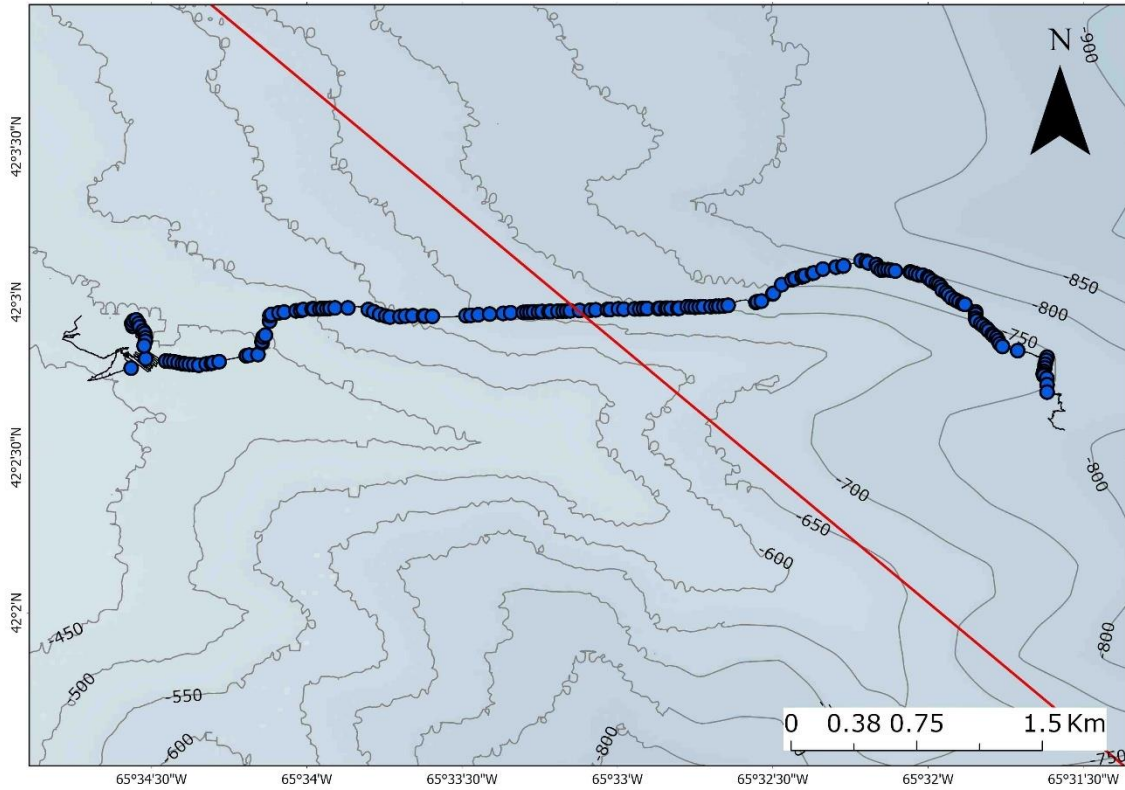


Figure 24. ROV transect (line) and positions of analysed images (blue points) for dive R2392 at the Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

3.2.1. Water column profile

Based on two CTD casts done in the Northeast Channel, maxima in salinity and temperature occurred between 150 and 250 m depth, below which salinity remained stable, and temperature slowly decreased (Fig. 25). The oxygen minimum zone was found between 150 and 350 m depth, and oxygen concentration reached its maximum below 550 m (Fig. 25).

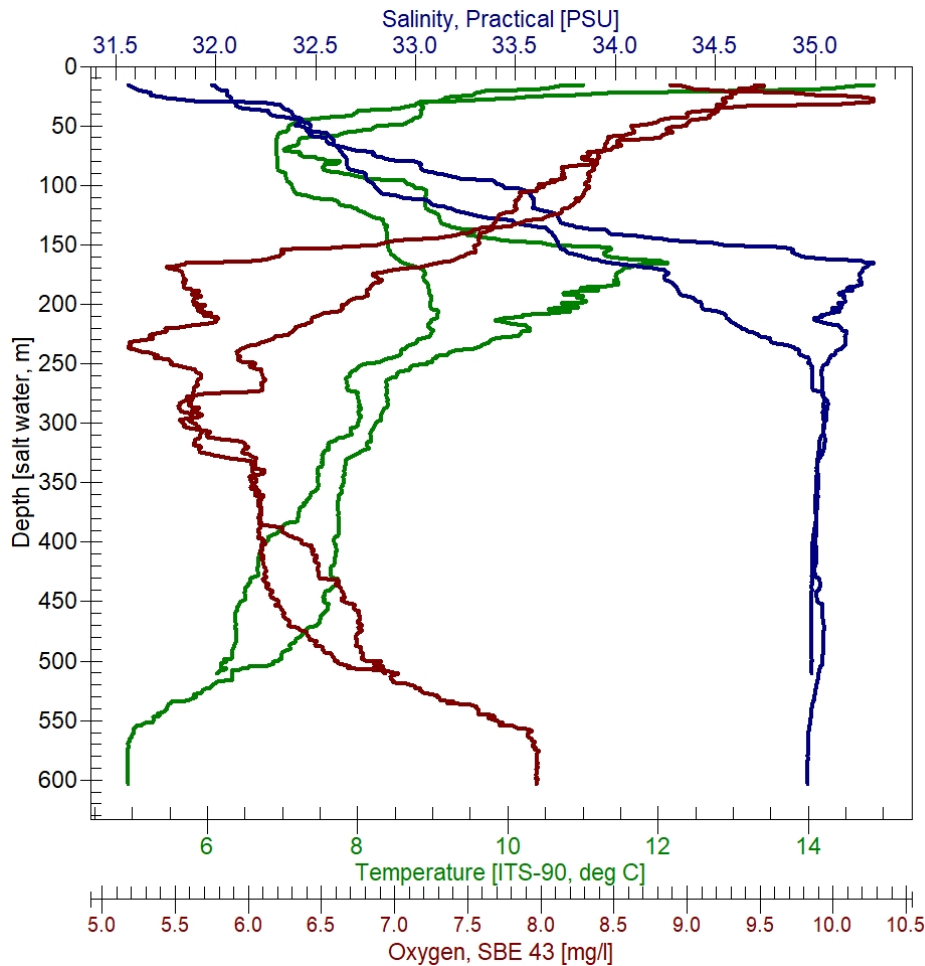


Figure 25. Temperature (green line), salinity (blue line) and oxygen (red line) depth profiles from the CTD casts in Northeast Channel.

3.2.2. Description of the dive R2391

The dive began in an area characterized by scattered boulders, cobbles and pebbles, which were usually inhabited by different anemones (*Actiniidae* sp.2, *Actinostolidae* sp.1, *Hormathiidae* sp.3 and *Phelliactis* sp., Fig. 26A). Boulders hosted mostly corals (*P. arborea*, *P. resedaeformis*) and sponges (*Vazella pourtalesii* (Russian hat sponge), encrusting white and grey sponges and small white round sponges) (Fig. 26B). Thirteen colonies of the seacorn coral, *P. resedaeformis*, were colonized by a yellow zoanthid (Fig. 26B). The seabed was covered with a dense population of the brittle star, *Ophiacantha abyssicola*, that was present up to 750 m depth (Fig. 26A, B). As the dive progressed to deeper areas (down the canyon flank), the seascape changed to more sloping areas of exposed bedrock and larger boulders, which hosted more colonies of *P. arborea* and *P. resedaeformis*. Towards the end of the dive

(> 700 m depth), the substrate changed to unconsolidated soft sediment, mainly sand, and shell pieces, where the sea pen, *Balticina finmarchica*, was sparsely found (Fig. 26C). Occasional large boulders (drop stones) were colonized by large gorgonians (*P. arborea* and *P. resedaeformis*). In the deepest part of the dive in the canyon axis, sand ripples were common, suggesting high current speeds with no visible fauna (Fig. 26D).

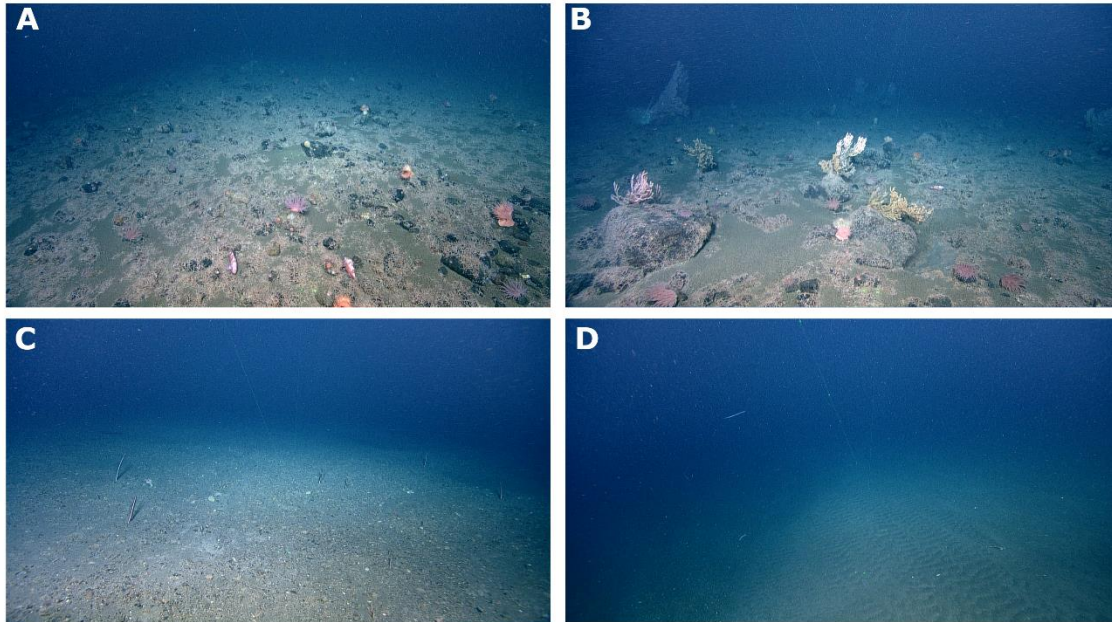


Figure 26. Video frames from the dive R2391 showing: (A) Four morphospecies of anemones growing on cobbles and pebbles and the seabed covered in brittle star *Ophiacantha abyssicola*; (B) Several colonies of seacorn coral, *Primnoa resedaeformis*, some partially or completely covered in a yellow zoanthid, as well as a large colony of bubblegum coral, *Paragorgia arborea*, in the background; (C) Soft sediment with several colonies of sea pen, *Balticina finmarchica*; (D) Sand ripples at the canyon axis.

3.2.3. Megafaunal analysis of dive R2391

Anemones were the most common faunal group found on this dive, accounting for 51% of all annotations and belonging to 4 morphospecies (Fig. 27). The most common anemone species was Hormathiidae sp.3 which accounted for 31% of all annotations (Fig. 27). It was found on cobbles and pebbles, as well as on boulders that hosted larger morphospecies such as corals, and mainly found at shallower depths (432-455 m depth) with mean density $1.15 \pm 1.03 \text{ ind} \cdot \text{m}^{-2}$ and maximum density ($3.73 \text{ ind} \cdot \text{m}^{-2}$) at 434 m (Table 5, Fig. 28). Larger

anemones (Actiniidae sp.2, Actinostolidae sp.1, and *Phelliactis* sp.) were mostly found at shallower depths (434-455 m) on cobbles and boulders with mean densities 0.34 ± 0.29 (Fig. 29), 0.12 ± 0.04 (Fig. 30), $0.19 \pm 0.09 \text{ ind}\cdot\text{m}^{-2}$ (Fig. 31), respectively (Table 5). Only Actinostolidae sp. 1 was found deeper, at 748-826 m.

Apart from anemones, larger cobbles and boulders also harboured sponges and corals. The most common coral was *P. arborea* (Fig. 27) with a maximum density ($0.76 \text{ col}\cdot\text{m}^{-2}$) found on bedrock at 668 m. It was also present on boulders amidst soft sediment at 810-826 m where densities were $0.1\text{-}0.6 \text{ col}\cdot\text{m}^{-2}$ (Table 5, Fig. 32). Fragments of *Paragorgia* skeleton were occasionally found (Fig. 33). *P. resedaeformis* was found in similar conditions as *P. arborea*, but also at shallower depths (435-455 m) with mean density of $0.17 \pm 0.1 \text{ col}\cdot\text{m}^{-2}$ (Table 5, Fig. 34). A yellow zoanthid was often found covering parts of or entire colonies of *P. resedaeformis*, particularly in the shallower areas.

At depths > 730 m, closer to the canyon axis, soft sediment was more dominant and *B. finmarchica* (Fig. 35) was found at a mean density $0.19 \pm 0.27 \text{ col}\cdot\text{m}^{-2}$ reaching a maximum density of $1.06 \text{ col}\cdot\text{m}^{-2}$ at 787 m (Table 5). Additionally, *Keratoisis* sp. was found on sparse cobbles, reaching $0.46 \text{ col}\cdot\text{m}^{-2}$ at 748 m (Table 5).

Sponges were represented by encrusting white sponge and small round white sponge (Fig. 36), mainly found on cobbles and pebbles at shallower depths (435-455 m). The two morphospecies reached mean densities of $0.86 \pm 1.64 \text{ col}\cdot\text{m}^{-2}$ and $0.42 \pm 0.35 \text{ col}\cdot\text{m}^{-2}$, respectively (Table 5). Larger sponges were found on larger cobbles, boulders and bedrock, represented by the Russian hat sponge *V. pourtalesii* and a white sponge belonging to suborder Astrophorina, some of which were overgrown by an encrusting *Hexadella* sponge. The maximum densities of these three morphospecies were $0.22 \text{ col}\cdot\text{m}^{-2}$ (435 m, Fig. 37), $0.11 \text{ col}\cdot\text{m}^{-2}$ (755 m, Fig. 38) and $0.4 \text{ col}\cdot\text{m}^{-2}$ (748 m, Fig. 39), respectively (Table 5).

The brittle star *O. abyssicola* was present in very dense aggregations, often referred to as mats, completely covering the visible seabed. It was consistently found from the beginning of the dive until 750 m, when soft sediment became the dominant substrate type.

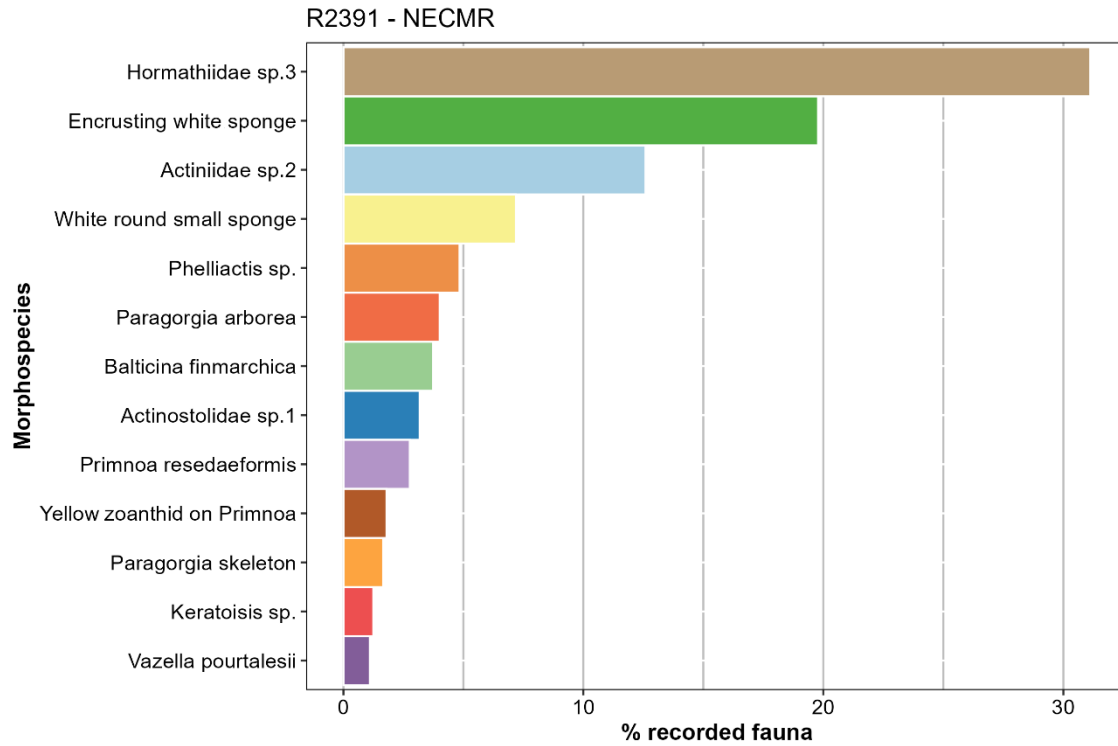


Figure 27. Bar chart with the main morphospecies for R2391 (representing 95% of all recorded fauna). Only morphospecies that contributed more than 1% of all annotations are included.

Table 5. Morphospecies found at dive R2391 in Northeast Channel, with number of individuals or colonies counted, mean density $\pm$ standard deviation (SD), maximum density and depth range (minimum and maximum).

Morphospecies (R2391)	Individuals counted	Density (mean) [col,ind·m ⁻²]	Density (SD) [col,ind·m ⁻²]	Density (Max) [col,ind·m ⁻²]	Depth (Min) [m]	Depth (Max) [m]
<i>Porifera</i>						
Astrophorina white	5	0.07	0.02	0.11	434	755
Astrophorina white with <i>Hexadella</i>	7	0.4	NA	0.4	748	748
Encrusting grey sponge	5	0.09	0.03	0.14	446	821
Encrusting white sponge	143	0.86	1.64	5.67	434	821
<i>Vazella pourtalesii</i>	8	0.13	0.05	0.22	435	821
White round small sponge	52	0.42	0.35	1.3	432	810
<i>Cnidaria</i>						
Anthomastinae	6	0.34	NA	0.34	748	748
<i>Balticina finmarchica</i>	27	0.19	0.27	1.06	748	833
<i>Paragorgia arborea</i>	29	0.48	0.28	0.76	668	826
<i>Paragorgia</i> skeleton	12	0.1	0.06	0.23	442	856
<i>Keratoisis</i> sp.	9	0.27	0.27	0.46	748	773

<i>Primnoa resedaeformis</i>	20	0.17	0.1	0.35	435	821
<i>Paramuricea</i> sp.2	2	0.06	0.001	0.06	443	770
Capnellidae	7	0.11	0.03	0.15	443	453
Actiniidae sp.2	91	0.34	0.29	1.11	432	455
Actinostolidae sp.1	23	0.12	0.04	0.21	432	826
<i>Phelliactis</i> sp.	35	0.19	0.09	0.33	432	455
Hormathiidae sp.3	225	1.15	1.03	3.73	432	748
Yellow Zoanthid on <i>Primnoa</i>	13	0.14	0.13	0.44	435	748
<i>Echinodermata</i>						
<i>Porania (P.) pulvillus</i> red	2	0.09	0.05	0.13	447	805
<i>Strongylocentrotus</i> <i>pallidus</i>	1	0.05	NA	0.05	748	748
<i>Poraniomorpha (P.)</i> <i>hispida</i>	1	0.1	NA	0.1	748	748

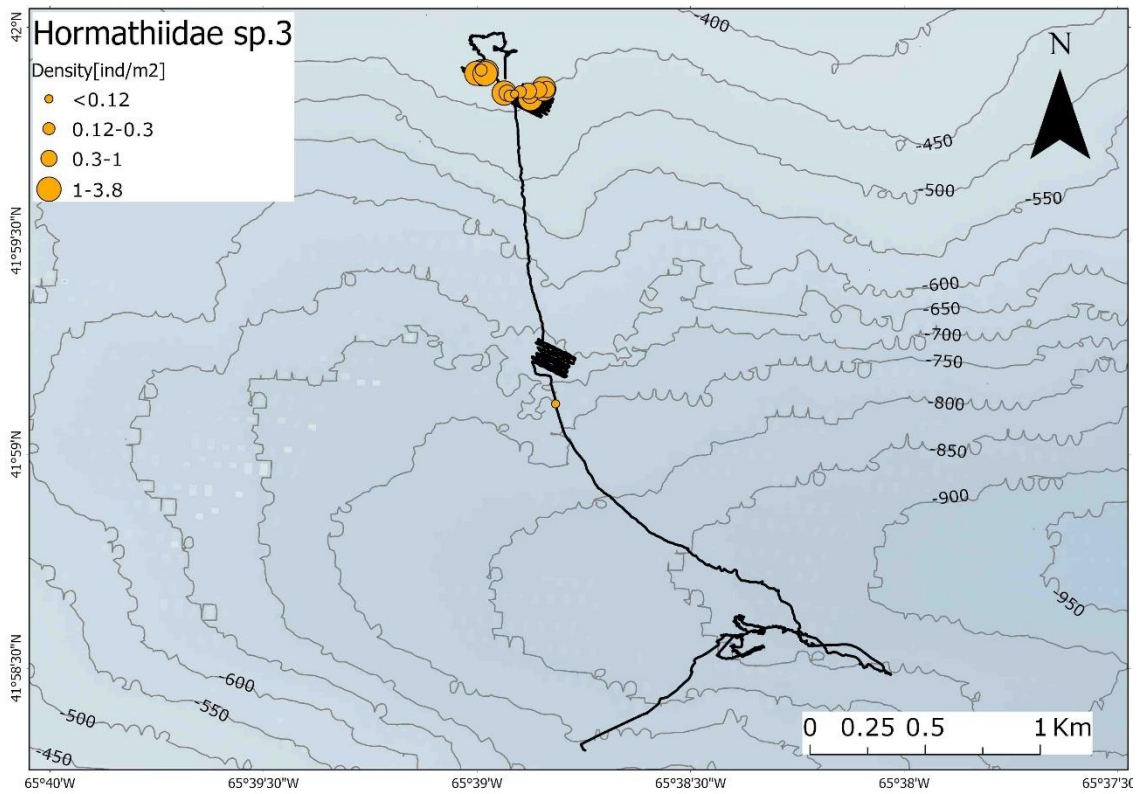


Figure 28. Density distribution of the anemone, *Hormathiidae* sp.3, found along the track of dive R2391 in Northeast Channel.

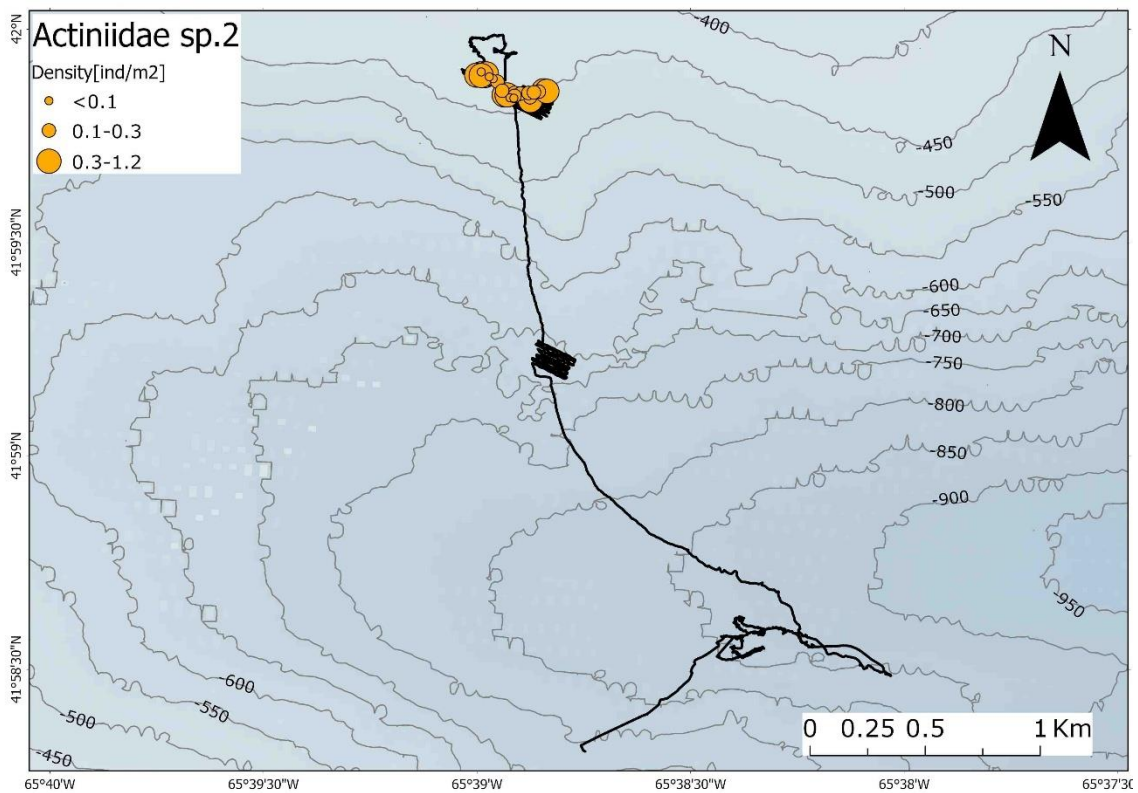


Figure 29. Density distribution of the anemone, Actiniidae sp.2, found along the track of dive R2391 in Northeast Channel.

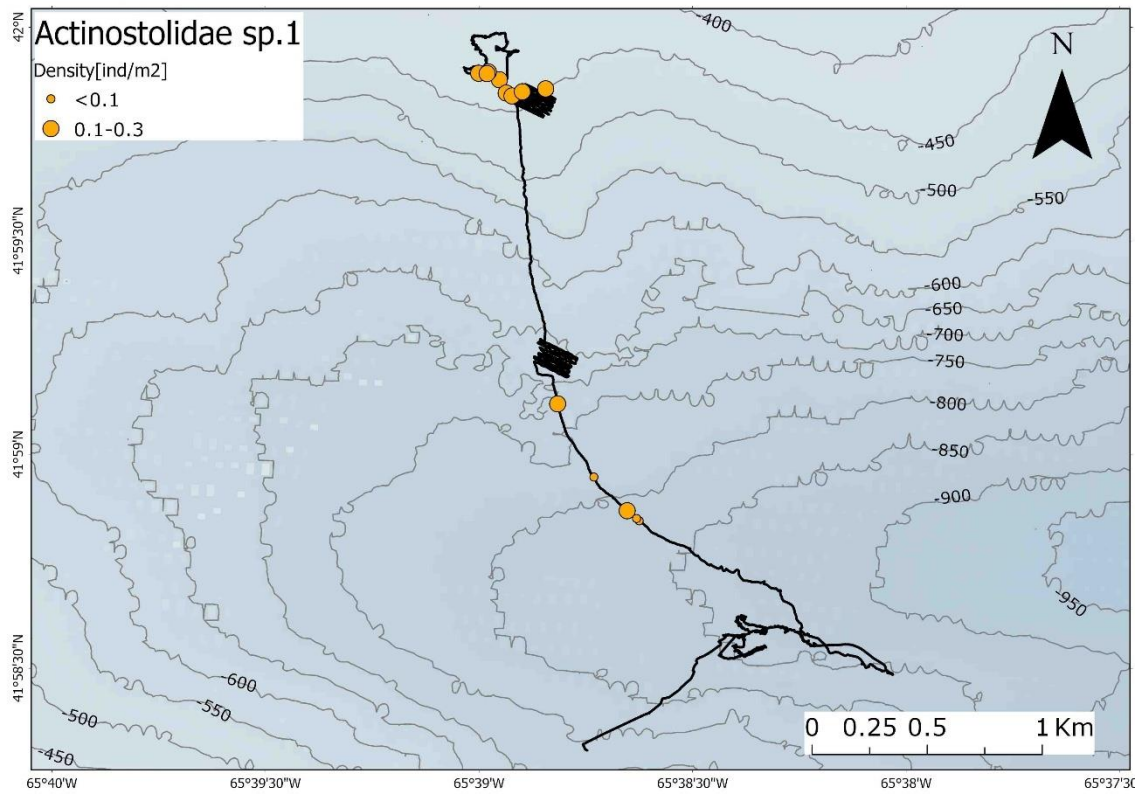


Figure 30. Density distribution of the anemone, Actinostolidae sp.1, found along the track of dive R2391 in Northeast Channel.

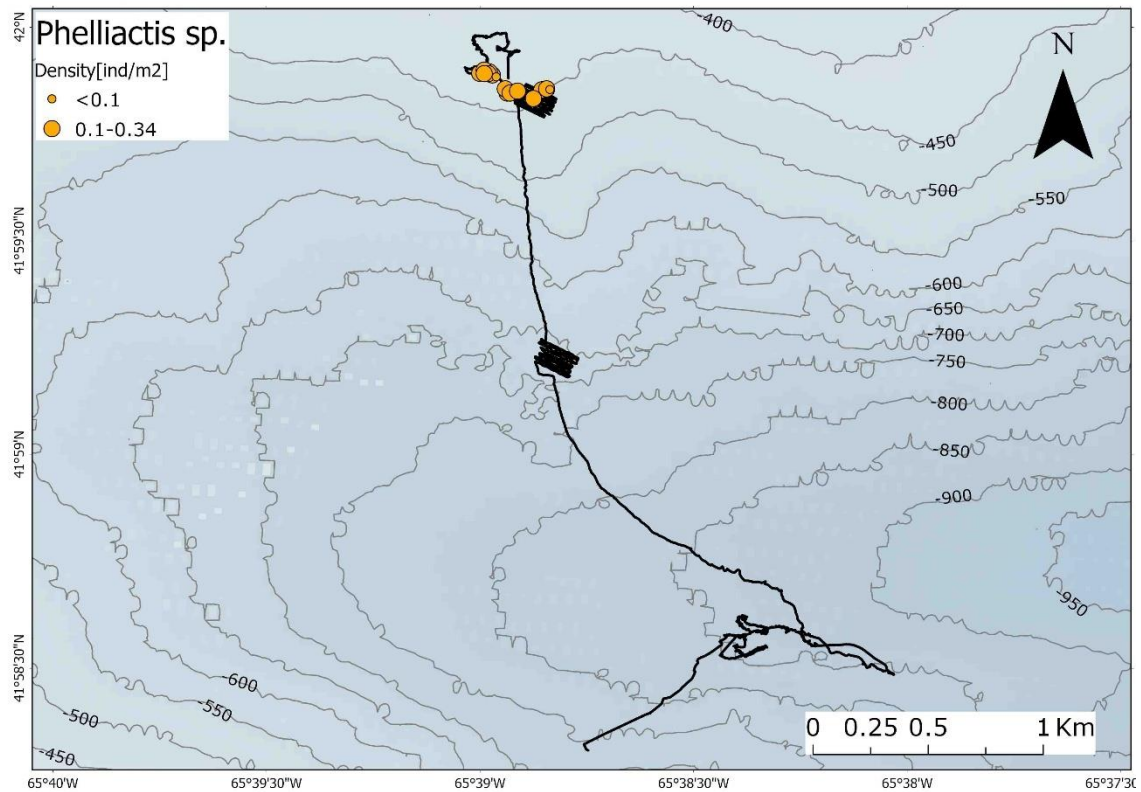


Figure 31. Density distribution of the anemone, *Phelliactis* sp., found along the track of dive R2391 in Northeast Channel.

