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Analysis of seabed video and stills data collected by drop down camera on the Solan Bank Reef SCI (1714S) (2014)

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Summary

Marine EcoSol was contracted by the Joint Nature Conservation Committee (JNCC) to analyse seabed imagery collected in 2014 from the Solan Bank Reef Site of Community Importance (SCI). This report details the video and stills analysis methods employed and summary results of the analysis.

The objectives of the imagery analysis were to:

1. Undertake a taxonomic analysis of fauna and characterise habitats from stills and video collected from the 1714S Solan Bank Reef SCI cruise to:
   - Identify and quantify all epifaunal species.
   - Identify and quantify all sponge morphological types.
   - Note the presence of anthropogenic impacts.
   - Delineate Annex I reef habitat (including subtypes).
   - Assign biotopes to habitats present.
   - Note the presence of Priority Marine Features.

2. Report average time spent determining:
   i. Sponge morphological abundance and diversity.
   ii. Sponge species abundance and diversity per still image and per 10 or 20 second video segment analysed.

3. Discuss success and limitations of different trialled methods.

4. Enter results into Marine Recorder.

Due to project time constraints and imagery analyses taking significantly longer than anticipated, three different methods of analysis were used to analyse the 156 video transects, identified by JNCC for analysis. Of the original 166 video transects, only 156 had high enough quality for video analysis, however stills from all 166 were analysed. Of these transects, six were subdivided and analysed in ten second sections; 73 were divided into 20 second sections and 77 transects were divided into, and analysed, as distinct habitats each lasting longer than 60 seconds. Of the total 1,701 stills selected for analysis, approximately one every minute of video recorded, 1,696 images were analysed. The remaining images were not deemed high enough quality (e.g. as the camera was too far from the seabed or lighting too poor to undertake analysis).

All distinct habitats identified within the Solan Bank Reef SCI seabed imagery survey were allocated to three broad-scale habitats: subtidal coarse sediments, subtidal mixed sediments, and greater than half of samples allocated to the third broad-scale habitat, moderate energy circalittoral rock. Within this last habitat complex, four biotopes and seven sub-biotopes were identified, all from the ‘Echinoderms and crustose communities’ biotope complex.

Annex I Reef habitat subtypes were assigned to stills and distinct habitats within video clips. Due to the sparse and sand-scoured look of the reefs observed in some imagery, surveyors were not confident in assigning some areas with the Annex I reef designation, although the areas met the reef criteria. As a result, surveyor confidence was attributed to Annex I reef assignment, with assignments qualitatively split into ‘low’, ‘medium’ and ‘high’ confidence by surveyors. From analysis of the stills, 34% of transects contained habitats assigned as stony or bedrock Annex I Reef subtypes with high or medium confidence. Twenty-eight percent of transects contained habitats assigned as stony or bedrock Annex I reef subtypes with high or medium confidence from analysis of video imagery.

From analysis of 1,696 stills, a total of 17,500 observations were made of 320 different taxa. The average number of taxa recorded per still (taxon richness) was 10.3 (+/- 0.14 standard error), with the greatest taxon richness of 28 recorded in two stills from the same transect. The average taxon richness per transect, recorded from analysis of the stills, was 10.1 (+/- 0.3 SE). The transect with the greatest average taxon richness was transect RSS82_S164, with an average taxon richness of 22 (+/- 1.56 SE).

At least one taxon was observed in 93% of stills. The most frequently recorded phyla were: Bryozoa comprising 31% of all taxa observations; then Echinodermata making up 14% of observations; and followed by Annelida, representing 12% of all taxa observations. Of all taxa observations recorded (fauna and flora), 42% were crustose in life form.

Of the nine sponge morphology types used to classify sponges, all nine were identified in the stills and/or video imagery analysed. One hundred and fifty-six of the 166 stills transects analysed contained at least one or more morphology. The dominant sponge morphologies identified within stills were encrusting (88% of transects), massive (52% of transects) and flabellate (40% of transects), followed by the less common morphologies being globular (21% of transects), arborescent (11% of transects), and the rarer morphologies including papillate (5% of transects), repent (2% of transects), and with pedunculate and tubular both present in only 0.6% of transects and identified from stills only.

From analysis of 1,696 stills, 114 were thought to contain fragile sponge and anthozoan communities totalling 25% of transects analysed. Of these stills, 92 were assigned with low surveyor confidence, 18 with medium surveyor confidence, and only four stills were assigned this habitat with high surveyor confidence.

Five Scottish Priority Marine Features (PMFs) were identified in the Solan Bank Reef SCI 2014 seabed imagery. Three were mobile species: Whiting (*Merlangius merlangus*), present in seven transects overall; Cod (*Gadus morhua*), present in five transects; and Ling (*Molva molva*), also present in five transects. Two PMF species of low and limited mobility were also recorded: the Northern feather star (*Leptometra celtica*), present in one transect and the White cluster anemone (*Parazoanthus anguicomus*), present in 19 transects.

Evidence of human impact observed in the Solan Bank area including litter, fishing gear or other primary evidence was reported in eight transects. Broken erect bryozoans (secondary or indirect evidence) were reported within three transects.

Times were recorded for the specific tasks of identifying and enumerating sponge morphologies and identifying and enumerating sponge and anthozoan taxa within a subset of 431 stills. This subset of stills was not chosen randomly; instead midway through the image analysis, surveyors began auditing time for various tasks within the analysis. Within these stills, on average 12% of the stills analysis time was spent identifying and enumerating sponge morphologies, and 14% of analysis time was spent identifying and enumerating sponge and anthozoan taxa. The remaining stills analysis time was spent identifying all other taxa, substrates, biotopes and features of interest.

Due to the linear process of analysing video it was not possible to audit the time it took for only the identification and enumeration of sponge morphologies, and only the identification of sponge and anthozoan taxa, as these could not be separated from the analysis of all taxa and other features of interest. However, proportional analysis times extrapolated from stills analysis times and applied to the video analysis, suggested it could have taken 0.52 and 0.59 minutes respectively to identify and enumerate sponge morphologies and sponge and anthozoan taxa per 20 second video section, and 0.65 minutes and 0.75 minutes respectively per 10 second video section for sponge morphologies and sponge and anthozoan taxa. The longer average analysis times for 10 second video sections compared to 20 second video sections, provides evidence of a training effect. The relatively few 10 second sections (486) for which these average times were calculated, were analysed at the beginning of the project compared with the larger sample size of 20 second video sections (4,015) being analysed later in the project.

One of the main lessons learnt from this project was the longer than anticipated length of time it took to analyse video using the 10 or 20 second subsections method, compared with where video is divided into natural breaks when the habitat changes. Transects split into 10 second subsections took on average 7.08 hours to analyse (5.3 minutes per subsection), 20 second subsections took on average 3.75 hours (4.2 minutes per subsection), whereas those analysed as habitats took on average 1.4 hours to analyse (62 minutes per habitat).

It was the opinion of the surveyors working on this project that the 20 second sub-sectioning method used for over 50% of videos analysed did not greatly improve accuracy of abundance measures, compared with normal habitat analysis of the video. The sparse and sand-scoured nature of the substrates, and the general low abundances and diversity of sponges and anthozoans reduced (in the authors opinion) the need to subsection the video compared with very complex habitats, such as dense turfs of sponges, hydroids and bryozoans, or areas with hundreds or thousands of individuals per square metre, such as horse mussel beds. In these more complex habitats, it is easy to miss individual taxa when counting or scoring over larger areas (i.e. during several minutes of video). Therefore the more focused approach of dividing the video into 20 second sections would likely achieve more accurate abundance estimates and reduce chances of missing taxa within the video.

Contents

1 Introduction

Marine Ecological Solutions (hereafter Marine EcoSol) was contracted by JNCC to analyse seabed imagery from the Solan Bank Reef Site of Community Importance (SCI).

The seabed survey of the Solan Bank Reef SCI was organised by JNCC but undertaken jointly by JNCC and Marine Scotland Science (MSS) staff in 2014 from the MRV Scotia. The vessel departed from Aberdeen on 28 October 2014, and returned on 9 November 2014.

Both still imagery and video data were collected from 166 transects using a Drop Down Video (DDV) frame. Imagery was collected from the Solan Bank Reef SCI area in line with the JNCC survey plan (O'Connor 2014) with aims to:

1. Ascertain whether DDV derived underwater camera video and stills data can be used to sufficiently estimate sponge morphological abundance and anthozoan abundance per unit area (e.g. video transect or still image).
2. Assess whether sufficient abundances of different sponge morphologies are present at Solan Bank Reef SCI to test the indicator at this site.
3. Ascertain whether underwater camera video and stills data can be used to measure patchiness of sponge and other epifaunal communities, which may be a response to physical damage.
4. Initiate collection of potential baseline data on sponge morphological abundance and epifaunal composition and abundance to enable future testing of the indicator.

To help achieve JNCC's aims as stated above, the objectives of the current contract were to:

a) Undertake a taxonomic analysis of fauna and characterise habitats from stills and video collected from the 1714S Solan Bank Reef SCI cruise to:
   - Identify and quantify all visible and mobile taxa.
   - Identify and quantify sponge morphological types.
   - Note the presence of anthropogenic impacts.
   - Delineate Annex I reef habitat (including subtypes).
   - Assign biotopes to habitats present.
   - Note the presence of Priority Marine Features.

b) Report on methods and results from imagery analysis.
c) Report average time spent determining (i) sponge morphological abundance and diversity and (ii) sponge species abundance and diversity per still image and per video segment analysed. Discuss success and limitations of different trialled methods.
d) Enter results into JNCC's marine benthic sample database called Marine Recorder (URL[1]).

This report addresses objectives a) to c) stated above. It does not attempt to answer JNCC's overall survey and project aims (1 to 4 above) as these will be reported upon separately elsewhere.

The focus of this report is the methods and methodological limitations trialled and identified during the imagery analysis. Summarised results from the analyses are also presented, however it should be noted, the bulk of data from this project is held within Excel spreadsheets and Marine Recorder (URL[1]), a database application used by JNCC and other organisations to store marine benthic sample data such as species, physical attributes and biotopes.

1.1 Background

Solan Bank Reef was submitted to the European Commission to become a candidate Special Area of Conservation (cSAC) on 31 August 2012 (URL[2]). In November 2013 the site was approved and adopted by the EC as a Site of Community Importance (SCI) (Commission of The European Community 2007 & URL[3]). Under the Offshore Marine Conservation (Natural Habitats *etc.*) Regulations 2007 (as amended) (URL[4]), Solan Bank Reef has to be designated as Special Area of Conservation (SAC) within six years of its adoption as an SCI by the EC.

The Solan Bank Reef SCI covers an area of 856km^2 within the Atlantic Biogeographic region (URL[5]), approximately 50km from the north coast of mainland Scotland. The feature for which Solan Bank Reef SCI was designation for is Annex I Reef. Figure 1.1 shows the location and extent of the Solan Bank Reef SCI.

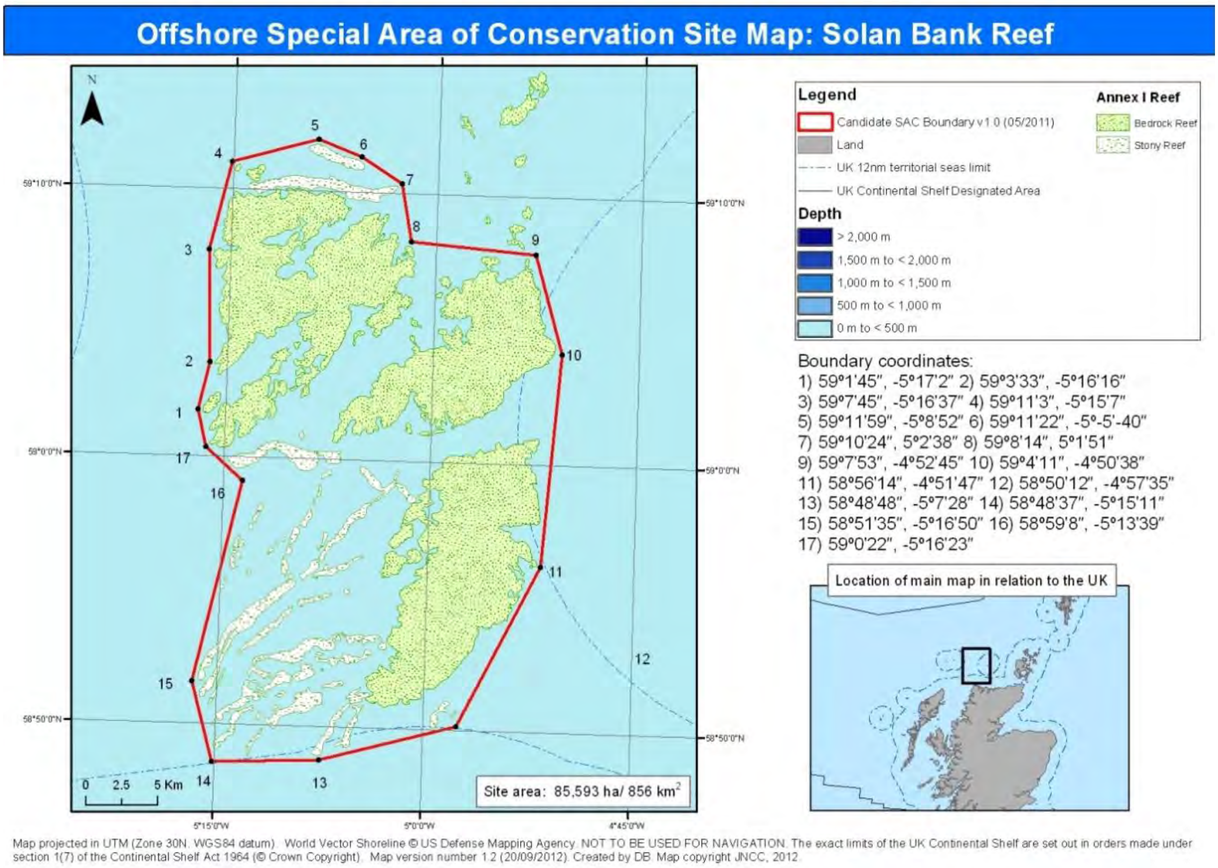


Figure 1.1. Overview of Solan Bank Reef SCI (JNCC 2012).

The SCI contains bedrock and stony reef ranging in depth from approximately 20 to 90 metres below sea level (JNCC 2012) and comprises different energy levels. Areas of bedrock subjected to high levels of scour are sparse in fauna, allowing only scour-tolerant organisms such as *Spirobranchus* to thrive. Areas of bedrock that experience less scour can exhibit more biodiversity and can contain fragile sponges and anthozoan communities, as well as bryozoans and hydroids. Reef communities can also support encrusting bryozoans, encrusting coralline algae, caryophyllid cup corals, ophiuroids, *Alcyonium digitatum*, and *Corynactis viridis* (McLeod *et al* 2005).

A previous JNCC commissioned survey on the Solan Bank Reef SCI was undertaken during 24 - 29 May 2008 (Whomersley e*t al* 2010). During this survey, acoustic data, video and still imagery and substrate samples from benthic grabs were collected. These data were used with Civil Hydrography Programme (CHP) bathymetry data to estimate the extent of substrate that qualified as Annex I habitat (O'Connor 2014). Data collected indicated that a number of different sponge morphologies were present at the site.

The aim of the Scotia 1714S survey was to collect evidence to aid development of a national indicator of 'Good Environmental Status' for fragile sponge and anthozoan communities as part of the UK's obligation under the Marine Strategy Framework Directive (O'Connor 2014). The indicator proposal can be found in *JNCC report*, No. 524 (Haynes *et al 2014*; see Indicator 2 'SpongeMorphAntho'). Testing and validation of this indicator had not been carried out previous to this survey due to a shortage in biological and environmental data. The Scotia 1714S survey collected initial baseline data on epifaunal communities and environmental variables in the Solan Bank SCI to assist in determining if the indicator is viable for UK offshore waters (O'Connor 2014). The offshore location of the site meant that sponge morphology abundance data was derived entirely by imagery collected from a drop down video (DDV) frame. Consequently the analysis of this imagery as part of the current Marine EcoSol contract aims to establish whether remotely captured imagery is sufficient to measure sponge morphology diversity and abundance.

2 Methods

Underwater video was captured during the JNCC Scotia 1714S survey using a drop frame mounted SubC 1 Alpha High Definition (HD) video camera, and photographs (stills) using a Kongsberg OE 14-408 digital camera (10 Mega Pixels) with dedicated flash unit. The drop frame was fitted with two pairs of orthogonal fan lasers, projecting a continuous centre square of 64 mm onto the seabed (O'Connor 2014). This scaling device was visible within the video, but was typically bleached-out by the camera flash, within stills. Hanging below the drop-frame was a weight of 64mm diameter, suspended 1.25m below the camera lens by a rope. The weight was generally visible within stills and provided a secondary means of scaling objects. Further details of sampling strategy and rationale are provided in the JNCC Scotia 1714S survey plan (O'Connor 2014), and the Scotia 1714S Cruise Report (JNCC 2014) gives details of the drop camera frame and the camera specifications.

The nominal viewing angles of the two cameras were 61 degrees (stills) and 60 degrees (video). When the camera was 1.25m above the seabed, the field of view of the stills camera was calculated to be approximately $1m^2$ (1125 x 870mm), and for the video camera, to be approximately $0.7m^2$ (1100 x 625mm). It should be noted both cameras were at variable heights above the seabed throughout this survey.

The operation of the stills camera and frequency of photographs taken during each video transect, was manually controlled by staff on the vessel who watched the drop frame view in real time using a Kongsberg 14-366 colour TV camera with feed to the surface (JNCC 2014). Stills were taken typically at 10-30s intervals, when the drop frame was at a suitable height off the seabed. HD video was recorded continuously throughout each video transect. Drop frame position and therefore geographic coordinates were recorded throughout each video transect, using a Sonar Scout Ultra-Short Base Line (USBL) acoustic transponder. For further technical details relating to onboard survey methods, see the JNCC Scotia 1714S survey plan (O'Connor 2014) and Scotia 1714S Cruise Report (JNCC 2014).

Video transects were a minimum of ten minutes in duration and estimated to be a minimum of 150 metres long (O'Connor 2014). During each drop frame deployment, the survey vessel executed a controlled drift at approximately 0.3 knots through the specified transect (JNCC 2014). The height of the drop frame off the seabed was variable as was the topography, and was winch-controlled, the operator of which had sight of the video monitor (JNCC 2014).

2.1 Prior to imagery analysis

To ensure consistency between surveyors, and prior to any analysis, the recording protocols were confirmed with JNCC and practised internally. During this process several terms required definition and further explanation so a set of rules and processes were developed as are described in the following sections.

2.1.1 Quality Assurance (QA) before imagery analysis

To ensure all surveyors undertook analysis and recording in the same way, and to minimise inter-surveyor variability, the first few days of analysis were used for Quality Assurance (QA) purposes. Whilst working together, the team watched and split the first few video transects and analysed the video samples and several corresponding stills. This ensured recording was consistent and any difficulties in species or substrate identification were highlighted and addressed. During this initial group-scoring, a set of rules was created to overcome differences in interpretation between surveyors and to ensure the highest level of recording consistency was maintained between the seven surveyors working on this project. Any resulting changes to pre-defined analysis and recording protocols were agreed and the recording *pro forma* updated accordingly. The resulting recording protocol was written out and a copy kept by each surveyor as a reminder.

2.1.2 Stills per minute (subsample)

In total 4,630 stills were taken during the 166 video transects comprising this survey. The scope of this image analysis project was to analyse a subset of this total, approximating one still per minute of video. Prior to imagery analysis and before any stills were viewed, stills were automatically selected (non-randomly) at approximately one minute intervals from the complete list of stills. Although a random selection of stills would possibly have been more statistically robust, it would have been more logistically difficult to achieve with this number of stills and transects, and it was agreed during discussions with the JNCC project manager, that a non-random approach to image selection was acceptable. Additionally, a random selection method could possibly select all images from a limited portion of the transect only, therefore potentially missing entire features or habitats. A time-interval based selection method selects stills from all parts of the transect and was therefore less likely to miss features or habitats.

To create the subsection list of stills for analysis, a value of one minute was added to the fix time of the first photograph in every transect, then repeated for the second and third still, until the transect end time was reached. This provided a model one-minute-interval subset throughout the duration of each transect. Within Microsoft Excel the Vlookup function was used to select the nearest actual still fix time to the model one-minute-interval subset. The result was a reduced list of stills per transect with a one minute interval between each still. Although stills were not selected randomly, this selection process was unsupervised, so surveyor bias was not introduced during the selection process.

2.1.3 Recording pro forma

To consistently record the relevant information required to meet the project objectives, four recording pro forma were developed, within Microsoft Excel, based upon those regularly used by the Centre of Environment, Fisheries and Aquaculture Science (Cefas) for imagery analyses relating to the Marine Conservation Zones (MCZ) project[2].

Habitat information, physical data and other metadata obtained prior to, and during, the analysis of video and stills, were recorded in separate pro formas, each set out similarly. Each spreadsheet row represented a sample (still, video section or video habitat), identified by a unique sample reference and each column, a separate item of information to be recorded about each sample (attribute). To help reduce different interpretations of questions and therefore reduce inter- and intra-surveyor-variability in terms of the types of answer a person could give, drop-down menus and look-up values were used for many sample attributes.

Taxon abundance was recorded in separate pro formas (stills and video), with taxa representing spreadsheet rows and unique sample references identifying samples within separate columns. Each pro forma spreadsheet was further divided into two sheets: one recording counts and percentage cover abundance data, and a second sheet recording semi-quantitative abundances data according to the Marine Nature Conservation Review (MNCR) SACFOR scale (Connor *et al* 2004).

Surveyors were each provided:

1. An audit spreadsheet showing which video transects and stills each surveyor was required to analyse, which imagery they were required to re-analyse for QA

[2] http://jncc.defra.gov.uk/page-2409

purposes, and allowing capture of information relating to how long each still and video took to analyse.
2. A video analysis pro forma detailing the full list of video transects to be analysed, including metadata provided by the client (times, dates, depths and coordinates).
3. A stills analysis pro forma detailing the one-minute-interval list of stills to be analysed, including metadata provided by the client (times, dates, depths and coordinates).
4. Two taxa matrix pro formas to record abundance information from stills and video.

2.1.4 Stills field of view:

Prior to starting imagery analysis, to estimate the field of view within the stills and therefore the area of seabed sampled, a selection of stills was viewed and classified using a qualitative scale of camera proximity to the seabed. Five classes, zero (closest) to four (furthest), were assigned and defined as:

- Category 0: The drop-frame was sitting on the seabed and the camera was therefore closest to the seabed. The weight and rope, normally suspended below the drop-frame, were not visible within the image. Images were typically slightly to very over-exposed and taxa and substrates (if not too over-exposed) were clearly visible.
- Category 1: The weight was visible and clearly on the seabed, usually lying on its side and the rope was slack or also partly lying on the seabed. Images were well lit and taxa and substrates clearly visible.
- Category 2: The weight was on the seabed and the rope was tight indicating the camera was approximately 1.25 metres off the seabed. To confirm the weight was on the seabed, little or no shadow was visible beside the weight. Images were well lit and taxa and substrates clearly visible.
- Category 3: Weight is off - but still close to - the seabed, indicated by little or no gap between the weight and its shadow (i.e. gap of less than 1 x diameter of the weight. The images were slightly darker but taxa and substrates still visible and identifiable. Smaller and more difficult to identify taxa were potentially missed or unidentifiable from images within this category.
- Category 4: Weight is well off the seabed, indicated by a large gap between the weight and its shadow (maximum of 2 x diameter of the weight). The images were quite dark and this image category formed the maximum distance from the seabed, that taxa and substrates were considered identifiable. However, smaller and more difficult to identify taxa were more likely to be missed or unidentifiable from images within this category.

Table 2.1. Average width (+/- Standard Error), height and field of view for each stills field of view category, calculated from a minimum of five stills from each category. Further details and calculations are provided in Appendix 1, with example images of field of view categories in Appendix 2.

Field of View category	Still Width cm (SE)	Still Height cm (SE)	Still Area m^2 (SE)
0 camera very close, no weight visible	58 (7.1)	44 (5.4)	0.3 (0.07)
1 weight on seabed, rope slack	83 (6.9)	62 (5.1)	0.5 (0.09)
2 weight on seabed, rope tight	118 (1.5)	88 (1.1)	1.0 (0.03)
3 weight off seabed, shadow close	151 (7.9)	111 (5.4)	1.7 (0.16)
4 darker, taxa visible, shadow gap	201 (12.8)	148 (11.2)	3.0 (0.42)

Multiple images from each field of view category were identified and used to measure the field of view in metres squared (image width x height). Three methods were used to provide a quantified scaled within multiple photographs, from which the field of view could be calculated and averaged from several photographs (Table 2.1):

1. Where the 64mm laser centre-square was clearly visible in the photograph, this was used as a scale to measure the image dimensions. However the laser scale was visible in only a small proportion of the photographs, due to the bleaching effect of the camera flash units.
2. Where the 64mm laser centre-square was not visible and for the field of view categories where the weight was both on the seabed, and clearly visible (categories 1 and 2 only), the diameter of the weight (64mm) was used instead of the laser centre-square.
3. Where neither the laser centre-square nor the weight were visible within the photographs (category 0), or where the weight was not on the seabed (categories 3 and 4), the scale was obtained from the video, and this scale then applied to the photographs (Figure 2.1). To do this, the video was viewed and a screen-grab obtained within 2 frames of the still being taken (visible within the video using frame-by-frame advance). From the video screen-grab, the laser centre-square was measured to provide a scale in the video at the same location as the photograph was taken. An object such a cobble or boulder, clearly visible in both the video screen-grab and the photograph was measured in both, to give a known dimension in the photograph, from which the photograph dimensions (width x height) were measured, and the field of view calculated (Figure 2.1).

The example shown in Figure 2.1 displays a screen-grab from video (left) taken at the same time as the photograph on the right, and shows the laser centre-square (note the white at the bottom of the video screen-grab shows the flash unit has just fired). The yellow arrow on the video screen-grab shows a known distance in the video (64mm). By measuring the yellow arrow on the video (19mm) and the boulder within the video (red arrow = 78mm), the actual boulder size was calculated as 263mm (64/19*78). Assuming the video and stills cameras were mounted at similar heights on the drop-frame, the boulder in the photograph was also 263mm in length (blue arrow) and the dimensions of the photograph were therefore 3.37 (64/19) times their measured dimensions (273mm x 366mm = 920mm x 1233mm). From these values the field of view was calculated as photograph height x width (920mm x 1233mm = 1.1m^2). Further examples of different fields of views in stills and video grab images are provided in Appendix 2.

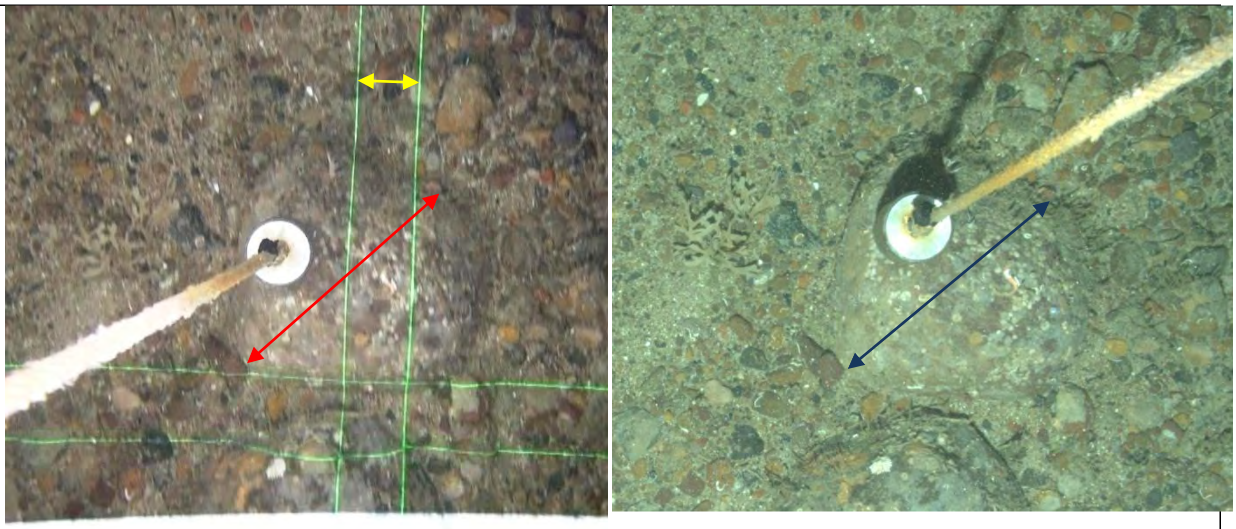


Figure 2.1. Examples of measuring the field of view in photographs where the laser centre-square was not visible in the still and the weight was not on the seabed.

2.1.5 Annex I Reef and elevation

Annex I Reef habitat subtypes were assigned to stills and video clips using information and definitions from CEC (2007), Blythe-Skyrme *et al* (2008) and Irving (2009). Reef habitat included hard compact substrata comprising biogenic concretions (biogenic reef) or substrata of geogenic origin comprising bedrock (bedrock reef) or boulders and cobbles (stony reef). To be assigned as Annex I Reef habitat, the hard substrata had to be topographically distinct from the surrounding solid or soft seafloor, and had to be deemed greater in area than $25m^2$ (an area of 5m x 5m) based on guidance for designating biotopes from Connor *et al* (2004). To be assigned as stony reef, an area required greater than 10% (more typically 30%) cover of boulders and cobbles, and the majority of any fauna present had to be dependent upon the hard substrata, rather than any sediment elements of the seafloor.

To help improve the consistency of multiple surveyors assigning the presence of the Annex I Reef feature and subtypes to substrates within stills and video samples, subjective terms used within reef definitions by Irving (2009) were further defined and guidance developed that was specific to the sand scoured, sparsely populated, reef being viewed as part of this project. As a result, confidence levels were agreed that allowed surveyors to tentatively assign an area as Annex I Reef (i.e. with low confidence) as well as provide more confident and therefore robust Annex I Reef assignments. For the Annex I stony reef subtype, comprising boulders and cobbles, the summary definitions table from Irving (2009), shown below in Box 2.1, was used to classify areas as low, medium or high confidence stony reef. Areas classified as low confidence would be assigned as 'potential Annex I stony reef' and areas assigned as medium or high confidence would be interpreted as 'Annex I stony reef'.

Box 2.1. Defining low, medium and high 'reefiness' of Annex I Stony Reef
Taken from Irving (2009).

Characteristic	**<u>Not</u> a 'stony reef'**	**'Resemblance' to being a 'stony reef'**		
		Low[1]	**Medium**	**High**
Composition:	**<10%**	10-40% Matrix supported	**40-95%**	**>95% Clast supported**
Notes: Diameter of cobbles / boulders being greater than 64mm. Percentage cover relates to a minimum area of $25m^2$. This 'composition' characteristic also includes 'patchiness'.				
Elevation:	**Flat seabed**	<64mm	**64mm-5m**	**>5m**
Notes: Minimum height (64mm) relates to minimum size of constituent cobbles. This characteristic could also include 'distinctness' from the surrounding seabed. Note that two units (mm and m) are used here.				
Extent:	**$<25m^2$**	**$>25m^2$** →		→
Biota:	**Dominated by infaunal species**			**>80% of species present composed of epifaunal species**

[1] When determining whether an area of the seabed should be considered as Annex I stony reef, if a 'low' is scored in any of the four characteristics (composition, elevation, extent or biota), then a strong justification would be required for this area to be considered as contributing to the Marine Natura site network of qualifying reefs in terms of the EU Habitats Directive.

The stony reef definitions provided by Irving (2009) were designed to be applied to areas greater than $25m^2$. Therefore to apply these rules to photographs, with areas ranging from $0.5m^2$ to $3m^2$, the minimum rock composition, within stills, for low confidence Annex I stony reef, was raised from 10% to 30% cover of cobbles or boulders. For areas within the video the minimum composition remained at 10% cover of cobbles.

For the Annex I bedrock reef subtype, two confidence levels were applied; ‘potential bedrock reef’ and ‘confirmed bedrock reef’. The potential category was deemed necessary because the analysis revealed areas of bedrock almost completely devoid of life. These areas did not conform to the author’s idea of ‘reefiness’, showing evidence of geological rather than biological features. It was assumed these low-lying bedrock areas were sand-scoured sediment-rock interfaces and were regularly inundated and exposed by the surrounding mobile sediments. The confirmed bedrock category was applied to areas of bedrock with reef-like sessile fauna and flora present.

In terms of reef elevation, several ranges were created based partly on the stony reef summary definitions table from Irving (2009), and partly from an initial viewing of the imagery to get a feel for what was detectable from the generally downward facing imagery. In some cases elevation was not discernible so an ‘unknown’ category was included. Other categories were: <64mm, 64mm to 1m, 1.1m to 5m, 5.1m to 10m and >10m. When estimating the elevation of stony reef, cobbles and boulders were assumed to be round in shape, so any area with cobbles (64mm to 256mm) or small boulders (256mm to 512mm) was assigned an elevation of ‘64mm to 1m’. Similarly areas with medium sized boulders (512mm to 1,024mm) were classified as either ‘64mm to 1m’ or ‘1.1m to 5m’ elevation category. Areas with large boulders (>1,024mm) were generally assigned the ‘1.1m to 5m’ elevation category, or larger as required.

2.1.6 Sponge morphological types

Sponge morphologies were identified based upon a combination of images (Figure 2.2), descriptions, resources and publications including: Bell & Barnes (2001) and various subsequent publications by the same author and associates (e.g. Bell *et al* 2006); monitoring protocols developed by Whittington *et al* (2007); and more specifically, identification rules developed during a quality assurance exercise conducted during a dive monitoring project for Natural Resources Wales (NRW) in 2007 (formerly Countryside Council for Wales – CCW), further details of which are shown in Appendix 3. It should be noted these rules were devised for divers sampling *in situ*, who were able to touch the sponges if required. Obviously this was not possible in the present project, so to adapt these rules for imagery analysis, any mention of touching or feeling sponge attributes were ignored.

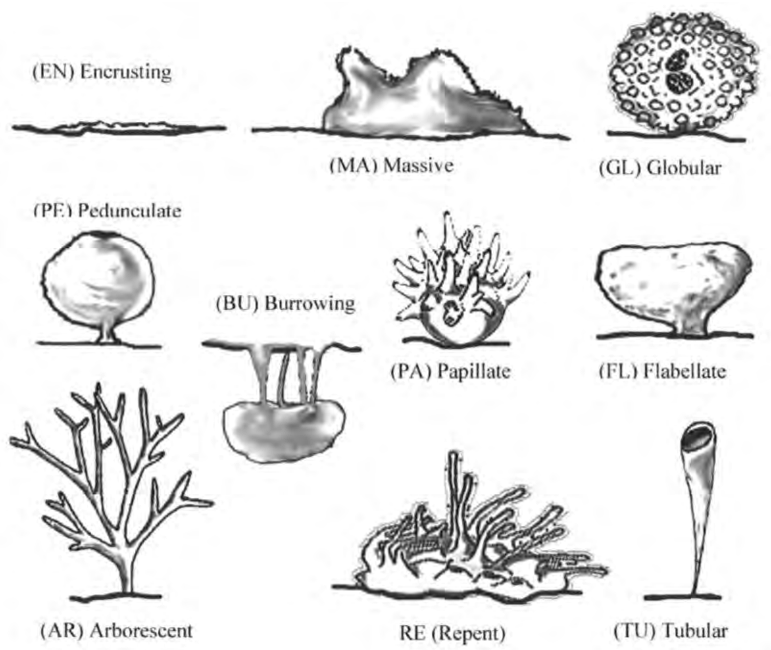


Figure 2.2. Sponge morphological types (Berman *et al* 2013, after Bell *et al* 2006).

Quantification of sponge morphologies required individual sponges to be counted, or the area they occupied be estimated as a percentage of the total area visible. Morphologies tending to cover an area (i.e. encrusting, massive and in some cases repent) were to be enumerated by estimating percent cover, whereas the remaining erect morphologies were to be individually counted. Sponge morphology example images, showing those considered to 'cover an area' and those considered 'erect', are provided in Table 3.6 within section 3.5. Further examples of sponge morphologies are provided in the image reference collection, collated as part of this project (Appendix 14).

It should be noted that the burrowing sponge morphology was not included in the present project, as it was not deemed possible to identify this from images alone.

2.1.7 Fragile sponge and anthozoan communities

The definition of fragile sponge and anthozoan communities was taken from the UK Biodiversity Action Plan Priority Habitat Descriptions (updated December 2011). Although this document provides a general habitat description and example biotopes where the habitat might be present, it was not deemed useful in providing specific detail of when an area (photograph or video sample) should be assigned the habitat. Instead, Tables 2.5 and 2.6 in Haynes *et al* (2014) (provided in Appendix 4), were used as a guide to sponge and anthozoan species considered to be indicative of the presence of the fragile sponge and anthozoan communities, when found in sufficient numbers.

Based on the BAP habitat description and information from Haynes *et al* (2014), rules and guidance were developed to help multiple surveyors consistently assign the presence of this habitat using high, medium and low confidence scores as follows:

- Low confidence included presence of at least one individual of an erect sponge morphology (all except encrusting) and two anthozoan species listed in Haynes *et al* (2014) Table 2.6.
- Medium confidence included multiple erect sponge and anthozoan species in greater abundance (than low confidence), although not necessarily characterising the biotope.

- High confidence required multiple erect sponge and anthozoan species in high abundances, and as characterising species of the biotope.

2.1.8 Evidence of human impact

Evidence of human impacts were defined as primary or secondary evidence. Primary evidence included photographic evidence of litter or discarded/lost fishing gear. These were considered objective measures of impacts and were easy to identify. Secondary (suspected) evidence included more subjective and difficult to identify features, where no confirmed photographic evidence remained of the impact cause. These included suspected trawl marks (within sediments), for example where cobbles and small boulders are arranged in un-natural looking lines beside furrows; or suspected evidence of physical damage such as many examples of brittle slow-growing fauna being broken or lying on their side. The identification of these more-subjective measures of impacts were considered more likely to differ between surveyors, and would depend on the previous video analysis experiences of the surveyors.

2.1.9 Priority Marine Features (PMF)

Scottish Natural Heritage (SNH) and JNCC have generated a focused list of habitats and species to target nature conservation action in Scottish waters - Priority Marine Features (PMFs, SNH 2014; Tyler-Walters *et al* 2012). An additional objective of this project was to improve knowledge of the occurrence and distribution of species and habitats of recognised conservation importance in the Solan Bank area. Therefore, once taxa, species and biotopes were assigned, the surveyor decided if there was a match to any Scottish Priority Marine Features including habitats, mobile species or limited mobility species (PMF, SNH 2014).

2.1.10 Biotope classification

Biotopes or sub-biotopes (EUNIS level 5 or 6), or biotope complexes (EUNIS level 4) were assigned to each sample within the analyses i.e. all photographs, video subsections (10 and 20 seconds) and video habitats, each lasting longer than one minute. Biotopes were assigned using information from the shallow section of the Marine Habitat Classification for Britain & Ireland, (formerly v04.05) (URL[6]), associated JNCC physical and biological comparative tables (URL[7]), and JNCC guidance relating to definitions of a biotope (URL[8]). Appendix 8 provides representative images of biotopes identified during this project. Further examples are provided in an image reference collection provided as part of this project (Appendix 14).

Surveyors aimed at assigning rock biotopes at JNCC Habitat Classification levels four or higher (EUNIS level 5 or higher) and sediment biotopes at JNCC Habitat Classification levels three or higher (EUNIS level 4 or higher), however on occasions where the imagery was of poor quality or where critical information was absent, lower levels have been assigned.

Areas identified within video, with two or more biotopes mixed together, interspersed or regularly repeating, such as with waves of coarse and then fine sediments, were defined as being a mosaic of all contributing habitats/biotopes. However, as the area of each still was less than $25m^2$, the Marine Nature Conservation Review (MNCR) recommended minimum area for assigning biotopes (URL[7]), stills were generally assigned a maximum of one biotope.

It should be noted that surveyors in the present study were made aware of proposed new biotopes (northern variants of existing biotopes) described from the Solan Bank area in a 2008 survey by Whomersley *et al* (2010). Further details of these proposed northern biotopes, including images, compiled from Whomersley *et al* (2010) are provided in Appendix 5.

Assignment of each biotope was accompanied by a confidence score for the assignment. Four confidence categories were used: 'Certain Whole Record' was used when a good biotope fit was found and the biotope described the entire habitat within the sample; 'Certain Part Record' was used in situations where the biotope in question was a good fit but only described part of the habitat present within the sample, used typically when describing mosaic habitats; 'Uncertain Whole Record' and 'Uncertain Part Record' were used in the similar situations, however when the biotope fit was not sufficiently close, and therefore confidence in the assignment was lower. Additionally, if a habitat was deemed to fit between two biotopes, or it was difficult to decide between two biotopes, then two biotopes were recorded and both categorised as 'Uncertain Whole Record'.

When describing a habitat, if no biotope within the Marine Habitat Classification fit, the best fit was recorded and notes made as to why the fit was poor. In cases where the same or similar habitat was identified from different areas, and therefore could be clearly distinguished from existing biotopes, a new biotope was proposed to JNCC, or changes to existing biotopes were proposed that would improve the fit of the scrutinised habitat.

2.1.11 Visual quality of sample

The visual quality of all stills and video sections and habitats were subjectively assessed along a qualitative gradient from 'Inadequate', to 'Poor', to 'Adequate' to 'Good'.

In addition video imagery that was analysed in 10 or 20 second sections was also assessed as either '0 – Unusable', 1 – Partially Usable' or '2 – Usable'. The idea being that any section of video classed as 'unusable' was not analysed, allowing the surveyor to move on to a section of video of higher quality. However, in practice this meant watching each video section once to assess the quality, and then, for all usable sections, again as many times as required, to actually analyse the imagery. This method therefore increased analysis time quite significantly. After trialling this initial method of assessing the video quality, all surveyors found it quicker to simply analyse the video section, obtain as much information as possible from the imagery, and then classify the image quality after analysis of each video section. To help minimise the subjectivity of assessing the video quality, the term 'unusable' was defined as meaning that one could not easily identify substrates, characterising taxa and biotopes.

Due to the bouncing effect of the drop-camera frame, presumably due to high swell, several transects comprised video where, within each 10 second video section, a large proportion e.g. seven seconds, were not usable (i.e. as the camera was too far off the seabed), and three seconds were quite clear and usable. As a result, it was agreed with the JNCC project manager, an approximate minimum of 25% of the video section should be clearly visible, for that video section to be classed as 'partially usable'. Although this bouncing effect was apparent within 20 second video sections as well as in 10 second sections, the frequency of the bouncing was such that within each 20 second section, a greater proportion of the section was clear and usable, when compared to 10 second sections.

After analysis, all truly unusable video sections and stills were removed from the dataset, leaving only those deemed partially usable or usable.

2.2 Imagery analysis

Analysis of video and stills imagery was undertaken in a prescribed sequence with slightly different methods for analysing video compared to stills. In summary: Using non-specialist video viewing software that allowed video play at various speeds, pausing, advance-frame and the taking of screen snapshots (VideoLan VLC media player version 2 and Windows Media Player version 12), the video for an entire video transect (Marine Recorder Event) was viewed to identify and record changes in habitat (Marine Recorder Samples), aiming at identifying changes at EUNIS level 4 (biotope complexes) or higher. All the stills for the same transect (each still representing a separate Marine Recorder Sample), were then analysed to obtain the best resolution taxa information, ground-truth substrates present throughout the transect, and identify the likely biotopes present within the stills. Finally, the video was analysed, benefiting from high resolution information from the stills analysis, to help inform identification of taxa, substrates, features of interest and biotopes visible within the various habitats comprising the video transect. This process was then repeated for all transects where both video and stills were analysed.

2.2.1 Imagery analysis step 1: Habitat splits

The first stage of image analysis required each transect (Marine Recorder Event) be viewed once in real time, or up to 2x speed, and split into broad-scale habitats (Marine Recorder Samples) based upon broad changes in substrate composition and associated fauna. Resulting habitat splits were aimed at EUNIS level 4 or higher. During this view the following information was recorded or checked against the metadata provided by the client:

1. Event description: Summary of habitat(s) present within the entire transect (station).
2. For each distinct habitat identified (sample), a short summary description (fewer than 100 characters) including details of the dominant substrate(s) and biota present.
3. The start and end time of each distinct habitat (sample).

Where video transects comprised multiple habitats, separate rows were added to the video pro forma spreadsheet and all metadata updated or recorded.

2.2.2 Imagery analysis step 2: Stills analysis

Each one-minute-interval still (selected as described in section 2.1.2) within the corresponding transect (identified in section 2.2.1) was analysed using the following sequence and process. Firstly the target image was assessed for quality comparing to those taken immediately before and after the target image. If the target still was not considered of good enough quality, the surveyor could change to the still taken immediately before or after the still listed in their audit spreadsheet. Analysis required viewing the stills at multiple (zoom) scales with a minimum of: ‘Fit-to-screen’ allowing observation of the entire image to gain information about large taxa or features of interest or those covering large proportions of the image; and 100% (zoom scale) or greater to enumerate taxa and ground-truth sediment particle sizes. Analysis of stills required:

1. Briefly describing the substrate and habitat present in a short sentence (fewer than 100 characters).
2. Visually assessing the substrate composition using percent cover for each MNCR substrate type present.
3. Visually assessing the field of view within the image (section 2.1.4).
4. Identifying and quantifying all:

a. Erect epifaunal species present as far as possible (to the best taxonomic level) using counts which were then converted to SACFOR scale abundances using guidance from Connor *et al* (2004).
b. Colonial/encrusting epifaunal species present as far as possible (to the best taxonomic level) using percentage cover which were then converted to SACFOR scale abundances using guidance from Connor *et al* (2004).
c. Sponge morphology types: Using counts for erect, percentage cover for massive and encrusting morphologies, which were then converted to SACFOR scale abundances using guidance from Connor *et al* (2004) (section 2.1.6).

5. Where the identification of visible fauna was uncertain, this was noted using the 'Uncertain' qualifier associated to each taxon name.
6. Recording the presence and estimating the composition and elevation of Annex I Reef and subtype (section 2.1.5).
7. Recording the presence of the fragile sponge and anthozoan communities (section 2.1.7).
8. Recording the presence of and describing any visible impacts or other modifiers, such as trawl marks, discarded fishing gear, visible physical damage, evidence of strong currents (section 2.1.8).
9. Recording the presence of Priority Marine Features (section 2.1.9).
10. Identifying the biotope present (section 2.1.10).
11. Recording the visual quality of the image (section 2.1.11).
12. Summarising all above information into a single habitat description and in addition including descriptions of any life-forms present which could be identified to a specific taxonomic group e.g. mixed faunal turf; and providing reasons for any uncertainty relating to identification of fauna or substrates e.g. blurred image, partially concealed from view, cannot be identified by image alone.

2.2.2.1 Timing how long it took to identify sponge morphologies and sponge and anthozoan taxa

Part way through the analysis, when surveyors were deemed comfortable with all recording protocols and methods, surveyors were asked to analyse a subset of stills using a different sequence, to enable auditing how long specific analysis tasks took, specifically to:

a) identify sponge morphologies and undertake all associated data entry,
b) identify sponge and anthozoan taxa and associated data entry,
c) undertake the rest of the image analysis.

To answer these questions surveyors were asked to accurately record how long the following three tasks took for a subset of stills:

1) view the entire image at 100% or greater scale, to identify and enumerate all sponge morphologies, and then undertake all associated data entry;
2) view the entire image at 100% or greater scale, to identify and enumerate sponge and anthozoan taxa, and then undertake all associated data entry;
3) undertake the rest of the image analysis as described in section 2.2.2 (*Imagery analysis step 2: Stills analysis*).

Stills for this subset were not selected randomly. Prior to stills analysis, stills within transects were assessed to determine whether many images contained sponges. The intention was to select transects containing the greatest numbers of sponges and then to apply this method to all stills within those transects. However in practice, due to the overall low abundance of large conspicuous sponges in this area, this method was used for all stills within a transect, if notable numbers of sponges were observed in any stills within that transect.

Surveyors were asked to repeat the analysis as described above on a different subset of stills (by using alternate stills) but this time switching around tasks one and two (from the list above). By alternating between starting with task one and then starting with task two on different stills, it is possible to determine how long each different but related task took i.e. the two tasks were not independent of each other. Once sponge morphologies within a still had been assessed and enumerated,, it was quicker to identify and enumerate sponge species for the same still, so the resulting audited times would not be accurate for the second task within the same still. Additionally, as only a few sponges could be confidently identified to species or genus level, with the remaining taxa being identified using descriptive features such as morphologies, the two tasks were in most cases very similar.

However, this alternating of the two analysis sequences was not always undertaken consistently by all surveyors. This was identified at the analysis stage when it was noted there was no way to differentiate which sequence had been started with, and therefore there was no way to confirm if surveyors had consistently switched between the two methods.

2.2.3 Imagery analysis step 3: Video analysis

Video transects were analysed using three different methods as follows:

- The first six videos (4%) were divided into 10 second subsections and each section analysed separately.
- 73 (47%) videos were divided into 20 second subsections and each section analysed separately.
- 77 (49%) videos were divided into distinct habitats aimed at JNCC Habitat Classification level 3 (EUNIS level 4), with each habitat lasting longer than 60 seconds.

These methods were applied to increase the temporal resolution of the video analysis. Results may be used to inform assessment of whether high resolution video analysis (e.g. using 10 or 20 second subsections) is more appropriate than traditional video analysis (i.e. where videos were divided into distinct habitats aimed at JNCC Habitat Classification level 3 (EUNIS level 4), with each habitat lasting longer than 60 seconds) and/or stills analysis for identifying and enumerating sponge morphology types and associated epifaunal taxa and assessing patchiness of habitats (e.g. Annex I Stony Reef).

Analysis of video required multiple viewings of each video subsection or habitat and recorded the following information, using the following sequence:

1. Visually assessing the substrate composition using percent cover for each MNCR substrate type present.
2. Identifying and quantifying:
    a. Erect epifaunal species present as far as possible (to the best taxonomic level) using counts, which were then converted to SACFOR scale abundances using guidance from Connor *et al* (2004).
    b. Colonial/encrusting epifaunal species present as far as possible (to the best taxonomic level) using percentage cover, which were then converted to SACFOR scale abundances using guidance from Connor *et al* (2004).
    c. Sponge morphology types: Using counts for erect, percentage cover for colonial/encrusting, which were then both converted to SACFOR scale abundances using guidance from Connor *et al* (2004) (section 2.1.6).
3. Where the identification of visible fauna was uncertain, the taxonomic level was raised and/or the 'Uncertain' qualifier was associated to each taxon name.

4. Recording the presence and estimating the composition and elevation of Annex I Reef and subtype (section 2.1.5).
5. Recording the presence of the fragile sponge and anthozoan communities (section 2.1.7).
6. Recording the presence of and describing any visible impacts or other modifiers, such as trawl marks, discarded fishing gear, visible physical damage, evidence of strong currents (section 2.1.8).
7. Recording the presence of Priority Marine Features (section 2.1.9).
8. Identifying biotope(s) present (section 2.1.10).
9. Recording the visual quality of the imagery (section 2.1.11).
10. Summarising all above information into a single habitat description and in addition including descriptions of any life-forms present which cannot be identified to a specific taxonomic group, e.g. mixed faunal turf; and providing reasons for any uncertainty relating to identification of fauna or substrates e.g. blurred image, partially concealed from view, cannot be identified by image alone.

Recording the above information whilst viewing the video required the video to be regularly paused and reviewed, and for cumulative scores and counts of multiple taxa, substrate proportions and other features of interest to be kept. To do this surveyors used a combination of direct entry into excel spreadsheets (section 2.1.3), and keeping handwritten notes and records of counts and percent cover for taxa and substrates.

2.3 Quality Assurance of imagery analysis

To ensure species and habitat identification was consistent between surveyors, regular discussion was maintained between the surveyors throughout analysis. In addition, all surveyors saved screen-grabs of taxa from stills and video, and organised these by phyla. Screen grabs were taken of both identifiable taxa and also taxa that presented ID difficulties either due to image clarity or ID uncertainty. At least once a week during the analysis stage, the surveyors spent half a day together reviewing uncertain taxa, agreeing how to deal with them, the appropriate taxonomic level they should be recorded to, and where appropriate, any relevant qualifier.

After the analysis stage was complete, a minimum of 10% of video clips and all associated stills were re-analysed by a different surveyor, to ensure inter-surveyor variability was reduced to a minimum. If, after re-analysis, the Quality Assurance (QA) highlighted significant inter-worker variability, the two surveyors worked together to determine where discrepancies occurred and formulated specific rules to overcome such differences for future analysis. If significant differences were identified between surveyors, consistent errors were corrected post analysis (for instance, inconsistent misnaming of one taxa or substrate). The qualifiers of some taxa were changed as part of quality control to ensure consistency following surveyor discussions, whilst some taxa were merged (for instance, where several different encrusting sponges were considered the same sponge at different exposure levels), prior to Marine Recorder (MR) data entry.

As with the initial imagery analysis, Excel spreadsheets were used to audit which data were re-analysed for QA purposes and by whom. Recorded within the audit spreadsheets was the date of QA, the name of the QA surveyor, QA re-analysis results, comments relating to differences in results between surveyors, and any remedial actions undertaken.

2.4 Marine Recorder v5 data entry

Data from this survey was entered into Marine Recorder (MR) (URL[3]) as a single MR survey with a single MR location (Solan Bank). Survey and location boxes were drawn up in the GIS prior to data entry. Each video transect was entered as an MR event and each still and video habitat (aimed at EUNIS level 4 or higher) corresponded to an MR sample.

The spreadsheet based data import function available with MRv5 was used to import the bulk of data from this project. Although this import function imports a large proportion of the data, several fields relating to depths, substrate and surveyors do not import, and this data was entered manually.

Various attributes recorded during this project do not have corresponding fields within Marine Recorder therefore information regarding Annex I Reef subtypes, fragile sponge and anthozoan communities, Priority Marine Features (PMF), and evidence of human impacts were entered as text strings into the sample description field.

Abundance data generated from this project included both counts / percent cover, and SACFOR data for each taxon identified. As both abundance data types were entered into MR, a taxon comment was added to each taxon entry, stating that abundance was recorded in both ways, and caution should be taken, not to overstate abundance, when downloading and interpreting taxon data only from this dataset. The same comment was added to every sample description.

It should be noted that a biotope was used throughout this analysis that is not currently available in the JNCC Marine Habitat Classification or in Marine Recorder. Therefore all records from this survey of CR.MCR.EcCr.CarSp.PenPcom should actually read CR.MCR.EcCr.CarSp.PenPcom.2 which is a northern sparse and sand-scoured variant of this biotope, described by Whomersley *et al* (2010) for the Solan Bank area. Further details of this biotope as described by Whomersley *et al* (2010) are in Appendix 5. A note was made in the sample description of all samples where this biotope was used.

