Epibenthic Megafauna of the Flemish Pass and Sackville Spur (Northwest Atlantic) Identified from *In Situ* Benthic Image Transects

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2015

Canadian Technical Report of
Fisheries and Aquatic Sciences 3127

Canadian Technical Report of Fisheries and Aquatic Sciences

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Cat. No. Fs 97-6/3127E ISBN 978-0-660-02028-0 ISSN 0706-6457
Cat. No. Fs 97-6/3127E-PDF ISBN 978-0-660-02029-7 ISSN 0706-6457

Correct citation for this publication:

Beazley, L.I. and Kenchington, E.L. 2015. Epibenthic Megafauna of the Flemish Pass and Sackville Spur (Northwest Atlantic) Identified from *In Situ* Benthic Image Transects. Can. Tech. Rep. Fish. Aquat. Sci. 3127: v + 496 p.

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ABSTRACT

Beazley, L.I. and Kenchington, E.L. 2015. Epibenthic Megafauna of the Flemish Pass and Sackville Spur (Northwest Atlantic) Identified from *In Situ* Benthic Image Transects. Can. Tech. Rep. Fish. Aquat. Sci. 3127: v + 496 p.

In 2009, the Department of Fisheries and Oceans Canada conducted *in situ* benthic image surveys in the Northwest Atlantic Fisheries Organization (NAFO) Regulatory Area (NRA) to identify and characterize benthic "vulnerable marine ecosystems" (VME) as part of Canada's contribution to the international 'NEREIDA' programme. This benthic imagery was subsequently analyzed for the abundance of epibenthic megafauna, specifically to determine the influence of sponge ground VMEs on the composition, abundance and diversity of the associated megafaunal community. This technical report serves a twofold purpose: 1) to describe in detail the methods used to acquire, process, and analyze the benthic images collected in the Flemish Pass/western Flemish Cap slope and Sackville Spur, and 2) to provide a visual representation of the epibenthic megafauna recorded in the images, and their taxonomic identities as reported in previous publications. As the Department of Fisheries and Oceans currently does not have a means of archiving image data for public use, this report is meant to assist in future monitoring of these areas by providing a visual guide and detailed descriptions of the epibenthic megafauna recorded in these areas, and should serve as a source for applying a common nomenclature for future applications.

RÉSUMÉ

Beazley, L.I. and Kenchington, E.L. 2015. Epibenthic Megafauna of the Flemish Pass and Sackville Spur (Northwest Atlantic) Identified from *In Situ* Benthic Image Transects. Can. Tech. Rep. Fish. Aquat. Sci. 3127: v + 496 p.

En 2009, Pêches et Océans Canada a mené des relevés photographiques benthiques *in situ* dans la zone réglementée par l'Organisation des pêches de l'Atlantique Nord-Ouest, en vue de déterminer et de caractériser les « écosystèmes marins vulnérables » benthiques dans le cadre de la contribution du Canada au programme NEREIDA international. Cette imagerie benthique a par la suite été analysée pour illustrer l'abondance de la mégafaune épibenthique, plus précisément pour déterminer l'influence des écosystèmes marins vulnérables de lits d'éponges sur la composition, l'abondance et la diversité de la mégafaune connexe. Le présent rapport technique poursuit un double objectif : 1) décrire en détail les méthodes utilisées pour acquérir, traiter et analyser les images benthiques recueillies dans la passe Flamande, le talus du Bonnet Flamand (ouest) et l'éperon de Sackville et 2) fournir une représentation visuelle de la mégafaune épibenthique captée dans les images et de son identité taxonomique signalée dans les publications précédentes. Puisque Pêches et Océans Canada ne dispose pas actuellement d'un moyen d'archiver les données d'images en vue d'une utilisation publique, le présent rapport vise à aider la surveillance future de ces zones en fournissant un guide visuel et des descriptions détaillées de la mégafaune épibenthique signalée dans ces zones. Le présent rapport doit être utilisé à titre de ressource pour attribuer une appellation commune pour les futures applications.

INTRODUCTION

In 2009 *in situ* benthic surveys were undertaken in the Northwest Atlantic Fisheries Organization (NAFO) Regulatory Area (NRA) to identify and characterize benthic "vulnerable marine ecosystems" (VME) (*sensu* FAO, 2009). Benthic image drift transects were conducted on the Flemish Cap slope, including Flemish Pass and Sackville Spur, using one of two camera survey systems developed at the Bedford Institute of Oceanography (BIO), Dartmouth, Nova Scotia, Canada, and deployed from CCGS *Hudson*. These surveys were part of Canada's contribution to the international NEREIDA research programme (http://www.nafo.int/science/frames/nereida.html) led by Spain and Canada. Through this programme, multiple research tools and devices were used to identify the presence and distribution of VMEs in the NRA. As part of the Canadian contribution, benthic imagery transects collected in the Flemish Pass/western Flemish Cap slope and on the Sackville Spur were analyzed for the abundance of epibenthic megafauna, specifically to determine the influence of sponge ground VMEs on the abundance, composition, and diversity of the associated megafaunal community. Drivers of these megafaunal communities were further examined to determine the relative importance of abiotic factors in explaining the observed patterns. Results of these analyses have been published in the primary literature (see Beazley et al., 2013; 2015). Beazley et al. (2013) found that in the Flemish Pass, the presence of structure-forming sponges (the constituents of sponge ground VMEs) was associated with a higher abundance, biodiversity, and different composition of associated megafauna compared to non-sponge habitat. There, the most important determinants in generalized linear models of megafaunal species richness and abundance were surface chlorophyll *a* and near-bottom salinity. Beazley et al. (2015) found that of 49 physical drivers, the abundance of structure-forming

sponges was the most important determinant of megafaunal species composition on the Sackville Spur. This technical report serves a twofold purpose: 1) to describe in greater detail than the former works, the methods used to acquire, process, and analyze the benthic images collected from the Flemish Pass and Sackville Spur, and 2) to provide a visual representation of the epibenthic megafauna recorded in the images and their taxonomic identities as reported in Beazley et al. (2013; 2015). Currently, the Department of Fisheries and Oceans has no means of archiving image data for public use. Consequently, important baseline studies such as Beazley et al. (2013; 2015) have limited value for monitoring purposes as they contain many unidentified taxa and taxa that are not identified to the species level. This report is meant to assist future monitoring of these areas by providing a visual guide and detailed descriptions of the epibenthic megafauna observed in the analyzed images and the names we assigned to them in our publications, and should serve as a source for applying a common nomenclature for future applications.

METHODS

Gear and Sampling Details

Two camera systems, Campod (Fig. 2a) and the 4K camera (Fig. 2b), were used to collect benthic imagery in the Flemish Pass and Sackville Spur (Fig. 1) during the *Hudson* cruise in 2009. Campod is a light-weight camera tripod camera system built and housed at The Bedford Institute of Oceanography. This system is controlled via a winch on deck, and is capable of operating down to ~650 m depth. It was equipped with an obliquely-mounted Sony XC-999 colour video camera which collected forward-facing video footage continuously throughout operation, and a downward-facing high-resolution Nikon D300 digital still camera with two

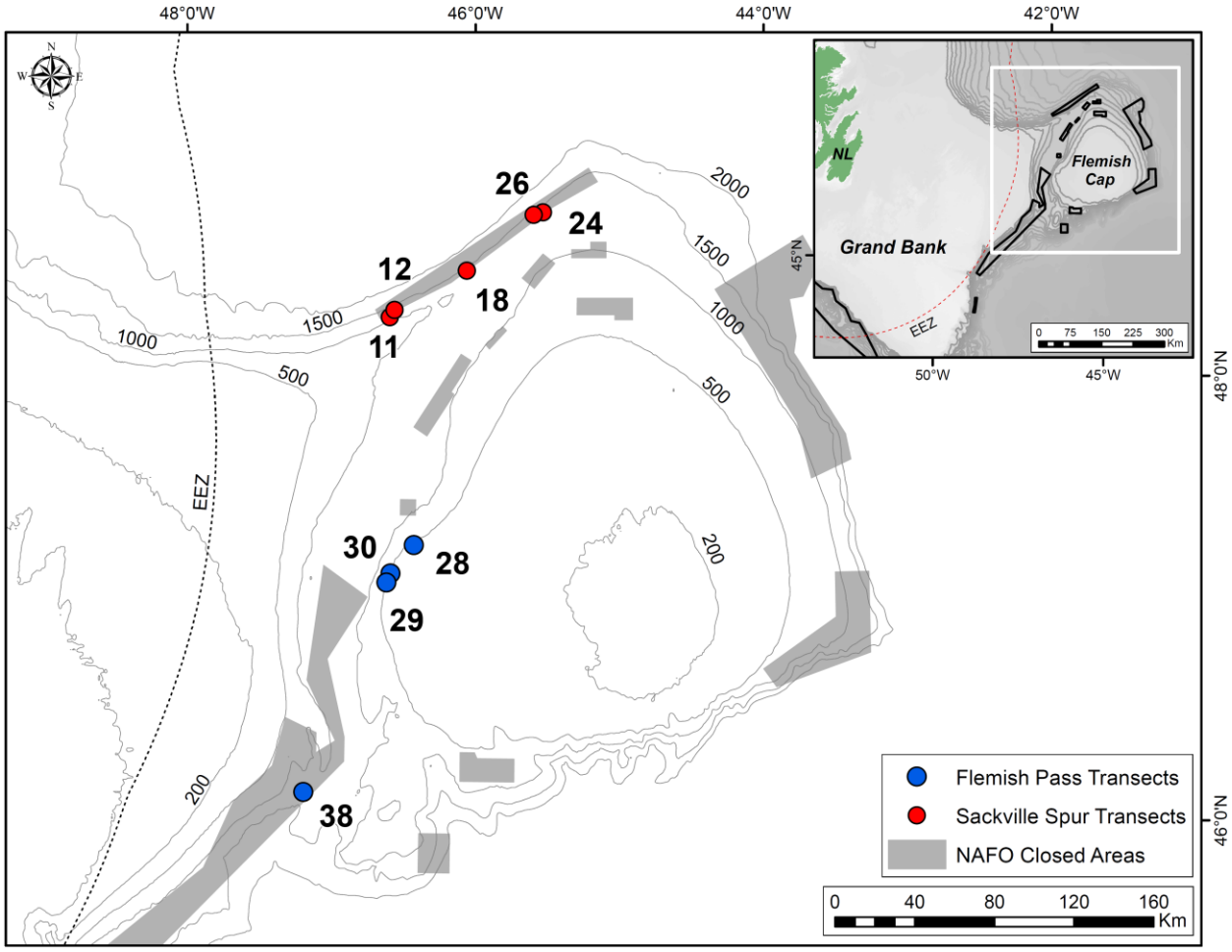


Figure 1. Location of *in situ* benthic imagery transects collected from the Flemish Pass/western Flemish Cap slope (blue circles) and the Sackville Spur (red circles) in 2009 as part of the Nereida program. Transects are labelled with their Transect ID number (see Table 1). Logistical details of each transect are outlined in Table 1.

high-speed flashes. The height of the downward-facing digital still camera above seabed is ~1 m when Campod is landed. Campod is equipped with two laser beams calibrated at 10 cm apart that are used as a size reference in the video and images. Digital still images were collected at one-minute intervals with Campod landed on the seabed. Although video was collected during the Campod dives, only digital still images were analyzed as part of this study. The 4K camera (or "4KCam"), was built by the Geological Survey of Canada (GSC) in 2008. This system is capable of operating down to 4000 m depth and houses a high-resolution Canon Rebel Eos Ti 12

megapixel digital still camera and two Canon flashes enclosed in an aluminum roll cage. The 4KCam is lowered to the seabed using a winch, and the camera and flashes are triggered when an attached lead weight hits the seabed. Successive images were taken at one-minute intervals along the drift course with the winch operator lifting the camera off-bottom after each image and hovering near-bottom until the next image deployment.