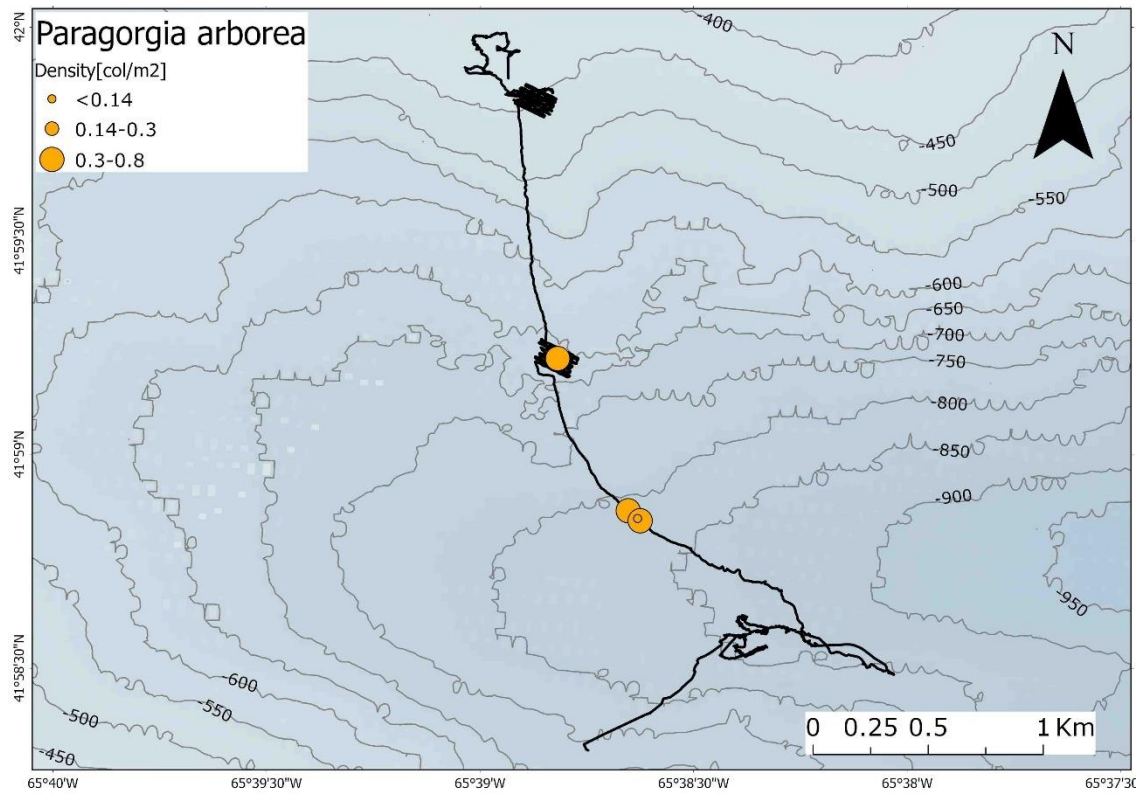


Figure 32. Density distribution of *Paragorgia arborea* found along the track of dive R2391 in Northeast Channel.

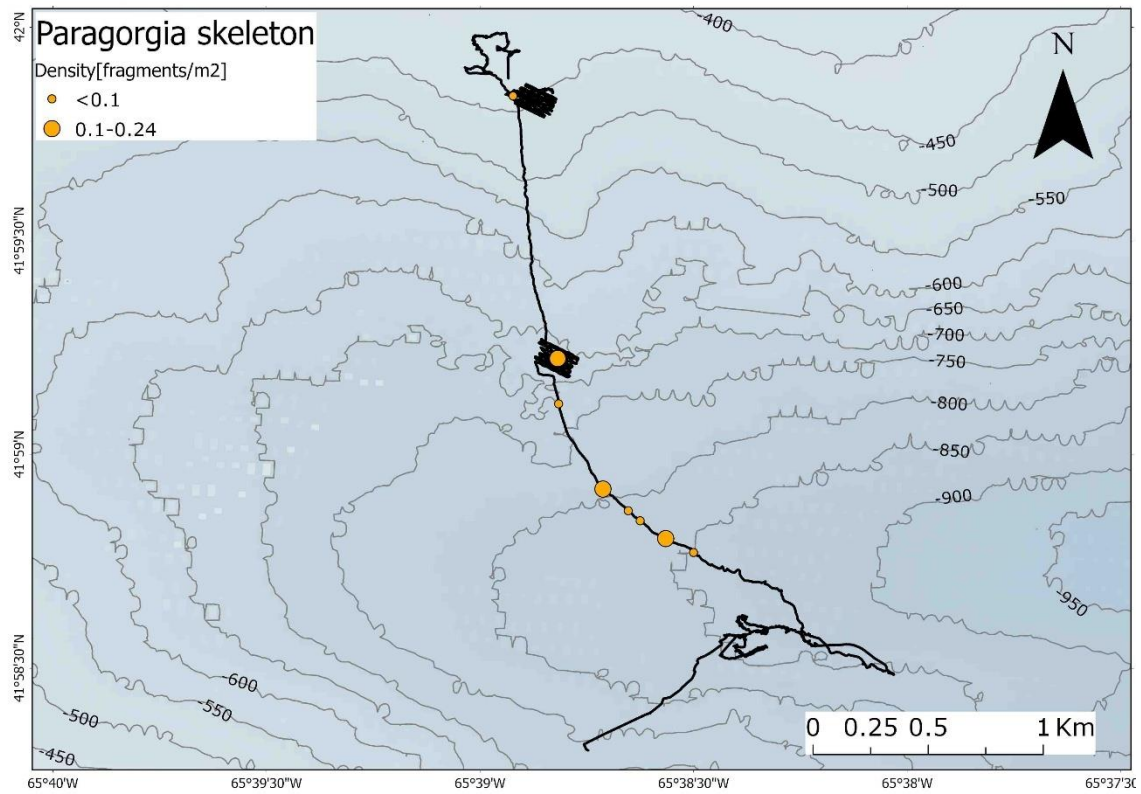


Figure 33. Density distribution of *Paragorgia* skeleton fragments found along the track of dive R2391 in Northeast Channel.

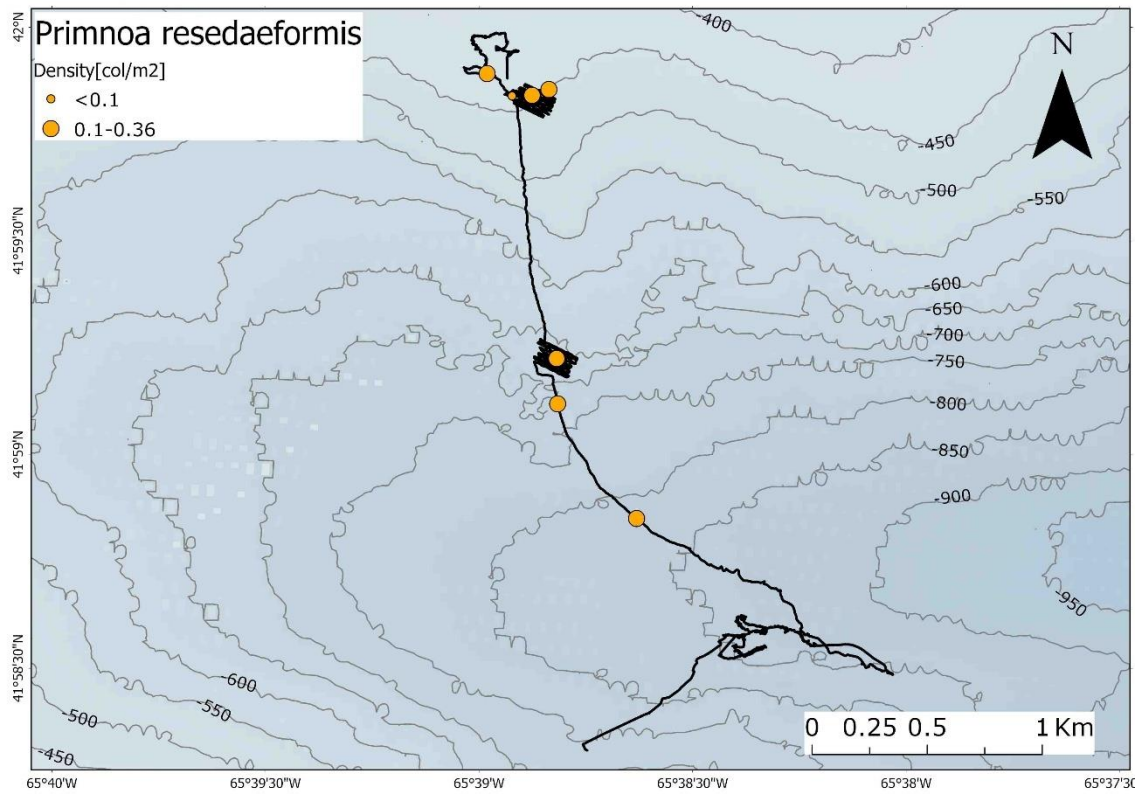


Figure 34. Density distribution of *Primnoa resedaeformis* found along the track of dive R2391 in Northeast Channel.

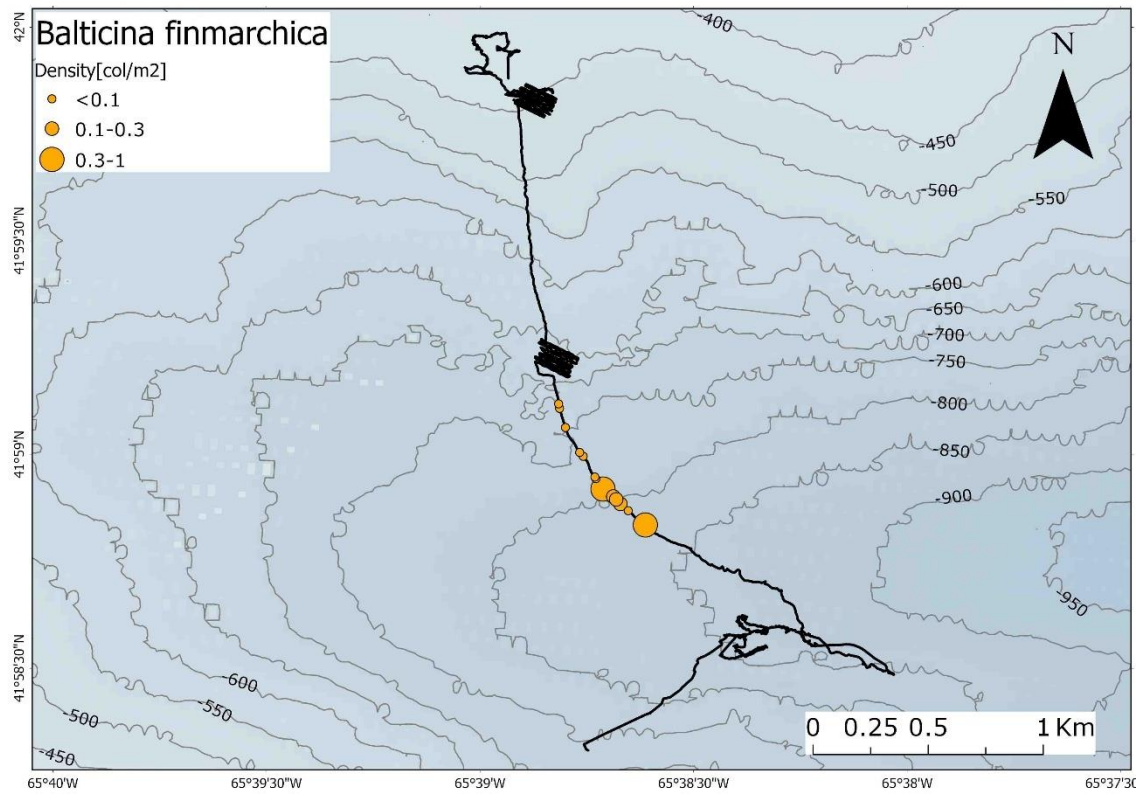


Figure 35. Density distribution of *Balticina finmarchica* found along the track of dive R2391 in Northeast Channel.

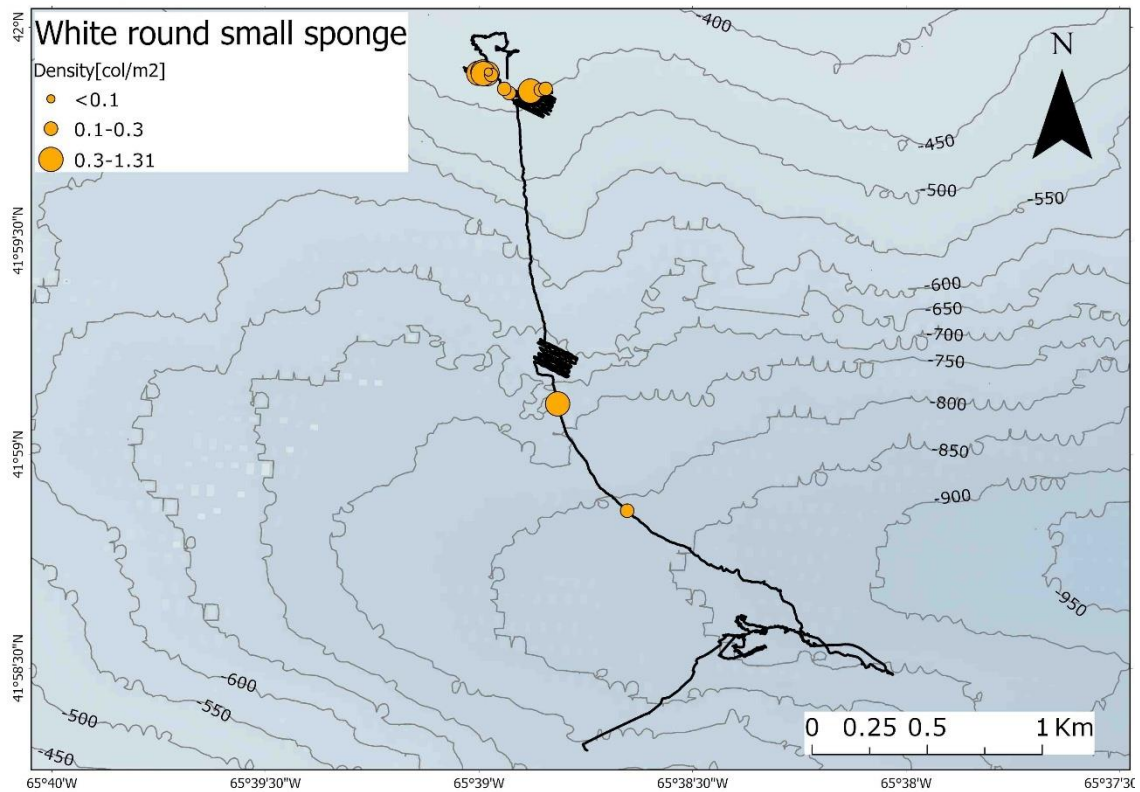


Figure 36. Density distribution of a white round small sponge found along the track of dive R2391 in Northeast Channel.

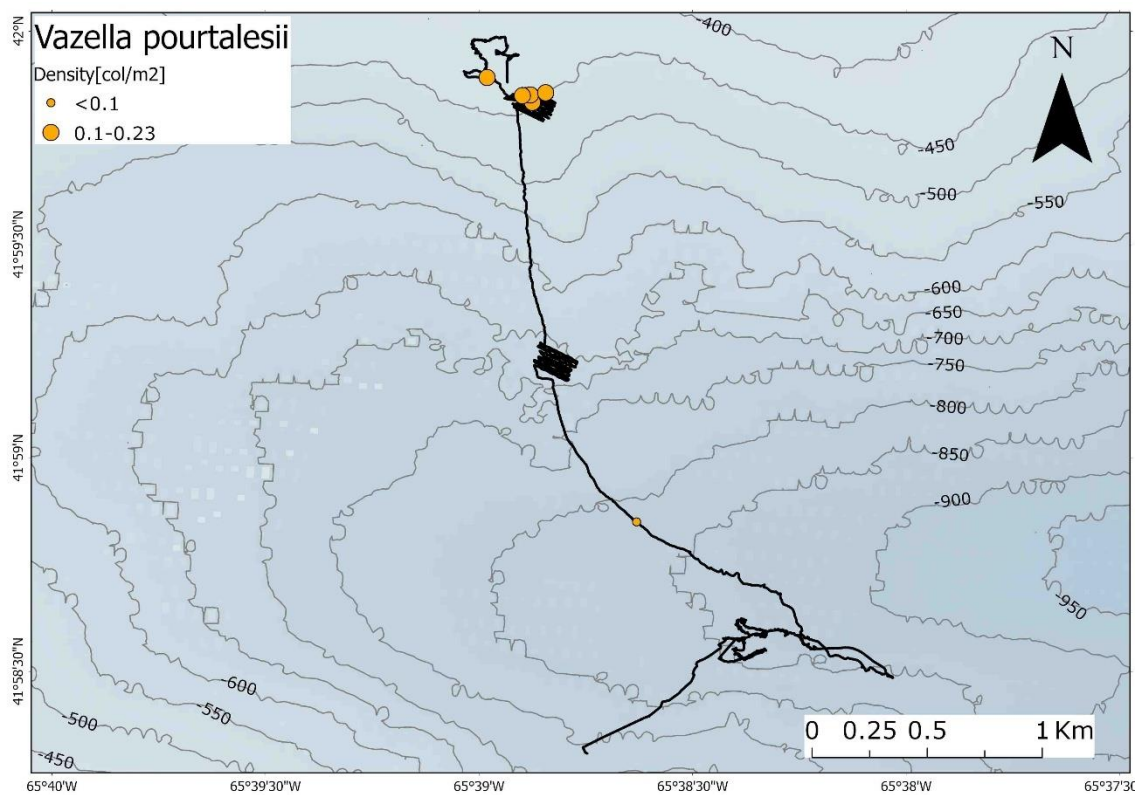


Figure 37. Density distribution of the Russian hat sponge, *Vazella pourtalesii*, found along the track of dive R2391 in Northeast Channel.

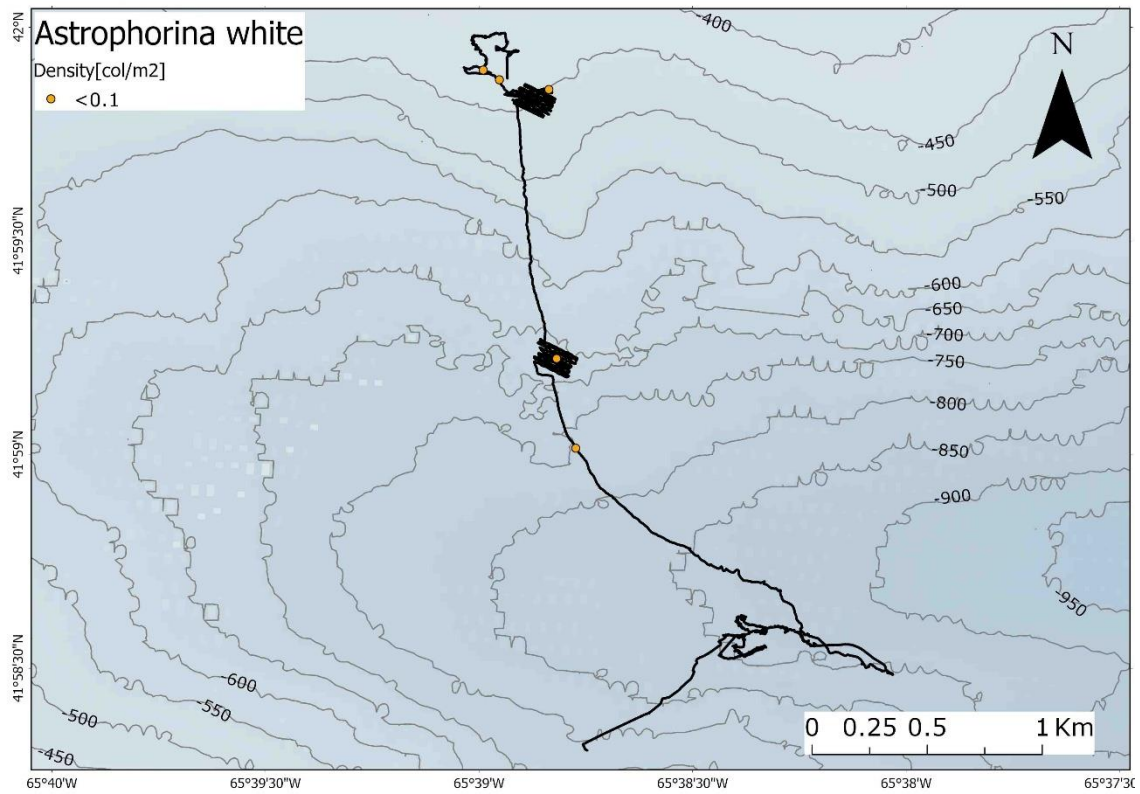


Figure 38. Density distribution of a white *Astrophorina* sponge found along the track of dive R2391 in Northeast Channel.

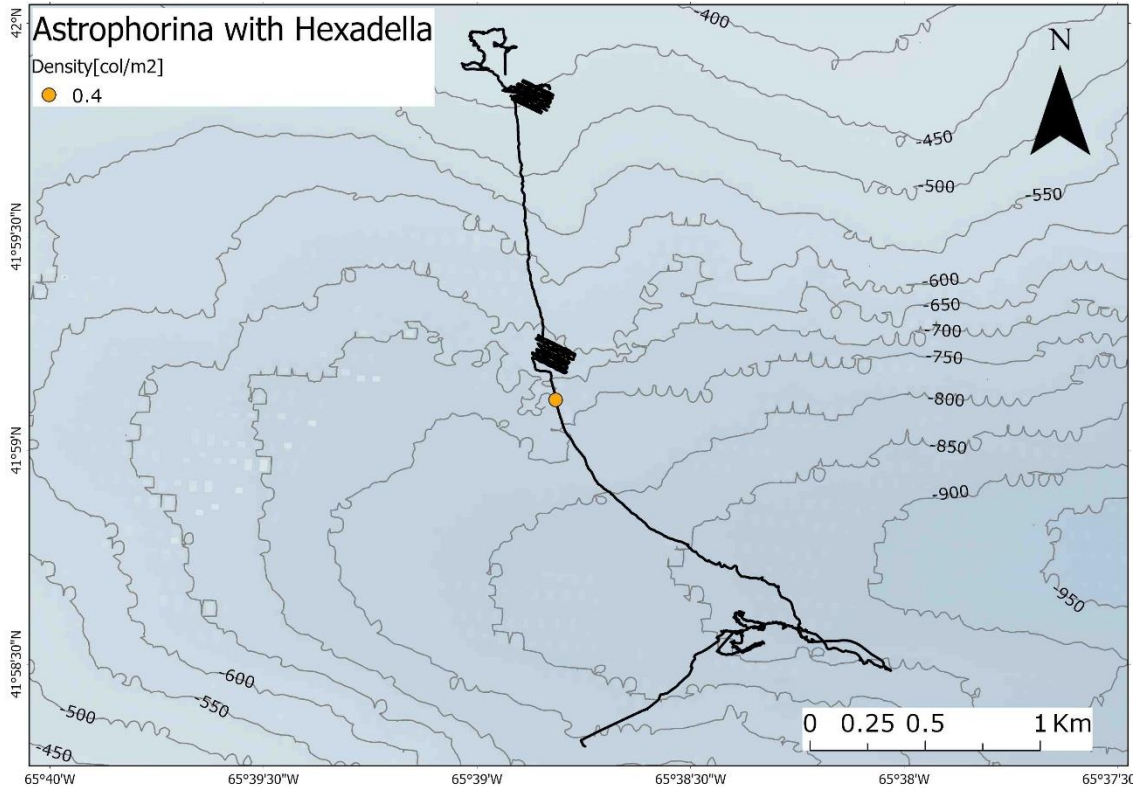


Figure 39. Density distribution of *Astrophorina* sponge with encrusting *Hexadella* sponge found along the track of dive R2391 in Northeast Channel.

3.2.4. Description of dive R2392

The dive started at a setting similar to R2391, with the seabed entirely covered with *O. abyssicola*, anemones and corals on scattered boulders. The dive progressed to the east, following a gentle slope. During the dive, dense gardens of colonies of all sizes of *P. resedaeformis* (Fig. 40A) and *P. arborea* were present (Fig. 40B). *P. resedaeformis* was the most abundant of the two in shallower depths and *P. arborea* was more abundant in deeper areas. At 612 m, cobbles, pebbles and gravel became the main substrate, and *P. arborea* tended to be found in aggregations of high densities, gradually decreasing below 700 m. From there on, many fishing lines were found, lodged between boulders, and extending across the visible area of the seabed (Fig. 40C). Cobbles and pebbles were often covered with the stoloniferan octocoral cf., *Telestula septentrionalis*, and brown *Epizoanthus*, which were annotated, when possible, but are likely underestimated as it was difficult to recognize them on ROV imagery. Additionally, white *Astrophorina* sponges covered with the yellow encrusting sponge *Hexadella* were found more frequently below 700 m. Sections of bare

bedrock were encountered between piled cobbles and pebbles but rarely harbouring corals. At 800 m, a steep vertical wall was encountered, with small *P. arborea*, the barnacle *Arcoscalpellum michelottianum*, and Astrophorina sponges with *Hexadella*. The last part of the dive followed the 750-m isobath where cobbles, pebbles and gravel were the main substrate, covered by yellow *Epizoanthus*, along with cf. *T. septentrionalis* and *Epizoanthus* brown (Fig. 40D). Fewer corals were found here, apart from some occasional large boulders (drop stones) occupied by *P. resedaeformis* and *P. arborea*.

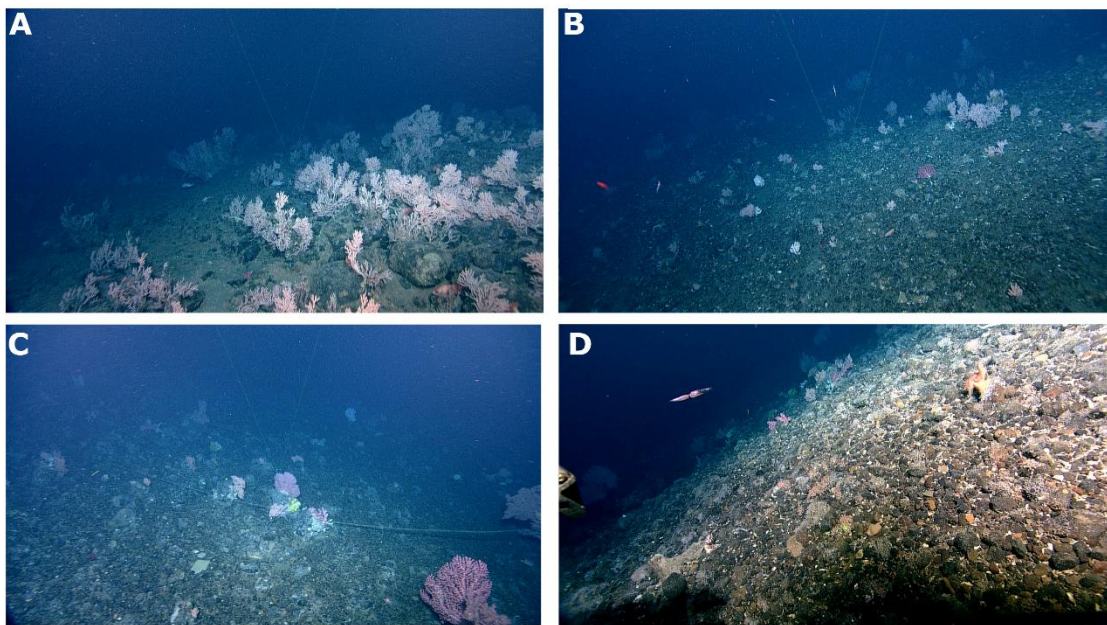


Figure 40. Video frames from dive R2392 showing (A) A dense aggregation of seacorn coral, *Primnoa resedaeformis*, growing on boulders, and the seabed covered by individuals of the brittle star, *Ophiacantha abyssicola*; (B) Recruits of *Primnoa resedaeformis* and *Paragorgia arborea* growing on cobbles and pebbles; (C) Fishing line lodged below several boulders hosting large gorgonians, *P. resedaeformis*, *P. arborea* and white *Astrophorina* sponge with encrusting *Hexadella* sponge; (D) Cobbles and pebbles covered in cf. *Telestula septentrionalis* and *Epizoanthus* brown.