2.4.1 Marine Recorder data entry QA

When preparing Excel data-entry spreadsheets for import into GIS and entry into Marine Recorder (MR), a thorough process of data cleaning was undertaken to ensure the quality of data within these formats. Data cleaning included using: the ‘Spell Checker’ to ensure spelling mistakes were removed; the ‘Find and Replace’ function to remove any unwanted spaces or other characters; and Excel ‘text string’ and ‘value’ functions and calculations to validate data types within text and value specific fields.

During manual data entry into MR of remaining fields not imported using the bulk import tool, 10% of MR samples were compared with cleansed (after QA and QC) recording sheets. Where any differences between original and final formats were identified, remedial action was taken to ensure data quality. If frequent and consistent errors were identified, the data was explored to identify any data entry or data import systematic errors.

Upon completion of MR data entry, the Event and Sample Validation tools within MR were used to check the presence and consistency of data entered and identify any data inconsistencies. Any such errors identified were corrected.

[3] http://jncc.defra.gov.uk/page-1599

The Snapshot tool was used to further interrogate data entered into MR including data relating to taxa, which are not viewable within the sample validation matrices alone. Additionally coordinates entered into MR were checked by exporting a snapshot of the stills dataset into GIS and comparing the proximity of MR coordinates VS pre-MR coordinates. All stills were closer than 50 metres from each other and only 23 points were greater than 10 metres apart. This level of accuracy was deemed acceptable and any differences likely to be a result of coordinate conversions used from the original Eastings/ Northings (UTM30N) into Latitude/Longitude (WGS84).

3 Results and discussion of results

JNCC provided Marine EcoSol with 166 video transects and 4630 stills, of which 1,701 images (approximately one still per minute) were selected for analysis (section 2.1.2). Of the 166 video transects, 10 were considered by JNCC to be inconsistent with the aims of the project, i.e. comprising predominantly course sediments, with perceived low taxon richness and containing few sponges or anthozoans. As a result, these 10 transects were removed from the scope of the project and therefore the analysis. However, stills were analysed from all 166 transects. Of the 1,701 still images selected for analysis (section 2.1.2), five were not analysed due to poor quality. The imagery analyses and data entry was undertaken by seven surveyors; Alexandra Deamer-John, Jack Egerton, Harry Goudge, Melanie Harding, Liz Morris-Webb, Frances Perry and Thomas Stamp.

The results of the Marine EcoSol analyses of video and stills imagery, particularly in relation to the trialled Sponge and Anthozoan methods, are described below and presented in the Appendices.

3.1 Summary of seabed imagery analysed

35.49km of video transect was recorded during 166 transects in the Solan Bank area (Figure 3.1), totalling an area of approximately 53,235m^2. Of the 156 video transects analysed: six transects were subdivided and analysed in ten second sections; 73 were divided into 20 second sections and 77 transects were divided into, and analysed, as distinct habitats each lasting longer than 60 seconds.

Time auditing, early in the project, indicated that using the ten second video subsection method would mean the project taking considerably longer than was planned and that the analysis would not possibly be delivered within the project timeframe. Additionally, due to the bouncing effect of the drop-camera frame, presumably caused by surface swell, many transects comprised video where within each 10 second video section, approximately seven seconds were not usable (i.e. the camera was too far off the seabed), and only three seconds were usable. Based on a combination of how long it was taking to analyse the imagery and how much of each ten second section was not usable, it was decided and agreed with the JNCC project officer to double the video section time to 20 seconds, therefore ensuring a greater proportion of each section was usable.

Of the total 1,701 stills selected for analysis, approximately one every minute of video recorded, 1,696 images were analysed. The remaining images were deemed of too poor quality for analysis. Appendix 6 provides a summary of each transect analysed, including the length and area analysed, the video imagery analysis technique (habitat or 10 or 20 second sections), the number of habitats or subsections and how many stills were analysed per transect.

Of the 1,696 stills analysed, a total of 17,500 observations were made of 320 different taxa. Of these observations, 43% were enumerated using counts (7,553 observations) and 57% (9,947 observations) were enumerated by estimating the percent cover that each individual taxa occupied, per still. Of the counted records, the total abundance was 170,580 individuals. Of the taxon records enumerated by percent cover, the average percent cover of an individual taxon within a still was 3.5% (+/- 0.18% standard error).

The average number of taxa recorded per still (taxon richness) was 10.3 (+/- 0.14 standard error), with the greatest taxon richness of 28 recorded in two stills from transect (station code) RSS82_S164. When aggregated to the level of transect, the average taxon richness, recorded from analysis of the stills, was 10.1 (+/- 0.3 SE). The transect with the greatest

average taxon richness was transect RSS82_S164, with an average taxon richness of 22 (+/- 1.56 SE). Appendix 7 shows data aggregated to the level of transect, including average (+/- SE) taxon richness recorded from analysis of all the stills.
From analysis of 1,696 stills, at least one taxon was observed within 1,572 stills (93% of total). The most frequently recorded phyla were Bryozoa, comprising 31% of all taxa observations; Echinodermata making up 14% of observations; and Annelida, representing 12% of all taxa observations (Table 3.1). Of all taxa observations recorded (fauna and flora) 42% were crustose in life form (Table 3.1).

Table 3.1. Number (and %) of stills with observations of taxa by phylum or group; number (and %) of taxa observations per phylum, class or group; and average (+/- Standard Error – SE) number of taxa observations, per still, by phylum, class or group. Values derived from analysis of 1696 stills from the 2014 Solan Bank Reef SCI seabed imagery analysis.

Phyla, class or group	Number of stills from which taxa were observed (% of stills)	Total taxa observations (% of total)	Average taxa observations per still (+/- SE)
Porifera	772 (45.5)	1,249 (7)	0.7 (<1)
Cnidaria: Hydrozoa	937 (55)	1,704 (10)	1.0 (<1)
Cnidaria: Anthozoa	490 (29)	551 (3)	0.3 (<1)
Cnidaria: Other	666 (39)	811 (5)	0.5 (<1)
Annelida	1,436 (85)	2,169 (12)	1.3 (<1)
Crustacea	659 (39)	1,020 (6)	0.6 (<1)
Mollusca	616 (36)	810 (5)	0.5 (<1)
Bryozoa	1,448 (85)	5,367 (31)	3.2 (<1)
Echinodermata	1,201 (71)	2,430 (14)	1.4 (<1)
Tunicata	72 (4)	77 (<1)	0.0 (<1))
Pisces	131 (8)	134 (1)	0.1 (<1)
Other Faunal Phyla	424 (25)	573 (3)	0.3 (<1)
Rhodophyta	558 (33)	605 (3.5)	0.4 (<1)
Total Crustose Taxa	1,531 (90)	7,376 (42)	4.3 (<1)
Total	**1,572 (93)**	**17,500 (100)**	**10.3 (<1)**

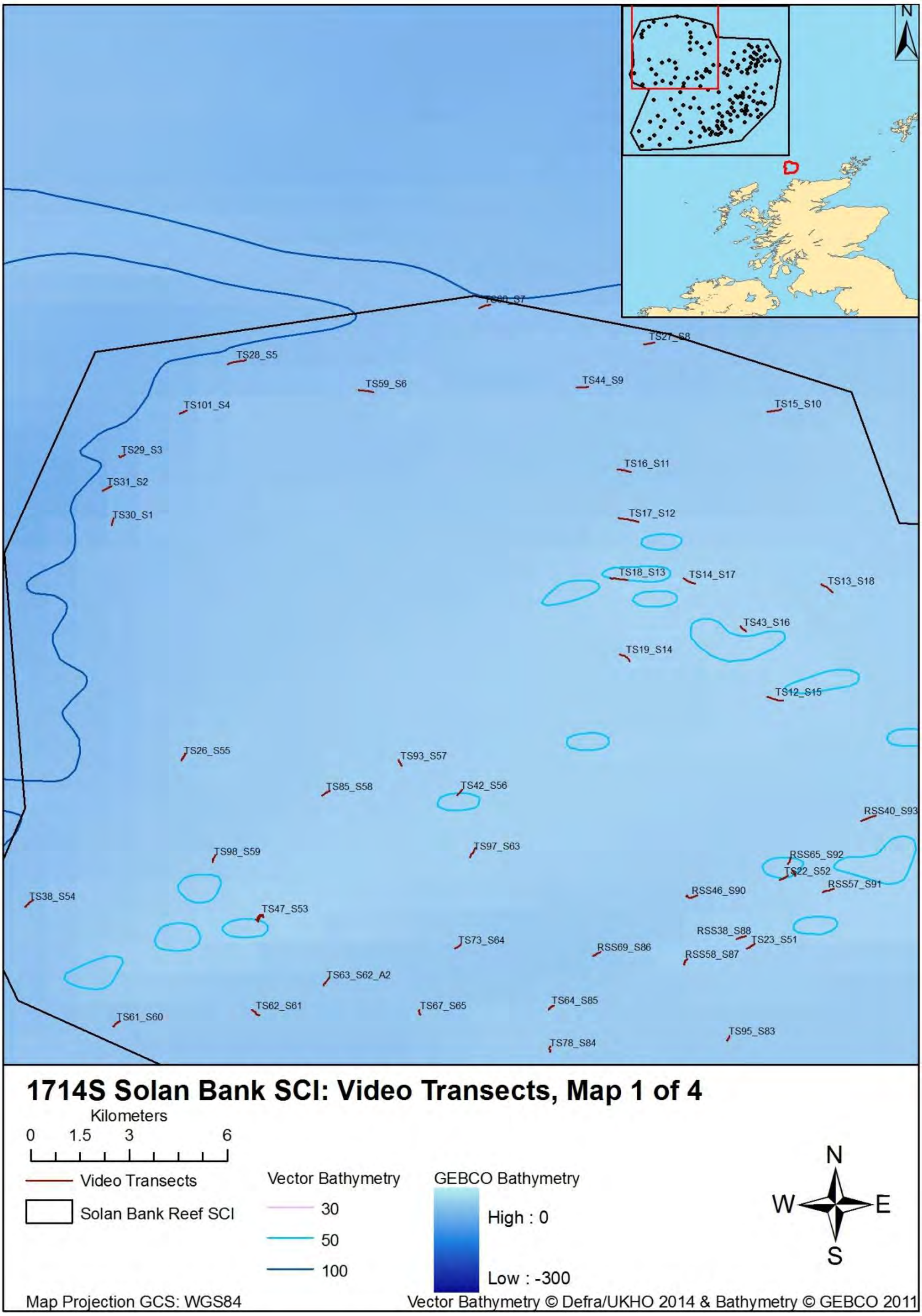


Figure 3.1.a. Locations of the 2014 Solan Bank Reef SCI survey area and transects surveyed (both video and stills) within the North West survey quartile of the survey area.

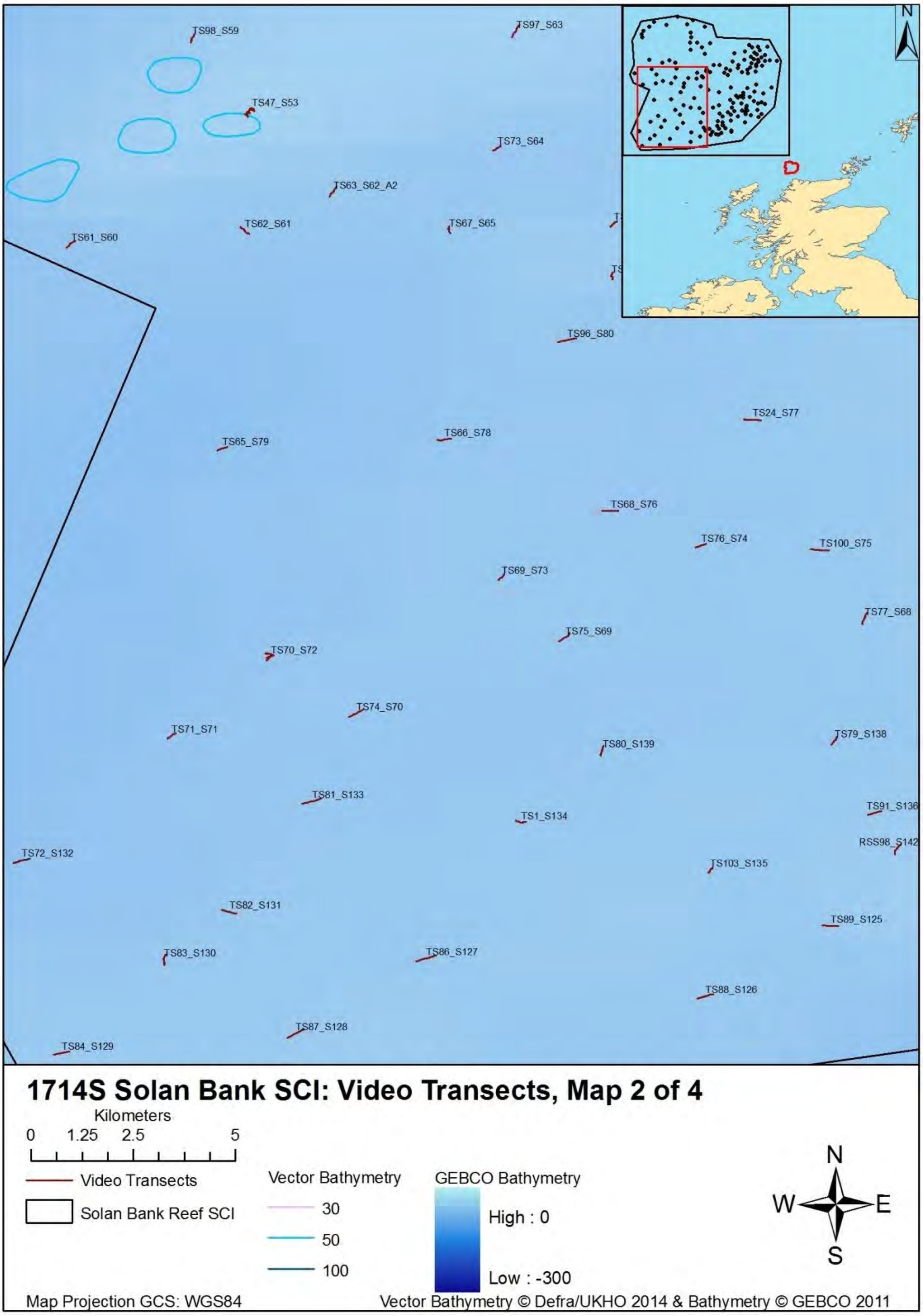


Figure 3.1.b. Locations of the 2014 Solan Bank Reef SCI survey area and transects surveyed (both video and stills) within the South West survey quartile of the survey area.

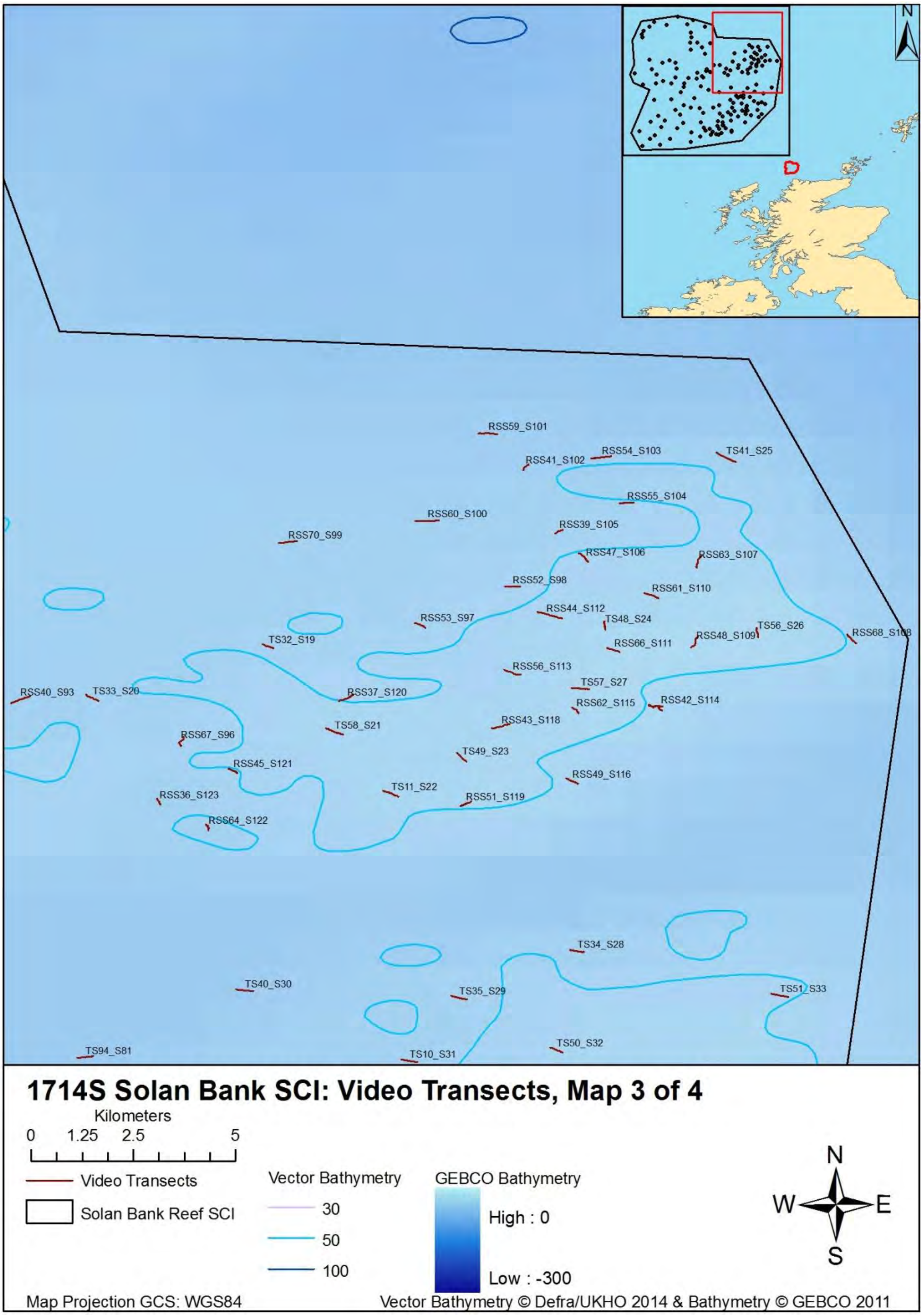


Figure 3.1.c. Locations of the 2014 Solan Bank Reef SCI survey area and transects surveyed (both video and stills) within the North East survey quartile of the survey area.

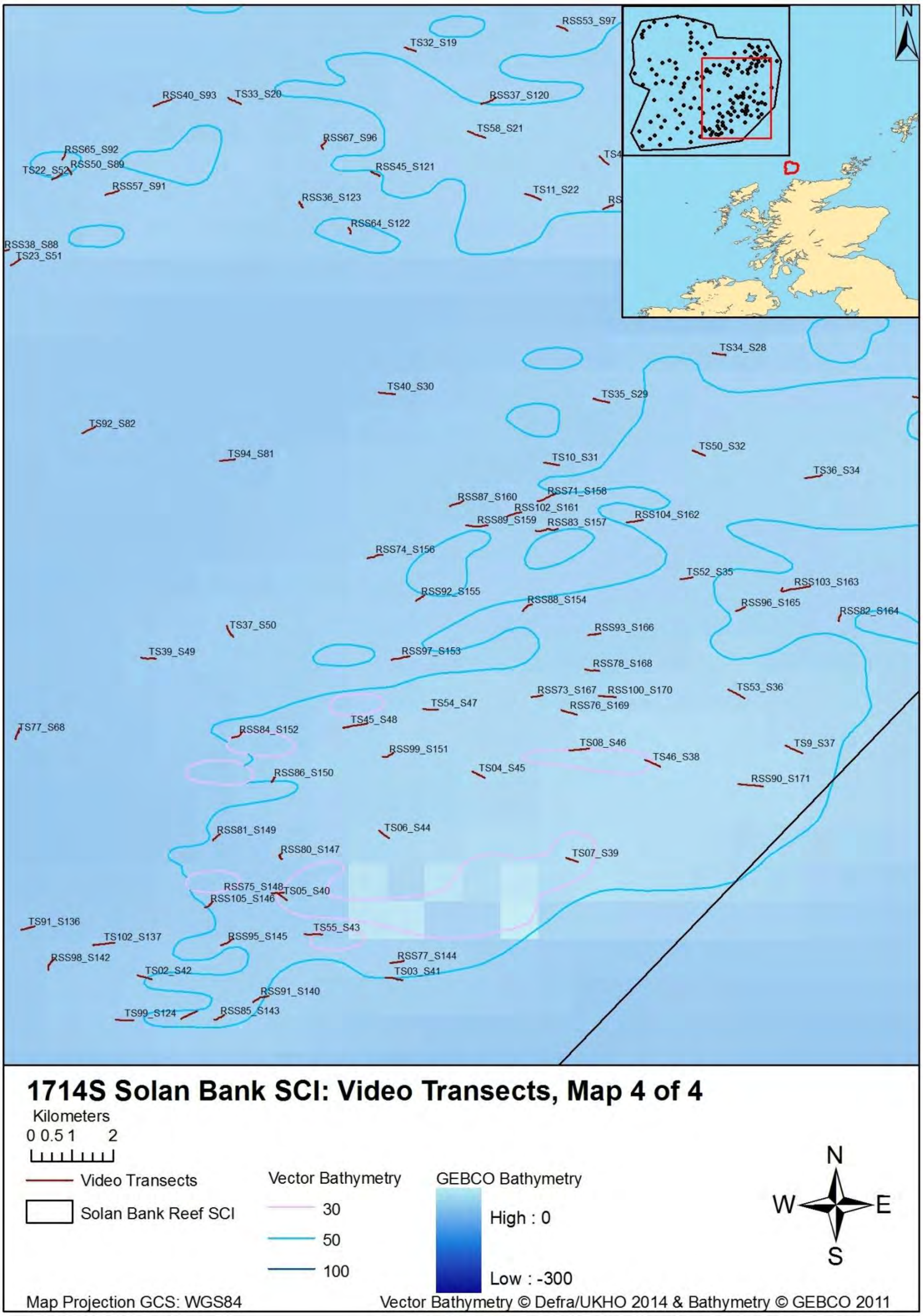


Figure 3.1.d. Locations of the 2014 Solan Bank Reef SCI survey area and transects surveyed (both video and stills) within South East survey quartile of the survey area.

3.2 Description of habitat complexes present

All habitats identified from within the Solan Bank Reef SCI seabed imagery survey were allocated to three habitat complexes (broad-scale habitats): subtidal coarse sediments, subtidal mixed sediments and moderate energy circalittoral rock. Examples of habitat complexes (broad-scale habitats), together with the number of samples of each, are presented in Table 3.2. Moderate energy circalittoral rock (JNCC Habitat Classification code CR.MCR) was assigned to over half of samples (1,070 stills and 190 video habitat samples) and included cobble, bedrock and boulders. Several video transects also included mosaics of more than one broad-scale habitat type.

Table 3.2. Habitat complexes (broad-scale habitats) allocated to samples from the 2014 Solan Bank Reef SCI seabed imagery analysis, and the number of transects, video and stills samples assigned to each.

Habitat Type	Typical image	No of stills samples	No of video samples
Circalittoral Coarse Sediments		543	88
Circalittoral Mixed Sediments		83	11

Habitat Type	Typical image	No of stills samples	No of video samples
Circalittoral Rock		1070	190

3.3 Summary of biotopes present

Biotope complexes, biotopes and sub-biotopes were assigned to stills and video samples using the shallow section of the JNCC Marine Habitat Classification for Britain and Ireland (Connor *et al* 2004). Appendix 8 provides representative images and more detailed information for each biotope identified during this survey.

Four biotopes (**bold text**) and seven sub-biotopes (indented text) were identified from the ‘Echinoderms and crustose communities’ biotope complex within the ‘Moderate energy circalittoral rock’ habitat complex as follows:

- ***Caryophyllia smithii*, sponges and crustose communities on wave-exposed circalittoral rock.**
    - Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock;
    - *Caryophyllia smithii* and sponges with *Pentapora foliacea, Porella compress*a and crustose communities on wave-exposed circalittoral rock (northern variant 2, described by Whomersley *et al* (2010) and further detailed in Appendix 5);
- ***Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock.**
- **Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock.**
    - *Flustra foliacea* on slightly scoured silty circalittoral rock
    - *Alcyonium digitatum*, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock;
    - *Alcyonium digitatum* with *Securiflustra securifrons* on tide-swept moderately wave-exposed circalittoral rock.
    - Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock;
    - *Caryophyllia smithii* with faunal and algal crusts on moderately wave-exposed circalittoral rock;
- ***Alcyonium digitatum* and faunal crust communities on vertical circalittoral bedrock.**

One biotope (**bold text**) was identified from the ‘Circalittoral coarse sediment’ biotope complex within the ‘Sublittoral coarse sediment (unstable cobbles and pebbles, gravels and coarse sands)' habitat complex as follows (remaining allocations within this habitat complex went no further than the biotope complex due to lack of infaunal data):

- ***Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles.**

The 'Sublittoral mixed sediment' biotope complex was identified from within the 'Sublittoral mixed sediment' habitat complex. However, due to lack of infaunal data, no allocations within this habitat complex went further than the biotope complex.

Table 3.3 provides a summary of marine habitat classifications together with the number of stills and video habitats allocated to each.

In addition to assigning JNCC Marine Habitat Classification biotopes to samples, detailed and customised habitat names and habitat descriptions were recorded for each sample, describing the substrate and dominant taxa and other features of interest (detailed in sections 2.2.1 & 2.2.2. Areas with two or more biotopes mixed together, interspersed or regularly repeating, such as waves of coarse and then mixed sediments, were defined as a mosaic of all contributing habitats/biotopes. Due to the high number of transects and stills images, the biotopes have not been displayed graphically but are available in the GIS data pack detailed in Appendix 14. Appendix 8 provides representative images for each biotope identified during this survey.

Table 3.3. Biotopes and biotope complexes assigned to 2014 Solan Bank Reef SCI video habitats and stills imagery. Further biotope detail is available within the JNCC Marine Habitat Classification for Britain and Ireland (Connor *et al* 2004). Appendix 8 provides further detail and representative images for each biotope identified during this survey.

Biotope / complex name	**Biotope / complex Code**	**No. of video habitats present in:**	**No of stills present in:**
Echinoderms and crustose communities on circalittoral rock	CR.MCR.EcCr	81	01
Alcyonium digitatum and faunal crust communities on vertical circalittoral bedrock	CR.MCR.EcCr.AdigVt	0	
Caryophyllia smithii, sponges and crustose communities on wave-exposed circalittoral rock	CR.MCR.EcCr.CarSp	10	7
Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock	CR.MCR.EcCr.CarSp.Bri	11	5
Caryophyllia smithii and sponges with *Pentapora foliacea, Porella compress*a and crustose communities on wave-exposed circalittoral rock	CR.MCR.EcCr.CarSp.PenPcom2	9	7
Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr	8	4
Alcyonium digitatum, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Adig	10	3
Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Bri	40	43
Caryophyllia smithii with faunal and algal crusts on moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Car	2	6

Flustra foliacea on slightly scoured silty circalittoral rock	CR.MCR.EcCr.FaAlCr.Flu	3	3
Alcyonium digitatum with *Securiflustra securifrons* on tide-swept moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Sec	1	0
Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock	CR.MCR.EcCr.UrtScr	1	
Circalittoral coarse sediment	SS.SCS.CCS	83	83
Pomatoceros triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	SS.SCS.CCS.PomB	5	8
Circalittoral mixed sediments	SS.SMx.CMx	11	5

3.3.1 Multivariate analysis to aid Quality Assurance of biotope allocation

Primer analyses were trialled to investigate the consistency of biotope allocations, specifically to see if significantly similar habitats and transects were assigned the same biotopes by the same and different surveyors.

In the Primer analyses, data from the stills analysis were compared in terms of the physical parameters available, including depth and proportions of MNCR substrate types, and also in terms of the biological communities present. Due to differences between count and percent cover estimates being incompatible within a multivariate analysis, all abundance data was first converted to SACFOR prior to analysis.

Although significantly similar groups were identified within both the physical and biological datasets independently of each other, these could not be related to each other, or to entire habitats, transects or to individual surveyors, and no firm conclusions were drawn. However inter-surveyor variability was identified as a factor affecting biotope allocation, so further QA was deemed necessary.

It was decided that manual QA of the biotopes by a single experienced surveyor was the best approach to improve consistency throughout the dataset. Biotope assignments, substrates and characterising taxa were checked within the stills and video datasets, focussing first on ambiguous and easily confused habitats, biotopes and substrates such as confusions between course and mixed sediments, and between gravels and pebbles. When errors were identified within particular biotopes or substrates, this prompted a dataset-wide search for the same or similar errors within other examples of the biotope or substrate. As a result of this manual QA, all biotopes were checked by an experienced second surveyor.

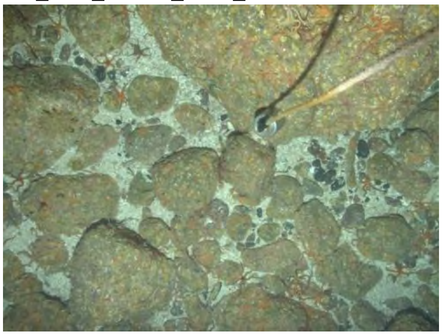
3.4 Annex I Reef subtypes present

Annex I Reef was present at a number of transects throughout the area of search within the Solan Bank Reef SCI. Of the three Annex I Reef subtypes (bedrock, stony, biogenic), bedrock and stony subtypes were recorded frequently during the imagery analysis. Biogenic reef was not recorded. Appendix 9 provides a summary of transects where stony and bedrock (both potential and confirmed) Annex I Reef were identified.

Annex I bedrock reef was described as either ‘confirmed’ or ‘potential’ depending on the surveyors’ confidence whether the rock was a) bedrock (and not boulders), and b) bedrock with reef-associated fauna present, rather than sand-scoured bare rock at the sediment/rock interface which was almost devoid of life.

Surveyors assigned low, medium or high confidence to areas of stony reef using the characterising features of a stony reef as outlined in Irving (2009) (detailed in section 2.1.5). Any sample recorded as 'low' quality stony reef was deemed 'potential' Annex I Reef, whilst anything of medium or high quality stony 'reefiness' was considered 'confirmed' Annex I Reef. Table 3.4 provides representative images of the different categories of Annex I reef.

Table 3.4. Typical images of Annex I Reef subtypes identified during the 2014 Solan Bank Reef imagery analysis.

Annex I subtype	**Confirmed**	**Potential**
Stony	 1714S_SBR_RSS90_S171_P29  1714S_SBR_TS52_S35_IMG_01	 1714S_SBR_RSS90_S171_P17  1714S_SBR_RSS78_S168_IMG_09

Bedrock	 1714S_SBR_RSS76_S169_IMG_04  1714S_SBR_TS17_S12_IMG_25	 1714S_SBR_TS19_S14_IMG_09  1714S_SBR_TS17_S12_IMG_12

Table 3.5a summarises the total number of transects identified as containing Annex I Reef subtypes from stills and video. Table 3.5b provides examples of potential bedrock and stony reef assigned during the analysis. Figure 3.2 presents locations of transects in which Annex I Reef subtypes were identified during analysis of video from the 2014 Solan Bank Reef SCI survey.

Table 3.5a. Total number of transects identified as containing Annex I Reef subtypes during analysis of 2014 Solan Bank Reef SCI stills and video imagery.

	No. of transects containing Stony confirmed	**No. of transects containing Bedrock confirmed**	**No. of transects containing confirmed Bedrock and Stony reef**
156 Video transects	16	31	4
156 Stills transects (same as video)	23	41	11
ALL 166 stills transects	24	43	11

Table 3.5b. Total number of transects identified as containing potential Annex I Reef subtypes during analysis of 2014 Solan Bank Reef SCI stills and video imagery.

	No. of transects containing Stony potential	**No. of transects containing Bedrock potential**
156 Video transects	99	59
156 Stills transects (same as video)	99	61
ALL 166 stills transects	103	67

Video was analysed from 156 transects. Confirmed stony or bedrock Annex I Reef was recorded in 43 (28%) video transects. Potential Annex I Reef (stony or bedrock) was recorded in 127 (81%) transects, whilst 20 (13%) transects were recorded to have no Annex I Reef present. Stony reef (both potential and confirmed) was the most prevalent form of Annex I Reef recorded within the video imagery. Of the 156 video transects, 103 (66%) contained either potential or confirmed stony reef, although only 16 of these transects were considered 'confirmed' Annex I stony reef. Bedrock reef was confirmed at 31 (20%) transects, and recorded as potential from a further 53 transects. Four transects were recorded with both stony and bedrock confirmed Annex I Reef, and as potential from 49 further transects. Appendix 9 details event (transect) references of all transects where Annex I Reef was recorded.

Stills were captured from 166 transects. Confirmed stony or bedrock Annex I Reef was recorded from 56 (34%) transects. Potential Annex I Reef (stony or bedrock) was assigned to 128 (77%) transects, whilst 20 (12%) transects were recorded as containing no Annex I Reef.

Stony reef (both potential and confirmed) was the most prevalent form of Annex I Reef recorded from the stills imagery. Of the 166 stills transects, 24 (15%) contained confirmed stony reef, with a further 103 (62%) transects containing potential stony reef. Confirmed bedrock reef was identified in 43 (26%) transects, and recorded as potential from a further 67 (40%) transects. Both stony and bedrock reef were confirmed from 11 transects, and as potential from 31 further transects. Appendix 9 details all transect references where Annex I Reef was recorded.

Four transects were assigned confirmed bedrock and stony Annex I Reef subtypes from analysis of the video, whereas eleven transects were assigned both Annex I Reef subtypes from analysis of the stills (Table 3.5). More detail of Annex I Reef subtypes assigned is provided below and in Appendix 9.

There were differences in the recording of Annex I Reef between the video and stills imagery. 166 stills transects were analysed compared to 156 video transects. Discounting the ten additional transects analysed by stills only, it was clear that stills analysis identified more Annex I Reef than video, as illustrated by Table 3.5. Of the same 156 transects analysed by both video and stills imagery, stills imagery identified eight more transects with confirmed stony reef and eleven more with bedrock reef.

It should be noted that identification of Annex I Reef from stills, or from individual 10 or 20 second video sections (viewed in isolation), is less appropriate than from entire video habitats or entire video transects due to the smaller area of stills and video subsections, compared to video habitats and entire transects. The suggested minimum area for allocating Annex I stony reef is 25m^2 (section 2.1.5), whereas the average area within stills from this project was 1.5m^2, from individual 10 second video sections was 4.1m^2 and from 20 second sections was 6.3m^2 (Table 4.1). As a result, a likely artefact of the methods from this imagery analysis project, was that very small areas or rock might have been allocated Annex I Reef subtypes, ignoring the minimum area for assigning these features. For example, individual close-up stills dominated by rock and analysed in isolation from other stills and video, were likely to have been allocated Annex I Reef, however these close-up stills, when seen from further away, often revealed the rock was only a single boulder amongst sediments, and in this case the rock should not have been assigned Annex I Reef. Assuming this scenario occurred for both small areas of bedrock surrounded by sediments and cobbles or boulders amongst sediments, it is likely there were multiple false positives within Annex I Reef subtype allocation in the stills dataset. This could explain why within the stills analyses a greater number of transects were identified as containing Annex I Reef, compared with the same video transects.

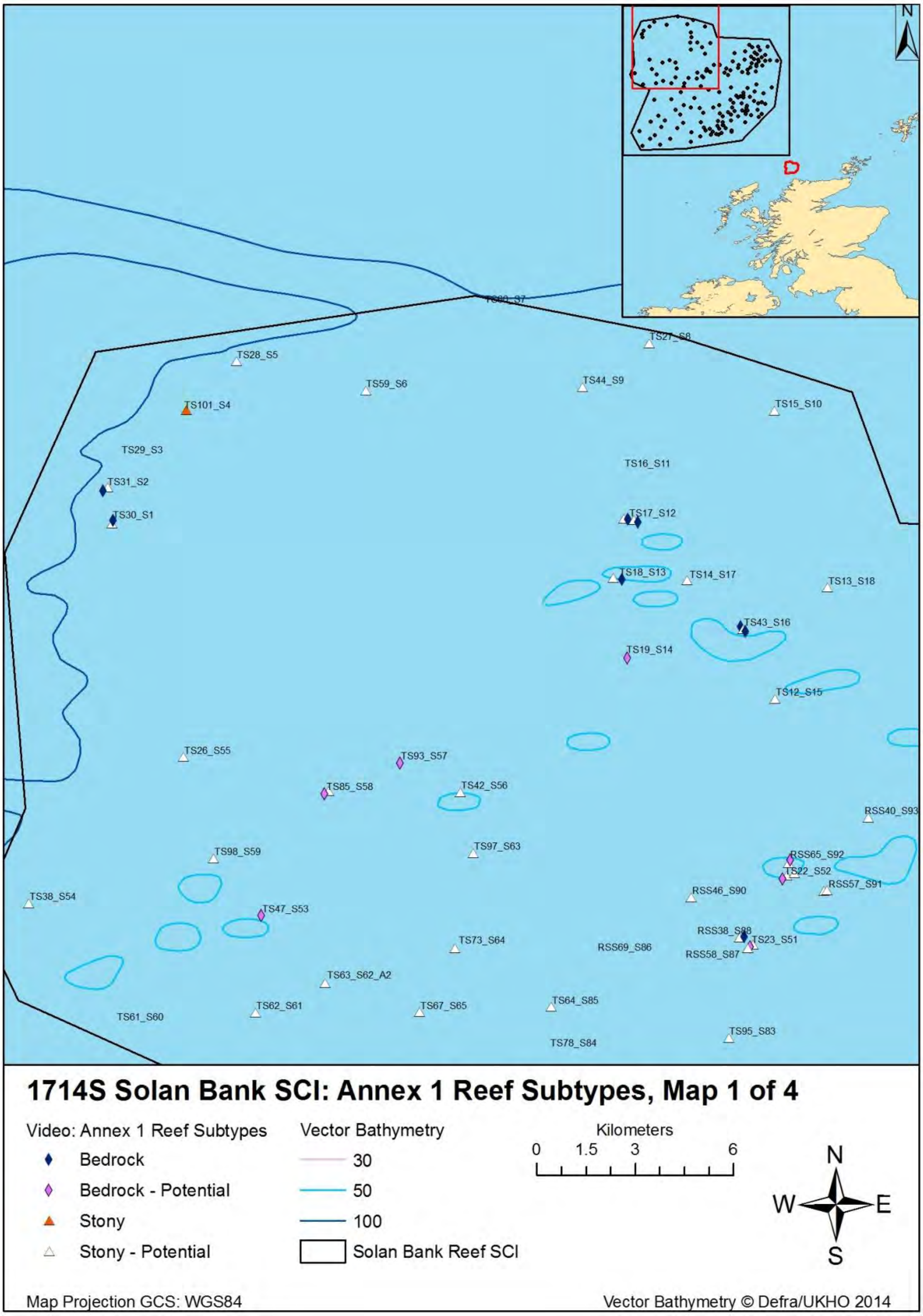


Figure 3.2.a. Confirmed and potential Annex I Reef subtypes present in video transects within the North West survey quartile of the 2014 Solan Bank Reef SCI survey area.

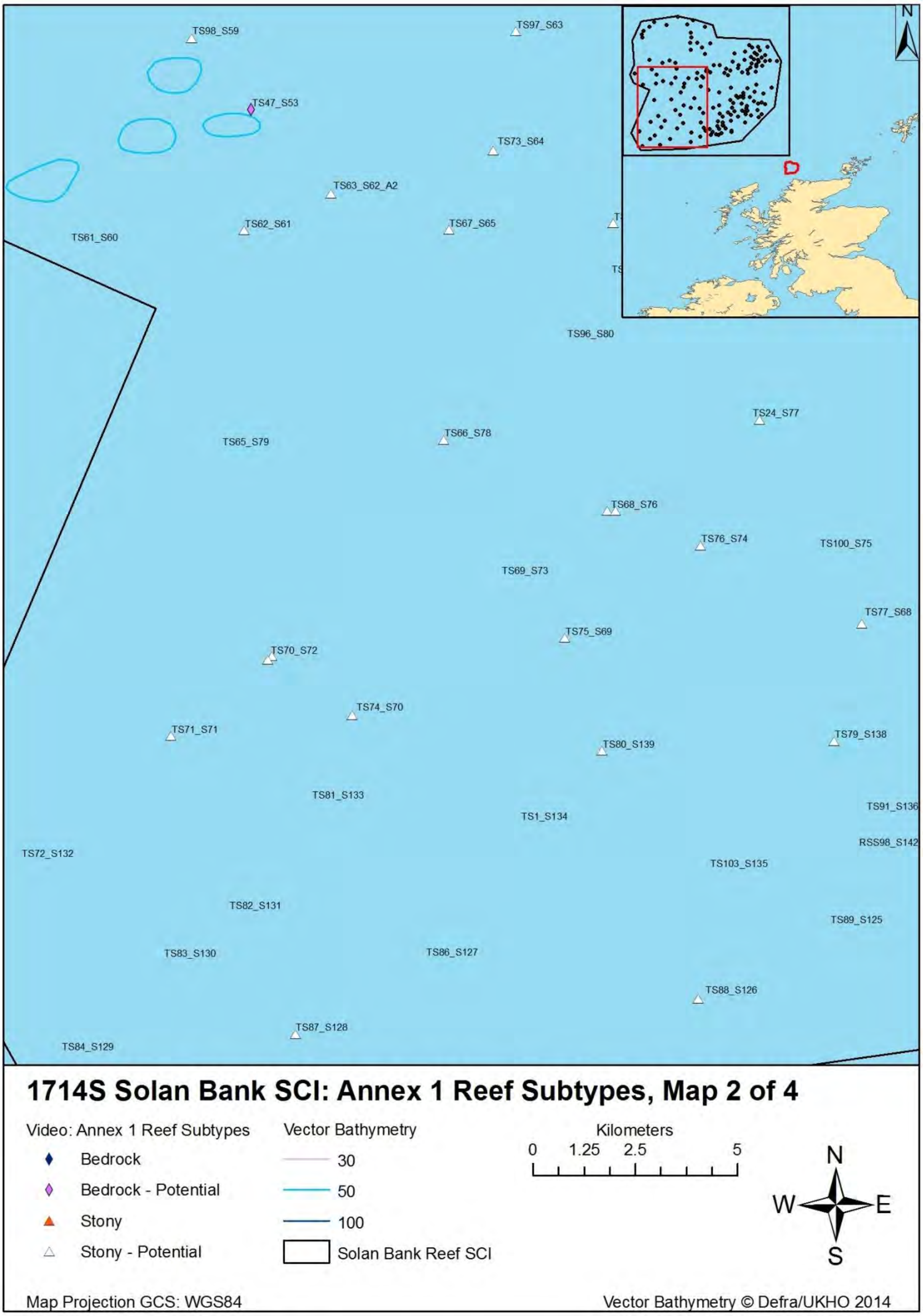


Figure 3.2.b. Confirmed and potential Annex I Reef subtypes present in video transects within the South West survey quartile of the 2014 Solan Bank Reef SCI survey area.

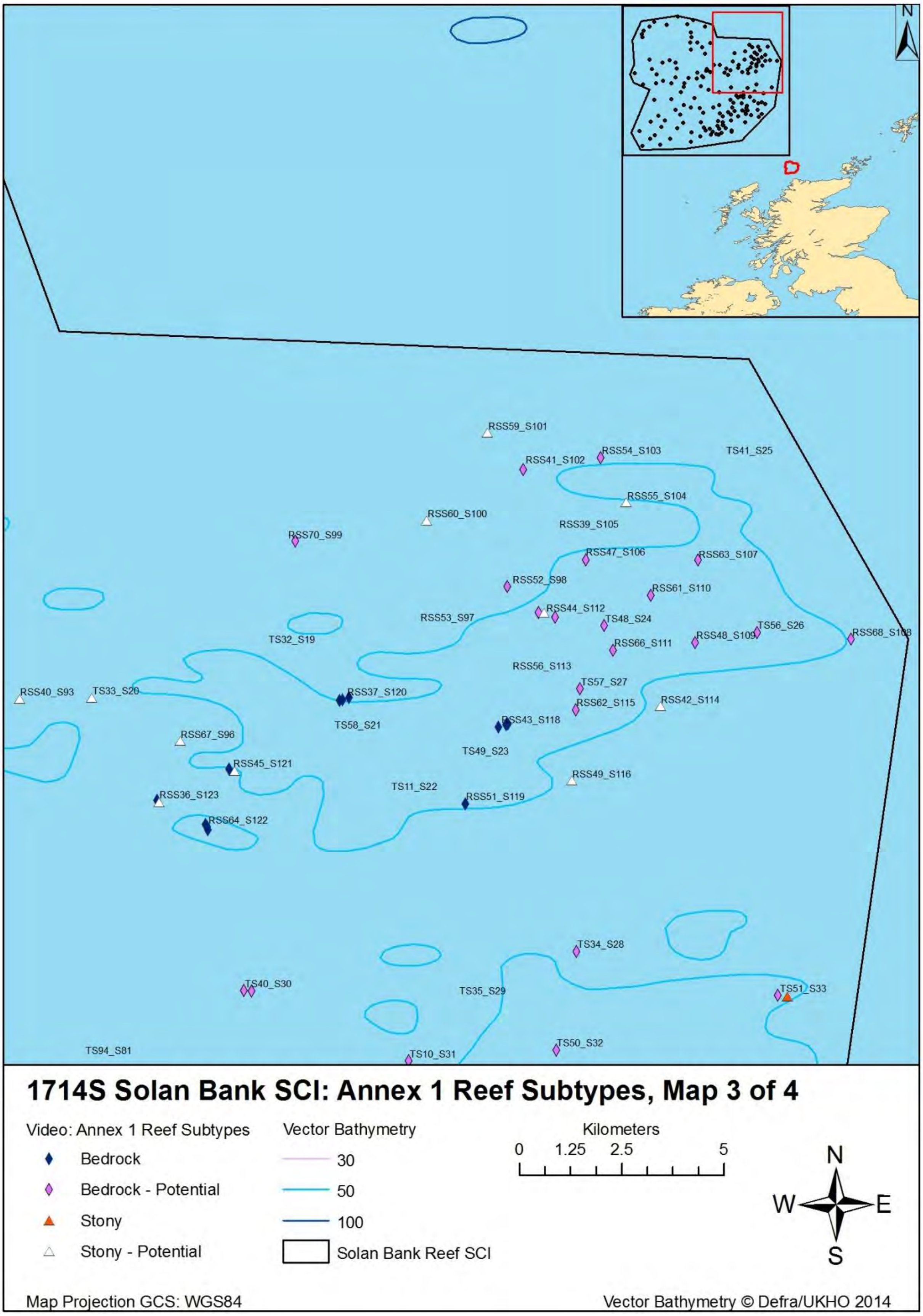


Figure 3.2.c. Confirmed and potential Annex I Reef subtypes present in video transects within the North East survey quartile of the 2014 Solan Bank Reef SCI survey area.

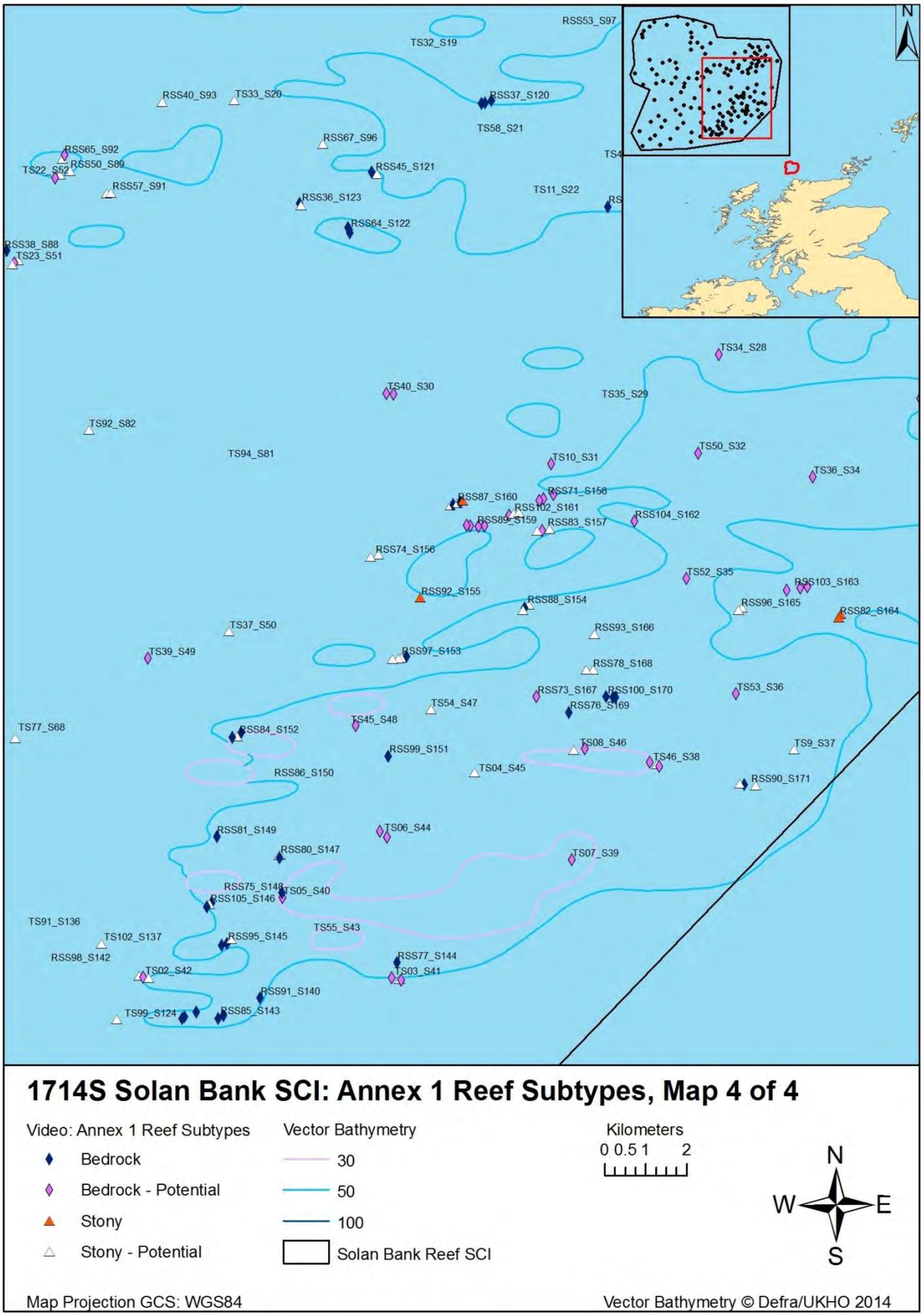
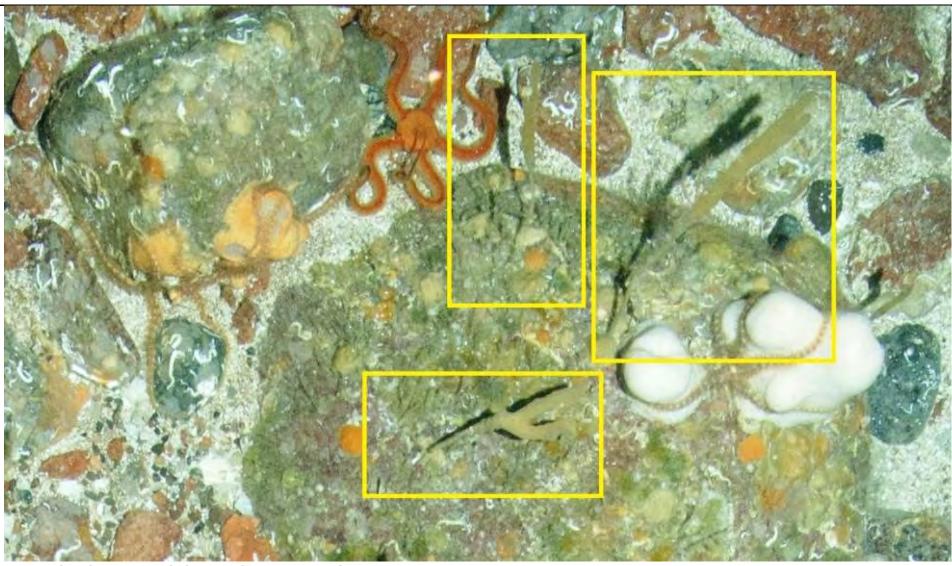
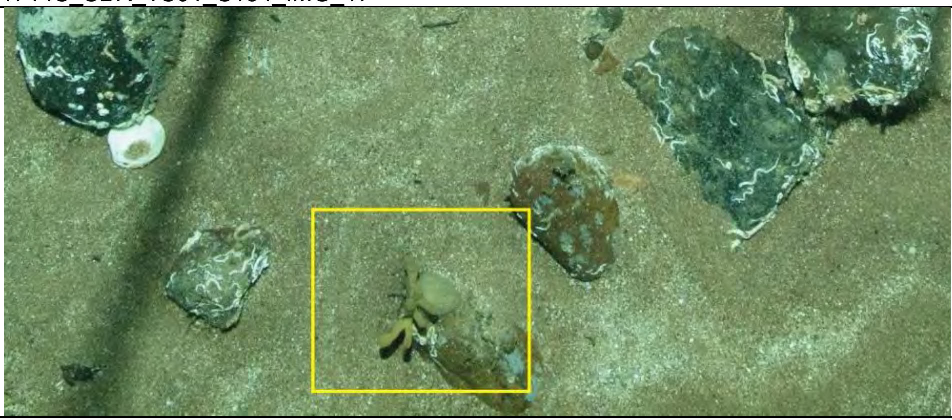


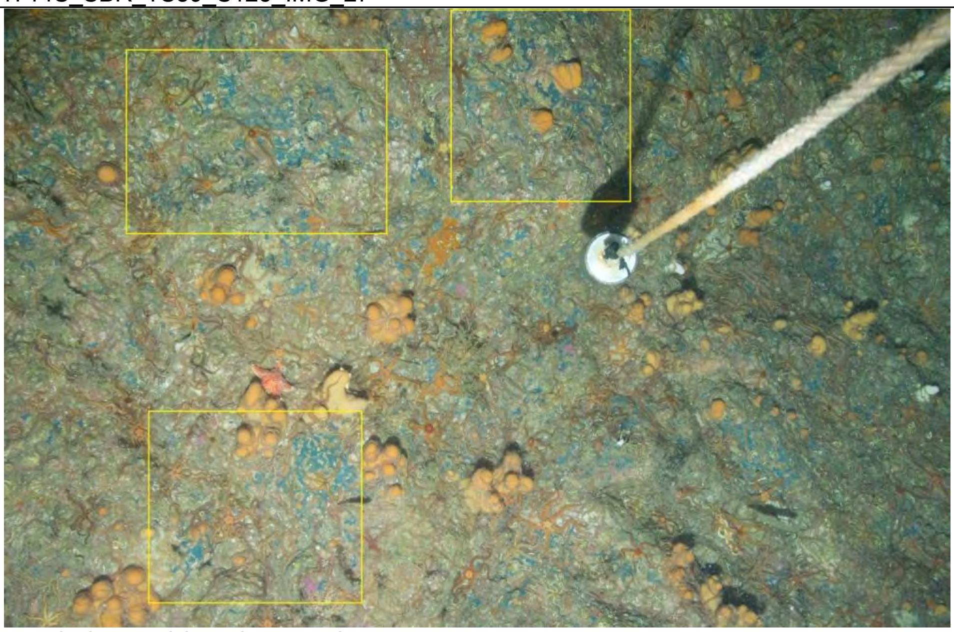
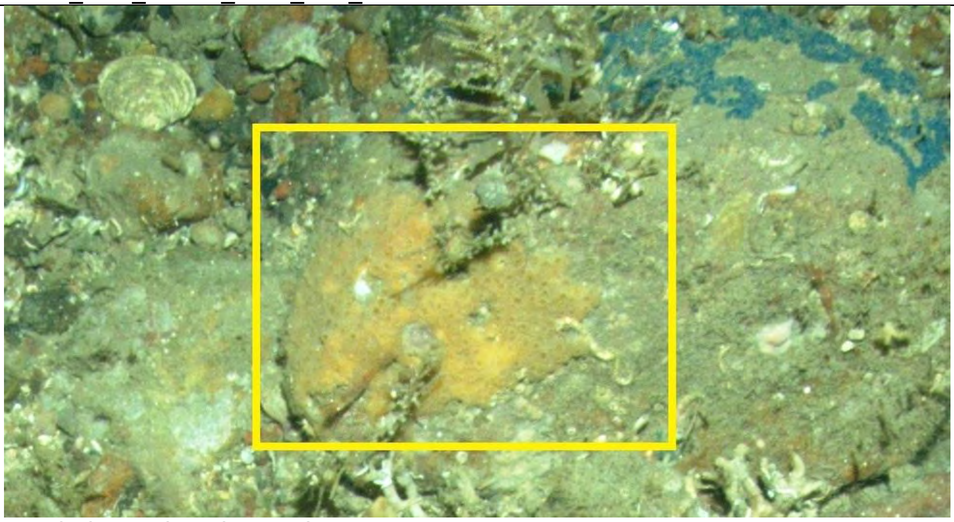
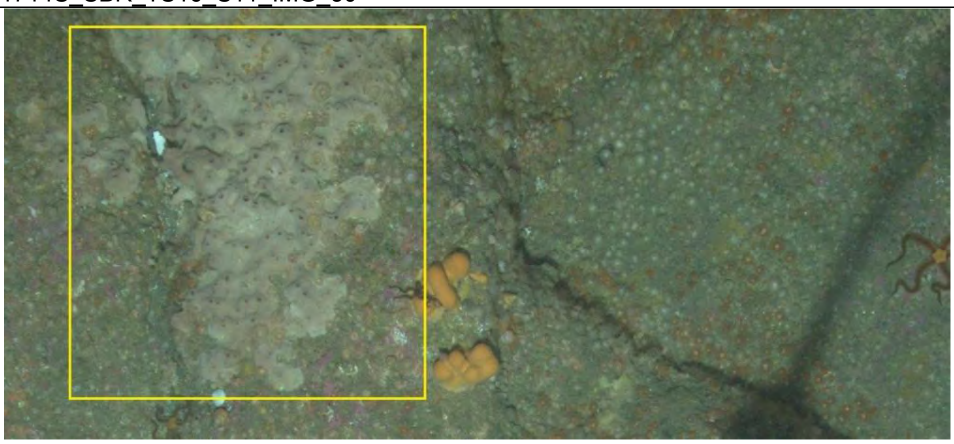
Figure 3.2.d. Confirmed and potential Annex I Reef subtypes present in video transects within the South East survey quartile of the 2014 Solan Bank Reef SCI survey area.