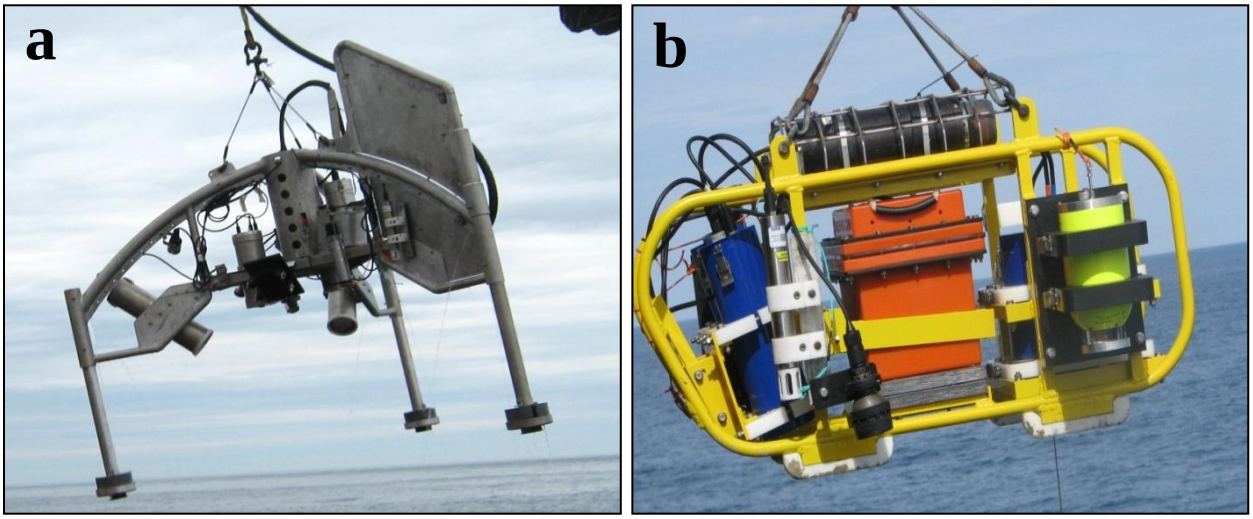


Figure 2. a) Campod and b) 4K ("4KCam") camera systems used to collect benthic imagery during the 2009 *Hudson* cruise in the Flemish Cap region.

Three photographic transects were conducted on the western Flemish Cap slope between 444 and 940 m depth using both Campod (transects 28, 29) and the 4KCam (transects 30) (Table 1). This area was targeted as it was thought to contain high concentrations of gorgonian and antipatharian corals, and sponges (Antonio Vazquez, Institute of Marine Research, Vigo, Spain; personal communication). Parts of the area were excluded from the standard groundfish surveys due to rough bottom and so little information on the benthos was known for this area prior to our sampling of it. The fourth transect (38) was collected using the 4KCam from the southern Flemish Pass between 1328 and 1411 m depth (Table 1). This transect directly targeted the

location where a large concentration (4000 kg) of sponge was previously caught as bycatch by a DFO trawl survey (2004 DFO unpublished data) and where large catches of sponge have been reported previously (NAFO, 2009a). This transect is located inside the boundaries of a closed area established by NAFO in January 2010 to protect the high concentrations of sponges reported there as bycatch of annual stock assessment surveys conducted by Canada and the EU. All areas surveyed in the Flemish Pass/western Flemish Cap slope experienced little fishing effort over the past 20 years (NAFO, 2009b). Average transect length for the Flemish Pass area was 3677 m, and a total of 473 images were collected.

On the Sackville Spur the 4KCam was used to conduct five image transects between 1080 and 1723 m depth (Table 1), in an area that was subsequently closed by NAFO in January 2010 to protect the sponge grounds that reside there (NAFO, 2010). Four of these transects

Table 1. Summary of the benthic imagery collected from the Sackville Spur and Flemish Pass area during the Hudson 2009 cruise.

Location	Transect ID	Inside closure?	Gear	Transect length (m)	Depth range (m)	Number of images
Flemish Pass/ western Flemish Cap slope	28	No	Campod	2 431	461 - 479	92
	29	No	Campod	3 197	444 - 471	132
	30	No	4KCam	6 101	455 - 940	174
	38	Yes	4KCam	2 978	1328 - 1411	75
Sackville Spur	11	Mostly	4KCam	6 211	1080 – 1545	167
	12	Yes	4KCam	6 343	1313 – 1723	172
	18	Yes	4KCam	5 238	1336 – 1478	92
	24	Yes	4KCam	4 974	1290 – 1427	145
	26	Yes	4KCam	3 212	1381 - 1409	38

(11, 12, 18, and 24) were conducted downslope, while transect 26 was conducted approximately along the 1400 m contour. Average transect length was 5196 m, and a total of 614 images were collected from the area.

Image Preparation

To reduce small-scale autocorrelative effects, only images taken ≥ 10 m apart were analyzed (Kenchington et al., 2014). Images at 10-m intervals were selected by calculating the straight-line distance between location points (calculated every second) along the camera system's path, binning these values at 10 m intervals, and taking the first image within each 10-m bin. The distance between adjacent images was checked to ensure that images were ≥ 10 m apart; if not, the second image of the two was not analyzed. Other images excluded from analysis were those taken too far or close to bottom, blurry images, and images containing sediment clouds that significantly impeded the identification of fauna.

To ensure consistent data recording within and among images, a 4 x 3 grid was created and applied to each image using batch processing in Adobe Photoshop version CS2 (see Fig. 3 for example image). Each of the 12 grid cells contained labelling (letters A through L), which was used to identify each grid cell during data recording. Scale bars 1 cm in size were also added to each grid cell using Photoshop's batch processing tool and used as a size reference when recording fauna. For Campod images, the calibrated lasers were used as a size reference for calculation of the scale bars, whereas the length or width of the lead weight was used as a size reference for the 4K camera images.

The average area of seabed covered in the 4KCam and Campod images was calculated in order to standardize the abundance data between gear types and to allow for comparisons with

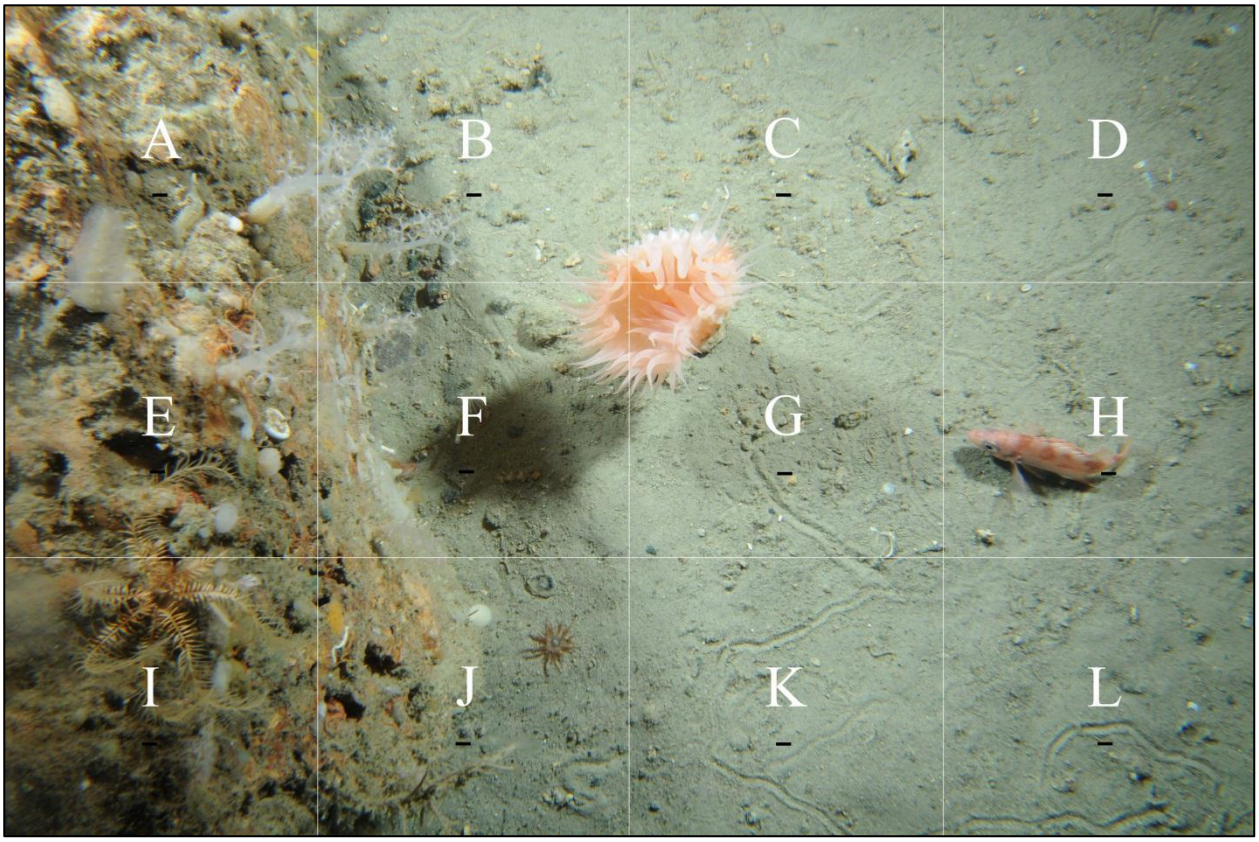


Figure 3. Campod image with the 4 x 3 grid and labelling. Small black bars under each letter are 1 cm scale bars.

the published literature. Fifty images were randomly sampled across both Campod transects (28 and 29) and the area covered in each was determined using the two calibrated lasers as a size reference, giving an average area of 0.71 ± 0.13 m^{-2} (mean ± SD). The average area covered in the 4KCam images was calculated from a subset of 50 suitable photos from transect 30 selected based on the orientation of the lead weight (flat on seabed). The length or width of the lead weight was then used as a size reference to determine the area covered by each image. The average area (0.47 ± 0.05 m^{-2}) was then used to standardize images from transect 30, and all five Sackville Spur transects. For transect 38 in the Flemish Pass, height above bottom and orientation of the images was more variable, therefore, the area covered was calculated for each individual image using the lead weight. For images with no visible lead weight, biological

features with a known size (e.g. the central disc of large ophiuroids such as *Ophiomusium lymani*) were used to calculate the area covered in each of these images. The average area covered by images on this transect was 0.70 ± 0.33 m^{-2}.

Taxonomic Identification of Epibenthic Megafauna from Images

All epibenthic megafauna (i.e. those $\geq$ 1 cm in size) were counted and taxonomically identified from each image. This included motile fauna (e.g. crustaceans, fish) observed on or near the seabed, and non-motile fauna attached to other organisms (e.g. anemone attached to coral branches). The Integrated Taxonomic Information System (ITIS: http://www.itis.gov/) was adopted as the taxonomic authority. All megafauna were identified down to the lowest taxonomic classification possible. Fauna that could not be identified down to species were given mutually exclusive morphotype designations (e.g. *Pennatula* sp. 1, where 'sp.' indicates that a single species is present in this taxon). When multiple species were suspected to occur within a single taxon but could not be confidently separated and identified, they were collectively assigned a single, higher-level classification (e.g. Octocorallia). In these cases where multiple species were grouped at the genus level, the designation 'spp.' was given following the genus name (e.g. *Geodia* spp.). Each taxon and morphotype not identified to the species level was taxonomically described. Due to the nature of the benthic images, the fine-scale features used to identify many taxa to the species level were not visible. As a result, superficial features such as body shape or morphology, colouration, and size were described following several key reference books (Gosner, 1971 and Pollock, 1998 for all phyla; Ackers, 2007 for sponges). When possible, any species suspected to comprise these higher-level classifications were noted in their taxonomic descriptions. Fauna that could not be placed into a phylum were separated based on shape and other surficial features and classified as 'Unidentified' morphotypes (e.g. Unidentified

5). Biogenic structures, including tubes, mounds, tracks, burrows, casts, and filaments, were also quantified from each image.

A customized form ("Photo form"; Fig. 4) created within a Microsoft Access database was used to record and store the taxonomic and abundance information associated with the megafauna observed in the images. Prior to analysis, image metadata, including station and photo file name was imported into the database from an associated Microsoft Excel spreadsheet by pressing the 'Import Photo Data' button on the form (see 'A' in Fig. 4). This metadata is stored in a separate table in the database, and is queried when transects and images are selected for analysis.