3.2.5. Megafaunal analysis of dive R2392:

This dive was dominated by deep-water corals, particularly *P. resedaeformis* followed by *P. arborea* accounting for 25% and 5% of all annotations, respectively (Fig. 41). Most colonies of *P. resedaeformis* were in good condition, and the yellow zoanthid was found only on nine

colonies (Table 6). Most dense *P. resedaeformis* aggregations were found at < 750 m, with a mean density of $0.77 \pm 0.75 \text{ col} \cdot \text{m}^{-2}$ (Fig. 42), and maximum density of $5.26 \text{ col} \cdot \text{m}^{-2}$ at 494 m (Table 6). Due to the colony shape of this species (bush-like), it was sometimes difficult to distinguish individual colonies, particularly in dense aggregations found on rocky seabed or large boulders. The red cushion sea star (*Porania pulvillus*) was particularly found in deeper areas > 750 m, where it reached $0.12 \pm 0.1 \text{ col} \cdot \text{m}^{-2}$ (Fig. 43). *P. arborea* was more frequently found below 670 m, inhabiting larger cobbles and boulders, alongside *P. resedaeformis*. The mean density for *P. arborea* was $0.27 \pm 0.29 \text{ col} \cdot \text{m}^{-2}$, and the maximum density was $1.72 \text{ col} \cdot \text{m}^{-2}$ at 778 m (Table 6, Fig. 44, *Paragorgia* skeleton Fig. 45). Throughout this dive, smaller colonies and recruits of both species were present, indicating this area receives propagules and supports coral recruitment. However, many small colonies were found growing on pebbles or cobbles on a slope, which might limit their potential maximum size.

Anemone Hormathiidae sp.3 accounted for 25% of all annotations (Fig. 41) and was mostly found on rocky surfaces. Mean density was $2.46 \pm 2.52 \text{ ind} \cdot \text{m}^{-2}$ and the maximum density was $11.45 \text{ ind} \cdot \text{m}^{-2}$, at 512 m (Table 6, Fig. 46). Other anemones such as Actiniidae sp.2 (Fig. 47), Actinostolidae sp.1 (Fig. 48), and *Phelliactis* sp. (Fig. 49), were also present along the dive, but at lower densities (Table 6).

Below 670 m, it was very common to find cobbles and pebbles overgrown with cf. *T. septentrionalis* (Fig. 50), as well as brown (Fig. 51) or yellow *Epizoanthus* (Fig. 52). Their densities presented here are rough estimates as it was difficult to distinguish individuals on ROV images (Table 6).

The most common sponges on this dive were the encrusting white sponge and the white round small sponge, both found on rocky surfaces, reaching mean densities of $0.85 \pm 1.06 \text{ col} \cdot \text{m}^{-2}$ and $0.48 \pm 0.34 \text{ col} \cdot \text{m}^{-2}$, respectively (Table 6). Larger sponges included *V. pourtalesii* and a white *Astrophorina* sponge, with or without the encrusting yellow *Hexadella*. Potentially, some of the white *Astrophorina* could belong to genus *Geodia*, but to minimize potential overestimation by misidentification, we categorized all massive white sponges under the same morphospecies (Appendix 2). *Astrophorina* sponge mean density was $0.09 \pm 0.05 \text{ col} \cdot \text{m}^{-2}$ (Fig. 53), with a maximum of $0.23 \text{ col} \cdot \text{m}^{-2}$ at 495 m (Table 6). The

most frequent form of white *Astrophorina* sponges was encrusted with *Hexadella*, reaching a mean density of $0.14 \pm 0.17 \text{ col} \cdot \text{m}^{-2}$ and a maximum density of $0.98 \text{ col} \cdot \text{m}^{-2}$ at 793 m (Table 6, Fig. 54).

Fishing lines were found outside the marine refuge, along the 750-m isobath, and reached a density of $0.1 \text{ lines} \cdot \text{m}^{-2}$ (Fig. 55). Despite the low density, fishing lines were long, extending for tens of meters. Due to the limitations of the ROV imagery it was not possible to accurately estimate their extent.

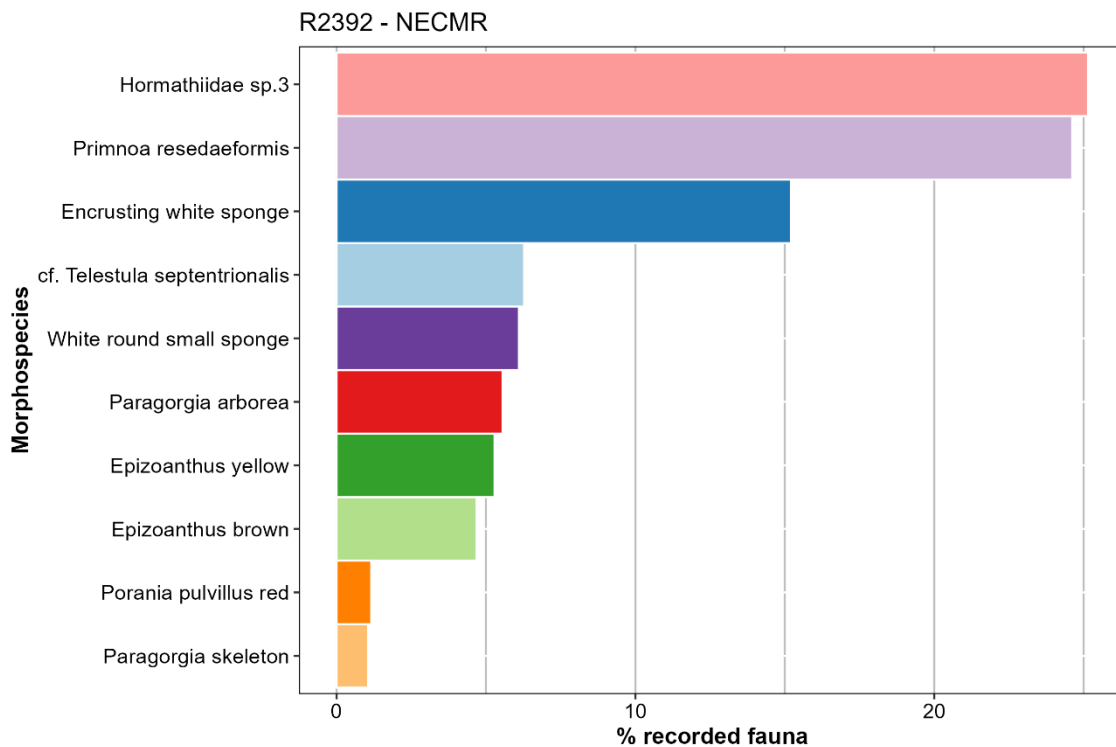


Figure 41. Bar chart with the main morphospecies for R2392 (representing 95% of all recorded fauna). Only morphospecies that contributed more than 1% of all annotations are included.

Table 6. Morphospecies found at dive R2392 in Northeast Channel, with number of individuals or colonies counted, mean density $\pm$ standard deviation (SD), maximum density and depth range (minimum and maximum).

Morphospecies (R2392)	Individuals counted	Density (mean) [col,ind· m ⁻²]	Density (SD) [col,ind· m ⁻²]	Density (Max) [col,ind· m ⁻²]	Depth (Min) [m]	Depth (Max) [m]
<i>Porifera</i>						
Astrophorina white	35	0.09	0.05	0.23	487	810
Astrophorina white with <i>Hexadella</i>	47	0.14	0.17	0.98	703	811
Encrusting grey sponges	4	0.09	0.06	0.13	506	705
Encrusting white sponge	892	0.85	1.06	3.71	481	811
Flabellate white sponge	1	0.07	NA	0.07	761	761
<i>Vazella pourtalesii</i>	3	0.11	NA	0.11	762	762
White round small sponge	358	0.48	0.34	1.62	481	811
<i>Cnidaria</i>						
Anthomastinae	3	0.08	0.01	0.1	764	810
<i>Paragorgia arborea</i>	326	0.27	0.29	1.72	483	817
<i>Paragorgia</i> skeleton	62	0.1	0.05	0.29	483	811
<i>Primnoa resedaeformis</i>	1444	0.77	0.75	5.26	483	817

<i>cf. Telestula septentrionalis</i>	368	1.22	1.99	10.28	672	812
Scleralcyonacea purple	1	0.06	NA	0.06	763	763
Capnellidae	24	0.09	0.03	0.16	484	811
Actiniidae sp.2	32	0.1	0.07	0.36	481	787
<i>cf. Actinoscyphia</i> sp.	1	0.04	NA	0.04	745	745
Actinostolidae sp.1	38	0.11	0.07	0.29	483	811
<i>Phelliactis</i> sp.	38	0.13	0.17	0.82	483	811
Hormathiidae sp.3	1475	2.46	2.52	11.45	483	612
<i>Epizoanthus</i> brown	275	0.53	0.44	1.79	671	812
<i>Epizoanthus</i> yellow	310	0.61	1.07	5.33	483	817
Yellow Zoanthid on <i>Primnoa</i>	9	0.05	0.02	0.09	483	717
<i>Mollusca</i>						
<i>Rossia</i> sp.	1	0.11	NA	0.11	764	764
<i>Arthropoda</i>						
<i>Chaceon quinquedens</i>	2	0.1	0.01	0.11	755	764
<i>Chirona hameri</i>	21	0.39	0.31	0.7	714	810

<i>Arcoscalpellum michelottianum</i>	15	0.79	NA	0.79	817	817
<i>Echinodermata</i>						
<i>Henricia</i> sp. yellow	1	0.08	NA	0.08	756	756
<i>Hippasteria phrygiana</i>	1	0.07	NA	0.07	761	761
cf. <i>Novodinia americana</i>	2	0.09	0.06	0.13	483	494
<i>Porania (P.) pulvillus</i> red	68	0.12	0.1	0.57	483	817
<i>Strongylocentrotus pallidus</i>	9	0.1	0.03	0.14	714	811

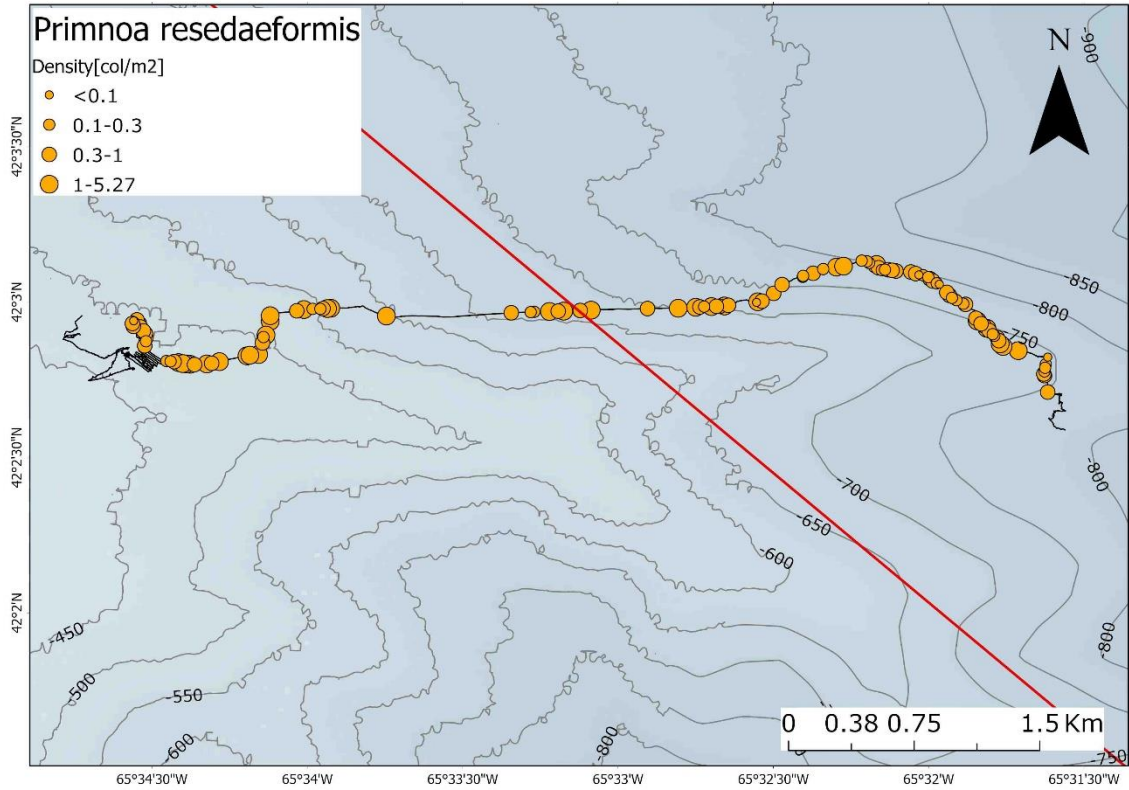


Figure 42. Density distribution of *Primnoa resedaeformis* found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

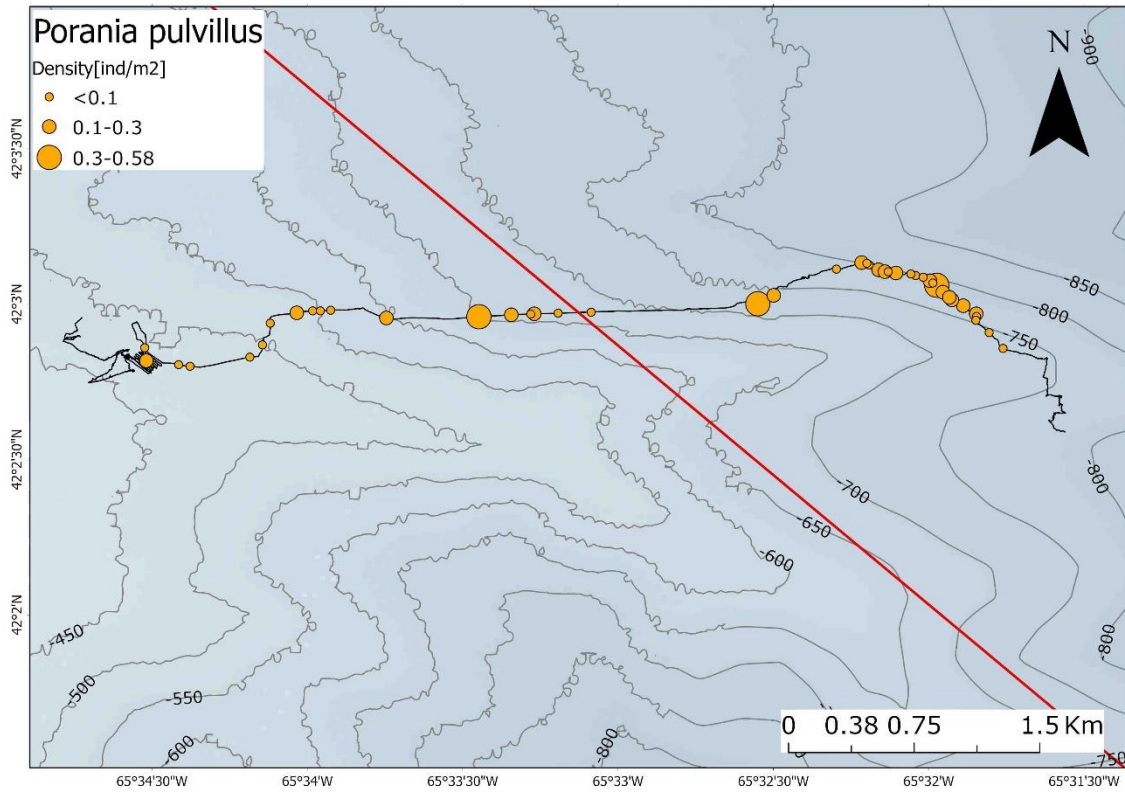


Figure 43. Density distribution of *Porania pulvillus* found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

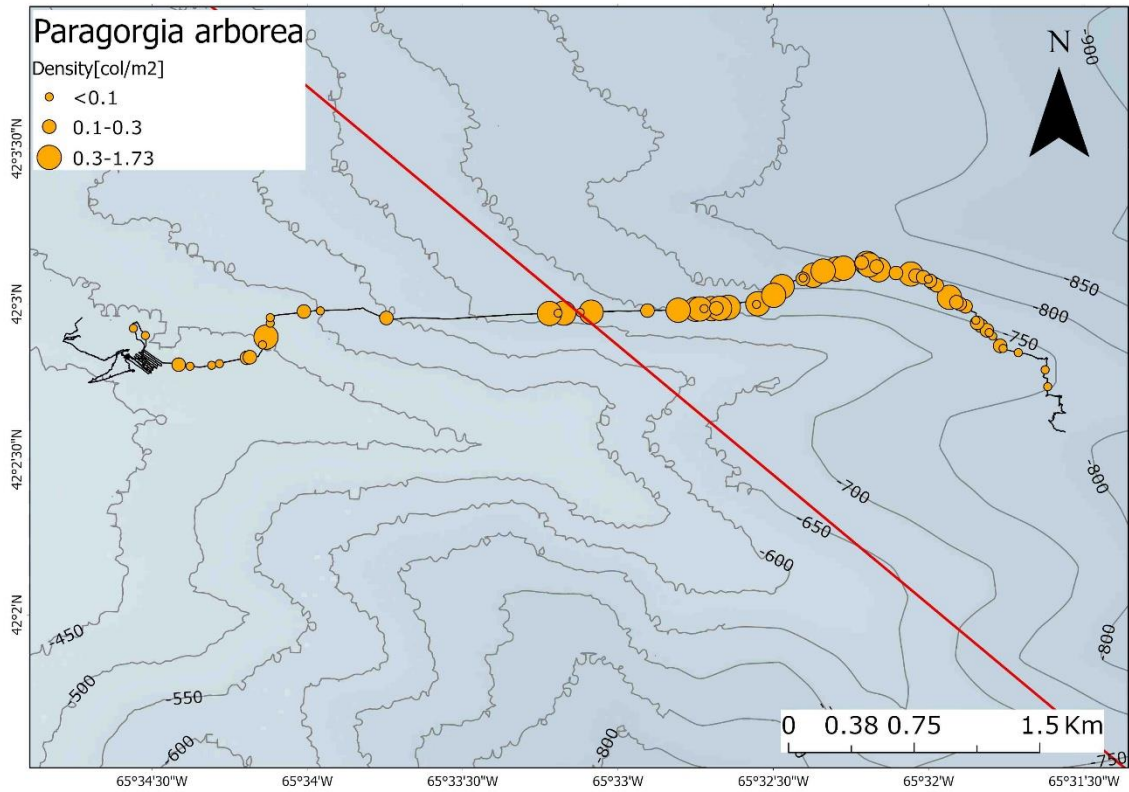


Figure 44. Density distribution of *Paragorgia arborea* found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

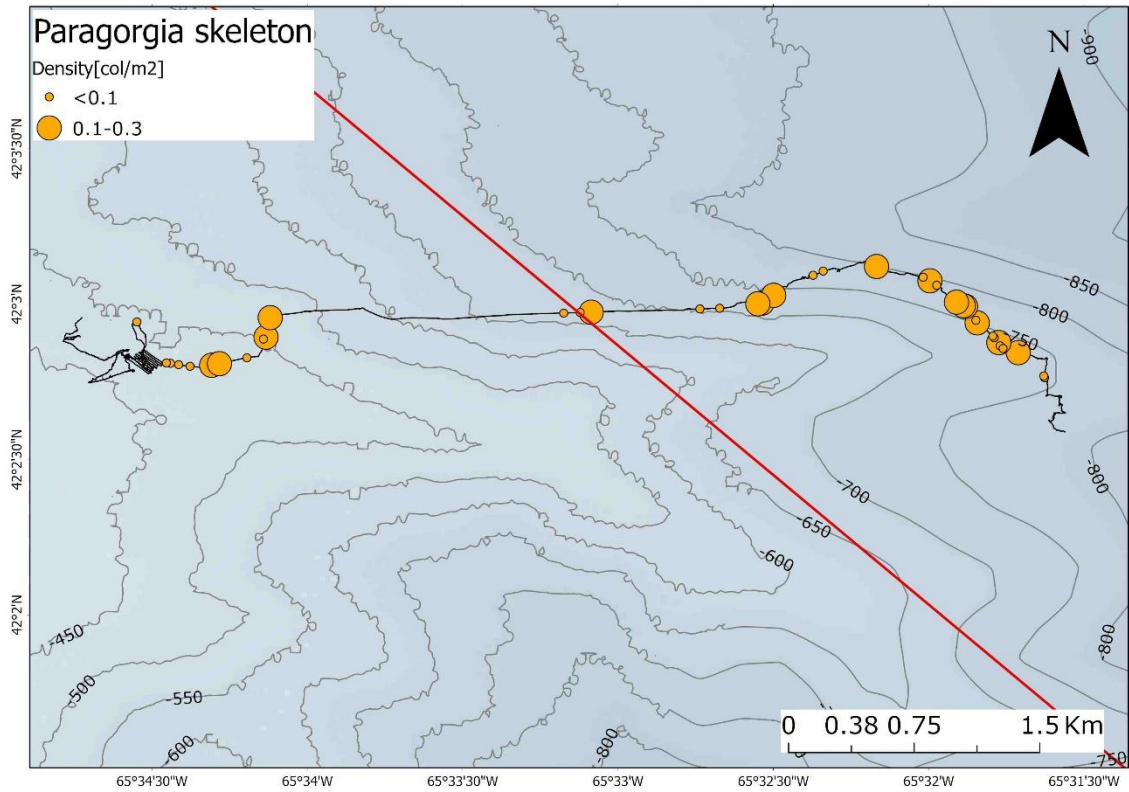


Figure 45. Density distribution of *Paragorgia* skeleton found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

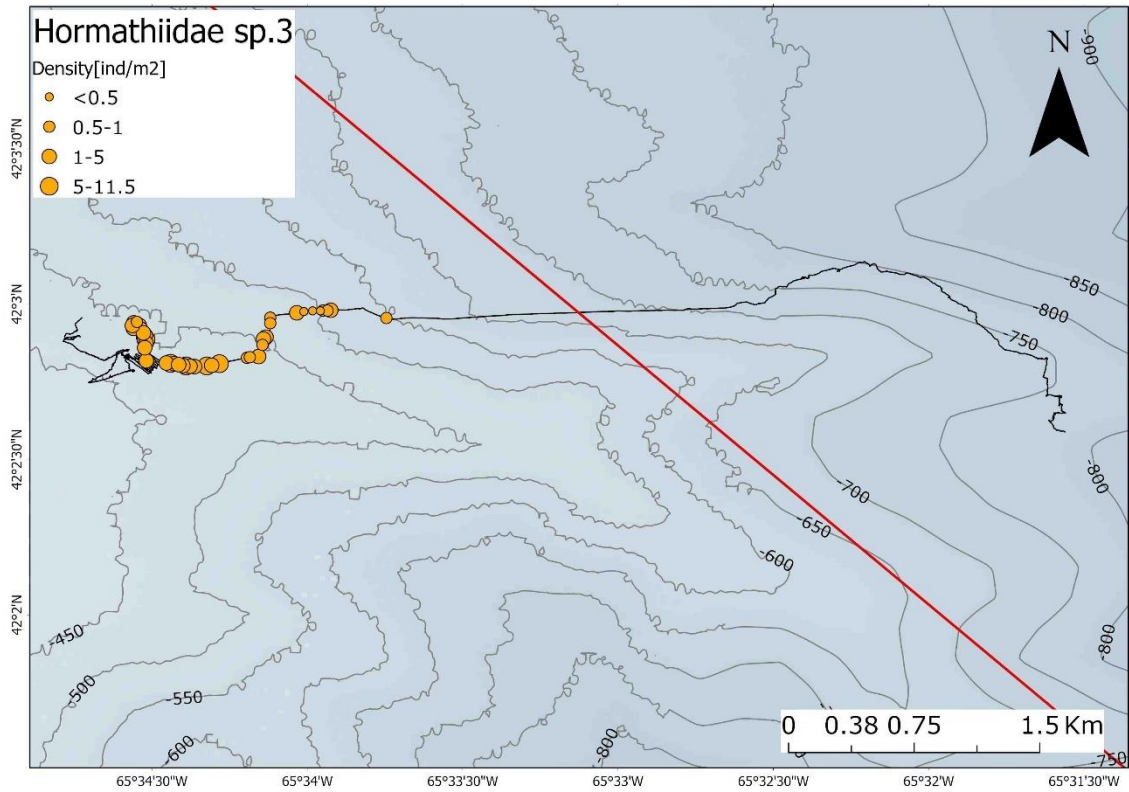


Figure 46. Density distribution of Hormathiidae sp.3 found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

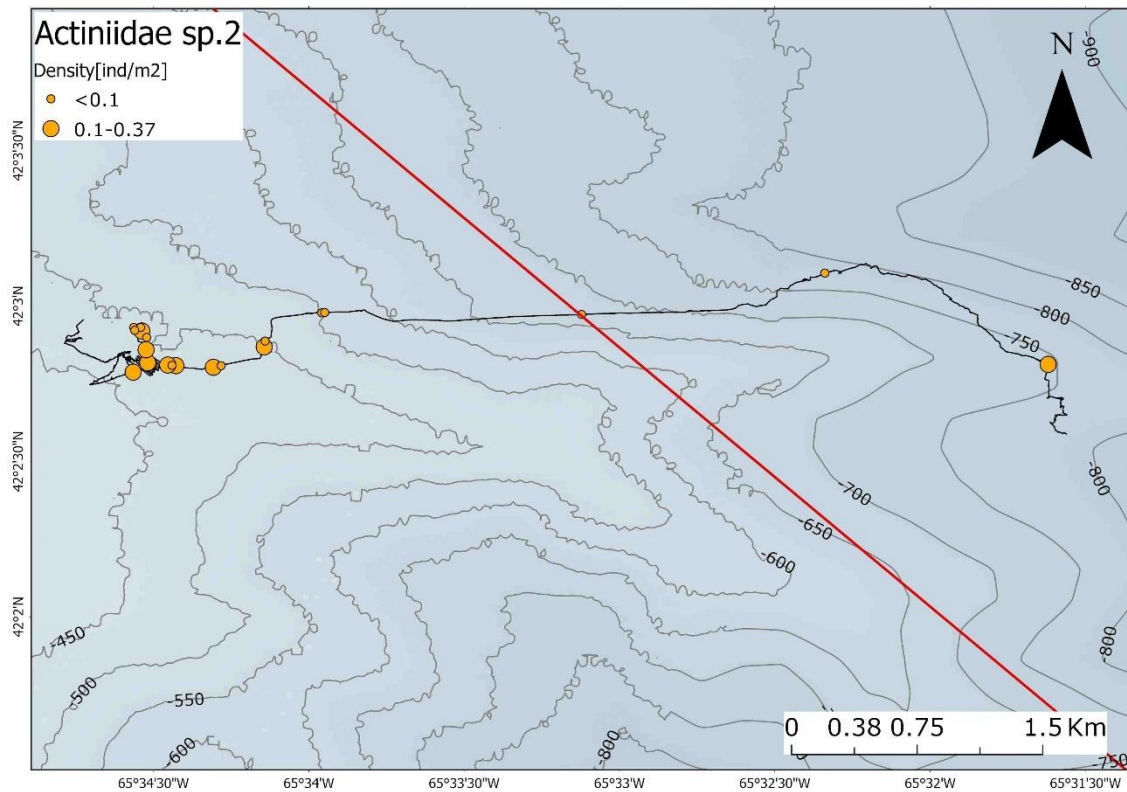


Figure 47. Density distribution of Actiniidae sp.2 found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

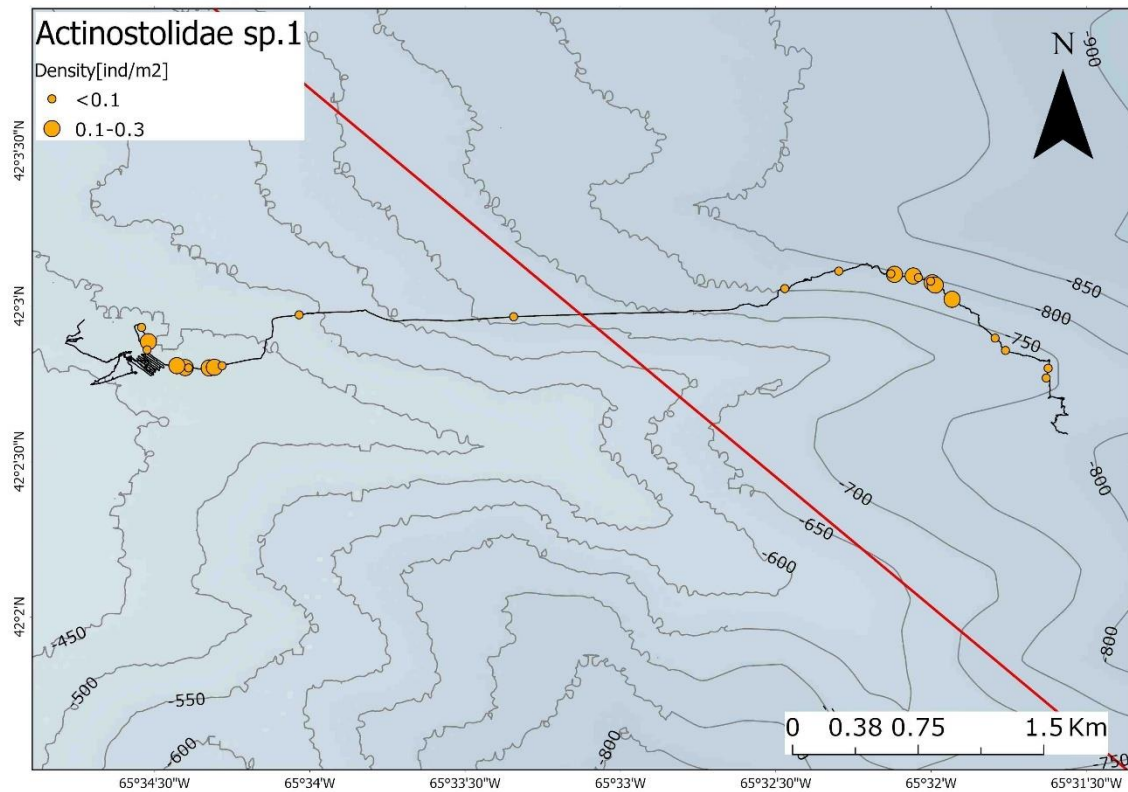


Figure 48. Density distribution of *Actinostolidae* sp.1. found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

