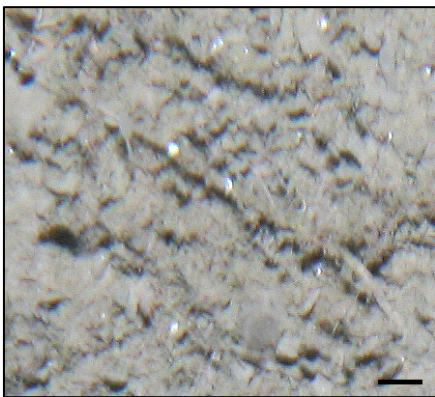
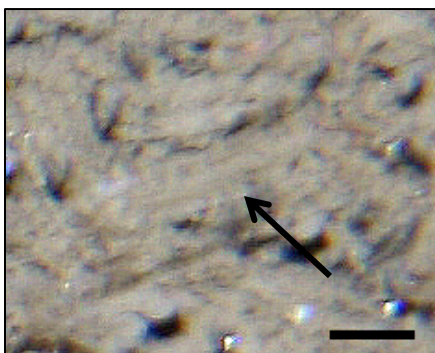


Unidentified 440*Description:*

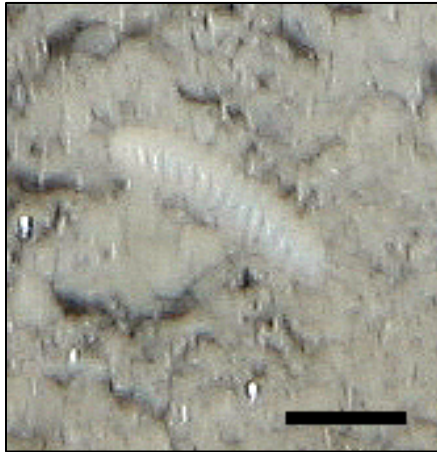
Filament-like, but with pinkish bulbed head. Small branches on stalk.

Unidentified 454*Description:*

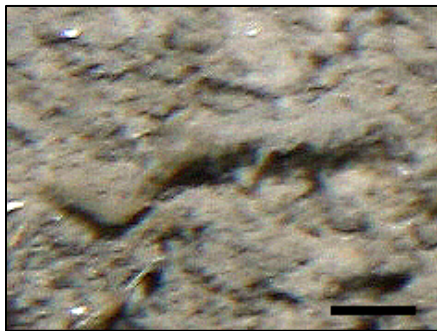
Long, slender, tube-like. Most of 'tube' is covered in sediment, but the exposed tissue at the base appears light-grey in colour.

Unidentified 459*Description:*

Transparent and worm-like. Suspended above sediment (shadow visible).

Unidentified 463*Description:*

Worm-like organism on soft sediment. Body appears segmented. Similar to Unidentified 156, but longer body and no visible purple colour.

Unidentified 465*Description:*

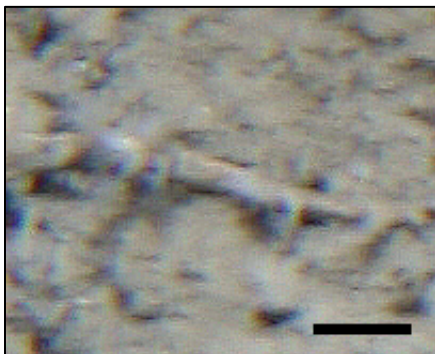
Tube-like, thick, irregularly-shaped. Could be a terebellid worm.

Unidentified 467*Description:*

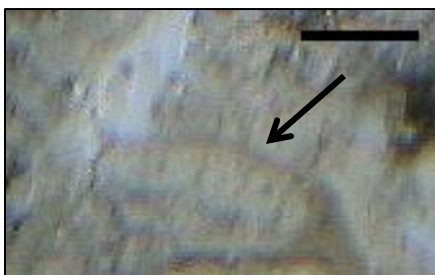
Column-shaped, with opening at one end. Possibly colonial. Semi-transparent tissue. Likely an ascidian.

Unidentified 469*Description:*

Thin, stringy, sheet-like, attached to sponge and soft sediment.

Unidentified 475*Description:*

Whitish tube; partially covered in sediment. White filaments on top, which could be a plume. Likely a serpulid worm.

Unidentified 476*Description:*

Erect stalk attached to a rock. Apical end of stalk appears to have branches that could be arms. Could be a crinoid stalk.

Unidentified 482*Description:*

Globular; pale-yellow in colour. Partially covered in sediment. Could be a bivalve species.

Unidentified 484*Description:*

White, globular organism with purple tinge. Edges appear to be covered in tiny projections. Could be two *Psolus* sp. 1, but with tentacles retracted.

Unidentified 485*Description:*

Semi-translucent, triangular organism attached to either rock or soft sediment. Large opening suggests that this is an ascidian, but could also be a poriferan.

Unidentified 486*Description:*

Globular organism on soft sediment. White with grey patches near centre; edges are covered in sediment. Could be an astrophorid sponge.

Unidentified 487*Description:*

Rectangular, semi-translucent organism attached to either rock or a sediment-covered astrophorid sponge species. Body appears sculptured. Could be a poriferan species.

Unidentified 488*Description:*

Oblong organism covered in what appear to be polyps. Lying on top of an axinellid sponge. Could be a soft coral.

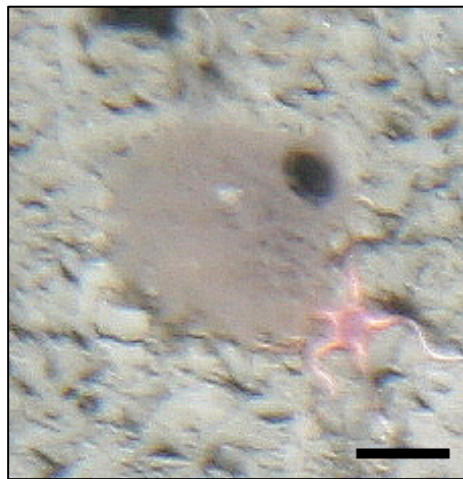
Unidentified 489



Description:

Thin stalk with tulip-like head. Head is a light pink colour, while the stalk is sediment coloured. Similar to Unidentified 295. Could be a stalked sponge such as *Rhizaxinella* sp. or *Stylochordyla borealis*.