Images within each transect were analyzed in random order to reduce the effects of observer bias. Images were viewed in Adobe Photoshop simultaneously with the Microsoft Access Photo form. Using a consistent zoom of 125%, each grid cell was analyzed separately, starting in grid cell 'A' and moving from left to right. If an organism spanned across more than 1 grid cell, it was recorded in the first grid cell it was encountered in. For each organism, only the phylum and taxon were recorded. This information was selected from drop-down menus (see 'B' in Fig. 4) which are manually populated as new taxa are observed using the 'Add New Taxa' button on the form. Pressing this button opens up a separate 'Taxonomy' form (Fig. 5) which allows you to enter the taxon and phylum used in the main Photo form, and other taxonomic information. This taxonomic information is stored in a separate table within the database and is queried each time the drop-down menus are selected in the Photo form. Once the taxon and phylum are selected from the drop-down menus, any comments associated with an organism can be recorded in the 'Comments' box on the Photo form. The recorder can also indicate whether a

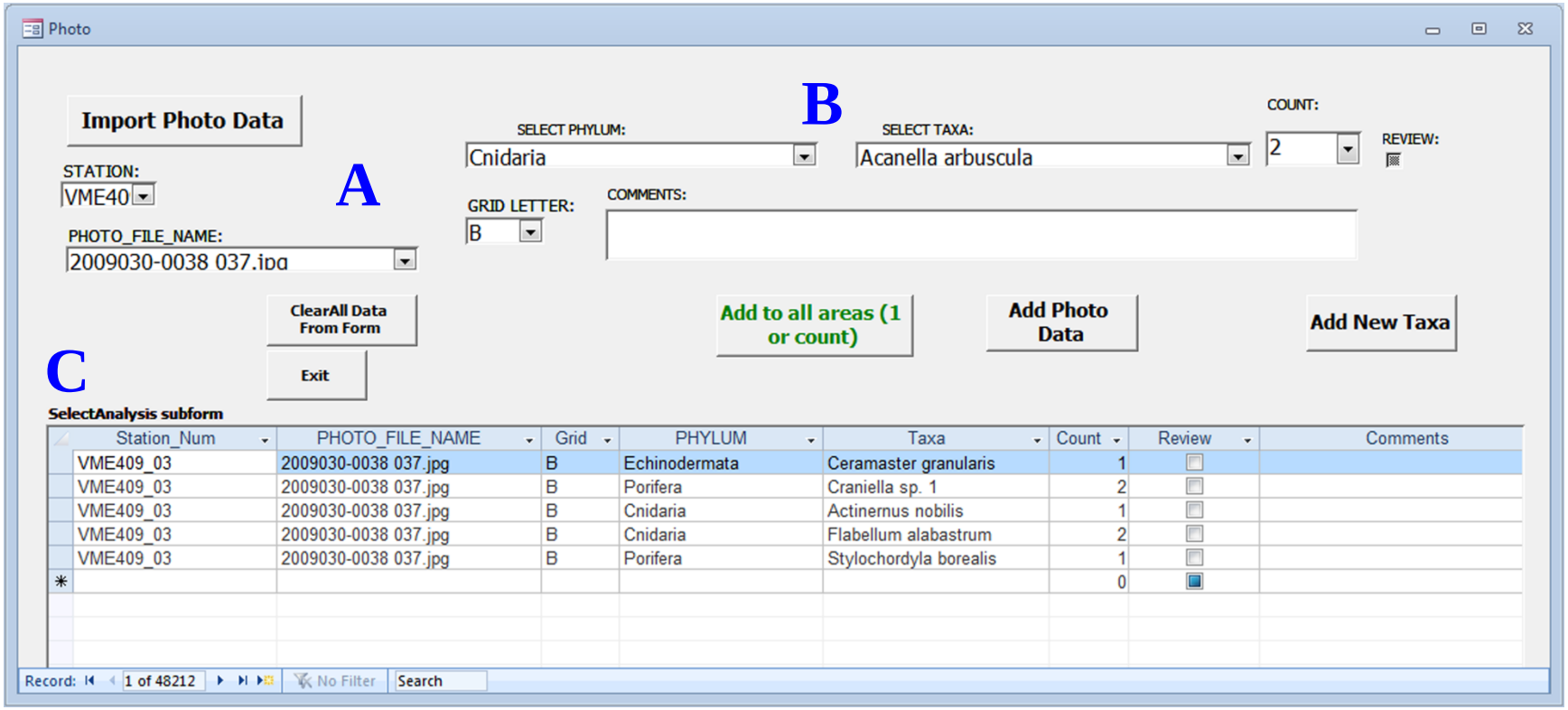


Figure 4. Customized Microsoft Access form used to record taxonomic and abundance information from benthic images.

record needs further review by checking the 'Review' button. Once the grid letter, phylum, taxon, count, and any comments are entered into the form, the 'Add Photo Data' button can then be selected which enters this information in a corresponding Access table and displays it in the 'SelectAnalysis subform' section of the Photo form ('C' in Fig. 4). Each taxonomic record is associated with the grid cell, image, and transect it was recorded from. Another feature of the form is the 'Add to all areas (1 or count)' button, which allows the recorder to add the same taxonomic record to all 12 grid cells of the image. Data can also be cleared from all grid cells by selecting the 'Clear All Data From Form' button.

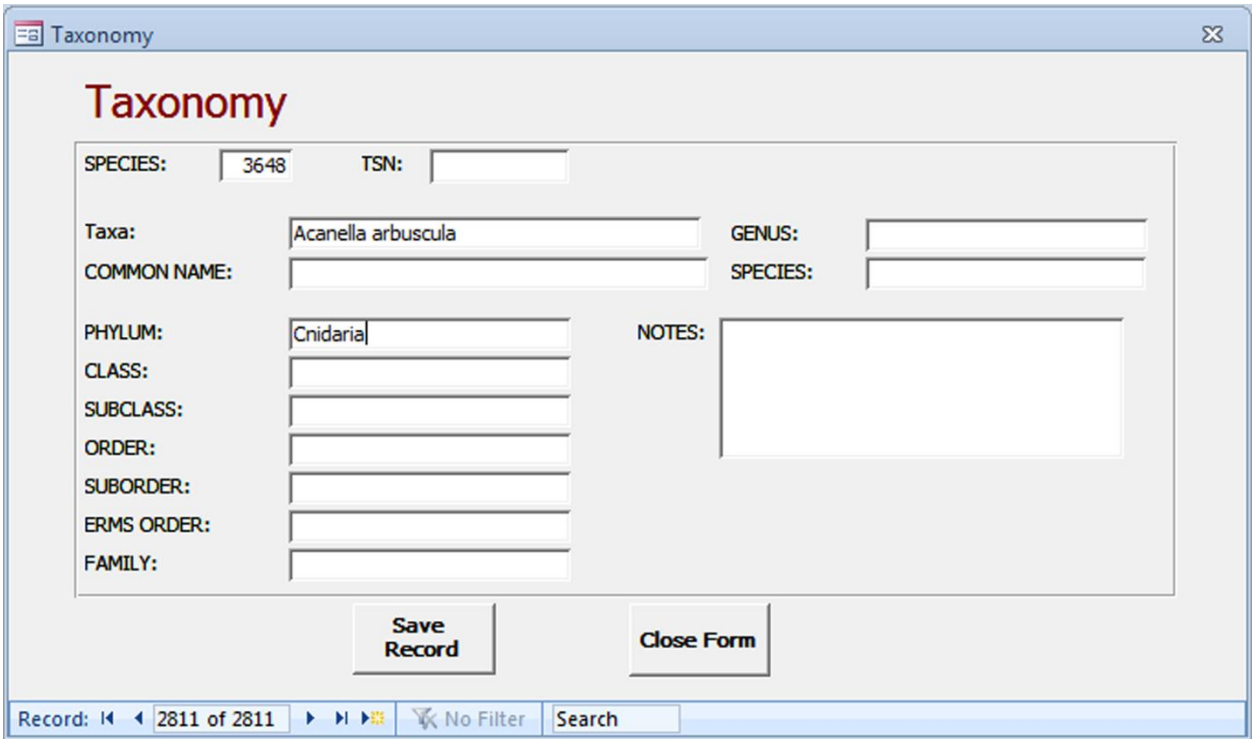


Figure 5. Taxonomy form used to enter taxonomic information (phylum and taxon) to be selected in drop-down menus in the main photo form.

CATALOGUE OF EPIBENTHIC MEGAFAUNA OF THE FLEMISH PASS/WESTERN FLEMISH CAP SLOPE

The following section provides a photographic account of all epibenthic megafaunal observed on the four image transects from the Flemish Pass/western Flemish Cap transects. Taxonomic descriptions are provided for all taxa identified to the genus level and higher. Scale bars in each image are 1 cm unless otherwise noted. For each phylum, a table precedes the fauna images that lists for each taxa and morphotype all levels of the taxonomic hierarchy according to ITIS, the ITIS Taxonomic Serial Number (TSN) (or the World Register of Marine Species (WoRMS) AphiaID if the taxon was not listed in ITIS), and the total abundance rounded to the nearest integer.

Table 2 shows the total standardized abundance and the number of taxa/morphotypes of all epibenthic megafauna within each phylum observed on the four Flemish Pass/western Flemish slope benthic image transects. The total abundance of all epibenthic megafauna was 29,830 individuals, representing 527 taxa/morphotypes. Note that in Beazley et al. (2013), ‘Bryozoa’ as in Table 2 was identified as ‘Ectoprocta’, which was the accepted classification for this group in ITIS during that time.

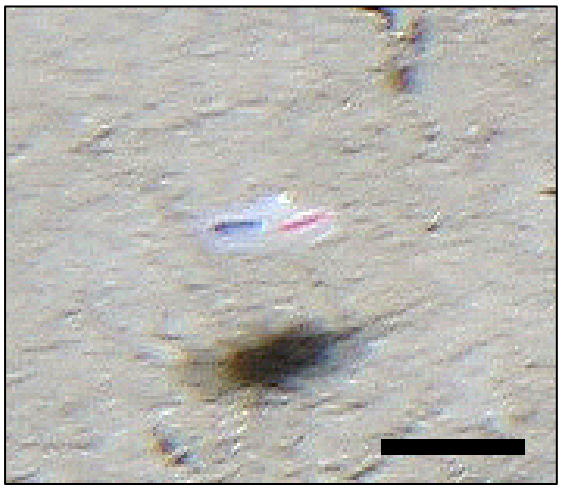
Table 2. Total abundance and number of taxa/morphotypes for each phylum observed over four benthic image transects in the Flemish Pass/western Flemish Cap slope.

Phylum/group	Total abundance	Number of taxa/morphotypes
Annelida	1 145	9
Arthropoda	2 156	35
Brachiopoda	362	2
Bryozoa	512	8
Chordata	1 973	12
Cnidaria	3 019	93
Echinodermata	6 983	34
Mollusca	483	24
Nemertea	28	6
Platyhelminthes	6	2
Porifera	11 091	182
Unidentified	2 072	120

PHYLUM ANNELIDA

Subphylum	Class	Order	Family	Taxa	ITIS TSN	Total abundance
Polychaeta	Errantia	Phyllodocida	Polynoidae	Polynoidae sp. 1	64397	75
	Sedentaria	Canalipalpata	Sabellidae	Sabellidae sp. 3	68076	67
				Sabellidae sp. 5		66
				Sabellidae sp. 6		11
				Sabellidae sp. 12		323
				Sabellidae		517
			Serpulidae	Serpulidae	68232	81
			Terebellidae	Terebellidae sp. 1	67899	4
				Terebellidae sp. 2		1

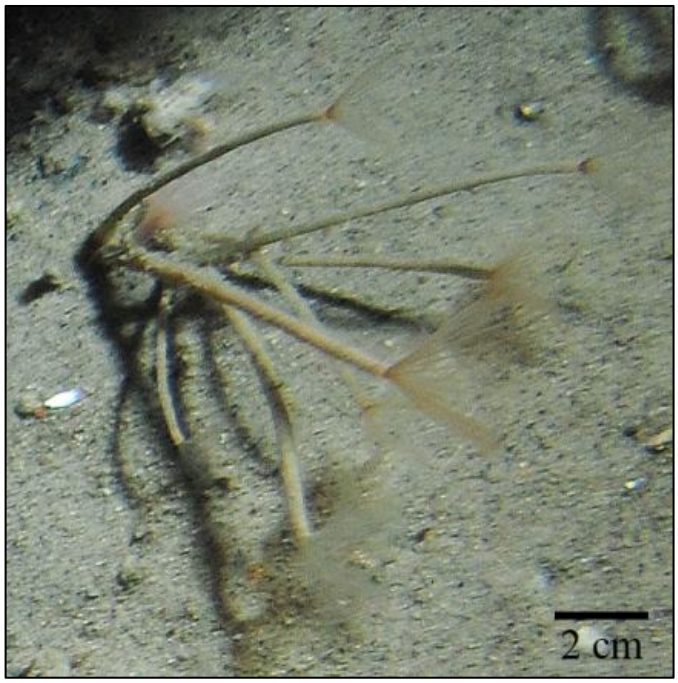
Polynoidae sp. 1

Description:

Polynoid scale worm observed either lying on soft sediment, or suspended in the water column just above the sea bed. Body colouring is half-pink and half-purple on dorsal side; parapodia/chaetae white.

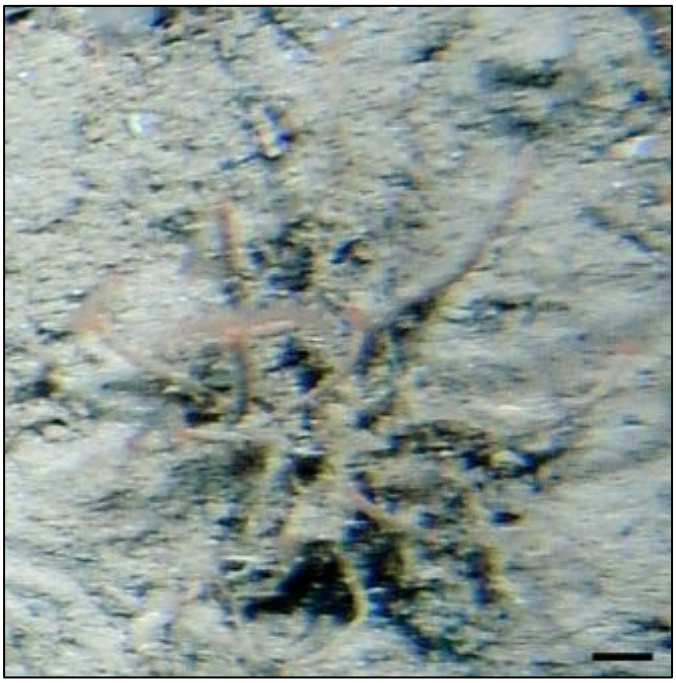
Sabellidae sp. 3



Description:

Cluster of erect, long slender tubes with brown to whitish plume at opening. Tubes smooth.