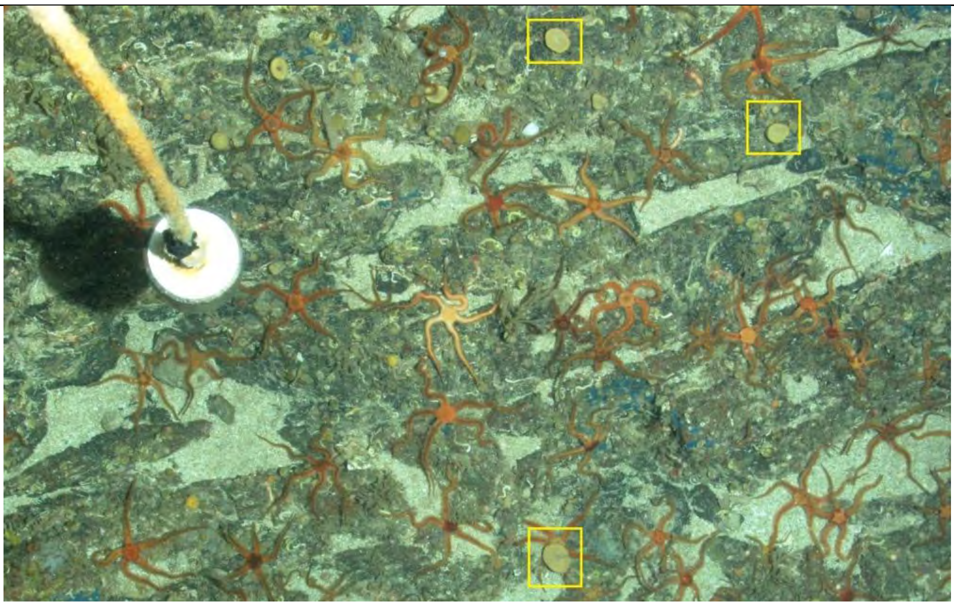
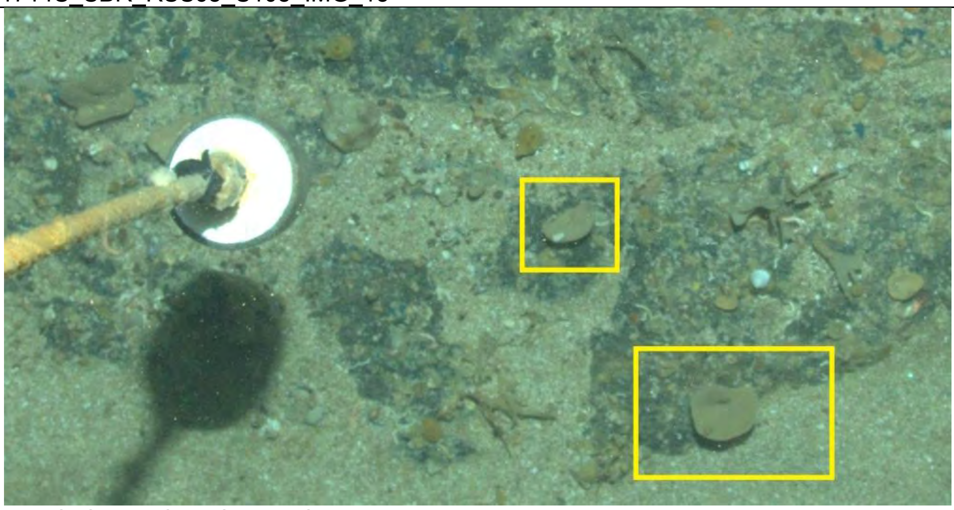
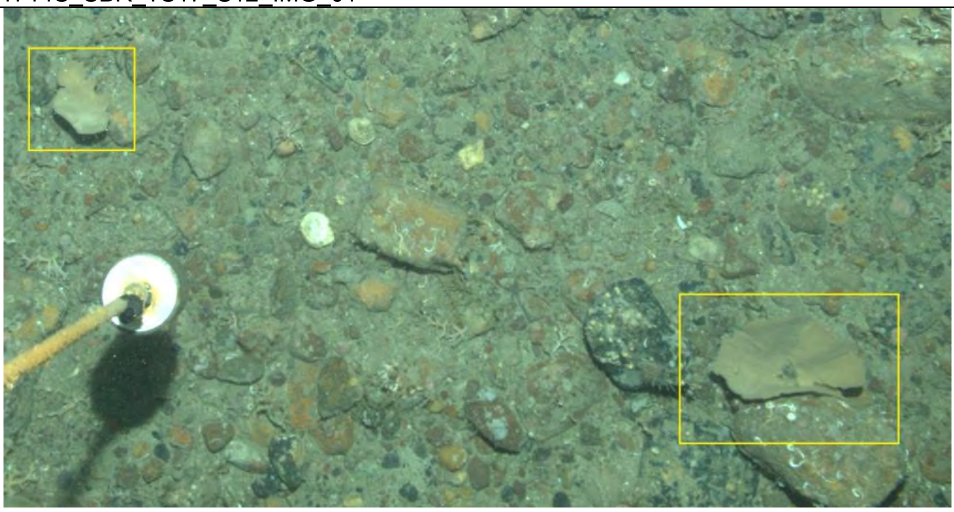
3.5 Presence of sponge morphologies

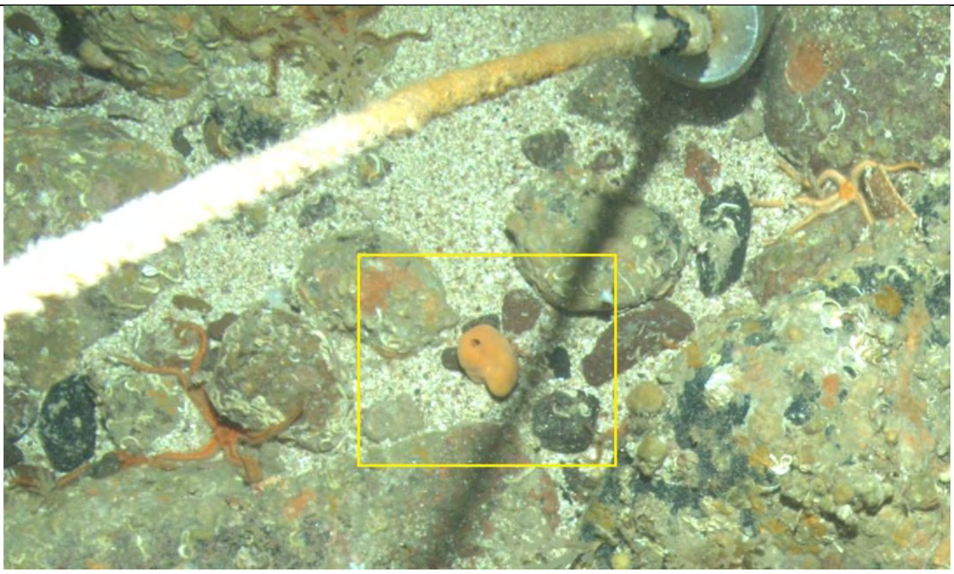
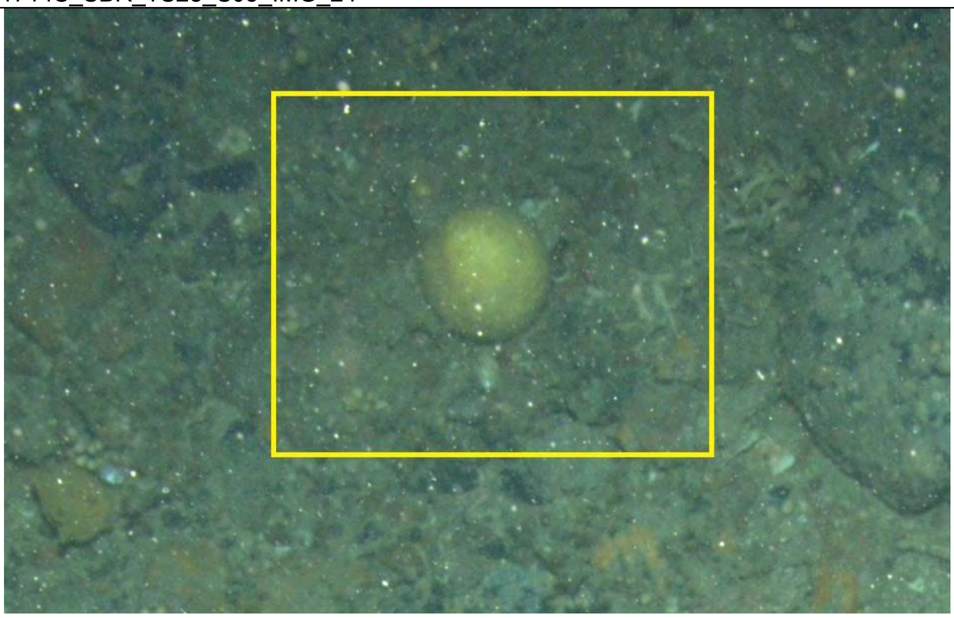
Sponge morphologies were identified in stills and video following methods described in Sections 2.1.6. Of the ten morphologies shown in Figure 2.2, one was excluded from the analysis (burrowing) as it was not deemed possible to identify this from images alone. Of the remaining nine morphologies, all nine were identified in the stills and video imagery analysed. Typical images of sponge morphologies identified are included in Table 3.6.

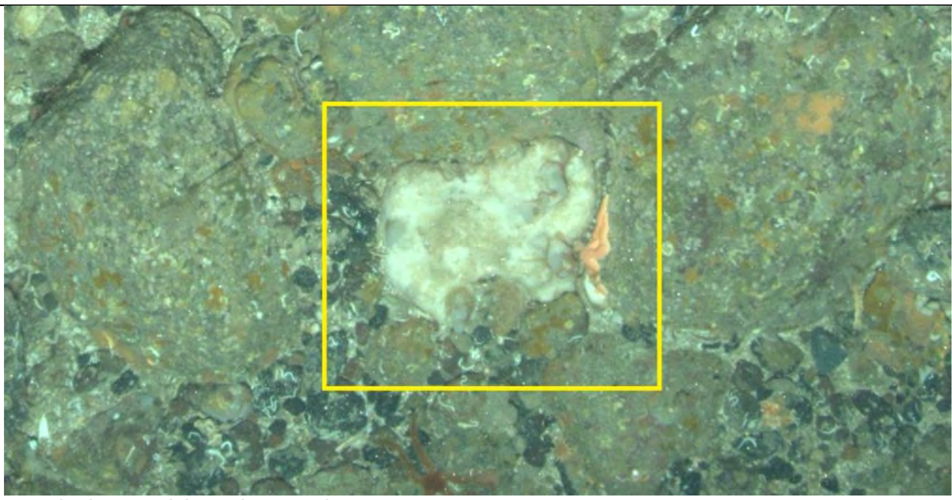
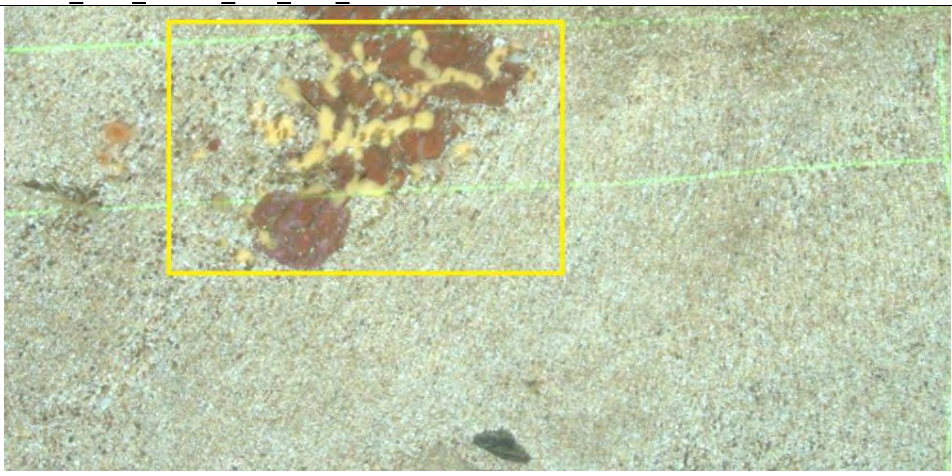
Table 3.6. Typical images of sponge morphologies identified during the 2014 Solan Bank Reef imagery analysis.

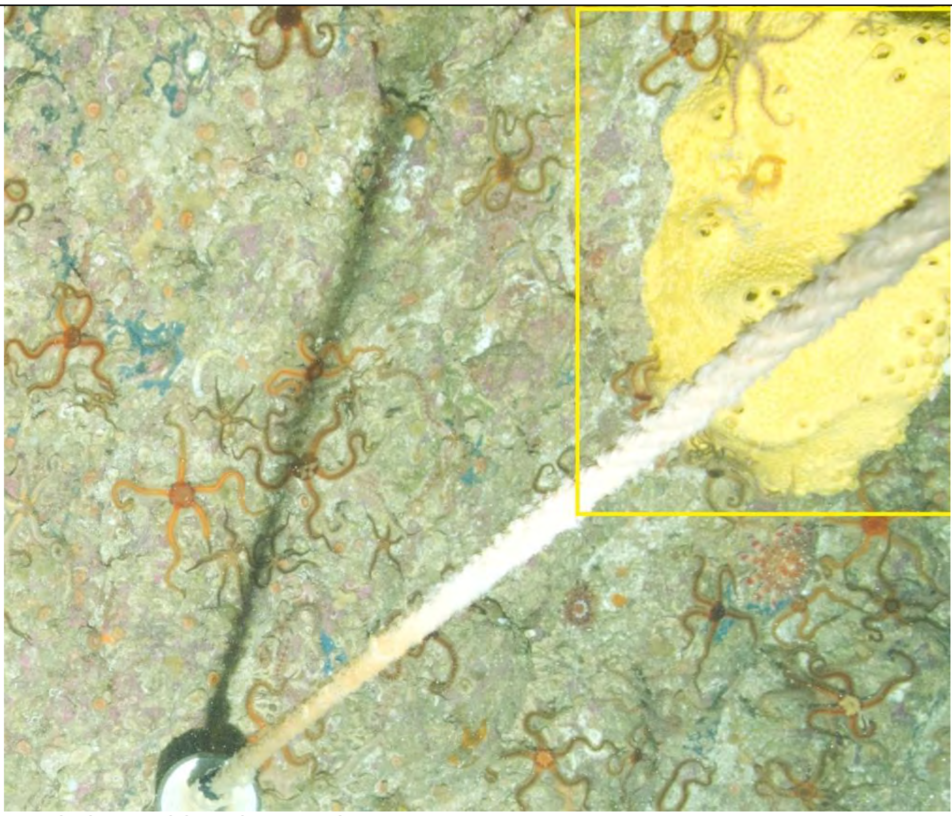
Sponge Morphology	Example images (from stills including image name)
Arborescent	 1714S_SBR_RSS96_S165_IMG_19.jpg
Arborescent	 1714S_SBR_TS01_S134_IMG_17
Arborescent	

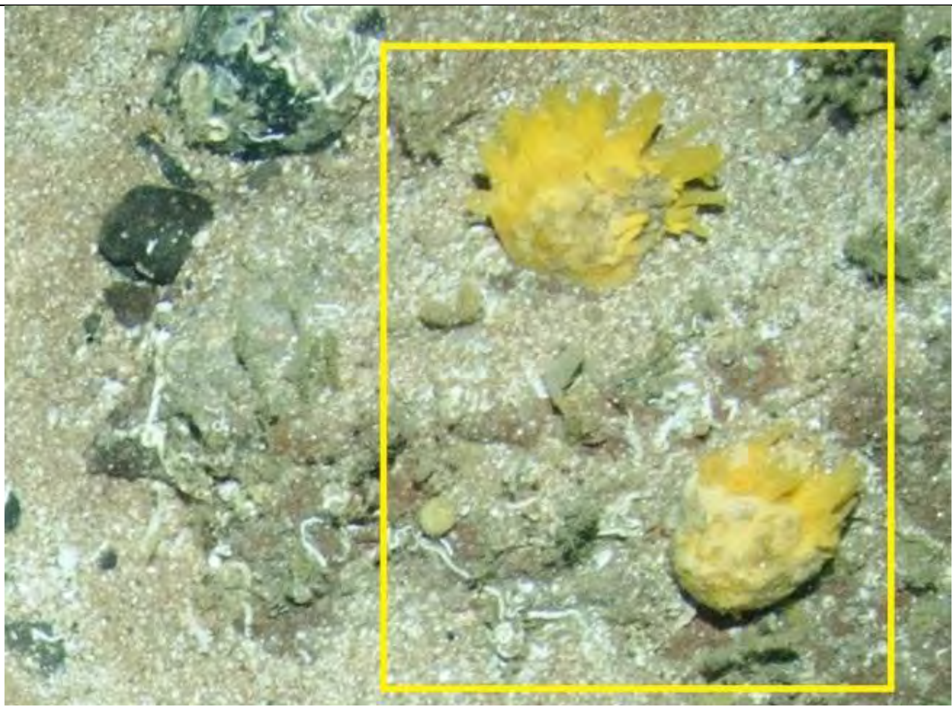
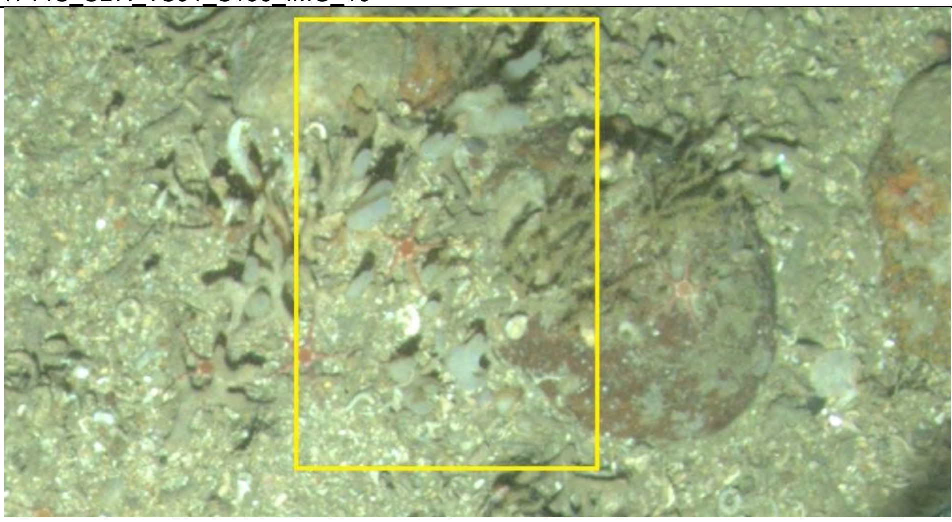
Sponge Morphology	**Example images (from stills including image name)**
	1714S_SBR_TS89_S125_IMG_27
Encrusting	 1714S_SBR_RSS92_S155_IMG_01
Encrusting	 1714S_SBR_TS16_S11_IMG_30
Encrusting	 1714S_SBR_TS52_S35_IMG_28

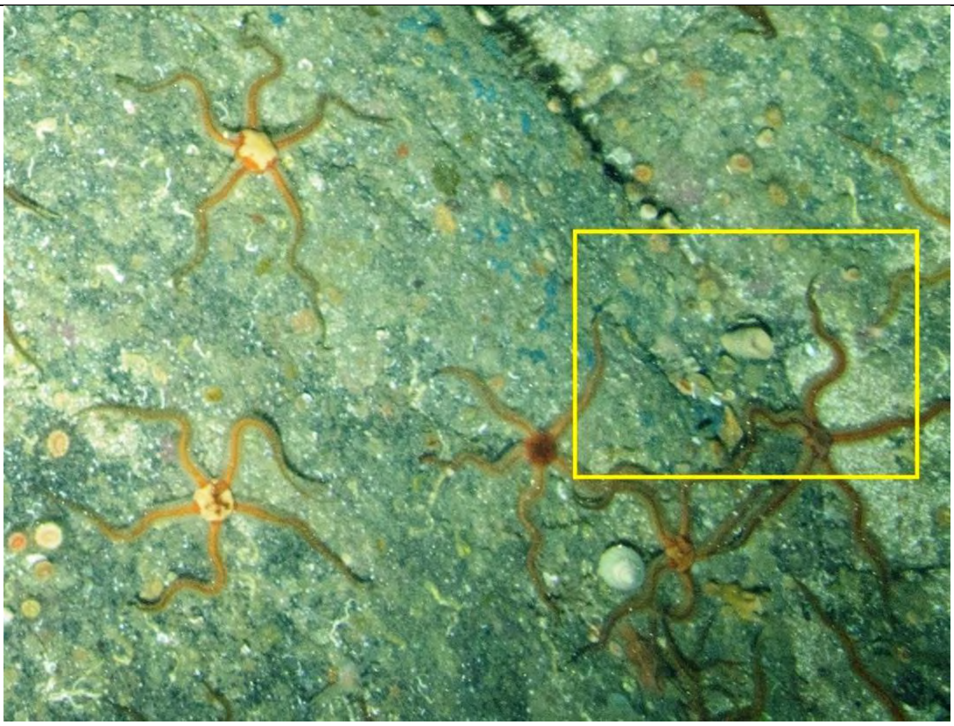
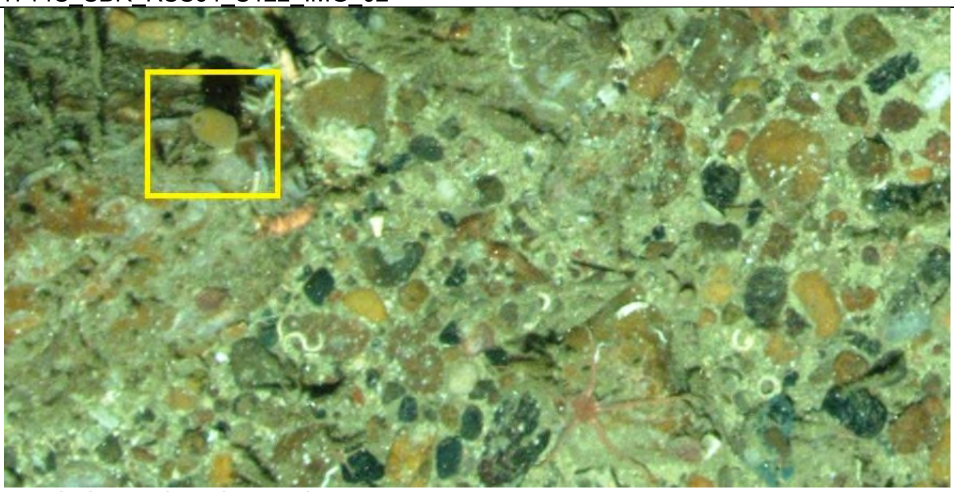
Sponge Morphology	**Example images (from stills including image name)**
Flabellate	 1714S_SBR_RSS68_S108_IMG_15
Flabellate	 1714S_SBR_TS17_S12_IMG_01
Flabellate	 1714S_SBR_TS28_S05_IMG_18

Sponge Morphology	Example images (from stills including image name)
Globular	 1714S_SBR_TS13_S18_IMG_21
Globular	 1714S_SBR_TS28_S05_IMG_24
Globular	 1714S_SBR_TS31_S02_IMG_20

Sponge Morphology	Example images (from stills including image name)
Massive	 1714S_SBR_RSS50_S89_IMG_15
Massive	 1714S_SBR_RSS56_S113_IMG_25

Sponge Morphology	Example images (from stills including image name)
Massive	 1714S_SBR_RSS91_S140_IMG_17
Papillate	 1714S_SBR_TS91_S136_IMG_16

Sponge Morphology	Example images (from stills including image name)
Papillate	 1714S_SBR_TS91_S136_IMG_16
Papillate (questionable)	 1714S_SBR_TS31_S02_IMG_23

<table>
<tr><th>Sponge Morphology</th><th>Example images (from stills including image name)</th></tr>
<tr><td>Tubular</td><td>
1714S_SBR_RSS64_S122_IMG_02</td></tr>
<tr><td>Tubular</td><td>
1714S_SBR_TS28_S05_IMG_03</td></tr>
<tr><td>Tubular</td><td></td></tr>
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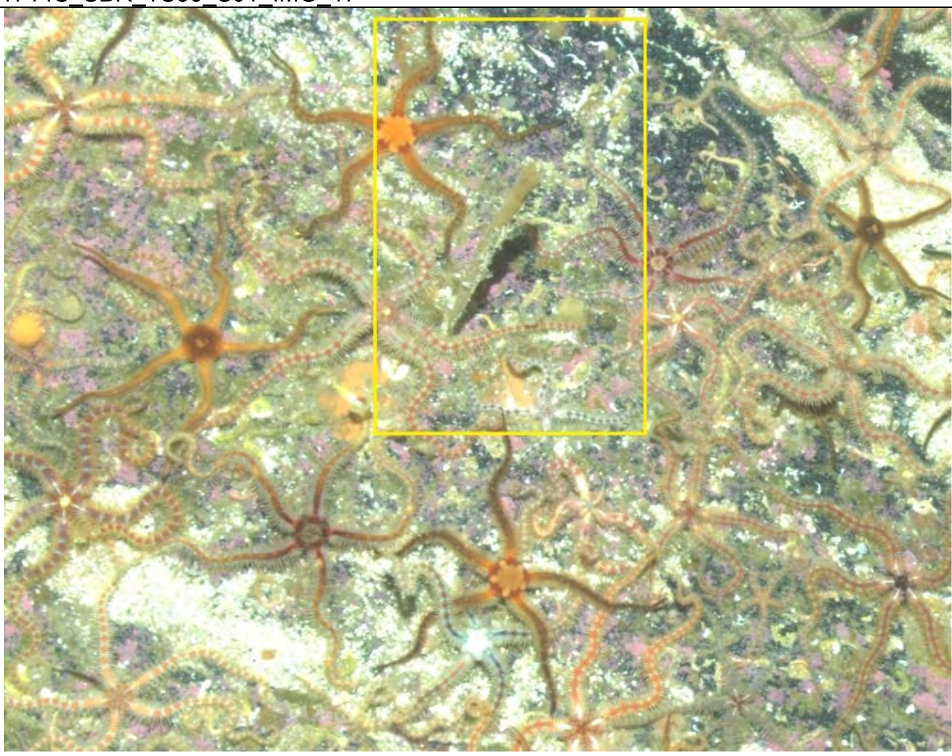
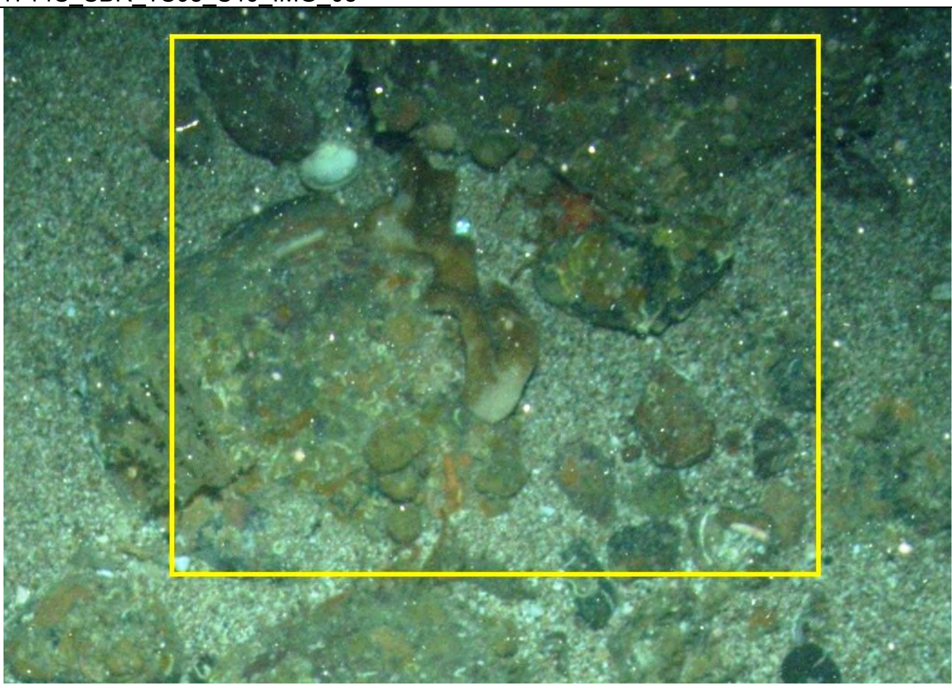
Sponge Morphology	Example images (from stills including image name)
	1714S_SBR_TS30_S01_IMG_17
Pedunculate (questionable)	 1714S_SBR_TS08_S46_IMG_08
Repent (questionable)	 1714S_SBR_TS12_S15_IMG_06

Of the 1,696 photos analysed, 770 were recorded as having at least one sponge morphology present. When aggregated to entire transects, 156 of the 166 stills transects analysed, contained at least one or more morphology. Table 3.7 shows the numbers of stills from which the nine different sponge morphologies were recorded.

Of the 156 video transects analysed, 139 were reported to contain one or more sponge morphology. Within these transects, 196 of 277 distinct habitats (biotopes lasting longer than 60 seconds video time) were reported to contain one or more morphology. Numbers of video habitats and video transects where each of the sponge morphologies were recorded is shown in Table 3.7.

Table 3.7. Numbers (and % of total in brackets) of stills, video habitats and transects where each sponge morphology was recorded following analysis of imagery from the Solan Bank Reef SCI 2014 survey.

Sponge morphologies	**Number of stills recorded**	**Number of transects recorded (stills)**	**Number of video habitats recorded**	**Number of transects recorded (video)**
Arborescent (Arb)	24 (1%)	19 (11%)	2 (1%)	2 (1%)
Encrusting (Enc)	626 (37%)	146 (88%)	150 (54%)	118 (77%)
Flabellate (Fla)	146 (9%)	67 (40%)	93 (34%)	73 (47%)
Globular (Glo)	74 (4%)	35 (21%)	55 (20%)	41 (26%)
Massive (Mas)	166 (10%)	86 (52%)	81 (29%)	69 (44%)
Papillate (Pap)	10 (1%)	8 (5%)	7 (2.5%)	7 (4.5%)
Pedunculate (Ped)	1 (<1%)	1 (1%)	0 (0%)	0 (0%)
Repent (Rep)	3 (<1%)	3 (2%)	0 (0%)	0 (0%)
Tubular (Tub)	3 (<1%)	1 (1%)	1 (<1%)	1 (1%)
Total with one or more morphology recorded	770 (45%)	156 (94%)	196 (71%)	139 (89%)
Total analysed	1696	166	277	156

Of the 79 video transects divided into 10 or 20 second subsections prior to analysis, 73 transects contained one or more sponge morphology. Of the six transects divided into 10 second subsections, 62 of the 486 subsections contained one or more sponge morphology; and of the 73 transects divided into 20 second subsections, 1,101 of the 4,015 subsections contained one or more morphologies. The numbers of video subsections and sub-sectioned video transects where each of the sponge morphologies was recorded, is shown in Table 3.8.

Table 3.8. Numbers (and % of total in brackets) of 10 and 20 second video subsections and sub-sectioned video transects where each sponge morphology was recorded following analysis of imagery from the Solan Bank Reef SCI 2014 survey.

Sponge morphologies	**Number of 10 second subsections**	**Number of transects recorded (10 sec)**	**Number of 20 second subsections**	**Number of transects recorded (20 sec)**
Arborescent (Arb)	0 (0%)	0 (0%)	1 (<1%)	1 (1%)
Encrusting (Enc)	37 (8%)	5 (83%)	748 (19%)	57 (78%)
Flabellate (Fla)	29 (6%)	3 (50%)	330 (8%)	31 (42.5%)
Globular (Glo)	0 (0%)	0 (0%)	132 (3%)	16 (22%)
Massive (Mas)	17 (3.5%)	3 (50%)	198 (5%)	35 (48%)
Papillate (Pap)	0 (0%)	0 (0%)	7 (<1%)	3 (4%)
Pedunculate (Ped)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Repent (Rep)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Tubular (Tub)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total with one or more morphology recorded	62 (13%)	5 (83%)	1101 (27%)	68 (93%)
Total analysed	486	6	4015	73

The dominant sponge morphologies identified within stills were encrusting (88% of transects), massive (52% of transects) and flabellate (40% of transects), followed by the less common morphologies of globular (21% of transects), arborescent (11% of transects), and the rarer morphologies including papillate (5% of transects), repent (2% of transects), and with pedunculate and tubular both only present in 1% of stills transects.

It should be noted that the burrowing sponge morphology was not included in the present project as it was not deemed possible to identify this morphology from images alone. Additionally, the pedunculate morphology was considered unlikely to be identified consistently from the predominantly downward-facing imagery as it was deemed unlikely the peduncle would be visible, and therefore specimens might easily be misidentified as the globular morphology. Although only one pedunculate sponge was identified in the present study, no conclusions can really be drawn as to the difficulty in identifying this morphology from the results. It is just as likely that only one specimen of this morphology was present, as that it was consistently misidentified.

3.6 Presence of fragile sponge and anthozoan communities

Fragile Sponge and Anthozoan (FSA) communities were identified following methods described in section 2.1.7, taxa specified in Appendix 4 and guidance provided in Haynes *et al* (2014). Example images of the different confidence categories of FSA communities are provided in Table 3.9.

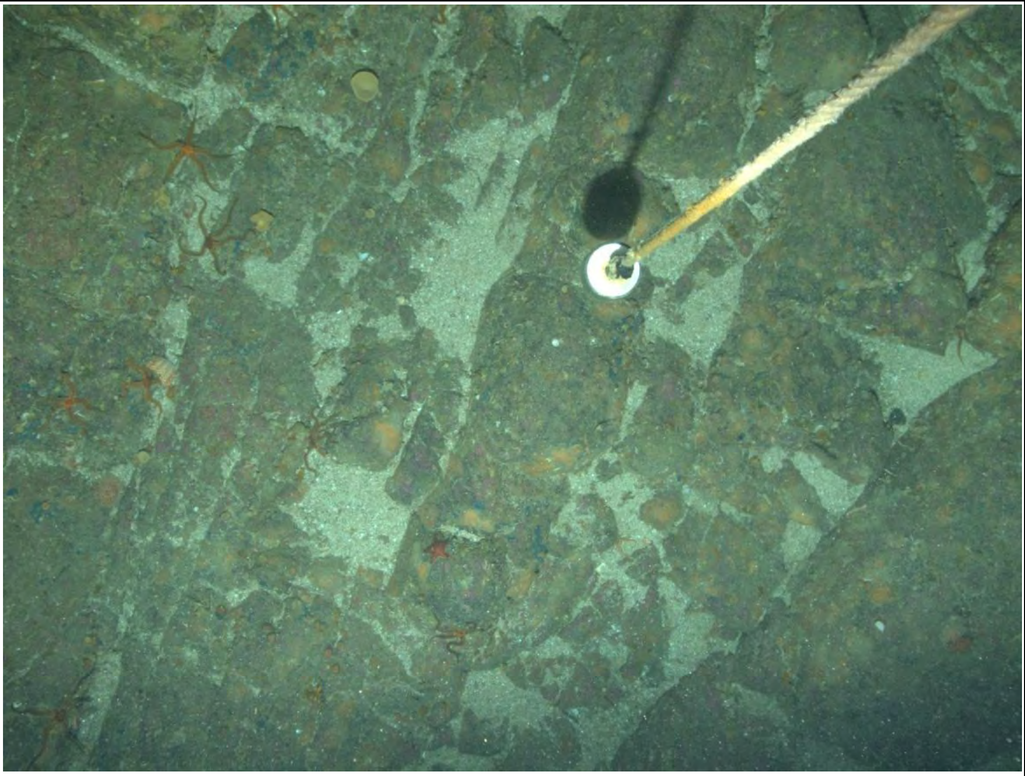
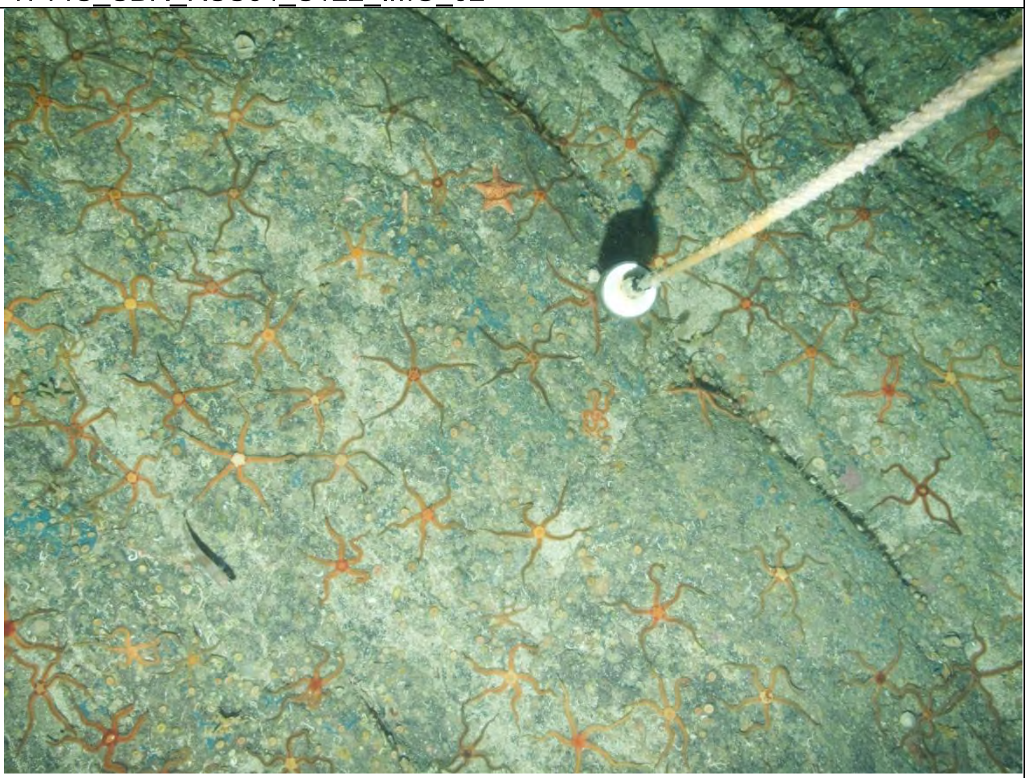
From analysis of 166 transects (1696 photos), 41 transects (114 photos) were identified as containing fragile sponge and anthozoan communities (62% of transects). Of these stills, 92 (81%) were considered low confidence, 18 (16%) were assigned medium confidence, and four (3.5%) high confidence. Table 3.10 details transects identified as containing fragile sponge and anthozoan communities, together with the associated confidence assignments.

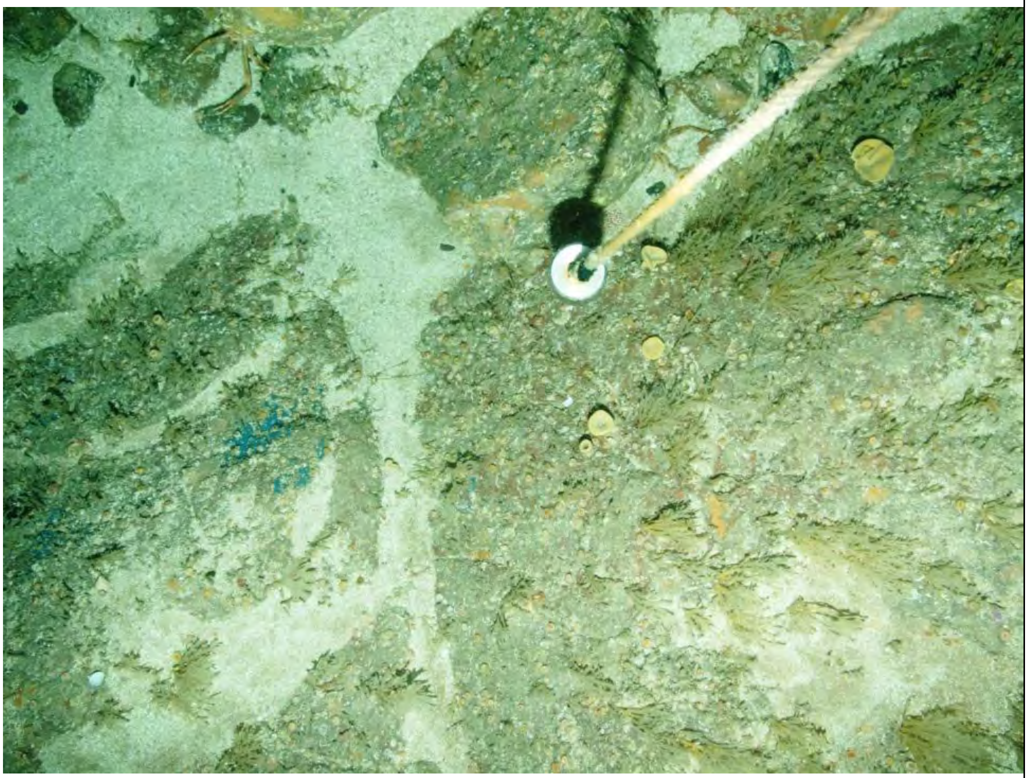
From the analysis of 156 video transects, FSA communities were identified within 48 transects (31% of transects). Throughout these videos 133 individual recordings of FSA were found, of which 110 were assigned with low confidence (83%), 21 were medium confidence (16%) and 2 (1.5%) were assigned with high confidence. Table 3.10 details the transects and FSA community confidence levels identified within the video imagery.

Transects identified as containing FSA communities differed between the stills and video imagery (Table 3.10). Of the 58 transects identified as having FSA communities, only 27 transects recorded FSA communities in both video and stills, leaving 29 transects where FSA community were only recorded from one form of imagery and not the other. FSA were recorded from video and not stills in 18 transects. For the remaining 11 transects the opposite was true.

Figure 3.3 presents the locations of fragile sponge and anthozoan communities identified in 2014 Solan Bank Reef SCI video and stills transects. Only the highest confidence category recorded for each transect is displayed. Additionally Appendices 10 and 11 contain sample references to every video sample and still image where fragile sponge and anthozoan communities were identified.

Table 3.9. Examples of fragile sponge and anthozoan communities from the 2014 Solan Bank Reef SCI surveys. 'Confidence' relates to the confidence in the surveyors assignment of fragile sponge and anthozoan community status (low, medium or high).

Confidence	Example image (from stills including image name)
Low	 1714S_SBR_RSS64_S122_IMG_02
Low	 1714S_SBR_TS47_S53_IMG_11

Confidence	Example image (from stills including image name)
Medium	 1714S_SBR_RSS101_S141_IMG_30
Medium	 1714S_SBR_RSS87_S160_IMG_08 BMB

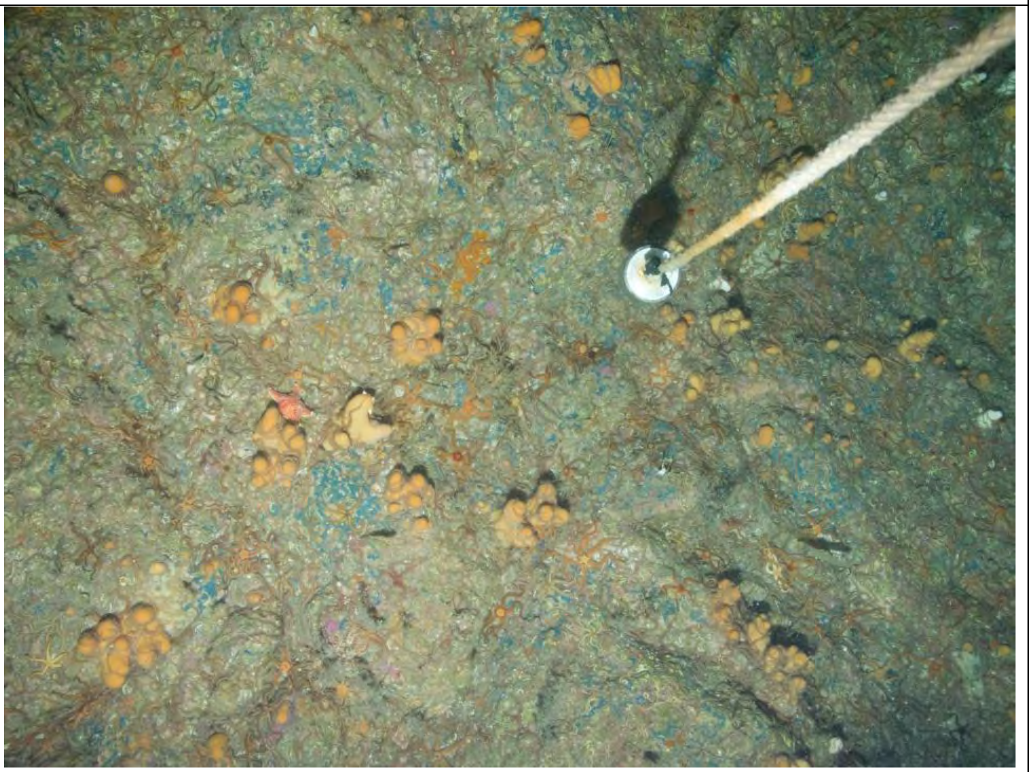
Confidence	Example image (from stills including image name)
High	 1714S_SBR_RSS92_S155_IMG_01
High	 1714S_SBR_TS52_S35_IMG_28

Table 3.10. Solan Bank Transects in which fragile sponge and anthozoan (FSA) communities were identified in 2014 stills and video imagery. As confidence was applied to each still and video subsection, all of the confidences recorded per transect are displayed (L= low confidence, M = medium, H = high).

Transect code	FSA confidence for stills	FSA confidence for video
RSS101_S141	M	L
RSS103_S163	L, M	M
RSS104_S162	L, M	L
RSS40_S93	L	
RSS44_S112	H	
RSS48_S109	L	
RSS51_S119		L
RSS56_S113	L	L
RSS60_S100		L
RSS64_S122	L	L
RSS68_S108	L	L
RSS71_S158	L	
RSS73_S167	L	L
RSS75_S148		L
RSS76_S169		L
RSS77_S144		L
RSS82_S164	L	L
RSS85_S143		M
RSS87_S160	L, M	L, M
RSS89_S159		L
RSS91_S140	M	M
RSS92_S155	H	M
RSS95_S145		L
RSS96_S165	L, M	L
TS02_S42		L, M
TS03_S41	L, M	L, M
TS05_S40	L, M	H
TS07_S39	L, M, H	M
TS1_S134	L	L
TS102_S137		L
TS10_S31	L	
TS11_S22	L	
TS12_S15	L	L
TS19_S14	L	L
TS22_S52	L	L
TS23_S51	L, M	L, M
TS26_S55	L	L
TS28_S5	L, M	
TS30_S1	L	L
TS31_S2	L	
TS38_S54	L	L
TS39_S49		L
TS40_S30	L	L
TS42_S56	L	L
TS47_S53	L	L
TS50_S32		L
TS51_S33	L	L, M
TS52_S35	L, H	L, M, H
TS53_S36	L	L, M
TS59_S6	L	L
TS73_S64	L	
TS79_S138		L
TS80_S139		L
TS9_S37	L	L
TS91_S136		L
TS93_S57		L
TS97_S63	L	
TS99_S124		L
Total no of transects with max assignment of 'low' FSA:	**27**	**35**
Total no of transects with max assignment of 'medium' FSA:	**10**	**11**
Total no of transects max assignment of 'high' FSA:	**4**	**2**

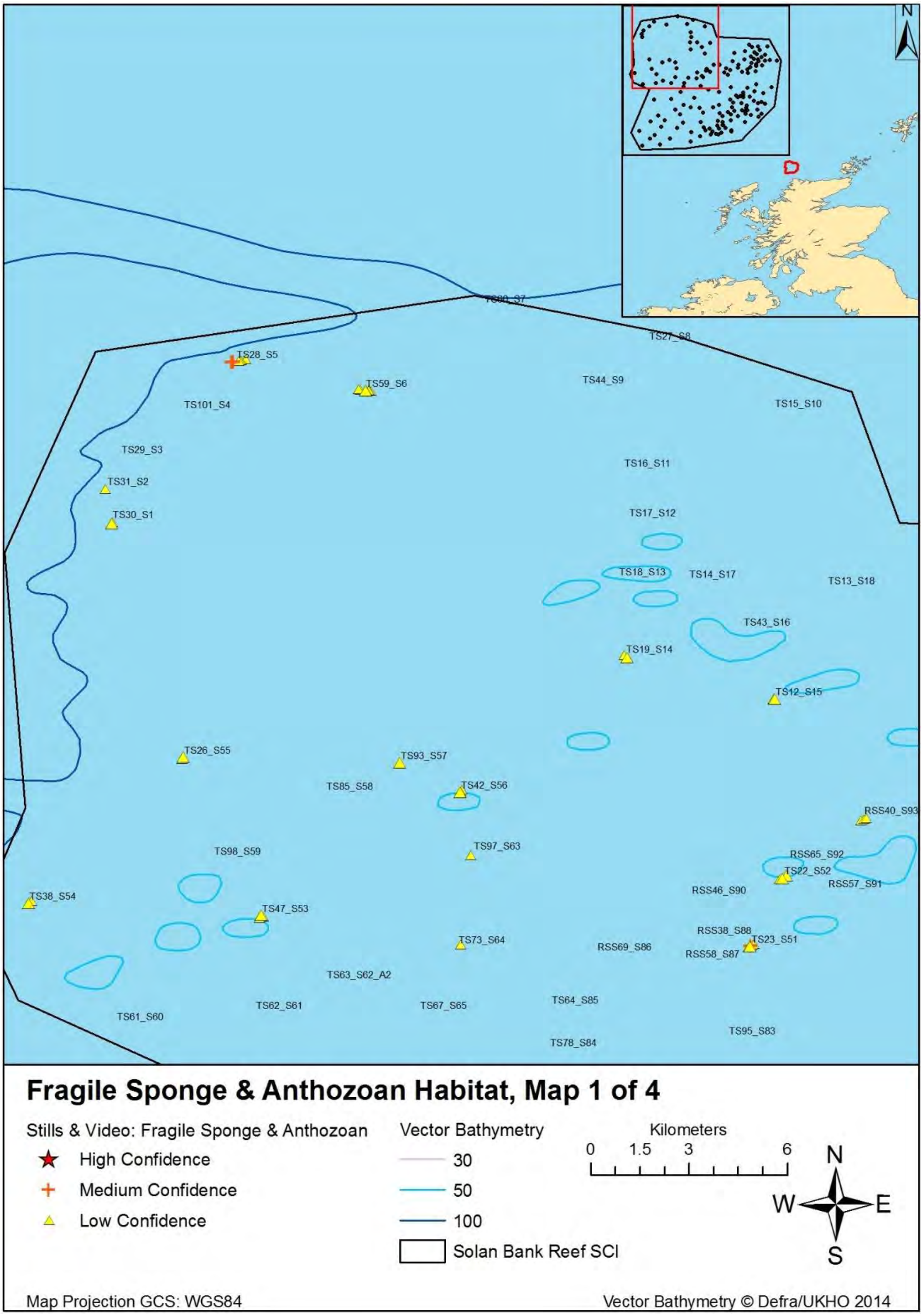


Figure 3.3.a. Presence of fragile sponge and anthozoan communities in video and stills transects within the North West survey quartile of the 2014 Solan Bank Reef SCI survey area.