Unidentified 590

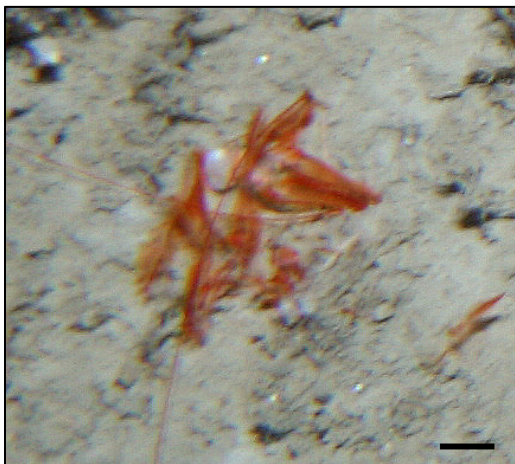


Description:

Semi-translucent, grey-brown organism on soft sediment. Body is flat and fuzzy-like, with a large opening that appears to have a raised rim. Could be an ascidian or poriferan.

Unidentified 1132*Description:*

Semi-translucent, stringy film found over soft sediment or other organisms. Very common.

Unidentified 1609*Description:*

Red clump of tissue on soft sediment. Sometimes long filaments are also present. Could be a buried pelagic crustacean.

Unidentified 1655*Description:*

Clump of short, white branches. Branches are covered in small bristles. Found on soft sediment. Could be a bryozoan or sponge species.

SUGGESTED CHANGES AND SUBSEQUENT MODIFICATIONS TO TAXONOMIC IDENTIFICATIONS AS REPORTED IN BEAZLEY ET AL. (2013; 2015)

Since the initial analysis and publication of data in Beazley et al. (2013; 2015), subsequent examination of the images and identified fauna has occurred and has furthered our understanding of the identities of the benthic megafauna in the Flemish Cap region. As a result, the taxonomic identification of several taxa from both the Flemish Pass/western Flemish Cap slope and the Sackville Spur, as published in Beazley et al. (2013) and Beazley et al. (2015), respectively, has changed. Table 4 shows the original taxonomic identification as found in this technical document and in Beazley et al. (2013; 2015), and the suggested change based on subsequent examination of the images and fauna. Some of the changes, particularly of the Porifera, are the result of examination by experts in the field. Comments explaining each change have been made where possible, some of which have been included in the taxonomic descriptions for the fauna found in the above sections of this document.

Table 4. Original taxonomic identification as found in this report and in Beazley et al. (2013; 2015), and the suggested change to these taxonomic identifications based on subsequent examination of the images and fauna.

Area	Original taxonomic identification	Suggested change to taxonomic identification	Comment
Flemish Pass/ western Flemish Cap slope	Malacostraca sp. 4	Pandalidae	Juvenile pandalid shrimp.
	Malacostraca sp. 12	Pandalidae	Juvenile pandalid shrimp.
	Decapoda sp. 1	Pandalidae	Pandalid shrimp.
	Bryozoa sp. 13	Bryozoa sp. 6	Dead/dying Bryozoa sp. 6
	<i>Sebastes</i> sp. 1	<i>Sebastes</i> spp.	Difficulty in separating lab specimens.
	<i>Sebastes</i> sp. 2	<i>Sebastes</i> spp.	Difficulty in separating lab specimens.
	Anthozoa sp. 18	Unidentified	Possibly not an anthozoan; may also be a polychaete.
	Actiniaria sp. 1	Zoanthidae sp.	Colonial nature suggests this is not an actiniarian, but is a zoanthid species.
	Cerianthidae sp. 8	Cerianthidae	Difficulty separating into different species, particularly when tentacles are retracted.
	Cerianthidae sp. 12	Cerianthidae	Difficulty separating into different species, particularly when tentacles are retracted.
	Isididae	<i>Acanella arbuscula</i>	No known records of other species of <i>Acanella</i> in the Flemish Cap region.
	Kophobelemnon spp.	<i>Kophobelemnon stelliferum</i>	Confident this taxon is the species <i>Kophobelemnon stelliferum</i> based on known distribution.
	<i>Psolus</i> spp.	<i>Psolus</i> sp. 1	Confident only a single species is present.
	Octopoda sp. 3	Unidentified	No longer confident this specimen is a mollusc. Resembles the tunicate Didemnidae sp. 1

Nemertea sp. 5	Unidentified	Possibly an acorn worm (Phylum Hemichordata).
Porifera sp. 25	Unidentified	May also be an ascidian.
Porifera sp. 31	Unidentified	Small size; may also be an ascidian.
Porifera sp. 47	Unidentified	May also be an ascidian.
Porifera sp. 72	Unidentified	May also be an ascidian.
Porifera sp. 110	Unidentified	May also be an ascidian.
Porifera sp. 197	Unidentified	May also be an ascidian.
Porifera sp. 242	Unidentified	Possibly an artifact of the substrate.
Porifera sp. 264	<i>Chonelasma choanoides</i>	Subsequently identified as <i>Chonelasma choanoides</i> .
Demospongiae sp. 4	Porifera sp. 231	Subsequently discovered that this is the same species.
Demospongiae sp. 4	Porifera sp. 4	Can't confidently be distinguished from one another.
Demospongiae sp. 14	<i>Psolus</i> sp. 1	
Demospongiae sp. 50	Unidentified	May also be an ascidian.
Porifera sp. 167	Demospongiae sp. 16	Subsequently identified as the same species.
<i>Geodia barretti</i>	<i>Geodia</i> spp.	Can't confidently distinguish from other <i>Geodia</i> specimens.
<i>Geodia</i> sp. 1	<i>Geodia</i> spp.	Possibly <i>Geodia barretti</i> .
<i>Geodia</i> spp.	<i>Geodia</i> spp.	Possibly includes <i>Geodia barretti</i> .
Axinellidae	Morphological descriptor- such as Lamellate sponges	Recently discovered other fan-shaped/lamellate sponges in the region that do not belong to the Family Axinellidae.
<i>Asconema</i> sp. 1	<i>Asconema foliata</i>	Recently confirmed as <i>A. foliata</i> (see Murillo et al., 2013).