Sabellidae sp. 5



Description:

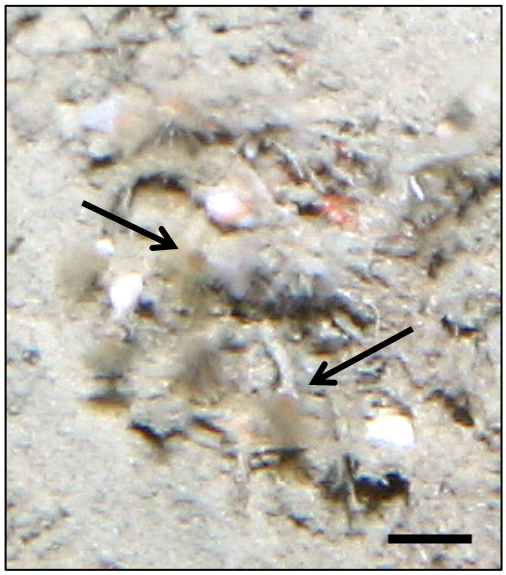
Cluster of erect tubes with red plume. Tubes shorter than Sabellidae sp. 3. Plumes also smaller and brighter red.

Sabellidae sp. 6

Description:

Small cluster of erect, short tubes, with small plume at tube ends. Tubes appear to be attached to a sponge. Plumes appear shimmery; tubes bumpy.

Sabellidae sp. 12



Description:

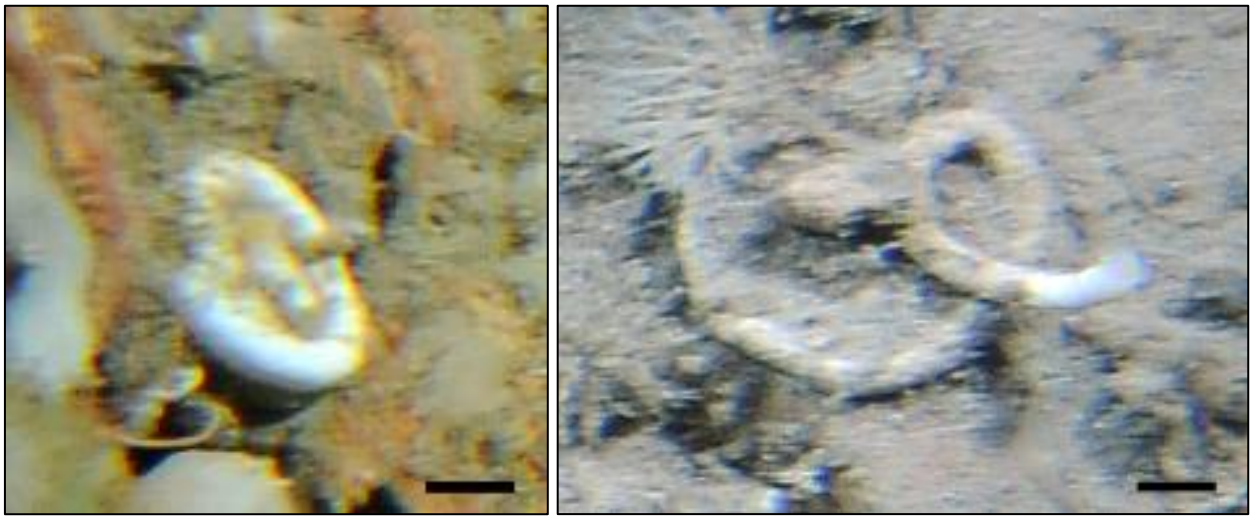
Cluster of short (~ 1 cm) tubes with feathery-like, orange to red plumes. Tubes not always erect, and are often observed lying horizontally across sediment.

Sabellidae

Description:

Group contains various-sized tubes with plumes retracted or semi-retracted. Can occur in clusters or individually.

Serpulidae



Description:

Calcareous tubes with white plume sometimes visible at end. Can be attached to rock or on soft sediment. Tube may be tightly coiled, or more loose.

Terebellidae sp. 1

Description:

Fleshy, irregularly-shaped tube on rock. Tube sometimes covered in sediment or detritus. No plume visible. Identified as a terebellid due to the fleshy colour of the tube.

Terebellidae sp. 2

Description:

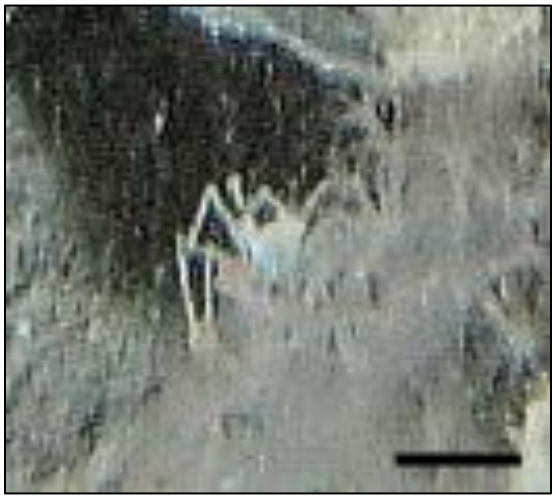
Long, partially erect tube with short plume visible at end. Tube covered in detritus or sediment. An orange actiniarian may be attached to tube.

PHYLUM ARTHROPODA

Subphylum	Class	Order	Family	Taxa	ITIS TSN	Total abundance
Chelicerata	Pycnogonida	Pantopoda	N/A	Pycnogonida sp. 1	83545	1
			N/A	Pycnogonida sp. 2		2
			N/A	Pycnogonida sp. 3		43
Crustacea	Malacostraca	N/A	N/A	Malacostraca sp. 4	89787	1
				Malacostraca sp. 12		3
				Malacostraca sp. 14		4
				Malacostraca sp. 15		1
				Malacostraca sp. 16		4
				Malacostraca sp. 17		56
				Malacostraca sp. 20		13
				Malacostraca sp. 25		94
				Malacostraca sp. 35		
				Malacostraca		1053
		Decapoda	N/A	Decapoda sp. 1	95599	1
			Crangonidae	Crangonidae sp. 1	97106	4
				Crangonidae sp. 2		2
				Crangonidae sp. 3		2
				Crangonidae		4
			Galatheidae	Galatheidae sp. 1		2

		Mysidae	Mysidae sp. 1	89856	82
			Mysidae sp. 3		16
			Mysidae sp. 4		58
			Mysidae sp. 6		66
			Mysidae sp. 9		3
			Mysidae sp. 10		14
			Mysidae sp. 12		16
			Mysidae sp. 13		2
			Mysidae sp. 14		35
			Mysidae sp. 15		5
			Mysidae sp. 16		11
			Mysidae		50
		Oplophoridae	*Acanthephyra* sp. 1	96113	2
		Pandalidae	Pandalidae		120
		Pasiphaeidae	*Pasiphaea multidentata*	96166	2
	Euphausiacea	Euphausiidae	*Meganyctiphanes norvegica*	95534	382

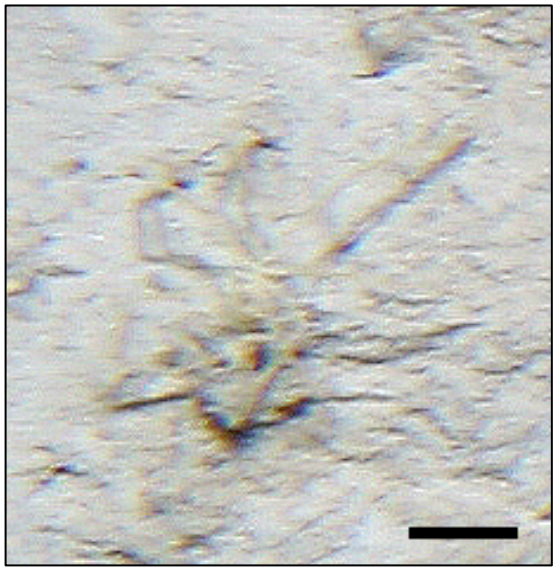
Pycnogonida sp. 1



Description:

Body and legs only partially visible. Legs appear light in colour; thorax/abdomen white. Observed on top of a soft coral.

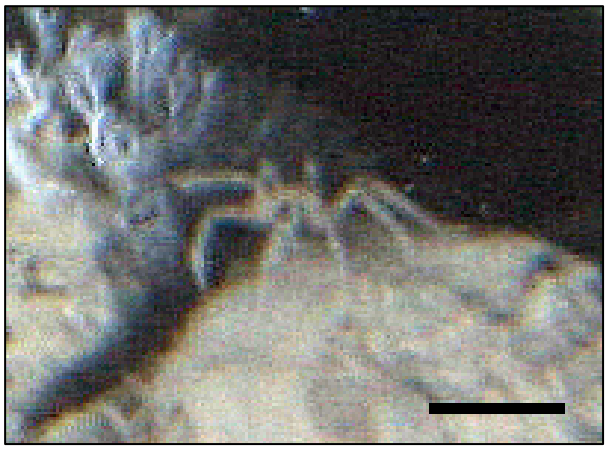
Pycnogonida sp. 2



Description:

Eight, long legs, yellow in colour. Proboscis not visible. Could be *Colossendeis clavata*.

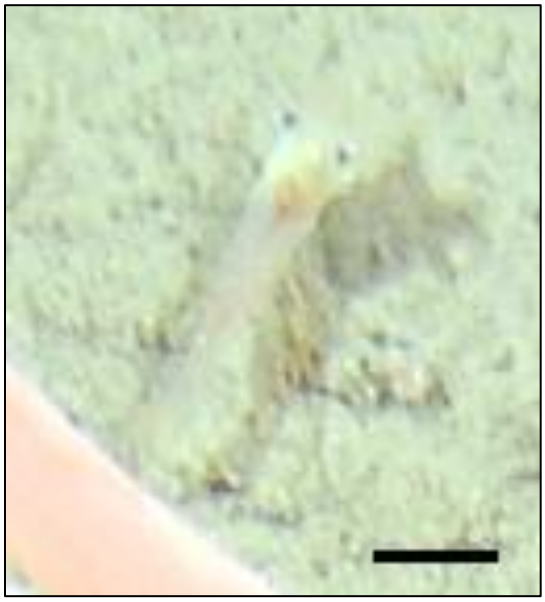
Pycnogonida sp. 3



Description:

Eight, short legs; thorax and abdomen compact and robust. Commonly observed on top of sponges.

Malacostraca sp. 4



Description:

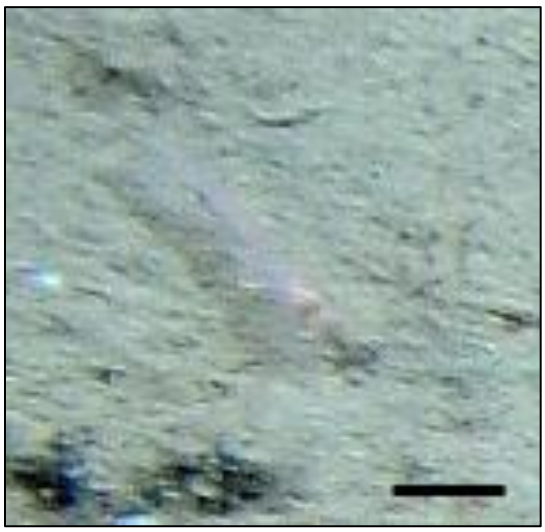
Large eyes, with short, semi-translucent body. Carapace green-coloured. Could be a juvenile pandalid shrimp.

Malacostraca sp. 12

Description:

Large eyes, with short, semi-translucent body. Body red-pink in colour; carapace yellow. Could be a juvenile pandalid shrimp.

Malacostraca sp. 14



Description:

Small eyes, body slender. Carapace light-pink, abdomen semi-translucent pink.

Malacostraca sp. 15

Description:

Large, black eyes, with large, semi-translucent carapace and abdomen.