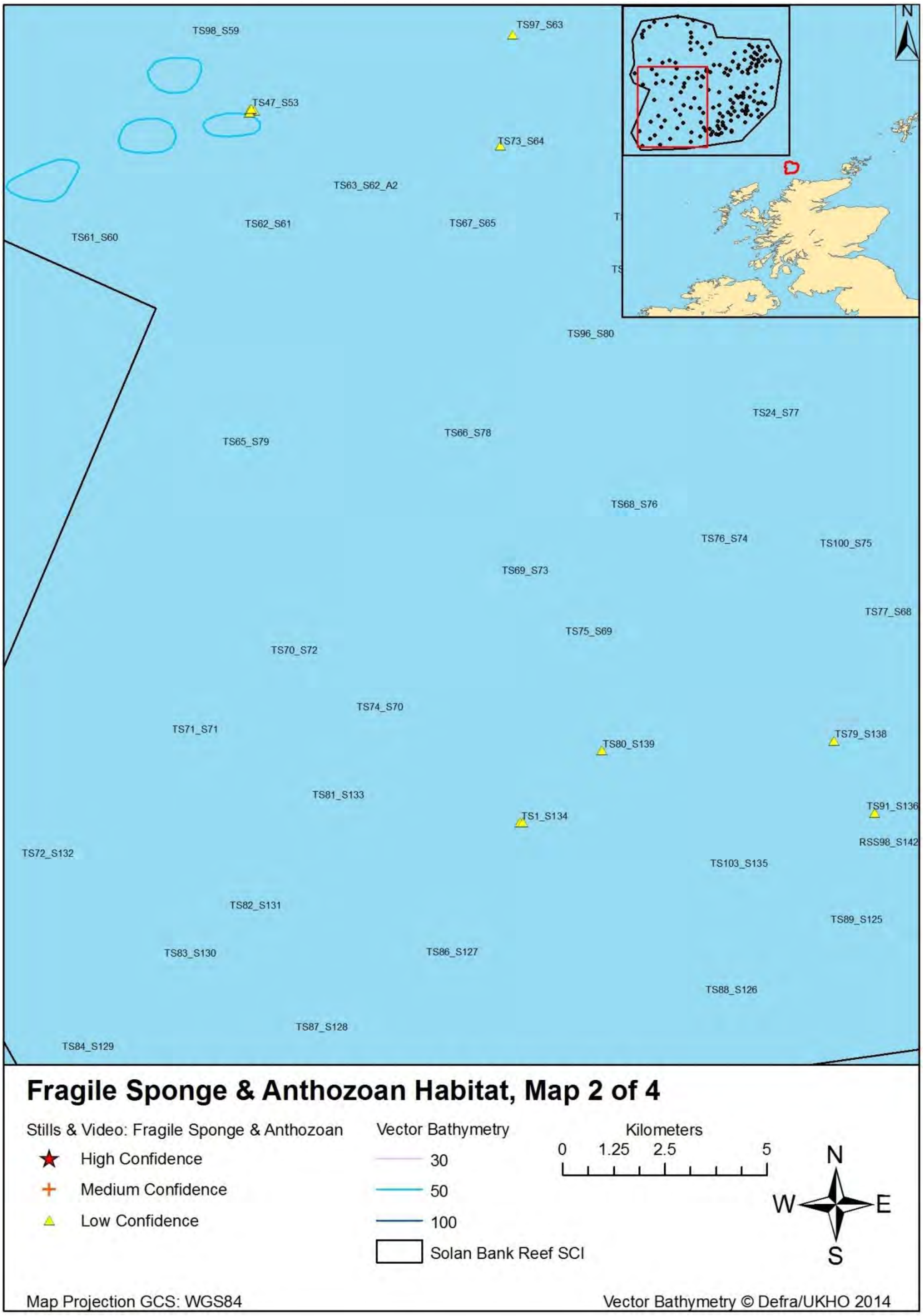


Figure 3.3.b. Presence of fragile sponge and anthozoan communities in video and stills transects within the South West survey quartile of the 2014 Solan Bank Reef SCI survey area.

Figure 3.3.c. Presence of fragile sponge and anthozoan communities in video and stills transects within the North East survey quartile of the 2014 Solan Bank Reef SCI survey area.

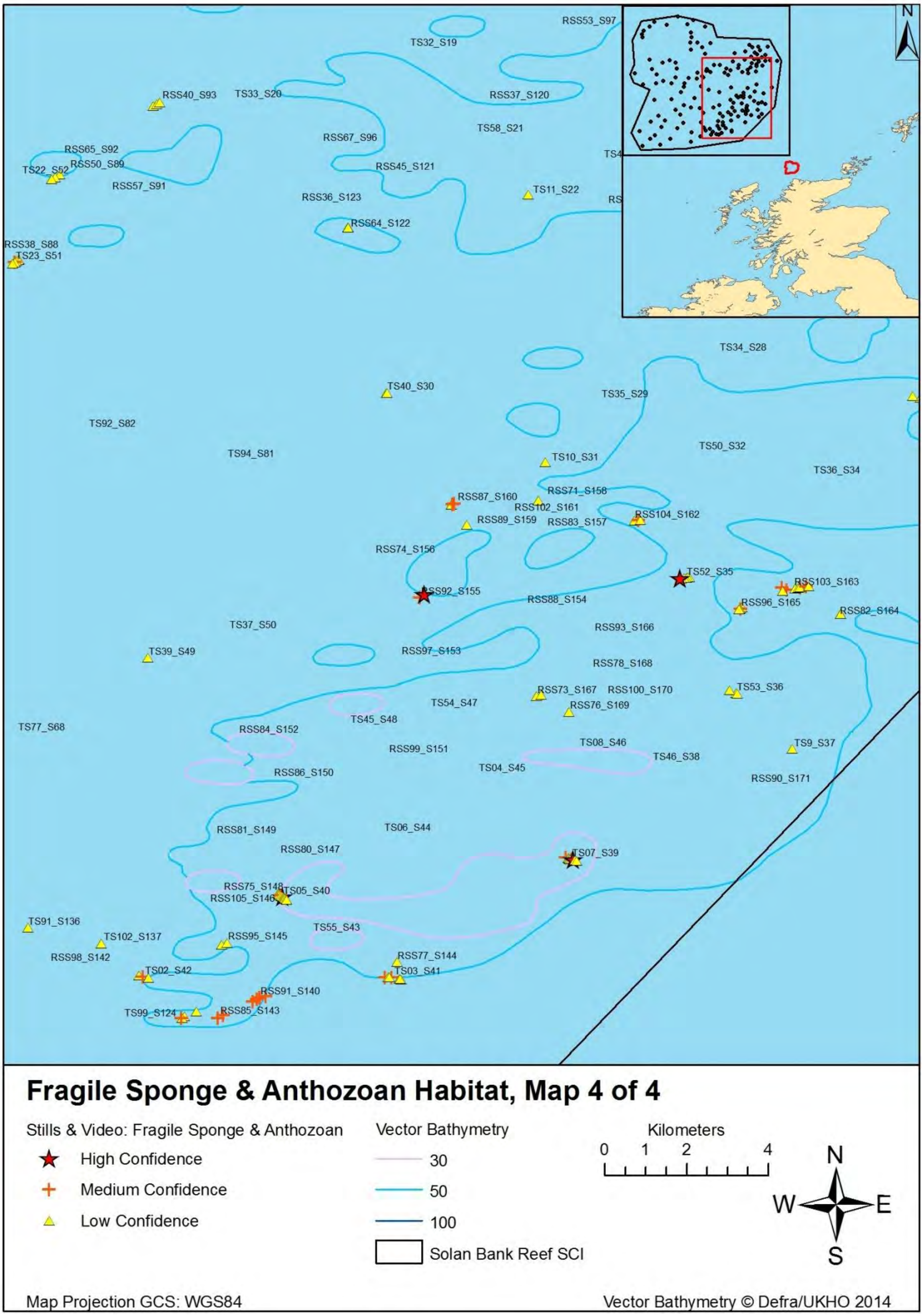


Figure 3.3.d. Presence of fragile sponge and anthozoan communities in video and stills transects within the South East survey quartile of the 2014 Solan Bank Reef SCI survey area.

3.7 Priority Marine Features and other species of conservation interest

Five Scottish Priority Marine Features (PMFs) were identified in the Solan Bank Reef SCI 2014 seabed imagery (Table 3.11), although none of these were seabed habitat PMF. Three were mobile species: Whiting (*Merlangius merlangus*), present in seven transects overall; Cod (*Gadus morhua*), present in five transects; and Ling (*Molva molva*), also present in five transects. Two PMF species of low and limited mobility were also recorded: the Northern feather star (*Leptometra celtica*), present in one transect, and the White cluster anemone (*Parazoanthus anguicomus*), present in 19 transects. Figure 3.4 shows locations of these features on the 2014 Solan Bank transects. Coordinates of transects where PMFs were identified are provided in Appendix 12.

Several other species from the Scottish Biodiversity List and species of least concern/near threatened on the IUCN Red List (2014.3) were also identified during the survey, the number of occurrences of which are listed in Table 3.11.

Table 3.11. Scottish features of conservation interest assigned to 2014 Solan Bank Reef SCI imagery.
SBL = Scottish Biodiversity (URL[9]), Osp = OSPAR (2008) List of Threatened and/or Declining Species and Habitats, IUCN = IUCN Red List of Threatened Species (2014), PMF = Priority Marine Features (SNH, 2014). IUCN Red List Categories: LC = Least concern; NT = Near threatened; VU = Vulnerable. **Emboldened species names are PMF**.

Species of Conservation Interest	**SBL**	**Osp**	**IUCN**	**PMF**	**No of video habitats recorded in:**	**No of stills recorded in:**	**Total no of transects recorded in:**
Cuckoo ray (*Leucoraja naevus)*			LC		1		**1**
Spotted ray *(Raja montagui*)			LC		9		**9**
Lesser spotted catshark / dogfish (*Scyliorhinus canicula)*			LC		5		**5**
Whiting (*Merlangius merlangus*)	•		LC	•	1	6	**7**
Poor Cod (*Trisopterus minutus)*			LC			7	**6**
Cod (*Gadus morhua*)	•		VU	•	5	1	**5**
Ling (*Molva molva*)	•			•	4	2	**5**
Hake (*Merluccius merluccius*)	•				1		**1**
Plaice (*Pleuronectes platessa*)	•		LC		1		**1**
Cuckoo wrasse (*Labrus mixtus)*			LC		4	2	**5**
White cluster anemone (*Parazoanthus anguicomus*)				•	13	50	**19**
Anthozoan (*Actinauge richardi)*	•					1	**1**
Burrowing anemone (*Halcampoides elongatus)*	•				1	8	**7**
Northern feather star *(Leptometra celtica*) (not aggregating)				•	6	1	**7**
Echinus esculentus			NT		52	23	**35**

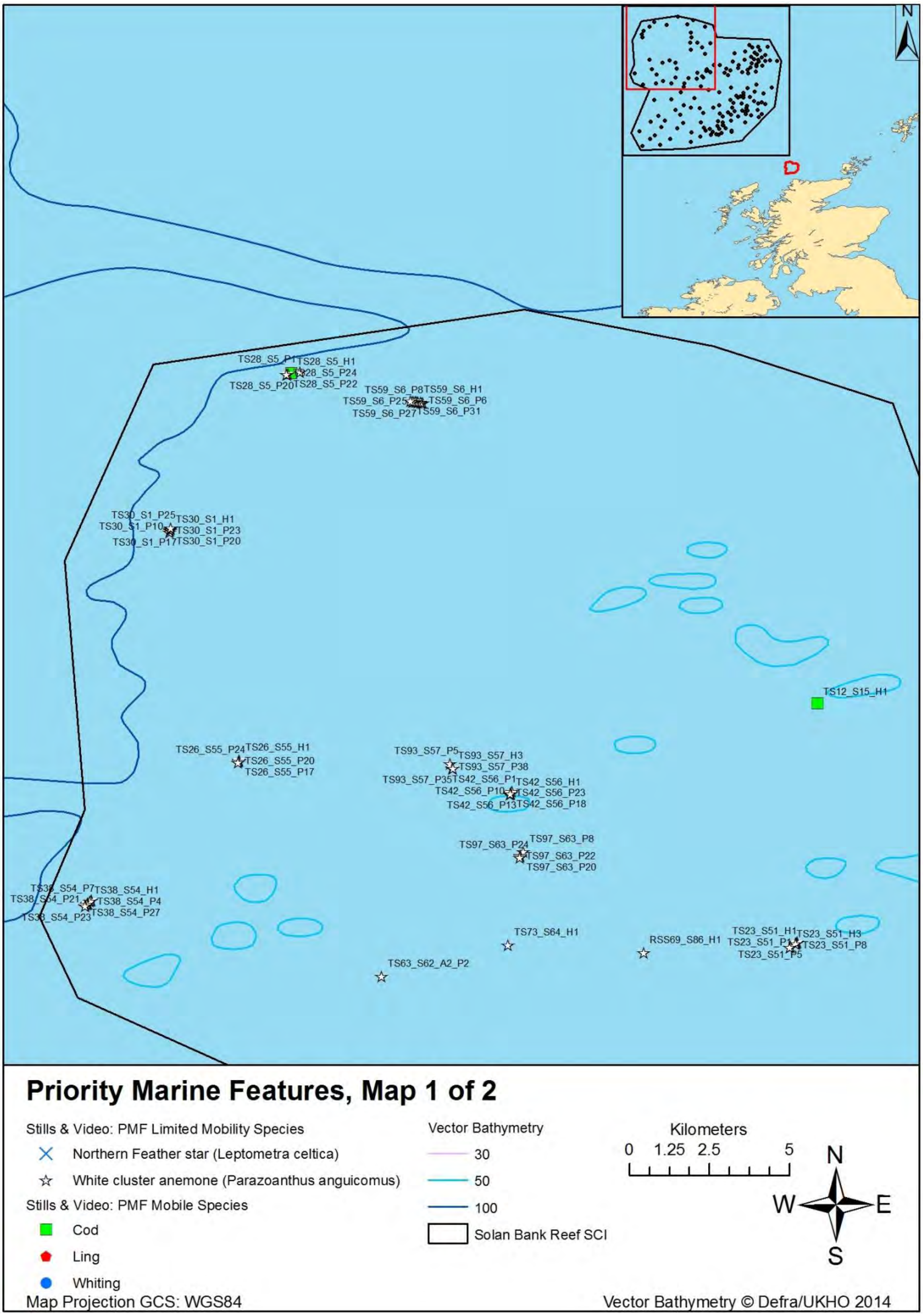


Figure 3.4.a. Presence of Scottish Priority Marine Features (PMF) within the northern part of the 2014 Solan Bank Reef SCI survey area (both stills and video centroids).

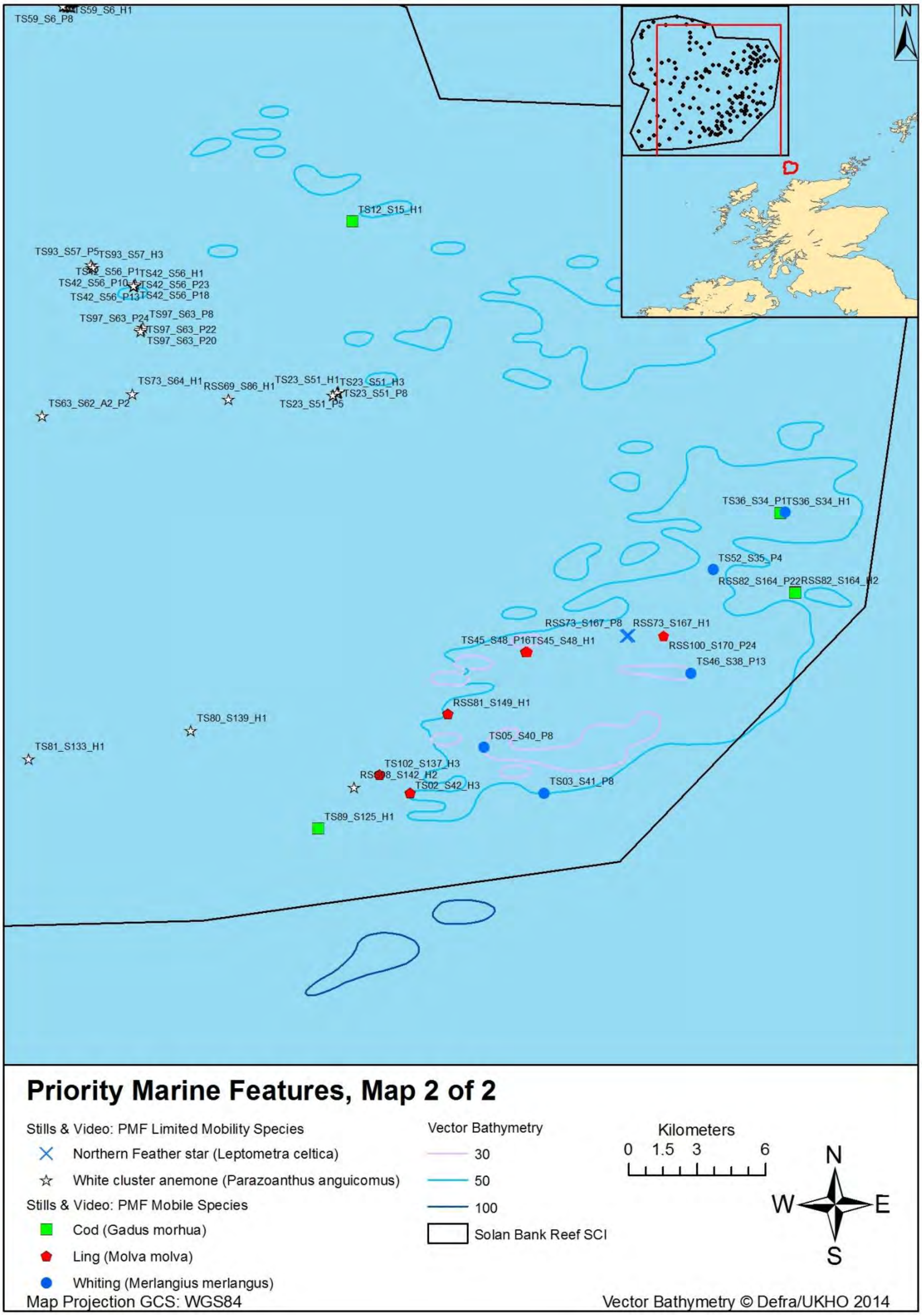
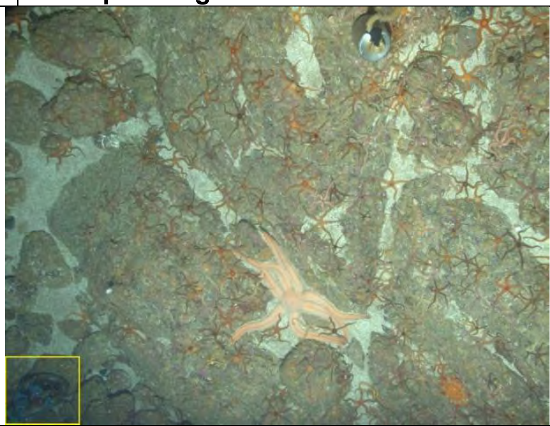
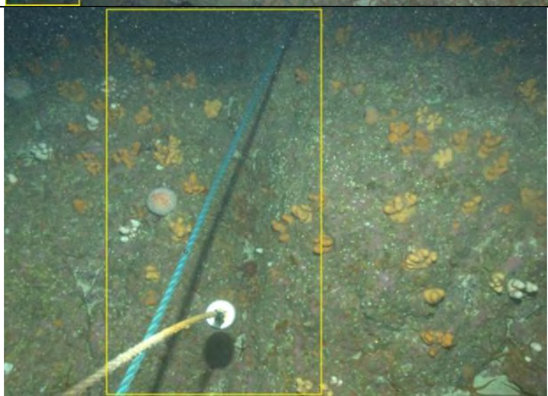
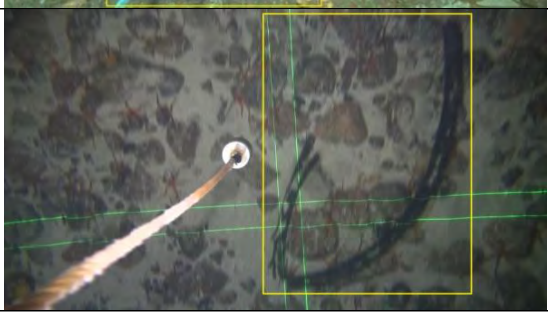


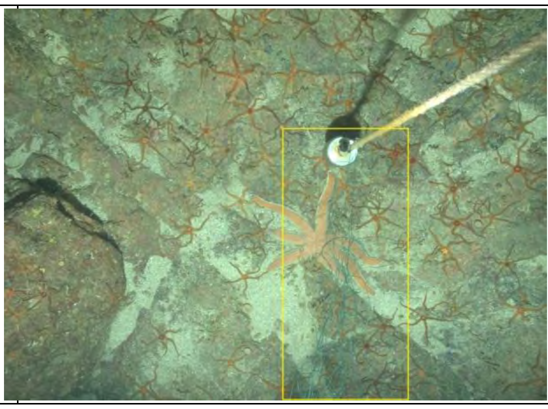
Figure 3.4.b. Presence of Scottish Priority Marine Features (PMF) within the northern part of the 2014 Solan Bank Reef SCI survey area (both stills and video centroids).

3.8 Evidence of human impact on the seabed

Types of human impact observed in the Solan Bank area on drop down video and stills imagery is provided in Table 3.12. Litter, fishing gear or other primary evidence of fishing was reported in eight transects, 32 stills and 5 video sections, displayed in Figure 3.5. Examples of an unidentified erect spiky (and probably fragile) bryozoan that were broken (secondary or indirect evidence) were reported as ‘evidence of fishing’ at three transects, and recorded in every image from these three transects. Sample references, depths and positions of all evidence of human impact are provided in Appendix 13.

Table 3.12. Evidence of human impact observed from drop down imagery in the Solan Bank SCI survey area, 2014.

Evidence type	Example image	Image taken from sample:
Fishing Gear		1714S_SBR_TS52_S35_IMG_03
Rope		1714S_SBR_TS52_S35_IMG_03
Litter		1714S_SBR_RSS68_S108_H1

Fishing net		1714S_SBR_TS43_S16_P15

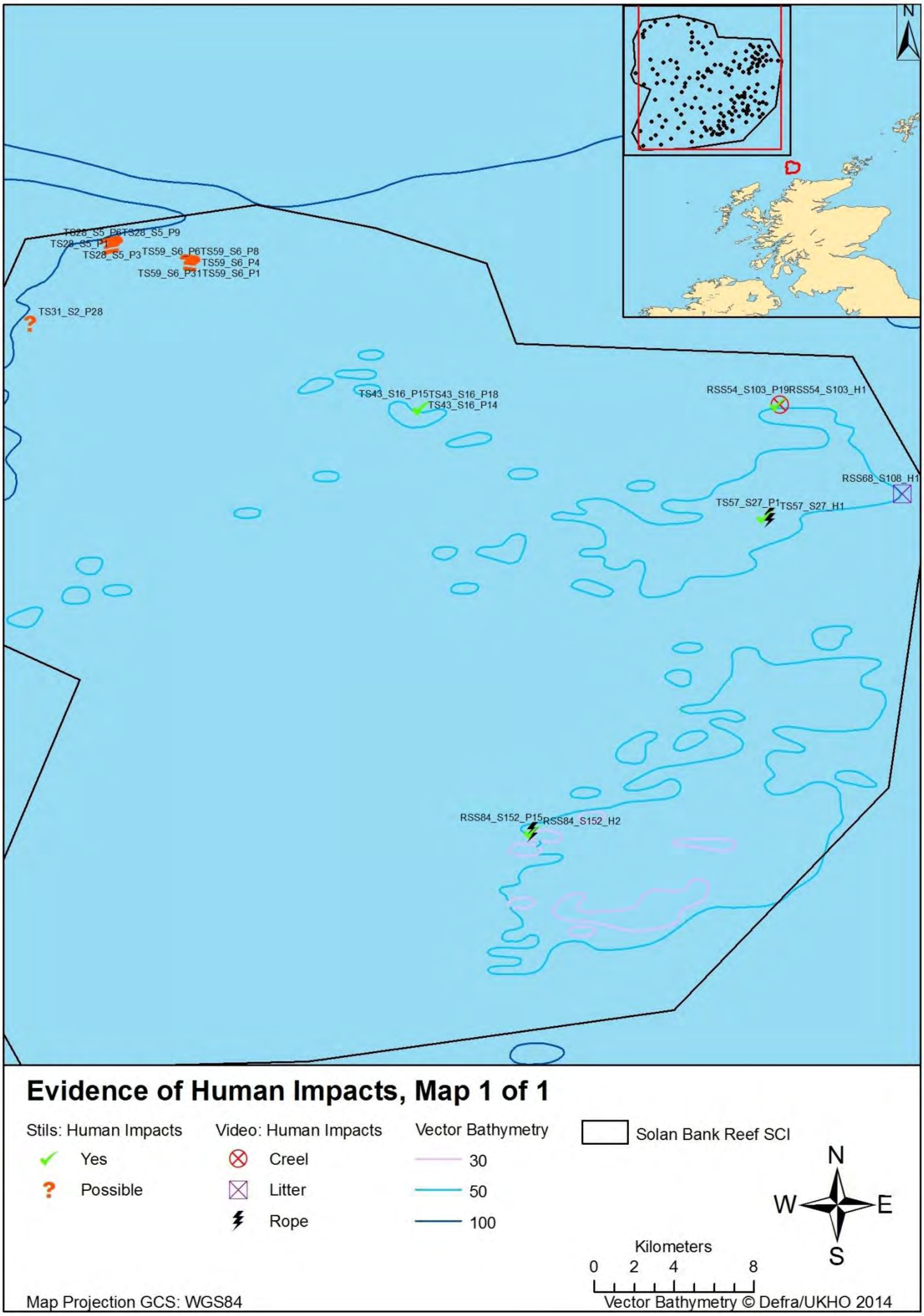


Figure 3.5. Evidence of human impact on the seabed observed in seabed imagery of the Solan Bank SCI survey area, 2014.

4 Discussion of the methods

The following sections focus on methodological discussion since the results were discussed in section 3.

4.1 Comparison of analysis times for stills and video

Throughout this project surveyors audited analysis times per photograph and per video transect. These figures are summarised in Table 4.1, which shows total and average analysis times and analysis areas for each of the imagery analysis methods, including stills, 10 second video subsections, 20 seconds video subsections, video habitats (i.e. transects split into distinct biotopes lasting longer than 60 seconds of video time) and totals for all video analysis. This information could be useful when planning future imagery analysis projects as it provides comparative analysis times (therefore allowing cost benefit analysis) for the different imagery types and video analysis methods employed during this project.

It should be noted that times detailed in this section and sections 4.1.1 and 4.1.2 were calculated from time auditing of analysis of imagery samples only, i.e. only analysis times were recorded per still and per video transect. These sample audit times were summed to provide project totals for the analysis element only. However, sample audit totals do not account for breaks taken between analysis of samples, or any associated quality assurance undertaken before, during or after the analysis phase of the project. Therefore these totals should not be used for the purpose of estimating how long elements of this project took, or predicting how long similar future analyses might take. Section 4.1.3 provides details of how many person hours and days each project element took including all aspects of quality assurance.

Table 4.1 Total and average minutes taken to analyse 2014 Solan Bank Reef SCI imagery per transect, video subsection, still and per analysis method employed. Additionally total and average area surveyed for stills, video subsections and analysis methods.

Analysis method	Total transects analysed	Total minutes analysis	Average minutes per transect	Total stills / sections analysed	Average minutes per still / section	Total area surveyed (m^2)	Average area surveyed per still / section (m^2)
Stills	166	26,311	168.7	1696	16.2	2,553.8	1.5
Video: 10 second	6	2,550	425.0	486	5.3	1,903.5	4.1
Video: 20 second	73	16,444	225.3	4015	4.2	25,119	6.4
Video: habitat	77	6,617	85.9	131	62.0	26,218.5	192.2
Total video	156	25,611	164.2	-	-	53,241	-

Analysis time varied by the method used, as is evident in Table 4.1, however it should be noted that the analysis started with all video being divided into ten second sections. The first six transects were therefore analysed by surveyors all new to the method, and whilst the methods were still being discussed and refined. Therefore these transects were likely to take significantly longer than those undertaken later in the analysis. Therefore, the 7.1 hours per video transect and 41.2 minutes per still, during these six transects, can be attributed to inexperience, and the later faster times are likely to be a result of gains in efficiency and a familiarisation effect.

Time auditing, early in the project, indicated that using the ten second video subsection method would mean the project took considerably longer than was planned and that the analysis would not possibly be delivered within the project timeframe. Additionally due to the bouncing effect of the drop-camera frame, presumably caused by surface swell many transects comprised video where within each 10 second video section, approximately seven seconds were not usable (i.e. the camera was too far off the seabed), and only three seconds were usable. Based on a combination of how long it was taking to analyse the imagery and how much of each ten second section was not usable, it was decided and agreed with the JNCC project officer to double the video section time to 20 seconds, therefore ensuring a greater proportion of each section was usable.

It became evident that both video and stills were taking considerably longer to analyse than anticipated even after switching from 10 to 20 second video sections. Approximately halfway through the allocated analysis time for the project, only 10% of imagery had been analysed, and at rates of working at that time, would mean the project would go significantly over time and over budget. Based upon previous imagery analysis projects and allowing a considerable buffer for the unknown time it might take to analyse video split into 10 second subsections, maximum time allocated to video transects within the project was three and a half hours per video transect and ten minutes per still. At this stage of the project, approximately halfway through the allocated analysis time, videos were taking on average five hours per video transect and 23 minutes per still.

Based on time limitations it was decided to analyse one half of the video using the 20 second subsections method and the other half without sub-sectioning the video at all, i.e. half the analysis would follow normal methods where the video is only split using natural breaks/changes in habitat (each lasting longer than 1 minute). By the end of the project, and due to this change in analysis methods, the average time per video transect reduced from five hours to 2.7 hours per video transect and due to a familiarisation/training effect, stills analysis times decreased from 23 to 16.2 minutes per still.

The 20 second video transects were analysed approximately concurrently (or alternately) with the video habitat transects, so any training effect is less apparent when comparing analysis times between these two method types, meaning it is more appropriate to compare times between these methods than with the 10 second method.

Table 4.2 Average minutes and average percent of analysis times (blue text) +/- Standard Error (SE in red text), required to identify and enumerate sponge morphologies, to identify and enumerate anthozoan and sponge taxa, and to complete remaining elements of analysis for a subset of stills from the 2014 Solan Bank Reef SCI survey. Stills chosen for the subset included those with analysis times greater than one minute for each element (this was the minimum time it took to search/analyse a still irrespective of presence of sponges or anthozoans); and subsets with the top 5% and 2% for both sponge morphology richness and overall taxon richness.

	Number of stills included in averages	**Average minutes per still (+/- SE)**	**Average minutes & average % of total minutes per still for analysis of sponge morphologies (+/- SE)**	**Average minutes & average % of total minutes per still for analysis of sponge & anthozoan taxa (+/- SE)**	**Average minutes & average % of total minutes per still for analysis of other elements (+/- SE)**	**Average taxon richness (+/- SE)**	**Average sponge morphology richness (+/- SE)**
[1]Stills focusing on **sponge morphologies**	59	19.4 (0.87)	**2.2 (0.09)** **12.3 (0.77)**	1.6 (0.09) 8.9 (0.41)	15.6 (0.84) 78.9 (1.01)	8.1 (0.48)	1.1 (0.08)
[2]Stills with sponge morphology richness of >1 (top 5%)	80	16.3 (0.79)	**1.2 (0.07)** **8.0 (0.35)**	1.6 (0.12) 10.5 (0.76)	13.5 (0.75) 81.5 (0.84)	13.3 (0.55)	2.3 (0.06)
[3]Stills with sponge morphology richness of >2 (top 2%)	19	14.7 (0.67)	**1 (0)** **7.0 (0.37)**	2.1 (0.35) 13.8 (2.15)	11.75 (0.68) 79.2 (2.13)	16.5 (1.02)	3.1 (0.07)
[1]Stills focusing on **sponge & anthozoan taxa**	63	18.8 (0.76)	1.7 (0.15) 9.1 (0.61)	**2.4 (0.11)** **14.1 (0.89)**	14.7 (0.75) 76.8 (1.00)	11.9 (0.81)	1.4 (0.11)
[4]Stills with a taxon richness of >17 (top 5%)	29	18.1 (1.20)	1.0 (0.03) 6.1 (0.31)	**1.9 (0.22)** **11.5 (1.38)**	15.2 (1.21) 82.3 (1.47)	20.6 (0.48)	1.6 (0.22)
[5]Stills with a taxon richness of >21 (top 2%)	12	16.7 (0.92)	1.0 (0) 6.2 (0.41)	**2.1 (0.36)** **12.7 (2.08)**	13.6 (0.95) 81.1 (2.14)	23.2 (0.47)	1.8 (0.27)
Total subset of stills used in above averages	431	14.4 (0.27)	1.2 (0.02) 8.8 (0.16)	1.2 (0.03) 9.0 (0.19)	12.0 (0.25) 82.4 (0.29)	9.8 (0.25)	0.9 (0.04)
Total stills	1696	16.2 (0.27)	-	**-**	-	10.3 (0.14)	0.6 (0.02)

[1] Only stills where the analysis time was greater than one minute were included because it took approximately one minute to analyse the still irrespective of presence or absence of sponges or anthozoans.
[2] Only stills with sponge morphology richness (i.e. number of different morphologies) greater than one were included (morphology richness ranged from 2 to 4).
[3] Only stills with sponge morphology richness greater than two were included (morphology richness ranged from 3 to 4).
[4] Only stills with taxon richness greater than 17 (top 5%) were included (taxa richness ranged from 18 to 27).
[5] Only stills with taxon richness greater than 21 (top 2%) were included (taxa richness ranged from 22 to 27).

4.1.1 Sponge morphology and anthozoan analysis times within stills

In addition to auditing time per still and per transect as described above, a subset of 431 stills were analysed using a slightly different analysis sequence (detailed in Section 2.2.2.1) to enable comparison of times for different elements of the analysis. These elements included sponge morphological abundance and diversity; sponge and anthozoan species abundance and diversity; and the remaining analysis, including all other taxa, substrates, features of interest, biotope (detailed in sections 2.1.5 to 2.1.11) and all associated data entry.

A subset of 431 stills was analysed, identifying and enumerating sponge morphologies and sponge and anthozoan taxa before completing the remaining elements of analysis (Table 4.2). It should be noted that although surveyors were asked to accurately audit the time taken for each task, this information was inconsistently recorded. Additionally, as with most bespoke rules and processes devised for this project, this particular method of analysing a subset of stills was only finalised mid-way through the project.

Of the subset of 431 stills analysed, analysis took on average 14.4 (+/- 0.27 SE) minutes per still, whereas the overall average for all 1,696 stills was 16.2 (+/- 0.27 SE) minutes per still (Table 4.2). The most likely reason for this lower average was that surveyors were all experienced and fully trained by the time this method was introduced and therefore working at faster rates than earlier in the project (i.e. a training effect was evident).

When considering how long it takes to analyse a still, taxon richness is likely to be an important factor, as the fewer species or taxa to identify and enumerate, the quicker the analysis should be. To test this theory, taxon richness (number of different taxa) were calculated for each still (Table 4.2). When taxon richness was averaged for all stills within a transect, and plotted against total stills analysis time for the same transect (Figure 4.1), a relationship was evident (Pearson correlation co-efficient: 0.32): transects with greater taxa-richness generally took longer to analyse.

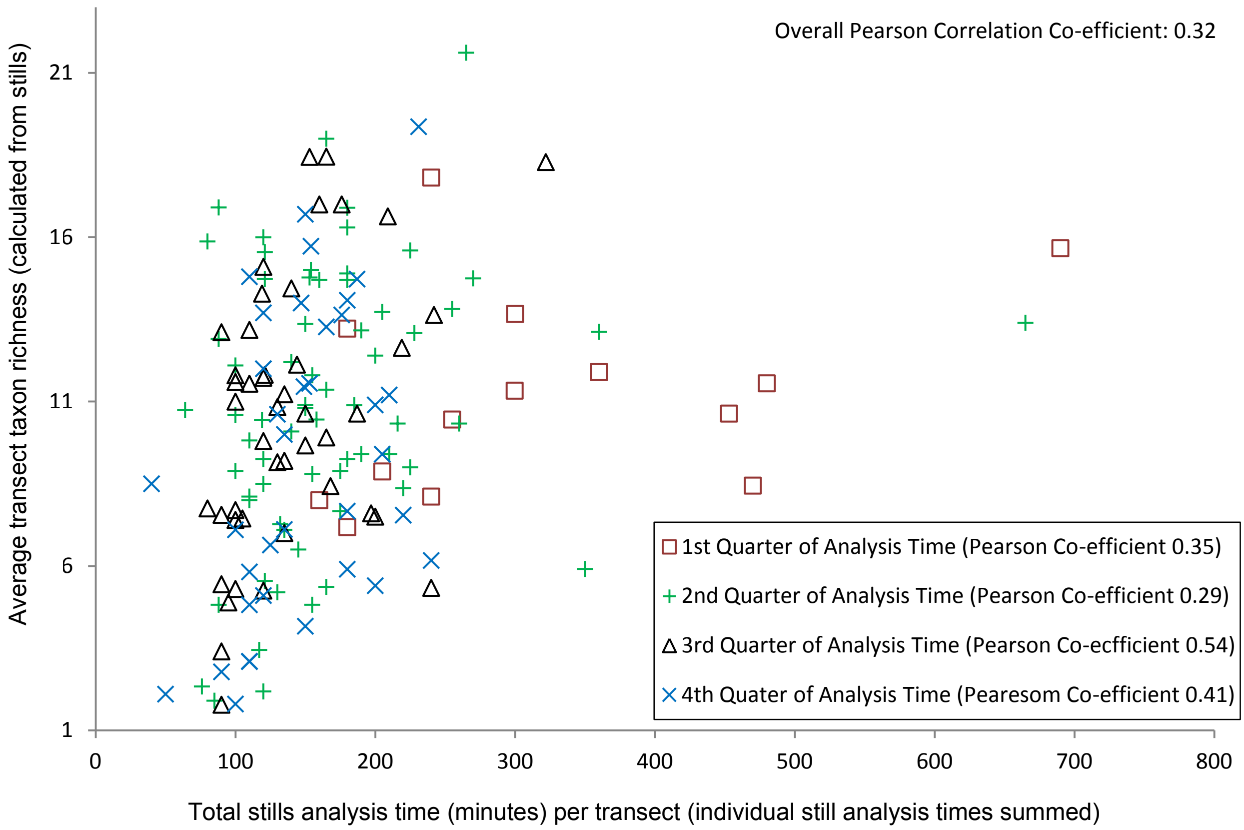


Figure 4.1. Relationships between taxon richness (averaged of all stills per transect) and total stills analysis time per transect. Symbols represent the quarter of analysis time that the stills (and therefore transect) were analysed within.

Outliers within Figure 4.1, with comparatively middle of the range taxon richness (6-13) and relatively long total analysis times (>300 minutes), required further explanation. When the data points (transects) were sorted chronologically by when they were analysed, and then split into quarters of total analysis time, the outliers could be explained by a training effect. Stills (and therefore transects) generally took longer to analyse at the beginning of the analysis, compared to those in the middle and nearer the end of the analysis, irrespective of taxon richness.

Based on the relationship between taxon richness and analysis times (Figure 4.1), analysis times for the 431 stills subset were further explored to see if taxon and sponge morphology richness influenced analysis times for individual stills and for the specific tasks of identifying/enumerating sponge morphologies and sponge and anthozoans. The average taxon richness and sponge morphology richness were comparable for all stills within the analysis (10.3 and 0.6 respectively) and the subset of 431 stills (9.8 and 0.9 respectively) as is shown in Table 4.2.

The process of searching a photograph for any feature of interest, be it sponge morphologies or sponge and anthozoan taxa, took an approximate minimum of one minute (Section 2.2.2.1) when no features of interest were present (i.e. scanning the photograph with no associated data entry). Therefore it was considered reasonable that stills which took greater than one minute to search were more likely to contain sponge or anthozoan taxa. Based on this assumption, only stills where the search time was greater than one minute were averaged to provide times for individual analysis tasks as follows:

- 59 stills, of the 431 subset, took longer than one minute to identify/enumerate **sponge morphologies** (Table 4.2) and these stills on average took 19.4 minutes (+/-

0.87 SE) to completely analyse, longer than the averages for all stills within the analysis (16.2 minutes +/- 0.27 SE) and the 431 subset (14.4 minutes +/- 0.27 SE).

- 63 stills, of the 431 subset, took longer than one minute to identify/enumerate **sponge and anthozoan taxa** (Table 4.2) and these stills on average took 18.8 minutes (+/- 0.76 SE) to completely analyse, again longer than the averages for all stills within the analysis (16.2 minutes +/- 0.27 SE) and the 431 subset (14.4 minutes +/- 0.27 SE).

Focusing on sponge morphologies:
The average time to identify/enumerate sponge morphologies within the subset of 59 stills was 2.2 minutes (+/- 0.09 SE), representing 12.3% of the stills analysis time. For the same 59 stills, 1.6 (+/- 0.09 SE) minutes (8.9% stills analysis time) on average was spent identifying/enumerating sponge and anthozoan taxa, and the remainder of the stills analysis took on average 15.6 (+/- 0.84 SE) minutes (78.9% of stills analysis time).

The average sponge morphology richness for these 59 stills (1.1 +/- 0.08 SE) was not considerably greater than the average for all 431 stills (0.9 +/- 0.04 SE), so to explore whether or not morphology richness influenced the time it took to identify and enumerate sponge morphologies, the subset of 431 stills was filtered to only include the top 5% and 2% sponge morphology richness. Within these resulting subsets (80 and 19 stills), times spent identifying sponge morphologies were both lower than for the 59 stills mentioned above, taking on average 1.2 minutes (8.0%) and 1 minute (7.0%) respectively to identify and enumerate sponge morphologies. This suggests greater sponge morphology richness, i.e. the number of different sponge morphologies present, did not lead to greater analysis times for this element of the analysis, and that other factors must have been more important in determining how long it took to enumerate sponge morphologies. Other factors probably included lower quality images taking longer to identify/enumerate sponge morphologies and images taken further off the seabed causing surveyors longer thinking time to decide if crusts were of sponge or bryozoan origin, and similarly deciding between confusing morphologies.

Focusing on sponge and anthozoan taxa:
The average time to identify/enumerate sponge and anthozoan taxa within the subset of 63 stills was 2.4 minutes (+/- 0.11 SE), representing 14.1% of the stills analysis time. For the same 63 stills, 1.7 minutes (+/- 0.15 SE) or 9.1% of time was spent identifying/enumerating sponge morphologies, and the remainder of the stills analysis took on average 14.7 minutes (+/- 0.75 SE), representing 76.8% of stills analysis time.

To explore whether taxon richness influenced the time it took to identify and enumerate sponge and anthozoan taxa, the subset of 431 stills was filtered to include only the top 5% and 2% taxon richness. Within these resulting subsets (29 & 12 stills), times spent identifying sponge and anthozoa were both lower than for the 63 stills mentioned above, taking on average 1.9 minutes (+/- 0.22 SE) (11.5%) and 2.1 minute (+/- 0.36 SE) (12.7%) respectively to identify and enumerate sponge and anthozoa. Again this suggests greater taxon richness (the number of different taxa present) did not lead to greater analysis times for this element of the analysis, and that other factors must have been more important in determining how long it took to enumerate sponge and anthozoan taxa.

Table 4.3 Average stills +/- Standard Error (SE in brackets) analysis times for image quality scores from a subset of 431 stills, and also from the full list of all stills analysed as part of the 2014 Solan Bank Reef SCI survey.

Image Quality	**Subset of 431 stills**		**All 1696 Stills**	
	Number of stills	**Average analysis time (+/- SE)**	**Number of stills**	**Average analysis time (+/- SE)**
Good	33	15.9 (1.55)	476	17.9 (0.60)
Adequate	289	15.0 (0.33)	941	16.2 (0.36)
Poor	101	12.3 (0.32)	261	13.3 (0.38)
Inadequate	8	14.1 (1.23)	18	16.0 (1.81)
Total	**431**	**14.4 (0.27)**	**1696**	**16.2 (0.27)**

As with the identification and enumeration of sponge morphologies, image quality is likely to affect analysis times. To test this theory, analysis times (minutes) for the 431 stills in the aforementioned subset, and also for the full list of stills, were averaged within each of the four image quality scores (Table 4.3). Although similar average analysis times were recorded between the image quality categories, it seems slightly more time was spent on better quality images (above average for the subset and full list of stills). Also the average analysis time decreased as image quality reduced through the categories, until the worst category where the analysis time increased again to almost equivalent to the ‘Adequate’ category. This suggests surveyors were spending time trying to obtain information from the worst quality images. This time would have been better spent focussing on the higher quality images, and to facilitate this, it is suggested rules and standards be developed to establish specific measureable minimum criteria for analysis of stills and video: scientists often try to elicit the maximum amount of information from the available evidence, in this case seabed imagery, when the worst images should have been quickly discarded in order to spend greater effort on the better quality imagery.

4.1.2 Sponge morphology and anthozoan analysis times within video

Due to the linear process of analysing video it was not possible to audit the time it took for only the identification and enumeration of sponge morphologies, and only the identification of sponge and anthozoan taxa, as these could not be separated from the analysis of all taxa and other features of interest. To audit time for this purpose within video would have required a dedicated viewing only for sponge morphologies. To audit time identifying and enumerating sponge and anthozoan taxa would have either required another dedicated viewing, or would have required alternating between auditing morphologies and taxa within different video transects. Either way would have required one additional viewing per video and this was not deemed reasonable considering time constraints of the project. Further, it was not possible to consider sponges as only taxa or only morphologies, for time audit purposes, as these were too similar and interchangeable i.e. only a few sponges were identified to species, genus or family level within the video, as confident sponge identification requires good close up photography and/or actual physical sampling with laboratory based spicule preparations. Therefore the majority of sponges were identified to life form or morphology level, irrespective of which task (sponge morphology or sponge taxa) was being undertaken.

However, if it is assumed that the same proportions of time might be required to identify and enumerate sponge morphologies and sponge and anthozoan taxa within video, compared to in the stills, then analysis times can be extrapolated from the stills analysis to that of the video analysis (adding the caveat that this is very approximate). Proportional analysis times extrapolated from stills analysis times and applied to the video analysis are detailed in Table 4.4a and 4.4b and suggest it could have taken 0.52 and 0.59 minutes respectively to identify and enumerate sponge morphologies and sponge and anthozoan taxa per 20 second video section, and 0.65 minutes and 0.75 minutes respectively per 10 second video section. The longer average analysis times for 10 second video sections compared to 20 second video sections, provides evidence of a training effect. The relatively few 10 second sections (486 sections) on average took 5.3 minutes to analyse and were analysed at the beginning of the project, compared with the larger number of 20 second video sections (4,015 sections), taking on average 4.2 minutes to analyse, and were analysed later in the project.

Table 4.4a Average proportion of analysis time per still, required to identify and enumerate sponge morphologies and sponge and anthozoan taxa from stills from the 2014 Solan Bank Reef SCI survey (data taken from Table 4.2). Averages were calculated from a subset of 431 stills (Table 4.2) analysed using methods described in Section 2.2.2.1.

Analysis method	**Average proportion of time, per still, to analyse sponge morphologies**	**Average proportion of time, per still, to analyse sponge & anthozoan taxa**	**Average proportion of time, per still, to complete rest of analysis**
Letters used in formulae in Table 4.4b	a	b	c
Stills	0.123	0.141	0.736

Table 4.4b Extrapolated times spent identifying and enumerating sponge morphologies and sponge and anthozoan taxa from stills and video from the 2014 Solan Bank Reef SCI survey. Values were extrapolated from proportional analysis times shown in Table 4.4a, based upon a subset of 431 stills (detailed in Table 4.2). Extrapolated data should be treated with caution as it assumed proportionally the same time was spent analysing video as with stills, although this was not tested or confirmed.

Analysis method	**Number of stills / video sections**	**Average minutes analysis per still / video section**	**Extrapolated minutes per still / video section for analysis of sponge morphologies**	**Extrapolated minutes per still / video section for analysis of sponge & anthozoan taxa**	**Extrapolated total hours**	**Extrapolated total hours for analysis of sponge morphologies**	**Extrapolated total hours for analysis of sponge & anthozoan taxa**	**Extrapolated total hours for rest of analysis**
Formulae used to calculate values	d	e	(e * a)	(e * b)	(d * e / 60)	(d * a)	(d * b)	(d * c)
Stills	1696	16.2	2	2.3	457.9	56.3	64.6	337.0
Video: 10 second sections	486	5.3	0.7	0.7	42.9	5.3	6.1	31.6
Video: 20 second sections	4015	4.2	0.5	0.6	281.1	34.6	39.6	206.9
Video: habitats	131	62.0	7.6	8.7	135.4	16.6	19.0	99.6
Total hours for all video	-	-	-	-	459.3	56.5	64.8	338.1
Total hours for all video & stills	-	-	-	-	917.3	112.8	129.3	675.1

4.1.3 Project timings

It should be noted that times detailed in sections 4.1.1, 4.1.2 and 4.1.3 were calculated from time auditing of analysis of imagery samples only i.e. only analysis times were recorded per still and per video transect.

In addition to individual sample time audits, an overall project audit was completed to keep track of how long all project elements were taking. Project elements, total hours and person days are detailed in Table 4.5, included:

- Project management involved all client liaison, time auditing, task allocation and monitoring.
- Methods Quality Assurance (QA) involved interpreting metadata provided by the client, creating a pro forma to capture all data required for the project, developing methods prior to analysis (section 2.1), working through the first few samples as a group, discussions relating to differences of opinion and discussions and meetings during analysis where methods were refined or changed.
- Stills analysis was undertaken as per section 2.2.2.
- Video analysis was undertaken as per sections 2.2.1 & 2.2.3.
- Image Quality Assurance (QA) involved two stages:
    - During image analysis, weekly review of example images and ongoing discussions regarding ambiguous, confusing or otherwise subjective taxa (i.e. where the identification was unsure). Example images from this project element were saved as a reference collection of all taxa identified throughout the project (details in Appendix 14).
    - After image analysis, 10% of imagery was reanalysed by a different person and the results of these two analyses compared to identify significant differences and suggest remedial changes where necessary.
- Data Quality Assurance (QA) involved two stages:
    - During analysis, all surveyors regularly reviewed and sense checked their own data.
    - After analysis all surveyor's data was reviewed and sense checked by the project manager; all data (pro forma) from seven surveyors was compiled into a single dataset, including aggregating data from 10 and 20 second video subsections to video habitats; count and % cover abundance data was converted to SACFOR abundance scores; data was edited / changed following QA of image analysis; community multivariate analysis of stills data was undertaken, to identify natural groups (clusters) amongst substrates and taxa within the stills, and to investigate consistency in biotope allocation between multiple surveyors; following inconclusive results from the multivariate analysis, all subjective (i.e. interpreted differently amongst surveyors) and confusing biotopes were reviewed and allocations were changed where necessary.
- GIS involved importing data into ArcGIS, creating shapefiles, converting sample coordinates from Eastings/Northings into Latitudes and Longitudes, and thematically displaying data onto maps for inclusion in the report.
- Marine Recorder (MR) data entry (described further in section 2.4) involved preparing data for entry, creating import spreadsheets, importing taxa and a limited amount of sample metadata, manually entering all remaining data fields and QA data entered (section 2.4.1).
- Data deliverables production included finalising all spreadsheet, GIS and Marine Recorder data deliverables.
- Report production included writing this report and all associated data analysis.

Table 4.5 Person hours and person days spent on different elements of the 2014 Solan Bank Reef SCI imagery analysis project.

Project element	Person hours	Person days
Project management	116	15
Methods Quality Assurance (QA)	75	10
Stills analysis	437	58
Video analysis	464	62
Imagery QA	295	39
Data QA	186	25
Geographical Information System (GIS)	76	10
Marine Recorder (v5) data entry (and all including associated QA)	161	21
Data deliverables production	19	3
Report production	155	21
Total	**1,984**	**264**

4.2 Lessons learned and recommendations

One of the main lessons learnt from this project was the longer than anticipated length of time it took to analyse video using the 10 or 20 second subsections method, compared with video that was divided into natural breaks with changes in habitat. In previous similar habitat classification projects with a mix of rock and sediment substrates, ten minute video transects have generally taken the team approximately six to eight times video duration time (i.e. 60-80 minutes) to analyse. In the present project, similar duration video transects, analysed using a mix of sub-sectioning methods, took on average 2.7 hours (164 minutes). These transects comprised those split into 10 second subsections, which took on average 7.08 hours to analyse (5.3 minutes per subsection), transects split into 20 second subsections, which took on average 3.75 hours (4.2 minutes per subsection), whereas those analysed with natural habitat breaks took on average 1.4 hours to analyse (62 minutes per habitat), a comparable time to previous similar projects.

In future projects with non-standard or new methods, it is suggested additional time be factored in at the start of the project to develop, trial and refine methods and training before the main analysis is undertaken. In hindsight, additional time should have been allowed for this stage in the present project. Additionally, methods were modified and refined during the project to make best use of limited time. In some cases, this led to increased task-loading of surveyors, with regular introductions of additional rules, processes and methods; as a result some time auditing elements were not consistently recorded, i.e. surveyors forgot to record certain time auditing elements.

Additionally, employing and comparing three different video analysis methods (10 and 20 second subsections and video habitats) naturally increased in time it took for data analysis, interpretation and quality assurance, because data from each method had to be treated differently, and as a result, doubling or in some cases tripling elements of the data analysis and QA. Though the adoption of the three methods was agreed to allow the aims of the project be achieved in the time available, in future similar projects, it is recommended only one analysis method be employed throughout, therefore reducing the time required to complete the data analysis.

Video analysis times for this project were also influenced by the survey methods employed, compared with previous projects. Video transects were regularly orientated perpendicular to reef features, starting on sediments or mixed ground, at the reef margins, and travelling towards and then on to the main reef feature of interest. The result of this targeted survey approach was that most video transects crossed several habitats (as many as five) which greatly increased video analysis times. If such a survey method is used in the future, explicitly defining the methodology/-ies used would greatly assist contractors with time estimations and project budgeting.

The best resolution taxonomic information in this project came from the stills (with the exception of large mobile species) and the most reliable overall broad-scale habitat information came from the video. Much time was spent trying to identify taxa and sponge morphologies from video, and also habitats from within stills, which was often inappropriate for limited field-of-view stills and the lower quality/resolution videos. Time savings could be made by changing the imagery analysis methods and reducing how much information was collected, or attempted, from each imagery type. For example, saving time by recording only substrates, taxa and only the PMFs and features of interest relevant to the scale and field of view of the stills. In this project, this would have included limited mobility PMFs and indicators of the fragile sponge and anthozoan community. No attempts would be made to assign biotopes or broad scale features such as Annex I Reef to stills. From video, only information relevant to the scale should be recorded. In the present project this might have included substrates, Annex I Reef subtypes and elevation, biotopes, PMF habitats, mobile PMFs, fragile sponge and anthozoan community and only taxa such as large conspicuous benthic taxa (and sponge morphologies) and all mobile taxa. Large conspicuous taxa might need some further definition but delineating these would also depend on the quality of the imagery. No attempt would be made to identify or enumerate cryptic and less conspicuous taxa as these would be identified in stills.