Sackville Spur

Unidentified 29	Shell fragments (hash)	
Unidentified 598	Serpulidae	Serpulid worm.
Unidentified 1082	Alcyoniidae	Subsequently identified as a soft coral from the Family Alcyoniidae.
Unidentified 1155	Shell fragments (hash)	
Terebellidae sp. 1	Serpulidae	Subsequently identified as Serpulidae based on colour of tube fragments.
Anguilliformes	Unidentified	May also be a malacostracan arthropod.
Clavulariidae sp. 2	Unidentified	Possibly not an anthozoan; may be an ascidian based on large pore in body.
Porifera sp. 83	Unidentified	May be a juvenile Didemnidae sp. 1.
Demospongiae sp. 3	Unidentified	Similar to Demospongiae sp. 50 from the Flemish Pass; possibly an ascidian.
Axinellidae	Morphological descriptor- such as Lamellate sponges	Recently discovered other fan-shaped/lamellate sponges in the region that do not belong to the Family Axinellidae.
Hexactinellida sp. 1	Porifera sp.	Similar to Demospongiae sp. 49 of the Flemish Pass. Possibly a demosponge.
<i>Asconema</i> sp. 1	<i>Asconema foliata</i>	Recently confirmed as <i>A. foliata</i> (see Murillo et al., 2013).
Unidentified 7	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an uncharacteristic, empty tube.
Unidentified 96	<i>Aporrhais occidentalis</i> covered in <i>Psolus</i> sp. 1	
Unidentified 138	Biogenic structure- Filament	Further examination of this specimen suggests that it may be an uncharacteristic, white filament.
Unidentified 141	Delete	Initially thought to be a poriferan, but further examination revealed this to be

		an extension of a cloud of sediment.
Unidentified 173	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an uncharacteristic, empty tube.
Unidentified 201	Unidentified 1132	Same as film-like organism Unidentified 1132.
Unidentified 207	Delete	Dark clump on sediment that is likely the artifact of the substrate.
Unidentified 222	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an uncharacteristic, empty tube.
Unidentified 225	Biogenic structure- Tube	Further examination of this specimen suggests that it may be a large empty tube.
Unidentified 229	Biogenic structure- Filament	Further examination of this specimen suggests that it may be an uncharacteristic, white filament.
Unidentified 232	Shell fragments (shell hash)	
Unidentified 235	Bryozoa sp. 4	Further examination of this specimen revealed that it is a juvenile Bryozoan sp. 4.
Unidentified 282	Biogenic structure- Tube	Further examination of this specimen suggests that it may be a large, uncharacteristic tube.
Unidentified 299	Asciacea sp. 3	Siphon of Asciacea sp. 3
Unidentified 333	Delete	Artifact of the sediment or a burrowing organism.
Unidentified 367	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an uncharacteristic tube.
Unidentified 378	Biogenic structure- Filament	

Unidentified 384	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an empty tube.
Unidentified 385	Delete	Depression in the sediment, possibly from a burrowing organism.
Unidentified 392	Unidentified 1132	Can't be distinguished from the film-like organism Unidentified 1132.
Unidentified 405	Biogenic structure- Tube	Further examination of this specimen suggests that it may be an erect tube.
Unidentified 418	Biogenic structure- Filament	
Unidentified 454	Biogenic structure- Tube	
Unidentified 469	Unidentified 1132	Same as film-like organism Unidentified 1132.
Unidentified 476	Biogenic structure- Filament	Uncharacteristic, erect filament.

ACKNOWLEDGMENTS

This technical report is the result of projects undertaken as part of the NAFO Potential Vulnerable Marine Ecosystems – Impacts of Deep-Sea Fisheries (NEREIDA) program, which is supported by Spain’s General Secretary of the Sea (SGM), Spain’s Ministry for the Rural and Marine Environment, the Spanish Institute of Oceanography, the Geological Survey of Canada (GSC), the Canadian Hydrographic Service (CHS), Fisheries and Oceans of Canada (DFO), the UK’s Centre for the Environment Fisheries and Aquaculture Sciences (Cefas), the Russian Polar Research Institute of Marine Fisheries and Oceanography (PINRO), and the Russian P.P. Shirshov Institute of Oceanography (RAS). This report was funded by a DFO International Governance Strategy (IGS) project to E. Kenchington. We thank V. Kostylev and C. Campbell (GSC) for the use of the ‘4KCam’, and A. Robertson (GSC) for technical support during its operation. We thank K. MacIsaac and J. Murillo for their advice on the taxonomic identification of all the benthos in general, and M. Best for her advice on the taxonomic identification of the sponges, all with DFO. We thank A. Cogswell (DFO) for processing the Sackville Spur benthic images. We thank Robert Benjamin (DFO) for processing the navigation and positional data for each image and for the creation of the customized Microsoft Access image analysis form. We thank Cam Lirette (DFO) for processing the navigational data and preparing summary maps and logistical metadata for each transect. Finally, we thank E. Baker and G. TompkinsMacdonald (DFO) for their review and improvements to this document.

REFERENCES

- Ackers, R.G., Moss, D., Picton, B.E., Stone, S.M.K., Morrow, C.C. 2007. Sponges of the British Isles ("SPONGE V"). A colour guide and working document. 1992 edition, reset with modifications, 2007. Marine Conservation Society, UK. 165 p.
- Beazley, L.I., Kenchington, E.L., Murillo, F.J., Sacau, M. 2013. Deep-sea sponge grounds enhance diversity and abundance of epibenthic megafauna in the Northwest Atlantic. *ICES J. Mar. Sci.* 70: 1471-1490.
- Beazley, L., Kenchington, E., Yashayaev, I., Murillo, F.J. 2015. Drivers of epibenthic megafaunal composition in the sponge grounds of the Sackville Spur, northwest Atlantic. *Deep-Sea Res. I* 98: 102-114.
- FAO. 2009. International Guidelines for the Management of Deep-Sea Fisheries in the High Seas. FAO, Rome, p. 73.
- Gosner, K.L. 1971. Guide to identification of marine and estuarine invertebrates. Cape Hatteras to the Bay of Fundy. Wiley-Interscience, New York. 393 p.
- ICES. 2009. Report of the ICES-NAFO Working Group on Deep-Water Ecology (WGDEC), 22-26 March 2009. ICES Doc. CM 2009/ACOM: 23. 92 p.
- Kenchington, E., Cogswell, A., MacIsaac, K., Beazley, L., Law, B., Kenchington, T. 2014. Limited depth zonation among bathyal epibenthic megafauna of the Gully submarine canyon, northwest Atlantic. *Deep-Sea Res. II* 104: 64-82.
- NAFO. 2009a. Report of the Working Group on the Ecosystem Approach to Fisheries Management (WGEAFM). NAFO SCS Document 09/06, Serial No. N5627. 22 p.
- NAFO. 2009b. Delineation of existing bottom fishing areas in the NAFO Regulatory Area. NAFO SCA Document 09/21, Serial No. N5676. 9 p.
- NAFO. 2010. NAFO Conservation and Enforcement Measures. NAFO/FC Doc. 10/1. Serial No. N5740. 95 p.
- Pollock, L.W. 1998. A practical guide to the marine animals of northeastern North America. Rutgers University Press, New Brunswick, New Jersey & London. 367 p.

