Pilot Study to Develop Monitoring Methodologies and Establish a Baseline Survey for the Submerged or Partially Submerged Sea Caves in the Lyme Bay and Torbay Candidate Special Area of Conservation (cSAC)

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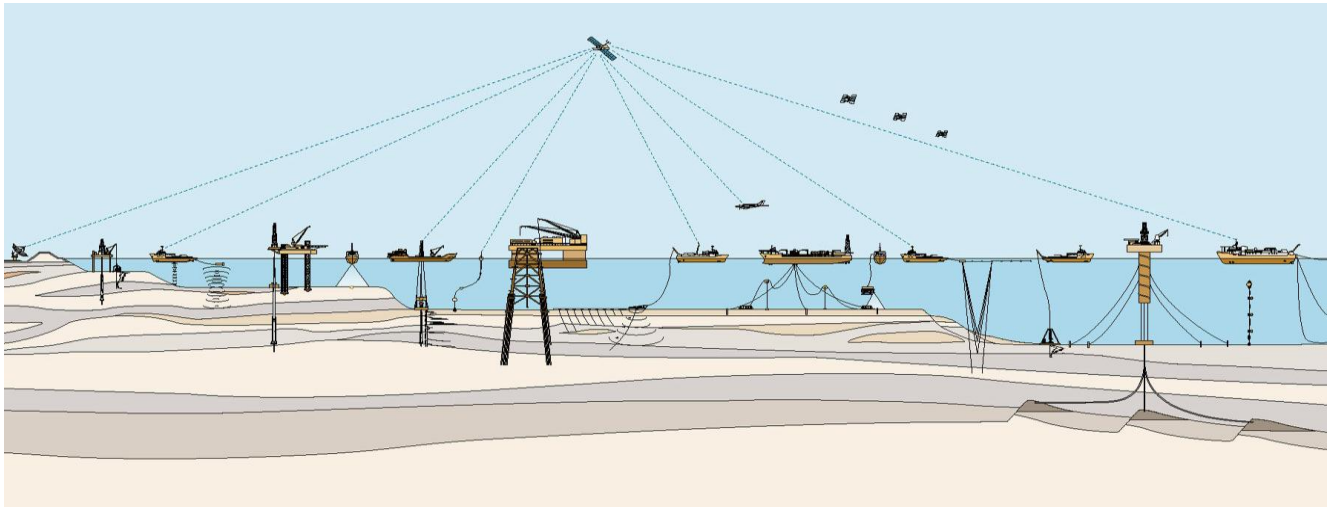

EXECUTIVE SUMMARY

EMU Limited (EMU) was commissioned by Natural England to undertake a survey to develop monitoring methodologies and establish a baseline for the submerged or partially submerged sea caves in the Lyme Bay and Torbay candidate Special Area of Conservation. The baseline survey aimed to provide sufficient information to allow for continual site condition assessment. The report compiled by Chris Proctor (2009), presented 202 caves for consideration, from which all those without an infralittoral or sublittoral aspect were removed, leaving a list of 82 sea caves from which a further selection was made. The selection process looked at, amongst other things, health and safety considerations and ease of relocation. For condition monitoring purposes, a series of attributes were considered including; whether a cave was considered representative of a set of caves, the presence of notable species, and the presence of representative sea cave biotopes. The information on attributes was extracted from the Proctor report. A primary list of 7 caves was selected, with an additional 8 reserves if required.

The survey was undertaken between the dates of Monday 3 and Friday 7 September 2012 inclusive. A team of four divers, 2 buddy pairs, conducted 4 dives a day between them from the charter vessel, Jennifer Ann. One day was reduced to 2 dives due to unfavourable weather conditions. A total of 13 caves were surveyed. An area of each cave was selected for in-depth survey based on being a safe working distance within the cave, and the appearance of a representative habitat and species assemblages. Video footage of the survey area was taken. Stills images at a known distance from the substrate were taken as replicates for post survey analysis. The data compiled from these images were analysed using multivariate techniques within PRIMER. Data was gathered to assist with biotope allocation, including species specific images, general habitat images of biotopes, and species sampling, from which a reference collection was assembled.

Across the 13 caves, a total of 15 biotopes were allocated. The overall area was dominated by a rock boring bivalve *Hiatella* (= *rugosa*), resulting in the biotope allocation of **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). Biotopes commonly associated with caves were also strongly represented, and showed a high level of agreement with those suggested within Proctor, 2009.

To establish a repeatable methodology, the epifaunal macro-invertebrate community composition was investigated by employing multivariate statistical measures drawn from the Plymouth Marine Laboratories PRIMER v6 (Plymouth Routines in Multivariate Ecological Research) suite of programs (Clarke & Gorley, 2006; Clarke & Warwick, 2001). Various approaches to the data were trialled, which in summary supported the suggested biotope allocations and identified 8 of the 15 biotopes arrived at by other means. The measurement of future change against this baseline will depend on careful survey planning, including the employment of appropriately experienced survey and taxonomy staff and employing those with previous skills at biotope identification.

Field methodologies have been reviewed, along with observations concerning conservation and management, and the occurrence of nationally rare and scarce species, found within the caves. Recommendations have been made regarding the field survey and post survey analysis.