Malacostraca sp. 16

Description:

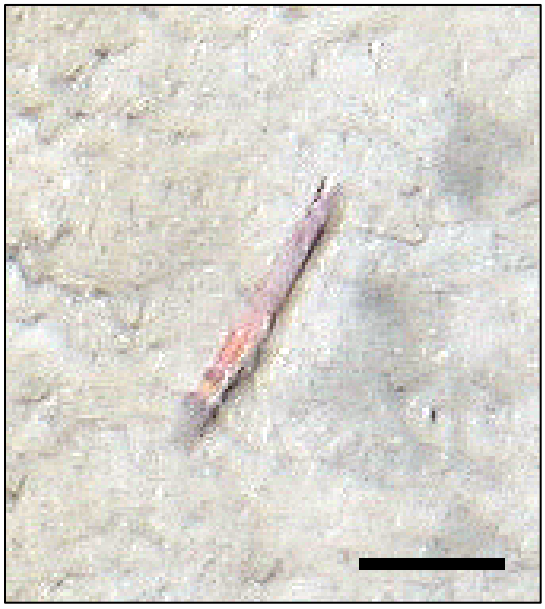
Small eyes, body slender. Carapace light-pink, abdomen semi-translucent pink. Similar to Malacostraca sp. 14.

Malacostraca sp. 17

Description:

Small eyes, body robust. Carapace light-pink; colour on abdomen appears banded, alternating between white and pink. Body appears thicker than Malacostraca sp. 14 and 16.

Malacostraca sp. 20



Description:

Small eyes, body robust. Carapace and abdomen pinkish. Similar to Malacostraca sp. 17.

Malacostraca sp. 25

Description:

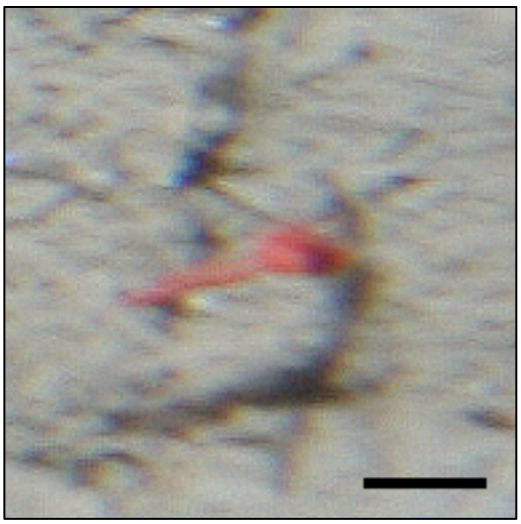
Large eyes and large, rounded carapace that is light pink in colour. Abdomen lighter than carapace.

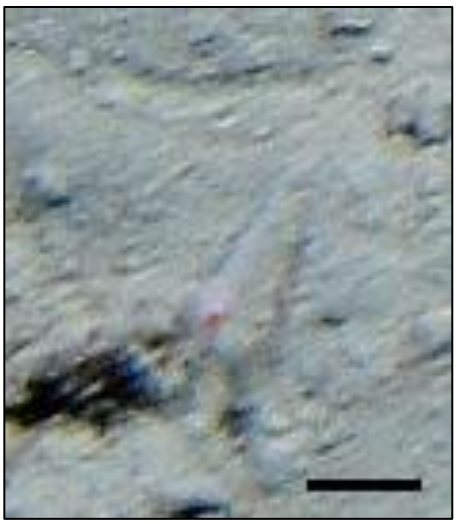
Malacostraca sp. 35

Description:

Large, bright eyes, with large, rounded carapace and tapering tail. Carapace purple-pinkish; tail light purple. A dark band runs down the centre of the body.

Malacostraca

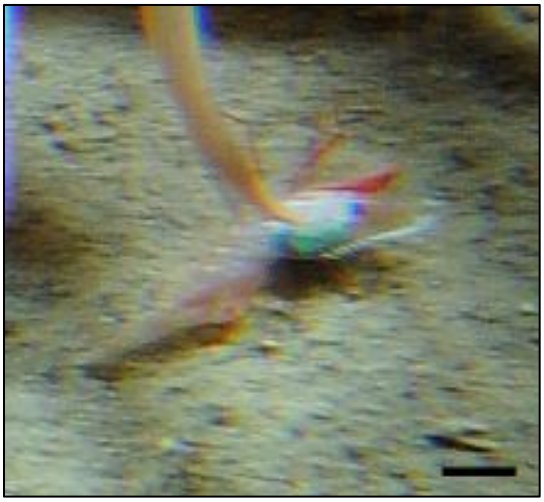




Description:

Taxon encompasses several species of shrimp-like organisms different from those identified above.

Decapoda sp. 1



Description:

Shrimp-like, with light pink abdomen, green thorax, and red rostrum. Likely a pandalid shrimp.

Crangonidae sp. 1

Description:

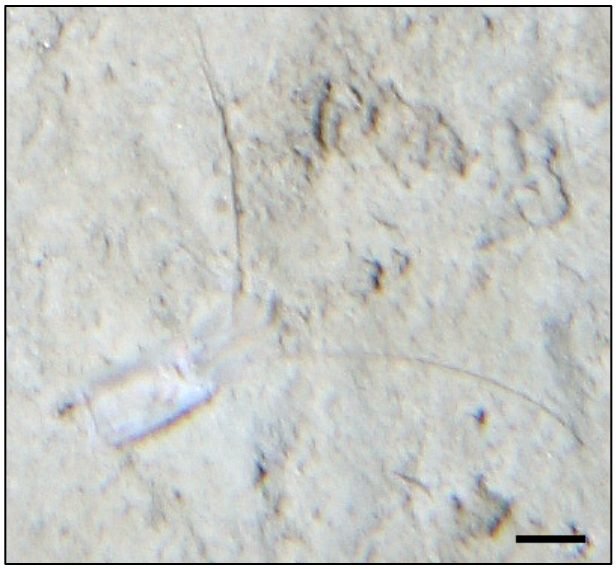
Partially-buried shrimp with medium-sized eyes and several long antennae. Thorax purple in colour; abdomen pinkish.

Crangonidae sp. 2

Description:

Partially-buried shrimp with large, bright eyes and two long antennae. Thorax redish; abdomen light pink.

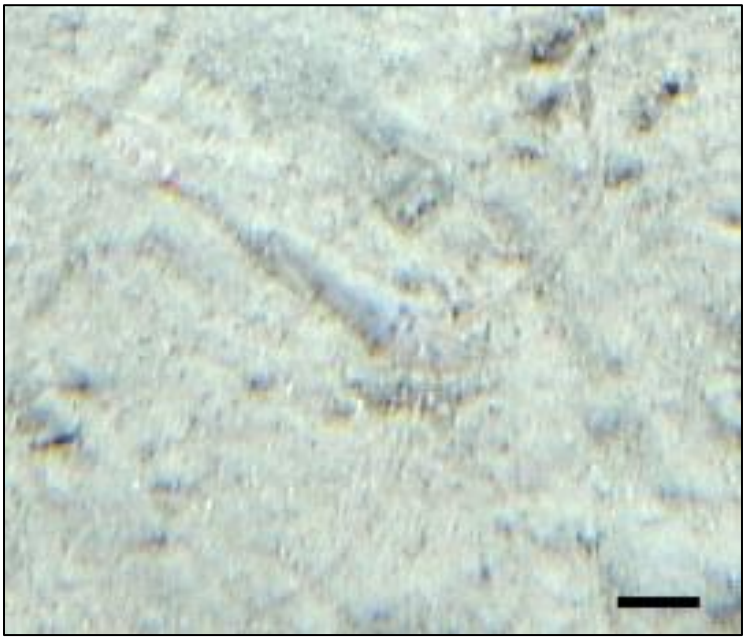
Crangonidae sp. 3



Description:

Partially-buried shrimp with two long antennae. Only a white or semi-translucent thorax is visible. Eyes are not visible.

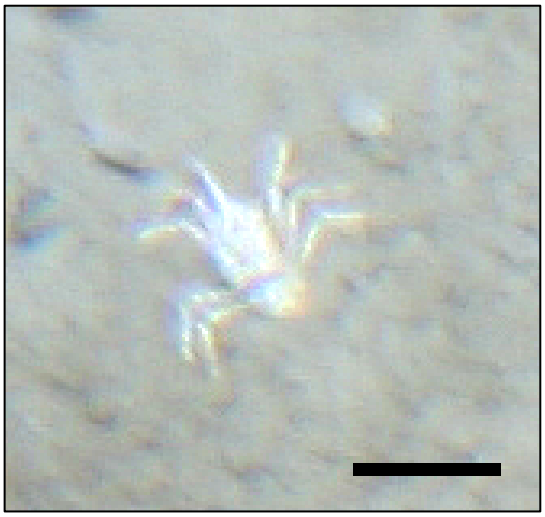
Crangonidae



Description:

Taxon contains several specimens not identifiable to the three above morphotypes. Body usually covered in sediment, making identification to either of the three morphotypes above impossible.

Galatheidae sp. 1



Description:

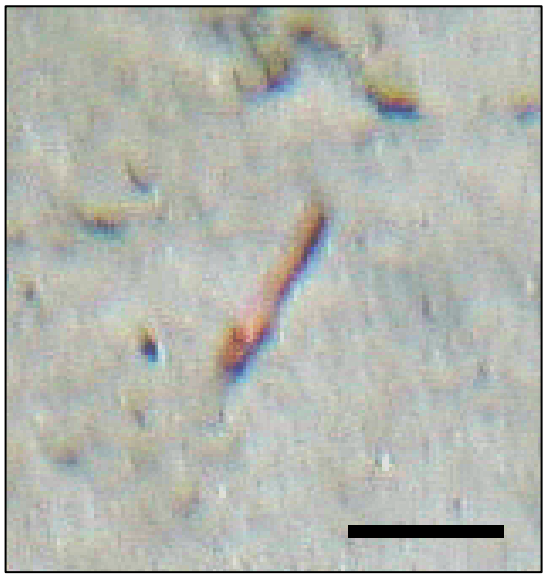
White ‘squat lobster’. Flat position of body on the seabed suggests that this specimen could be dead.

Mysidae sp. 1

Description:

Small (~1 cm) pink mysid with lighter-coloured carapace. Eyes barely visible. Characterized by circular indentation in sediment underneath body.

Mysidae sp. 3



Description:

Small (~1 cm) fushia-coloured mysid with lighter-coloured carapace. Eyes larger than Mysidae sp. 1, and appear to sit closer together on the top of the rostrum as opposed to the side.

Mysidae sp. 4

Description:

Medium-sized pink mysid with lighter-coloured carapace. Carapace and eyes are larger than Mysidae sp. 1, although the same sediment indentation is sometimes visible. Could be an adult Mysidae sp. 1.

Mysidae sp. 6

Description:

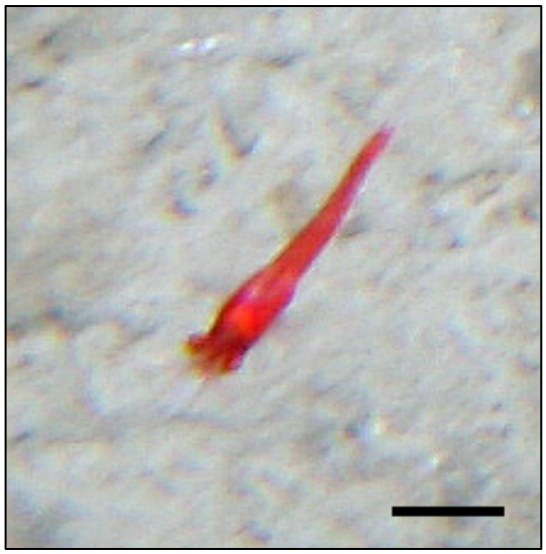
Medium-sized pink mysid. Carapace appears smaller than Mysidae sp. 4, and the eyes appear to sit closer together on the top of the rostrum as opposed to the side.

Mysidae sp. 9

Description:

Small (~1 cm) pink mysid. Carapace is lighter pink than abdomen; eye area dark red in colour.

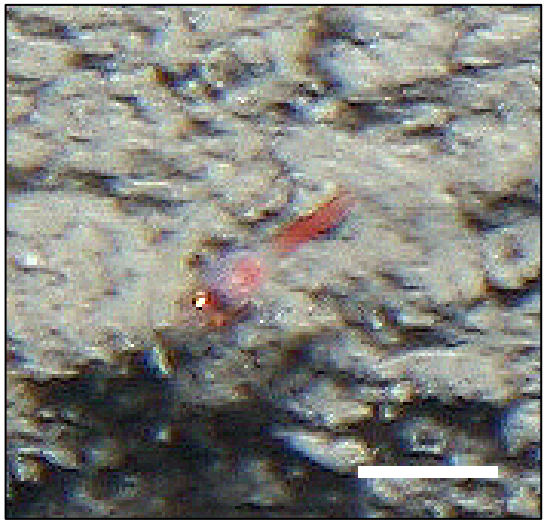
Mysidae sp. 10



Description:

Large, bright red mysid with large carapace and eyes. Colour consistent between carapace and abdomen. Eyes bright red.