If the best resolution taxa information comes from stills, it seems more sensible if analysis time is to be saved, to reduce the effort spent analysing video and increase the number of stills to be analysed. Before this project started, to reduce the overall costs and reduce the estimated duration of the project, 1701 of 4630 stills and 156 of 166 transects were analysed.

Primary objectives and features of interest for this project included the identification of sponge morphologies and sponge and anthozoan taxa, and the identification of fragile sponge and anthozoan communities. Taking this into account, one method of reducing video effort, and therefore overall project costs, could be to have a two-tiered approach to video analysis. Rather than analysing all video using the 20 second sub-sectioning method, only video containing the features of interest would be analysed using this method and the remaining video would be analysed without sub-sectioning the video. Those videos to be analysed using the 20 second sections method would be identified in step 1 of image analysis (section 2.2.1), i.e. when videos are viewed to split them into distinct habitats. These would be selected using specific criteria such as when ‘x’ erect sponge morphologies were regularly seen together or when greater than ‘y’ fragile anthozoan or sponge indicator species (Haynes *et al* 2014 detailed in Appendix 4) were seen together for portions of the video.

It was the opinion of the authors and the surveyors working on this project, that the 20 second sub-sectioning method used for approximately 50% of video analysed, did not greatly add value or greatly improve accuracy of abundance measures, compared with normal habitat analysis of the video. A perceived reason for this was the general sparse and sand-scoured nature of the substrates, and the general low abundances and diversity of taxa, specifically sponges and anthozoans. It was agreed by surveyors working on this analysis project, this method would have greater merit in very complex conditions such as dense turfs of sponges, hydroids and bryozoans, or when analysing video from areas with hundreds or thousands of individuals per square metre, such as *Modiolus modiolus* (horse mussel) beds. In these conditions it is easy to miss individual taxa when counting or scoring over larger areas (i.e. during several minutes of video, rather than seconds). Therefore the more-focused approach of dividing the video into 20 second sections would likely achieve more accurate abundance estimates and reduce chances of missing taxa within the video.

Hanging below the drop-frame was a weight of 64mm diameter, suspended 1.25m below the camera lens by a rope. This weight was generally visible within stills, whilst the laser scale was bleached-out by the stills camera strobes. This weight was useful for providing scale in the images throughout this project, and could be used in the same way in future surveys.

Relating to scale, the method of estimating the field of view and area sampled within stills, developed during this project, could be included in future imagery analysis guidance or procedural documents, therefore ensuring it is more widely available for future similar projects. Although a useful method of rapidly estimating the area sampled within a large number of stills, it should be noted that the result from this method is an estimate based upon a qualitative assessment of the photograph, rather than any measured values. The process we used of categorising images based on their proximity to the seabed, and then measuring the field of view in only a subsample from each category, took overall a relatively short amount of time when compared with how long it would have taken to measure the field of view in each and every still. The method adopted here required that a short period of time be spent deciding which category each still would be classified within (using guidance provided), and then a further day (8 hours) to calculate the field of view within the subsample of 34 stills, used to give average areas to each category. In the current study as the laser scales were not visible in many of the stills, the process of measuring the field of view in all stills would have been lengthy, requiring as described in section 2.1.4, finding the same view within the video and measuring an object visible in both the still and the video. This method was slow and as a result measuring the field of view of 34 images took on average a little over 14 minutes per still. If we assume this process would have taken less time with practise, say 10 minutes per still, it would have still have taken approximately 40 days to measure the field of view in all 1696 stills analysed during this project.

If the objectives of future projects require an accurate measure of the field of view for every photograph, then the method from this study should not be used. For studies requiring this level of accuracy it is recommended an effective scaling device be used which provides a visible scale in every still (e.g. a higher powered or different colour laser scaling device than was used for the present study). This would allow the surveyor to directly measure the field of view for each still during the analysis. However measuring every still in this way will increase analysis times by several minutes per still, so this should be budgeted for if this is deemed necessary. The process of measuring within stills is also prone to human error, so QA would also be required to minimise error. An alternative which could speed up this process and reduce human error, would be to use imaging software to measure the field of view in an automated batch process.

Within the current study, the minimum size of organisms that could be confidently identified, was never determined. This value is likely to depend on image quality, proximity to the seabed and adequacy of lighting. Although this minimum size was not recorded in the present study, to enable the process of converting counts to SACFOR, it was required that surveyors recorded the SACFOR size category of each taxon they identified. Based on this data, one can investigate the approximate minimum size of taxa identified within the stills. Within the overall taxa list (those enumerated using counts) from analysis of the stills, there were three taxa in the SACFOR size class <1 cm, 47 taxa within the next size category of 1-3 cm, and 162 taxa within the following size category (3-15 cm). This information suggests surveyors could identify a few individuals less than 1 cm, however the majority of taxa identified during this project were greater than 1 cm.

To reduce ambiguity identifying sponge morphologies and other taxa from video and stills in future projects, it is suggested a publically available (web-based) comprehensive reference collection of images of sponge morphologies (and other taxa) be collated from drop-down and towed underwater imagery i.e. imagery taken using a variety of forward facing, top-down viewing angles. Such a reference collection would need to be sourced from multiple habitats and from as many geographic areas as possible. The reference collection should include images of individuals raging in ambiguity from unambiguous i.e. those easily and consistently identified by several people as the same morphology (or taxon); to those considered highly ambiguous, i.e. individuals not consistently identified by several people.

When assessing the quality of 10 and 20 second video sections during or prior to analysis, the camera was frequently off the seabed for periods within many 10 or 20 second video sections, due to poor weather experienced on the survey. This data loss was sometimes as high as 75% of a 10 or 20 second video section. In these cases the remaining 25% of the video section was very clear and usable and as a result the section was classified as ‘partially usable’ i.e. 25% of the imagery being clear and the seabed being visible. This 25% value was agreed with the JNCC project manager as the cut-off, below which the video section should be classified as ‘unusable’. It could be argued however, that if we are only able to see 25% of the seabed within a video section, that section of imagery should be considered ‘unusable’ rather than ‘partially usable’, and a higher minimum viewable proportion be applied. However when analysing video imagery, it is very rare for the seabed to be seen all the time, there are always periods where the camera comes off the seabed and data are lost. It is therefore very important this fact be taken into account when deciding if analysis of video imagery is a suitable method and consistent with the objectives of the project. Video should be used to get an overall picture of the habitat, therefore missing a few seconds here and there should not be important because the overview is still achievable. However if the remit of the project is to count every animal or other feature of interest within an area, then this issue becomes important and it is likely a greater proportion of the video imagery should be classified as ‘unusable’ and discarded. For this project many video sections and therefore entire portions of transects would have been classified as ‘unusable’ if the minimum cut-off of 25% had been substantially increased.

Within the present project, surveyors were assigned transects in blocks based upon consecutive station/transect codes i.e. surveyor one analysed transects 1-40, surveyor two analysed transects 41-80 and so forth. This allocation was chosen without much thought as it was logistically easy to manage. When using multivariate statistics to investigate if surveyors consistently allocated similar biotopes within statistically similar areas of seabed, although no firm conclusions were drawn, inter-surveyor variability was found to affect similarities and differences in the data. However it was noted that the way in which transects were allocated to surveyors, posed a potential problem when trying to examine inter-surveyor variability of biotope allocation. It is not certain whether the differences identified between surveyors, who analysed imagery from different areas of seabed, are not in fact differences between those two areas, rather than differences between the way surveyors analyse the imagery. Without a single surveyor returning to the original imagery and re-analysing large proportions of video, it is very difficult to assess whether differences in biotope assignment are real inconsistencies or whether surveyors genuinely had slightly different habitats from each other. With imagery analysis projects of this size, it is not feasible that one surveyor analyse all the imagery as this would take too long. If multiple surveyors are therefore to be used, they should be allocated transects in a randomised way, rather than in blocks as was the case in this project. Ideally, a single surveyor would view all video first before allocating transects to different surveyors. During this viewing the single surveyor would assess video quality (discarding substandard imagery) split the transect into distinct habitats (using timestamps) and identify the broad-scale habitat or biotope complex for each habitat within each transect. Transects would then be allocated to surveyors, ensuring each surveyor received a mixture of the different habitats encountered within the imagery being analysed. However to do this would substantially increase the duration of the imagery analysis and therefore increase the cost of the analysis.

4.3 Conclusion

In conclusion the specific objectives of this project, as set out in the contract and detailed in the Introduction (Section 1), were met.

5 References

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6 Appendices

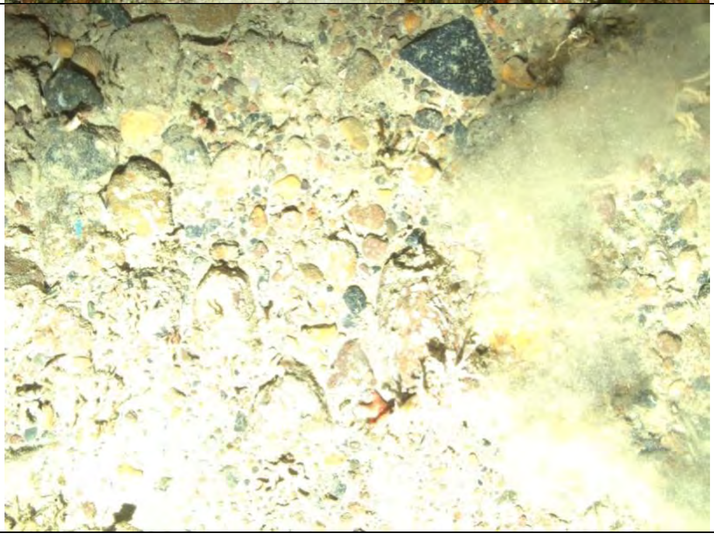
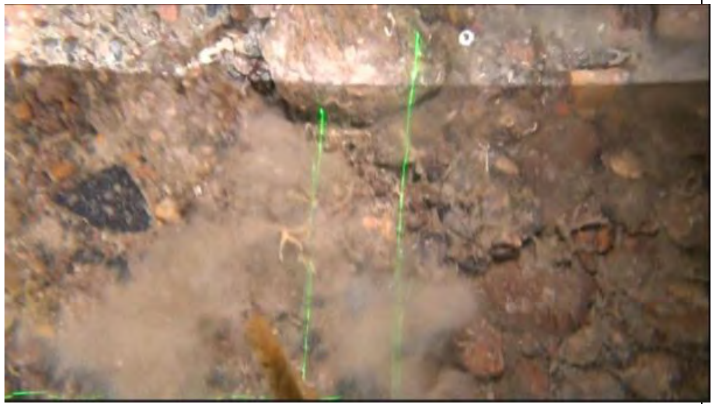
Appendix 1: Calculating the average field of view per ‘field of view category’ for still imagery

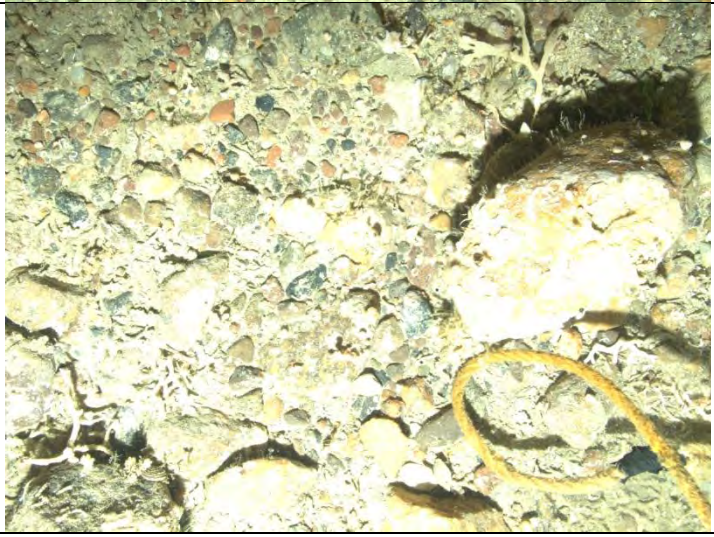
Photograph filename, image dimensions and field of view all for each replicate image used to calculate the average field of view per stills field of view category (categories 0-4).

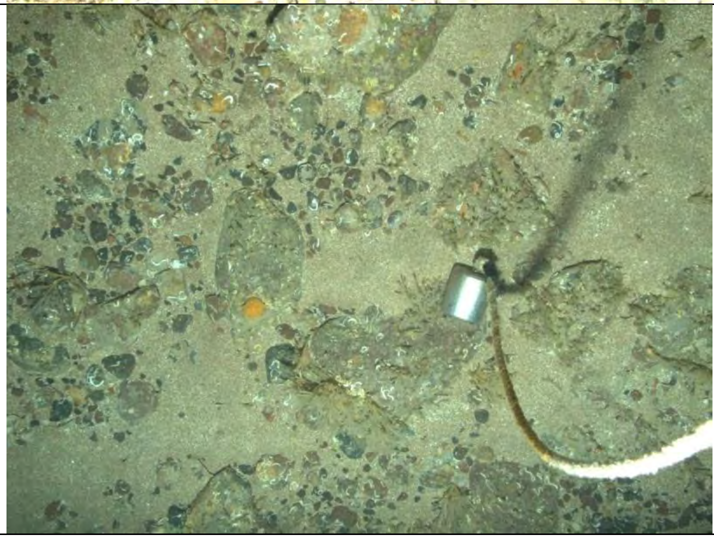
Replicate	Field of View Category	Image Width (mm)	Image Height (mm)	Area (m^2)	Image Filename	Scaling Method
1	0 camera very close, no weight	596.6	460.8	0.3	1714S_SBR_RSS43_S118_IMG_08.jpg	Laser
2	0 camera very close, no weight	517.4	391.2	0.2	1714S_SBR_TS28_S05_IMG_04.jpg	Laser video
3	0 camera very close, no weight	843.0	635.6	0.5	1714S_SBR_TS28_S05_IMG_08.jpg	Laser video
4	0 camera very close, no weight	525.4	392.3	0.2	1714S_SBR_TS28_S05_IMG_14.jpg	Laser video
5	0 camera very close, no weight	419.8	316.2	0.1	1714S_SBR_TS60_S07_IMG_04.jpg	Laser video
1	1 weight on seabed, rope slack	1024.0	764.4	0.8	1714S_SBR_RSS40_S93_IMG_12 HG.jpg	Weight
2	1 weight on seabed, rope slack	614.4	458.7	0.3	1714S_SBR_RSS99_S151_IMG_24je.jpg	Weight
3	1 weight on seabed, rope slack	1053.3	786.3	0.8	1714S_SBR_RSS36_S123_IMG_19 HG.jpg	Weight
4	1 weight on seabed, rope slack	708.9	529.2	0.4	1714S_SBR_RSS37_S120_IMG_20 HG.jpg	Weight
5	1 weight on seabed, rope slack	1024.0	764.4	0.8	1714S_SBR_RSS38_S88_IMG_20 MH.jpg	Weight
6	1 weight on seabed, rope slack	682.7	509.6	0.3	1714S_SBR_RSS68_S108_IMG_06je.jpg	Weight
7	1 weight on seabed, rope slack	614.4	458.7	0.3	1714S_SBR_RSS73_S167_IMG_03 MH.jpg	Weight
8	1 weight on seabed, rope slack	921.6	688.0	0.6	1714S_SBR_RSS99_S151_IMG_25je.jpg	Weight
1	2 weight on seabed, rope tight	1152.0	860.0	1.0	1714S_SBR_RSS38_S88_IMG_30 MH.jpg	Weight
2	2 weight on seabed, rope tight	1084.2	809.4	0.9	1714S_SBR_RSS39_S105_IMG_02 HG.jpg	Weight
3	2 weight on seabed, rope tight	1228.8	917.3	1.1	1714S_SBR_RSS40_S93_IMG_11 HG.jpg	Weight
4	2 weight on seabed, rope tight	1228.8	917.3	1.1	1714S_SBR_RSS60_S100_IMG_19 HG.jpg	Weight
5	2 weight on seabed, rope tight	1228.8	917.3	1.1	1714S_SBR_RSS73_S167_IMG_22 MH.jpg	Weight
6	2 weight on seabed, rope tight	1152.0	860.0	1.0	1714S_SBR_RSS91_S140_IMG_17je.jpg	Weight
7	2 weight on seabed, rope tight	1228.8	917.3	1.1	1714S_SBR_RSS99_S151_IMG_02je.jpg	Weight
8	2 weight on seabed, rope tight	1152.0	860.0	1.0	1714S_SBR_RSS99_S151_IMG_19je.jpg	Weight
9	2 weight on seabed, rope tight	1152.0	860.0	1.0	1714S_SBR_RSS99_S151_IMG_26je.jpg	Weight
10	2 weight on seabed, rope tight	1228.8	917.3	1.1	1714S_SBR_TS74_S70_IMG_02 MH.jpg	Weight
11	2 weight on seabed, rope tight	1152.0	860.0	1.0	1714S_SBR_TS74_S70_IMG_17 MH.jpg	Weight
1	3 weight off seabed, shadow close	1640.0	1240.0	2.0	1714S_SBR_TS101_S04_IMG_05.jpg	Laser video
2	3 weight off seabed, shadow close	1442.9	1095.3	1.6	1714S_SBR_RSS63_S107_IMG_05 HG.jpg	Laser video

Replicate	Field of View Category	Image Width (mm)	Image Height (mm)	Area (m^2)	Image Filename	Scaling Method
3	3 weight off seabed, shadow close	1232.0	920.0	1.1	1714S_SBR_TS101_S04_IMG_07.jpg	Laser video
4	3 weight off seabed, shadow close	1581.2	1185.9	1.9	1714S_SBR_TS101_S04_IMG_11.jpg	Laser video
5	3 weight off seabed, shadow close	1656.5	1111.6	1.8	1714S_SBR_TS101_S04_IMG_12.jpg	Laser video
1	4 darker, taxa visible, shadow gap	2267.4	1721.1	3.9	1714S_SBR_RSS99_S151_IMG_17 HG	Laser
2	4 darker, taxa visible, shadow gap	1870.8	1403.1	2.6	1714S_SBR_TS101_S04_IMG_04.jpg	Laser video
3	4 darker, taxa visible, shadow gap	2360.9	1770.7	4.2	1714S_SBR_RSS68_S108_IMG_09je.jpg	Laser
4	4 darker, taxa visible, shadow gap	1874.3	1240.0	2.3	1714S_SBR_TS28_S05_IMG_16.jpg	Laser video
5	4 darker, taxa visible, shadow gap	1693.9	1269.3	2.2	1714S_SBR_TS28_S05_IMG_19.jpg	Laser video
Average	**0 camera very close, no weight**	**580.5**	**439.2**	**0.3**		
Average	**1 weight on seabed, rope slack**	**830.4**	**619.9**	**0.5**		
Average	**2 weight on seabed, rope tight**	**1180.7**	**881.5**	**1.0**		
Average	**3 weight off seabed, shadow close**	**1510.5**	**1110.5**	**1.7**		
Average	**4 darker, taxa visible, shadow gap**	**2013.4**	**1480.8**	**3.0**		

Appendix 2: Example images of each ‘field of view category’ from stills and video

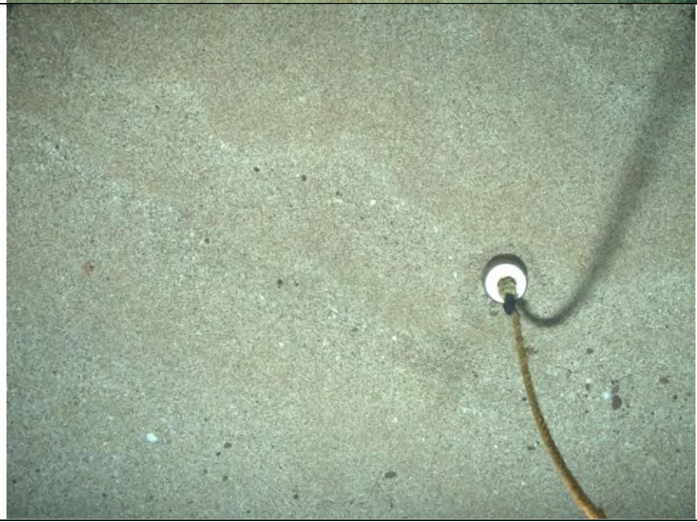
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
0	1714S_SBR_RSS43_S118_IMG_08.jpg			Laser
0	1714S_SBR_TS28_S05_IMG_04.jpg			Laser video

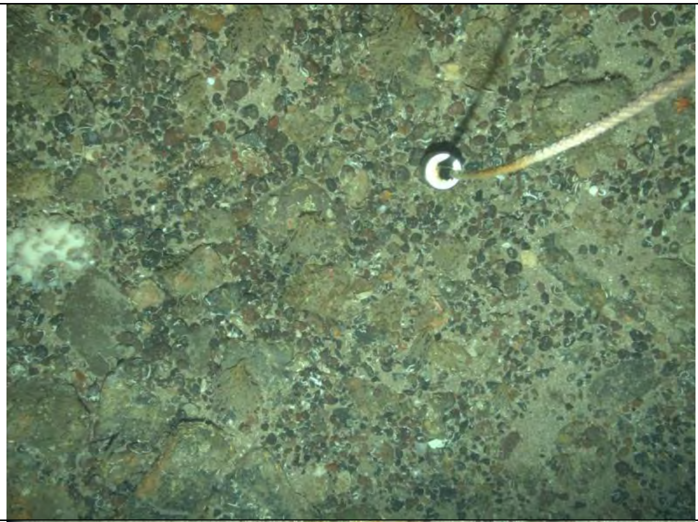
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
0	1714S_SBR_TS28_S05_IMG_08.jpg			Laser video
0	1714S_SBR_TS28_S05_IMG_14.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
0	1714S_SBR_TS60_S07_IMG_04.jpg			Laser video
1	1714S_SBR_RSS40_S93_IMG_12HG.jpg			Weight

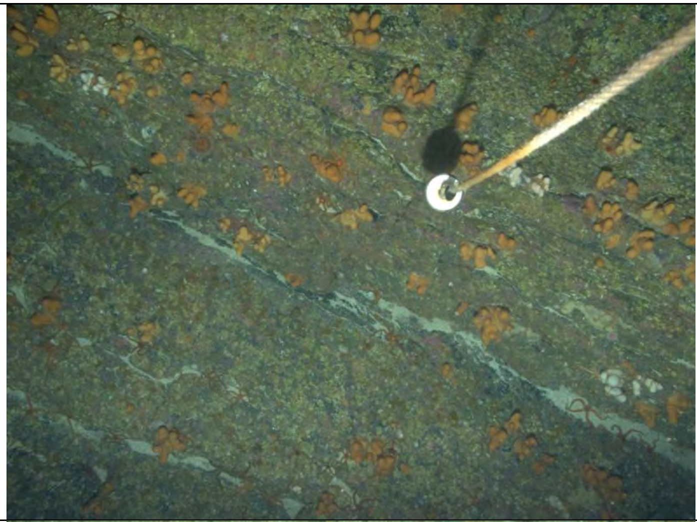
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
1	1714S_SBR_RSS99_S151_IMG_24je.jpg			Weight
1	1714S_SBR_RSS36_S123_IMG_19HG.jpg			Weight

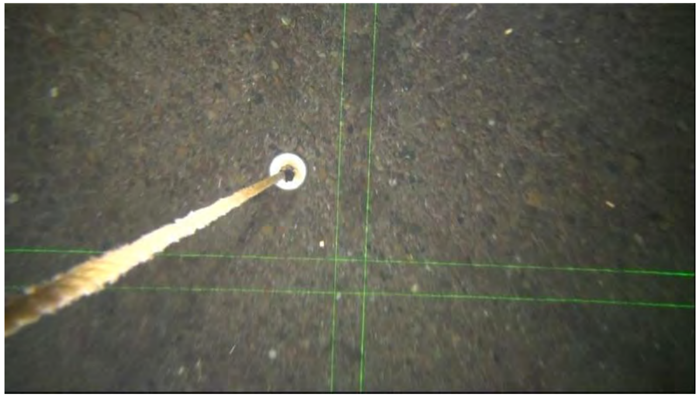
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
1	1714S_SBR_RSS68_S108_IMG_06je.jpg			Weight
1	1714S_SBR_RSS73_S167_IMG_03MH.jpg			Weight

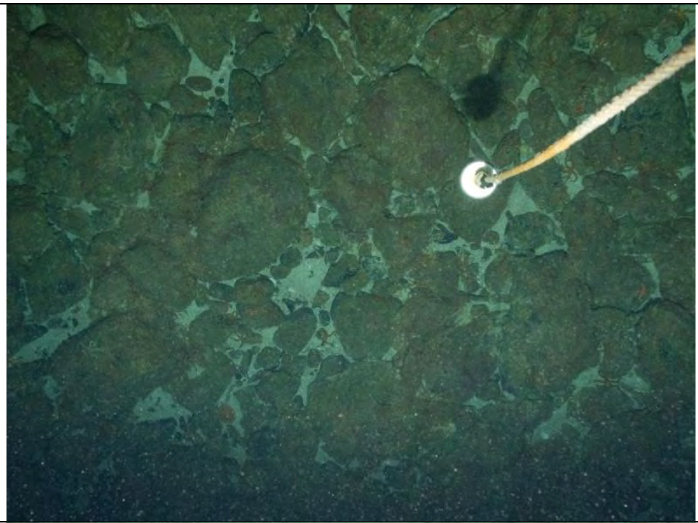
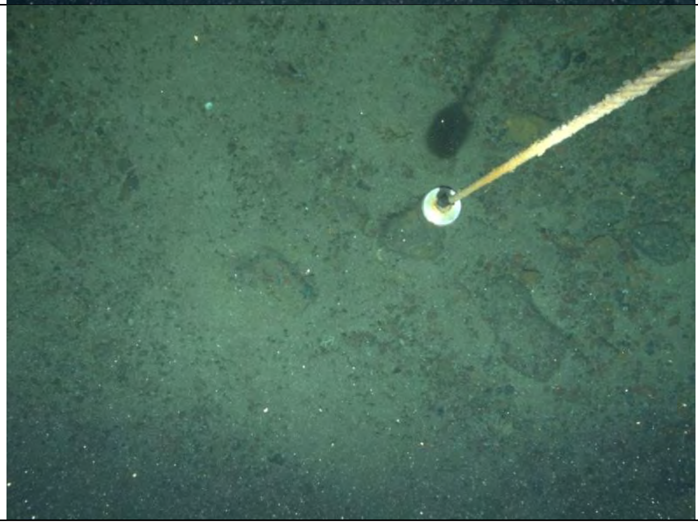
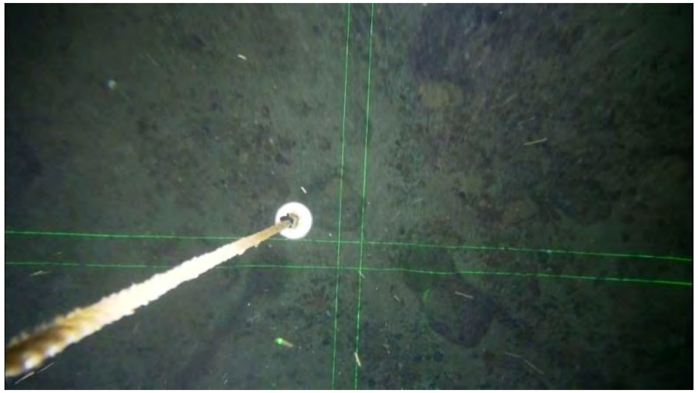
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
2	1714S_SBR_RSS38_S88_IMG_30MH.jpg			Weight
2	1714S_SBR_RSS39_S105_IMG_02HG.jpg			Weight

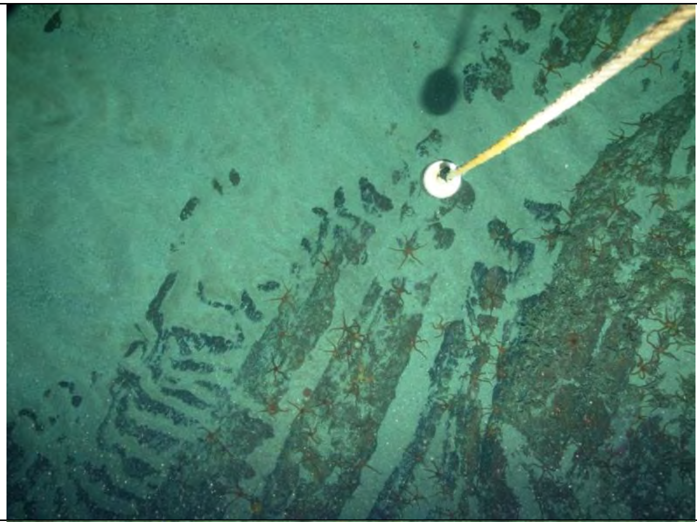
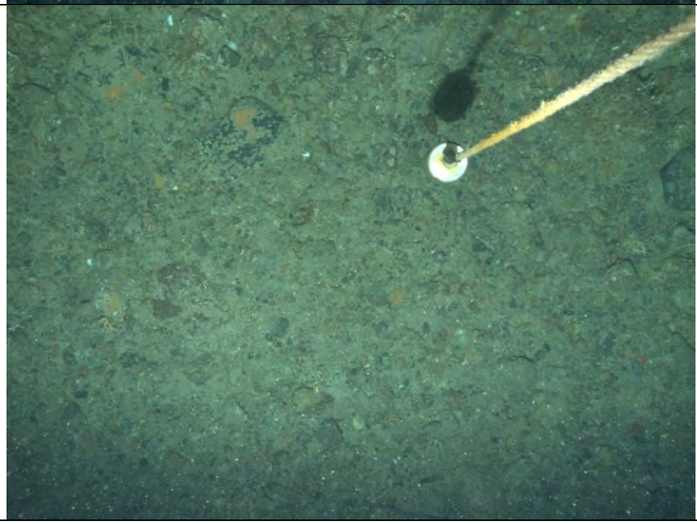
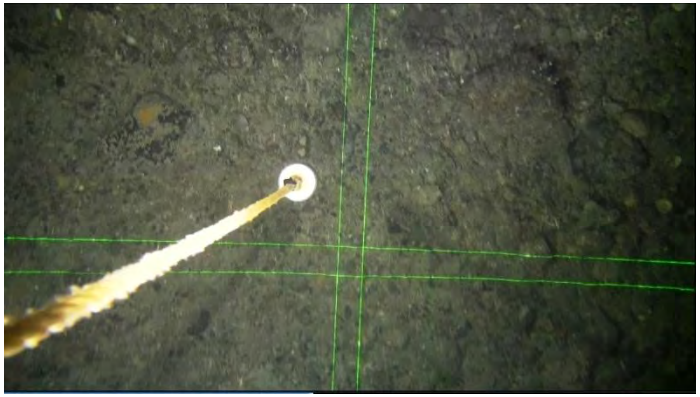
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
2	1714S_SBR_RSS40_S93_IMG_11HG.jpg			Weight
2	1714S_SBR_RSS60_S100_IMG_19HG.jpg			Weight

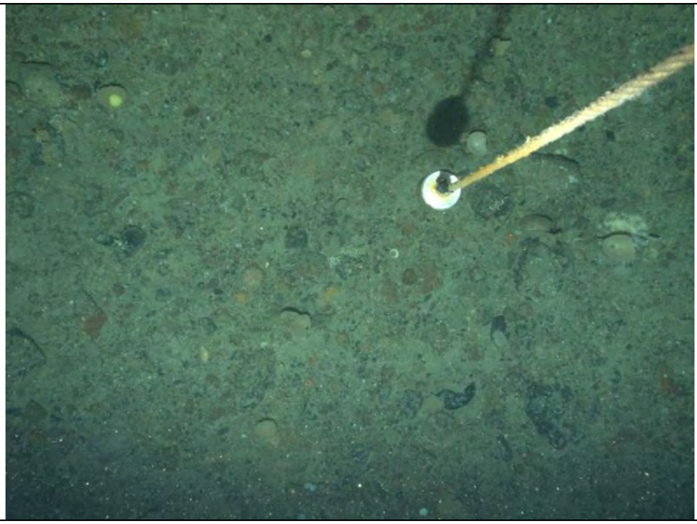
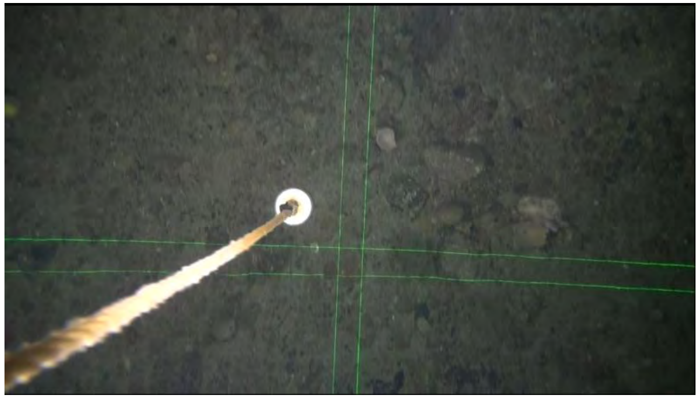
Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
2	1714S_SBR_RSS73_S167_IMG_22MH.jpg			Weight
3	1714S_SBR_TS101_S04_IMG_05.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
3	1714S_SBR_RSS63_S107_IMG_05HG.jpg			Laser
3	1714S_SBR_TS101_S04_IMG_07.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
3	1714S_SBR_TS101_S04_IMG_11.jpg			Laser video
3	1714S_SBR_TS101_S04_IMG_12.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
4	1714S_SBR_RSS99_S151_IMG_17HG			Laser
4	1714S_SBR_TS101_S04_IMG_04.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
4	1714S_SBR_RSS68_S108_IMG_09je.jpg			Laser
4	1714S_SBR_TS28_S05_IMG_16.jpg			Laser video

Field of view category	Image filename	Photograph	Video screen-grab	Scaling Method
4	1714S_SBR_TS28_S05_IMG_19.jpg			laser video

Appendix 3: Guidance used for indentifying (*in situ*) sponge morphology types

Taken from the CCW Across Wales Diving Project 2006-12.

General rules:

- When two morphologies can be easily confused, a single morphology must always be dominant, i.e. the dominant morphology ‘trumps’ the subordinate – further details are provided below.
- When classifying sponge morphologies the overall shape is more important than the texture.
- When an individual sponge colony demonstrates multiple morphologies the dominant morph should be chosen.

Morphology specific rules:

Encrusting:

- Follows underlying substrate.
- Sponge is thin enough that the underlying substrate is felt when the sponge is poked i.e. the sponge has little ‘give’.

Massive:

- Forms its own shape (with thickness) above the substratum.
- Arises from a broad base – i.e. not undercut at the edges.
- When poked the surface will give - i.e. underlying surface not felt.
- Surface can be textured (i.e. papillate) but overall shape is more apparent than the texture.
- This form trumps globular.

Globular:

- Ball like i.e. rounded.
- Arising from a narrow base i.e. undercut at the edges.
- No peduncle.

Tubular:

- Structure is erect and columnar with a terminal oscule (hole).
- More structure sticking up than at its base i.e. not fat.
- Needs to be hollow.
- This form trumps pedunculate.

Pedunculate:

- Must have a constricted stalk i.e. a peduncle.
- Structure above the peduncle is 3D and rounded.
- This form trumps flabellate.

Papillate:

- Must have unbranched and distinct papillae arising from a basal structure.
- Base must be joined up between papillae.
- Basal structure can be obscured by sediment.

Flabellate:

- Mostly flattened and unbranched in one plane i.e. 2D.
- Includes vase and cup shapes.

- Moves when wafted.

Repent:

- Forms bridges and arches between attachment sites.

Arborescent:

- Tree or bush like.
- Does not have to be branching.
- Mostly erect i.e. attachment is only a small proportion structure.
- More 3D branching than 2D.

Appendix 4: Sponge and Anthozoan species used to indicate the presence of fragile sponges and anthozoan habitat

Table 2.5 from Haynes *et al* (2014): Sponge indicator species proposed by consulted experts and the justifications for their selection. Part 1: Developing Proposals for Potential Shallow Sublittoral Rock Indicators for Fragile Sponges and Anthozoan Assemblages.

Indicator Species Name	Morpho-type(s)	Relevant traits*	Distribution	Detectable pressures**	Sensitivities and tolerances	Reasons for choice as an indicator	Biotope(s)***	Bio-geographic region of assessment ****
Amphilectus fucorum	Fistulate/ Encrusting/ Massive	Fast-growing and early coloniser	Common throughout the UK and has been recorded from the Shetland Isles, Orkney, Fraserburgh, the Firth of Forth, Northumberland and east Yorkshire, the south-east, south and south-west coasts of England and the west coasts of England and Scotland.	Unknown	Sensitive to sediment	Easy to ID (although some morphological variability), and early coloniser	CR.HCR.FaT.Ctub.CuSp; CR.HCR.Xfa.ByErSp.DysAct; CR.HCR.Xfa.FluHocu; CR.MCR.CFaVS.CuSpH.As	1,2,3,4,5,6,7
Axinella dissimilis	Arborescent/ Branch	Long-lived; slow-growing; large (3D structure); fragile	Common on the south coast of the UK to as far north as Mull in Scotland.	Physical disturbance	Tolerates silt. Very sensitive to physical disturbance	Easy to ID (distinct form) and likely to be sensitive to physical disturbance	CR.HCR.DpSp.PhaAxi	6,5,4
Axinella infundibuliformis	Cup	Long-lived; slow-growing; large (3D structure); fragile	West coast of Scotland down to the southwest coast of England.	Physical disturbance	Tolerates silt. Very sensitive to physical disturbance	Easy to ID (distinct form) and likely to be sensitive to physical disturbance	CR.HCR.DpSp.PhaAxi	4,5,6,7
Cliona celata	Massive	Long-lived; slow-growing, but fast regeneration	UK-wide.	Unknown	Sensitive to sediment	Easy to ID (very distinct form) and long-lived	CR.HCR.DpSp.PhaAxi; CR.HCR.Xfa.ByErSp.DysAct; CR.HCR.Xfa.ByErSp.Sag CR.HCR.Xfa.SubCriTf; CR.MCR.EcCr.CarSp.PenPcom; CR.MCR.CFaVS.CuSpH; CR.MCR.CFaVS.CuSpH.As	All
Halichondria panicea	Cushion/ Massive	Fast-growing	UK-wide.	Nutrient enrichment	Very tolerant of high levels of organic nutrients	Easy to ID and appears to respond to changes in nutrient input	CR.HCR.Xfa.SubCriTf; CR.MCR.CFaVS.CuSpH; CR.MCR.CFaVS.CuSpH.As; CR.MCR.CFaVS.CuSpH.VS	1,2,3,4,5,6,7
Haliclona oculata	Arborescent/ Branch	Fast-growing	Recorded from the Shetland Isles, Cromarty Firth, Firth of Forth, Northumberland, southern coasts of England, Isles of Scilly, north Devon, Wales, Cumbria, western Scotland, Hebrides, and northern Ireland.	Physical disturbance	Tolerates silt; Sensitive to physical disturbance	Delicate branching species	CR.HCR.Xfa.FluHocu; CR.MCR.CFaVS.CuSpH.VS	1,2,3,4,5,6,7

Indicator Species Name	Morpho-type(s)	Relevant traits*	Distribution	Detectable pressures**	Sensitivities and tolerances	Reasons for choice as an indicator	Biotope(s)***	Bio-geographic region of assessment ****
Hemimycale columella	Encrusting	Unknown	This species has a widespread distribution from south-east England to northwest Scotland, it has not been recorded from the North Sea coast except at Blyth.	Unknown	Intolerant of sedimentation	One of the few encrusting species that is easy to ID	CR.HCR.FaT.Ctub.CuSp; CR.HCR.DpSp.PhaAxi; CR.HCR.Xfa.ByErSp.DysAct; CR.HCR.Xfa.ByErSp.Sag; CR.HCR.Xfa.SpAnVt;	2,3,4,5,6,7
Pachymatisma johnstonia	Massive	Long-lived; large and likely to be slow growing	Wide distribution having been found on the south and west coasts of Great Britain and as far north as Orkney.	Unknown	Some tolerance to sedimentation	Easy to ID and through to be long-lived	CR.HCR.FaT.Ctub.CuSp; CR.HCR.DpSp.PhaAxi; CR.HCR.Xfa.ByErSp.DysActCR.HCR.Xfa.ByErSp.Sag; CR.HCR.Xfa.SpAnVt; CR.MCR.EcCr.CarSp.PenPcom	2,3,4,5,6,7
Phakellia ventilabrum	Cup	Long-lived; fragile; slow growing	West coast of Scotland and the Hebrides, and from the very south western tip of Wales.	Physical disturbance	Tolerates silt; Very sensitive to physical disturbance	Easy to ID (distinct form) (although possible to confuse with *A. infundibuliformis*)	CR.HCR.DpSp.PhaAxi	4,5,6
Polymastia penicillus	Papillate	Long-lived	Widely distributed.	Unknown	Tolerates sediment	Usually on upward-facing rocks; tolerant of turbid water	CR.HCR.Xfa.ByErSp.Sag; CR.HCR.Xfa.SubCriTf;	1,2,3,4,5,6,7
Raspailia ramosa	Arborescent/ Branch	Rapid and regular recruitment	Broad distribution around the UK, from the southwest coast of the UK to Scotland, but is absent from the North Sea.	Physical disturbance	Tolerates silt; Very sensitive to physical disturbance	Delicate species, sensitive to disturbance	CR.HCR.Xfa.ByErSp.DysAct; CR.HCR.Xfa.SubCriTf; CR.MCR.CFaVS.CuSpH.As	3,4,5,6,7
Stelligera stuposa	Arborescent/ Branch	Rapid and regular recruitment	Widely distributed around the UK, but is typically more common on the west coast as far north as Scotland.	Physical disturbance	Tolerates silt. Sensitive to physical disturbance	Hard to differentiate from *Raspailia hispida* when small; slimey when stressed. Possible to group recent recruits - would need microscopic identification. Although would be quick as spicule compliment very different.	CR.HCR.DpSp.PhaAxi; CR.HCR.Xfa.ByErSp.DysAct; CR.HCR.Xfa.ByErSp.Sag;	3,4,5,6,7
Tethya aurantium	Globulose	High levels recruitment; reliant on asexual reproduction	South-west England, the west coast of Wales, and western Scotland down to 130m.	Physical disturbance		Easy to ID; size can alter by contracting.	CR.HCR.DpSp.PhaAxi; CR.HCR.Xfa.ByErSp.DysAct	3,4,5,6,7

*= 'Relevant traits' are those features of the species biology/ecology that could be used as a component of a supporting indicator (e.g. the presence of long-lived species).
**= 'Detectable pressures' provides professional judgement from the consulted experts on the pressures that the species may be able to detect.
***= The biotope column provides a list of the biotopes in which this species occurs as a characterising element.
****= 'Biogeographic regions of assessment' are the regions where the species could be utilised as an indicator (based on: Regional Sea Boundaries (UKMMAS 2010))

Table 2.6 from Haynes *at al* (2014): Anthozoan indicator species proposed by consulted experts and the justifications for their selection. Part 1: Developing Proposals for Potential Indicators. Sourced from Marine Strategy Framework Directive Shallow Sublittoral Rock Indicators for Fragile Sponges and Anthozoan Assemblages.

Indicator Species Name	Morpho-type(s)	Relevant traits*	Distribution	Detectable pressures **	Sensitivities and tolerances	Reasons for choice as an indicator	Biotope(s)***	Bio-geographic region of assessment ****
Alcyonium digitatum	Massive	Opportunistic; fast-growing; long-lived	Widely distributed.	Physical disturbance	They have high sensitivity to substratum loss, and some susceptibility to smothering.	Easy to ID (though some possible confusion of orange form with pale *A. glomeratum*); long-distance larval dispersal; occurs from pristine to 'challenging' environmental conditions; high abundance in environmentally compromised areas. Low abundance where a wider variety of species can colonise; Long-lived brooder; relatively easy to see physical damage; indicative of lack of disturbance in some habitats.	CR.HCR.FaT.Ctub.Adig CR.HCR.Xfa.ByErSp.Eun CR.HCR.Xfa.CvirCri CR.HCR.Xfa.ByErSp.Sag CR.HCR.Xfa.ByErSp.DysAct CR.HCR.Xfa.SwiLgAs CR.HCR.Xfa.SpAnVt CR.MCR.EcCr.CarSwi.LgAs CR.MCR.EcCr.CarSp.PenPcom CR.MCR.EcCr.FaAlCr.Car CR.MCR.EcCr.AdigVt CR.LCR.BrAs.NeoPro CR.FCR.FouFa.AdigMsen	1,2,3,4,5,6,7
Alcyonium glomeratum	Massive	Common/ frequent species	South and west coasts of Britain, but has been reported as far north as western Scotland.	Physical disturbance	They have high sensitivity to substratum loss, and some susceptibility to smothering.	Easy to ID (though some possible confusion with orange form of *A. digitatum*); fast growing, long-lived, probably long-distance larval dispersal and colonised new surfaces quickly. High abundance in environmental conditions that are favourable to a high diversity and often rare or scarce species. May be susceptible to eutrophic conditions and disease; indicative of lack of disturbance in some habitats; common but needs research to see if it is a reliable indicator; disappearing from SMNR monitoring sites, but the cause is unknown.	CR.FCR.Cv.SpCup	4,5,6
Caryophyllia smithii	Cup coral	Ubiquitous; relatively common; slow-growing; long-lived; associated with other species	Wide distribution from Shetland, north eastern England, the south west, Wales, and north western Scotland.	Physical disturbance	Tolerant to sedimentation	Easy to ID; can reach high abundance so might be able to use univariate statistics. Often associated with *Axinella* sp.; Change in morphology of calyx due to high sediment loads.	CR.HCR.Xfa.ByErSp.Eun CR.HCR.Xfa.CvirCri CR.HCR.Xfa.ByErSp.Sag CR.HCR.Xfa.ByErSp.DysAct CR.HCR.Xfa.SwiLgAs CR.HCR.Xfa.SpAnVt CR.MCR.EcCr.CarSwi.LgAs CR.MCR.EcCr.CarSp.PenPcom 1CR.MCR.EcCr.FaAlCr.Car CR.MCR.EcCr.AdigVt CR.FCR.Cv.SpCup CR.FCR.FouFa.AdigMsen	3,4,5,6,7,

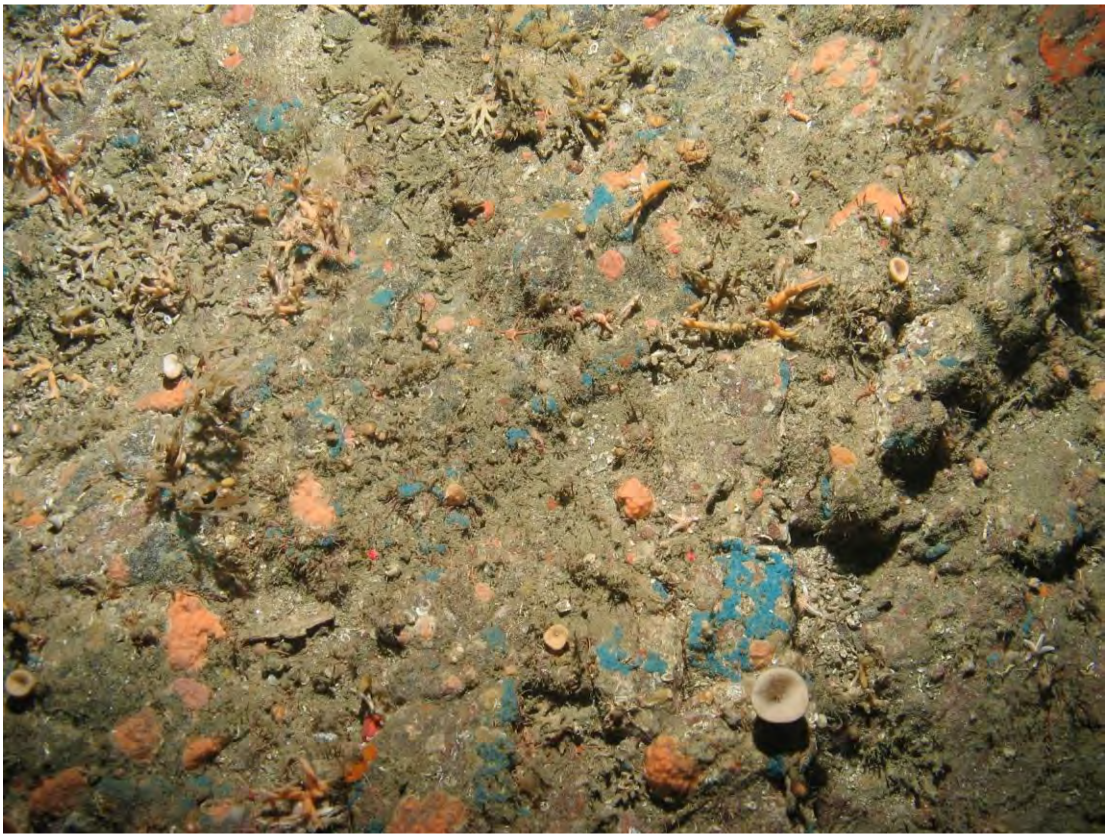
Indicator Species Name	Morpho-type(s)	Relevant traits*	Distribution	Detectable pressures **	Sensitivities and tolerances	Reasons for choice as an indicator	Biotope(s)***	Bio-geographic region of assessment ****
Corynactis viridis	Anemone-shaped	Locally common	Reaches its northern limit in Shetland. It is commonly found along the south and west coasts of Britain.	Unknown	Unknown	Easy to ID; common to some locations, lend themselves to quantification via photoquadrats.	CR.HCR.FaT.Ctub.Adig CR.HCR.Xfa.CvirCri CR.HCR.Xfa.ByErSp.Sag CR.HCR.Xfa.ByErSp.DysAct CR.HCR.Xfa.SpAnVt CR.MCR.EcCr.CarSp.PenPcom CR.MCR.EcCr.AdigVt CR.FCR.Cv.SpCup CR.FCR.FouFa.AdigMsen	3,4,5,6,7,
Eunicella verrucosa	Arborescent/ fan	Long-lived; slow-growing; fragile; supports other spp.; local	Skomer south and west to Isles of Scilly and east to Dorset. Also in S & W Ireland.	Physical disturbance	Intolerant of scour; vibrio disease/necrosis Intolerant smothering and changes in water flow and exposure regime. It has some tolerance to physical disturbance and abrasion.	Easy to ID; "flagship" spp; existing data (from several sites throughout SW); intolerant of scour - doesn't occur in any significant abundance where sand is in suspension). Probably limited (<1km) larval dispersal. Grows fairly slowly (~1cm/yr). Very sensitive to physical disturbance (physical disturbance = towed fishing gear). May be sensitive to eutrophication & vibrio bacterial infections. Has a specific fauna of associated (bryozoan) species. Often part of a rich community.	CR.HCR.Xfa.ByErSp.Eun	4,5
Leptopsammia pruvoti	Cup coral	Found in caves & overhanging walls; very rare and very local	Occurs at Portland Bill, Lyme Bay, off Plymouth Sound, the Isles of Scilly and Lundy only.	Physical disturbance	Highly intolerant to substratum loss, smothering, desiccation and abrasion/physical damage	Easy to ID; existing data (from Lundy); associated with high spp. richness; only found in caves and overhangs but the species is an important feature in these habitats; distribution shift/abundance.	CR.FCR.Cv.SpCup	4
Parazoanthus anguicomus	Colonial anemone	Associated with high spp. richness	Restricted distribution to western and northern Scotland, but has also been reported from south-west Wales & SW England.	Unknown	Indicative of good water quality	Useful edge of range species (north/south).	CR.FCR.Cv.SpCup	4,5,6,
Parazoanthus axinellae	Colonial anemone	Associated with high spp richness; Uncommon	South west and west coasts of the British Isles.	Unknown	Indicative of good water quality	Useful edge of range species (south/north); easy to ID; NRW methodology in place with photos.	CR.HCR.Xfa.ByErSp.Eun CR.FCR.Cv.SpCup	5,6,7

Indicator Species Name	Morpho-type(s)	Relevant traits*	Distribution	Detectable pressures **	Sensitivities and tolerances	Reasons for choice as an indicator	Biotope(s)***	Bio-geographic region of assessment ****
Swiftia pallida	Arborescent/ fan	Long-lived; slow-growing; fragile; local; relatively common on west coast of Scotland	North-west (Scotland)	Physical disturbance; entanglement	Sensitive to smothering, but not to changes in suspended sediments or turbidity. They are likely to be sensitive to physical disturbance and substratum loss	Easy to ID; existing data; associated with Axinella spp. and *Caryophyllia smithii*.	CR.HCR.Xfa.SwiLgAs	6,7
Urticina felina	Anemone-shaped	Common	Widely distributed	Physical disturbance	Low sensitivity to smothering and increased suspended sediment, but some sensitivity to changes in flow rate, temperature and abrasion.	Could be good abrasion indicator; impact feeder – subject to dredging / infill; conspicuous. Possible confusion with *U. eques*	CR.HCR.FaT.Ctub.Adig CR.HCR.Xfa.ByErSp.Sag CR.MCR.EcCr.CarSp.PenPcom CR.MCR.EcCr.UrtScr CR.MCR.EcCr.AdigVt	1,2,3,4,5,6,7

*= 'Relevant traits' are those features of the species biology/ecology that could be used as a component of a supporting indicator (e.g. the presence of long-lived species).
**= 'Detectable pressures' provides professional judgement from the consulted experts on the pressures that the species may be able to detect.
***= The biotope column provides a list of the biotopes in which this species occurs as a characterising element.
****= 'Biogeographic regions

Appendix 5: Proposed northern biotopes from Whomersley *et al* (2010), used in the present survey

JNCC 04.05 code: CR.MCR.EcCr.CarSp.PenPcom.1
Habitat title: *Porella compressa* with cup corals, sponges, *Cellapora pumicosa* and crustose communities on wave-exposed circalittoral rock
Wave exposure: Moderately exposed
Tidal streams: Moderately strong
Substratum: Bedrock or stable boulder dominated, with frequent coarse sand veneer



Substratum description: Predominantly bedrock with significant veneer of coarse, mobile sand, interspersed with stable/embedded boulders/cobbles in larger fissures.

Habitat description:
In deep, moderately exposed circalittoral bedrock or boulder dominated areas, notable populations of the erect calcareous bryozoan *Porella compressa* occur along with significant encrusting bryozoans, including *Parasmittina trispinosa* and *Cellapora pumicosa*. Cup corals (*Caryophyllia smithii*, and an unidentified smaller coral) and the sponges *Hymedesmia paupertus*, *Axinella infundibuliformis*, *Polymastia boletiformis*, *Tethya norvegica*/*hibernica* and *Stelligera stuposa* are notable. *Securiflustra securifrons* is also occasionally encountered. The biotope shows some evidence of sand scour, and appears to exhibit a different assemblage from the existing CR.MCR.EcCr.CarSp.PenPcom biotope. Two variants are proposed: one showing a less sand-scoured assemblage, replete with a richer diversity of sponges and erect hydroids, and a second more sand-scoured variant, showing an increase in the cover of keel worms (*Pomatoceros triqueter*), fewer sponges and increased erect bryozoans *Flustra foliacea* and *Securiflustra securifrons*.