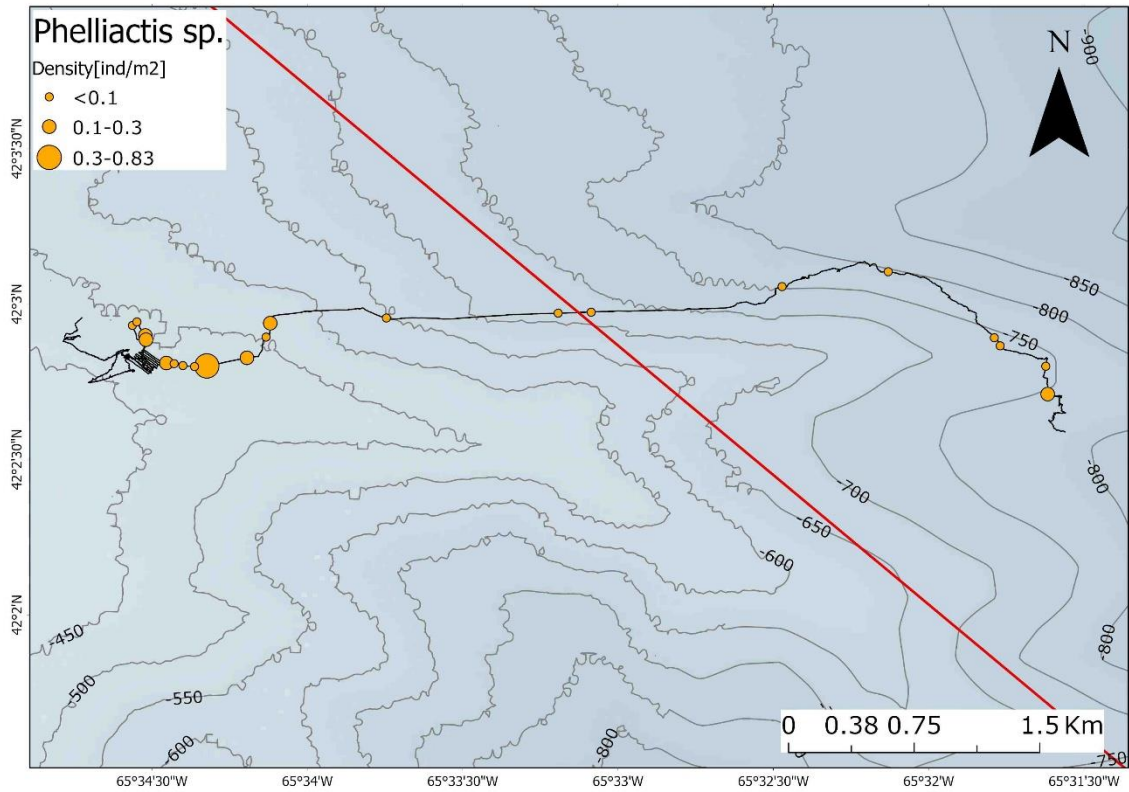


Figure 49. Density distribution of *Phelliactis* sp. found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

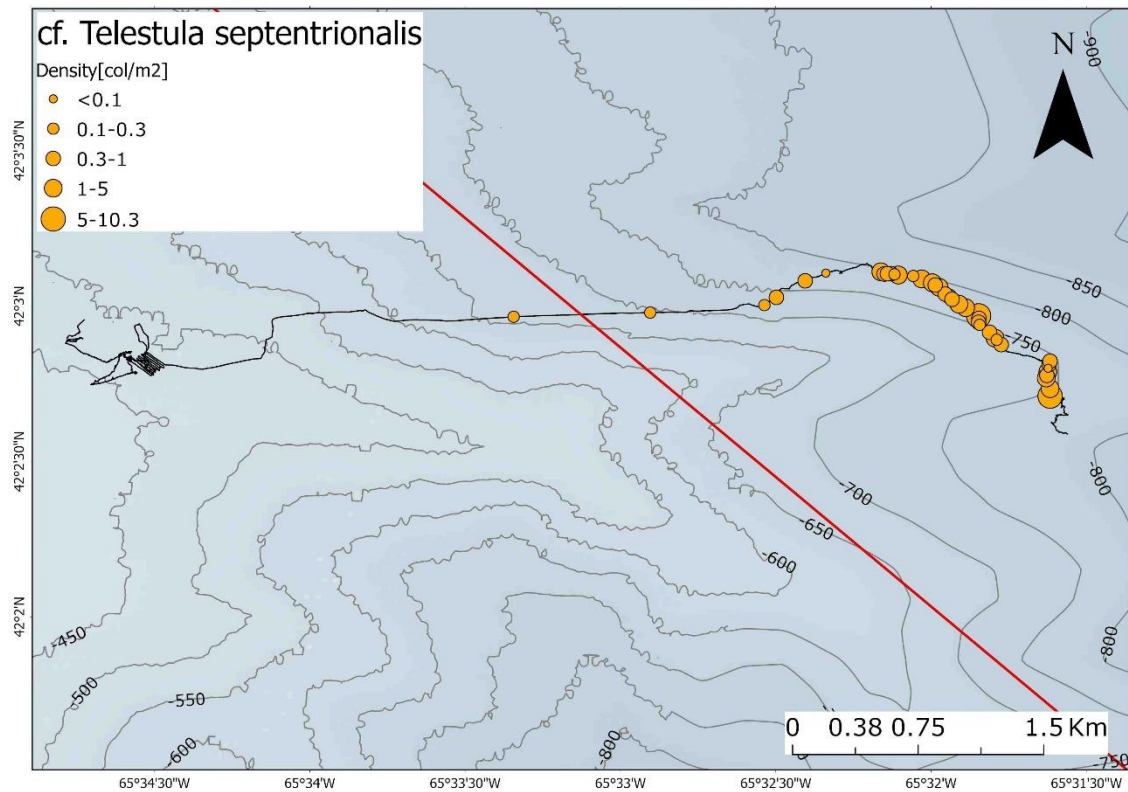


Figure 50. Density distribution of cf. *Telestula septentrionalis* found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

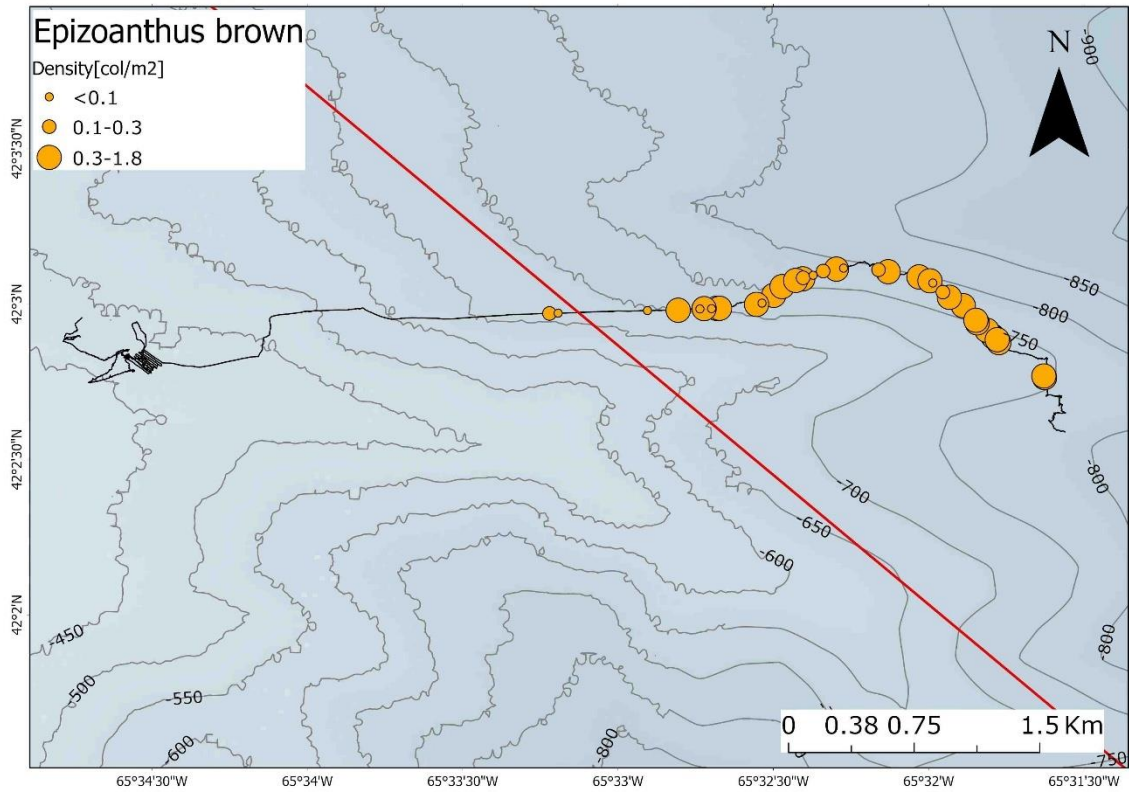


Figure 51. Density distribution of *Epizoanthus brown* found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

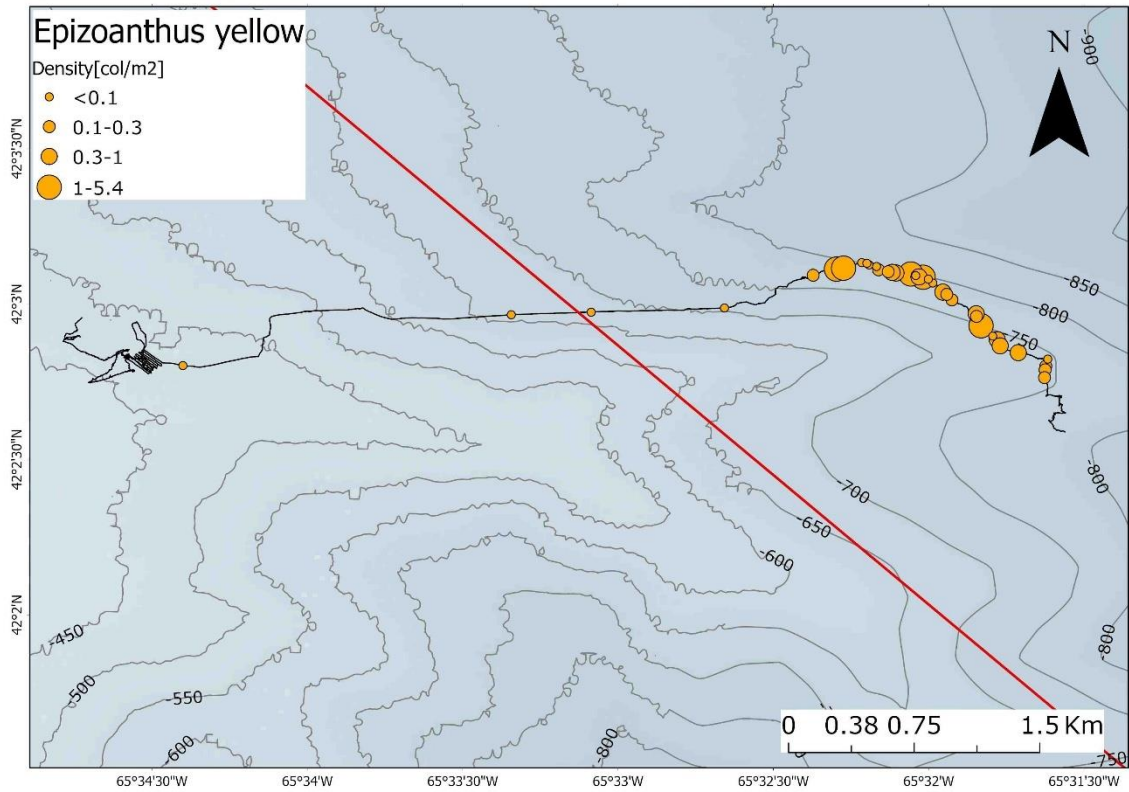


Figure 52. Density distribution of *Epizoanthus* yellow found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

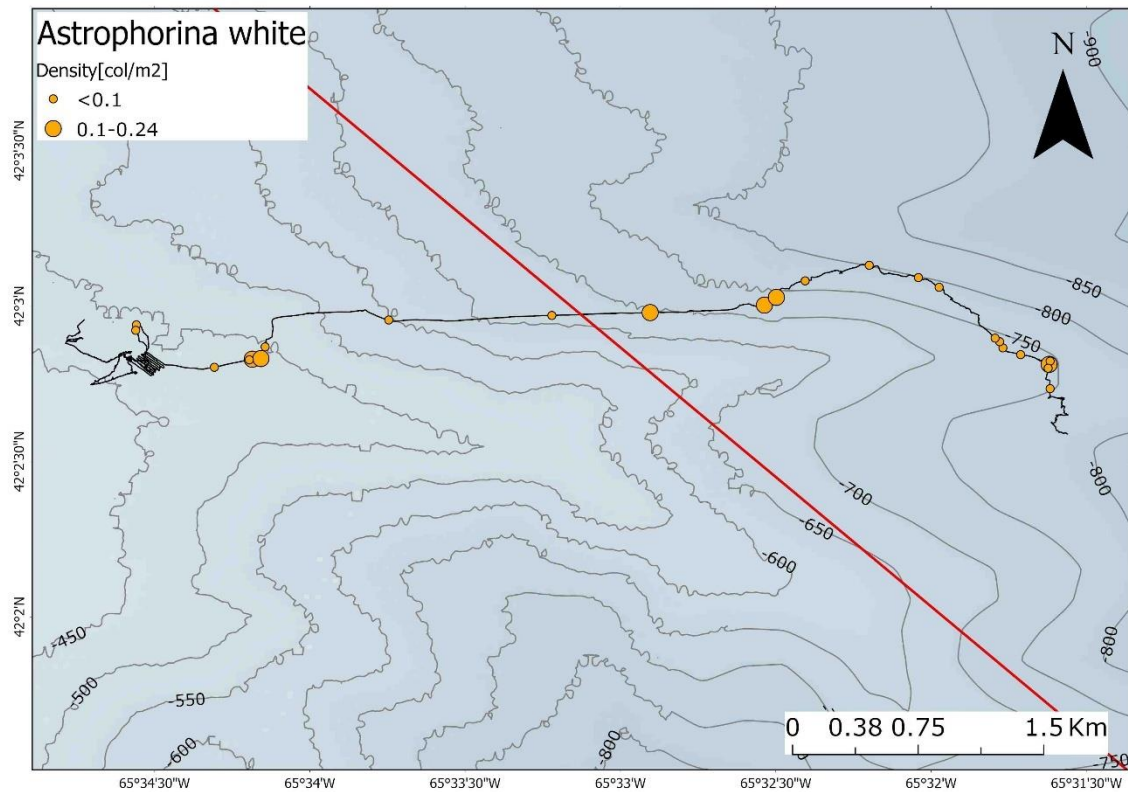


Figure 53. Density distribution of white *Astrophorina* sponges found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

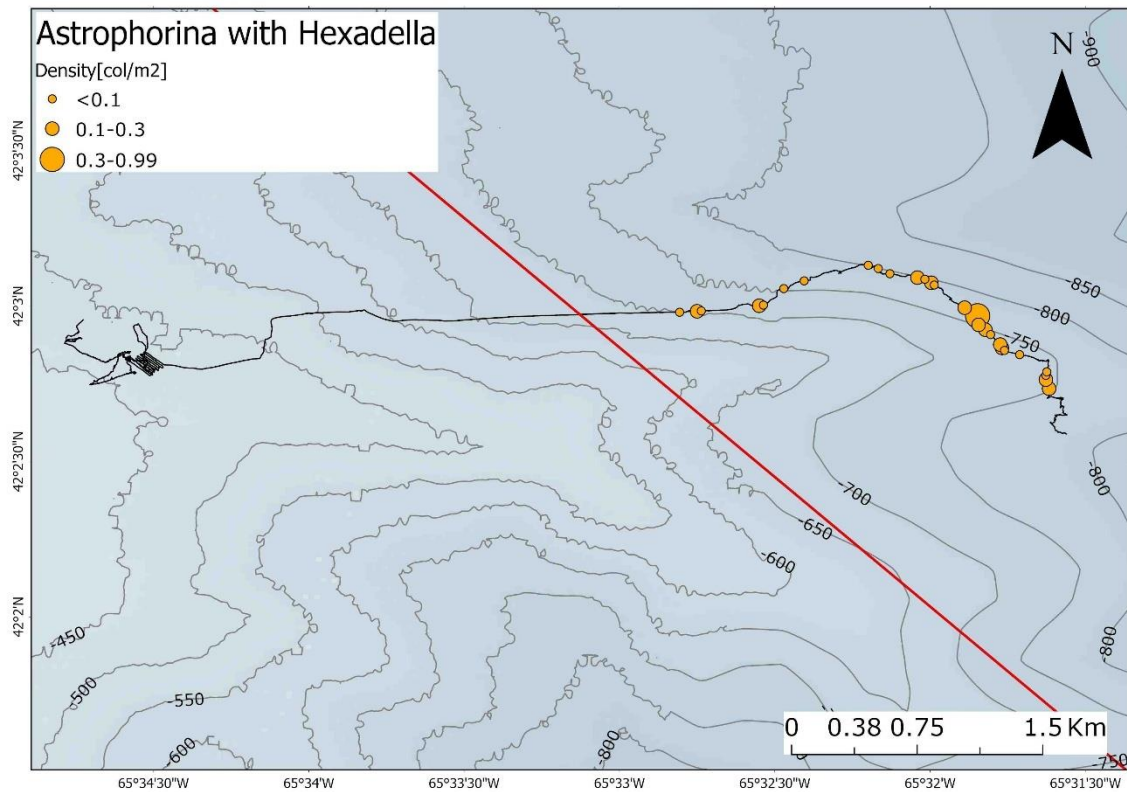


Figure 54. Density distribution of *Astrophorina* sponges with encrusting *Hexadella* sponge found along the track of dive R2392 in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

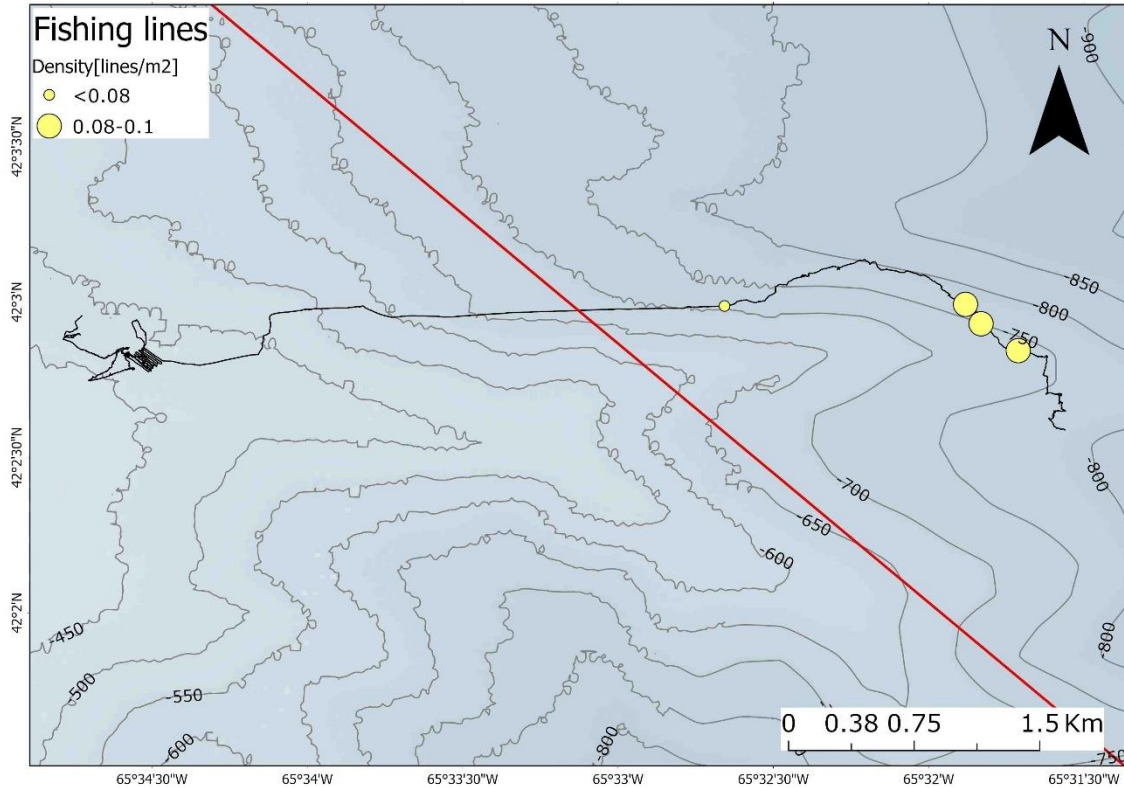


Figure 55. Density distribution of fishing lines found along the track of dive R2392 dive in Northeast Channel. Red line represents the boundary of Northeast Channel Marine Refuge.

3.3. Gulf of Maine

Two dives were conducted in Jordan Basin, Gulf of Maine, on 27 (R2393) and 28 July (R2394) 2024, the latter as a transboundary dive. These were the shallowest dives of the research cruise, starting at 223 and 220 m and ending at 211 and 185 m, respectively. Both dives covered a similar linear distance (6203 and 6043 m, respectively). Dive R2393 lasted for 11 h 36 min and R2394 for 6 h 34 min. Very high turbidity during R2393 led to a significant reduction of available images for megafaunal analysis (84 images), of which 69 contained recognizable fauna for a total of 120 m² of analysed seabed and 17999 animals belonging to 18 morphospecies (Fig. 56).



Figure 56. ROV transect (line) and positions of analysed images (blue points) for dive R2393 in Gulf of Maine.

For dive R2394, 211 images were analysed, of which 164 had recognizable fauna, for a total of 441 m² of analysed seabed, and 8927 animals belonging to 28 morphospecies (Fig. 57).



Figure 57. ROV transect (line) and positions of analysed images (blue points) for dive R2394 in Gulf of Maine. Yellow line represents the USA-Canada border.

3.3.1. Water column profile

Four CTD casts were performed in the Gulf of Maine. Salinity gradually increased with increasing depth, while temperature dramatically decreased until 40-60 m, slowly increasing thereafter (Fig. 58). The oxygen minimum was located at the seabed, and at > 180 m depth (Fig. 58).

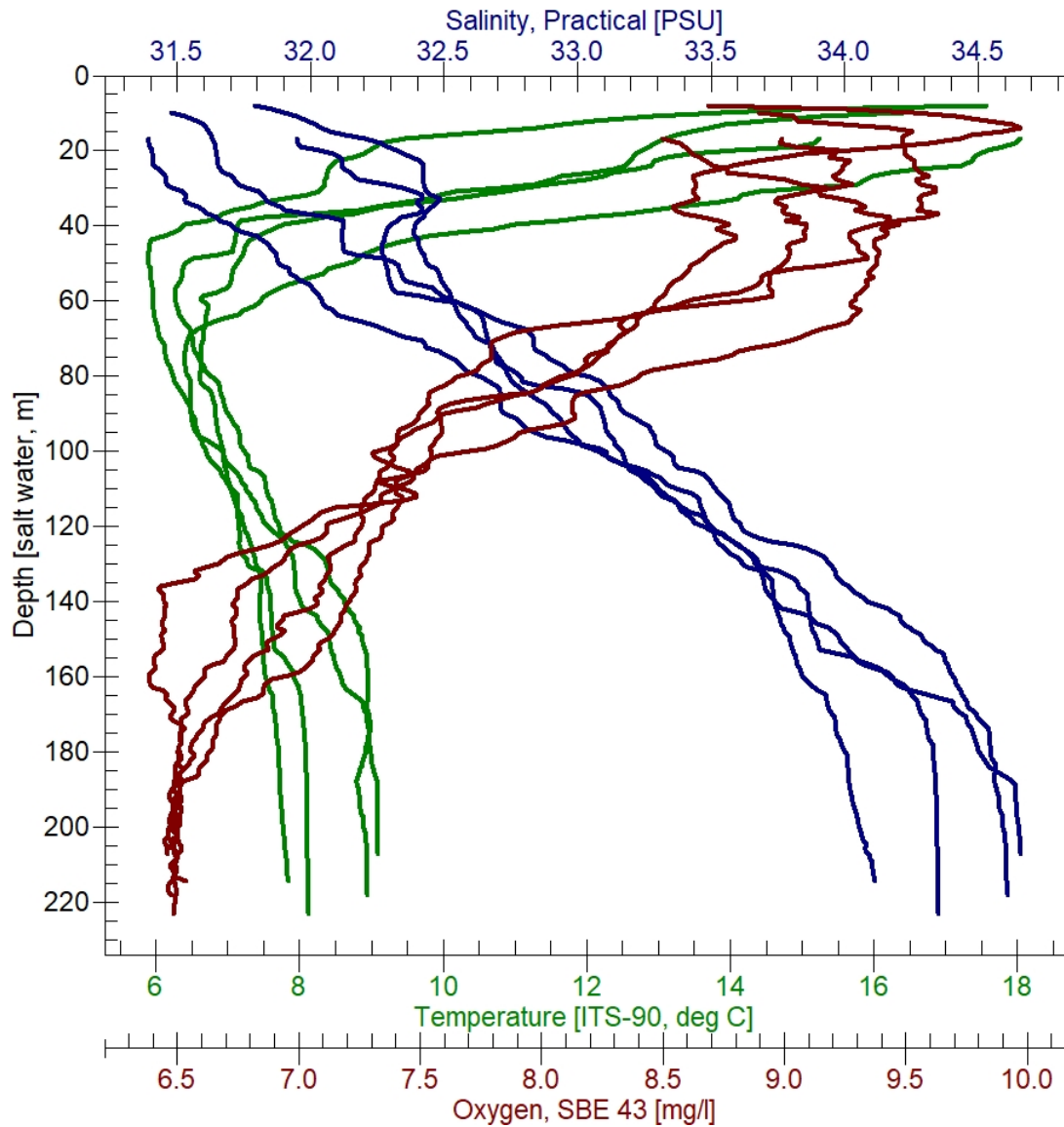


Figure 58. Temperature (green line), salinity (blue line) and oxygen (red line) depth profiles from the CTD casts at Gulf of Maine.

3.3.2. Description of dive R2393

The dive followed a rocky feature, roughly oriented North to South, within a narrow depth range at approximately 200 m. The seabed was covered with a layer of soft sediment, while the entire dive was characterized by high turbidity. We found three color types (purple, pink and yellow) of the shallow morphospecies of the gorgonian, *Paramuricea* sp.2. However, for the purposes of the megafaunal analysis, all colonies were annotated as one morphospecies (Fig. 59A, B). The highest densities of *Paramuricea* sp.2 were found on top of the rocky feature, as well as on its steep sides. Along with *Paramuricea* sp.2, the brachiopod,

Terebratulina septentrionalis, was very abundant, and reached very high densities. Small white sponges were also present, growing on rock or brachiopods. Their small size, color and morphology made it difficult to distinguish them from brachiopods in the ROV images (Fig. 59B). Additionally, Actiniidae sp.4 and sponges belonging to the family Polymastiidae (Polymastiidae sp.1 and *Polymastia uberrima*) were occasionally found among *Paramuricea* sp.2 colonies.

The rocky feature was sometimes interrupted by areas of dislodged rocks, cobbles and sand, where *Paramuricea* sp.2 was found at lower densities. At 215 m, *V. pourtalesii* was found heavily covered in sediment, while Actiniidae sp.4 was more frequent, sometimes found at high densities (Fig. 59D). Towards the end of the dive, at 237 m, there were longer stretches of soft sediment with interspersed cobbles. In this area, brachiopods were found scattered on cobbles, along with anemone Hormathiidae. sp3, Polymastiidae sponges (Fig. 59C) and very few colonies of *Paramuricea* sp.2.

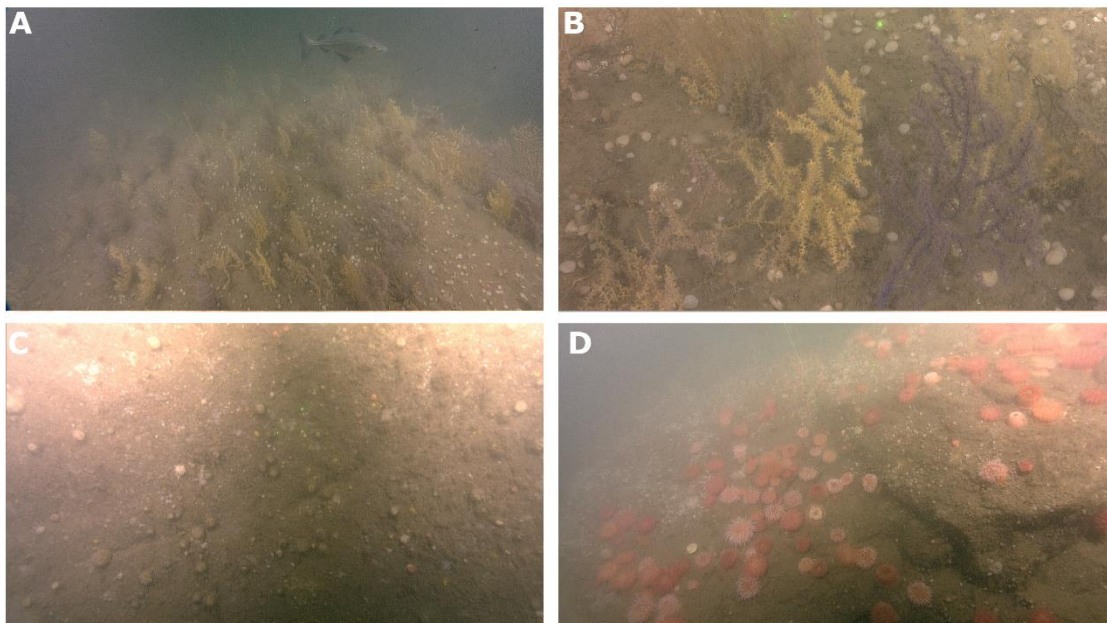


Figure 59. Video frames from dive R2393 showing (A) A dense aggregation of yellow and purple colour morph of gorgonian, *Paramuricea* sp.2, growing on top of the rocky feature, with a dense aggregation of brachiopods, *Terebratulina septentrionalis*; (B) Zoom in on two colour morphs of *Paramuricea* sp.2, along with *Terebratulina septentrionalis* and small white round sponges, highlighting the similarity between brachiopod and sponge on ROV

imagery; (C) Side of the rocky feature with sponges Polymastiidae sp.1 and *Polymastia uberrima*; (D) Dense aggregation of anemone Actiniidae. sp.4 and brachiopods.