APPENDIX A

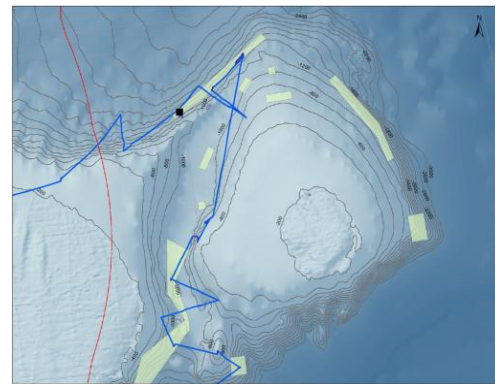
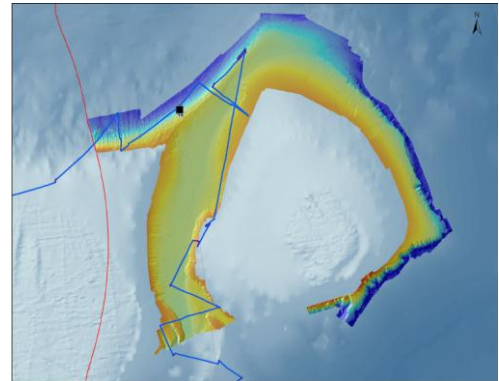
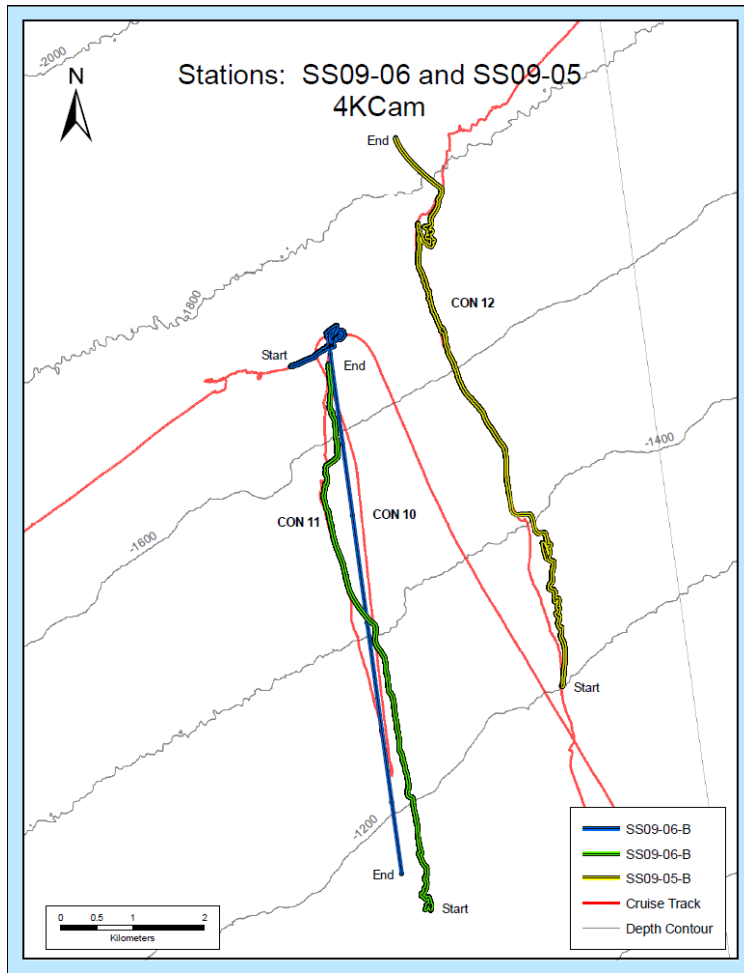
This appendix contains spatial and logistical information for each benthic image transect analyzed in this report. For each transect, the following maps are shown:

1. Large-scale map of each transect (labelled by their consecutive operation number, or CON), with depth contours visible.
2. Small-scale map of the cruise track and transect location (black square) in the Flemish Cap area overtop of multibeam collected during the NEREIDA programme.
3. Small-scale map of the cruise track and transect location (black square) with NAFO closure areas (from 2010) visible as green polygons.

For each transect, the latitude, longitude, and JDayGMT (Julian Day + GMT (in hours, minutes, seconds)) is included for several key points during the operation of the camera gear:

1. When the camera gear is deployed and first reaches the surface of the water ('In Water').
2. When the camera gear first reaches the seabed ('On Bottom'). This represents the beginning of the transect.
3. When the camera gear leaves the bottom and begins its ascent to the surface ('Off Bottom'). This represents the end of the transect.
4. When the camera gear is brought back onboard the ship ('On Deck').
5. Total time the camera gear is on bottom (hours, minutes, seconds).