Characterising species from video:
Porella compressa (occasional to frequent), encrusting bryozoans including *Parasmittina trispinosa* and *Cellapora pumicosa* (frequent to common), *Caryophyllia smithii* (occasional), sponges including

notably *Hymedesmia paupertus*, *Axinella infundibuliformis, Polymastia boletiformis*, *Tethya norvegica/hibernica* and *Stelligera stuposa, Securiflustra securifrons* (occasional)

Why proposed habitat differs from other types? Very similar to existing CR.MCR.EcCr.CarSp.PenPcom but consistently no *Pentapora fascialis*, and northern variants of other species

BIOTOPE VARIATION : JNCC 04.05 code: *CR.MCR.EcCr.CarSp.PenPcom.2*

Substratum description:
Predominantly bedrock with significant veneer of coarse, mobile sand, interspersed with stable/embedded boulders/cobbles in larger fissures; sparse version also found in cobble/boulder fields ('stony reef')

Characterising species from video:
Porella compressa (occasional to frequent), encrusting bryozoans including *Parasmittina trispinosa* (frequent), encrusting corallines where appropriately shallow, common keel worms (*Pomatoceros triqueter*), unidentified cup corals (occasional) and rarely *Caryophyllia smithii*, sponges including *Hymedesmia paupertus* and *Axinella infundibuliformis*; *Flustra foliacea* and *Securiflustra securifrons* frequent; more sand-scoured and sparse than CR.MCR.EcCr.CarSp.PenPcom.1

JNCC 04.05 code: CR.MCR.EcCr.CarSp.Bri.1
Habitat title: Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock, northern version
Wave exposure: Moderately exposed
Tidal streams: Moderately strong
Substratum: Stable boulders and cobbles or bedrock, with significant proportion of mobile coarse sediments

Substratum description:
Stable boulders and cobbles or bedrock, with significant proportion of mobile coarse sediments

Habitat description:
In deep, moderately exposed circalittoral boulder-dominated and occasionally bedrock dominated areas abundant populations of the brittlestars *Ophiothrix fragilis* and *Ophiocomina nigra* result in a scoured environment of bryozoan and coralline crusts, with *Parasmittina trispinosa* frequent, and significant populations of the keel worm *Pomotoceros triqueter* and the gastropod *Hinia incrassata* characteristic. The cup coral *Caryophyllia smithii* and anemone *Urticina eques* also characterise this environment, along with rare to occasional *Alcyonium digitatum*, *Antedon petasus*, *Stichastrella rosea* and *Axinella infundibuliformis*.

Characterising species from video:
Alyconium digitatum rare to frequent, dominant bryozoan crust (inc. *Parasmittina trispinosa*-frequent), encrusting corallines where appropriately shallow, dominated by brittlestars (*Ophiothrix fragilis, Ophiocomina nigra*), keel worms frequent (*Pomatoceros triqueter*); *Hinia incrassata*, *Antedon petasus*, *Stichastrella rosea*, *Axinella infundibuliformis, Caryophyllia smithii* & *Urticina eques* also characteristic though occur occasionally to rarely.
Why proposed habitat differs from other types? Very similar to existing CR.MCR.EcCr.CarSp.Bri but notable northern variants of species.

Appendix 6: Summary of transects: Physical data

The following information is provided per transect: the length (m), approximate area (m²), the number of video habitats or video subsections analysed including subsection duration (20 or 10 seconds), the number of stills analysed from each transect. Positions are provided in decimal degrees (WGS84).

N.B. The video from 10 transects were not analysed at the request of the client (due to low quality or a low density of sponges and anthozoan taxa), but stills from all transects were analysed. Therefore, some information relating to these videos is missing in the following table.

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
TS30_S1	29/10/2014	99.5	93	59.13670, -05.24733	59.13880, -05.24676	232	348	20 second	2	10
TS31_S2	29/10/2014	96	102	59.14750, -05.24729	59.14620, -05.24984	202	303	Habitats	2	9
TS29_S3	29/10/2014	108	106	59.15620, -05.24362	59.15570, -05.24498	201	301.5	Habitats	1	7
TS101_S4	29/10/2014	88	93	59.16817, -05.22668	59.16733, -05.22868	152	228	20 second	2	10
TS28_S5	29/10/2014	101	93	59.18217, -05.21051	59.18100, -05.21550	326	489	20 second	1	14
TS59_S6	29/10/2014	83	85	59.17333, -05.17546	59.17383, -05.17954	247	370.5	20 second	1	11
TS60_S7	29/10/2014	100	95	59.19717, -05.14337	59.19633, -05.14639	210	315	20 second	1	10
TS27_S8	29/10/2014	91.6	91.7	59.18700, -05.09821	59.18650, -05.10120	187	280.5	Habitats	1	10
TS44_S9	29/10/2014	92	90	59.17467, -05.11634	59.17467, -05.11962	202	303	Habitats	1	12
TS15_S10	30/10/2014	77.5	77.8	59.16850, -05.06338	59.16783, -05.06719	236	354	Habitats	1	9
TS16_S11	30/10/2014	83	83	59.15140, -05.10464	59.15210, -05.10845	242	363	Habitats	1	11
TS17_S12	30/10/2014	74.9	68.9	59.13890, -05.10812	59.13770, -05.10262	252	378	Habitats	5	10
TS18_S13	30/10/2014	59.3	61.5	59.12220, -05.11042	59.12180, -05.10566	269	403.5	Habitats	2	12
TS19_S14	30/10/2014	65.9	66.3	59.10140, -05.10782	59.09940, -05.10509	287	430.5	Habitats	2	9
TS12_S15	30/10/2014	63	63	59.08960, -05.06731	59.08860, -05.06286	286	429	Habitats	1	11
TS43_S16	30/10/2014	62.2	60.4	59.10910, -05.07452	59.10760, -05.07309	162	243	Habitats	4	10
TS14_S17	30/10/2014	68.8	64.9	59.12230, -05.09032	59.12070, -05.08703	248	372	Habitats	2	10
TS13_S18	30/10/2014	70.3	66.4	59.12060, -05.05237	59.11830, -05.04924	322	483	Habitats	1	10

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
TS32_S19	30/10/2014	65	65.3	59.06850, -04.98612	59.06760, -04.98372	183	274.5	Habitats	1	10
TS33_S20	30/10/2014	65.4	68.7	59.05740, -05.02500	59.05600, -05.02226	227	340.5	Habitats	1	11
TS58_S21	30/10/2014	57	55	59.05000, -04.97222	59.04860, -04.96838	*	*	N/A	0	10
TS11_S22	30/10/2014	57	54	59.03620, -04.95964	59.03490, -04.95614	*	*	N/A	0	10
TS49_S23	30/10/2014	53	54	59.04450, -04.94328	59.04270, -04.94125	*	*	N/A	0	10
TS48_S24	30/10/2014	53.3	50.8	59.07350, -04.91088	59.07170, -04.91071	209	313.5	20 second	1	10
TS41_S25	30/10/2014	59.6	69.5	59.11070, -04.88632	59.10860, -04.88200	*	*	N/A	0	8
TS56_S26	30/10/2014	49	51.6	59.07210, -04.87740	59.07010, -04.87709	226	339	20 second	1	12
TS57_S27	30/10/2014	46	48.9	59.05890, -04.91809	59.05860, -04.91418	241	361.5	20 second	1	12
TS34_S28	30/10/2014	61.6	59.8	59.00120, -04.91835	59.00080, -04.91543	180	270	20 second	1	11
TS35_S29	30/10/2014	65	65	58.99117, -04.94460	58.99017, -04.94112	*	*	N/A	0	10
TS40_S30	30/10/2014	74.2	69	58.99250, -04.99190	58.99217, -04.98822	180	270	20 second	4	9
TS10_S31	30/10/2014	61.5	61.7	58.97700, -04.95552	58.97650, -04.95210	211	316.5	Habitats	1	9
TS50_S32	30/10/2014	51.7	56.2	58.97967, -04.92275	58.97850, -04.92006	204	306	10 second	1	9
TS51_S33	31/10/2014	52.6	66	58.99150, -04.87422	58.99083, -04.87041	235	352.5	10 second	2	10
TS36_S34	31/10/2014	56	56.2	58.97417, -04.89432	58.97367, -04.89809	235	352.5	20 second	1	9
TS52_S35	31/10/2014	51.7	51.2	58.95183, -04.92269	58.95133, -04.92547	170	255	20 second	1	10
TS53_S36	31/10/2014	51.5	55	58.92717, -04.91494	58.92500, -04.91134	307	460.5	20 second	1	10
TS9_S37	31/10/2014	51	55	58.91467, -04.90230	58.91300, -04.89855	294	441	20 second	1	11
TS46_S38	31/10/2014	42.7	46.7	58.91167, -04.93325	58.91017, -04.92990	240	360	20 second	3	10
TS07_S39	31/10/2014	34.3	45.6	58.89000, -04.95062	58.88917, -04.94793	195	292.5	Habitats	1	10
TS05_S40	31/10/2014	50	43.7	58.88200, -05.01392	58.88067, -05.01201	199	298.5	Habitats	1	12
TS03_S41	31/10/2014	59.7	61.3	58.86367, -04.99035	58.86317, -04.98659	216	324	Habitats	3	8
TS02_S42	31/10/2014	65.3	57.6	58.86417, -05.04493	58.86333, -05.04188	180	270	Habitats	3	11
TS55_S43	31/10/2014	48.1	46	58.87317, -05.00817	58.87317, -05.00431	*	*	N/A	0	7

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
TS06_S44	31/10/2014	52.3	52.8	58.89600, -04.99182	58.89433, -04.98958	216	324	Habitats	3	10
TS04_S45	31/10/2014	54.5	51.1	58.90900, -04.97129	58.90767, -04.96848	223	334.5	Habitats	2	10
TS08_S46	31/10/2014	45.6	48.4	58.91417, -04.94546	58.91367, -04.94997	247	370.5	Habitats	3	11
TS54_S47	31/10/2014	51.5	51.6	58.92267, -04.97877	58.92267, -04.98205	198	297	20 second	1	9
TS45_S48	31/10/2014	48	51.6	58.91967, -04.99429	58.91867, -04.99941	319	478.5	20 second	1	12
TS39_S49	31/10/2014	68	69.9	58.93400, -05.04091	58.93417, -05.04422	198	297	20 second	1	11
TS37_S50	31/10/2014	66.6	66.4	58.94117, -05.02529	58.93867, -05.02393	282	423	20 second	1	11
TS23_S51	31/10/2014	68.4	69.3	59.02190, -05.07070	59.02050, -05.07290	190	285	20 second	3	11
TS22_S52	31/10/2014	63.5	59.7	59.04060, -05.06151	59.03940, -05.06378	186	279	Habitats	2	11
TS47_S53	31/10/2014	60.2	45.4	59.02970, -05.20585	59.02850, -05.20766	558	837	Habitats	2	8
TS38_S54	31/10/2014	71	72.1	59.03390, -05.26892	59.03190, -05.27120	264	396	Habitats	1	12
TS26_S55	31/10/2014	77.9	75.3	59.07400, -05.22710	59.07220, -05.22813	212	318	Habitats	1	11
TS42_S56	31/10/2014	64	64	59.06420, -05.15093	59.06260, -05.15236	195	292.5	Habitats	1	10
TS93_S57	31/10/2014	72	74	59.07230, -05.16850	59.07070, -05.16765	174	261	Habitats	3	10
TS85_S58	31/10/2014	73	75	59.06380, -05.18737	59.06250, -05.18951	191	286.5	Habitats	2	11
TS98_S59	01/11/2014	73	71	59.04620, -05.21878	59.04420, -05.21963	233	349.5	Habitats	1	9
TS61_S60	01/11/2014	88.6	87	59.00060, -05.24495	58.99900, -05.24699	212	318	Habitats	1	9
TS62_S61	01/11/2014	84	88	59.00370, -05.20879	59.00210, -05.20682	216	324	20 second	1	10
TS97_S63	01/11/2014	69.5	70.5	59.04810, -05.14727	59.04540, -05.14889	317	475.5	20 second	1	11
TS73_S64	01/11/2014	88.1	88.3	59.02160, -05.15137	59.02050, -05.15306	158	237	20 second	2	8
TS67_S65	01/11/2014	77.1	78.5	59.00370, -05.16279	59.00230, -05.16252	179	268.5	20 second	1	10
TS77_S68	03/11/2014	80.7	81.2	58.91850, -05.07084	58.91617, -05.07178	283	424.5	20 second	2	6
TS75_S69	03/11/2014	83.9	86.3	58.91417, -05.13620	58.91233, -05.13855	250	375	20 second	1	9
TS74_S70	03/11/2014	89.8	89.4	58.89717, -05.18177	58.89567, -05.18478	235	352.5	20 second	2	10
TS71_S71	03/11/2014	89.6	90	58.89200, -05.22295	58.89100, -05.22477	179	268.5	20 second	1	10

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
TS70_S72	03/11/2014	85.4	86.1	58.90967, -05.20274	58.90800, -05.20291	463	694.5	20 second	2	13
TS69_S73	03/11/2014	84	84	58.92700, -05.15070	58.92583, -05.15193	159	238.5	Habitats	2	10
TS76_S74	03/11/2014	81.2	81.1	58.93383, -05.10611	58.93300, -05.10855	169	253.5	Habitats	1	10
TS100_S75	03/11/2014	81.6	71.5	58.93267, -05.08314	58.93233, -05.07912	238	357	Habitats	1	11
TS68_S76	03/11/2014	85.4	86.2	58.94100, -05.12904	58.94100, -05.12551	200	300	Habitats	2	11
TS24_S77	03/11/2014	76.7	76.6	58.96117, -05.09785	58.96100, -05.09528	440	660	Habitats	1	13
TS66_S78	03/11/2014	85.3	82.8	58.95667, -05.16535	58.95700, -05.16236	183	274.5	Habitats	1	9
TS65_S79	03/11/2014	94	94	58.95433, -05.21382	58.95517, -05.21166	152	228	Habitats	1	12
TS96_S80	03/11/2014	87.4	86.2	58.97817, -05.13884	58.97900, -05.13482	*	*	N/A	0	10
TS94_S81	03/11/2014	76.8	72.6	58.97733, -05.02688	58.97767, -05.02345	206	309	Habitats	1	11
TS92_S82	03/11/2014	76.7	78.1	58.98500, -05.05417	58.98350, -05.05717	244	366	Habitats	1	11
TS95_S83	03/11/2014	79.8	82.8	58.99517, -05.07827	58.99650, -05.07761	161	241.5	Habitats	1	9
TS78_S84	03/11/2014	84.4	83.9	58.99200, -05.12688	58.99367, -05.12675	*	*	N/A	0	9
TS64_S85	03/11/2014	78.8	80.8	59.00370, -05.12720	59.00490, -05.12585	156	234	Habitats	1	9
RSS69_S86	03/11/2014	80.9	77.6	59.01850, -05.11507	59.01950, -05.11294	175	262.5	Habitats	1	10
RSS58_S87	03/11/2014	72.7	71.7	59.01610, -05.09005	59.01770, -05.08918	*	*	N/A	0	10
RSS38_S88	03/11/2014	22.09	34.03	59.02320, -05.07559	59.02400, -05.07314	176	264	10 second	2	9
RSS50_S89	03/11/2014	61.9	60.3	59.04050, -05.05958	59.04190, -05.06031	177	265.5	10 second	1	9
RSS46_S90	03/11/2014	71.3	70.2	59.03480, -05.08950	59.03510, -05.08637	280	420	20 second	1	11
RSS57_S91	04/11/2014	61.5	60	59.03590, -05.05204	59.03700, -05.04898	204	306	20 second	3	11
RSS65_S92	04/11/2014	63.1	59	59.04370, -05.06159	59.04550, -05.06079	197	295.5	20 second	2	11
RSS40_S93	04/11/2014	68.7	67.3	59.05550, -05.04149	59.05700, -05.03735	305	457.5	20 second	1	8
RSS67_S96	05/11/2014	63.7	63.2	59.04610, -05.00408	59.04800, -05.00346	234	351	20 second	1	9
RSS53_S97	05/11/2014	64.4	63.4	59.07310, -04.95268	59.07210, -04.95033	195	292.5	20 second	1	11
RSS52_S98	05/11/2014	57.9	59.1	59.08120, -04.93282	59.08130, -04.92937	176	264	20 second	2	10

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
RSS70_S99	05/11/2014	67.6	67.7	59.09080, -04.98253	59.09130, -04.97855	230	345	20 second	2	9
RSS60_S100	05/11/2014	67	66	59.09560, -04.95251	59.09570, -04.94730	313	469.5	20 second	1	9
RSS59_S101	05/11/2014	70.8	69.8	59.11490, -04.93859	59.11480, -04.93453	239	358.5	Habitats	1	10
RSS41_S102	05/11/2014	67	68	59.10680, -04.92877	59.10810, -04.92758	157	235.5	Habitats	2	10
RSS54_S103	05/11/2014	62	63	59.10940, -04.91387	59.10990, -04.90938	272	408	Habitats	1	10
RSS55_S104	05/11/2014	64.3	59.7	59.09950, -04.90764	59.09970, -04.90444	190	285	Habitats	1	11
RSS39_S105	05/11/2014	61.4	63.7	59.09370, -04.92005	59.09290, -04.92176	138	207	Habitats	1	8
RSS47_S106	05/11/2014	56.9	54.3	59.08850, -04.91649	59.08680, -04.91473	327	490.5	Habitats	2	9
RSS63_S107	05/11/2014	53.7	52.5	59.08790, -04.88955	59.08540, -04.89059	284	426	Habitats	2	10
RSS68_S108	05/11/2014	61	72	59.07060, -04.85746	59.06870, -04.85549	244	366	Habitats	1	10
RSS48_S109	06/11/2014	53.8	50.5	59.07010, -04.89028	59.06790, -04.89179	280	420	Habitats	1	10
RSS61_S110	06/11/2014	51.5	51.2	59.07980, -04.90213	59.07860, -04.89899	234	351	Habitats	1	10
RSS66_S111	06/11/2014	51.8	52.3	59.06760, -04.91026	59.06680, -04.90753	187	280.5	Habitats	1	11
RSS44_S112	06/11/2014	54.8	51.1	59.07560, -04.92561	59.07420, -04.92014	318	477	Habitats	3	11
RSS56_S113	06/11/2014	58.6	57.6	59.06290, -04.93287	59.06190, -04.92925	252	378	20 second	1	10
RSS42_S114	06/11/2014	59.5	64.3	59.05510, -04.90101	59.05390, -04.89818	507	760.5	20 second	1	9
RSS62_S115	06/11/2014	53.7	52.6	59.05460, -04.91792	59.05330, -04.91653	185	277.5	20 second	1	10
RSS49_S116	06/11/2014	64.5	65.4	59.03900, -04.91930	59.03780, -04.91662	218	327	10 second	1	11
RSS43_S118	07/11/2014	53.2	54.2	59.05000, -04.93560	59.05100, -04.93180	244	366	10 second	3	9
RSS51_S119	07/11/2014	52.4	55.6	59.03290, -04.94252	59.03380, -04.94019	176	264	20 second	1	11
RSS37_S120	07/11/2014	59.8	59	59.05600, -04.96929	59.05740, -04.96610	224	336	20 second	3	9
RSS45_S121	07/11/2014	62.1	63.2	59.04110, -04.99365	59.04020, -04.99170	157	235.5	20 second	2	9
RSS64_S122	07/11/2014	72	75	59.02880, -04.99858	59.02750, -04.99799	153	229.5	20 second	3	12
RSS36_S123	07/11/2014	68	68	59.03450, -05.00930	59.03320, -05.00854	166	249	20 second	3	11
TS99_S124	07/11/2014	71.3	72.1	58.85417, -05.04589	58.85450, -05.04970	222	333	20 second	3	10

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
TS89_S125	07/11/2014	81.2	79.9	58.84967, -05.07705	58.84983, -05.08057	209	313.5	20 second	2	11
TS88_S126	07/11/2014	85.1	83	58.83450, -05.10463	58.83367, -05.10811	212	318	20 second	4	9
TS86_S127	07/11/2014	79.8	80.1	58.84317, -05.16560	58.84183, -05.17005	299	448.5	20 second	1	11
TS87_S128	07/11/2014	75.4	75.5	58.82700, -05.19475	58.82500, -05.19837	304	456	20 second	1	11
TS84_S129	07/11/2014	78	78	58.82200, -05.24636	58.82150, -05.24987	220	330	20 second	1	8
TS83_S130	07/11/2014	79	77	58.84317, -05.22513	58.84117, -05.22542	230	345	20 second	2	11
TS82_S131	07/11/2014	77.7	78.4	58.85317, -05.21280	58.85233, -05.20956	215	322.5	20 second	1	11
TS72_S132	07/11/2014	95	95.6	58.86450, -05.25505	58.86350, -05.25862	235	352.5	20 second	1	9
TS81_S133	07/11/2014	84.4	86.3	58.87783, -05.19085	58.87650, -05.19504	287	430.5	20 second	1	12
TS1_S134	07/11/2014	82.8	84.9	58.87267, -05.14577	58.87300, -05.14816	173	259.5	Habitats	2	10
TS103_S135	07/11/2014	84.7	83.2	58.86250, -05.10476	58.86133, -05.10570	*	*	N/A	0	12
TS91_S136	07/11/2014	78.7	80	58.87500, -05.06755	58.87417, -05.07053	200	300	Habitats	1	10
TS102_S137	07/11/2014	74.8	75.5	58.87133, -05.05001	58.87083, -05.05471	269	403.5	Habitats	3	10
TS79_S138	07/11/2014	81.7	82.7	58.89117, -05.07735	58.88950, -05.07865	223	334.5	Habitats	1	11
TS80_S139	07/11/2014	86.8	81.2	58.88917, -05.12876	58.88717, -05.12937	249	373.5	Habitats	1	10
RSS91_S140	07/11/2014	48.6	47.4	58.85967, -05.01614	58.85817, -05.01950	266	399	Habitats	1	11
RSS101_S141	08/11/2014	62.1	66.8	58.85617, -05.03176	58.85467, -05.03529	241	361.5	Habitats	4	10
RSS98_S142	08/11/2014	72.9	70.6	58.86767, -05.06328	58.86533, -05.06456	273	409.5	Habitats	2	11
RSS85_S143	08/11/2014	49.7	58.5	58.85433, -05.02800	58.85550, -05.02586	181	271.5	Habitats	2	11
RSS77_S144	08/11/2014	52.1	50.3	58.86700, -04.98926	58.86733, -04.98627	194	291	Habitats	1	10
RSS95_S145	08/11/2014	62.6	63.3	58.87067, -05.02667	58.87217, -05.02386	221	331.5	Habitats	3	11
RSS105_S146	08/11/2014	61.1	67	58.88050, -05.02828	58.87917, -05.03011	183	274.5	20 second	3	11
RSS80_S147	08/11/2014	57.6	57	58.89100, -05.01313	58.88983, -05.01314	157	235.5	20 second	4	11
RSS75_S148	08/11/2014	38.1	56.6	58.88250, -05.01268	58.88217, -05.01541	163	244.5	20 second	2	12
RSS81_S149	08/11/2014	61.7	63.9	58.89517, -05.02673	58.89383, -05.02831	178	267	20 second	2	8

Station / Transect	Date of capture	Start depth (m BSL)	End Depth (m BSL)	Start Position (Lat / Long)	End Position (Lat / Long)	Length of transect (m)	Approx area of transect analysed (m^2)	Video analysis method	No. video habitats / sections analysed	No. of Stills analysed
RSS86_S150	08/11/2014	60.7	60.4	58.90767, -05.01467	58.90667, -05.01546	140	210	20 second	1	11
RSS99_S151	08/11/2014	54.8	58.2	58.91317, -04.98860	58.91217, -04.99093	192	288	20 second	1	9
RSS84_S152	08/11/2014	66.3	68	58.91767, -05.02175	58.91633, -05.02419	210	315	20 second	3	10
RSS97_S153	08/11/2014	63.5	64.7	58.93450, -04.98496	58.93367, -04.98903	194	291	20 second	5	11
RSS88_S154	08/11/2014	58.2	57	58.94583, -04.95816	58.94450, -04.96012	191	286.5	Habitats	3	11
RSS92_S155	08/11/2014	62.3	63	58.94783, -04.98179	58.94667, -04.98366	180	270	20 second	1	8
RSS74_S156	08/11/2014	62.8	61.5	58.95667, -04.99094	58.95600, -04.99438	217	325.5	20 second	2	9
RSS83_S157	08/11/2014	59.5	59	58.96250, -04.95236	58.96200, -04.95734	271	406.5	20 second	4	10
RSS71_S158	08/11/2014	61.2	60.3	58.97017, -04.95288	58.96850, -04.95691	273	409.5	20 second	4	9
RSS89_S159	08/11/2014	57.4	59.6	58.96317, -04.96789	58.96317, -04.97263	239	358.5	20 second	5	11
RSS87_S160	08/11/2014	59.1	60.4	58.96750, -04.97620	58.96867, -04.97317	188	282	20 second	5	12
RSS102_S161	08/11/2014	62.9	61.7	58.96517, -04.96359	58.96617, -04.96044	193	289.5	20 second	3	10
RSS104_S162	08/11/2014	59.4	51.8	58.96383, -04.93733	58.96450, -04.93373	218	327	20 second	1	9
RSS103_S163	08/11/2014	58.3	59.5	58.94950, -04.90297	58.94983, -04.89684	448	672	Habitats	3	11
RSS82_S164	08/11/2014	60.1	59.6	58.94350, -04.89007	58.94217, -04.89056	152	228	Habitats	2	13
RSS96_S165	08/11/2014	58.8	59.1	58.94517, -04.91118	58.94450, -04.91325	161	241.5	Habitats	3	15
RSS93_S166	08/11/2014	61.3	60.3	58.93950, -04.94301	58.93917, -04.94577	172	258	Habitats	1	10
RSS73_S167	08/11/2014	52.1	54.1	58.92567, -04.95580	58.92533, -04.95828	155	232.5	Habitats	1	11
RSS78_S168	08/11/2014	57.3	57.6	58.93117, -04.94331	58.93150, -04.94639	180	270	Habitats	2	11
RSS76_S169	08/11/2014	48.7	48.9	58.92150, -04.94819	58.92250, -04.95166	230	345	Habitats	1	11
RSS100_S170	08/11/2014	47.4	49.9	58.92550, -04.93967	58.92567, -04.94335	181	271.5	Habitats	4	11
RSS90_S171	08/11/2014	49.8	48.4	58.90567, -04.90721	58.90617, -04.91269	353	529.5	Habitats	3	11
TS63_S62_A2	01/11/2014	87.9	85.6	59.01240, -05.18756	59.01030, -05.18905	253	379.5	20 second	2	10
Average per transect						**227.5**	**341.3**		**1.7**	**10.2**
Total analysed						**35490**	**53235**		**278**	**1696**

Appendix 7: Summary of transects: Numbers of sponge morphologies, and taxa, by phyla

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS30_S1	10	13.4 (1.82)	1.1 (0.43)	4.4 (0.69)	1.9 (0.81)	1.2 (0.20)	0.9 (0.23)	1.1 (0.31)	1.5 (0.27)	0.3 (0.15)	0.6 (0.16)	3.5 (0.58)	2.0 (0.26)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.3 (0.15)
TS31_S2	9	10.9 (1.15)	1.2 (0.22)	3.1 (0.54)	1.3 (0.24)	1.0 (0.17)	0.1 (0.11)	1.2 (0.22)	1.0 (0.24)	0.1 (0.11)	0.2 (0.15)	3.9 (0.42)	1.3 (0.33)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.7 (0.24)
TS29_S3	7	8.4 (2.25)	0.7 (0.36)	2.0 (0.95)	0.9 (0.34)	0.1 (0.14)	0.0 (0.00)	0.4 (0.20)	1.4 (0.43)	0.9 (0.40)	0.1 (0.14)	2.4 (1.04)	1.7 (0.36)	0.0 (0.00)	0.3 (0.18)	0.0 (0.00)	0.1 (0.14)
TS101_S4	10	7.6 (1.72)	0.6 (0.27)	3.0 (0.65)	0.8 (0.36)	0.7 (0.33)	0.4 (0.16)	0.2 (0.13)	1.9 (0.28)	0.6 (0.22)	0.1 (0.10)	1.9 (0.62)	1.0 (0.21)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS28_S5	14	18.3 (1.16)	2.1 (0.27)	6.4 (0.48)	2.7 (0.37)	1.2 (0.15)	0.5 (0.20)	0.9 (0.10)	1.9 (0.23)	3.6 (0.29)	1.9 (0.36)	4.4 (0.43)	1.3 (0.24)	0.0 (0.00)	0.1 (0.07)	0.0 (0.00)	0.0 (0.00)
TS59_S6	11	18.5 (0.96)	1.9 (0.21)	7.6 (0.39)	2.5 (0.28)	1.6 (0.20)	0.8 (0.12)	1.1 (0.09)	2.1 (0.16)	2.4 (0.41)	1.5 (0.34)	5.3 (0.24)	1.1 (0.21)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS60_S7	10	7.5 (0.52)	1.1 (0.10)	3.5 (0.17)	1.1 (0.10)	0.4 (0.16)	0.1 (0.10)	0.1 (0.10)	1.1 (0.10)	1.3 (0.37)	0.4 (0.16)	2.1 (0.23)	0.6 (0.22)	0.0 (0.00)	0.3 (0.15)	0.0 (0.00)	0.0 (0.00)
TS27_S8	10	11.2 (0.79)	1.8 (0.25)	4.1 (0.23)	2.8 (0.25)	1.2 (0.13)	0.2 (0.13)	0.8 (0.13)	1.0 (0.21)	1.3 (0.40)	0.2 (0.13)	2.3 (0.21)	1.2 (0.13)	0.1 (0.10)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
TS44_S9	12	6.2 (0.78)	1.0 (0.17)	3.2 (0.37)	1.1 (0.23)	0.4 (0.15)	0.3 (0.19)	0.1 (0.08)	0.9 (0.08)	0.8 (0.22)	0.0 (0.00)	1.7 (0.31)	0.9 (0.19)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS15_S10	9	11.6 (3.69)	0.8 (0.36)	4.4 (1.43)	0.7 (0.29)	1.3 (0.53)	0.0 (0.00)	0.3 (0.17)	1.2 (0.43)	1.0 (0.44)	0.4 (0.24)	4.3 (1.54)	0.8 (0.36)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)	1.3 (0.44)
TS16_S11	11	13.6 (1.74)	1.3 (0.38)	4.9 (0.73)	1.3 (0.38)	1.5 (0.31)	0.4 (0.20)	0.4 (0.15)	2.4 (0.24)	1.0 (0.19)	0.5 (0.16)	4.8 (0.87)	1.2 (0.40)	0.0 (0.00)	0.3 (0.14)	0.0 (0.00)	0.0 (0.00)
TS17_S12	10	16.7 (2.34)	1.2 (0.39)	5.6 (0.76)	1.3 (0.45)	1.2 (0.25)	0.2 (0.20)	0.3 (0.15)	1.9 (0.10)	1.8 (0.49)	1.2 (0.25)	6.2 (1.02)	1.4 (0.31)	0.6 (0.31)	0.1 (0.10)	0.1 (0.10)	0.4 (0.27)
TS18_S13	12	14.1 (1.14)	0.7 (0.26)	6.3 (0.51)	0.6 (0.23)	1.0 (0.25)	0.3 (0.22)	0.8 (0.17)	1.3 (0.13)	0.7 (0.33)	0.8 (0.27)	3.6 (0.56)	2.1 (0.38)	0.1 (0.08)	0.1 (0.08)	1.3 (0.13)	1.5 (0.26)
TS19_S14	9	10.0 (2.29)	1.6 (0.50)	4.9 (1.25)	1.8 (0.62)	0.0 (0.00)	0.2 (0.15)	0.0 (0.00)	1.2 (0.32)	0.9 (0.31)	0.2 (0.15)	3.3 (0.88)	1.0 (0.33)	0.0 (0.00)	0.2 (0.15)	0.7 (0.24)	0.7 (0.17)
TS12_S15	11	13.3 (1.35)	1.4 (0.41)	6.5 (0.58)	1.5 (0.45)	0.2 (0.12)	0.5 (0.16)	0.0 (0.00)	1.8 (0.12)	0.8 (0.23)	0.5 (0.16)	4.7 (0.56)	1.4 (0.20)	0.1 (0.09)	0.5 (0.16)	0.7 (0.14)	0.8 (0.18)
TS43_S16	10	9.4 (1.28)	1.1 (0.18)	4.3 (0.58)	1.7 (0.26)	0.4 (0.16)	0.4 (0.16)	0.5 (0.17)	0.9 (0.10)	0.9 (0.48)	0.5 (0.31)	1.2 (0.25)	2.1 (0.48)	0.0 (0.00)	0.0 (0.00)	0.8 (0.13)	0.0 (0.00)
TS14_S17	10	5.4 (0.69)	0.9 (0.18)	3.0 (0.21)	1.0 (0.26)	0.4 (0.16)	0.1 (0.10)	0.2 (0.13)	1.0 (0.00)	0.1 (0.10)	0.1 (0.10)	1.6 (0.16)	0.9 (0.23)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS13_S18	10	14.8 (1.76)	0.9 (0.23)	7.6 (0.96)	1.2 (0.29)	1.6 (0.31)	0.1 (0.10)	0.0 (0.00)	1.2 (0.25)	1.0 (0.21)	0.6 (0.22)	6.3 (0.79)	1.6 (0.34)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	1.1 (0.23)
TS32_S19	10	2.1 (0.67)	0.1 (0.10)	1.6 (0.50)	0.1 (0.10)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	1.1 (0.35)	0.1 (0.10)	0.1 (0.10)	0.5 (0.17)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS33_S20	11	14.7 (0.86)	1.2 (0.12)	6.3 (0.49)	2.1 (0.25)	1.3 (0.19)	0.1 (0.09)	1.0 (0.23)	1.8 (0.12)	0.8 (0.23)	1.3 (0.30)	2.6 (0.53)	2.4 (0.28)	0.2 (0.12)	0.1 (0.09)	1.1 (0.16)	0.0 (0.00)
TS58_S21	10	10.9 (1.22)	0.7 (0.21)	5.1 (0.43)	0.8 (0.25)	0.7 (0.26)	0.2 (0.13)	0.3 (0.21)	1.4 (0.16)	0.1 (0.10)	1.1 (0.31)	3.1 (0.28)	2.4 (0.31)	0.2 (0.13)	0.0 (0.00)	0.6 (0.16)	0.0 (0.00)
TS11_S22	10	13.7 (2.47)	0.8 (0.20)	6.1 (1.11)	1.3 (0.33)	1.0 (0.30)	0.2 (0.13)	1.6 (0.27)	1.5 (0.27)	0.1 (0.10)	1.6 (0.43)	3.4 (0.60)	2.1 (0.41)	0.0 (0.00)	0.0 (0.00)	0.9 (0.18)	0.0 (0.00)
TS49_S23	10	12.0 (1.73)	0.5 (0.17)	5.1 (0.84)	0.9 (0.31)	0.6 (0.27)	0.1 (0.10)	1.6 (0.22)	1.1 (0.23)	0.2 (0.13)	0.9 (0.28)	2.9 (0.46)	2.7 (0.42)	0.0 (0.00)	0.0 (0.00)	1.0 (0.15)	0.0 (0.00)
TS48_S24	10	9.2 (0.96)	0.1 (0.10)	4.2 (0.47)	0.1 (0.10)	0.7 (0.21)	0.5 (0.17)	0.9 (0.18)	0.9 (0.10)	0.1 (0.10)	0.4 (0.22)	2.0 (0.45)	2.4 (0.22)	0.0 (0.00)	0.0 (0.00)	1.2 (0.13)	0.5 (0.22)
TS41_S25	8	8.5 (3.14)	1.0 (0.46)	2.9 (1.08)	1.0 (0.46)	0.8 (0.31)	0.1 (0.13)	0.3 (0.16)	0.8 (0.31)	0.5 (0.38)	0.6 (0.32)	3.0 (1.21)	1.1 (0.35)	0.0 (0.00)	0.1 (0.13)	0.3 (0.16)	0.0 (0.00)
TS56_S26	12	10.8 (0.99)	1.0 (0.17)	5.2 (0.65)	1.2 (0.24)	0.3 (0.13)	0.7 (0.22)	1.3 (0.13)	1.2 (0.17)	0.5 (0.26)	0.3 (0.14)	1.6 (0.29)	2.3 (0.40)	0.1 (0.08)	0.1 (0.08)	1.3 (0.14)	0.3 (0.14)
TS57_S27	12	9.7 (0.71)	0.8 (0.21)	3.7 (0.53)	1.0 (0.28)	0.4 (0.15)	0.7 (0.14)	1.2 (0.11)	0.8 (0.13)	0.5 (0.19)	0.4 (0.15)	1.4 (0.23)	2.6 (0.38)	0.0 (0.00)	0.1 (0.08)	1.3 (0.22)	0.4 (0.15)
TS34_S28	11	9.9 (0.69)	0.7 (0.19)	5.4 (0.59)	0.8 (0.23)	0.5 (0.31)	0.2 (0.12)	0.2 (0.12)	1.1 (0.16)	0.5 (0.25)	0.4 (0.15)	2.8 (0.38)	2.0 (0.19)	0.2 (0.12)	0.1 (0.09)	0.5 (0.25)	0.8 (0.12)
TS35_S29	10	5.9 (2.87)	0.2 (0.20)	2.5 (1.10)	0.3 (0.30)	0.8 (0.42)	0.1 (0.10)	0.1 (0.10)	1.1 (0.38)	0.8 (0.47)	0.6 (0.27)	1.6 (0.85)	0.5 (0.34)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS40_S30	9	4.9 (2.17)	0.4 (0.34)	1.4 (0.73)	0.4 (0.34)	0.0 (0.00)	0.0 (0.00)	0.7 (0.24)	0.7 (0.29)	0.4 (0.24)	0.1 (0.11)	1.3 (0.69)	0.7 (0.37)	0.2 (0.22)	0.1 (0.11)	0.0 (0.00)	0.2 (0.15)
TS10_S31	9	11.2 (1.09)	0.8 (0.22)	5.6 (0.38)	1.2 (0.43)	0.4 (0.18)	0.8 (0.28)	1.0 (0.29)	1.2 (0.15)	0.7 (0.33)	0.6 (0.24)	2.7 (0.33)	1.1 (0.11)	0.1 (0.11)	0.1 (0.11)	0.8 (0.15)	0.7 (0.17)
TS50_S32	9	11.6 (1.20)	0.8 (0.15)	4.3 (0.53)	1.0 (0.24)	1.2 (0.32)	0.6 (0.18)	1.1 (0.20)	0.9 (0.11)	0.3 (0.24)	0.6 (0.18)	1.4 (0.29)	3.3 (0.24)	0.0 (0.00)	0.1 (0.11)	1.0 (0.00)	0.0 (0.00)
TS51_S33	10	11.9 (0.85)	1.1 (0.31)	4.4 (0.48)	1.4 (0.43)	1.4 (0.22)	0.3 (0.15)	0.8 (0.13)	1.0 (0.00)	0.5 (0.22)	0.3 (0.15)	3.7 (0.58)	1.7 (0.30)	0.1 (0.10)	0.1 (0.10)	0.6 (0.16)	0.0 (0.00)
TS36_S34	9	14.8 (0.91)	0.4 (0.18)	4.8 (0.32)	0.4 (0.18)	1.0 (0.47)	0.7 (0.24)	1.3 (0.17)	0.9 (0.11)	0.6 (0.24)	0.7 (0.24)	4.2 (0.36)	3.8 (0.52)	0.3 (0.24)	0.1 (0.11)	0.8 (0.15)	0.0 (0.00)
TS52_S35	10	14.9 (1.14)	0.7 (0.21)	5.7 (0.50)	1.5 (0.48)	0.9 (0.31)	0.5 (0.17)	1.5 (0.17)	0.7 (0.15)	0.3 (0.21)	0.9 (0.23)	4.1 (0.53)	3.6 (0.40)	0.0 (0.00)	0.1 (0.10)	0.8 (0.13)	0.0 (0.00)
TS53_S36	10	16.3 (1.03)	0.8 (0.20)	5.6 (0.48)	1.0 (0.26)	2.6 (0.34)	0.5 (0.22)	1.3 (0.26)	1.0 (0.00)	0.5 (0.27)	0.8 (0.20)	4.5 (0.62)	3.4 (0.27)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)	0.0 (0.00)
TS9_S37	11	19.0 (1.18)	0.7 (0.14)	6.3 (0.52)	1.2 (0.30)	2.2 (0.33)	0.4 (0.15)	1.1 (0.09)	1.0 (0.00)	1.3 (0.41)	1.5 (0.34)	6.2 (0.35)	3.5 (0.43)	0.0 (0.00)	0.0 (0.00)	0.8 (0.12)	0.0 (0.00)
TS46_S38	10	16.9 (1.32)	0.6 (0.16)	6.6 (0.37)	0.6 (0.16)	0.8 (0.33)	0.9 (0.28)	1.3 (0.21)	0.9 (0.10)	1.1 (0.41)	0.3 (0.21)	5.7 (0.42)	3.8 (0.36)	0.1 (0.10)	0.1 (0.10)	1.3 (0.15)	0.0 (0.00)
TS07_S39	10	14.7 (1.16)	0.3 (0.15)	4.9 (0.50)	0.2 (0.13)	1.2 (0.44)	1.7 (0.33)	1.5 (0.17)	0.9 (0.10)	0.1 (0.10)	0.4 (0.16)	2.6 (0.27)	3.8 (0.25)	0.0 (0.00)	0.2 (0.13)	1.5 (0.31)	0.6 (0.16)
TS05_S40	12	10.3 (1.67)	0.5 (0.15)	3.2 (0.63)	0.8 (0.28)	1.2 (0.47)	0.9 (0.29)	1.0 (0.21)	0.4 (0.15)	0.3 (0.18)	0.8 (0.13)	1.4 (0.51)	2.6 (0.36)	0.0 (0.00)	0.2 (0.11)	0.9 (0.08)	0.0 (0.00)

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect																
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS03_S41	8	15.9 (1.29)	0.8 (0.16)	5.4 (0.38)	1.0 (0.27)	2.8 (0.31)	0.0 (0.00)	1.5 (0.19)	1.0 (0.00)	1.0 (0.38)	0.9 (0.13)	5.0 (0.38)	2.1 (0.40)	0.0 (0.00)	0.1 (0.13)	0.5 (0.19)	0.0 (0.00)
TS02_S42	11	9.8 (1.29)	0.6 (0.15)	3.3 (0.57)	0.7 (0.19)	2.2 (0.54)	0.0 (0.00)	0.6 (0.15)	0.9 (0.09)	0.4 (0.15)	0.3 (0.14)	3.6 (0.56)	0.8 (0.26)	0.1 (0.09)	0.2 (0.12)	0.0 (0.00)	0.0 (0.00)
TS55_S43	7	14.3 (1.30)	0.6 (0.37)	5.9 (0.40)	0.6 (0.37)	1.6 (0.30)	0.4 (0.20)	0.6 (0.20)	1.4 (0.20)	0.1 (0.14)	1.9 (0.34)	4.3 (0.36)	2.4 (0.20)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)	0.0 (0.00)
TS06_S44	10	5.2 (1.21)	0.3 (0.15)	2.7 (0.65)	0.3 (0.15)	0.0 (0.00)	0.2 (0.13)	0.2 (0.20)	0.7 (0.15)	0.5 (0.17)	0.0 (0.00)	1.2 (0.47)	1.3 (0.37)	0.0 (0.00)	0.0 (0.00)	0.7 (0.15)	0.1 (0.10)
TS04_S45	10	5.1 (1.36)	0.1 (0.10)	2.4 (0.69)	0.1 (0.10)	0.2 (0.13)	0.4 (0.16)	0.5 (0.22)	0.6 (0.16)	0.0 (0.00)	0.1 (0.10)	1.3 (0.33)	1.2 (0.36)	0.1 (0.10)	0.0 (0.00)	0.6 (0.16)	0.1 (0.10)
TS08_S46	11	6.6 (0.54)	0.3 (0.19)	4.1 (0.28)	0.3 (0.19)	0.2 (0.12)	0.4 (0.15)	0.6 (0.20)	0.9 (0.09)	0.0 (0.00)	0.3 (0.14)	2.0 (0.23)	1.0 (0.13)	0.0 (0.00)	0.0 (0.00)	0.9 (0.09)	0.3 (0.14)
TS54_S47	9	7.4 (0.87)	0.3 (0.24)	3.8 (0.32)	0.3 (0.24)	0.7 (0.33)	0.3 (0.17)	0.2 (0.15)	0.9 (0.11)	0.6 (0.24)	0.0 (0.00)	1.4 (0.18)	1.6 (0.29)	0.0 (0.00)	0.2 (0.15)	1.1 (0.20)	0.3 (0.17)
TS45_S48	12	5.3 (0.48)	0.4 (0.15)	2.6 (0.29)	0.4 (0.15)	0.3 (0.13)	0.2 (0.11)	0.8 (0.24)	0.2 (0.11)	0.1 (0.08)	0.2 (0.11)	1.2 (0.17)	1.3 (0.13)	0.0 (0.00)	0.1 (0.08)	1.0 (0.00)	0.2 (0.11)
TS39_S49	11	10.6 (0.28)	0.5 (0.21)	5.5 (0.34)	0.5 (0.21)	0.5 (0.21)	0.0 (0.00)	0.0 (0.00)	1.9 (0.25)	0.7 (0.24)	0.1 (0.09)	3.6 (0.28)	1.7 (0.24)	0.0 (0.00)	0.0 (0.00)	0.1 (0.09)	1.7 (0.19)
TS37_S50	11	5.9 (0.31)	0.1 (0.09)	2.5 (0.31)	0.1 (0.09)	0.8 (0.12)	0.0 (0.00)	0.0 (0.00)	1.2 (0.18)	0.4 (0.15)	0.2 (0.12)	1.7 (0.27)	1.5 (0.25)	0.0 (0.00)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)
TS23_S51	11	8.4 (0.64)	1.7 (0.24)	3.6 (0.31)	1.8 (0.30)	1.0 (0.00)	0.6 (0.15)	0.3 (0.14)	1.5 (0.16)	0.0 (0.00)	0.2 (0.12)	2.6 (0.28)	0.4 (0.15)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS22_S52	11	5.4 (1.02)	0.2 (0.18)	2.3 (0.45)	0.3 (0.27)	0.7 (0.19)	0.1 (0.09)	0.3 (0.19)	0.8 (0.12)	0.1 (0.09)	0.2 (0.12)	2.0 (0.45)	0.9 (0.25)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS47_S53	8	9.3 (2.19)	1.4 (0.41)	4.0 (0.93)	2.0 (0.53)	0.5 (0.27)	0.4 (0.18)	0.6 (0.18)	1.0 (0.27)	0.5 (0.27)	0.6 (0.26)	2.4 (0.60)	1.3 (0.31)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS38_S54	12	9.3 (0.91)	0.3 (0.14)	3.7 (0.33)	0.3 (0.14)	1.8 (0.25)	0.7 (0.14)	0.0 (0.00)	1.3 (0.22)	1.1 (0.31)	0.7 (0.14)	2.3 (0.28)	1.1 (0.23)	0.0 (0.00)	0.1 (0.08)	0.0 (0.00)	0.0 (0.00)
TS26_S55	11	13.4 (0.41)	1.1 (0.25)	6.3 (0.43)	1.1 (0.25)	1.7 (0.14)	0.3 (0.14)	0.3 (0.14)	1.8 (0.12)	1.5 (0.25)	1.0 (0.19)	4.2 (0.23)	1.5 (0.34)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS42_S56	10	10.6 (1.11)	0.8 (0.13)	5.6 (0.37)	0.8 (0.13)	0.8 (0.20)	0.9 (0.28)	0.1 (0.10)	1.9 (0.10)	0.3 (0.21)	0.4 (0.16)	4.5 (0.54)	0.8 (0.20)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
TS93_S57	10	12.1 (1.62)	1.4 (0.34)	5.4 (0.65)	1.5 (0.40)	1.0 (0.15)	0.5 (0.17)	0.0 (0.00)	1.9 (0.10)	1.1 (0.23)	0.7 (0.21)	4.3 (0.72)	1.1 (0.31)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS85_S58	11	11.5 (1.67)	0.9 (0.31)	5.8 (0.84)	1.0 (0.33)	0.7 (0.14)	0.2 (0.12)	0.0 (0.00)	1.7 (0.19)	1.2 (0.26)	0.6 (0.20)	4.6 (0.75)	1.5 (0.28)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS98_S59	9	13.1 (0.70)	0.3 (0.17)	5.8 (0.40)	0.3 (0.17)	1.7 (0.24)	0.4 (0.18)	0.0 (0.00)	2.0 (0.00)	2.2 (0.43)	0.8 (0.22)	4.1 (0.39)	1.6 (0.29)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS61_S60	9	5.4 (1.20)	0.3 (0.17)	2.0 (0.53)	0.4 (0.24)	0.9 (0.11)	0.2 (0.15)	0.0 (0.00)	1.1 (0.26)	0.7 (0.29)	0.0 (0.00)	1.3 (0.50)	0.7 (0.33)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)
TS62_S61	10	11.8 (1.12)	0.6 (0.16)	4.5 (0.45)	0.6 (0.16)	1.4 (0.22)	0.4 (0.16)	0.0 (0.00)	1.9 (0.10)	2.1 (0.38)	0.8 (0.20)	3.5 (0.50)	1.0 (0.26)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS63_S62_A2	10	11.0 (1.15)	0.6 (0.27)	4.4 (0.45)	0.6 (0.27)	1.0 (0.26)	0.7 (0.26)	0.0 (0.00)	2.0 (0.00)	1.5 (0.34)	0.7 (0.21)	3.4 (0.58)	0.8 (0.13)	0.0 (0.00)	0.3 (0.15)	0.0 (0.00)	0.0 (0.00)
TS97_S63	11	13.2 (0.71)	1.0 (0.19)	6.7 (0.33)	1.0 (0.19)	1.2 (0.18)	0.5 (0.16)	0.0 (0.00)	1.9 (0.09)	1.3 (0.33)	0.5 (0.16)	6.2 (0.46)	0.5 (0.16)	0.0 (0.00)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)
TS73_S64	8	7.8 (0.92)	0.6 (0.26)	4.0 (0.38)	0.6 (0.26)	0.9 (0.23)	0.1 (0.13)	0.6 (0.18)	1.5 (0.19)	0.3 (0.16)	0.5 (0.19)	2.5 (0.46)	0.6 (0.26)	0.0 (0.00)	0.1 (0.13)	0.0 (0.00)	0.0 (0.00)
TS67_S65	10	7.4 (1.35)	0.9 (0.23)	3.3 (0.37)	0.9 (0.23)	1.0 (0.33)	0.1 (0.10)	0.5 (0.31)	1.6 (0.22)	0.3 (0.15)	0.2 (0.13)	2.0 (0.37)	0.7 (0.21)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
TS77_S68	6	0.5 (0.50)	0.2 (0.17)	0.2 (0.17)	0.2 (0.17)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.2 (0.17)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.2 (0.17)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS75_S69	9	7.6 (0.75)	0.7 (0.24)	3.3 (0.55)	0.8 (0.28)	1.6 (0.29)	0.2 (0.15)	0.0 (0.00)	1.2 (0.15)	0.2 (0.15)	0.4 (0.24)	2.6 (0.63)	0.6 (0.18)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS74_S70	10	5.3 (0.62)	0.2 (0.13)	2.0 (0.52)	0.4 (0.31)	0.9 (0.18)	0.3 (0.15)	0.1 (0.10)	0.0 (0.00)	0.2 (0.13)	0.1 (0.10)	2.6 (0.37)	0.6 (0.16)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
TS71_S71	10	7.7 (0.58)	1.2 (0.25)	4.4 (0.43)	1.2 (0.25)	0.6 (0.16)	0.2 (0.13)	0.1 (0.10)	1.4 (0.22)	0.5 (0.17)	0.2 (0.13)	3.2 (0.20)	0.3 (0.15)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS70_S72	13	9.2 (0.88)	0.7 (0.17)	4.2 (0.41)	0.7 (0.17)	1.7 (0.26)	0.2 (0.10)	0.1 (0.08)	1.8 (0.12)	0.8 (0.23)	0.3 (0.13)	2.8 (0.34)	0.8 (0.25)	0.0 (0.00)	0.1 (0.08)	0.0 (0.00)	0.0 (0.00)
TS69_S73	10	1.8 (0.36)	0.0 (0.00)	1.2 (0.25)	0.0 (0.00)	0.2 (0.13)	0.1 (0.10)	0.0 (0.00)	1.0 (0.15)	0.0 (0.00)	0.0 (0.00)	0.2 (0.13)	0.2 (0.13)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
TS76_S74	10	7.1 (0.69)	0.3 (0.15)	3.9 (0.35)	0.1 (0.10)	0.9 (0.23)	0.0 (0.00)	0.0 (0.00)	1.8 (0.13)	0.3 (0.21)	0.1 (0.10)	3.0 (0.37)	0.7 (0.21)	0.0 (0.00)	0.2 (0.13)	0.0 (0.00)	0.0 (0.00)
TS100_S75	11	4.8 (0.52)	0.5 (0.16)	2.9 (0.25)	0.5 (0.16)	0.6 (0.15)	0.0 (0.00)	0.6 (0.15)	1.2 (0.12)	0.1 (0.09)	0.0 (0.00)	1.8 (0.23)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS68_S76	11	5.8 (1.58)	0.3 (0.14)	2.9 (0.79)	0.3 (0.14)	1.0 (0.30)	0.0 (0.00)	0.1 (0.09)	1.1 (0.28)	0.5 (0.28)	0.0 (0.00)	2.5 (0.67)	0.4 (0.20)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS24_S77	13	10.6 (0.62)	0.6 (0.18)	5.2 (0.36)	0.5 (0.14)	1.8 (0.25)	0.0 (0.00)	0.2 (0.12)	1.5 (0.14)	1.1 (0.26)	0.2 (0.10)	4.4 (0.38)	0.8 (0.25)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS66_S78	9	2.8 (0.81)	0.2 (0.22)	1.8 (0.32)	0.2 (0.22)	0.2 (0.15)	0.0 (0.00)	0.0 (0.00)	0.8 (0.15)	0.1 (0.11)	0.1 (0.11)	1.2 (0.43)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS65_S79	12	4.2 (0.67)	0.5 (0.19)	2.1 (0.36)	0.7 (0.28)	0.3 (0.13)	0.2 (0.11)	0.0 (0.00)	0.6 (0.19)	0.4 (0.15)	0.1 (0.08)	0.8 (0.27)	0.8 (0.18)	0.0 (0.00)	0.1 (0.08)	0.0 (0.00)	1.2 (0.21)
TS96_S80	10	0.2 (0.20)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS94_S81	11	3.1 (0.76)	0.4 (0.15)	1.5 (0.28)	0.4 (0.15)	0.5 (0.16)	0.1 (0.09)	0.6 (0.20)	0.8 (0.12)	0.1 (0.09)	0.0 (0.00)	0.6 (0.24)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS92_S82	11	7.5 (0.47)	1.4 (0.15)	2.9 (0.37)	1.5 (0.16)	1.1 (0.09)	0.5 (0.16)	0.0 (0.00)	0.9 (0.21)	0.5 (0.21)	0.4 (0.20)	2.1 (0.16)	0.5 (0.21)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
TS95_S83	9	7.1 (1.11)	1.2 (0.15)	3.0 (0.29)	1.7 (0.24)	0.8 (0.15)	0.7 (0.24)	0.3 (0.17)	0.7 (0.17)	0.2 (0.15)	0.1 (0.11)	1.7 (0.17)	0.7 (0.33)	0.2 (0.15)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)
TS78_S84	9	1.8 (0.62)	0.0 (0.00)	0.8 (0.28)	0.0 (0.00)	0.2 (0.15)	0.1 (0.11)	0.0 (0.00)	0.8 (0.28)	0.2 (0.15)	0.2 (0.15)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.2 (0.15)	0.0 (0.00)	0.0 (0.00)