3.3.3. Megafaunal analysis of dive R2393

The dive was characterized by two co-occurring species, the shallow morphospecies, *Paramuricea* sp.2, and the brachiopod, *T. septentrionalis*, together accounting for 97% of all annotations. The brachiopod reached very high densities (average: $137.6 \pm 105.39 \text{ ind}\cdot\text{m}^{-2}$, maximum: $435.97 \text{ ind}\cdot\text{m}^{-2}$) (Table 7, Fig. 60). The density of this species is likely overestimated, as it was not always possible to distinguish it from a smaller white sponge that was often found in the same area (Fig. 59B). Nevertheless, brachiopods were very dominant at this site. *Paramuricea* sp.2 was found at a mean density of $13.85 \pm 10.59 \text{ col}\cdot\text{m}^{-2}$ and reached a maximum of $44.78 \text{ col}\cdot\text{m}^{-2}$ (Table 7, Fig. 61). Coral colonies found on top of the rocky feature usually grew facing the prevailing current, seemingly in parallel rows, while colonies growing on boulders showed a more random spatial arrangement. Amidst *Paramuricea* sp.2 colonies, Actiniidae sp. 2 and an arborescent sponge were sometimes encountered, in mean densities of $0.73 \pm 0.54 \text{ ind}\cdot\text{m}^{-2}$ and $2.03 \pm 3.34 \text{ ind}\cdot\text{m}^{-2}$, respectively (Table 7).

Aggregations of Actiniidae sp.4 reached high densities of up to $54.47 \text{ ind}\cdot\text{m}^{-2}$ at 219 m (Fig. 62), followed by Hormathiidae.sp3 with a maximum density of $28.01 \text{ ind}\cdot\text{m}^{-2}$ at 231 m (Table 7). The encrusting white sponge was the most abundant sponge, with mean density $2.86 \pm 2.78 \text{ col}\cdot\text{m}^{-2}$ and maximum density $10.97 \text{ col}\cdot\text{m}^{-2}$ (Table 7). Additionally, the sponges *P. uberrima* and Polymastiidae sp.1 (Fig. 63) were common throughout the dive, particularly in areas with lower densities of brachiopods and colonies of *Paramuricea* sp.2, such as on the flanks of the rocky feature. Mean densities for these species were $1.36 \pm 1.60 \text{ col}\cdot\text{m}^{-2}$ and $4.15 \pm 7.01 \text{ col}\cdot\text{m}^{-2}$, respectively (Table 7).

Table 7. Morphospecies found at dive R2393 in Gulf of Maine, with number of individuals or colonies counted, mean density $\pm$ standard deviation (SD), maximum density and depth range (minimum and maximum).

Morphospecies (R2393)	Individuals counted	Density (mean) [col,ind·m⁻²]	Density (SD) [col,ind·m⁻²]	Density (Max) [col,ind·m⁻²]	Depth (Min) [m]	Depth (Max) [m]
<i>Porifera</i>						
<i>Polymastia uberrima</i>	17	1.36	1.6	5.48	212	230
Polymastiidae sp.1	22	4.15	7.01	14.67	212	229
<i>Vazella pourtalesii</i>	1	0.69	NA	0.69	219	219
Arborescent sponge sp.1	16	2.03	3.34	9.59	212	226
Encrusting orange sponge	11	4.41	5.75	8.48	216	229
Encrusting white sponge	113	2.86	2.78	10.97	212	231
Encrusting yellow sponge	9	2.43	1.13	3.23	215	226
White round small sponge	15	5.61	6.1	12.34	213	226
<i>Cnidaria</i>						

<i>Paramuricea</i> sp.2	1371	13.85	10.59	44.78	212	231
Actiniidae sp.2	9	0.73	0.54	1.88	216	229
Actiniidae sp.4	148	10.2	17.14	54.47	212	222
Hormathiidae sp.3	64	4.8	7.64	28.01	217	231
<i>Brachiopoda</i>						
<i>Terebratulina septentrionalis</i>	16177	137.62	105.39	435.97	212	237
<i>Arthropoda</i>						
<i>Cancer borealis</i>	1	0.55	NA	0.55	222	222
<i>Lithodes maja</i>	3	0.52	0.25	0.81	223	229
<i>Echinodermata</i>						
<i>Henricia</i> sp. yellow	5	0.69	0.27	0.99	212	225
<i>Porania (P.) pulvillus</i> purple	1	0.69	NA	0.69	212	212
Neoasteroidea	16	0.73	0.31	1.53	214	225

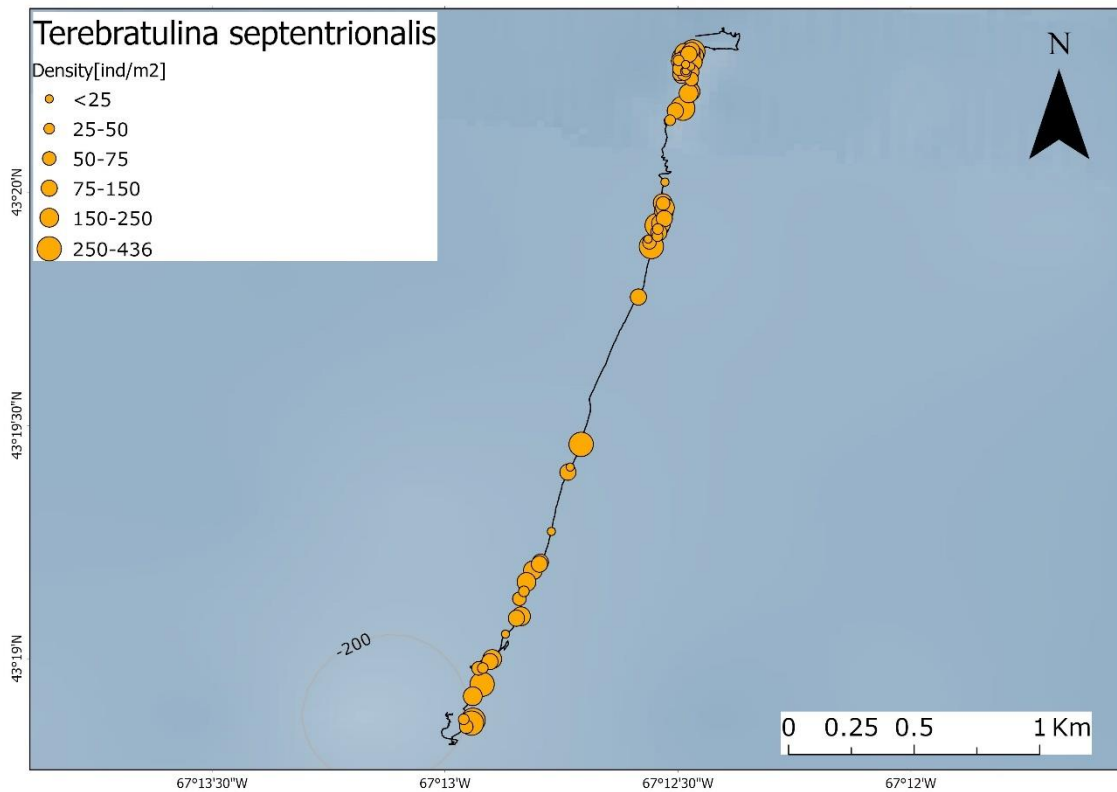


Figure 60. Density distribution of brachiopod, *Terebratulina septentrionalis*, found along the track of dive R2393 in the Gulf of Maine.

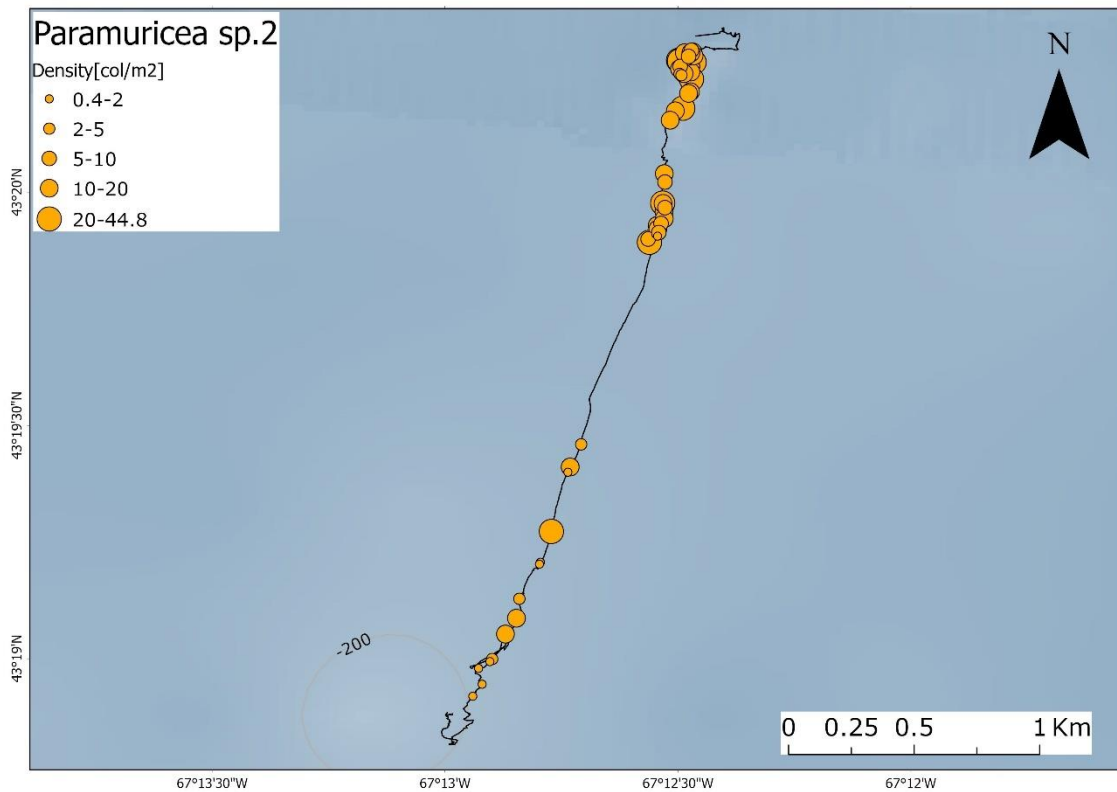


Figure 61. Density distribution of *Paramuricea* sp.2 found along the track of dive R2393 in the Gulf of Maine.

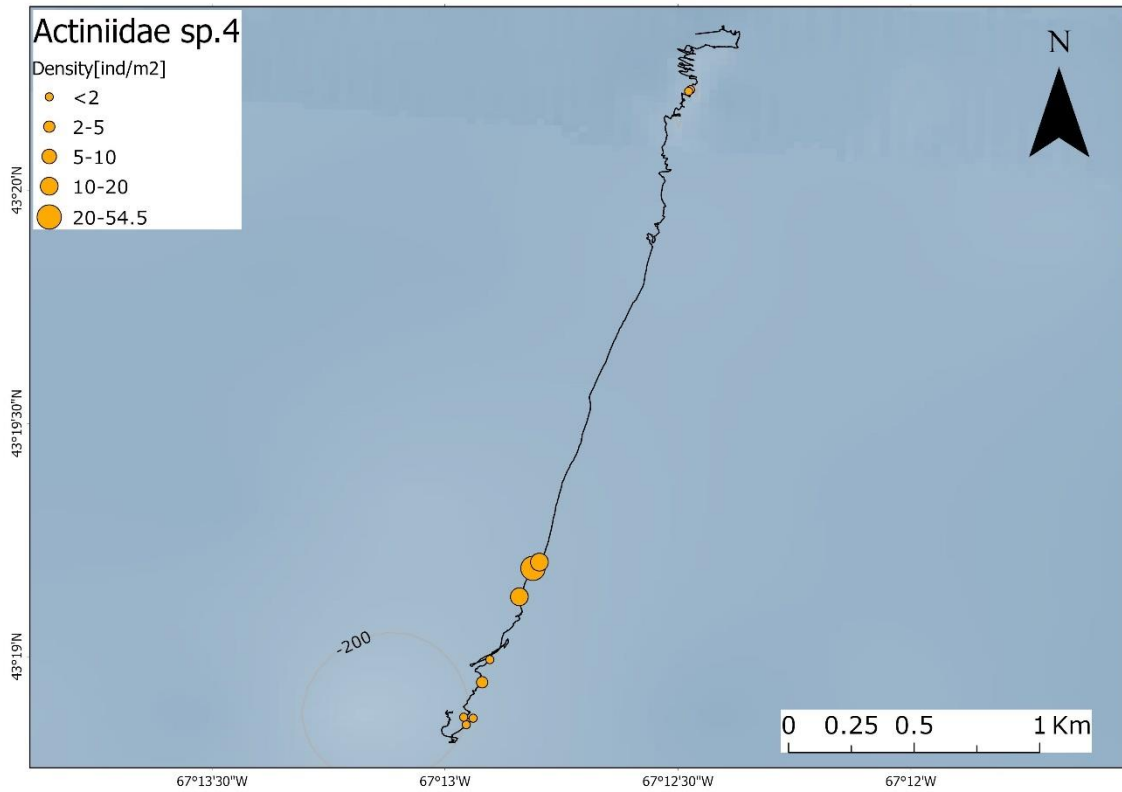


Figure 62. Density distribution of Actiniidae sp.4 found along the track of dive R2393 in the Gulf of Maine.

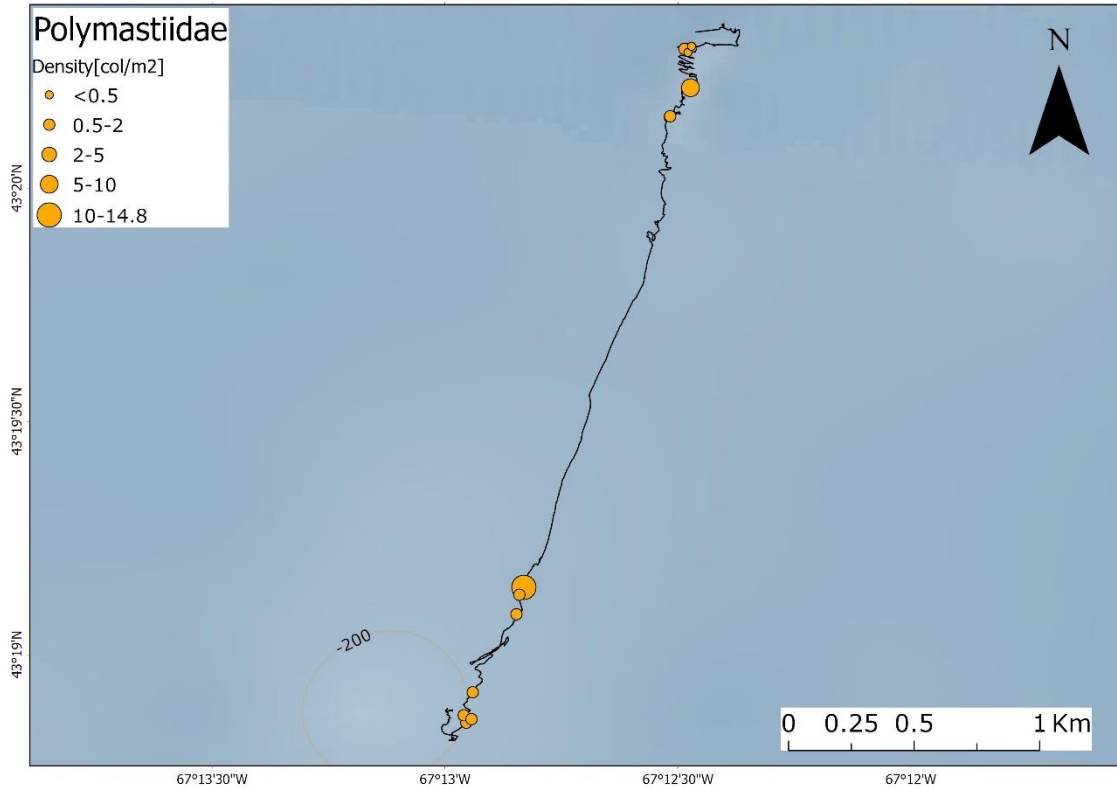


Figure 63. Density distribution of sponges belonging to Polymastiidae (including *Polymastia uberrima* and Polymastiidae. sp.1) found along the track of dive R2393 in the Gulf of Maine.

3.3.4. Description of dive R2394

This dive was performed within the Canadian EEZ, as part of a transboundary dive. Most of the dive was characterized by cobbles, pebbles, and boulders scattered on soft sediment that included smaller shell remains. Here, few animals were encountered, such as sea stars (*Poraniomorpha hispida*, several morphospecies belonging to the infraclass Neoasteroidea and *Henricia* sp. yellow) and anemones (Actiniidae sp. 2, Actiniidae sp. 4 and Hormathiidae sp.3) (Appendix 2) which were present at low densities. Larger areas of elevated rocky features were occasionally found along the dive. They were mainly inhabited by anemones and different encrusting sponges, as well as *T. septentrionalis* which in some areas reached high densities. Occasional boulders next to these areas were mainly inhabited by white, yellow and grey encrusting sponges, and less often by the sponge cf. *Iophon* sp. Moreover, dark, equidistant, straight markings were seen on the top of these rocky features, likely trawl marks (Fig. 64A, B). On the flanks, anemones and polymastid sponges (*P. uberrima*, Polymastiidae sp.1 and Polymastiidae sp.2) were present (Fig. 64C). Towards the end of the

dive, an aggregation of *Paramuricea* sp.2 was present on boulders and bedrock, along with encrusting grey and yellow sponges, as well as trawl marks (Fig. 64D).

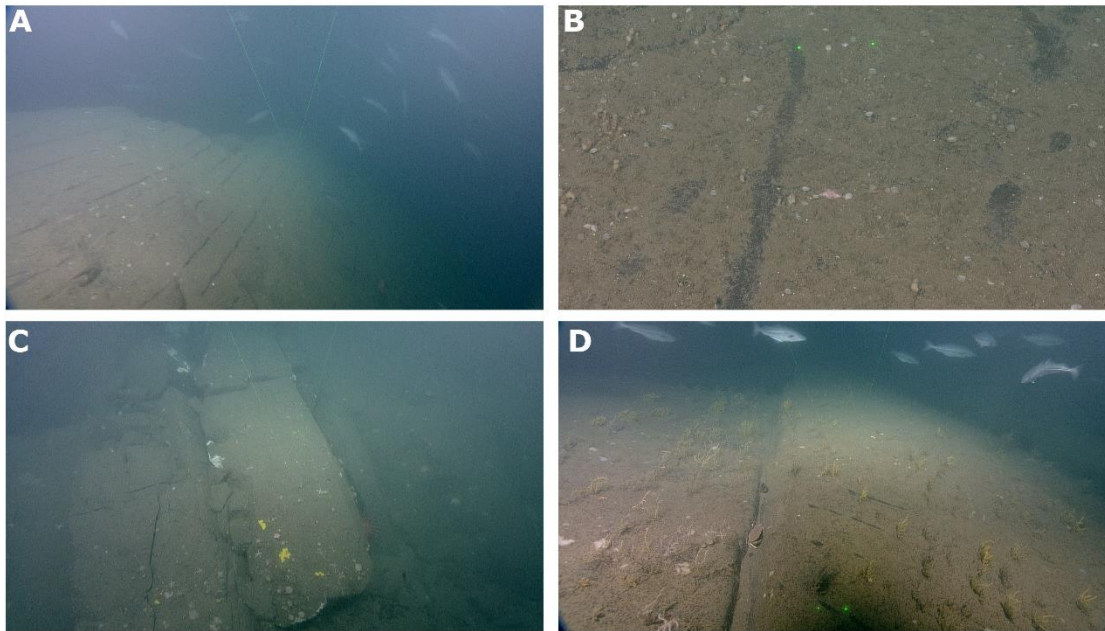


Figure 64. Video frames from R2394 dive showing (A) Rocky feature with straight equidistant trawl marks; (B) Zoom on trawl marks, brachiopods and sea star *Astroidea*.sp.1; (C) Rocky feature with grey, white and yellow encrusting sponges, Polymastiidae, several sea stars and anemone Actiniidae sp. 2 on the side of the rock; (D) Aggregation of yellow and purple colour morph of *Paramuricea* sp.2 growing on top of a rocky feature with several trawl marks, and a Jonah crab *Cancer borealis*.

3.3.5. Megafaunal analysis of dive R2394

The most abundant species, accounting for 76% of all annotations (Fig. 65), was the brachiopod *T. septentrionalis*. It was found at very high densities (mean density $194.34 \pm 274.94 \text{ ind} \cdot \text{m}^{-2}$; maximum density $1002.52 \text{ ind} \cdot \text{m}^{-2}$) (Table 8), but in a constrained area (Fig. 66). Similarly, the shallow morphospecies of *Paramuricea* sp.2 was found towards the end of the dive on flat bedrock, reaching a maximum density of $21.5 \text{ col} \cdot \text{m}^{-2}$ at 196 m (Table 8) (Fig. 67). For most of the dive, fauna consisted of grey, white and yellow encrusting sponges on rocky surfaces (rocky features, boulders, cobbles) (Fig. 65), reaching mean densities of $6.80 \pm 11.1 \text{ col} \cdot \text{m}^{-2}$, $1.99 \pm 3.24 \text{ col} \cdot \text{m}^{-2}$ and $11.22 \pm 21.73 \text{ col} \cdot \text{m}^{-2}$ respectively (Table 8). The sponge cf. *Iophon* sp. was present in a small area where it reached maximum density of $10.49 \text{ col} \cdot \text{m}^{-2}$ (Table 8). On the sides of rocky features, *P. uberrima* and Polymastiidae sp.1 sponges

were found at mean density of $0.84 \pm 0.99 \text{ col}\cdot\text{m}^{-2}$ and $1.14 \pm 0.84 \text{ col}\cdot\text{m}^{-2}$, respectively (Table 8) (Fig. 68).

Throughout the dive, several morphospecies of sea stars were present, such as *P. hispida* with mean density $0.68 \pm 0.39 \text{ ind}\cdot\text{m}^{-2}$ (Fig. 69), Neoasteroidea with mean density of $0.94 \pm 0.82 \text{ ind}\cdot\text{m}^{-2}$ (Fig. 70) and *Henricia* sp. yellow with density $1.12 \pm 1.54 \text{ ind}\cdot\text{m}^{-2}$ (Table 8) (Fig. 71). The morphospecies Neoasteroidea (lowest shared taxonomic rank) was composed of at least three lightly coloured species (*Henricia* sp. white, *Leptasterias* sp. and *Asterias* sp.) (Appendix 2). The densities of potential trawl marks ranged between 0.7-6.3 trawl marks $\cdot\text{m}^{-2}$ (Fig. 72). These are likely older trawl marks, as fauna was often observed on these features.

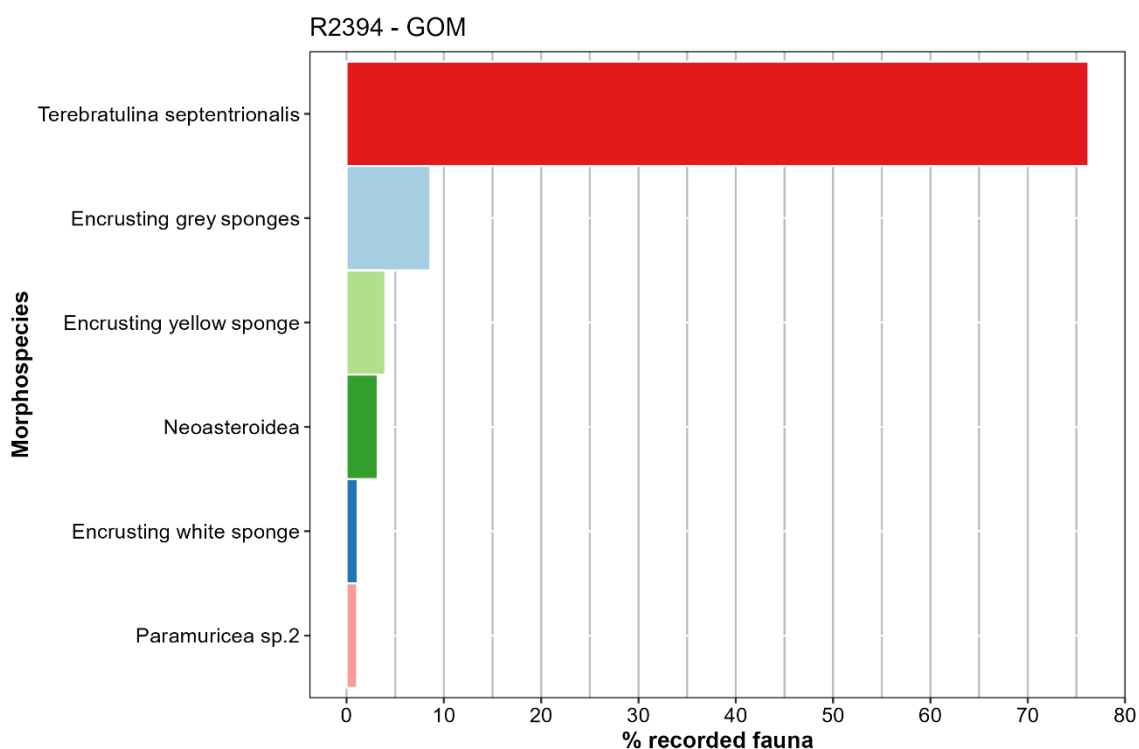


Figure 65. Bar chart with the main morphospecies for R2394 (representing 95% of all recorded fauna). Only morphospecies that contributed more than 1% of all annotations are included.

Table 8. Morphospecies found at dive R2394 in Gulf of Maine, with number of individuals or colonies counted, mean density $\pm$ standard deviation (SD), maximum density and depth range (minimum and maximum).