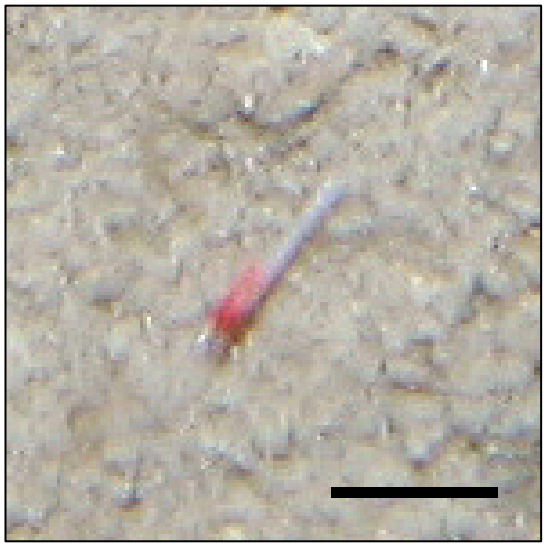
Mysidae sp. 12



Description:

Large, bright eyes, and large, rounded carapace that is lightish pink in colour. Abdomen is red. Could be a species from the genus *Boreomysis*.

Mysidae sp. 13



Description:

Slender, with red carapace and white abdomen. Eyes are not clearly visible.

Mysidae sp. 14

Description:

Large, bright eyes, and large, rounded carapace that is white in colour. Abdomen is red. Could be a species from the genus *Boreomysis*, and possibly an adult specimen of Mysidae sp. 12.

Mysidae sp. 15

Description:

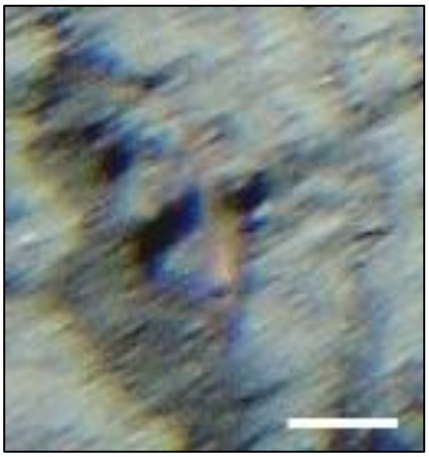
Large, bright eyes, and large white carapace that is less rounded and more slender than Mysidae sp. 12 and 14. Abdomen red.

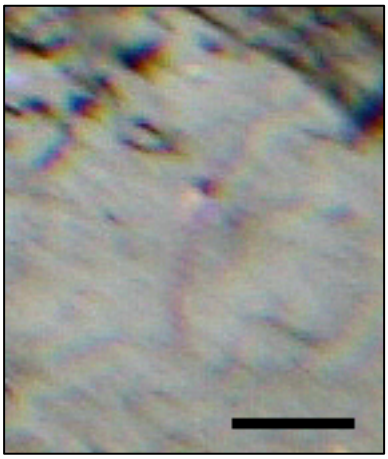
Mysidae sp. 16

Description:

Large, bright eyes, and large orangish carapace that is less rounded and more slender than Mysidae sp. 12 and 14. Carapace and abdomen colour are more consistent.

Mysidae





Description:

Taxon encompasses several species of mysid that could not be consistently distinguished from one another. Most are small, and pink in colour.

Acanthephyra sp. 1

Description:

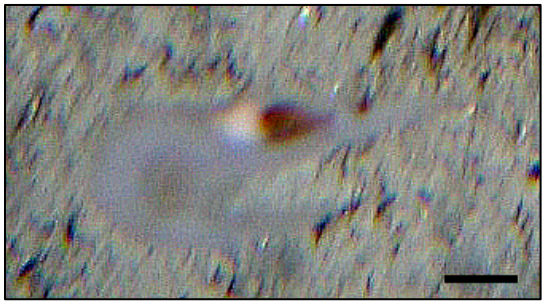
Body bright red, bright yellow eye visible. Abdomen partially buried in sediment.

Pandalidae

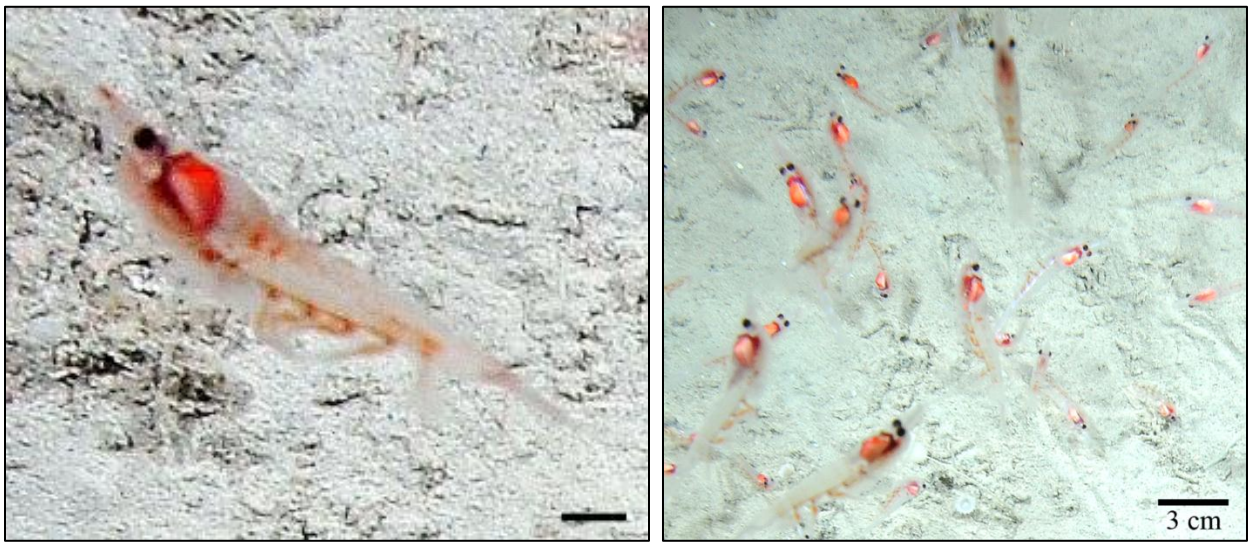
Description:

Taxon possibly includes northern shrimp *Pandalus borealis* and striped shrimp *P. montagui*, both found in the northwest Atlantic.

Pasiphaea multidentata



Meganyctiphanes norvegica



PHYLUM BRACHIOPODA

Phylum	Class	Order	Family	Taxa	ITIS TSN	Total abundance
Brachiopoda	N/A	N/A	N/A	Brachiopoda	156755	354
	Rhynchonellata	Terebratulida	Cancellothyridae	*Terebratulina* sp. 1	156801	8

Brachiopoda

Description:

Taxon likely encompasses several species of brachiopod that are difficult to consistently distinguish from one another. Most are erect on soft sediment, but some were observed lying flat. Groove in shell apparent in some but not others. Lophophore sometimes visible when shells are open.

Terebratulina sp. 1

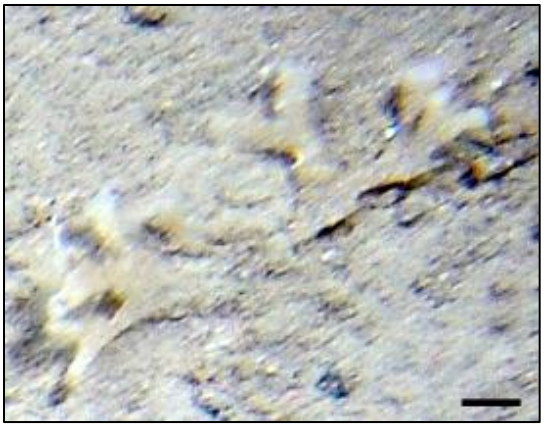
Description:

Smooth, teardrop-shaped shell. Colour white. Never erect; always lying flat on sediment. Could be *Terebratulina septentrionalis*.

PHYLUM BRYOZOA

Phylum	Class	Order	Family	Taxa	ITIS TSN	Total abundance
Bryozoa	N/A	N/A	N/A	Bryozoa sp. 1	155469	8
				Bryozoa sp. 2		32
				Bryozoa sp. 5		23
				Bryozoa sp. 6		1
				Bryozoa sp. 7		13
				Bryozoa sp. 10		99
				Bryozoa sp. 13		8
				Bryozoa		327

Bryozoa sp. 1



Description:

Fan-shaped bryozoan, with wide, flat branches. Branch tips are square. Partially brown or sediment-coloured; tips of branches white.

Bryozoa sp. 2

Description:

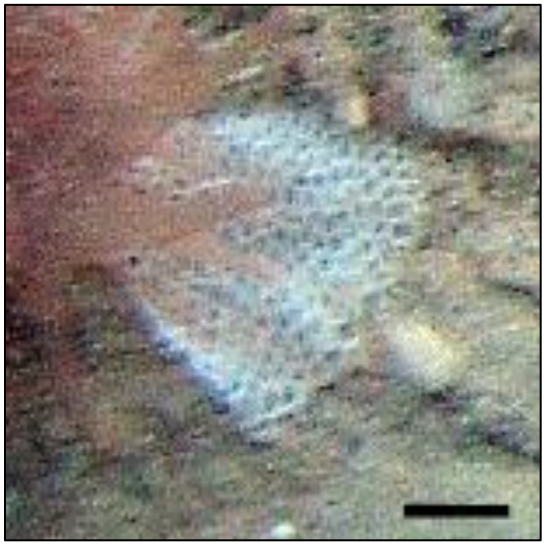
Erect, fan-shaped bryozoan. Branches and tips more slender than Bryozoa sp. 1. White in colour.

Bryozoa sp. 5

Description:

Erect, fan-shaped bryozoan with thin branches. Branching dichotomous. Colour is light yellow to brown.

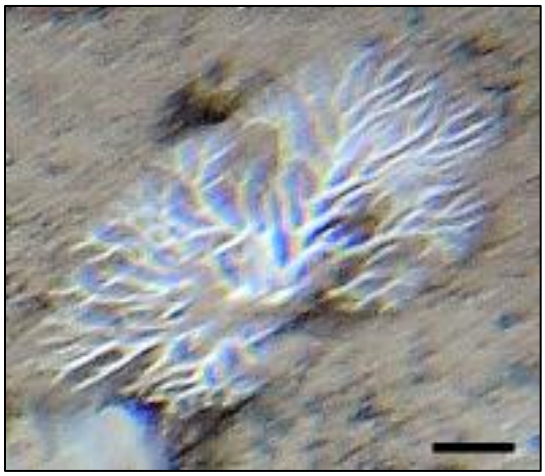
Bryozoa sp. 6



Description:

White, net or mesh-like bryozoan. Piece found lying flat on seabed.

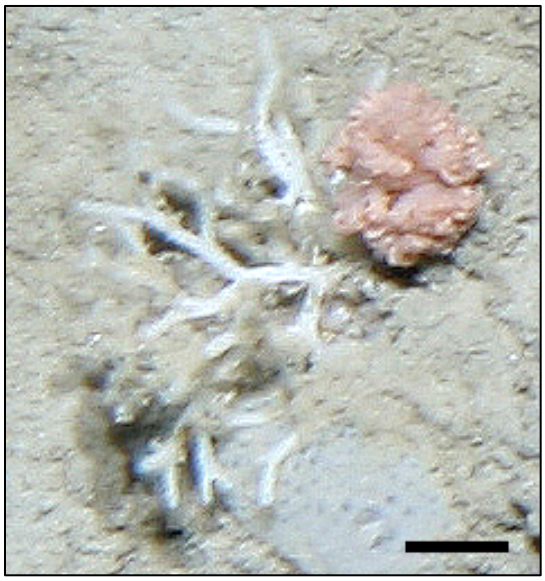
Bryozoa sp. 7



Description:

Large, fan-shaped bryozoan. Branches are rigid and dichotomous. Bright white in colour.

Bryozoa sp. 10



Description:

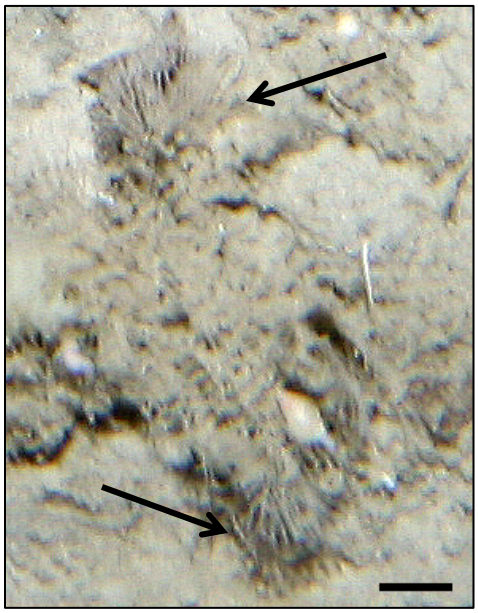
Large, bushy or shrub-like bryozoan. Branches are thicker and less rigid than Bryozoa sp. 7. White in colour.