Transects 11 & 12 (SS09-06-B/Con 11 & SS09-05-B/Con 12) - Sackville Spur



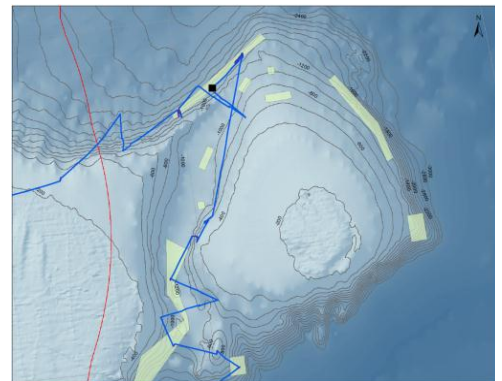
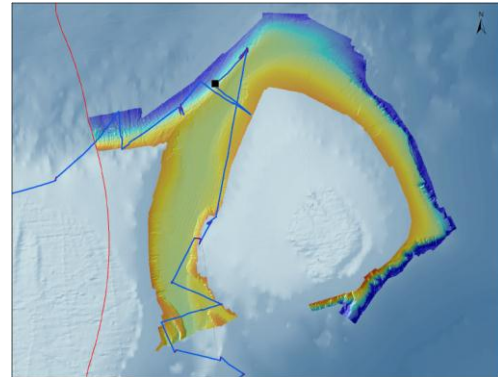
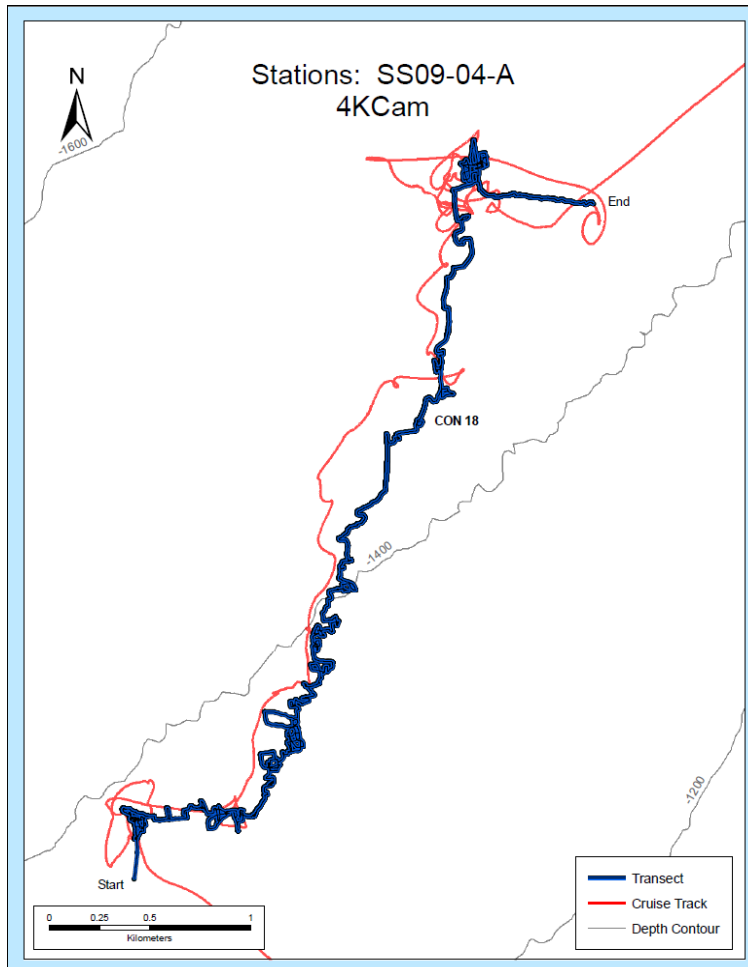
SS09-06-B/Con 11

4KCam location	Latitude	Longitude	JDayGMT
In Water	48.356631	-46.557059	195124220
On Bottom	48.31994	-46.554277	195133804
Off Bottom	48.373522	-46.561737	195170033
On Deck	48.386005	-46.559071	195173958
Total time on bottom			032229

SS09-05-B/Con 12

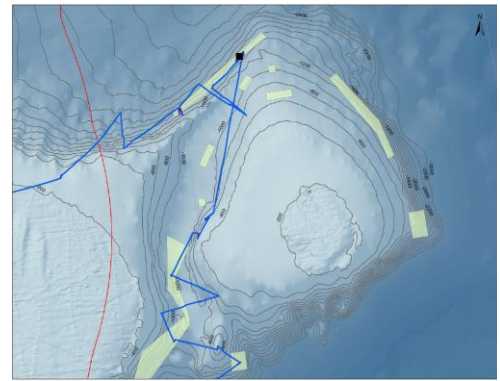
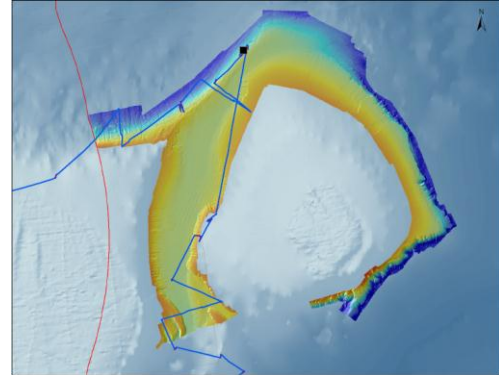
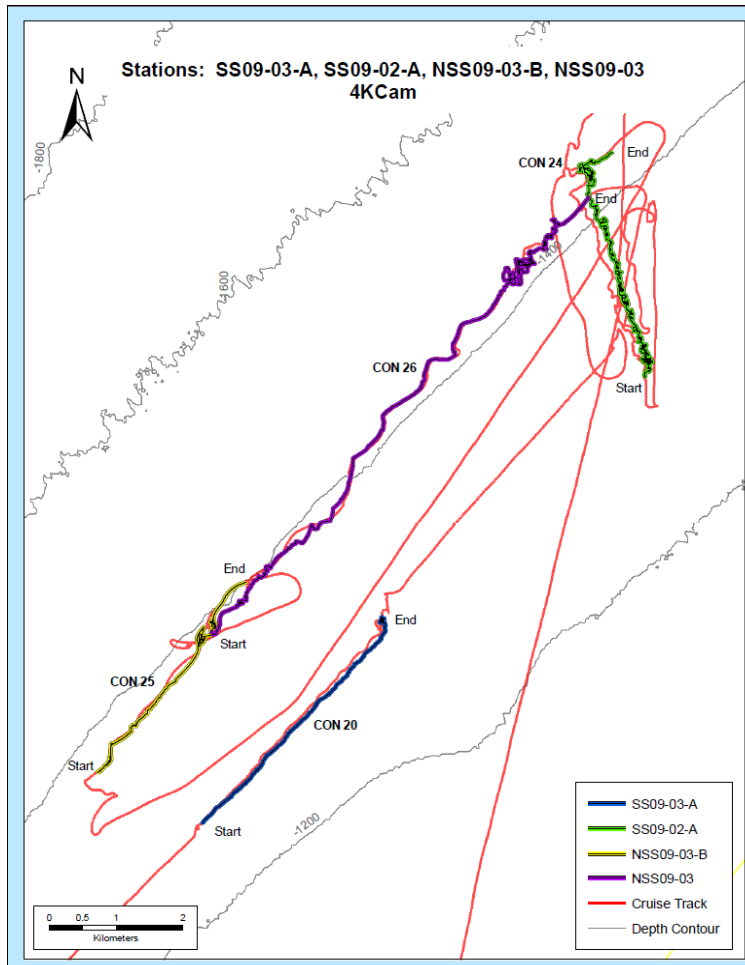
4KCam location	Latitude	Longitude	JDayGMT
In Water	48.342229	-46.524098	195190814
On Bottom	48.353154	-46.522455	195195034
Off Bottom	48.400043	-46.538969	195231230
On Deck	48.405604	-46.533389	195235342
Total time on bottom			032156