Morphospecies (R2394)	Individuals counted	Density (mean) [col,ind·m⁻²]	Density (SD) [col,ind·m⁻²]	Density (Max) [col,ind·m⁻²]	Depth (Min) [m]	Depth (Max) [m]
<i>Porifera</i>						
<i>Polymastia uberrima</i>	30	0.84	0.99	3.81	186	204
Polymastiidae sp.1	37	1.14	0.84	3.15	186	219
Polymastiidae sp.2	17	3.98	NA	3.98	195	195
Encrusting grey sponge	770	6.8	11.1	59.93	186	210
Encrusting monoporus sponge	2	0.4	0.12	0.49	186	188
Encrusting white sponge	102	1.99	3.24	13.6	188	217
Encrusting yellow sponge	356	11.22	21.73	64.58	192	207
White round small sponge	30	1.54	1.23	4.25	186	204
cf. <i>Iophon</i> sp.	70	4.64	5.17	10.49	198	209

<i>Cnidaria</i>						
<i>Pennatula aculeata</i>	2	0.33	0.09	0.4	202	210
cf. <i>Telestula septentrionalis</i>	6	3.43	NA	3.43	197	197
<i>Paramuricea</i> sp.2	97	12.54	12.66	21.5	195	196
<i>Pachycerianthus borealis</i>	4	0.74	0.06	0.78	193	196
Actiniidae sp.2	22	0.4	0.14	0.79	186	218
Actiniidae sp.4	31	1.06	0.83	2.49	186	217
Hormathiidae sp.3	81	1.55	1.08	5.36	188	217
Actiniaria sp.6	2	1.38	NA	1.38	196	196
<i>Epizoanthus</i> brown	26	0.89	0.8	3.1	186	202
<i>Epizoanthus</i> yellow	1	0.31	NA	0.31	193	193
Hydroids	1	1.17	NA	1.17	194	194
<i>Brachiopoda</i>						
<i>Terebratulina septentrionalis</i>	6806	194.34	274.94	1002.52	186	196
<i>Echinodermata</i>						
<i>Cancer borealis</i>	7	0.35	0.08	0.48	186	198

<i>Henricia</i> sp.yellow	40	1.12	1.54	5.84	186	217
<i>Sclerasterias tanneri</i>	2	0.63	0.23	0.79	188	189
<i>Porania (P.) pulvillus</i> red	2	0.27	0.02	0.28	195	202
<i>Porania (P.) pulvillus</i> purple	9	0.31	0.1	0.49	186	209
Neoasteroidea	286	0.94	0.82	4.77	186	220
<i>Poraniomorpha (P.)</i> <i>hispida</i>	88	0.68	0.39	2.31	186	219

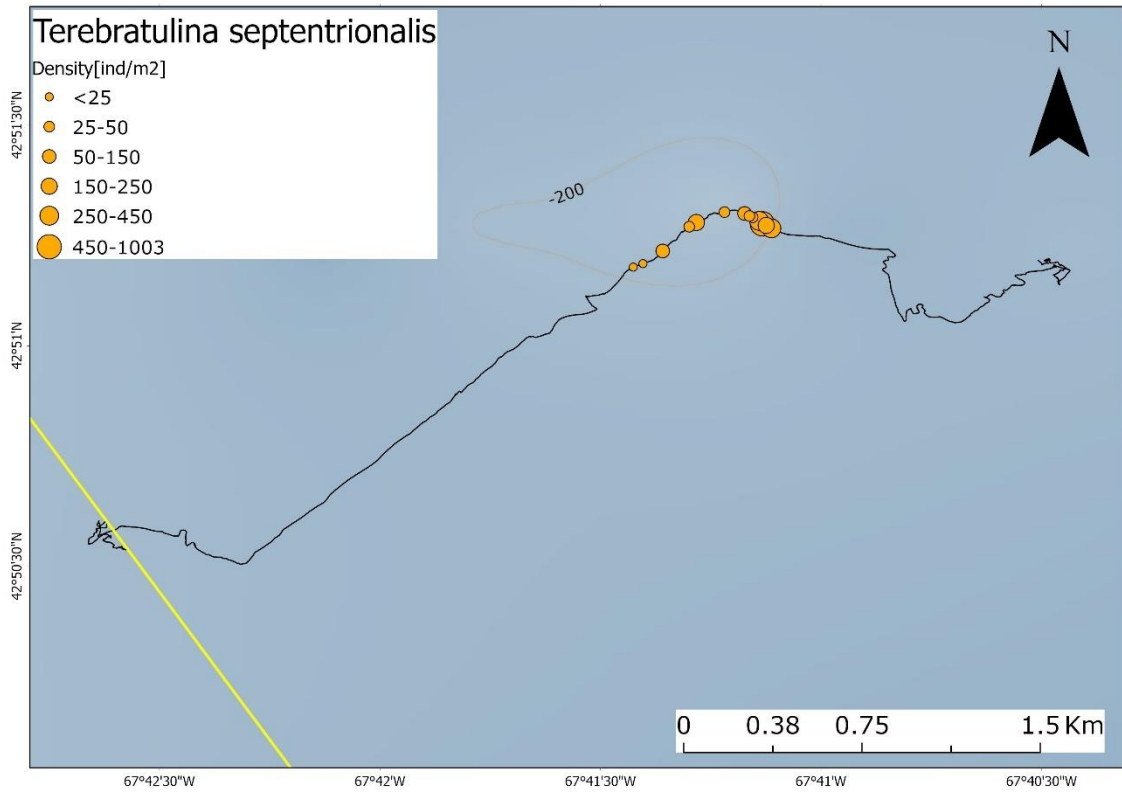


Figure 66. Density distribution of *Terebratulina septentrionalis* found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

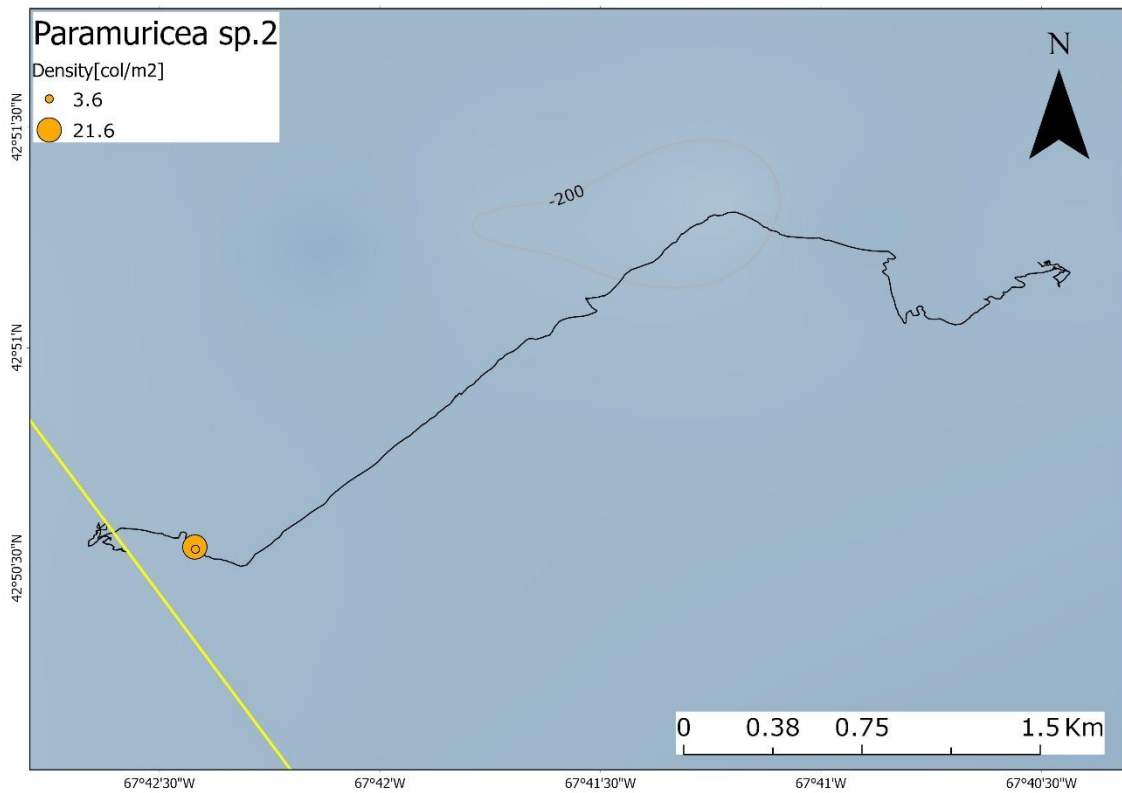


Figure 67. Density distribution of *Paramuricea* sp.2 found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

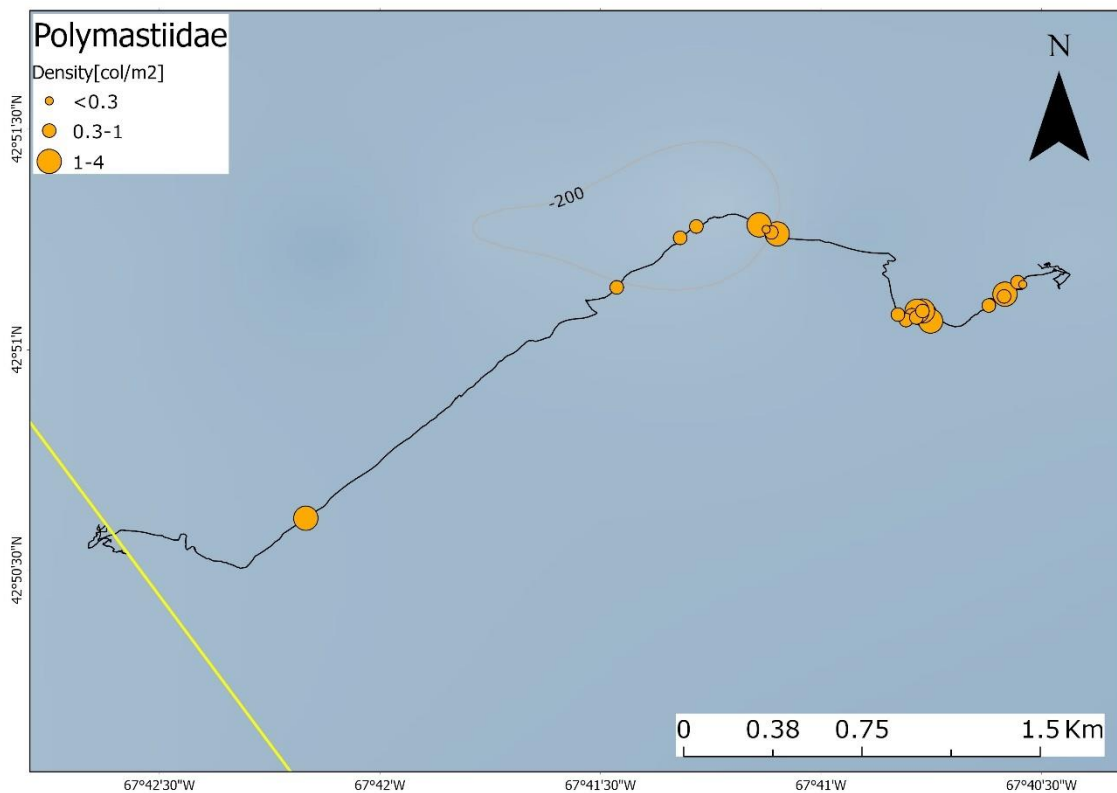


Figure 68. Density distribution of Polymastiidae (including *Polymastia uberrima*, Polymastiidae sp. 1, Polymastiidae sp. 2) found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

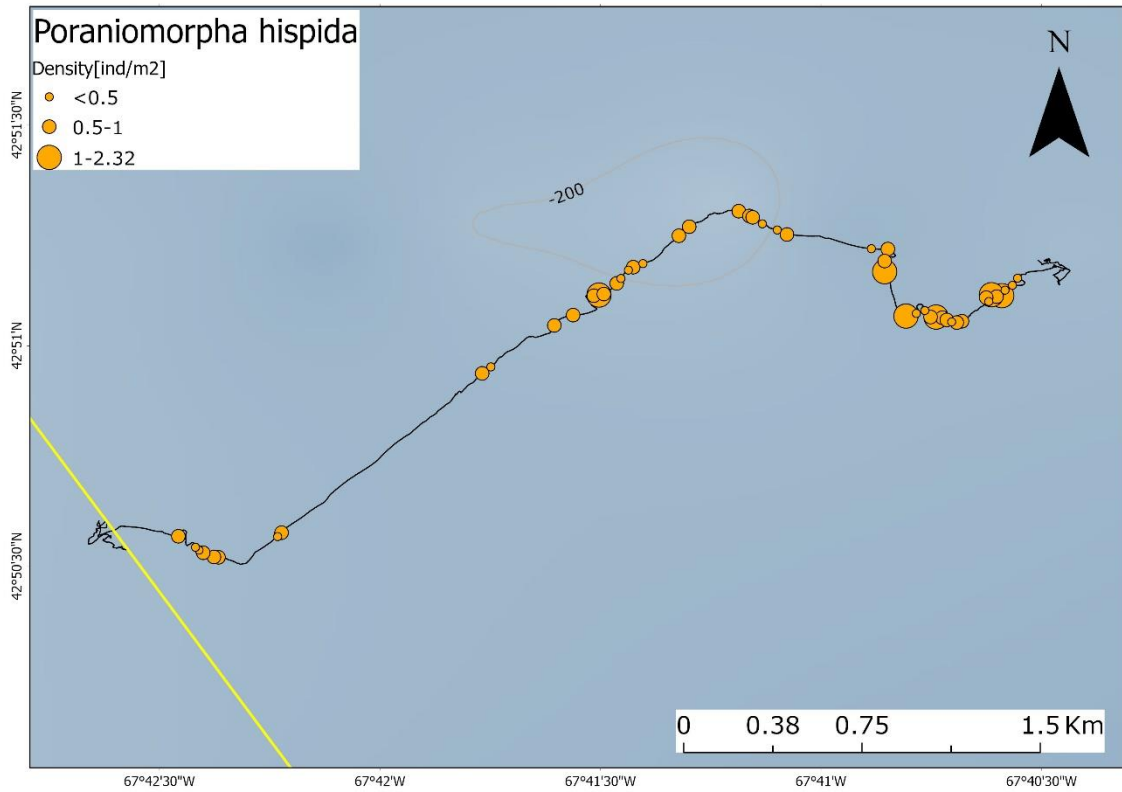


Figure 69. Density distribution of *Poraniomorpha hispida* found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

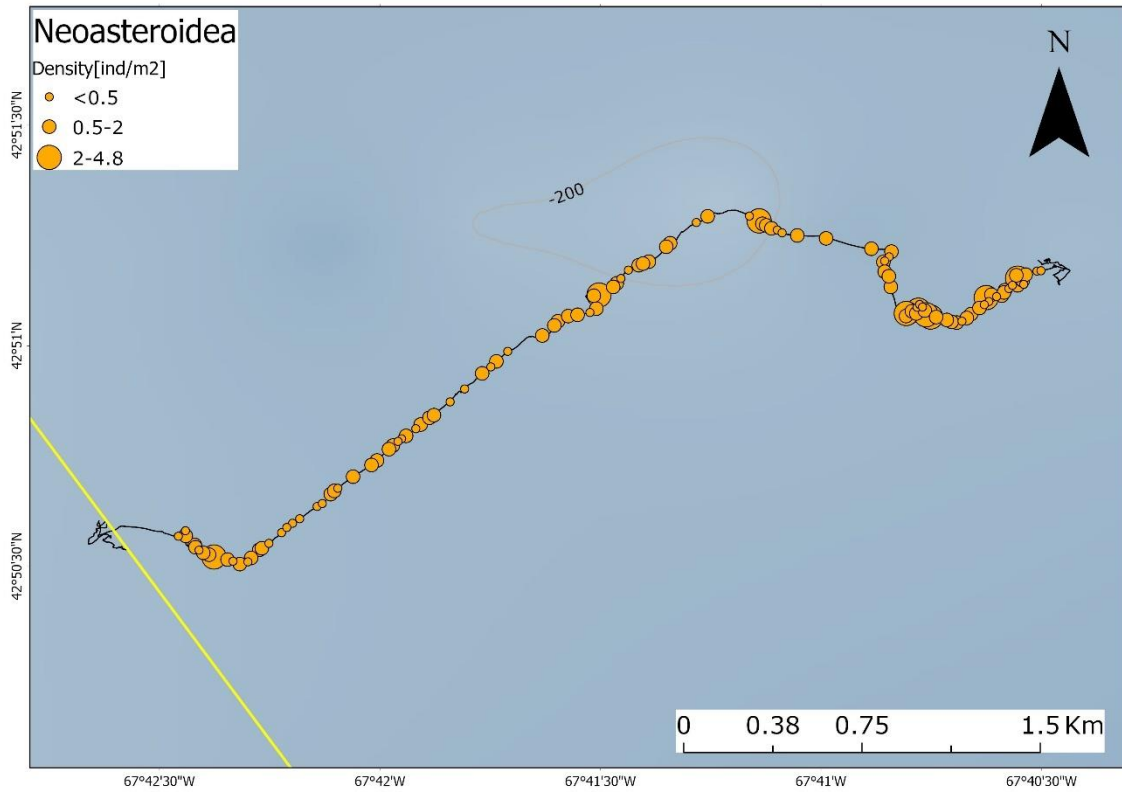


Figure 70. Density distribution of sea stars from the infraclass Neoasteroidea (containing at least three similar species) found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

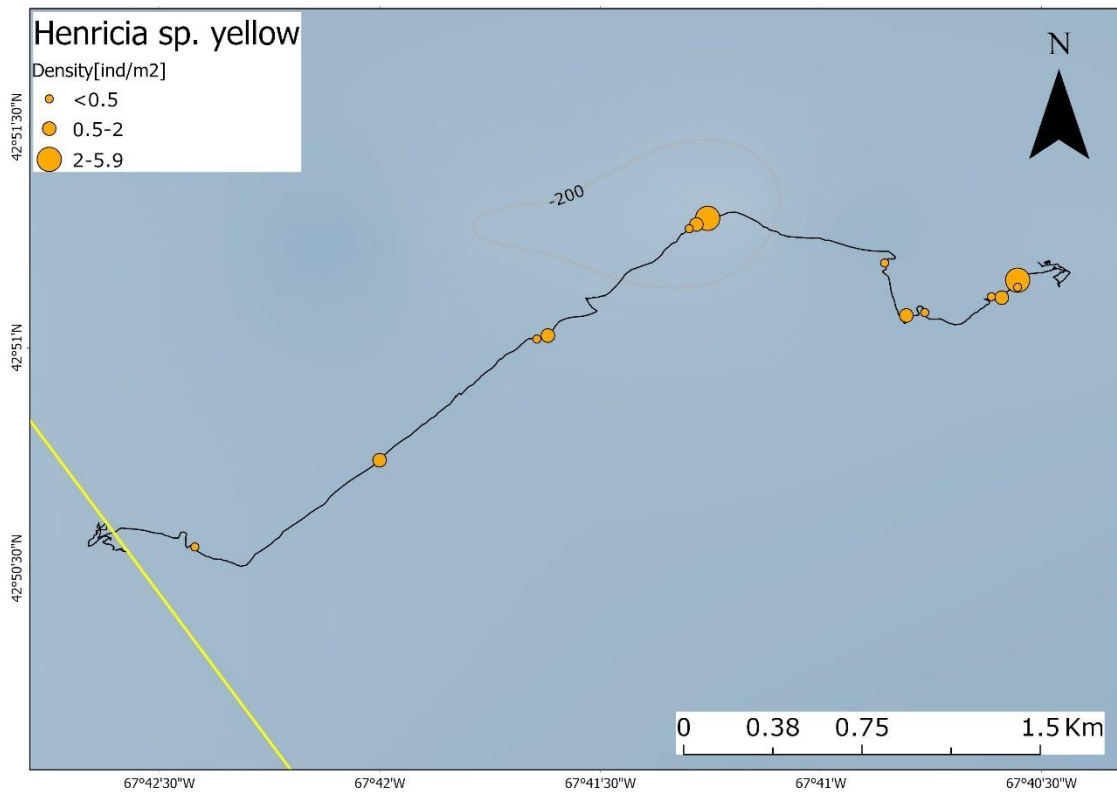


Figure 71. Density distribution of *Henricia* sp. found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

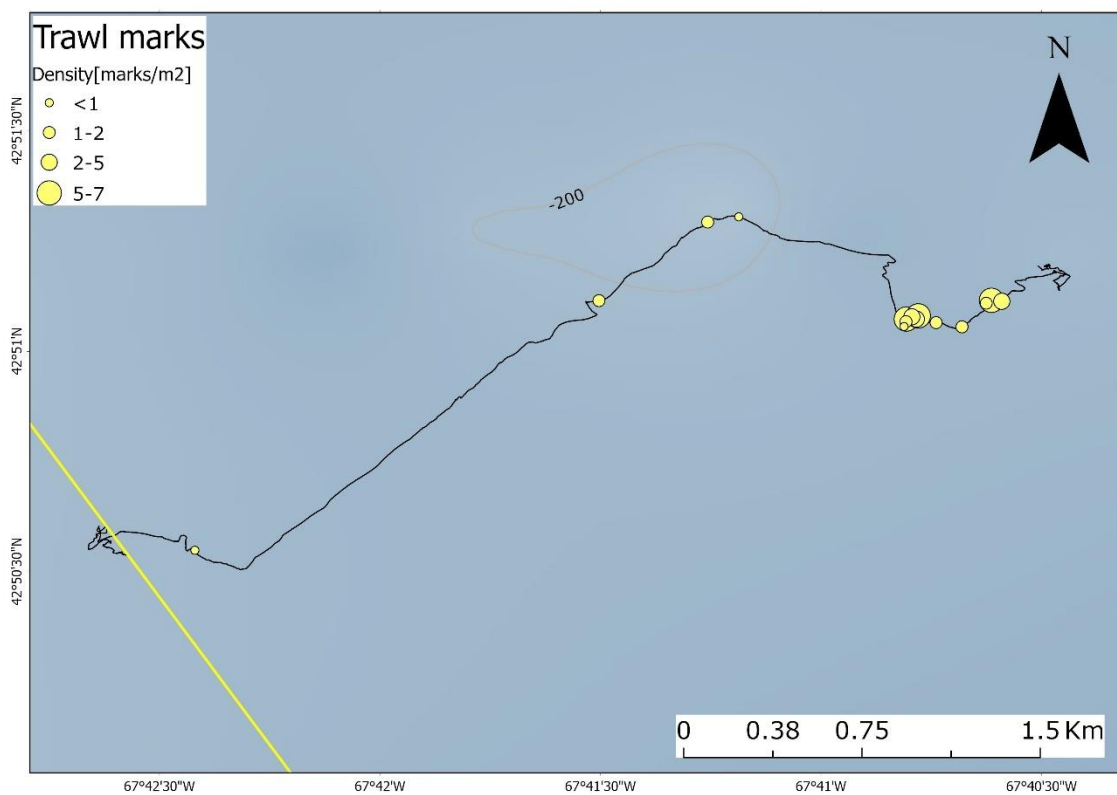


Figure 72. Density distribution of trawl marks found along the track of dive R2394 in the Gulf of Maine. Yellow line represents the USA-Canada border.

4. Documentation on the use of rights, limitations and required credits for summary imagery

Permission is given to Fisheries and Oceans Canada (DFO) Oceans, Maritimes Region to use the provided data, analyses and contextual elements of the project documentation (e.g. still images, ROV mission profile specifics, spatial information on occurrence of corals and other epifauna) for the following purposes:

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1. Inclusion in written departmental reports relating to the use of the information in consultations with stakeholders on coral conservation.
2. Retention and use of the submitted data/analysis in electronic format for use in preparing geospatial representations of coral distribution for subsequent internal analysis and integration with other information, again for consultations.

Imagery

1. Inclusion in written departmental reports and in media (e.g. presentations, posters, brochures) prepared for consultations with stakeholders and public outreach on coral conservation, with adherence to the limitations and credits.

Limitations

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1. The provided data may not be used for primary scientific publication without submission to the owner (Metaxas) of a written notice for such use. Any such use must clearly credit the data owner(s) and funding source(s).
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Credits for data and analyses: Anna Metaxas, Department of Oceanography, Dalhousie University Credits for imagery: Anna Metaxas, Department of Oceanography, Dalhousie University; Martha Nizinski, NOAA/NMFS, USA; CSSF/ROPOS

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7. Appendixes:

Appendix 1: Details of collected faunal samples entered in Smithsonian National Museum of Natural History

Catalogue number	Primary coll number (from time of Collecting Event)	Taxon: (Identification Details)	Date Collected:	Latitude: (Version 1.2 elements (3))	Longitude: (Version 1.2 elements (3))	Minimum Depth: (Version 1.2 elements (4))
1739291	HB2405-005	Paramuricea sp.: Plexauridae: Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.28608	-68.1163	1236.75
1739292	HB2405-011	Thouarella sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.28644	-68.1165	1240.97
1739293	HB2405-007	Paramuricea sp.: Plexauridae: Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.28701	-68.1148	1132.38
1739294	HB2405-004	Paramuricea sp.: Plexauridae: Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29006	-68.1166	
1739295	HB2405-017	Hydrozoa : Cnidaria	19 July 2024	40.29064	-68.1158	1071.79
1739296	HB2405-018	Zoanthidea : Anthozoa : Cnidaria	19 July 2024	40.29064	-68.1158	1071.79
1739297	HB2405-014	Paramuricea sp.: Plexauridae: Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29074	-68.1157	1066.67
1739298	HB2405-015	Ophiuroidea : Echinodermata	19 July 2024	40.29074	-68.1157	1066.67
1739299	HB2405-012	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29111	-68.115	1030.01
1739300	HB2405-010	Acanthogorgia sp. : Acanthogorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29115	-68.1149	1024.81
1739301	HB2405-009	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29135	-68.114	988.07

1739302	HB2405-002	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29134	-68.114	987.54
1739303	HB2405-001	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29152	-68.1137	974.23
1739304	HB2405-008	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29161	-68.1135	968.97
1739305	HB2405-003	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29186	-68.1125	952.27
1739306	HB2405-016	Porifera	19 July 2024	40.29395	-68.1115	870.48
1739307	HB2405-019	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29423	-68.1115	880.75
1739308	HB2405-013	Thouarella sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29429	-68.1116	884.92
1739309	HB2405-022	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29438	-68.1116	886.4
1739310	HB2405-021	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria & Actiniaria : Anthozoa : Cnidaria	19 July 2024	40.29439	-68.1116	886.67
1739311	HB2405-023	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29439	-68.1116	886.85
1739312	HB2405-006	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29439	-68.1116	886.85
1739313	HB2405-020	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29438	-68.1117	884.35
1739314	HB2405-025	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29437	-68.1117	888.18
1739315	HB2405-024	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	19 July 2024	40.29438	-68.1117	884.96

1739316	HB2405-043	Porifera	20 July 2024	40.22597	-67.8571	1698.27
1739317	HB2405-044	Ophiuroidea : Echinodermata	20 July 2024	40.22597	-67.8571	1698.27
1739318	HB2405-034	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22596	-67.8571	1698.29
1739319	HB2405-035	Ophiuroidea : Echinodermata	20 July 2024	40.22596	-67.8571	1698.29
1739320	HB2405-048	Decapoda : Malacostraca : Arthropoda	20 July 2024	40.22529	-67.857	1685.77
1739321	HB2405-032	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22532	-67.8571	1676.77
1739322	HB2405-033	Ophiuroidea : Echinodermata	20 July 2024	40.22532	-67.8571	1676.77
1739323	HB2405-040	Thouarella sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22534	-67.8574	1660.31
1739324	HB2405-041	Ophiuroidea : Echinodermata	20 July 2024	40.22534	-67.8574	1660.31
1739325	HB2405-042	Ophiuroidea : Echinodermata	20 July 2024	40.22534	-67.8574	1660.31
1739326	HB2405-030	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22531	-67.8575	1646.76
1739327	HB2405-031	Ophiuroidea : Echinodermata	20 July 2024	40.22531	-67.8575	1646.76
1739328	HB2405-046	Isididae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.2253	-67.8575	1645.81
1739329	HB2405-028	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22511	-67.8586	1581.84
1739330	HB2405-037	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22453	-67.8592	1499.23

1739331	HB2405-029	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22454	-67.8591	1485.57
1739332	HB2405-036	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22459	-67.8593	1496.83
1739333	HB2405-038	Paragorgia sp. : Paragorgiidae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22459	-67.8593	1497.33
1739334	HB2405-039	Actiniaria : Anthozoa : Cnidaria	20 July 2024	40.22459	-67.8593	1497.33
1739335	HB2405-027	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22414	-67.8588	1485.39
1739336	HB2405-047	Balticina sp. : Virgulariidae : Pennatulacea : Anthozoa : Cnidaria	20 July 2024	40.22413	-67.8588	1485.39
1739337	HB2405-026	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	20 July 2024	40.22508	-67.8623	1428.87
1739523	HB2405-049	Ophiuroidea : Echinodermata	20 July 2024	40.22529	-67.857	1685.77
1739338	HB2405-057	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06317	-66.3885	829.42
1739339	HB2405-056	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06355	-66.3887	829.57
1739340	HB2405-070	Porifera	21 July 2024	41.06373	-66.3892	804.04
1739341	HB2405-071	Ophiuroidea : Echinodermata	21 July 2024	41.06373	-66.3892	804.04
1739342	HB2405-064	Bivalvia : Mollusca	21 July 2024	41.06442	-66.3896	797.21
1739343	HB2405-063	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06442	-66.3896	797.21
1739344	HB2405-055	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06444	-66.3895	795.64

1739345	HB2405-059	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06489	-66.3892	772.97
1739346	HB2405-058	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06491	-66.3893	771.73
1739347	HB2405-054	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06456	-66.3895	773.15
1739348	HB2405-069	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06511	-66.3895	755.55
1739349	HB2405-062	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06508	-66.3895	754.64
1739350	HB2405-050	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06538	-66.3898	751
1739351	HB2405-065	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06543	-66.39	749.04
1739352	HB2405-066	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06545	-66.39	750.96
1739353	HB2405-053	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06563	-66.3906	744.95
1739354	HB2405-061	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06561	-66.3907	738.26
1739355	HB2405-052	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06566	-66.3912	741.19
1739356	HB2405-067	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06566	-66.3912	745.38
1739357	HB2405-051	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06854	-66.3957	744.83
1739358	HB2405-060	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06867	-66.3958	739.2
1739359	HB2405-068	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.06882	-66.3959	730.61

1739360	HB2405-072	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	21 July 2024	41.069	-66.3959	725.7
1739361	HB2405-075	Polychaeta : Annelida	21 July 2024	41.07048	-66.3984	743.32
1742035	HB2405-073	Acesta sp. : Limidae : : Bivalvia : Mollusca	21 July 2024	41.06188	-66.3855	911.98
1742036		Placiphorella sp. : Mopaliidae : : Polyplacophora : Mollusca	21 July 2024	41.06188	-66.3855	911.98
1742037		Gastropoda : Mollusca	21 July 2024	41.06188	-66.3855	911.98
1742038		Gastropoda : Mollusca	21 July 2024	41.06188	-66.3855	911.98
1742040	HB2405-074	Clavularia sp. : Clavulariidae : Alcyonacea : Anthozoa : Cnidaria	21 July 2024	41.06188	-66.3855	911.98
1742041		Ophiuroidea : Echinodermata	21 July 2024	41.06188	-66.3855	911.98
1742042		Crinoidea : Echinodermata	21 July 2024	41.06188	-66.3855	911.98
1742043		Porifera	21 July 2024	41.06188	-66.3855	911.98
1739362	HB2405-081	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32929	-66.1424	894.12
1739363	HB2405-080	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32906	-66.1424	883.54
1739364	HB2405-082	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32879	-66.1429	869.3
1739365	HB2405-077	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32856	-66.1433	844.55
1739366	HB2405-079	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32829	-66.1433	823.14

1739367	HB2405-078	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32825	-66.1434	819.5
1739368	HB2405-091	Nephtheidae : Alcyonacea : Anthozoa : Cnidaria	22 July 2024	41.3279	-66.1443	801.4
1739369	SF1/SF2	Ascidacea : Chordata & Actiniaria : Anthozoa : Cnidaria	22 July 2024	41.3279	-66.1443	801.4
1739370	HB2405-076	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32597	-66.1461	706.25
1739371	HB2405-084	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32604	-66.147	690.2
1739372	HB2405-085	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.3261	-66.1504	599.6
1739373	HB2405-090	Cladorhizidae : Poecilosclerida : Demospongiae : Porifera	22 July 2024	41.32601	-66.151	600.11
1739374	HB2405-087	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32722	-66.1509	608.6
1739375	HB2405-088	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32831	-66.1507	664.57
1739376	HB2405-083	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32814	-66.1511	655.76
1739377	HB2405-086	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32818	-66.1512	655.1
1739378	HB2405-089	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	22 July 2024	41.32804	-66.1511	650.63
1739379	HB2405-092	Decapoda : Malacostraca : Arthropoda	22 July 2024	41.32928	-66.1603	499.45
1739380	HB2405-093	Polymastia uberrima (Schmidt, 1870) : Polymastiidae : Hadromerida : Demospongiae : Porifera	23 July 2024	42.90885	-67.8979	203.97