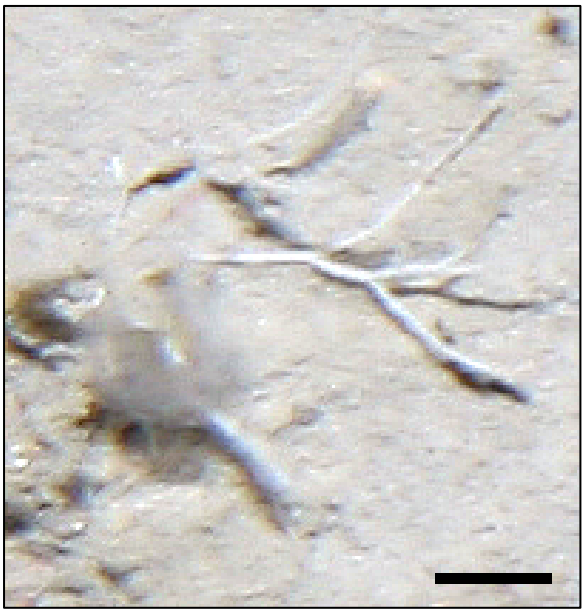
Bryozoa sp. 13

Description:

Net or mesh-like bryozoan. Colour is yellow and brown. Could be same as Bryozoa sp. 6 but is dead or dying.

Bryozoa





Description:

Taxon includes several species of bryozoan that appear distinct from those described above. Most have thin, slender branches.

PHYLUM CHORDATA

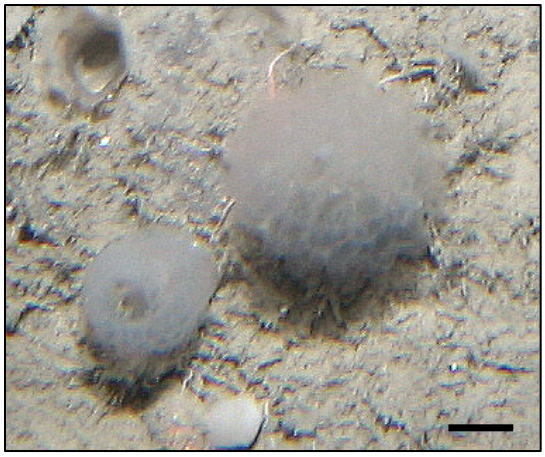
Subphylum	Superclass	Class	Order	Family	Taxa	ITIS TSN	Total abundance
Urochordata	N/A	Ascidiacea	N/A	N/A	Ascidiacea sp. 1	158854	20
					Ascidiacea sp. 2		112
					Ascidiacea		253
			Enterogona	Didemnidae	Didemnidae sp. 1	159047	530
Vertibrata	Osteichthyes	N/A	N/A	N/A	Osteichthyes sp. 1	161030	2
					Osteichthyes		18
		Actinopterygii	Gadiformes	Gadidae	*Gadus* sp. 1	164710	6
				Macrouridae	Macrouridae sp. 1	165332	8
					Macrouridae sp. 2		2
			Scorpaeniformes	Scorpaenidae	*Sebastes* sp. 1	166705	3
					Sebastes sp. 2		2
		Chondrichthyes	N/A	N/A	Chondrichthyes sp. 1	914180	1

Ascidiacea sp. 1

Description:

Oblong-shaped ascidian. Body appears lobed, with large siphon at end of lobe. Surface smooth and semi-transparent.

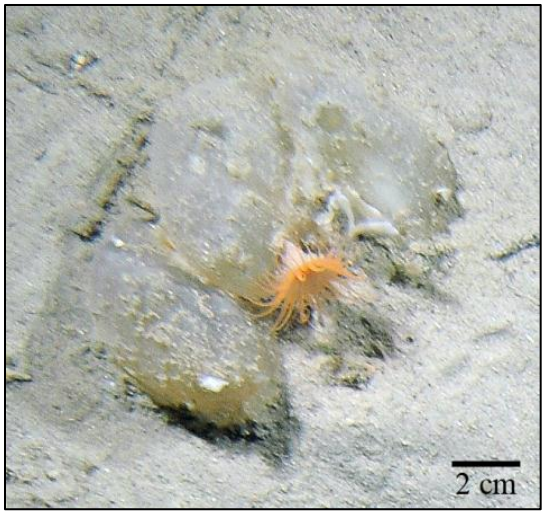
Ascidiacea sp. 2



Description:

Semi-translucent, globular-shaped ascidian. Single large siphon at apical end that is more apparent in juveniles. Fuzzy appearance when small, but has vertical striping and a more punctate surface when large. Image includes both juvenile and adult specimens.

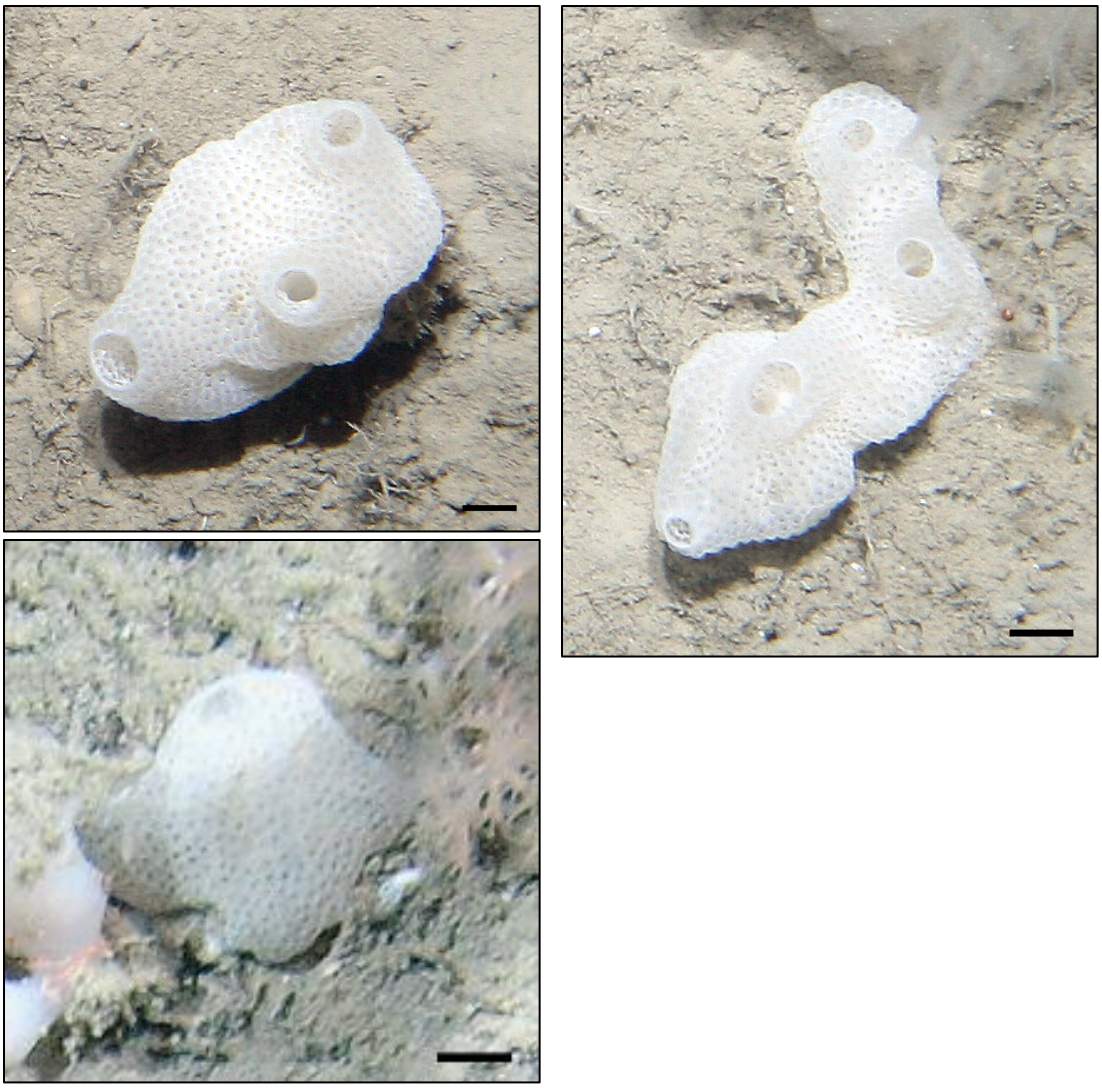
Ascidiacea



Description:

Taxon includes several large, globular ascidians. Siphon usually small and sometimes hexagonal-shaped. Always on soft sediment.

Didemnidae sp. 1



Description:

Colonial tunicate. Can be globular to lobate in form, or more flat and horizontally spreading. Several siphons visible, sometimes raised likely ‘chimneys’. Skin highly porous. Colour white to off-white.

Osteichthyes sp. 1

Description:

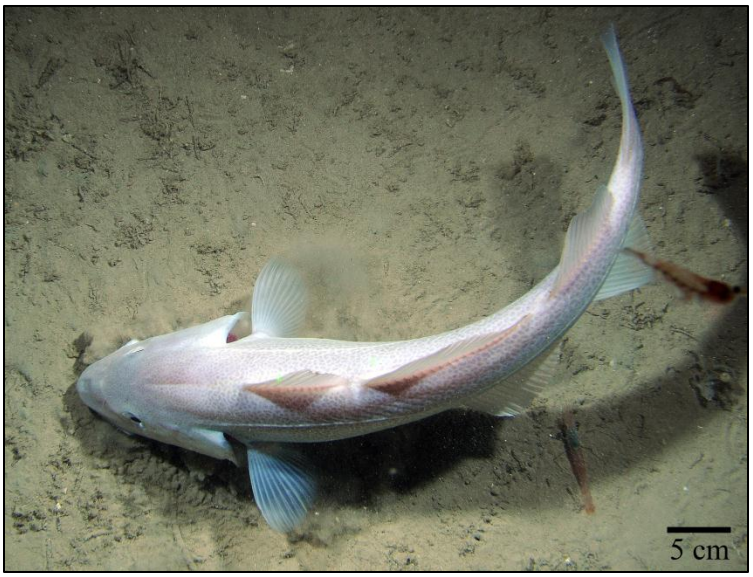
Large fish with fan-like caudal fin; caudal fin black at tip. Colour is purple/grey and banded.

Osteichthyes

Description:

Taxon includes several species of fish. Bodies are not fully visible in the images.

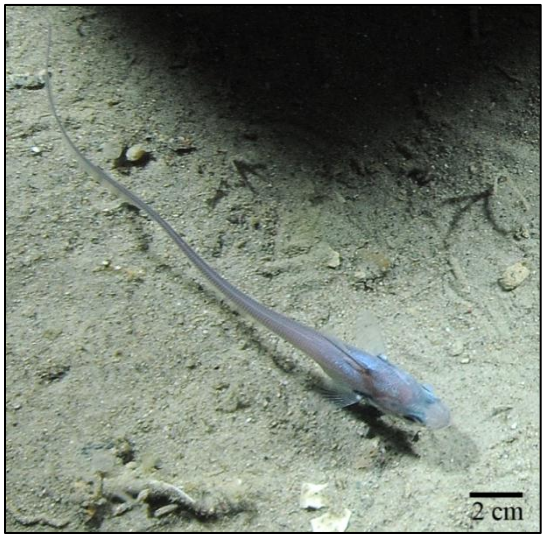
Gadus sp. 1



Description:

Likely *Gadus morhua*.

Macrouridae sp. 1



Description:

Grenadier with long, slender tail. Large eyes. Colour is primarily purple with blue spots on the head.

Macrouridae sp. 2

Description:

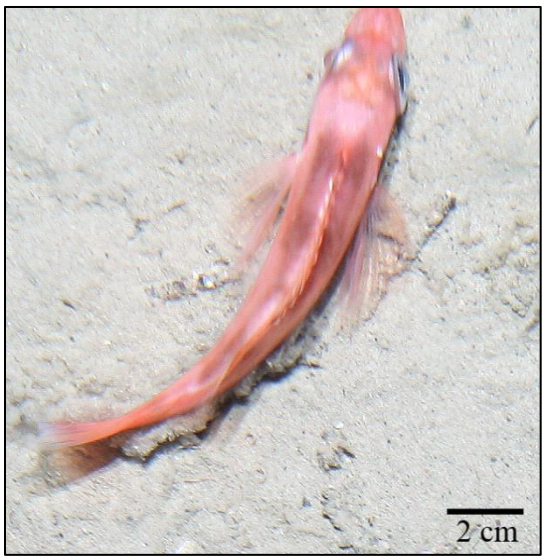
Grenadier. Larger head, shorter tail, and smaller eyes than Macrouridae sp. 1. Colour is grey/silver to purple.

Sebastes sp. 1

Description:

Redfish with alternating bands of dark and light pink. Large dorsal fin.