Transect 18 (SS09-04-A/Con 18) - Sackville Spur



4KCam location	Latitude	Longitude	JDayGMT
In Water	48.535535	-46.045154	196144923
On Bottom	48.53533	-46.037348	196155107
Off Bottom	48.562701	-46.016672	196183732
On Deck	48.560098	-46.009157	196191540
Total time on bottom			024625

Transects 24 & 26 (SS09-02-A/Con 24 & NSS09-03/Con 26) - Sackville Spur

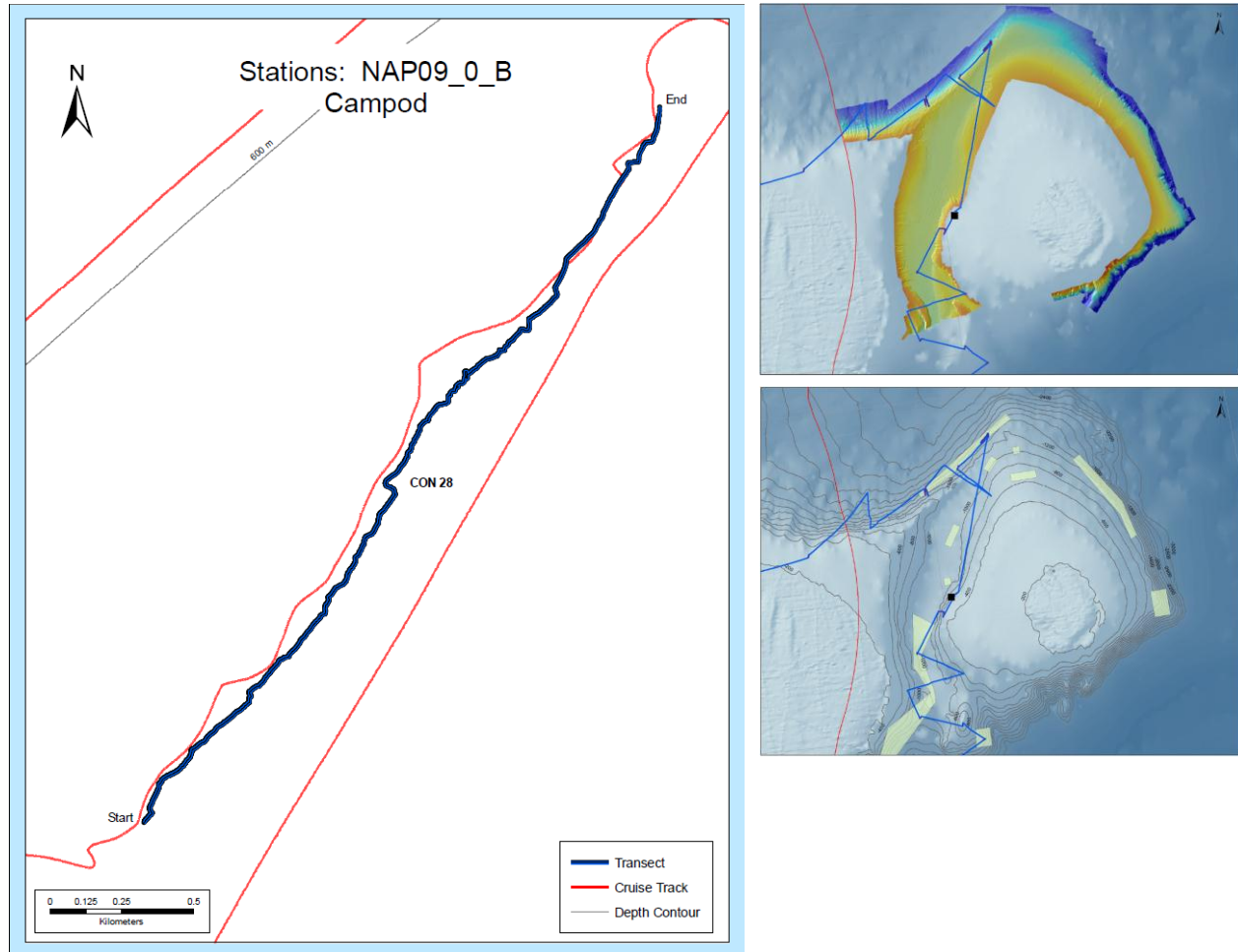


SS09-02-A/Con 24

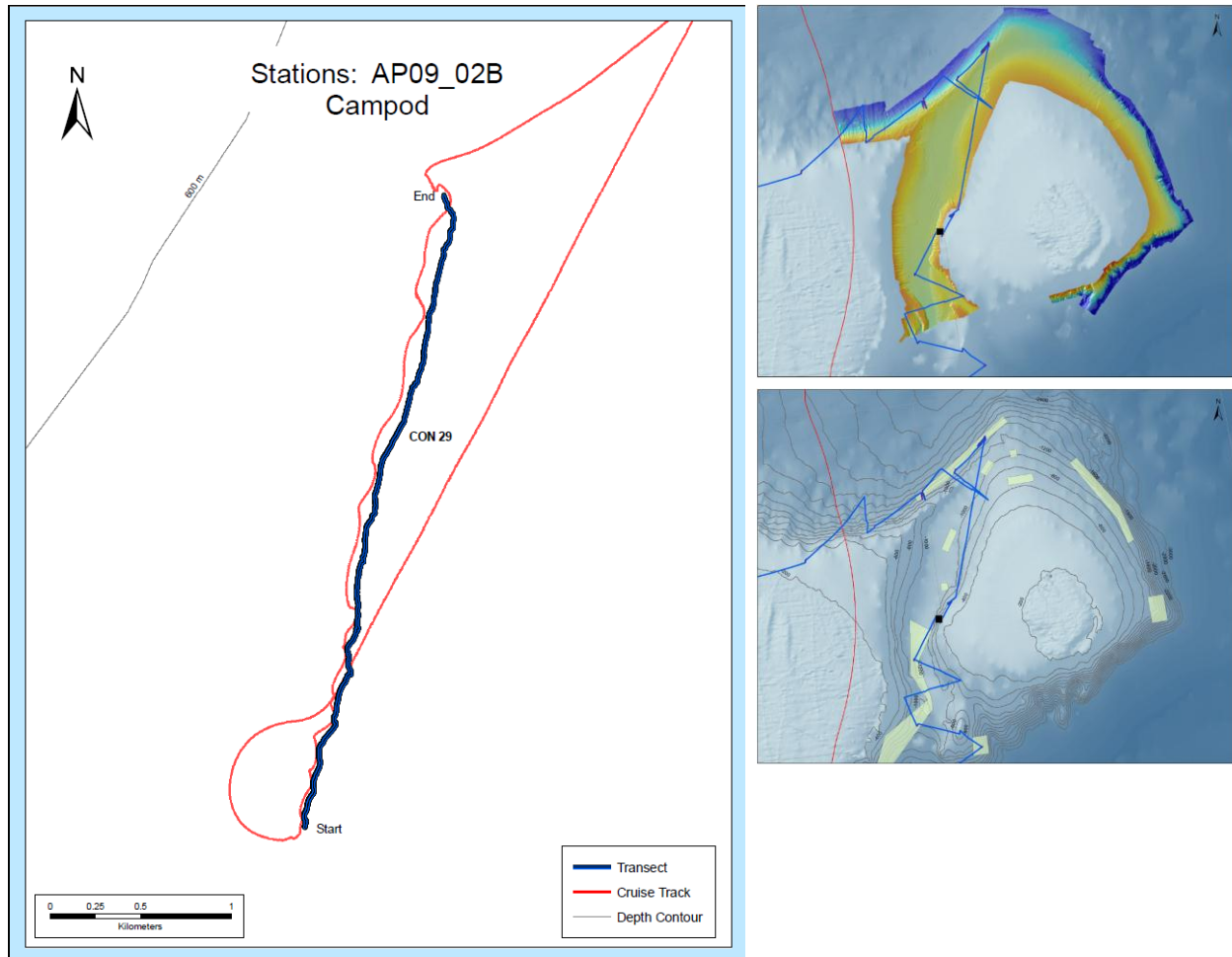
4KCam location	Latitude	Longitude	JDayGMT
In Water	48.798675	-45.523156	197093900