1739381	HB2405-094	Porifera	23 July 2024	42.90752	-67.8986	204.93
1739382	HB2405-095	Ophiopholis aculeata (Linnaeus, 1767) : Ophiactidae : Ophiurida : Ophiuroidea : Echinodermata	23 July 2024	42.90752	-67.8986	204.93
1739383	HB2405-096	Asterias rubens Linnaeus, 1758 : Asteroidea : Forcipulatida : Echinodermata	23 July 2024	42.90553	-67.9024	201.08
1739384	HB2405-104	Nemertea	23 July 2024	42.90311	-67.9063	195.15
1739385	HB2405-097	Porifera	23 July 2024	42.90094	-67.9059	198.98
1739386	HB2405-098	Ophiuroidea : Echinodermata	23 July 2024	42.90094	-67.9059	198.98
1739387	HB2405-099	Pectinidae : Bivalvia : Mollusca	23 July 2024	42.90106	-67.9061	196.4
1739388	HB2405-100	Porifera	23 July 2024	42.89891	-67.9082	182.76
1739389	HB2405-103	Ophiuroidea : Echinodermata	23 July 2024	42.89847	-67.9084	179.56
1739390	HB2405-102	Crinoidea : Echinodermata	23 July 2024	42.89847	-67.9084	179.56
1739391	HB2405-101	Porifera	23 July 2024	42.89847	-67.9084	179.56
1739392	HB2405-105	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04733	-65.5762	493.21
1739393	HB2405-107	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04731	-65.5763	491.31
1739394	HB2405-119	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04731	-65.5763	491.61

1739395	HB2405-108	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04727	-65.5764	490.23
1739396	HB2405-111	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04723	-65.5764	489.37
1739397	HB2405-113	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04718	-65.5764	488.2
1739398	HB2405-116	Maxillopoda : Arthropoda	25 July 2024	42.04713	-65.5763	486.3
1739399	HB2405-114	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04713	-65.5763	486.3
1739400	HB2405-115	Ophiuroidea : Echinodermata	25 July 2024	42.04713	-65.5763	486.3
1739401	HB2405-117	Hydrozoa : Cnidaria	25 July 2024	42.04713	-65.5763	486.3
1739402	HB2405-120	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04711	-65.5763	487.21
1739403	HB2405-125	Ophiuroidea : Echinodermata	25 July 2024	42.0471	-65.5763	486.89
1739404	HB2405-121	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04708	-65.5762	486.14
1739405	HB2405-122	Maxillopoda : Arthropoda	25 July 2024	42.04708	-65.5762	486.14
1739406	HB2405-123	Ophiuroidea : Echinodermata	25 July 2024	42.04708	-65.5762	486.14
1739407	HB2405-124	Decapoda : Malacostraca : Arthropoda	25 July 2024	42.04708	-65.5762	486.14
1739408	HB2405-106	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04714	-65.5765	485.81
1739409	HB2405-118	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	25 July 2024	42.04711	-65.5764	487.02

1739410	HB2405-109	Alcyonacea : Anthozoa : Cnidaria	25 July 2024	42.05006	-65.5435	733.38
1739411	HB2405-112	Zoanthidea : Anthozoa : Cnidaria	25 July 2024	42.05004	-65.5435	733.1
1739412	HB2405-110	Zoanthidea : Anthozoa : Cnidaria	25 July 2024	42.0518	-65.5382	785.4
1739413	HB2405-128	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33828	-67.208	223.14
1739414	HB2405-129	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33828	-67.2079	223.09
1739415	HB2405-157	Terebratulina sp. : Cancellothyrididae : Terebratulida : Rhynchonellata : Brachiopoda	27 July 2024	43.33828	-67.2079	223.1
1739416	jar1	Mysida : Malacostraca : Arthropoda	27 July 2024	43.33828	-67.2079	223.1
1739417	HB2405-158	Ophiuroidea : Echinodermata	27 July 2024	43.33828	-67.2079	223.1
1739418	jar1	Bryozoa	27 July 2024	43.33828	-67.2079	223.1
1739419	jar1	Decapoda : Malacostraca : Arthropoda	27 July 2024	43.33828	-67.2079	223.1
1739420	HB2405-131	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33822	-67.2078	217.25
1739421	HB2405-130	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33822	-67.2078	217.27
1739422	HB2405-132	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33833	-67.2078	218.29
1739423	HB2405-133	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.3383	-67.2078	218.28

1739424	HB2405-134	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33834	-67.2078	218.3
1739425	HB2405-135	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33813	-67.2081	222.24
1739426	HB2405-136	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33813	-67.2081	222.19
1739427	HB2405-137	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33813	-67.2081	222.25
1739428	HB2405-138	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33804	-67.2083	225.79
1739429	HB2405-139	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33804	-67.2083	225.91
1739430	HB2405-140	Acanthogorgia sp. : Acanthogorgiidae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33804	-67.2083	225.9
1739431	HB2405-141	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33804	-67.2083	225.6
1739432	HB2405-142	Porifera	27 July 2024	43.3379	-67.208	216.9
1739433	HB2405-144	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33769	-67.208	215.72
1739434	HB2405-145	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33769	-67.208	215.73
1739435	HB2405-146	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.3377	-67.208	215.79
1739436	HB2405-147	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33694	-67.2079	213.91
1739437	HB2405-148	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33694	-67.2079	213.93
1739438	HB2405-149	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33694	-67.2079	214.12

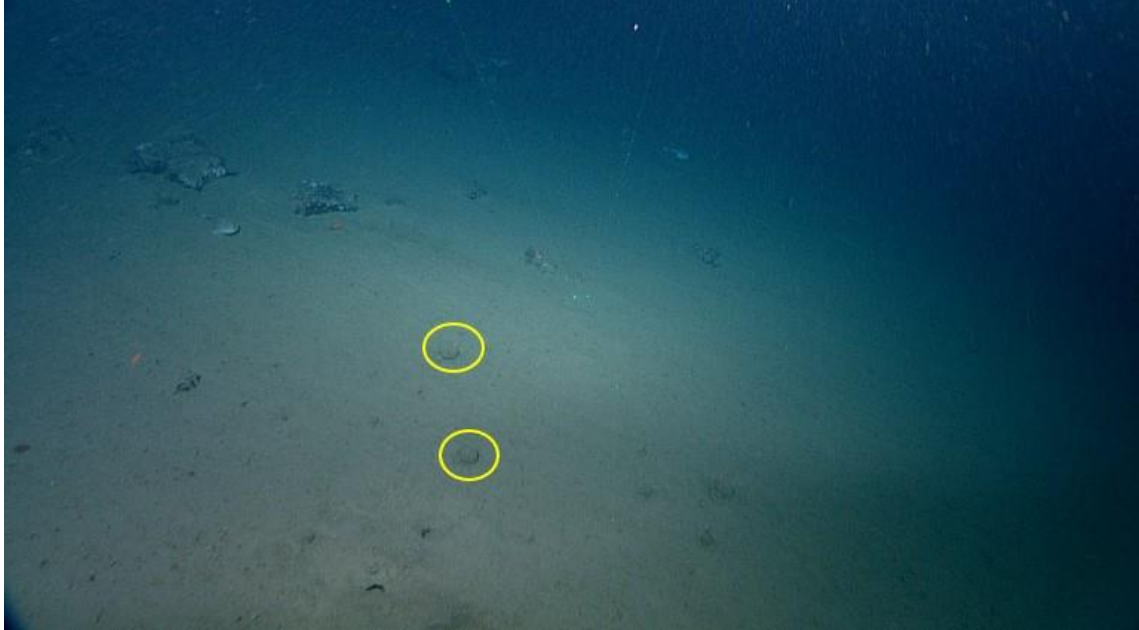
1739439	HB2405-150	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33598	-67.2087	217.71
1739440	HB2405-151	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33597	-67.2087	217.87
1739441	HB2405-152	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33597	-67.2087	217.93
1739442	HB2405-153	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33506	-67.2088	213.33
1739443	HB2405-154	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33506	-67.2088	213.42
1739444	HB2405-126	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33413	-67.2088	218.76
1739445	HB2405-155	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33371	-67.2088	223.64
1739446	HB2405-156	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33371	-67.2088	223.69
1739447	HB2405-143	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.33212	-67.209	222.28
1739448	HB2405-127	Primnoa sp. : Primnoidae : Gorgonacea : Anthozoa : Cnidaria	27 July 2024	43.31489	-67.216	211.1
1739449	HB2405-159	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	28 July 2024	42.8424	-67.707	196.08
1739450	HB2405-160	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	28 July 2024	42.84241	-67.707	195.78
1739451	HB2405-161	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	28 July 2024	42.84241	-67.707	195.85
1739452	HB2405-162	Porifera	28 July 2024	42.84596	-67.7278	202.89
1739453	HB2405-163	Porifera	28 July 2024	42.84596	-67.7278	202.89

1739454	HB2405-164	Isididae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03699	-69.0369	968.05
1739455	HB2405-165	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03681	-69.0365	959.74
1739456	HB2405-166	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03695	-69.0361	925.05
1739457	HB2405-180	Porifera	30 July 2024	40.03698	-69.0358	906.48
1739458	HB2405-181	Polychaeta : Annelida	30 July 2024	40.03698	-69.0358	906.48
1739459	HB2405-177	Alcyonacea : Anthozoa : Cnidaria	30 July 2024	40.03698	-69.0358	906.48
1739460	HB2405-178	Decapoda : Malacostraca : Arthropoda	30 July 2024	40.03698	-69.0358	906.48
1739461	HB2405-179	Polychaeta : Annelida	30 July 2024	40.03698	-69.0358	906.48
1739462	HB2405-167	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03681	-69.0346	875.41
1739463	HB2405-168	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03711	-69.0346	852.42
1739464	HB2405-170	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03655	-69.0323	829.24
1739465	HB2405-169	Cladorhizidae : Poecilosclerida : Demospongiae : Porifera	30 July 2024	40.03584	-69.031	850.41
1739466	HB2405-172	Ophiuroidea : Echinodermata	30 July 2024	40.03536	-69.0309	842.56
1739467	HB2405-171	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03536	-69.0309	842.56
1739468	HB2405-173	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03614	-69.0269	670.4

1739469	HB2405-182	Cladorhizidae : Poecilosclerida : Demospongiae : Porifera	30 July 2024	40.03486	-69.0271	770.59
1739470	HB2405-174	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.0322	-69.0259	809.47
1739471	HB2405-175	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03237	-69.0234	702.19
1739472	HB2405-176	Paramuricea sp. : Plexauridae : Gorgonacea : Anthozoa : Cnidaria	30 July 2024	40.03046	-69.0233	678.01

Appendix 2: Morphospecies catalogue used for megafaunal analysis in this cruise report. All images sourced from the CroCHET cruise (digital still camera (DSC) or extracted from videos).

Morphospecies taxonomic rank	Morphospecies <i>in situ</i> photo		Notes
Phylum: Foraminifera Class: Monothalamea Order: Astrorhizida Family: Rhabdamminidae Genus: <i>Bathysiphon</i> Sars, 1872 Morphospecies: <i>Bathysiphon</i> sp.1			

Phylum: Foraminifera Class: Monothalamea Suborder: Xenophyophoroidea Morphospecies: Xenophyophore			
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Phylum: Porifera Class: Demospongiae Order: Poecilosclerida Family: Acarnidae Genus: <i>Iophon</i> Gray, 1867 Morphospecies: cf. <i>Iophon</i> sp.				
Phylum: Porifera Class: Demospongiae Order: Poecilosclerida Family: Cladorhizidae Morphospecies: <i>Asbestopluma</i> (<i>Asbestopluma</i>) <i>pennatula</i> (Schmidt, 1875)				

Phylum: Porifera
Class: Demospongiae
Order: Polymastiida
Family: Polymastiidae

Morphospecies:
Polymastia uberrima
(Schmidt, 1870)



Phylum: Porifera Class: Demospongiae Order: Polymastiida Family: Polymastiidae Morphospecies: Polymastiidae sp.1				
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Phylum: Porifera Class: Demospongiae Order: Polymastiida Family: Polymastiidae Morphospecies: Polymastiidae sp.2		
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Phylum: Porifera
Class: Demospongiae
Order: Tetractinellida
Suborder: Astrophorina

Morphospecies:
Astrophorina white



Phylum: Porifera
Class: Demospongiae
Order: Tetractinellida
Suborder: Astrophorina

Morphospecies:
Astrophorina white with
Hexadella

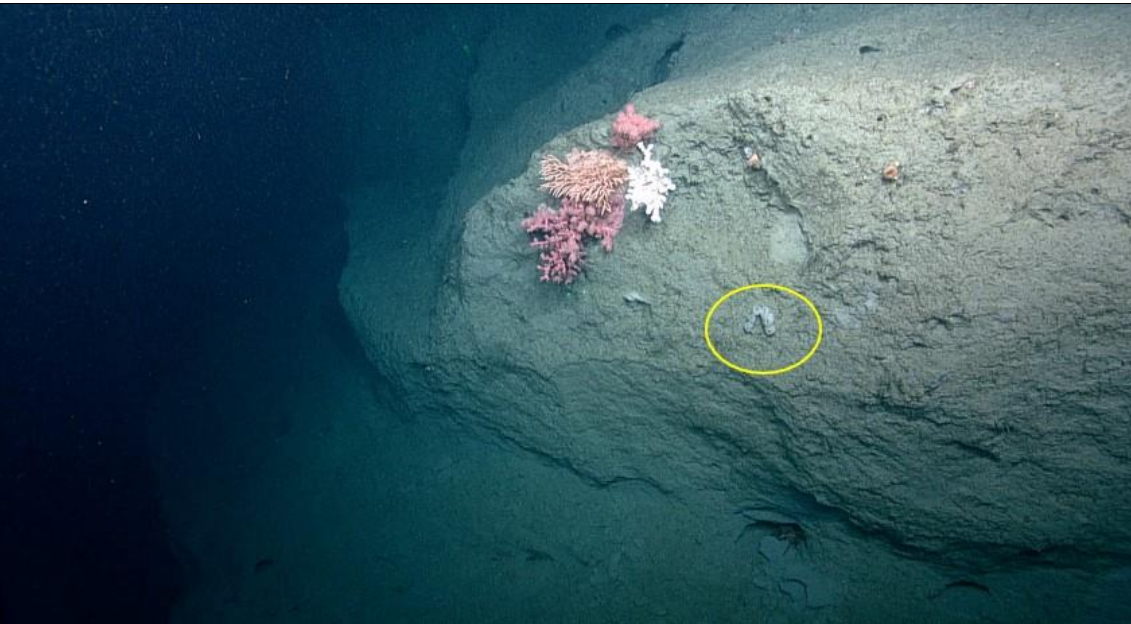


Phylum: Porifera
Class: Hexactinellida
Order: Lyssacinosida
Family: Rossellidae

Morphospecies: *Vazella
pourtalesii* (Schmidt,
1870)

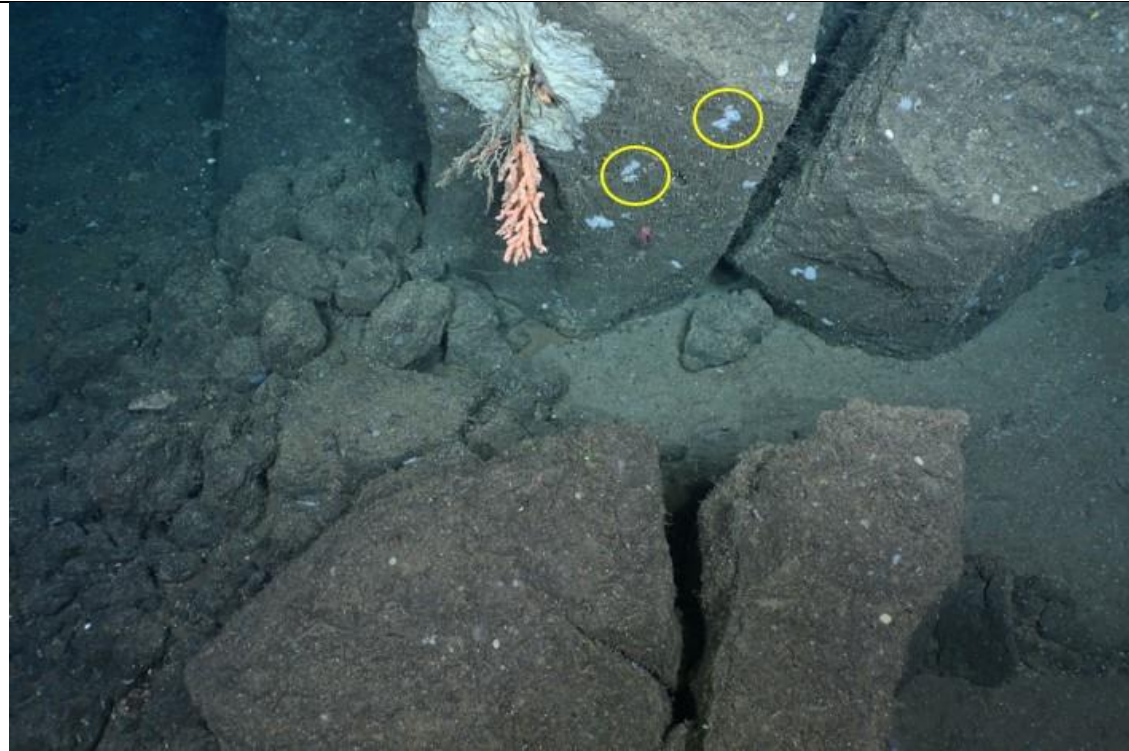


Phylum: Porifera Morphospecies: Arborescent sponge sp.1				
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Phylum: Porifera Morphospecies: Cup white sponge	
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Phylum: Porifera

Morphospecies:
Encrusting grey sponge



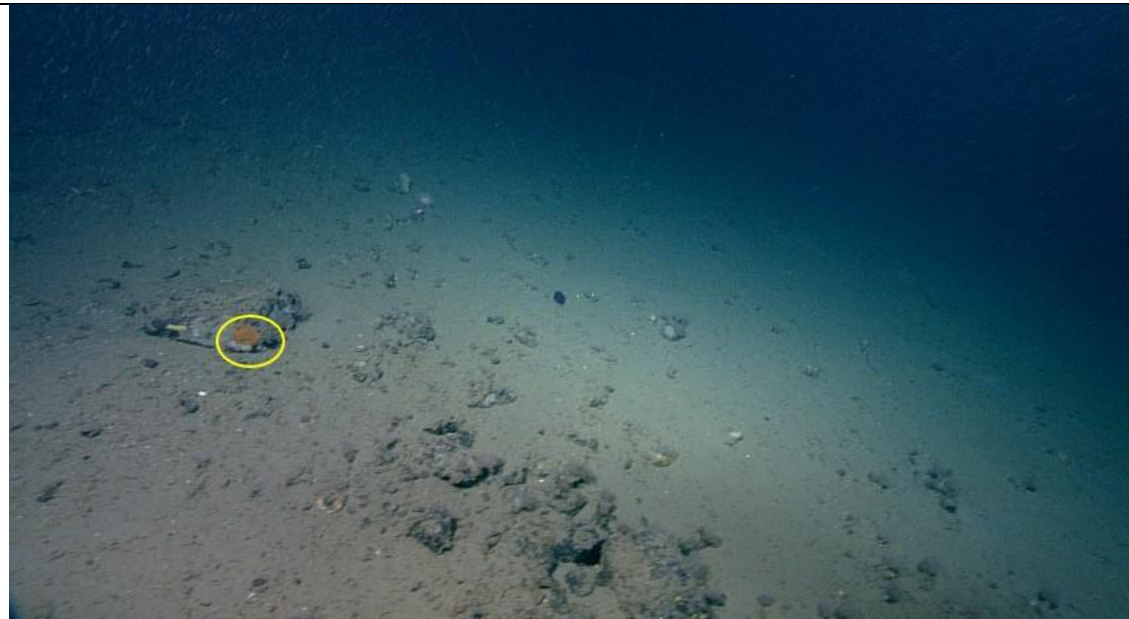
Phylum: Porifera

Morphospecies:
Encrusting monoporus
sponge



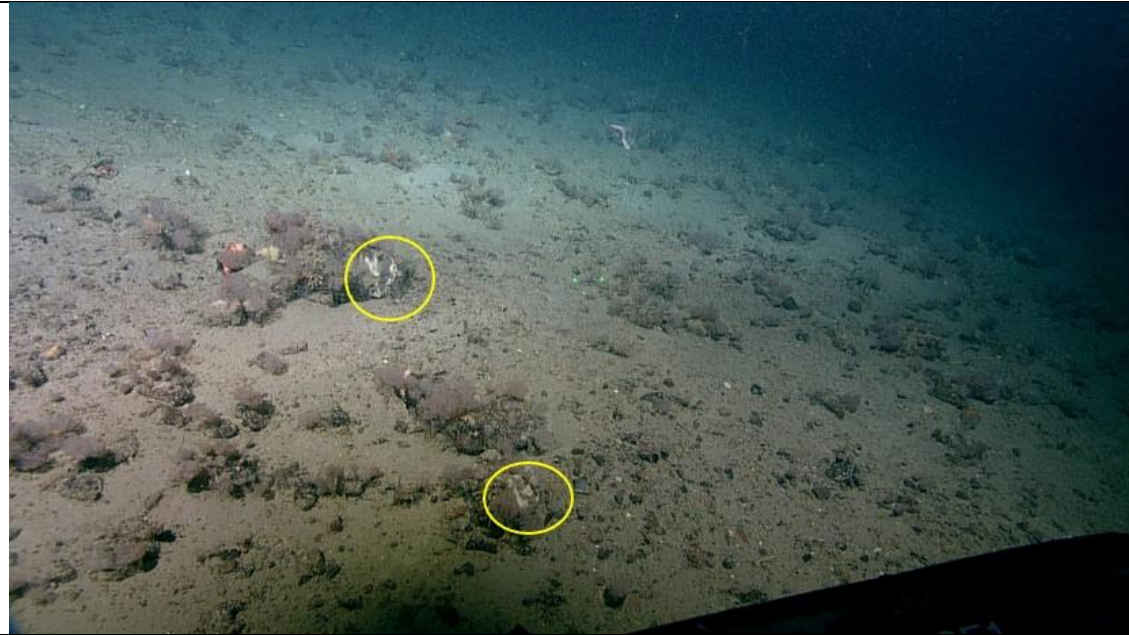
Phylum: Porifera

Morphospecies:
Encrusting orange sponge



Phylum: Porifera

Morphospecies:
Encrusting white sponge



Phylum: Porifera

Morphospecies:
Encrusting yellow sponge



Phylum: Porifera

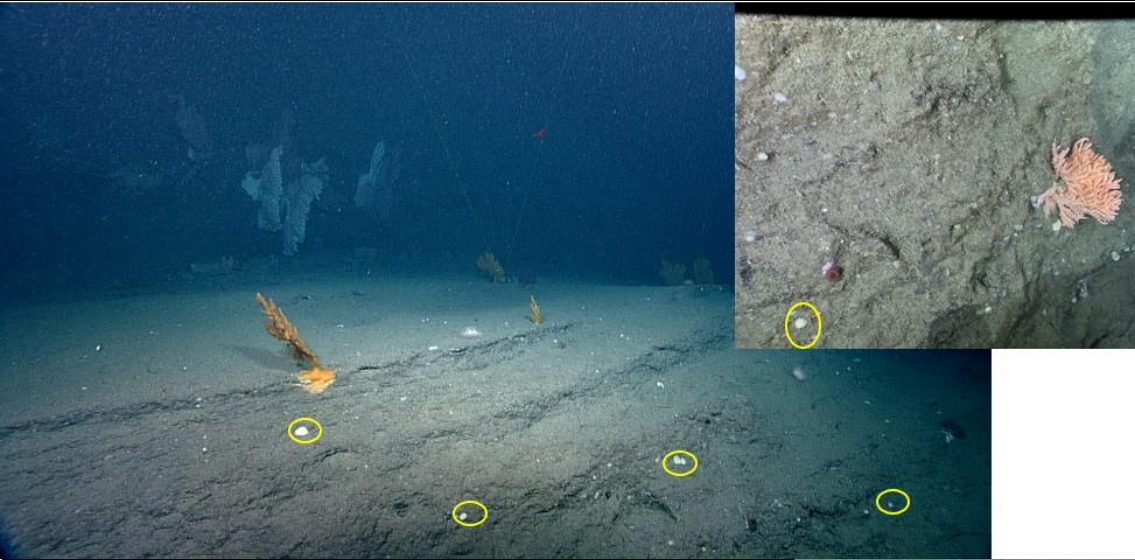
Morphospecies: Flabellate
white sponge



Phylum: Porifera

Morphospecies: Flabellate
yellow sponge



Phylum: Porifera Morphospecies: White round small sponge		
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Actiniidae Morphospecies: Actiniidae sp.2		

Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Actiniaria
Family: Actiniidae

Morphospecies:
Actiniidae sp.4



Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Actinoscyphiidae Genus: <i>Actinoscyphia</i> Stephenson, 1920 Morphospecies: cf. <i>Actinoscyphia</i> sp.				
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Actinostolidae Morphospecies: Actinostolidae sp.1				

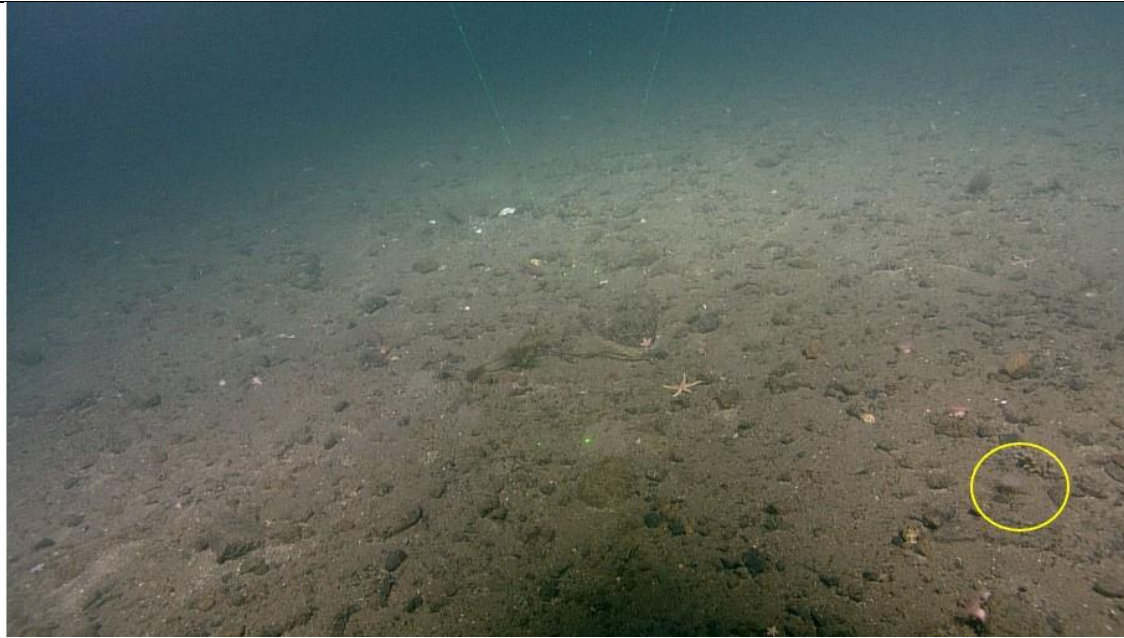
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Hormathiidae Genus: <i>Phelliactis</i> Simon, 1892 Morphospecies: <i>Phelliactis</i> sp.		
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Hormathiidae Morphospecies: Hormathiidae sp.3		

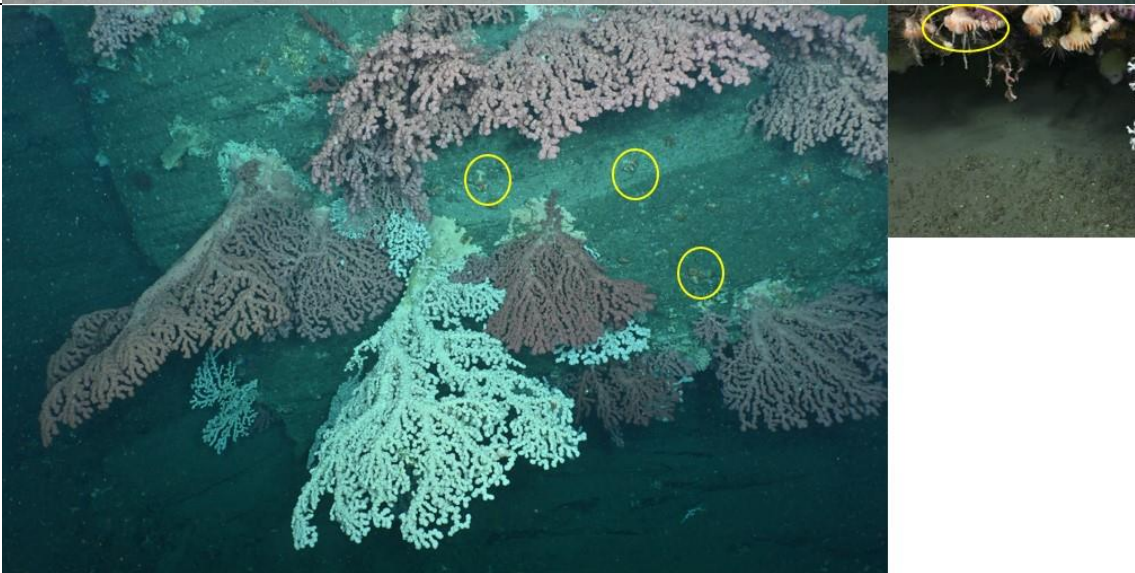
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Family: Hormathiidae Morphospecies: Hormathiidae sp.5			
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Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Actiniaria Morphospecies: Actiniaria sp.1		
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Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Actiniaria

Morphospecies: Actiniaria
sp.6



Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Ceriantharia Family: Cerianthidae Morphospecies: <i>Pachycerianthus borealis</i> (Verrill, 1873)	
Phylum: Cnidaria Subphylum: Anthozoa Class: Hexacorallia Order: Scleractinia Family: Caryophylliidae Morphospecies: <i>Desmophyllum dianthus</i> (Esper, 1794)	

Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Scleractinia
Family: Caryophylliidae

Morphospecies:
Desmophyllum pertusum
(Linnaeus, 1758)



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Scleractinia
Family: Caryophylliidae

Morphospecies:
Solenosmilia variabilis
Duncan, 1873



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Scleractinia
Family: Flabellidae

Morphospecies: cf.
Javania caillieti
(Duchassaing &
Michelotti, 1864)



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Zoantharia
Family: Epizoanthidae
Genus: *Epizoanthus* Gray,
1867

Morphospecies:
Epizoanthus brown



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Zoantharia
Family: Epizoanthidae
Genus: *Epizoanthus* Gray,
1867

Morphospecies:
Epizoanthus yellow



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Zoantharia
Family: Epizoanthidae

Morphospecies: Yellow
Zoanthid on Paramuricea



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Hexacorallia
Order: Zoantharia
Family: Epizoanthidae

Morphospecies: Yellow
Zoanthid on Primnoa



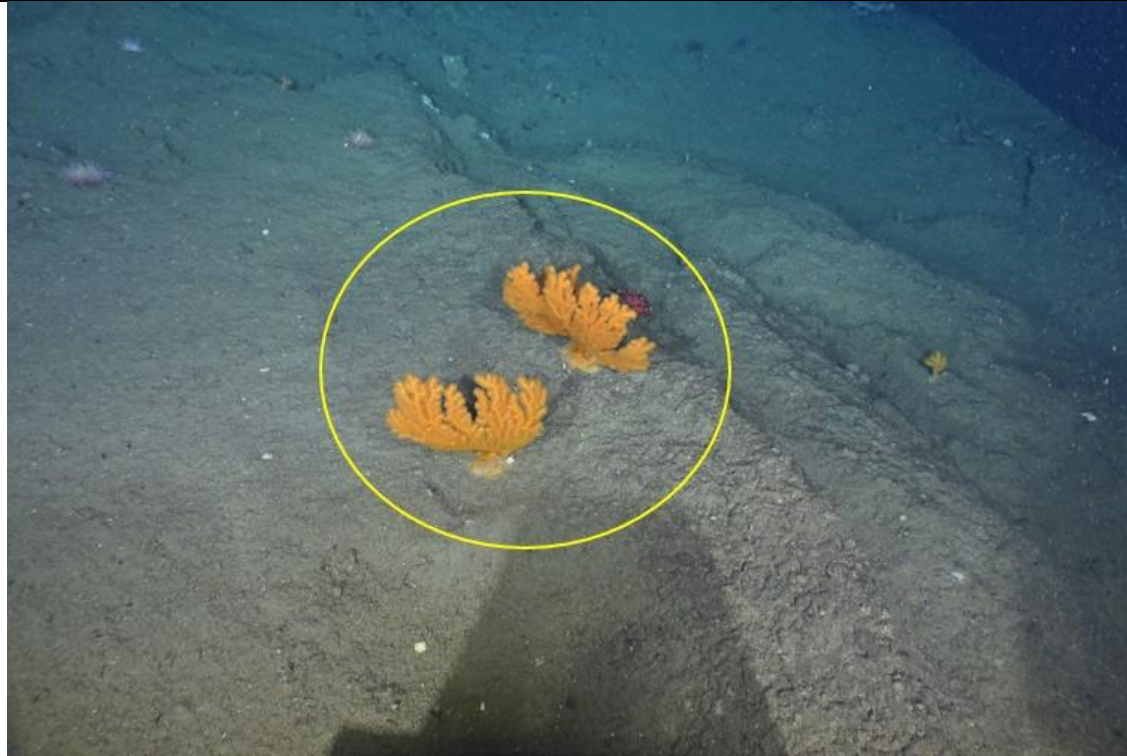
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Malacalcyonacea
Family: Acanthogorgiidae
Genus: *Acanthogorgia*
Gray, 1857

Morphospecies:
Acanthogorgia sp.