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS64_S85	9	7.7 (0.62)	1.3 (0.17)	3.6 (0.38)	1.8 (0.28)	0.8 (0.15)	0.7 (0.29)	0.0 (0.00)	1.0 (0.00)	0.8 (0.28)	0.2 (0.15)	1.9 (0.26)	0.2 (0.15)	0.1 (0.11)	0.2 (0.15)	0.0 (0.00)	0.0 (0.00)
RSS69_S86	10	3.1 (0.78)	0.1 (0.10)	1.9 (0.66)	0.1 (0.10)	0.5 (0.17)	0.1 (0.10)	0.0 (0.00)	0.8 (0.20)	0.0 (0.00)	0.2 (0.20)	1.2 (0.42)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)
RSS58_S87	10	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.0 (0.00)
RSS38_S88	9	8.4 (0.73)	0.7 (0.29)	5.2 (0.43)	0.9 (0.45)	0.2 (0.22)	0.2 (0.15)	0.0 (0.00)	1.3 (0.17)	0.2 (0.22)	0.1 (0.11)	3.7 (0.37)	0.6 (0.24)	0.0 (0.00)	0.0 (0.00)	0.6 (0.18)	0.7 (0.17)
RSS50_S89	9	8.1 (1.09)	0.7 (0.29)	4.2 (0.36)	1.0 (0.41)	0.0 (0.00)	0.7 (0.17)	0.2 (0.22)	0.8 (0.15)	0.1 (0.11)	0.0 (0.00)	2.2 (0.46)	1.4 (0.53)	0.0 (0.00)	0.1 (0.11)	1.0 (0.00)	0.6 (0.18)
RSS46_S90	11	7.2 (0.33)	0.4 (0.20)	5.4 (0.28)	0.5 (0.28)	0.1 (0.09)	0.3 (0.14)	0.0 (0.00)	1.9 (0.21)	0.2 (0.12)	0.0 (0.00)	3.1 (0.37)	0.3 (0.14)	0.0 (0.00)	0.0 (0.00)	0.1 (0.09)	0.8 (0.12)
RSS57_S91	11	10.5 (1.51)	1.0 (0.23)	5.7 (0.68)	1.3 (0.38)	0.2 (0.12)	0.2 (0.12)	0.6 (0.15)	1.8 (0.26)	0.4 (0.20)	0.6 (0.28)	2.7 (0.38)	1.3 (0.24)	0.2 (0.12)	0.1 (0.09)	0.6 (0.15)	0.5 (0.21)
RSS65_S92	11	8.0 (0.89)	0.3 (0.14)	4.4 (0.64)	0.4 (0.20)	0.1 (0.09)	0.5 (0.21)	0.4 (0.15)	1.1 (0.16)	0.1 (0.09)	0.4 (0.20)	2.1 (0.46)	1.5 (0.25)	0.1 (0.09)	0.1 (0.09)	0.5 (0.16)	0.7 (0.14)
RSS40_S93	8	8.9 (1.14)	1.0 (0.19)	5.1 (0.55)	1.0 (0.19)	0.0 (0.00)	0.4 (0.18)	0.4 (0.26)	1.4 (0.26)	0.5 (0.27)	0.4 (0.26)	3.0 (0.46)	0.9 (0.30)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)
RSS67_S96	9	8.1 (0.48)	0.3 (0.17)	5.7 (0.50)	0.3 (0.17)	0.1 (0.11)	0.0 (0.00)	0.1 (0.11)	1.3 (0.17)	0.0 (0.00)	0.0 (0.00)	3.3 (0.24)	1.9 (0.42)	0.0 (0.00)	0.1 (0.11)	0.4 (0.18)	0.4 (0.18)
RSS53_S97	11	2.2 (1.11)	0.1 (0.09)	1.5 (0.76)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)	0.5 (0.25)	0.5 (0.28)	0.0 (0.00)	0.1 (0.09)	0.8 (0.40)	0.2 (0.12)	0.0 (0.00)	0.0 (0.00)	0.1 (0.09)	0.3 (0.14)
RSS52_S98	10	6.5 (1.85)	0.5 (0.22)	3.4 (0.83)	0.5 (0.22)	0.2 (0.20)	0.0 (0.00)	0.1 (0.10)	0.8 (0.20)	0.3 (0.15)	0.3 (0.15)	2.2 (0.57)	1.3 (0.37)	0.0 (0.00)	0.0 (0.00)	0.2 (0.13)	1.2 (0.25)
RSS70_S99	9	2.3 (0.99)	0.1 (0.11)	1.8 (0.49)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.8 (0.22)	0.0 (0.00)	0.0 (0.00)	1.2 (0.49)	0.7 (0.29)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
RSS60_S100	9	10.3 (1.17)	0.3 (0.17)	5.7 (0.67)	0.3 (0.17)	0.1 (0.11)	0.1 (0.11)	0.8 (0.15)	1.6 (0.24)	0.4 (0.18)	0.6 (0.24)	4.4 (0.75)	0.9 (0.20)	0.1 (0.11)	0.1 (0.11)	0.0 (0.00)	0.9 (0.11)
RSS59_S101	10	9.0 (1.15)	0.2 (0.13)	4.8 (0.44)	0.3 (0.21)	0.3 (0.21)	0.1 (0.10)	0.0 (0.00)	1.5 (0.27)	0.5 (0.17)	0.1 (0.10)	3.6 (0.60)	1.3 (0.40)	0.1 (0.10)	0.1 (0.10)	0.0 (0.00)	1.1 (0.18)
RSS41_S102	10	1.9 (1.20)	0.2 (0.20)	0.5 (0.34)	0.3 (0.21)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	0.2 (0.20)	0.0 (0.00)	0.1 (0.10)	0.9 (0.60)	0.4 (0.16)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)
RSS54_S103	10	8.8 (1.81)	0.7 (0.26)	4.6 (1.12)	0.8 (0.33)	0.4 (0.22)	0.3 (0.15)	0.2 (0.13)	1.8 (0.42)	0.3 (0.15)	0.2 (0.13)	1.8 (0.49)	1.8 (0.42)	0.0 (0.00)	0.1 (0.10)	0.7 (0.15)	0.4 (0.22)
RSS55_S104	11	10.1 (1.39)	0.5 (0.21)	5.2 (0.77)	0.5 (0.28)	0.1 (0.09)	0.1 (0.09)	0.5 (0.16)	1.3 (0.24)	0.4 (0.15)	0.5 (0.21)	3.1 (0.46)	2.2 (0.38)	0.0 (0.00)	0.0 (0.00)	0.5 (0.16)	0.9 (0.21)
RSS39_S105	8	0.6 (0.50)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.3 (0.25)	0.3 (0.25)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.4 (0.26)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
RSS47_S106	9	8.9 (1.74)	0.7 (0.24)	4.3 (0.96)	0.7 (0.24)	0.1 (0.11)	0.4 (0.18)	0.3 (0.17)	1.0 (0.24)	0.3 (0.17)	0.1 (0.11)	2.6 (0.53)	2.3 (0.50)	0.0 (0.00)	0.0 (0.00)	0.4 (0.18)	0.7 (0.17)
RSS63_S107	10	10.8 (1.00)	0.4 (0.22)	4.5 (0.52)	0.5 (0.31)	0.0 (0.00)	0.6 (0.16)	1.3 (0.21)	0.9 (0.10)	0.3 (0.21)	0.5 (0.27)	2.5 (0.50)	2.5 (0.40)	0.0 (0.00)	0.1 (0.10)	1.1 (0.10)	0.6 (0.22)

Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
RSS68_S108	10	12.4 (1.48)	2.0 (0.52)	5.4 (0.60)	2.1 (0.55)	0.0 (0.00)	0.5 (0.22)	0.5 (0.17)	1.7 (0.15)	0.8 (0.29)	0.4 (0.22)	3.3 (0.52)	1.7 (0.26)	0.0 (0.00)	0.1 (0.10)	0.5 (0.17)	0.8 (0.25)
RSS48_S109	10	10.9 (0.78)	0.5 (0.22)	5.2 (0.65)	0.6 (0.27)	0.4 (0.22)	0.3 (0.15)	0.4 (0.22)	1.1 (0.10)	0.3 (0.15)	0.5 (0.17)	3.2 (0.39)	2.5 (0.27)	0.1 (0.10)	0.0 (0.00)	0.8 (0.20)	1.0 (0.26)
RSS61_S110	10	9.8 (1.24)	0.4 (0.22)	5.0 (0.75)	0.6 (0.31)	0.2 (0.13)	0.4 (0.16)	1.0 (0.21)	1.1 (0.18)	0.2 (0.13)	0.4 (0.16)	2.3 (0.33)	2.3 (0.45)	0.0 (0.00)	0.1 (0.10)	1.0 (0.21)	0.8 (0.13)
RSS66_S111	11	11.7 (1.00)	0.2 (0.12)	5.5 (0.53)	0.2 (0.12)	0.4 (0.28)	0.8 (0.12)	0.8 (0.18)	1.3 (0.14)	0.5 (0.28)	0.5 (0.16)	3.0 (0.47)	2.8 (0.33)	0.0 (0.00)	0.0 (0.00)	1.1 (0.09)	1.0 (0.23)
RSS44_S112	11	7.0 (1.39)	0.2 (0.12)	2.9 (0.64)	0.2 (0.12)	0.4 (0.20)	0.5 (0.16)	0.9 (0.21)	0.6 (0.15)	0.3 (0.14)	0.1 (0.09)	1.3 (0.45)	1.8 (0.55)	0.0 (0.00)	0.4 (0.20)	0.6 (0.20)	0.5 (0.21)
RSS56_S113	10	3.4 (0.96)	0.2 (0.20)	2.1 (0.55)	0.4 (0.40)	0.1 (0.10)	0.1 (0.10)	0.7 (0.21)	0.7 (0.15)	0.0 (0.00)	0.0 (0.00)	1.3 (0.42)	0.1 (0.10)	0.1 (0.10)	0.0 (0.00)	0.2 (0.13)	0.1 (0.10)
RSS42_S114	9	14.4 (0.71)	0.9 (0.31)	7.4 (0.53)	1.0 (0.29)	0.8 (0.28)	0.3 (0.17)	0.1 (0.11)	1.6 (0.18)	2.0 (0.37)	0.6 (0.24)	4.8 (0.49)	1.6 (0.24)	0.1 (0.11)	0.0 (0.00)	0.9 (0.26)	1.3 (0.17)
RSS62_S115	10	11.6 (0.87)	0.5 (0.22)	5.4 (0.43)	0.6 (0.31)	0.5 (0.34)	0.5 (0.17)	1.1 (0.18)	1.3 (0.15)	0.4 (0.16)	0.7 (0.26)	3.0 (0.26)	2.3 (0.21)	0.2 (0.13)	0.0 (0.00)	1.1 (0.10)	0.5 (0.17)
RSS49_S116	11	10.6 (0.73)	0.0 (0.00)	4.6 (0.20)	0.0 (0.00)	1.4 (0.28)	0.4 (0.20)	0.0 (0.00)	1.2 (0.12)	0.5 (0.16)	0.5 (0.16)	5.7 (0.49)	1.1 (0.25)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
RSS43_S118	9	15.7 (1.64)	0.6 (0.18)	6.2 (0.57)	0.7 (0.24)	1.2 (0.40)	0.9 (0.26)	0.8 (0.32)	1.7 (0.17)	0.4 (0.24)	1.0 (0.29)	4.9 (0.63)	2.8 (0.28)	0.2 (0.15)	0.0 (0.00)	1.1 (0.11)	0.0 (0.00)
RSS51_S119	11	17.8 (0.88)	0.6 (0.15)	6.5 (0.21)	0.7 (0.19)	3.1 (0.44)	0.5 (0.16)	0.9 (0.09)	2.4 (0.20)	0.5 (0.16)	1.3 (0.33)	4.7 (0.33)	2.5 (0.31)	0.2 (0.12)	0.0 (0.00)	0.9 (0.09)	0.0 (0.00)
RSS37_S120	9	11.3 (1.17)	0.1 (0.11)	5.2 (0.43)	0.1 (0.11)	1.3 (0.55)	0.2 (0.15)	0.0 (0.00)	2.0 (0.24)	0.2 (0.15)	0.0 (0.00)	4.3 (0.65)	2.1 (0.31)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)	0.0 (0.00)
RSS45_S121	9	13.2 (1.06)	0.1 (0.11)	6.7 (0.24)	0.1 (0.11)	1.7 (0.44)	0.0 (0.00)	0.4 (0.24)	2.6 (0.24)	0.7 (0.24)	0.7 (0.33)	4.8 (0.43)	1.2 (0.15)	0.0 (0.00)	0.1 (0.11)	1.0 (0.00)	0.0 (0.00)
RSS64_S122	12	13.7 (0.74)	1.2 (0.27)	4.9 (0.47)	1.3 (0.33)	0.4 (0.15)	0.4 (0.19)	0.4 (0.15)	1.8 (0.17)	0.8 (0.25)	1.3 (0.22)	4.1 (0.45)	2.1 (0.15)	0.3 (0.14)	0.8 (0.11)	0.0 (0.00)	0.0 (0.00)
RSS36_S123	11	4.8 (1.27)	0.2 (0.12)	2.1 (0.49)	0.2 (0.12)	0.2 (0.12)	0.2 (0.18)	0.3 (0.14)	1.3 (0.27)	0.2 (0.12)	0.3 (0.19)	1.6 (0.47)	0.5 (0.21)	0.1 (0.09)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)
TS99_S124	10	8.5 (1.19)	0.4 (0.16)	2.5 (0.43)	0.4 (0.16)	1.2 (0.33)	0.4 (0.16)	0.7 (0.15)	1.9 (0.23)	0.7 (0.21)	0.5 (0.22)	1.5 (0.50)	1.0 (0.30)	0.0 (0.00)	0.2 (0.13)	0.0 (0.00)	0.0 (0.00)
TS89_S125	11	5.5 (0.78)	0.9 (0.25)	2.4 (0.20)	1.0 (0.30)	0.3 (0.14)	0.5 (0.21)	0.2 (0.18)	2.2 (0.23)	0.1 (0.09)	0.1 (0.09)	0.7 (0.24)	0.5 (0.25)	0.0 (0.00)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)
TS88_S126	9	3.4 (1.52)	0.1 (0.11)	1.7 (0.67)	0.1 (0.11)	0.1 (0.11)	0.0 (0.00)	0.1 (0.11)	1.0 (0.44)	0.7 (0.33)	0.4 (0.34)	0.7 (0.37)	0.2 (0.22)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)
TS86_S127	11	16.9 (0.46)	0.9 (0.21)	5.9 (0.34)	0.9 (0.21)	3.4 (0.24)	0.0 (0.00)	0.4 (0.15)	2.5 (0.21)	1.3 (0.33)	0.5 (0.16)	5.7 (0.33)	1.8 (0.40)	0.0 (0.00)	0.4 (0.15)	0.0 (0.00)	0.1 (0.09)
TS87_S128	11	12.9 (0.89)	0.1 (0.09)	5.7 (0.19)	0.2 (0.12)	2.1 (0.31)	0.2 (0.12)	0.1 (0.09)	2.5 (0.21)	1.2 (0.18)	0.1 (0.09)	5.6 (0.24)	0.6 (0.24)	0.1 (0.09)	0.0 (0.00)	0.0 (0.00)	0.2 (0.12)
TS84_S129	8	10.8 (1.19)	0.6 (0.26)	6.0 (0.38)	0.6 (0.26)	1.6 (0.60)	0.3 (0.16)	0.1 (0.13)	1.9 (0.23)	0.5 (0.27)	0.1 (0.13)	4.9 (0.40)	0.5 (0.27)	0.0 (0.00)	0.3 (0.16)	0.0 (0.00)	0.0 (0.00)

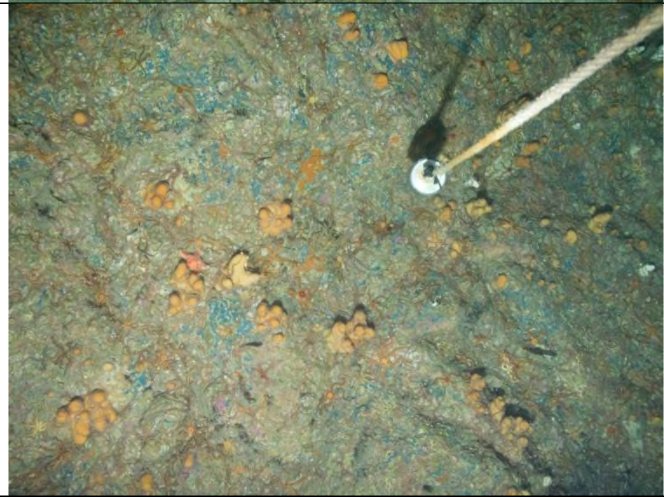
Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
TS83_S130	11	4.8 (1.85)	0.5 (0.28)	2.2 (0.77)	0.5 (0.28)	0.5 (0.31)	0.5 (0.21)	0.2 (0.12)	0.8 (0.33)	0.1 (0.09)	0.0 (0.00)	2.1 (0.84)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.09)
TS82_S131	11	14.7 (0.81)	0.1 (0.09)	5.5 (0.31)	0.1 (0.09)	2.6 (0.39)	0.2 (0.12)	0.4 (0.15)	1.8 (0.18)	1.6 (0.24)	0.5 (0.16)	6.3 (0.38)	1.1 (0.25)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.2 (0.12)
TS72_S132	9	0.4 (0.24)	0.0 (0.00)	0.2 (0.22)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.11)	0.1 (0.11)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)	0.0 (0.00)
TS81_S133	12	14.8 (1.21)	0.6 (0.26)	5.7 (0.33)	0.6 (0.26)	2.8 (0.44)	0.6 (0.19)	0.1 (0.08)	1.7 (0.19)	1.7 (0.22)	0.3 (0.19)	5.0 (0.43)	1.4 (0.31)	0.0 (0.00)	0.1 (0.08)	0.0 (0.00)	0.5 (0.15)
TS1_S134	10	9.4 (1.93)	1.6 (0.65)	4.1 (0.85)	1.8 (0.68)	1.1 (0.28)	0.6 (0.31)	0.1 (0.10)	1.5 (0.27)	0.5 (0.22)	0.0 (0.00)	3.7 (0.83)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)
TS103_S135	12	13.1 (1.27)	0.7 (0.26)	4.3 (0.56)	0.8 (0.24)	1.3 (0.31)	0.5 (0.19)	0.0 (0.00)	2.2 (0.17)	1.7 (0.26)	0.6 (0.19)	4.3 (0.53)	0.9 (0.34)	0.1 (0.08)	0.3 (0.18)	0.0 (0.00)	0.4 (0.15)
TS91_S136	10	9.4 (1.19)	0.7 (0.33)	4.8 (0.42)	0.6 (0.31)	1.5 (0.31)	0.4 (0.22)	0.0 (0.00)	1.6 (0.27)	0.7 (0.21)	0.4 (0.16)	3.6 (0.34)	0.3 (0.15)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.2 (0.13)
TS102_S137	10	8.0 (1.94)	0.2 (0.13)	3.2 (0.76)	0.2 (0.13)	1.1 (0.41)	0.4 (0.16)	0.1 (0.10)	1.6 (0.34)	0.6 (0.31)	0.5 (0.31)	2.7 (0.80)	0.4 (0.16)	0.0 (0.00)	0.1 (0.10)	0.1 (0.10)	0.2 (0.13)
TS79_S138	11	15.5 (1.21)	0.0 (0.00)	4.9 (0.44)	0.0 (0.00)	2.5 (0.25)	0.1 (0.09)	0.1 (0.09)	1.8 (0.23)	2.1 (0.37)	1.1 (0.37)	5.8 (0.54)	1.5 (0.21)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.5 (0.16)
TS80_S139	10	16.0 (1.56)	0.4 (0.16)	4.9 (0.43)	0.4 (0.16)	3.4 (0.60)	0.6 (0.16)	0.1 (0.10)	2.2 (0.20)	1.9 (0.50)	0.7 (0.21)	5.3 (0.72)	1.2 (0.20)	0.0 (0.00)	0.1 (0.10)	0.0 (0.00)	0.1 (0.10)
RSS91_S140	11	15.0 (0.95)	1.6 (0.20)	6.3 (0.52)	2.0 (0.33)	0.5 (0.31)	0.9 (0.28)	1.5 (0.16)	1.3 (0.24)	0.3 (0.14)	0.6 (0.20)	2.8 (0.60)	2.6 (0.20)	0.1 (0.09)	0.0 (0.00)	0.9 (0.16)	1.4 (0.31)
RSS101_S141	10	12.2 (1.48)	0.4 (0.27)	4.9 (0.50)	0.4 (0.27)	1.7 (0.47)	0.1 (0.10)	0.8 (0.13)	1.7 (0.15)	1.0 (0.37)	0.6 (0.22)	4.7 (0.65)	0.7 (0.30)	0.0 (0.00)	0.0 (0.00)	0.1 (0.10)	0.4 (0.22)
RSS98_S142	11	7.3 (1.53)	0.1 (0.09)	4.1 (0.73)	0.1 (0.09)	0.7 (0.24)	0.5 (0.21)	0.0 (0.00)	1.2 (0.12)	0.6 (0.24)	0.1 (0.09)	3.0 (0.71)	0.6 (0.28)	0.0 (0.00)	0.2 (0.12)	0.0 (0.00)	0.2 (0.12)
RSS85_S143	11	10.6 (1.57)	1.4 (0.31)	4.3 (0.73)	1.4 (0.31)	0.5 (0.21)	0.0 (0.00)	0.9 (0.25)	1.3 (0.14)	0.5 (0.25)	0.6 (0.20)	2.6 (0.82)	1.4 (0.34)	0.0 (0.00)	0.2 (0.12)	0.3 (0.14)	0.9 (0.25)
RSS77_S144	10	17.0 (0.94)	0.3 (0.21)	6.3 (0.37)	0.3 (0.21)	2.4 (0.37)	0.5 (0.17)	0.4 (0.16)	1.6 (0.27)	1.3 (0.30)	0.7 (0.30)	5.2 (0.55)	2.1 (0.41)	0.6 (0.22)	0.0 (0.00)	0.6 (0.16)	1.3 (0.21)
RSS95_S145	11	13.6 (1.59)	0.9 (0.28)	4.6 (0.54)	0.9 (0.28)	1.2 (0.46)	0.4 (0.15)	1.0 (0.27)	0.9 (0.21)	1.1 (0.41)	0.4 (0.15)	5.4 (0.62)	1.2 (0.26)	0.3 (0.14)	0.1 (0.09)	0.1 (0.09)	0.8 (0.30)
RSS105_S146	11	17.0 (1.23)	0.5 (0.21)	7.2 (0.50)	0.5 (0.21)	2.1 (0.28)	0.2 (0.12)	0.7 (0.14)	1.5 (0.16)	1.2 (0.33)	0.8 (0.26)	6.4 (0.54)	1.7 (0.30)	0.2 (0.12)	0.2 (0.12)	0.3 (0.14)	1.2 (0.40)
RSS80_S147	11	11.8 (2.02)	0.5 (0.16)	5.0 (0.90)	0.5 (0.16)	1.5 (0.53)	0.3 (0.14)	0.8 (0.18)	0.9 (0.09)	0.2 (0.18)	0.3 (0.14)	4.3 (0.90)	2.1 (0.41)	0.0 (0.00)	0.2 (0.12)	0.6 (0.15)	0.3 (0.19)
RSS75_S148	12	5.3 (1.94)	0.3 (0.13)	2.1 (0.83)	0.2 (0.11)	0.3 (0.26)	0.3 (0.14)	0.5 (0.15)	0.0 (0.00)	0.0 (0.00)	0.5 (0.23)	1.4 (0.76)	0.7 (0.36)	0.0 (0.00)	0.1 (0.08)	0.5 (0.15)	0.8 (0.27)
RSS81_S149	8	12.1 (1.01)	0.9 (0.35)	5.8 (0.31)	1.0 (0.38)	0.9 (0.52)	0.3 (0.16)	0.6 (0.18)	1.0 (0.00)	0.4 (0.26)	0.1 (0.13)	3.3 (0.16)	2.4 (0.18)	0.0 (0.00)	0.3 (0.16)	0.3 (0.16)	1.8 (0.25)
RSS86_S150	11	16.6 (1.04)	0.1 (0.09)	7.8 (0.40)	0.1 (0.09)	1.8 (0.26)	0.2 (0.12)	0.0 (0.00)	1.2 (0.12)	0.3 (0.14)	0.9 (0.28)	6.0 (0.30)	3.5 (0.25)	0.1 (0.09)	0.1 (0.09)	0.7 (0.19)	1.8 (0.18)

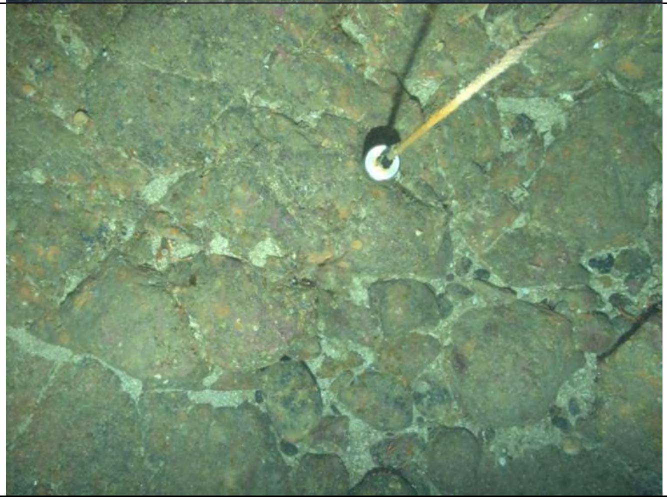
Station / Transect	Number of Stills	Average (Standard Error in brackets) number of taxa recorded within stills per transect															
		All Taxa	Sponge morphologies	All Crustose Taxa	Porifera	Cnidaria: Hydrozoa	Cnidaria: Anthozoa	Cnidaria: Other	Annelida	Crustacea	Mollusca	Bryozoa	Echinodermata	Tunicata	Pisces	Rhodophyta	Other phyla
RSS99_S151	9	18.4 (0.69)	0.4 (0.18)	8.7 (0.44)	0.6 (0.24)	2.4 (0.38)	0.6 (0.18)	0.2 (0.15)	1.4 (0.24)	0.2 (0.15)	1.0 (0.24)	5.9 (0.20)	2.7 (0.24)	0.3 (0.17)	0.0 (0.00)	1.0 (0.00)	2.1 (0.11)
RSS84_S152	10	15.1 (1.56)	0.3 (0.15)	5.6 (0.37)	0.3 (0.15)	2.3 (0.42)	0.3 (0.15)	1.2 (0.20)	1.4 (0.22)	0.4 (0.16)	0.6 (0.16)	5.3 (0.80)	2.1 (0.28)	0.0 (0.00)	0.0 (0.00)	0.2 (0.13)	1.0 (0.33)
RSS97_S153	11	15.7 (2.30)	0.3 (0.14)	6.9 (1.03)	0.4 (0.20)	2.0 (0.36)	0.3 (0.14)	0.5 (0.21)	1.4 (0.15)	0.4 (0.15)	0.7 (0.30)	5.5 (0.90)	2.5 (0.51)	0.0 (0.00)	0.0 (0.00)	0.4 (0.20)	1.8 (0.38)
RSS88_S154	11	19.4 (0.92)	0.5 (0.21)	8.3 (0.59)	0.5 (0.21)	3.0 (0.38)	0.5 (0.16)	0.4 (0.15)	1.3 (0.19)	0.3 (0.14)	0.9 (0.25)	6.3 (0.52)	2.9 (0.25)	0.1 (0.09)	0.0 (0.00)	0.9 (0.16)	2.5 (0.16)
RSS92_S155	8	13.1 (1.25)	0.6 (0.18)	5.4 (0.26)	1.3 (0.45)	1.5 (0.42)	0.0 (0.00)	0.9 (0.23)	1.8 (0.16)	0.6 (0.18)	1.5 (0.42)	2.5 (0.57)	2.5 (0.33)	0.1 (0.13)	0.0 (0.00)	0.5 (0.19)	0.0 (0.00)
RSS74_S156	9	8.9 (1.39)	0.0 (0.00)	3.3 (0.47)	0.0 (0.00)	1.7 (0.47)	0.1 (0.11)	0.0 (0.00)	2.1 (0.35)	0.1 (0.11)	0.7 (0.37)	2.1 (0.45)	2.0 (0.33)	0.0 (0.00)	0.0 (0.00)	0.1 (0.11)	0.0 (0.00)
RSS83_S157	10	7.1 (1.44)	0.6 (0.16)	3.3 (0.40)	0.7 (0.21)	0.8 (0.33)	0.1 (0.10)	0.0 (0.00)	1.4 (0.22)	0.1 (0.10)	0.3 (0.15)	1.7 (0.33)	1.7 (0.42)	0.1 (0.10)	0.0 (0.00)	0.2 (0.13)	0.0 (0.00)
RSS71_S158	9	7.7 (1.90)	0.7 (0.33)	3.6 (0.91)	0.8 (0.43)	0.7 (0.33)	0.1 (0.11)	0.1 (0.11)	1.2 (0.28)	0.1 (0.11)	0.6 (0.24)	2.2 (0.49)	1.2 (0.40)	0.0 (0.00)	0.0 (0.00)	0.2 (0.15)	0.4 (0.18)
RSS89_S159	11	13.7 (1.07)	0.5 (0.16)	5.5 (0.49)	0.8 (0.33)	1.5 (0.28)	0.2 (0.12)	0.6 (0.15)	1.1 (0.09)	0.5 (0.21)	0.6 (0.20)	4.3 (0.41)	2.9 (0.25)	0.1 (0.09)	0.0 (0.00)	0.9 (0.09)	0.2 (0.12)
RSS87_S160	12	13.2 (1.74)	0.8 (0.27)	5.7 (0.73)	1.5 (0.56)	1.3 (0.35)	0.1 (0.08)	0.8 (0.18)	1.2 (0.17)	0.5 (0.19)	0.4 (0.15)	4.7 (0.80)	2.1 (0.36)	0.0 (0.00)	0.0 (0.00)	0.8 (0.13)	0.0 (0.00)
RSS102_S161	10	14.7 (1.30)	1.1 (0.46)	5.5 (0.67)	1.7 (0.67)	1.7 (0.26)	0.2 (0.13)	0.7 (0.15)	1.5 (0.22)	0.3 (0.15)	0.8 (0.20)	5.2 (0.44)	2.1 (0.41)	0.1 (0.10)	0.0 (0.00)	0.4 (0.16)	0.0 (0.00)
RSS104_S162	9	10.4 (1.62)	0.8 (0.32)	4.2 (0.66)	1.3 (0.55)	1.4 (0.41)	0.0 (0.00)	0.6 (0.18)	1.0 (0.00)	0.3 (0.17)	0.6 (0.18)	2.4 (0.60)	2.1 (0.42)	0.0 (0.00)	0.0 (0.00)	0.6 (0.18)	0.1 (0.11)
RSS103_S163	11	13.8 (1.66)	0.7 (0.24)	4.4 (0.64)	0.7 (0.24)	0.8 (0.30)	0.7 (0.19)	1.4 (0.20)	1.5 (0.16)	0.6 (0.20)	0.8 (0.26)	5.4 (0.70)	1.5 (0.34)	0.0 (0.00)	0.3 (0.14)	0.2 (0.12)	0.0 (0.00)
RSS82_S164	13	21.6 (1.56)	0.2 (0.17)	6.7 (0.58)	0.2 (0.17)	3.8 (0.41)	0.3 (0.13)	1.0 (0.00)	2.8 (0.30)	2.5 (0.40)	2.0 (0.30)	7.0 (0.49)	1.5 (0.27)	0.2 (0.10)	0.3 (0.17)	0.0 (0.00)	0.0 (0.00)
RSS96_S165	15	15.6 (2.20)	0.7 (0.23)	4.7 (0.61)	0.7 (0.23)	2.7 (0.56)	0.3 (0.12)	1.3 (0.21)	1.7 (0.28)	0.5 (0.19)	1.2 (0.31)	4.3 (0.55)	2.5 (0.45)	0.1 (0.09)	0.0 (0.00)	0.2 (0.11)	0.0 (0.00)
RSS93_S166	10	11.8 (0.92)	0.0 (0.00)	4.7 (0.45)	0.0 (0.00)	1.3 (0.45)	0.5 (0.17)	0.7 (0.21)	1.1 (0.10)	0.0 (0.00)	0.7 (0.26)	5.1 (0.41)	2.1 (0.28)	0.0 (0.00)	0.1 (0.10)	0.2 (0.13)	0.0 (0.00)
RSS73_S167	11	11.4 (0.68)	0.8 (0.12)	5.3 (0.30)	1.1 (0.21)	0.5 (0.25)	0.7 (0.14)	0.6 (0.24)	1.0 (0.00)	0.1 (0.09)	0.4 (0.15)	2.9 (0.25)	2.9 (0.31)	0.0 (0.00)	0.2 (0.12)	0.9 (0.09)	0.0 (0.00)
RSS78_S168	11	12.6 (0.93)	0.2 (0.12)	3.9 (0.39)	0.2 (0.12)	3.3 (0.45)	0.0 (0.00)	0.8 (0.23)	1.9 (0.16)	0.1 (0.09)	0.3 (0.14)	5.0 (0.40)	0.6 (0.20)	0.0 (0.00)	0.0 (0.00)	0.3 (0.14)	0.2 (0.12)
RSS76_S169	11	10.5 (0.76)	0.5 (0.16)	3.6 (0.41)	0.5 (0.16)	0.3 (0.14)	1.0 (0.13)	0.8 (0.12)	0.6 (0.15)	0.4 (0.20)	0.3 (0.14)	2.2 (0.26)	2.7 (0.27)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)	0.7 (0.14)
RSS100_S170	11	11.5 (1.37)	0.2 (0.12)	3.7 (0.54)	0.2 (0.12)	0.2 (0.12)	0.9 (0.21)	1.1 (0.16)	0.8 (0.26)	0.5 (0.21)	0.8 (0.23)	2.7 (0.38)	2.3 (0.30)	0.0 (0.00)	0.2 (0.12)	0.9 (0.09)	0.9 (0.09)
RSS90_S171	11	14.0 (0.71)	0.5 (0.16)	4.8 (0.23)	0.5 (0.21)	1.7 (0.30)	0.3 (0.14)	1.2 (0.12)	1.2 (0.12)	0.8 (0.12)	0.5 (0.21)	3.5 (0.25)	2.5 (0.21)	0.0 (0.00)	0.0 (0.00)	1.0 (0.00)	0.8 (0.12)

Appendix 8: Representative images of JNCC Biotopes assigned during analysis of 2014 Solan Bank Reef SCI seabed imagery

All example images for individual tows and biotopes have been provided to JNCC as separate files (See Appendix 4.1 for detail).

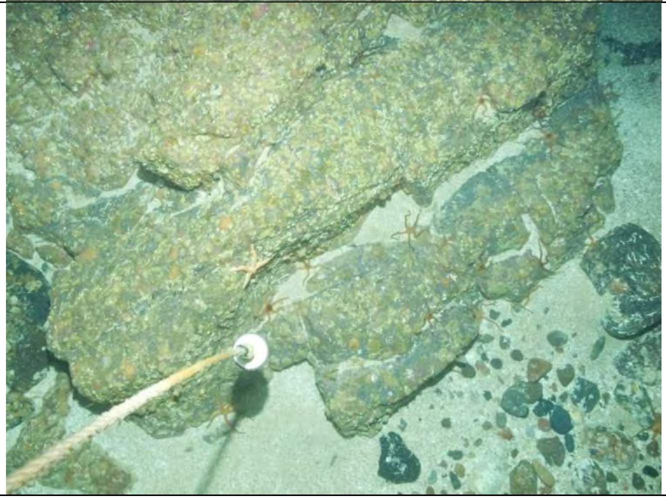
JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr	Echinoderm and crustose communities	Circalittoral stony reef of boulders and cobbles. Biota of brittlestars, *Securiflustra* & bryozoan crusts; depth approximately 59m; image good.		1714S_SBR_RSS87_S160_IMG_02.jpg

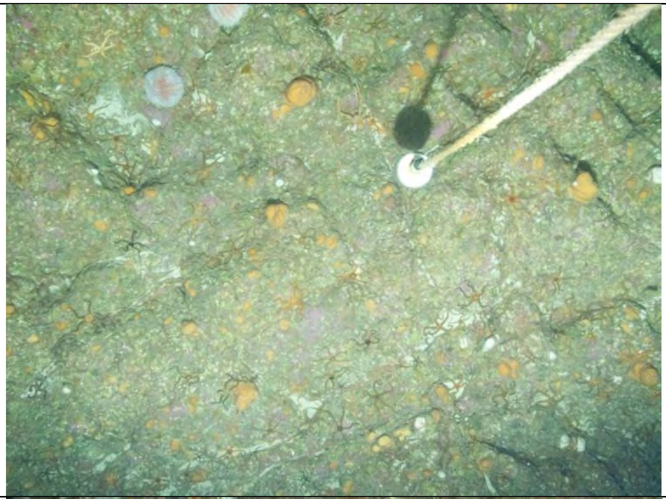
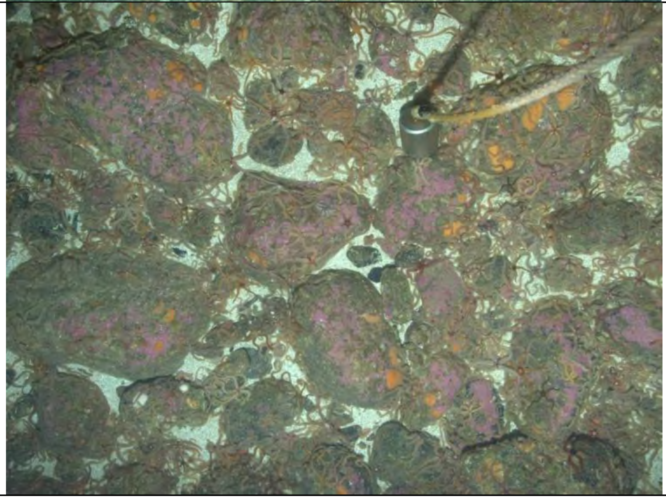
JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr	Echinoderm and crustose communities	Circalittoral bedrock and mobile, rippled coarse sediment; biota brittlestars & bryozoan crusts, depth approximately 59m, image good.		1714S_SBR_RSS96_S165_IMG_06.jpg
CR.MCR.EcCr.AdigVt	*Alcyonium digitatum* and faunal crust communities on vertical circalittoral bedrock.	Circalittoral bedrock with brittlestars and *Alcyonium digitatum* and abundant sponge crusts at 62m. Small patches of mobile sand. Image quality - good.		1714S_SBR_RSS92_S155_IMG_01.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.CarSp	*Caryophillia smithii*, sponges and crustose communities on wave-exposed circalittoral rock.	Circalittoral Bedrock reef with Boulders and cobbles. Dominant fauna of bryozoans and *Flustra*. Depth of 50m. Good biotope fit. Adequate image.		1714S_SBR_TS05_S40_IMG_08.jpg
CR.MCR.EcCr.CarSp	*Caryophillia smithii*, sponges and crustose communities on wave-exposed circalittoral rock.	Relatively smooth circalittoral bedrock with some fissures, coarse sediment found within fissures. Low confidence sponge and anthozoan community containing *Caryophyllia smithii*, and encrusting Porifera and *Axinella infundibuliformis*. Other encrusting species include *Spirobranchus*, Bryozoans, and Hydroid turf. Erect Bryozoans, Ophiuridae and Galatheidae are also present. Biotope good fit. Adequate image quality.		1714S_SBR_TS47_S53_IMG_07.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.CarSp.Bri	Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock.	Circalittoral bedrock and boulder reef. Dominant fauna of brittlestars, bryozoans and urchins present. Good image.		1714S_SBR_TS50_S32_IMG_15.jpg
CR.MCR.EcCr.CarSp.Bri	Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock.	Circalittoral bedrock with interstitial sand at 52.4m BSL. Faunal assemblage includes Ophiuroidea and encrusting species. Biotope good fit. Image of good quality, however image of too low resolution to identify all fauna to high taxonomic level.		1714S_SBR_RSS51_S119_IMG_16.jpg

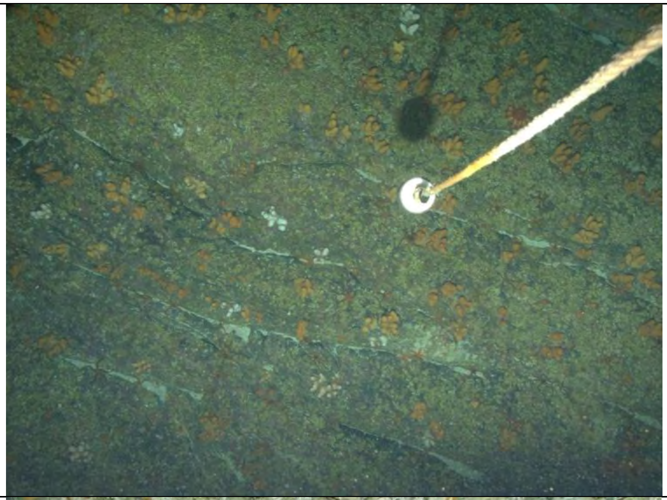
JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.PenPcom1	*Porella compressa* with cup corals, sponges, *Cellapora pumicosa* and crustose communities on wave-exposed circalittoral rock.	Circalittoral bedrock and a sand veneer, with coarse sediment types. Animal turf is comprised of *Flustra foliacea*, Bryozoa crust, Hydroid turf, and *Spirobranchus*. *Axinella infundibuliformis* and encrusting sponges as well as *Caryophyllia smithii* form an sponge and anthozoan community. Unsure of biotope due to new designation. Adequate image quality.		1714S_SBR_TS23_S51_IMG_24.jpg
CR.MCR.EcCr.PenPcom2	*Porella compressa* with cup corals, sponges, *Cellapora pumicosa* and crustose communities on wave-exposed circalittoral rock.	Circalittoral embedded cobble & pebble reef amongst slightly muddy gravels and sands with scour tolerant and crustose fauna at approx 90-100 metres. Dominant cover of *Spirobranchus* and an unidentified erect branching bryozoan (possibly *Porella sp*). Image quality acceptable for more conspicuous taxa ID. Biotope fit uncertain as this is a newly proposed biotope and this habitat could be classified as embedded/stable mixed sediment or a cobble and pebble reef.		1714S_SBR_TS30_S01_IMG_07.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.UrtScr	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock	Circalittoral bedrock inundated with sand, at approximately 49m BSL. Faunal assemblage includes *Caryophyllia*, Ophiuroidea and laminar Bryozoans. Biotope good fit, image of adequate quality, however of too low resolution to identify many species to high taxonomic level.		CR.MCR.EcCr. UrtScr_1714S_SBR_TS17_S12_IMG_14.jpg
CR.MCR.EcCr.FaAlCr	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock.	Circalittoral rock and coarse sand, sand/rock interface, at approximately 53.2m depth. Faunal assemblage includes Ophiuroidea, Serpulidae and encrusting Bryozoans. Biotope good fit. Image of good quality, however too far from seabed to identify fauna to a high taxonomic level, camera off seabed.		1714S_SBR_RSS43_S118_IMG_19.jpg

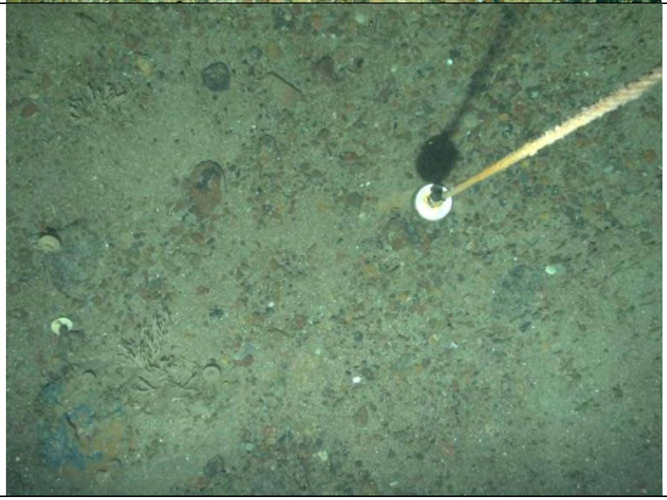
JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.FaAlCr.Adig	*Alcyonium digitatum*, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock	Circalittoral stable cobbles and boulders with *Alcyonium*, crustose algae, hydroids and brittlestars. Image good for ID and substrates. Approx depth 48.5-50m.		RSS90_S171_P26.jpg
CR.MCR.EcCr.FaAlCr.Bri	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	Circalittoral embedded boulders and cobbles amongst sand. Fauna of brittlestars and *Alcyonium digitatum*. Depth of 43m. Adequate image		1714S_SBR_TS46_S38_IMG_01.jpg

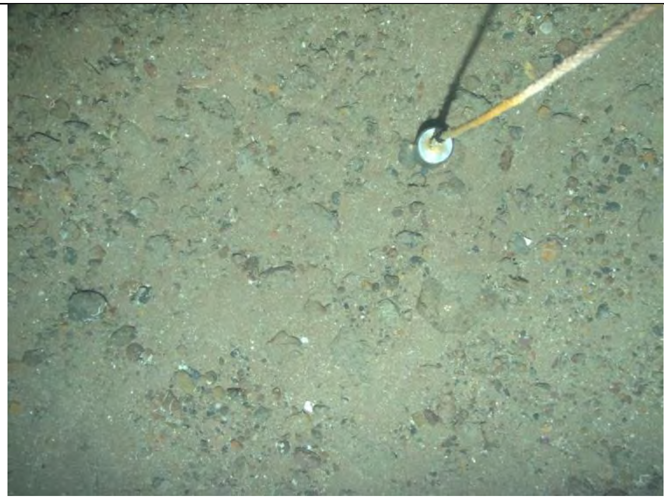
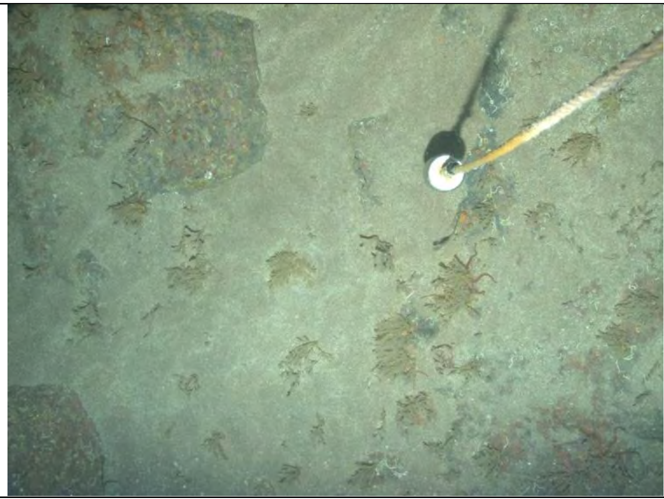
JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.FaAlCr.Bri	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	Circalittoral bedrock reef with brittlestars, Alcyonium digitatum, coralline and bryozoan crusts. Brittlestars obscuring sessile epifauna on rock surface. Approx 48-49m bcd. 20% cover of greenish unidentified thin sponge-like faunal crust (possibly sponge with bacteria). Could be fragile anthozoan community with no sponge (therefore fragile sponge and anthozoan uncertain).		CR.MCR.EcCr.FaAlCr.Bri RSS76_S169_IMG_10.jpg
CR.MCR.EcCr.FaAlCr.Bri	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	Circalittoral bedrock reef with brittlestars, *Alcyonium digitatum,* coralline and bryozoan crusts. Brittlestars obscuring sessile epifauna on rock surface. Approx 48-49m bcd. 35% cover of greenish unidentified thin sponge-like faunal crust (possibly sponge with bacteria).		RSS76_S169_IMG_24.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.FaAlCr.Car	*Caryophyllia smithii* with faunal and algal crusts on moderately wave-exposed circalittoral rock	Circalittoral Bedrock reef at 50m depth. Dominant fauna of colonial anemones. Good image.		1714S_SBR_RSS103_S163_IMG_11.jpg
CR.MCR.EcCr.FaAlCr.Flu	*Flustra foliacea* on slightly scoured silty circalittoral rock	Circalittoral stony reef of cobbles and boulders. Biota *Flustra* & encrusting bryozoa. Depth approximately 60m. Image good. Biotope uncertain no algae or silt.		1714S_SBR_RSS82_S164_IMG_03.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
CR.MCR.EcCr.FaAlCr.Pom	Faunal and algal crusts with *Pomatoceros triqueter* and sparse *Alcyonium digitatum* on exposed to moderately wave-exposed circalittoral rock	Circalittoral bedrock, sparse sand inundation. Encrusting fauna, bryozoans, *Spirobranchus*, *Alcyonidium digitatum* and Echinoderms. Camera far from bottom making species identification difficult. About 53 mts.		1714S_SBR_RSS63_S107_IMG_07.jpg
CR.MCR.EcCr.FaAlCr.Sec	*Alcyonium digitatum* with *Securiflustra securifrons* on tide-swept moderately wave-exposed circalittoral rock	Circalittoral matrix supported stony reef of cobbles. Biota of brittlestars, *Securiflustra*, bryozoan crusts & *Spirobranchus*. Depth approximately 63m. Image good. Biotope uncertain because of absence of *Alcyonium digitatum*. Note that this species is present in the video at low densities.		1714S_SBR_RSS102_S161_IMG_17.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
SS.SCS.CCS	Circalittoral coarse sediment	Circalittoral coarse sediment (sand and gravel) with little / no signs of epifaunal life with exception of one *Tristopterus*. Image adequate for species analysis but not adequate for substrate composition. Approx depth 47-50m.		1714S_SBS_RSS100_S170_P29.jpg
SS.SCS.CCS	Circalittoral coarse sediment	Circalittoral coarse sediment with very sparse biota of *Spirobranchus* and bryozoan crusts. Depth approximately 60m. Image rather far off seabed.		1714S_SBR_RSS83_S157_IMG_03.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
SS.SCS.CCS.PomB	Pomaceteros triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	Circalittoral coarse sediment with cobble, pebbles and sand, at approximately 60m BSL. Faunal assemblage includes Ophiuroidea and Serpulidae. Biotope good fit. Image of adequate quality, however resolution too low to identify many species to high taxonomic level.		1714S_SBR_RSS86_S150_IMG_18.jpg
SS.SMx.CMx	Circalittoral mixed sediments	Circalittoral course slightly muddy mixed sediments with occasional small boulders & cobbles at approximately 88-93 metres depth. Rocks with *Flustra foliacea* & sponges including Axinellidae. Image quality acceptable. Biotope Certain.		1714S_SBR_TS101_S04_IMG_05.jpg

JNCC biotope / complex Code	JNCC biotope / complex Description	Habitat Name/Description	Typical image	Stills Sample Ref
SS.SMx.CMx	Circalittoral mixed sediments	Circalittoral mixed sediment with very little fauna. The only species visible are *Ophiura albida,* unidentifiable Hydroids, and *Spirobranchus*. Uncertain of biotope. Poor image quality		1714S_SBR_TS61_S60_IMG_04.jpg
Mosaic - CR.MCR.EcCr.FaAl.Cr.Sec/SS.SCS.CCS	*Alcyonium digitatum* with *Securiflustra securifrons* on tide-swept moderately wave-exposed circalittoral rock/Circalittoral coarse sediment	Circalittoral bedrock reef inundated by mobile, rippled sand. Biota *Securiflustra*, brittlestars & cup corals on rock. Depth approximately 65m. Image good. Biotope uncertain no algae, very rare *Alcyonium*. Sand biotope uncertain no evidence of biota.		1714S_SBR_TS33_S20_IMG_05.jpg

Appendix 9: Presence of potential and confirmed Annex I stony and bedrock reef identified during analysis of 2014 Solan Bank Reef SCI seabed imagery

The presence of potential and confirmed stony and bedrock reef within the seabed imagery. The final two columns display transects where both stony and bedrock Annex I Reef have been recorded. Rows in **red** are those transects where only stills were analysed.

v = identified in video; s = identified in still(s).