On Bottom	48.801516	-45.522337	197101658
Off Bottom	48.827511	-45.527662	197125813
On Deck	48.832081	-45.517588	197132446
Total time on bottom			024115

NSS09-03/Con 26

4KCam location	Latitude	Longitude	JDayGMT
In Water	48.773226	-45.617326	197181628
On Bottom	48.790528	-45.585539	197192249
Off Bottom	48.816504	-45.542352	197212620
On Deck	48.823946	-45.528601	197215326
Total time on bottom			020331

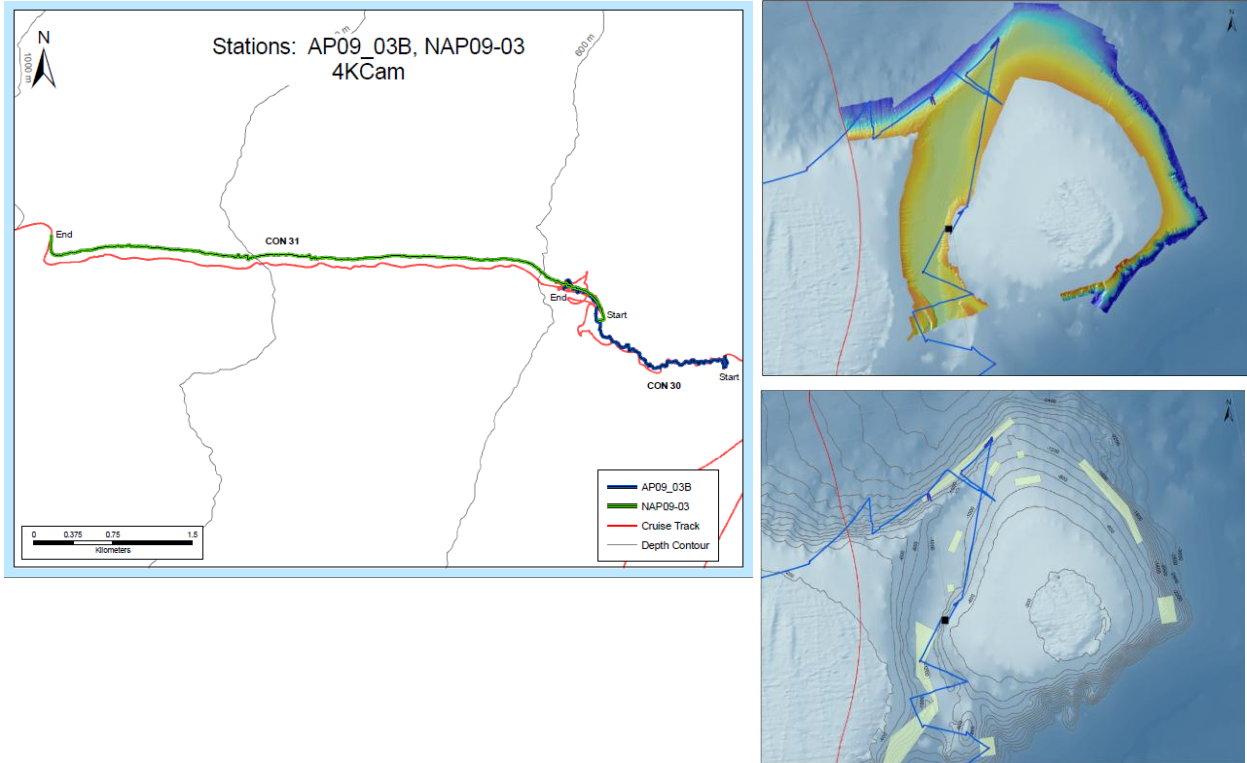
Transect 28 (NAP09_0_B/Con 28) - Flemish Pass/Western Flemish Cap slope