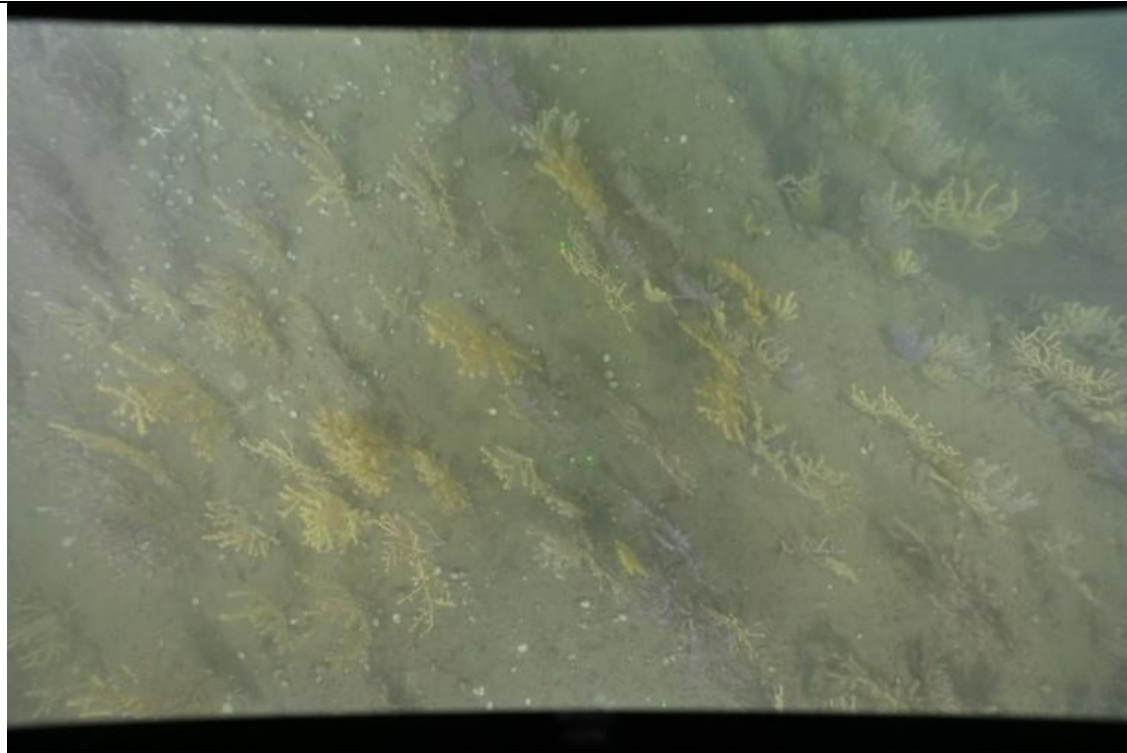
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Malacalcyonacea
Family: Acanthogorgiidae
Genus: *Paramuricea*
Kölliker, 1865

Morphospecies:
Paramuricea sp.1

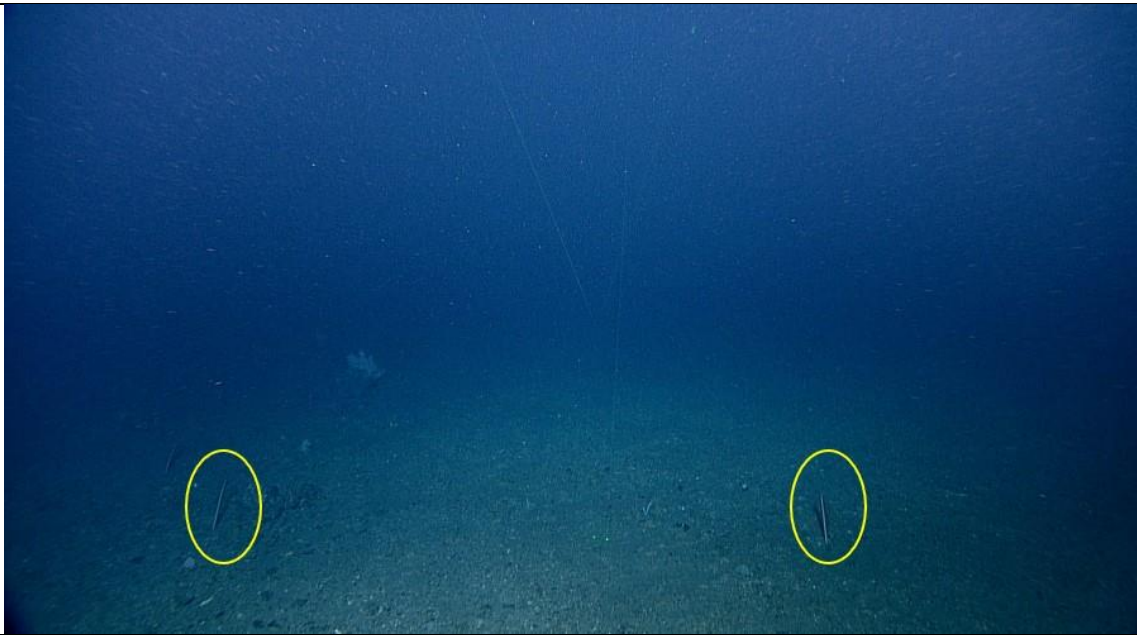


Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Malacalcyonacea
Family: Acanthogorgiidae
Genus: *Paramuricea*
Kölliker, 1865

Morphospecies:
Paramuricea sp.2

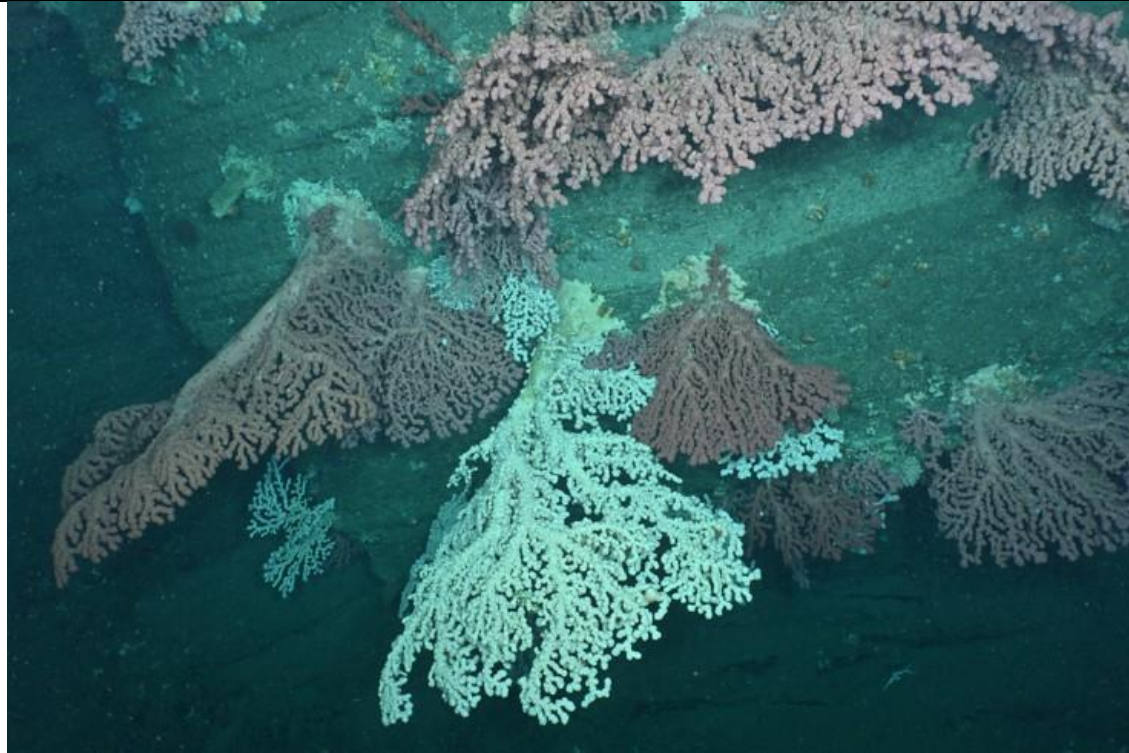


Phylum: Cnidaria Subphylum: Anthozoa Class: Octocorallia Order: Malacalcyonacea Family: Capnellidae Morphospecies: Capnellidae		Most likely it is species <i>Duva florida</i>, but similar species are present in the region belonging to genus <i>Drifa</i> and <i>Pseudodrifa</i>. It cannot be clear from the imagery all individuals are one species; hence we kept the family level.
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Phylum: Cnidaria Subphylum: Anthozoa Class: Octocorallia Order: Scleralcyonacea Family: Balticinidae Morphospecies: <i>Balticina finmarchica</i> (Sars, 1851)				
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Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Coralliidae

Morphospecies:
Paragorgia arborea
(Linnaeus, 1758)



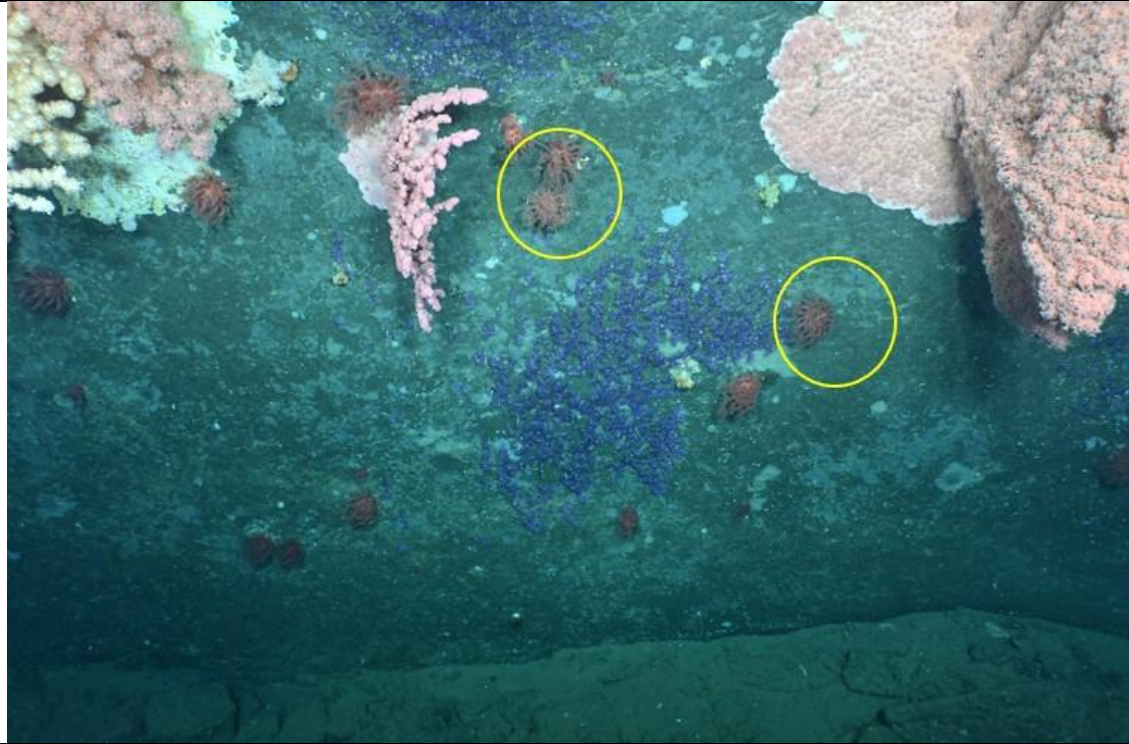
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Coralliidae

Morphospecies:
Paragorgia skeleton



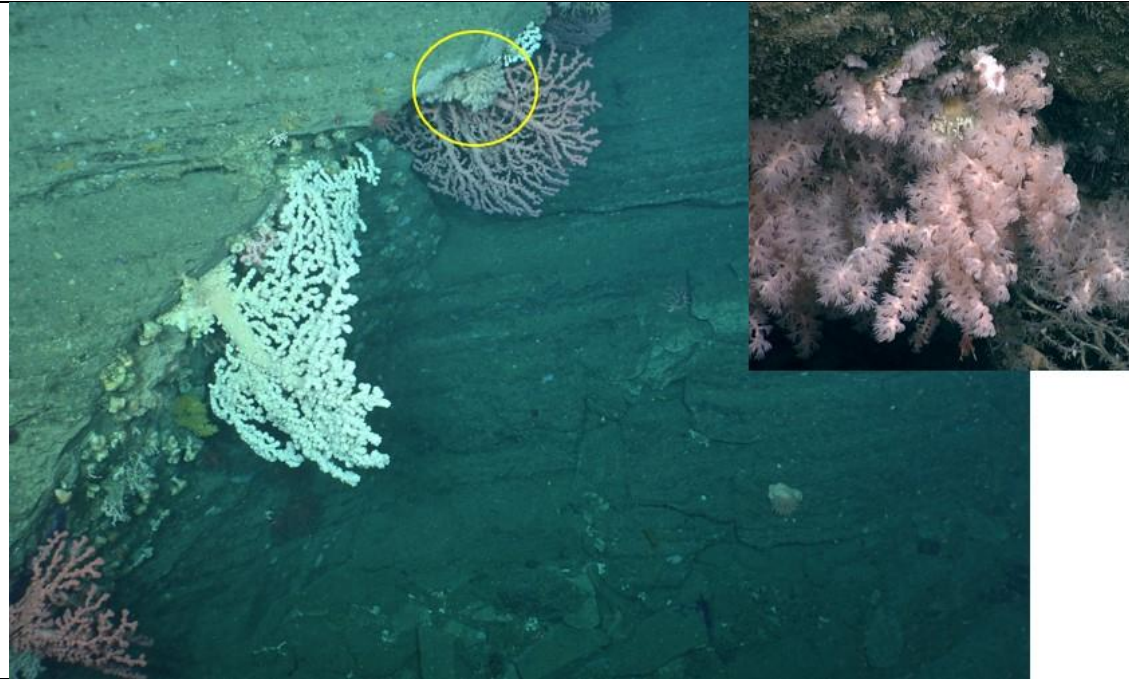
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Coralliidae

Morphospecies:
Anthomastinae



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Coralliidae

Morphospecies:
Anthothela grandiflora
(Sars, 1856)



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Keratoisididae
Genus: *Keratoisis* Wright,
1869

Morphospecies: *Keratoisis*
grayi.



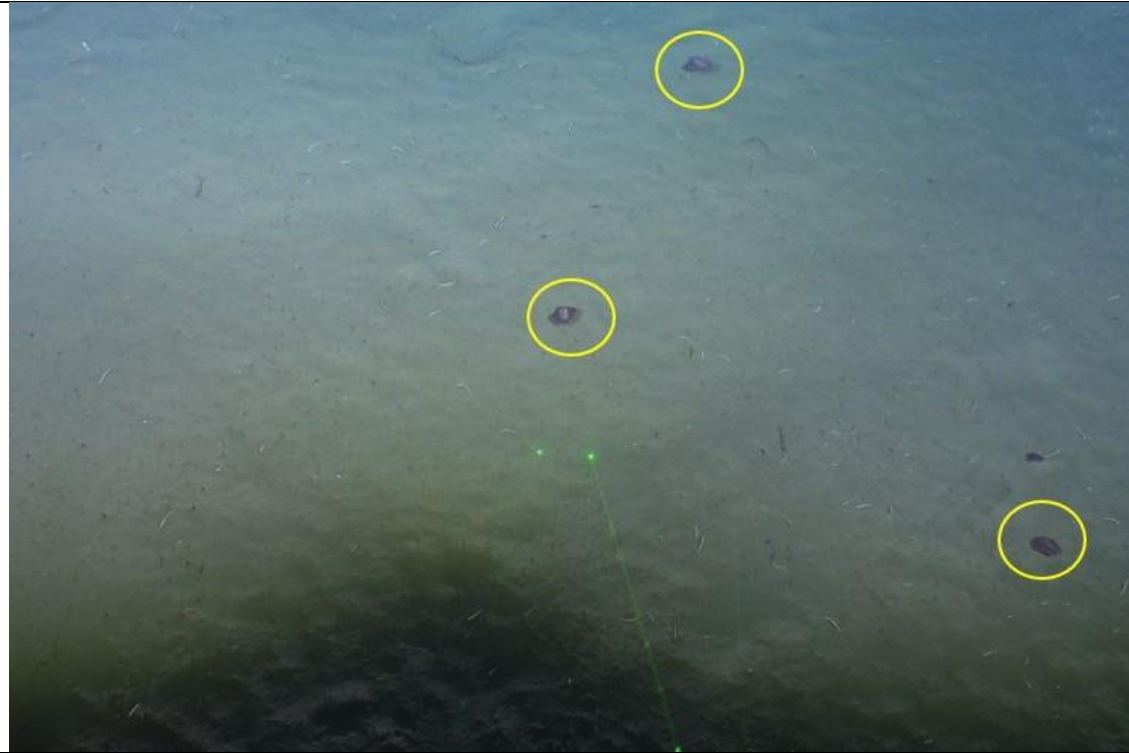
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Keratoisididae

Morphospecies: *Acanella*
arbuscula (Johnson, 1862)



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Pennatulidae

Morphospecies: *Pennatula
aculeata* Danielssen, 1860



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Primnoidae

Morphospecies: *Primnoa
resedaeformis* (Gunnerus,
1763)



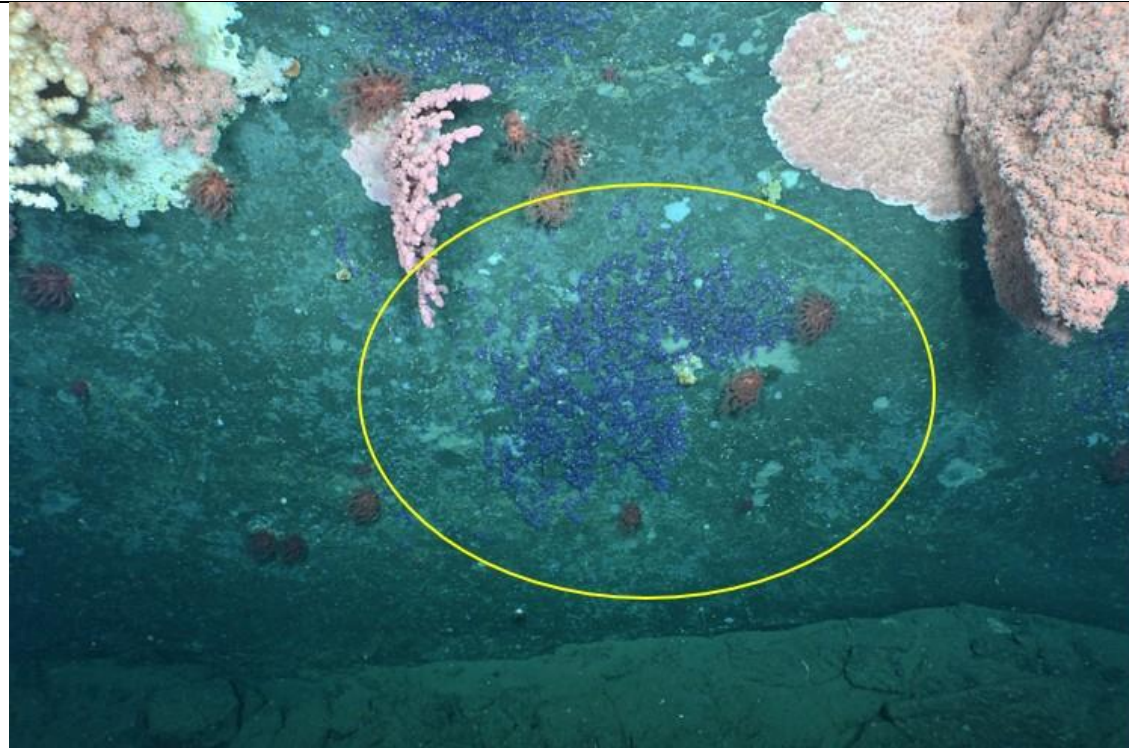
Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea
Family: Sarcodictyonidae

Morphospecies: cf.
Telestula septentrionalis
Madsen, 1944



Phylum: Cnidaria
Subphylum: Anthozoa
Class: Octocorallia
Order: Scleralcyonacea

Morphospecies:
Scleralcyonacea purple



Phylum: Cnidaria

Class: Hydrozoa

Morphospecies: Hydroids



Phylum: Mollusca
Class: Cephalopoda
Order: Octopoda
Family: Bathypolypodidae

Morphospecies:
Bathypolypus bairdii (A.
E. Verrill, 1873)



Phylum: Mollusca
Class: Cephalopoda
Order: Oegopsida
Family: Ommastrephidae

Morphospecies: cf. *Illex*
illecebrosus (Lesueur,
1821)



Phylum: Mollusca
Class: Cephalopoda
Order: Sepiida
Family: Sepiolidae
Genus: *Rossia* Owen,
1835

Morphospecies: *Rossia* sp.



Phylum: Brachiopoda
Subphylum:
Rhynchonelliformea
Class: Rhynchonellata
Order: Terebratulida
Family:
Cancellothyrididae

Morphospecies:
Terebratulina
septentrionalis (Couthouy,
1838)



Phylum: Arthropoda Subphylum: Crustacea Class: Malacostraca Order: Decapoda Family: Cancridae Morphospecies: <i>Cancer borealis</i> Stimpson, 1859				
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Phylum: Arthropoda
Subphylum: Crustacea
Class: Malacostraca
Order: Decapoda
Family: Geryonidae

Morphospecies: *Chaceon
quinquedens* (Smith,
1879)



Phylum: Arthropoda
Subphylum: Crustacea
Class: Malacostraca
Order: Decapoda
Family: Lithodidae

Morphospecies: *Lithodes
maja* (Linnaeus, 1758)



Phylum: Arthropoda
Subphylum: Crustacea
Class: Thecostraca
Order: Balanomorpha
Family: Balanidae

Morphospecies: *Chirona hameri* (Ascanius, 1767)



Phylum: Arthropoda
Subphylum: Crustacea
Class: Thecostraca
Order: Scalpellomorpha
Family: Scalpellidae

Morphospecies:
Arcoscalpellum
michelottianum
(Seguenza, 1876)



Phylum: Echinodermata
Subphylum: Asterozoa
Class: Asteroidea
Order: Brisingida
Family: Novodiniidae

Morphospecies: cf.
Novodinia americana
(Verrill, 1880)



Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Forcipulatida Family: Asteriidae Genus: <i>Asterias</i> Linnaeus, 1758 Morphospecies: <i>Asterias</i> sp.	 A photograph of a rocky seabed. A starfish with five arms, light brown in color, is circled in yellow in the lower center of the image. The background consists of dark, wet rocks and some green algae.	Annotated under Neoasteroidea (Infraclass) along with <i>Henricia</i> sp. white and <i>Leptasterias</i>, as they were difficult to distinguish from ROV images
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Phylum: Echinodermata
Subphylum: Asterozoa
Class: Asteroidea
Order: Forcipulatida
Family: Asteriidae
Genus: *Sclerasterias*
Perrier, 1891

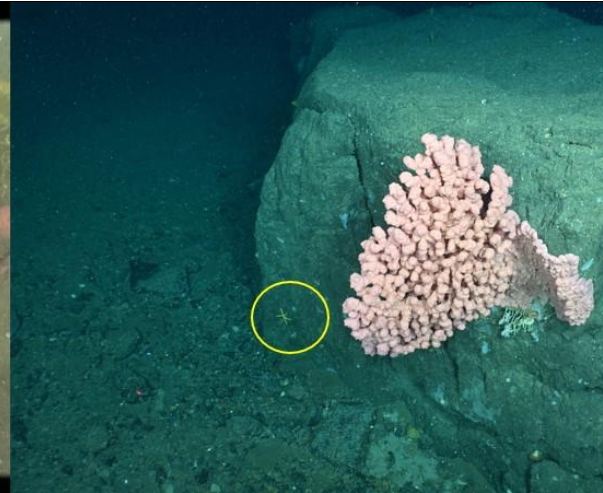
Morphospecies:
Sclerasterias tanneri



Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Spinulosida Family: Echinasteridae Genus: <i>Henricia</i> Gray, 1840 Morphospecies: <i>Henricia</i> sp. white		Annotated under Neoasteroidea (Infraclass) along with <i>Asterias</i> sp., <i>Leptasterias</i>, as they were difficult to distinguish from ROV images
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Phylum: Echinodermata
Subphylum: Asterozoa
Class: Asteroidea
Order: Spinulosida
Family: Echinasteridae
Genus: *Henricia* Gray,
1840

Morphospecies: *Henricia*
sp. yellow



Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Valvatida Family: Goniasteridae Morphospecies: <i>Hippasteria phrygiana</i> (Parelius, 1768)				
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Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Valvatida Family: Poraniidae Genus: <i>Chondraster</i> Verrill, 1895 Morphospecies: cf. <i>Chondraster</i> sp.	 An underwater photograph showing a pink starfish on a dark, rocky seabed. The starfish is circled in yellow. The surrounding environment includes greenish-brown algae and other small marine organisms. Two green laser pointers are visible in the lower center of the image.	Annotated under <i>Porania pulvillus</i> red along with <i>Porania pulvillus</i> red, as they were difficult to distinguish from ROV images
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Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Valvatida Family: Poraniidae Morphospecies: <i>Porania</i> (<i>Porania</i>) <i>pulvillus</i> purple (O.F. Müller, 1776)					
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Phylum: Echinodermata
Subphylum: Asterozoa
Class: Asteroidea
Order: Valvatida
Family: Poraniidae

Morphospecies: *Porania*
(*Porania*) *pulvillus* red
(O.F. Müller, 1776)



Phylum: Echinodermata Subphylum: Asterozoa Class: Asteroidea Order: Valvatida Family: Poraniidae Morphospecies: <i>Poraniomorpha</i> <i>(Poraniomorpha) hispida</i> (Stuxberg, 1878)			This morphospecies might also include <i>Pteraster militaris</i>, but here all were annotated as <i>Poraniomorpha (Poraniomorpha) hispida</i>
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Phylum: Echinodermata
Subphylum: Echinozoa
Class: Echinoidea
Order: Camarodonta
Family:
Strongylocentrotidae

Morphospecies:
Strongylocentrotus
pallidus (Sars G.O., 1872)



Appendix 3. Cruise logo