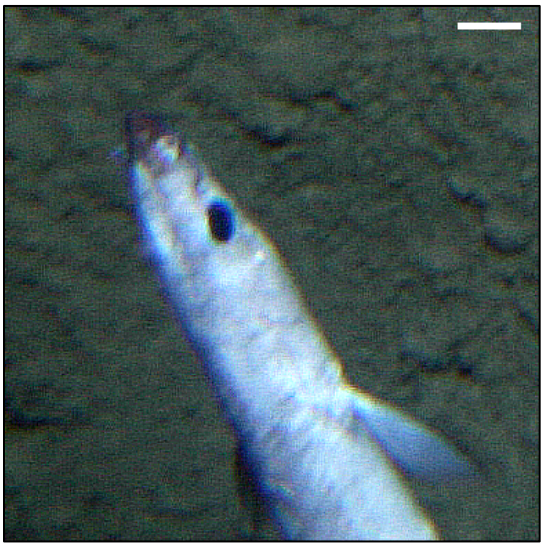
Sebastes sp. 2



Description:

Redfish with alternating bands of dark and light pink. Colour darker than *Sebastes* sp. 2; dorsal fin shorter.

Chondrichthyes sp. 1



Description:

Only the upper body visible in image. Pointed snout identifies this specimen as Chondrichthyes.

PHYLUM CNIDARIA

Class	Subclass	Order	Subord.	Family	Taxa	ITIS TSN	Total abundance
Anthozoa	N/A	N/A		N/A	Anthozoa sp. 1	914163	1
					Anthozoa sp. 8		2
					Anthozoa sp. 9		4
					Anthozoa sp. 10		30
					Anthozoa sp. 11		2
					Anthozoa sp. 16		1
					Anthozoa sp. 18		2
					Anthozoa sp. 19		2
					Anthozoa sp. 21		13
					Anthozoa		138
	Hexacorallia	Actiniaria		N/A	Actiniaria sp. 1	52485	41
					Actiniaria sp. 7		6
					Actiniaria sp. 9		168
					Actiniaria sp. 11		4
					Actiniaria sp. 12		6
					Actiniaria sp. 21		1
					Actiniaria sp. 27		6
					Actiniaria sp. 42		31
					Actiniaria sp. 43		10
					Actiniaria sp. 45		14
					Actiniaria sp. 46		10
					Actiniaria sp. 47		3

	Actiniaria sp. 48		4
	Actiniaria sp. 49		3
	Actiniaria sp. 51		1
	Actiniaria sp. 52		3
	Actiniaria sp. 53		1
	Actiniaria sp. 54		1
	Actiniaria sp. 57		1
	Actiniaria sp. 59		7
	Actiniaria sp. 65		4
	Actiniaria sp. 67		1
	Actiniaria sp. 70		1
	Actiniaria sp. 71		1
	Actiniaria sp. 96		28
	Actiniaria sp. 97		4
	Actiniaria sp. 98		41
	Actiniaria sp. 100		11
	Actiniaria sp. 107		11
	Actiniaria sp. 111		2
	Actiniaria sp. 114		2
	Actiniaria sp. 115		2
	Actiniaria		197
Actinernidae	*Actinernus nobilis*	611480	2
Actiniidae	*Bolocera* spp.	52579	4

	Hormathiidae	Hormathiidae sp. 1	52651	3
		Hormathiidae sp. 2		1
		Hormathiidae sp. 3		4
		Hormathiidae sp. 4		4
		Hormathiidae sp. 5		6
		Hormathiidae sp. 6		2
		Hormathiidae sp. 7		17
		Hormathiidae		55
Antipatharia	Schizopathidae	*Stauropathes arctica*	719057*	3
Ceriantharia	Cerianthidae	Cerianthidae sp. 8	52460	83
		Cerianthidae sp. 12		2
		Cerianthidae		102
Corallimorpharia	N/A	Corallimorpharia sp. 1	52460	31
		Corallimorpharia sp. 2		1
Scleractinia	N/A	Scleractinia sp. 3	52839	43
		Scleractinia sp. 4		4
		Scleractinia sp. 5		3
		Scleractinia sp. 6		15
		Scleractinia sp. 7		6
		Scleractinia sp. 8		9
		Scleractinia sp. 9		1
		Scleractinia		20
	Flabellidae	*Flabellum alabastrum*	572140	10
		Flabellum angulare	572141	1

					Flabellum spp.	53713	4
		Zoantharia		Zoanthidae	Zoanthidae sp. 1	52432	45
					Zoanthidae sp. 2		30
					Zoanthidae sp. 3		69
	Octocorallia	Alcyonacea		N/A	Alcyonacea sp. 2	52016	13
					Alcyonacea sp. 3		19
					Alcyonacea sp. 4		2
					Alcyonacea sp. 5		2
					Alcyonacea sp. 6		2
				Alcyoniidae	Alcyoniidae	52019	1429
					Heteropolypus cf. *insolitus*	345477*	4
				Isididae	Isididae	52329	9
					Acanella arbuscula	52338	4
		Pennatulacea		Anthoptilidae	*Anthoptilum grandiflorum*	52365	9
				Halipteridae	*Halipteris* sp. 1	719025	4
				Kophobelemidae	*Kophobelemnon* spp.	52360	34
				Pennatulidae	*Pennatula* sp. 1	52417	1
					Pennatula sp. 2		1
Hydrozoa	Hydroidolina	Anthothecatae	Capitata	N/A	Capitata sp. 1	613022	2

			Tubulariidae	*Tubularia* sp. 1	48914	39
	Leptothecatae	N/A	N/A	Leptothecatae sp. 1	718926	8
				Leptothecatae sp. 2		5
				Leptothecatae sp. 3		12
				Leptothecatae sp. 4		3

*Not recognized in ITIS; number is WoRMS AphiaID

Anthozoa sp. 1

Description:

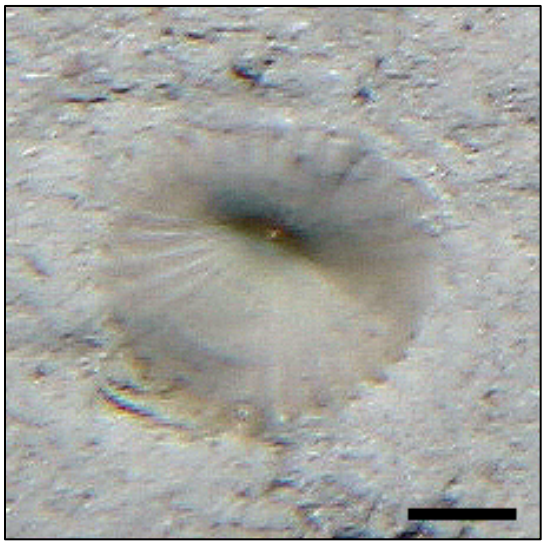
Anemone-like organism with dark red centre (possibly mouth) and a light-pink outer region. Tentacles apparent around outer edge. Possibly a scleractinian cup coral or actiniarian.

Anthozoa sp. 8

Description:

Anemone-like organism with dark red body. Raised mouth in centre, with short, thick tentacles around the periphery. Likely an actiniarian, but could possibly be a scleractinian cup coral.

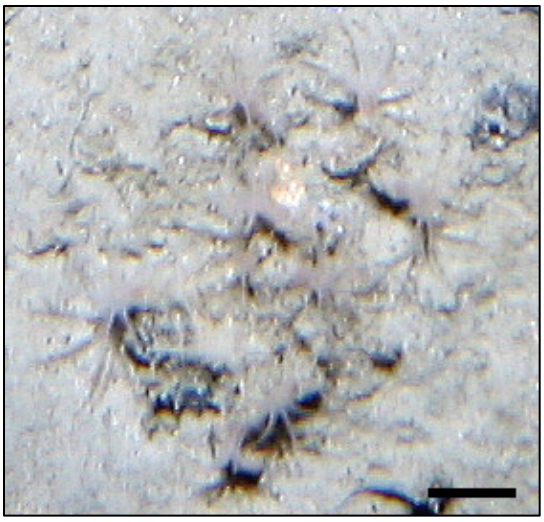
Anthozoa sp. 9



Description:

Cup-like organism that appears to extend out of the sediment. Hole in centre likely a mouth. Tentacles form a continuous sheet. Greyish in colour.

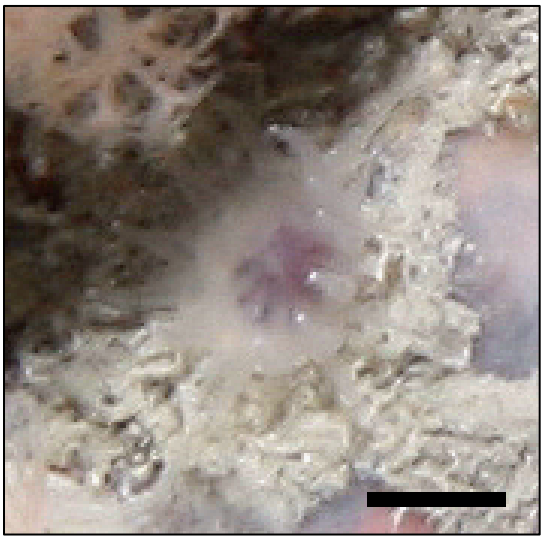
Anthozoa sp. 10



Description:

Cluster of light-pink polyps extending from tube-like structures. Tentacles are long and thin. Colonial nature suggests this species is a zoanthid.

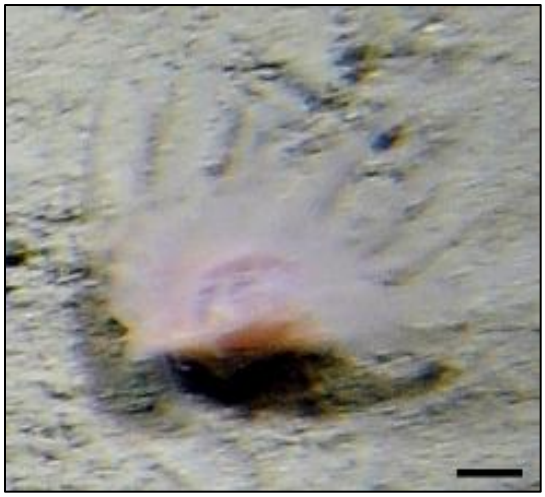
Anthozoa sp. 11



Description:

Anemone-like organism with purple centre and grey, semi-translucent tentacles. Tentacles are white at the tips. Centre of organism appears to be divided; divisions may be either septa or mesenteries.

Anthozoa sp. 16



Description:

Cup-like organism with tapering base and large, ovoid top. Centre darker in colour than rest of body. Long, thin tentacles radiate from the periphery. ‘Pinched’, appearance of cup suggests that this species may be a *Flabellum* cup coral.

Anthozoa sp. 18

Description:

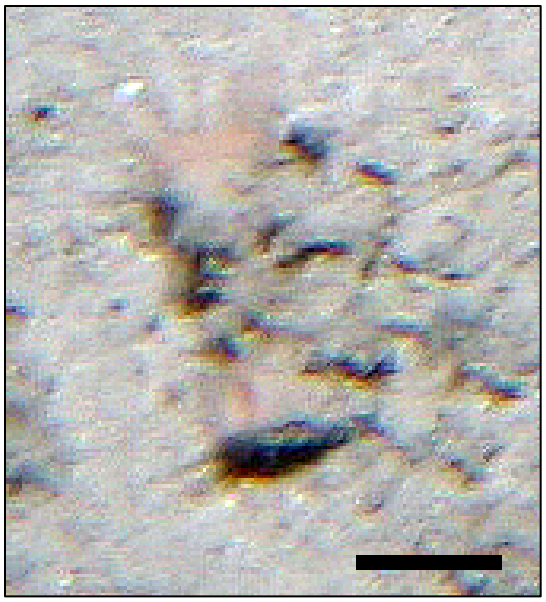
Cup-like organism extending from sediment. Colour of body alternates in rows of brown and white. Possibly an anthozoan, but could also be an annelid.

Anthozoa sp. 19

Description:

Anemone-like organism with pink body and tentacles. Multiple rows of tentacles apparent. Body appears to taper at the base, suggesting that this could be a scleractinian cup coral.

Anthozoa sp. 21



Description:

Cluster of pale orangish polyps extending from tube-like structures. Tentacles are long and thin. Colonial nature suggests this species is an zoanthid.

Anthozoa

Description:

Taxon encompasses several members of the Class Anthozoa that are different than those described above. Many appear to be anemone-like, but some may also be juvenile sea pens.

Actiniaria sp. 1

Description:

Long polyps that appear connected. Column is light yellow in colour and smooth; tentacles light-pink to orange. Protruding mouth at centre of polyp. Colonial nature suggests this is a zoanthid.

Actiniaria sp. 7

Description:

Medium-sized anemone with long, red tentacles. Tentacles are arranged in two rows and of unequal length. Dark ring around light-coloured mouth. Column not visible. Possibly a burrowing anemone.