Campod location	Latitude	Longitude	JDayGMT
In Water	47.294098	-46.366571	198102525
On Bottom	47.295514	-46.364428	198103854
Off Bottom	47.308559	-46.34428	198120330
On Deck	47.311788	-46.340574	Not available
Total time on bottom			012436

Transect 29 (AP09_02B/Con 29) - Flemish Pass/Western Flemish Cap slope


Campod location	Latitude	Longitude	JDayGMT
In Water	47.122882	-46.542277	198140029
On Bottom	47.123996	-46.541516	198141322
Off Bottom	47.148628	-46.527227	198163255
On Deck	47.15162	-46.526580	Not available
Total time on bottom			021933

Transects 30 & 31 (AP09_03B/Con 30, NAP09-02/Con 31) - Flemish Pass/Western Flemish Cap slope

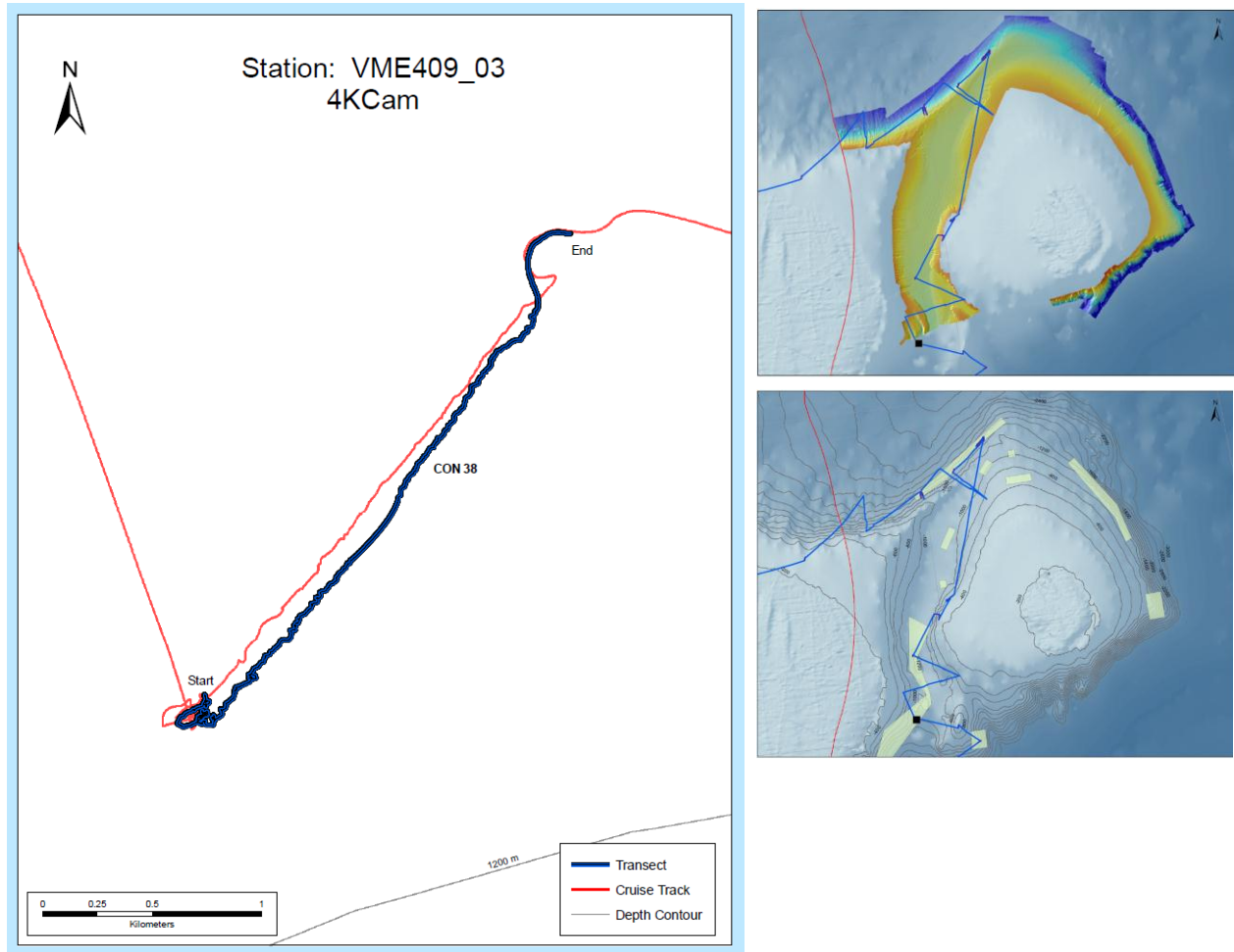


AP09_03B/Con 30

4KCam location	Latitude	Longitude	JDayGMT
In Water	47.165553	-46.512593	198173556
On Bottom	47.165372	-46.51555	198175616
Off Bottom	47.172659	-46.52879	198192541
On Deck	47.173224	-46.531452	198194515
Total time on bottom:			012925

NAP09-03/Con 31

4KCam location	Latitude	Longitude	JDayGMT
In Water	Not available	Not available	Not available
On Bottom	47.175472	-46.534684	198204905
Off Bottom	47.181659	-46.589524	198235059
On Deck	47.183363	-46.593034	199001002
Total time on bottom:			030154

Transect 38 (VME409_03, or Con 38) - Southern Flemish Pass


4KCam location	Latitude	Longitude	JDayGMT
In Water	46.172002	-47.054702	199183032
On Bottom	46.171221	-47.055049	199192550
Off Bottom	46.184003	-47.035846	199220500
On Deck	46.189207	-47.028084	199230000
Total time on bottom:			023910