Transect code	Stony potential	Stony confirmed	Bedrock potential	Bedrock confirmed	Presence of confirmed Bedrock and Stony reef	Presence of Bedrock and Stony reef (both potential and confirmed)
RSS100_S170				v		
RSS101_S141	s			v & s		
RSS102_S161	v & s	v & s	v & s	s	s	v & s
RSS103_S163		s	v & s	s	s	
RSS104_S162	v & s		v & s	s		v & s
RSS105_S146	v & s			v & s		v
RSS36_S123	v & s		v & s	v		v & s
RSS37_S120	v & s			v & s		v
RSS38_S88	v & s		s	v		v & s
RSS39_S105						
RSS40_S93	v & s					
RSS41_S102	s		v			
RSS42_S114	v & s		v & s			v & s
RSS43_S118	s			v & s		
RSS44_S112	v		v & s			v
RSS45_S121	v & s		v	v & s		v
RSS46_S90	v & s		v & s			v & s
RSS47_S106			v & s			
RSS48_S109			v & s			
RSS49_S116	v & s					
RSS50_S89	v & s		s			s
RSS51_S119	v		v	v & s		v
RSS52_S98	s		v & s			s
RSS53_S97	s					
RSS54_S103			v & s			
RSS55_S104	v & s		s			s
RSS56_S113			v & s			
RSS57_S91	v & s		v & s			v & s
RSS58_S87						
RSS59_S101	v & s					
RSS60_S100	v & s		v			v
RSS61_S110			v & s			

Transect code	Stony potential	Stony confirmed	Bedrock potential	Bedrock confirmed	Presence of confirmed Bedrock and Stony reef	Presence of Bedrock and Stony reef (both potential and confirmed)
RSS62_S115			v & s			
RSS63_S107			v & s			
RSS64_S122	v & s		s	v & s		v & s
RSS65_S92	v & s		v & s			v & s
RSS66_S111			v & s			
RSS67_S96	v & s		v			v
RSS68_S108	s		v & s			s
RSS69_S86						
RSS70_S99			v & s			
RSS71_S158	v	v & s	v & s	s	s	v
RSS73_S167	s	s	v & s	s	s	s
RSS74_S156	v & s		v			v
RSS75_S148				v & s		
RSS76_S169		s		v & s	s	
RSS77_S144	s			v & s		
RSS78_S168	v & s					
RSS80_S147	v & s			v & s		v
RSS81_S149	v & s			v & s		v
RSS82_S164	s	v & s				
RSS83_S157	v & s	s	v & s			v & s
RSS84_S152	v & s			v & s		v
RSS85_S143	s			v & s		
RSS86_S150	v & s					
RSS87_S160	v	v & s	v & s	v & s	v & s	v
RSS88_S154	v & s			v & s		v
RSS89_S159	v & s	v & s	v & s			v & s
RSS90_S171	v & s	v & s		v & s	v & s	v
RSS91_S140	s			v & s		
RSS92_S155	v	v & s		v & s	v & s	v
RSS93_S166	v & s	s	s			s
RSS95_S145	v & s			v & s		v
RSS96_S165	v & s	s	s			s
RSS97_S153	v & s			v & s		v
RSS98_S142						
RSS99_S151	v & s			v & s		v
TS02_S42	v	s	v & s			v
TS03_S41	v & s	s	v & s			v & s
TS04_S45	v & s		s			s
TS05_S40		s	v & s			
TS06_S44	s		v & s			s
TS07_S39			v & s			

Transect code	Stony potential	Stony confirmed	Bedrock potential	Bedrock confirmed	Presence of confirmed Bedrock and Stony reef	Presence of Bedrock and Stony reef (both potential and confirmed)
TS08_S46	v & s		v & s			v & s
TS1_S134						
TS10_S31	s		v & s			s
TS100_S75						
TS101_S4	v	v & s				
TS102_S137	v					
TS103_S135	s					
TS11_S22			s	s		
TS12_S15	v & s		s			s
TS13_S18	v & s					
TS14_S17	v & s					
TS15_S10	v & s					
TS16_S11						
TS17_S12	v & s		s	v & s		v & s
TS18_S13	v & s			v & s		v
TS19_S14	s		v & s			s
TS22_S52	v & s		v & s			v & s
TS23_S51	v & s		v & s	s		v & s
TS24_S77	v & s					
TS26_S55	v & s					
TS27_S8	v & s					
TS28_S5	v & s			v & s		v
TS29_S3	s					
TS30_S1	v & s	v		v & s	v	v
TS31_S2	v & s			v & s		v
TS32_S19						
TS33_S20	v & s		s			s
TS34_S28	v & s		v & s			v & s
TS35_S29			s			
TS36_S34	v & s	v & s	v & s	s	s	v & s
TS37_S50	v & s	v & s				
TS38_S54	v & s					
TS39_S49	v & s		v & s			v & s
TS40_S30	v & s		v & s			v & s
TS41_S25	s		s			s
TS42_S56	v & s					
TS43_S16	v & s		s	v & s		v & s
TS44_S9	v			s		
TS45_S48			v & s			
TS46_S38	v & s		v & s			v & s
TS47_S53			v & s			

Transect code	Stony potential	Stony confirmed	Bedrock potential	Bedrock confirmed	Presence of confirmed Bedrock and Stony reef	Presence of Bedrock and Stony reef (both potential and confirmed)
TS48_S24			v & s			
TS49_S23			s	s		
TS50_S32		v	v	s		v
TS51_S33	v	v & s	v	s	s	v
TS52_S35		v & s	v	s	s	v
TS53_S36	s	v	v & s	s		v & s
TS54_S47	v & s		v & s			v & s
TS55_S43	s	s	s			s
TS56_S26			v & s			
TS57_S27			v & s			
TS58_S21	s		s			s
TS59_S6	v & s	s				
TS60_S7						
TS61_S60						
TS62_S61	v					
TS63_S62_A2	v & s					
TS64_S85	v					
TS65_S79						
TS66_S78	v & s					
TS67_S65	v & s					
TS68_S76	v & s					
TS69_S73						
TS70_S72	v & s					
TS71_S71	v					
TS72_S132						
TS73_S64	v & s					
TS74_S70	v					
TS75_S69	v & s					
TS76_S74	v & s					
TS77_S68	v & s					
TS78_S84						
TS79_S138	v & s					
TS80_S139	v & s					
TS81_S133	v					
TS82_S131	v & s					
TS83_S130						
TS84_S129						
TS85_S58	v & s		v & s			v & s
TS86_S127	s					
TS87_S128	v & s					
TS88_S126	v					

Transcect code	Stony potential	Stony confirmed	Bedrock potential	Bedrock confirmed	Presence of confirmed Bedrock and Stony reef	Presence of Bedrock and Stony reef (both potential and confirmed)
TS89_S125						
TS9_S37	v & s	v & s	v & s			v & s
TS91_S136						
TS92_S82	v & s			s		
TS93_S57			v & s			
TS94_S81						
TS95_S83	v					
TS96_S80						
TS97_S63	v & s					
TS98_S59	v & s					
TS99_S124	v & s					
Total occurrence in video:	**98**	**15**	**56**	**31**	**4**	**53**
Total occurrence in stills:	**104**	**24**	**67**	**44**	**11**	**42**

Appendix 10: References and coordinates of photos containing Fragile Sponge and Anthozoan Communities

Still Sample Ref	Position	Frag Spong Antho Habitat	Visual quality of sample
RSS101_S141_P30	382591.969648899, 6525662.35882081	Medium	Adequate
RSS103_S163_P1	390519.243393921, 6535987.93641702	Medium	Good
RSS103_S163_P14	390684.16802813, 6535960.54015884	Low	Good
RSS103_S163_P18	390720.640066711, 6535969.22080306	Low	Good
RSS103_S163_P20	390743.436689573, 6535976.0519426	Low	Good
RSS103_S163_P26	390824.579959104, 6536001.97742341	Medium	Good
RSS103_S163_P30	390858.572015555, 6536013.39194792	Low	Good
RSS103_S163_P5	390523.25763488, 6535903.79565023	Low	Good
RSS104_S162_P17	388747.549102033, 6537686.78241009	Medium	Adequate
RSS104_S162_P19	388772.194235195, 6537695.88	Low	Poor
RSS40_S93_P1	382912.211579827, 6548020.13037172	Low	Inadequate
RSS40_S93_P11	382997.931642684, 6548094.3828241	Low	Adequate
RSS40_S93_P6	382958.321018443, 6548057.87	Low	Adequate
RSS44_S112_P24	389886.340298733, 6549909.36738798	High	Adequate
RSS48_S109_P20	391543.43915043, 6549159.03	Low	Adequate
RSS56_S113_P25	389361.869410947, 6548540.814266	Low	Adequate
RSS64_S122_P2	385286.314741215, 6544975.79681149	Low	Good
RSS64_S122_P3	385285.434584594, 6544966.85612613	Low	Good
RSS68_S108_P13	393554.143804818, 6549313.59280821	Low	Poor
RSS68_S108_P15	393558.159717827, 6549296.18330641	Low	Adequate
RSS68_S108_P17	393567.26215732, 6549272.82810831	Low	Adequate
RSS68_S108_P20	393580.894731636, 6549243.47457082	Low	Adequate
RSS68_S108_P23	393594.425733749, 6549222.54828091	Low	Adequate
RSS68_S108_P7	393532.237860138, 6549344.44601696	Low	Adequate
RSS71_S158_P26	387490.923201043, 6538204.7673302	Low	Adequate
RSS73_S167_P4	387394.199274607, 6533440.14831605	Low	Good
RSS82_S164_P1	391243.010826084, 6535314.05441305	Low	Adequate
RSS87_S160_P10	386426.000942008, 6538158.14856331	Medium	Good
RSS87_S160_P7	386388.8332979, 6538138.03193622	Low	Good
RSS87_S160_P8	386407.97729926,	Medium	Good

Still Sample Ref	Position	Frag Spong Antho Habitat	Visual quality of sample
	6538151.29776704		
RSS91_S140_P12	383599.838628602, 6526138.69864861	Medium	Adequate
RSS91_S140_P17	383564.191140911, 6526091.80108334	Medium	Adequate
RSS91_S140_P26	383515.11748689, 6526035.32488833	Medium	Adequate
RSS91_S140_P4	383683.453333232, 6526168.68444426	Medium	Adequate
RSS92_S155_P1	385980.434863864, 6535943.63232302	High	Good
RSS96_S165_P19	389982.883436685, 6535487.69356676	Medium	Good
RSS96_S165_P22	389973.409943897, 6535478.86917898	Low	Good
RSS96_S165_P25	389965.008349056, 6535472.67074658	Low	Good
RSS96_S165_P28	389953.523567239, 6535465.24254803	Low	Good
TS03_S41_P1	385208.825490602, 6526583.7902642	Medium	Adequate
TS03_S41_P20	385391.585932863, 6526529.10111944	Low	Adequate
TS03_S41_P6	385243.443432319, 6526589.40471944	Low	Adequate
TS03_S41_P8	385258.705416746, 6526580.38996302	Low	Adequate
TS05_S40_P1	383911.573785311, 6528673.4600565	Low	Adequate
TS05_S40_P10	383944.375625656, 6528621.16212618	Low	Adequate
TS05_S40_P12	383954.767154981, 6528610.43569004	Low	Adequate
TS05_S40_P13	383968.421125204, 6528594.99621442	Low	Adequate
TS05_S40_P16	383979.80404791, 6528576.0703433	Low	Adequate
TS05_S40_P17	383985.079075888, 6528564.93646878	Low	Adequate
TS05_S40_P19	383993.277879535, 6528543.31513874	Low	Adequate
TS05_S40_P22	384005.089686475, 6528532.88538855	Low	Adequate
TS05_S40_P24	384016.745858241, 6528513.18770519	Low	Adequate
TS05_S40_P3	383919.844927804, 6528662.6975361	Low	Adequate
TS05_S40_P6	383928.908302972, 6528648.38024928	Low	Adequate
TS05_S40_P8	383940.581311559, 6528632.21	Medium	Adequate
TS07_S39_P12	387635.607451044, 6529414.86753497	Low	Adequate
TS07_S39_P15	387648.019283676, 6529405.897028	Low	Adequate
TS07_S39_P17	387659.875607387, 6529402.08712895	Low	Adequate
TS07_S39_P19	387675.511527664, 6529391.1071291	High	Adequate
TS07_S39_P21	387695.693333299, 6529375.16888889	Low	Adequate
TS07_S39_P23	387720.977587924, 6529360.95238874	Low	Adequate

Still Sample Ref	Position	Frag Spong Antho Habitat	Visual quality of sample
TS07_S39_P3	387591.582026611, 6529447.87579434	Medium	Adequate
TS07_S39_P7	387618.693737628, 6529432.26401381	Low	Adequate
TS07_S39_P9	387623.010680808, 6529426.52175856	Low	Adequate
TS1_S134_P20	376200.144027095, 6527844.45149835	Low	Good
TS10_S31_P4	387610.421456123, 6539139.35621021	Low	Adequate
TS11_S22_P11	387585.232551229, 6545709.11439479	Low	Good
TS12_S15_P13	381657.373043689, 6551793.03466226	Low	Adequate
TS19_S14_P16	379389.47885619, 6553136.15528873	Low	Adequate
TS19_S14_P9	379345.46061607, 6553191.58012985	Low	Adequate
TS22_S52_P31	381578.756135692, 6546268.52165552	Low	Adequate
TS23_S51_P17	381066.019390861, 6544258.6791709	Low	Poor
TS23_S51_P19	381055.211832217, 6544245.241649	Medium	Adequate
TS23_S51_P22	381049.352551927, 6544233.33330809	Low	Poor
TS23_S51_P28	381021.08, 6544205.28	Low	Poor
TS23_S51_P5	381110.072572991, 6544313.16520066	Low	Adequate
TS23_S51_P8	381096.966628006, 6544297.03195361	Low	Adequate
TS26_S55_P17	372299.072972912, 6550300.02081077	Low	Adequate
TS26_S55_P24	372278.607942984, 6550242.79176153	Low	Adequate
TS28_S5_P1	373687.310946826, 6562432.03764416	Low	Good
TS28_S5_P11	373595.695887355, 6562397.94378321	Low	Good
TS28_S5_P13	373578.055865369, 6562393.32903844	Low	Good
TS28_S5_P20	373496.413820497, 6562370.54167913	Medium	Good
TS28_S5_P22	373476.765639602, 6562363.8036508	Medium	Adequate
TS28_S5_P24	373462.675427558, 6562357.6309836	Medium	Adequate
TS28_S5_P9	373618.231557273, 6562403.67648382	Low	Good
TS30_S1_P10	371421.412335526, 6557491.07437499	Low	Adequate
TS30_S1_P14	371425.158501528, 6557523.4336826	Low	Adequate
TS31_S2_P23	371348.672127288, 6558541.71596834	Low	Good
TS38_S54_P7	369760.868699912, 6545993.57894321	Low	Adequate
TS40_S30_P11	385654.384040955, 6540896.96884103	Low	Adequate
TS42_S56_P23	376634.958390156, 6549110.7457293	Low	Adequate
TS42_S56_P5	376660.296746581, 6549170.67632941	Low	Poor

Still Sample Ref	Position	Frag Spong Antho Habitat	Visual quality of sample
TS47_S53_P11	373355.674688092, 6545423.03781123	Low	Poor
TS47_S53_P18	373339.323222832, 6545342.14764925	Low	Poor
TS47_S53_P7	373400.333013381, 6545393.02762616	Low	Adequate
TS51_S33_P1	392304.523118407, 6540629.8590664	Low	Good
TS52_S35_P10	389332.52771652, 6536264.42576589	Low	Good
TS52_S35_P15	389304.905438168, 6536255.11928682	Low	Adequate
TS52_S35_P18	389283.580527473, 6536250.20288086	Low	Good
TS52_S35_P24	389247.272605332, 6536241.5306896	Low	Good
TS52_S35_P28	389231.5331222, 6536237.77	High	Good
TS52_S35_P8	389351.37702119, 6536270.43872341	Low	Good
TS53_S36_P17	389875.03357023, 6533398.56385341	Low	Good
TS53_S36_P4	389783.790300851, 6533494.9165413	Low	Adequate
TS59_S6_P12	375587.375486772, 6561410.76162239	Low	Good
TS59_S6_P16	375552.109133846, 6561419.13520726	Low	Good
TS59_S6_P27	375453.315679278, 6561443.7336606	Low	Good
TS59_S6_P31	375426.560253915, 6561452.26959193	Low	Good
TS59_S6_P6	375622.341231006, 6561392.05231098	Low	Good
TS59_S6_P8	375605.570544754, 6561399.69361869	Low	Good
TS73_S64_P7	376483.45, 6544427.25	Low	Adequate
TS9_S37_P12	390531.886638645, 6532038.70641461	Low	Adequate
TS97_S63_P22	376731.105223237, 6547147.20506786	Low	Adequate

Appendix 11: References and co-ordinates of video sections containing Fragile Sponge and Anthozoan Communities

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
RSS101_S141_H1	Habitats	382796.113516, 6525830.630095	382775.188268, 6525814.294477	Low	Adequate
RSS101_S141_H3	Habitats	382653.864864, 6525715.951699	382623.626278, 6525695.88	Low	Adequate
RSS101_S141_H4	Habitats	382623.626278, 6525695.88	382587.129221, 6525655.196598	Low	Adequate
RSS103_S163_H1	Habitats	390519.243394, 6535987.936417	390697.976368, 6535963.037122	Medium	Inadequate
RSS103_S163_H2	Habitats	390697.976368, 6535963.037122	390797.420594, 6535994.313253	Medium	Inadequate
RSS104_S162_H1	Habitats	388589.367819, 6537651.177383	388798.235101, 6537703.658325	Low	Inadequate
RSS104_S162_H1_12	20	388665.948347, 6537663.102017	388672.6819, 6537666.710213	Low	Inadequate
RSS104_S162_H1_13	20	388672.6819, 6537666.710213	388686.077602, 6537669.233043	Low	Inadequate
RSS104_S162_H1_14	20	388686.077602, 6537669.233043	388686.077602, 6537669.233043	Low	Inadequate
RSS104_S162_H1_23	20	388747.549102, 6537686.78241	388747.549102, 6537686.78241	Low	Inadequate
RSS104_S162_H1_29	20	388784.220849, 6537701.129104	388784.220849, 6537701.129104	Low	Inadequate
RSS104_S162_H1_30	20	388784.220849, 6537701.129104	388784.220849, 6537701.129104	Low	Inadequate
RSS51_S119_H1	Habitats	388514.343985, 6545335.708786	388650.762848, 6545435.350166	Low	Adequate
RSS51_S119_H1_09	20	388544.255307, 6545359.141046	388547.295947, 6545359.189318	Low	Adequate
RSS56_S113_H1	Habitats	389164.39749, 6548654.21583	389369.150142, 6548541.865363	Low	Adequate
RSS56_S113_H1_31	20	389361.869411, 6548540.814266	389369.150142, 6548541.865363	Low	Adequate
RSS60_S100_H1	Habitats	388145.13956, 6552338.323982	388444.02, 6552340.73	Low	Poor
RSS60_S100_H1_15	20	388240.756423, 6552335.627036	388246.802577, 6552334.419601	Low	Poor
RSS60_S100_H1_28	20	388328.506008, 6552334.361791	388338.32023, 6552335.16977	Low	Poor
RSS64_S122_H1	Habitats	385283.941049, 6544973.567979	385285.434585, 6544966.856126	Low	Adequate
RSS64_S122_H1_01	20	385283.941049, 6544973.567979	385283.941049, 6544973.567979	Low	Adequate
RSS64_S122_H1_02	20	385283.941049, 6544973.567979	385286.314741, 6544975.796811	Low	Adequate
RSS64_S122_H1_03	20	385286.314741, 6544975.796811	385285.434585, 6544966.856126	Low	Adequate

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
RSS68_S108_H1	Habitats	393511.936279, 6549395.84376	393619.00162, 6549182.359546	Low	Poor
RSS73_S167_H1	Habitats	387403.554717, 6533438.843774	387259.521403, 6533397.913687	Low	Adequate
RSS75_S148_H1	Habitats	383984.128873, 6528711.130285	383938.246154, 6528701.750769	Low	Adequate
RSS75_S148_H1_02	20	383984.128873, 6528711.130285	383983.30419, 6528710.568917	Low	Adequate
RSS75_S148_H1_03	20	383983.30419, 6528710.568917	383983.30419, 6528710.568917	Low	Adequate
RSS75_S148_H1_04	20	383983.30419, 6528710.568917	383978.551179, 6528706.165503	Low	Adequate
RSS75_S148_H1_05	20	383978.551179, 6528706.165503	383978.551179, 6528706.165503	Low	Adequate
RSS75_S148_H1_06	20	383978.551179, 6528706.165503	383978.551179, 6528706.165503	Low	Adequate
RSS75_S148_H1_07	20	383978.551179, 6528706.165503	383972.132415, 6528709.03	Low	Adequate
RSS75_S148_H1_08	20	383972.132415, 6528709.03	383968.942985, 6528704.166571	Low	Adequate
RSS75_S148_H1_09	20	383968.942985, 6528704.166571	383968.942985, 6528704.166571	Low	Adequate
RSS75_S148_H1_12	20	383968.942985, 6528704.166571	383968.942985, 6528704.166571	Low	Adequate
RSS75_S148_H1_13	20	383968.942985, 6528704.166571	383968.942985, 6528704.166571	Low	Adequate
RSS75_S148_H1_15	20	383968.942985, 6528704.166571	383945.971724, 6528702.630423	Low	Adequate
RSS76_S169_H1	Habitats	387827.765217, 6532955.824716	387630.834026, 6533069.189981	Low	poor
RSS77_S144_H1	Habitats	385282.788586, 6526944.804256	385456.67078, 6526990.518708	Low	Adequate
RSS82_S164_H1	Habitats	391243.010826, 6535314.054413	391234.704658, 6535296.98	Low	Poor
RSS85_S143_H1	Habitats	383006.371873, 6525614.237553	383112.108767, 6525704.04789	Medium	Adequate
RSS85_S143_H2	Habitats	383112.108767, 6525704.04789	383133.645436, 6525735.481262	Medium	Adequate
RSS87_S160_H2	Habitats	386384.322854, 6538134.881398	386435.262347, 6538161.330228	Medium	Inadequate
RSS87_S160_H2_06	20	386384.322854, 6538134.881398	386388.833298, 6538138.031936	Medium	Inadequate
RSS87_S160_H2_07	20	386388.833298, 6538138.031936	386388.833298, 6538138.031936	Medium	Inadequate
RSS87_S160_H2_08	20	386388.833298, 6538138.031936	386388.833298, 6538138.031936	Medium	Inadequate
RSS87_S160_H2_09	20	386388.833298, 6538138.031936	386407.977299, 6538151.297767	Medium	Inadequate
RSS87_S160_H2_10	20	386407.977299, 6538151.297767	386418.022305, 6538155.090277	Medium	Inadequate

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
RSS87_S160_H2_11	20	386418.022305, 6538155.090277	386418.022305, 6538155.090277	Medium	Inadequate
RSS87_S160_H2_12	20	386418.022305, 6538155.090277	386426.000942, 6538158.148563	Medium	Inadequate
RSS87_S160_H2_13	20	386426.000942, 6538158.148563	386435.262347, 6538161.330228	Medium	Inadequate
RSS87_S160_H3	Habitats	386435.262347, 6538161.330228	386491.352239, 6538188.923963	Low	Inadequate
RSS87_S160_H3_14	20	386435.262347, 6538161.330228	386440.951059, 6538163.682511	Low	Inadequate
RSS87_S160_H3_15	20	386440.951059, 6538163.682511	386445.029816, 6538167.456502	Low	Inadequate
RSS89_S159_H5	Habitats	386593.41, 6537629.17	386557.689066, 6537641.236348	Low	Inadequate
RSS89_S159_H5_29	20	386579.337553, 6537636.06527	386579.337553, 6537636.06527	Low	Inadequate
RSS89_S159_H5_30	20	386579.337553, 6537636.06527	386566.976692, 6537639.941478	Low	Inadequate
RSS91_S140_H1	Habitats	383708.458352, 6526180.64343	383510.090469, 6526028.43196	Medium	Adequate
RSS92_S155_H1	Habitats	385980.434864, 6535943.632323	385868.558637, 6535810.140635	Medium	Poor
RSS92_S155_H1_01	20	385980.434864, 6535943.632323	385980.434864, 6535943.632323	Medium	Poor
RSS95_S145_H1	Habitats	383138.406916, 6527438.734265	383187.077648, 6527468.805173	Low	Adequate
RSS95_S145_H2	Habitats	383187.077648, 6527468.805173	383266.4775, 6527549.075	Low	Adequate
RSS96_S165_H2	Habitats	390007.818919, 6535509.51009	389988.721199, 6535496.037538	Low	Poor
TS02_S42_H1	Habitats	382063.588753, 6526731.578212	382111.162239, 6526707.778193	Low	Adequate
TS02_S42_H2	Habitats	382111.162239, 6526707.778193	382158.189717, 6526685.59624	Medium	Adequate
TS02_S42_H3	Habitats	382158.189717, 6526685.59624	382236.675, 6526634.0775	Low	Adequate
TS03_S41_H1	Habitats	385208.825491, 6526583.790264	385376.481485, 6526537.127976	Medium	Adequate
TS03_S41_H2	Habitats	385376.481485, 6526537.127976	385391.585933, 6526529.101119	Low	Adequate
TS03_S41_H3	Habitats	385391.585933, 6526529.101119	385423.810943, 6526514.662622	Low	Adequate
TS05_S40_H1	Habitats	383911.573785, 6528673.460057	384016.745858, 6528513.187705	High	Adequate
TS07_S39_H1	Habitats	387585.905873, 6529454.924431	387737.49, 6529346.525833	Medium	Adequate
TS1_S134_H1	Habitats	376279.174888, 6527857.357865	376195.730987, 6527851.396518	Low	Adequate
TS102_S137_H2	Habitats	381704.491501, 6527532.597269	381563.199494, 6527503.856076	Low	Adequate

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
TS12_S15_H1	Habitats	381548.948699, 6551862.76121	381800.727411, 6551747.215728	Low	Poor
TS19_S14_H2	Habitats	379328.974342, 6553199.745733	379418.948577, 6553017.157356	Low	Poor
TS22_S52_H1	Habitats	381712.730552, 6546395.85507	381663.026553, 6546339.876904	Low	Poor
TS22_S52_H2	Habitats	381663.026553, 6546339.876904	381578.756136, 6546268.521656	Low	Poor
TS23_S51_H1	Habitats	381121.020086, 6544330.269645	381060.136823, 6544248.729311	Low	Poor
TS23_S51_H1_08	20	381090.381298, 6544285.269014	381086.772054, 6544281.225394	Low	Poor
TS23_S51_H1_09	20	381086.772054, 6544281.225394	381081.256807, 6544275.068198	Low	Poor
TS23_S51_H1_12	20	381073.530337, 6544265.352747	381066.019391, 6544258.679171	Medium	Poor
TS23_S51_H1_13	20	381066.019391, 6544258.679171	381066.019391, 6544258.679171	Low	Poor
TS23_S51_H2	Habitats	381060.136823, 6544248.729311	381038.632443, 6544220.017766	Low	Poor
TS23_S51_H2_15	20	381060.136823, 6544248.729311	381055.211832, 6544245.241649	Low	Poor
TS23_S51_H2_16	20	381055.211832, 6544245.241649	381055.211832, 6544245.241649	Low	Poor
TS23_S51_H2_17	20	381055.211832, 6544245.241649	381050.656899, 6544235.802268	Low	Poor
TS23_S51_H2_18	20	381050.656899, 6544235.802268	381049.352552, 6544233.333308	Low	Poor
TS23_S51_H2_19	20	381049.352552, 6544233.333308	381043.852006, 6544226.509099	Low	Poor
TS23_S51_H2_20	20	381043.852006, 6544226.509099	381038.632443, 6544220.017766	Low	Poor
TS23_S51_H2_21	20	381038.632443, 6544220.017766	381038.632443, 6544220.017766	Low	Poor
TS23_S51_H3	Habitats	381038.632443, 6544220.017766	380989.831429, 6544178.827143	Low	Poor
TS23_S51_H3_28	20	381010.041594, 6544194.981669	380999.319894, 6544187.17	Low	Poor
TS26_S55_H1	Habitats	372337.650212, 6550419.300784	372271.777412, 6550219.974231	Low	Poor
TS30_S1_H1	Habitats	371413.549485126, 6557444.16150866	371426.441553, 6557536.633208	Low	Poor
TS38_S54_H1	Habitats	369789.313552, 6546036.678634	369650.999128, 6545817.117595	Low	Poor
TS39_S49_H1	Habitats	382532.159223, 6534489.85639	382342.503069, 6534518.653862	Low	Poor
TS39_S49_H1_08	20	382495.139525, 6534495.286387	382484.166245, 6534496.268819	Low	Poor
TS39_S49_H1_10	20	382478.828243, 6534495.809491	382478.828243, 6534495.809491	Low	Poor

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
TS39_S49_H1_12	20	382467.327457, 6534496.472846	382454.250397, 6534496.391496	Low	Poor
TS39_S49_H1_13	20	382454.250397, 6534496.391496	382447.292823, 6534494.231486	Low	Poor
TS39_S49_H1_14	20	382447.292823, 6534494.231486	382441.752369, 6534494.375665	Low	Poor
TS40_S30_H2	Habitats	385622.979307, 6540904.515379	385654.384041, 6540896.968841	Low	Poor
TS40_S30_H2_16	20	385622.979307, 6540904.515379	385647.025071, 6540897.788527	Low	Poor
TS40_S30_H2_17	20	385647.025071, 6540897.788527	385654.384041, 6540896.968841	Low	Poor
TS40_S30_H2_18	20	385654.384041, 6540896.968841	385654.384041, 6540896.968841	Low	Poor
TS42_S56_H1	Habitats	376667.930926, 6549182.542968	376580.321254, 6549013.402854	Low	Poor
TS47_S53_H1	Habitats	373392.903529, 6545452.789384	373307.21236, 6545363.764288	Low	Poor
TS50_S32_H1	Habitats	389478.179793, 6539386.043976	389629.60603, 6539259.661715	Low	Adequate
TS50_S32_H1_18	10	389524.341958, 6539348.924971	389524.341958, 6539348.924971	Low	Adequate
TS50_S32_H1_20	10	389535.701078, 6539340.72104	389535.701078, 6539340.72104	Low	Adequate
TS50_S32_H1_54	10	389629.60603, 6539259.661715	389629.60603, 6539259.661715	Low	Adequate
TS50_S32_H1_55	10	389629.60603, 6539259.661715	389629.60603, 6539259.661715	Low	Adequate
TS51_S33_H1	Habitats	392304.523118, 6540629.859066	392494.907109, 6540548.874861	Low	Adequate
TS51_S33_H1_03	10	392304.523118, 6540629.859066	392319.375577, 6540621.576292	Low	Adequate
TS51_S33_H1_08	10	392336.875672, 6540613.04804	392336.875672, 6540613.04804	Medium	Adequate
TS51_S33_H1_14	10	392361.748065, 6540601.902888	392369.179673, 6540597.552291	Low	Adequate
TS52_S35_H1	Habitats	389392.549236, 6536282.200251	389231.533122, 6536237.77	Low	Adequate
TS52_S35_H1_18	20	389304.905438, 6536255.119287	389304.905438, 6536255.119287	Low	Good
TS52_S35_H1_27	20	389251.695312, 6536244.21301	389247.272605, 6536241.53069	Low	Adequate
TS52_S35_H1_28	20	389247.272605, 6536241.53069	389241.703346, 6536242.014615	Low	Adequate
TS52_S35_H1_29	20	389241.703346, 6536242.014615	389241.703346, 6536242.014615	Medium	Adequate
TS52_S35_H1_30	20	389241.703346, 6536242.014615	389231.533122, 6536237.77	Low	Adequate
TS52_S35_H1_31	20	389231.533122, 6536237.77	389231.533122, 6536237.77	High	Adequate

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
TS53_S36_H1	Habitats	389759.748065, 6533519.858692	389960.548722, 6533288.877475	Low	Adequate
TS53_S36_H1_04	20	389783.790301, 6533494.916541	389792.17333, 6533487.941968	Low	Adequate
TS53_S36_H1_05	20	389792.17333, 6533487.941968	389805.338775, 6533475.056692	Low	Adequate
TS53_S36_H1_07	20	389810.577566, 6533469.10678	389820.160112, 6533459.944925	Low	Adequate
TS53_S36_H1_08	20	389820.160112, 6533459.944925	389820.160112, 6533459.944925	Low	Adequate
TS53_S36_H1_09	20	389820.160112, 6533459.944925	389829.553154, 6533451.226695	Low	Adequate
TS53_S36_H1_10	20	389829.553154, 6533451.226695	389835.233193, 6533445.00888	Low	Adequate
TS53_S36_H1_19	20	389875.03357, 6533398.563853	389883.162828, 6533388.828341	Low	Adequate
TS53_S36_H1_20	20	389883.162828, 6533388.828341	389883.162828, 6533388.828341	Medium	Adequate
TS53_S36_H1_21	20	389883.162828, 6533388.828341	389894.05224, 6533379.053247	Low	Adequate
TS53_S36_H1_22	20	389894.05224, 6533379.053247	389907.651712, 6533363.6049	Low	Adequate
TS53_S36_H1_23	20	389907.651712, 6533363.6049	389907.651712, 6533363.6049	Low	Adequate
TS59_S6_H1	Habitats	375658.05491, 6561382.41279	375426.560254, 6561452.269592	Low	Inadequate
TS59_S6_H1_13	20	375587.375487, 6561410.761622	375581.892449, 6561412.300841	Low	Inadequate
TS59_S6_H1_16	20	375581.892449, 6561412.300841	375569.250603, 6561417.307229	Low	Inadequate
TS79_S138_H1	Habitats	380287.728728, 6529812.438644	380206.756184, 6529621.632215	Low	Adequate
TS80_S139_H1	Habitats	377318.582305, 6529681.352227	377276.14052, 6529445.402982	Low	Adequate
TS9_S37_H1	Habitats	390448.358949, 6532127.035614	390658.672277, 6531927.628639	Low	Adequate
TS9_S37_H1_05	20	390470.1042, 6532103.82471	390470.1042, 6532103.82471	Low	Adequate
TS9_S37_H1_12	20	390506.02965, 6532068.253875	390514.002432, 6532053.895666	Low	Adequate
TS9_S37_H1_14	20	390524.633351, 6532047.415602	390531.886639, 6532038.706415	Low	Adequate
TS9_S37_H1_15	20	390531.886639, 6532038.706415	390531.886639, 6532038.706415	Low	Adequate
TS9_S37_H1_16	20	390531.886639, 6532038.706415	390543.840212, 6532029.792808	Low	Adequate
TS9_S37_H1_29	20	390629.150998, 6531953.84643	390642.522812, 6531939.201875	Low	Adequate
TS91_S136_H1	Habitats	380796.1991, 6527974.576345	380621.911731, 6527896.228365	Low	Adequate

Video Section / Sample Ref	Method	Start Position	End Position	Frag Spong Antho Habitat	Visual quality of sample
TS93_S57_H2	Habitats	375694.94931, 6550074.199235	375723.637618, 6549979.132906	Low	Poor
TS99_S124_H2	Habitats	381920.187849, 6525636.418771	381784.756955, 6525652.353045	Low	Inadequate
TS99_S124_H2_24	20	381818.946015, 6525647.911947	381818.946015, 6525647.911947	Low	Poor
TS99_S124_H2_27	20	381799.534536, 6525650.644924	381793.283787, 6525651.283479	Low	Poor
TS99_S124_H2_28	20	381793.283787, 6525651.283479	381784.756955, 6525652.353045	Low	Poor
TS99_S124_H3	Habitats	381784.756955, 6525652.353045	381755.136948, 6525656.63842	Low	Poor
TS99_S124_H3_29	20	381784.756955, 6525652.353045	381783.512002, 6525655.004287	Low	Poor
TS99_S124_H3_30	20	381783.512002, 6525655.004287	381773.191046, 6525655.180941	Low	Poor

Appendix 12: Positions of Scottish Priority Marine Features assigned to 2014 Solan Bank imagery

Scottish PMF Present	Video Tow (event)	Sample Ref	Method	Position Start Point	Position End Point	Depth (approx. m bsl)
Whiting (*Merlangius merlangus*)	SBR_RSS61	RSS61_S110_H1	Video	59.0798 -4.90213	59.0786 -4.89899	50
	SBR_TS36	TS36_S34_P1	Still	58.9743 -4.89432		56
	SBR_TS52	TS52_S35_P4	Still	58.9518 -4.92293		
	SBR_TS46	TS46_S38_P13	Still	58.9109 -4.93161		
	SBR_TS05	TS05_S40_P8	Still	58.8818 -5.0134		
	SBR_TS03	TS03_S41_P8	Still	58.8637 -4.98949		
	SBR_RSS63	RSS63_S107_P10	Still	59.0873 -4.89019		
Cod (*Gadus morhua*)	SBR_TS28	TS28_S5_H1	Video	59.1822 -5.21051	59.181 -5.2155	95
	SBR_TS12	TS12_S15_H1	Video	59.0896 -5.06731	59.0886 -4.89809	63
	SBR_TS36	TS36_S34_H1	Video	58.9743 -4.89432	58.9737 -4.89809	56
	SBR_TS89	TS89_S125_H1	Video	58.8498 -5.07705	58.8499 -5.08017	
	SBR_RSS82	RSS82_S164_H2	Video	58.9435 -4.8902	58.9423 -4.8906	
	SBR_RSS82	RSS82_S164_P22	Still	58.9427 -4.89054		
Ling (*Molva molva*)	SBR_TS02	TS02_S42_H3	Video	58.8638 -5.04326	58.8634 -5.04188	
	SBR_TS45	TS45_S48_H1	Video	58.9197 -4.99429	58.9188 -4.99941	50
	SBR_TS102	TS102_S137_H3	Video	58.871 -5.05401	58.8709 -5.05471	75
	SBR_RSS81	RSS81_S149_H1	Video	58.8953 -5.02673	58.8943 -5.02807	60
	SBR_TS45	TS45_S48_P16	Still	58.9193 -4.99619		
	SBR_RSS100	RSS100_S170_P24	Still	58.9257 -4.94236		
White cluster anemone (*Parazoanthus anguicomus*)	SBR_TS30	TS30_S1_H1	Video	59.1367 -5.24733	59.1376 -5.24716	99.5
	SBR_TS59	TS59_S6_H1	Video	59.071 -5.16783	59.0707 -5.16765	83
	SBR_TS23	TS23_S51_H1	Video	58.9258 -4.9558	58.9254 -4.95828	69
	SBR_TS23	TS23_S51_H3	Video	59.0642 -5.15093	59.0626 -5.15236	69
	SBR_TS38	TS38_S54_H1	Video	59.0339 -5.26892	59.0319 -5.2712	71
	SBR_TS26	TS26_S55_H1	Video	59.074 -5.2271	59.0722 -5.22813	76
	SBR_TS42	TS42_S56_H1	Video	59.0642 -5.15093	59.0626 -5.15236	64
	SBR_TS93	TS93_S57_H3	Video	59.0185 -5.11507	59.0195 -5.11294	73
	SBR_TS73	TS73_S64_H1	Video	58.8667 -5.06434	58.8654 -5.06456	88

Scottish PMF Present	**Video Tow (event)**	**Sample Ref**	**Method**	**Position Start Point**	**Position End Point**	**Depth (approx. m bsl)**
White cluster anemone (*Parazoanthus anguicomus*)	SBR_RSS69	RSS69_S86_H1	Video	59.1734 -5.17546	59.1739 -5.17954	79
	SBR_TS81	TS81_S133_H1	Video	59.0209 -5.07208	59.0205 -5.0729	85
	SBR_TS80	TS80_S139_H1	Video	59.1367 -5.24733	59.1376 -5.24716	84
	SBR_RSS98	RSS98_S142_H2	Video	59.071 -5.16783	59.0707 -5.16765	71
	SBR_RSS73	RSS73_S167_P6	Still	58.9258 -4.95602		
	SBR_RSS73	RSS73_S167_P8	Still	58.9258 -4.95626		99.5
	SBR_TS30	TS30_S1_P10	Still	59.1372 -5.24722		99.5
	SBR_TS30	TS30_S1_P17	Still	59.1376 -5.24713		99.5
	SBR_TS30	TS30_S1_P20	Still	59.1379 -5.24704		99.5
	SBR_TS30	TS30_S1_P23	Still	59.1381 -5.24699		99.5
	SBR_TS30	TS30_S1_P25	Still	59.1384 -5.24689		99.5
	SBR_TS28	TS30_S5_P1	Still	59.1822 -5.21051		101
	SBR_TS28	TS30_S5_P20	Still	59.1816 -5.21382		101
	SBR_TS28	TS30_S5_P22	Still	59.1815 -5.21416		101
	SBR_TS28	TS30_S5_P24	Still	59.1815 -5.2144		101
	SBR_TS59	TS59_S6_P6	Still	59.1734 -5.17608		85
	SBR_TS59	TS59_S6_P8	Still	59.1735 -5.17638		85
	SBR_TS59	TS59_S6_P12	Still	59.1736 -5.17671		85
	SBR_TS59	TS59_S6_P16	Still	59.1736 -5.17733		85
	SBR_TS59	TS59_S6_P19	Still	59.1737 -5.17778		85
	SBR_TS59	TS59_S6_P21	Still	59.1738 -5.17816		85
	SBR_TS59	TS59_S6_P25	Still	59.1738 -5.17869		85
	SBR_TS59	TS59_S6_P27	Still	59.1738 -5.17907		85
	SBR_TS59	TS59_S6_P31	Still	59.1739 -5.17954		85
	SBR_TS23	TS23_S51_P1	Still	59.0219 -5.0707		68
	SBR_TS23	TS23_S51_P5	Still	59.0217 -5.07088		68
	SBR_TS23	TS23_S51_P8	Still	59.0216 -5.0711		68
	SBR_TS23	TS23_S51_P13	Still	59.0214 -5.07136		68
	SBR_TS23	TS23_S51_P30	Still	59.0206 -5.07256		68
	SBR_TS23	TS23_S51_P35	Still	59.0205 -5.0729		68

Scottish PMF Present	Video Tow (event)	Sample Ref	Method	Position Start Point	Position End Point	Depth (approx. m bsl)
	SBR_TS38	TS38_S54_P4	Still	59.0337 -5.26922		71
	SBR_TS38	TS38_S54_P7	Still	59.0335 -5.26939		71
	SBR_TS38	TS38_S54_P10	Still	59.0333 -5.26961		71
	SBR_TS38	TS38_S54_P17	Still	59.0329 -5.27016		71
	SBR_TS38	TS38_S54_P19	Still	59.0327 -5.27036		71
	SBR_TS38	TS38_S54_P21	Still	59.0325 -5.27057		71
	SBR_TS38	TS38_S54_P23	Still	59.0323 -5.27076		71
	SBR_TS38	TS38_S54_P27	Still	59.032 -5.271		71
	SBR_TS26	TS26_S55_P17	Still	59.0729 -5.2277		77
	SBR_TS26	TS26_S55_P20	Still	59.0727 -5.22778		77
	SBR_TS26	TS26_S55_P24	Still	59.0724 -5.22803		77
	SBR_TS42	TS42_S56_P1	Still	59.0642 -5.15093		64
	SBR_TS42	TS42_S56_P10	Still	59.0639 -5.15122		64
	SBR_TS42	TS42_S56_P13	Still	59.0638 -5.15128		64
	SBR_TS42	TS42_S56_P18	Still	59.0637 -5.15138		64
	SBR_TS42	TS42_S56_P23	Still	59.0635 -5.15146		64
	SBR_TS93	TS93_S57_P5	Still	59.0721 -5.16843		
	SBR_TS93	TS93_S57_P35	Still	59.0709 -5.16778		
	SBR_TS93	TS93_S57_P38	Still	59.0707 -5.16765		
	SBR_TS63	TS63_S62_A2_P2	Still	59.0124 -5.18762		85
	SBR_TS97	TS97_S63_P8	Still	59.0474 -5.14784		85
	SBR_TS97	TS97_S63_P20	Still	59.0463 -5.14856		85
	SBR_TS97	TS97_S63_P22	Still	59.0459 -5.14868		85
	SBR_TS97	TS97_S63_P24	Still	59.0457 -5.14879		85
Northern feather star (*Leptometra celtica*)	SBR_RSS73	RSS73_S167_H1	Video	58.9258 -4.9558	58.9254 -4.95828	53
	SBR_RSS73	RSS73_S167_P6	Still	58.9258 -4.95602		53
	SBR_RSS73	RSS73_S167_P8	Still	58.9258 -4.95626		53

Appendix 13: Positions of evidence and type of human impact observed in 2014 Solan Bank imagery

Disturbance Feature	Video Tow (event)	Sample Ref	Method	Position start / point	Position End	Depth (m bsl)
Evidence of fishing	SBR_TS31	TS31_S2_P28	Still	59.1464 -5.24957		100
Evidence of fishing	SBR_TS28	TS28_S5_P1	Still	59.1822 -5.21051		101
Evidence of fishing	SBR_TS28	TS28_S5_P3	Still	59.1821 -5.21077		101
Evidence of fishing	SBR_TS28	TS28_S5_P6	Still	59.182 -5.21119		101
Evidence of fishing	SBR_TS28	TS28_S5_P9	Still	59.1819 -5.2117		101
Evidence of fishing	SBR_TS28	TS28_S5_P11	Still	59.1819 -5.2121		101
Evidence of fishing	SBR_TS28	TS28_S5_P13	Still	59.1818 -5.2124		101
Evidence of fishing	SBR_TS28	TS28_S5_P16	Still	59.1817 -5.213		101
Evidence of fishing	SBR_TS28	TS28_S5_P18	Still	59.1816 -5.21343		101
Evidence of fishing	SBR_TS28	TS28_S5_P20	Still	59.1816 -5.21382		101
Evidence of fishing	SBR_TS28	TS28_S5_P22	Still	59.1815 -5.21416		101
Evidence of fishing	SBR_TS28	TS28_S5_P24	Still	59.1815 -5.2144		101
Evidence of fishing	SBR_TS28	TS28_S5_P28	Still	59.1813 -5.2149		101
Evidence of fishing	SBR_TS28	TS28_S5_P30	Still	59.1812 -5.21511		101
Evidence of fishing	SBR_TS28	TS28_S5_P34	Still	59.181 -5.21544		101
Evidence of fishing	SBR_TS59	TS59_S6_P1	Still	59.1734 -5.17546		84
Evidence of fishing	SBR_TS59	TS59_S6_P4	Still	59.1734 -5.1758		84
Evidence of fishing	SBR_TS59	TS59_S6_P6	Still	59.1734 -5.17608		84
Evidence of fishing	SBR_TS59	TS59_S6_P8	Still	59.1735 -5.17638		84
Evidence of fishing	SBR_TS59	TS59_S6_P12	Still	59.1736 -5.17671		84
Evidence of fishing	SBR_TS59	TS59_S6_P16	Still	59.1736 -5.17733		84
Evidence of fishing	SBR_TS59	TS59_S6_P19	Still	59.1737 -5.17778		84
Evidence of fishing	SBR_TS59	TS59_S6_P21	Still	59.1738 -5.17816		84
Evidence of fishing	SBR_TS59	TS59_S6_P25	Still	59.1738 -5.17869		84
Evidence of fishing	SBR_TS59	TS59_S6_P27	Still	59.1738 -5.17907		84
Evidence of fishing	SBR_TS59	TS59_S6_P31	Still	59.1739 -5.17954		84
Fishing net	SBR_TS43	TS43_S16_P14	Still	59.1079 -5.07342		60
Fishing net	SBR_TS43	TS43_S16_P15	Still	59.1078 -5.07328		60
Fishing net	SBR_TS43	TS43_S16_P18	Still	59.1076 -5.07309		60
Rope	SBR_TS57	TS57_S27_P1	Still	59.0589 -4.91809		47

Disturbance Feature	Video Tow (event)	Sample Ref	Method	Position start / point	Position End	Depth (m bsl)
Creel	SBR_RSS54	RSS54_S103_P19	Still	59.1096 -4.91207		51
Rope	SBR_RSS84	RSS84_S152_P15	Still	58.9168 -5.02305		
Rope	SBR_TS57	TS57_S27_H1 _01	Video	59.0589 -4.91809	59.0589 -4.91799	48
Rope	SBR_TS57	TS57_S27_H1 _02	Video	59.0589 -4.91799	59.0588 -4.9178	48
Creel	SBR_RSS54	RSS54_S103_ H1	Video	59.1094 -4.91387	59.1099 -4.90938	62
Litter	SBR_RSS68	RSS68_S108_ H1	Video	59.0706 -4.85746	59.0687 -4.85549	67
Rope	SBR_RSS84	RSS84_S152_ H2_22	Video	58.9168 -5.02283	58.9168 -5.02283	

Appendix 14: Data Archive Appendix

The following files have been provided to JNCC as part of the 2014 Solan Bank Reef SCI seabed imagery analysis project:

1. REPORTING:

20150929 JNCC Solan Bank v3 Final Draft.docx
20150929 JNCC Solan Bank v3 Final Draft.pdf

2. DATA FILES:

Marine Recorder v5:	
20150512 MR Validation.xlsx	Using the Event and Sample Validation tools within MR, these are the validation results saved in Excel format for ease of viewing.
20150513 SolanBank5 SnapshotDatav51.mdb	Following Marine Recorder data entry QA some changes/corrections have been made. This is now the most recent snapshot of the data.
20150513 SolanBank_Post_edit_NBNData.mdb	This is the most recent Marine Recorder NBNdata.mdb file.
Excel Spreadsheets:	
20150508 Proforma_Stills analysis FINAL.xlsx	Results of the stills analysis detailed within the sheet called ‘**Stills Form**’. Sample metadata including: sample references, times, dates, coordinates, depths, sample area (field of view), substrates, Annex I reef subtype & elevation, presence of fragile sponge and anthozoan habitat, presence of PMFs, evidence of human impacts, biotopes assigned, surveyors name and imagery quality. Please note, column titles have comments to help explain the data, and further explanatory notes for some fields are within the sheet called ‘LookUp_Tables’. Guidance and rationale for selecting PMFs, is within the sheet called ‘Scottish PMF’.

20150507 Proforma_Video analysis FINAL.xlsx	Results of the video analysis split over several sheets: '**VideoFormAll**' contains the following information combined from analysis of 10 and 20 second subsections (not entered into Marine Recorder) and non-sectioned habitats information (as entered into Marine Recorder): sample references, times, dates, coordinates, depths, sample area (field of view), substrates, Annex I reef subtype & elevation, presence of fragile sponge and anthozoan habitat, presence of PMFs, evidence of human impacts, biotopes assigned, surveyors name and imagery quality. '**Video Form Habitats**' contains the above information for all transects where video was analysed. This information was entered into Marine Recorder. '**Video Form 10 Second Sections**' contains the above information for all transects where video was split into 10 second subsections. These were the first videos analysed before the decision was made to move to 20 second video subsections. '**Video Form 20 Second Sections**' contains the above information for all transects where video was split into 20 second subsections. Please note, column titles have comments to help explain the data, and further explanatory notes for some fields are within the sheet called 'LookUp_Tables'. Guidance and rationale for selecting PMFs, is within the sheet called 'Scottish PMF'.
20150505 Proforma_SpeciesMatrix Stills FINAL.xlsx	Results of the stills analysis including all taxa identified, split over two sheets: '**Stills matix_abun%cover**' includes all original data from the analysis enumerated using counts and % cover. '**Stills matrix_SACFOR**' contains same the data after conversion from counts/% cover to SACFOR. Note the stills sample area was averaged for ease of SACFOR conversions.

20150505 Proforma_SpeciesMatrix Video FINAL.xlsx	Results of the Video analysis including all taxa identified, split over eight sheets: '**Video matrix_abundance%cov All**' includes all combined taxa data from all video analysed, enumerated using counts and % cover. '**Video matrix_SACFOR All**' contains the same data after conversion from counts/% cover to SACFOR. '**Video_abundance%cov Habs**' & '**Video_SACFOR Habs**' contain taxa data for all transects where video was analysed, aggregated to a habitat level. This information was entered into Marine Recorder. '**Video_abundance%cov 10Sec**' & '**Video_SACFOR 10Sec**' contain taxa data for all transects where video was split into 10 second subsections. Note the sample area was averaged for ease of SACFOR conversions. '**Video_abundance%cov 20Sec**' & '**Video_SACFOR 20Sec**' contain taxa data for all transects where video was split into 20 second subsections. Note the sample area was averaged for ease of SACFOR conversions.
20150409 QA Results.xlsx	Summarised results of the imagery QA showing differences and similarities between the original data analysis and QA analysis. To standardise comparison of QA data, specific key elements of the analysis are compared. These elements included references and metadata (sample references, dates, time & positions etc); habitat names and descriptions; substrates; Annex I habitats; PMFs; Biotopes; and Taxa. With numerical data, only differences greater than 10% are reported. Where differences are reported, comments, recommendations and actions are also reported. These are then acted upon before final delivery of the data.

3. GIS:

Folder: 20150507 Maps for report	Map exports from ArcMap saved as jpeg images (200dpi). Includes all maps within the report.
Folder: From JNCC	Folder containing GIS data used in the ArcMap workspaces (.mxd files) and used to produce the maps for the report.
20150506_Event_Polylines.shp	Polyline layer showing all transects (entire video transects or stations) where video and/or stills were analysed. Attributes includes information entered into Marine Recorder at an Event level (i.e. entire video tows). Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150506_Event_Centroids.shp	Centroids (points) created from the 'Events Polyline' layer, including all attributes from this layer. Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150506_Stills_Points.shp	Points layer showing all stills analysed. Attributes include those specified within the contract. Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.

20150507_VideoHabitats_Polylines.shp	Polyline layer showing all video habitats. Attributes include those specified within the contract, representing information entered into Marine Recorder at a Video sample level (video habitats). Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150506_VideoHabitats_Centroids.shp	Centroids (points) created from the 'Video Habitats Polyline' layer, including all attributes from this layer. Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150507_VideoSubSections_Points.shp	Points layer showing all video subsections analysed. Expressed as points because each 10 or 20 second video subsection was very short (i.e. small distance sampled). Some subsection records had the same coordinates because they were not distant enough from each other, to ensure separate coordinates (i.e. UBSL fixes were not recorded frequently enough). Attributes include those specified within the contract, representing information entered into Marine Recorder at a Video sample level (video habitats). Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150507_VideoSubSections_Polylines.shp	Polyline layer showing video subsections analysed. Please note 10 or 20 second video subsections were very short (i.e. small distance sampled). Some subsection records had the same coordinates because they were not distant enough from each other to ensure separate coordinates (i.e. UBSL fixes were not recorded frequently enough). Where subsection start and end coordinates were the same, they might have been omitted from this shapefile because the process of converting from points to lines might have skipped these records. Attributes include those specified within the contract, representing information entered into Marine Recorder at a Video sample level (video habitats). Metadata has been added using the ArcCatalog metadata wizard and the 'ISO' template.
20150506_StillsFragSpongAntho.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_StillsHumanImpact.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_StillsPMF_LimMobSp.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_StillsPMF_MobSp.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_VideoAnnex1Reef.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.

20150506_VideoBiotopes.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_VideoFragSpongAntho.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_VideoHumanImpact.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_VideoPMF_LimMobSp.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
20150506_VideoPMF_MobSp.lyr	Layer file including symbology categories and labelling convention used in the maps within the report.
JNCC Solan Bank SCI 2015 A_Reef1.mxd	Example ArcMap workspace including Layout 1 (top left map) used to create the Annex I Reef Subtypes, Map 1 of 4, within the report.
JNCC Solan Bank SCI 2015 A_Reef2.mxd	Example ArcMap workspace including Layout 2 (bottom left map) used to create the Annex I Reef Subtypes, Map 2 of 4, within the report.
JNCC Solan Bank SCI 2015 A_Reef3.mxd	Example ArcMap workspace including Layout 3 (top right map) used to create the Annex I Reef Subtypes, Map 3 of 4, within the report.
JNCC Solan Bank SCI 2015 A_Reef4.mxd	Example ArcMap workspace including Layout 4 (bottom right map) used to create the Annex I Reef Subtypes, Map 4 of 4, within the report.

4. SOLAN BANK IMAGE REFERENCE COLLECTION:

The image reference collection includes images saved/exported during the imagery analysis and represents the image reference collection deliverable of this project. The collection comprising the following folders is zipped into a single folder called ImageRefCollection.zip:

01 Porifera
02 Cnidaria – hydroids
03 Cnidaria - anemones
04 Cnidaria – other
05 Annelida
06 Crustaceans
07 Molluscs
08 Brachiopods
09 Bryozoans
10 Echinoderms
11 Tunicates
12 Pisces
13 Rhodophyta
14 Other phyla
15 Unsure
Annex I Reef
Biotopes
Frag Sp & Anth
Evidence of human impact
Stills field of view

20150427_Solan Bank ImageRefCollection.xlsx is an excel spreadsheet detailing all images within the following image reference collection.

JNCC provided Marine EcoSol with all imagery data on external hard drive. Marine EcoSol has returned this external hard drive with all deliverables detailed in this section.