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Appendix II Analysis Data

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Appendix IV Biotope Summary

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We would particularly like to thank Chris Proctor for his very informative 2009 report, from which this work extends and his subsequent invaluable advice and assistance with the project.

1 INTRODUCTION

1.1 EMU Limited (subsequently Fugro EMU Limited) were commissioned by Natural England to undertake a 'Pilot Study to Develop Monitoring Methodologies and Establish a Baseline Survey for the Submerged or Partially Submerged Sea Caves in the Lyme Bay and Torbay Candidate Special Area of Conservation (cSAC)', (Contract Number 23834).

1.2 SACs form part of the European-wide Natura 2000 network of internationally important sites. Natural England is responsible for providing advice on site management to relevant authorities and conservation objectives for European marine sites. Site condition monitoring is undertaken by measuring specific attributes against established targets and is required once every 6 years.

1.3 The Lyme Bay and Torbay cSAC is comprised of Lyme Bay Reefs and Mackerel Cove to Dartmouth Reefs (the latter area is also referred to as the Torbay unit). *"The Torbay area contains a diversity of wave-eroded sea caves in different rock types, and solution caves occur in limestone from high water to fully submerged (Cork et al., 2008). Only caves with an element below mean low water (MLW) are included in the conservation objectives of the site. The sea caves in this site are geographically different to those in existing SACs. Solution caves are formed by the dissolution of calcium carbonate and are therefore only found in limestone. Freshwater follows narrow fissures, dissolving the rock, which overtime enlarges them to become caves. These caves are usually more complex than sea caves and may penetrate far into the rock (Cork et al., 2008). They occur at Babbacombe to Hopes Nose and Broad Sands to Berry Head. Caves in the site support a richness of animal life including many nationally significant species such as sponges, pink sea fingers (Alcyonium hibernicum), burrowing anemones, southern cup coral (Caryophyllia inornata), Weymouth carpet coral (Hoplangia durotrix), and the squat lobster (Galathea nexa) (Cork et al., 2008). The animals found vary between caves and many of the caves are large and complex. Solution caves are not usually associated with the sea, however, in Torbay, where freshwater and saltwater mix in these caves, there are some of the best examples of coastal solution caves in the UK (Cork et al., 2008)*" (Natural England, 2012). '

1.4 This report outlines the processes and methods employed in the acquisition of baseline data for a sub-selection of sea caves within the Torbay area. The field methods are presented along with the various methods of subsequent data analysis, including species sampling and identification, video and stills analysis, and biotope allocation. Statistical analyses using PRIMER (Plymouth Routines in Multivariate Ecological Research) has been applied to data derived from selected images.

Aims

1.5 The aim of the current project was to undertake a pilot study of a selection of sea caves within the Torbay area. The baseline data acquired would then contribute to the development of appropriate monitoring methodologies, to facilitate condition assessment according to methods outlined in the JNCC Common Standards Monitoring (CSM) Guidance documents, available on the JNCC website. (http://jncc.defra.gov.uk/page-2236) In summary, the aims were:

- To identify a subset of representative, notable or at risk sea caves in the Torbay unit of the Lyme Bay and Torbay cSAC and to monitor these for the purposes of condition assessment;
- To develop a safe, cost-effective and statistically robust approach to monitoring the relevant and appropriate attributes of the above subset of sea caves in order to assess change against a baseline measure; and
- Where resources allow, establish baseline measures for suitable attributes against which future condition can be assessed. These are listed in section three, Table 3.2.

2 SEA CAVE SUBSET

Selection process

2.1 A summary table of the known sea caves (produced by Chris Proctor) presented a total of 202 sea caves for consideration. Sea caves recorded as eulittoral, or supralittoral without an infralittoral or sublittoral aspect were removed from the selection process, which reduced the dataset to a total of 82 sea caves for consideration in the baseline studies.

2.2 The selection process took into consideration the following aspects:

- Health and safety issues of a particular cave;
- Anthropogenic impacts, either current, or perceived future threats (other than pollution events);
- Ease of relocation (not only for the baseline survey, but also for future monitoring);
- Whether a cave was deemed to be representative of a group of sea caves;
- Geomorphology of the caves;
- Previously recorded notable species as per the attributes for assessment;
- Previously recorded biotopes relevant to the attributes; and
- Aspect of cave, in relation to sea conditions (in order to maximise the number of caves to be surveyed allowing for varying sea conditions).
- Geographical spread

2.3 Sea caves were automatically removed from the selection process if they were considered to pose an unacceptable level of risk to divers.

2.4 Table 2.1 presents the subset of sea caves selected for the baseline surveys, together with the criteria against which they were selected. Table 2.2 presents a further eight sea caves. The purpose of selecting these optional sea caves, was to allow for flexibility in the field to reselect sites, should weather conditions preclude diving at a particular site for the duration of the field elements. This would ensure that an alternative sea cave based on comparable criteria could be surveyed, and, therefore, field survey time could be maximised. A selection of additional caves, also allowed further caves to be investigated, where time allowed.

Table 2.1 Priority sea cave subset (Source Proctor, 2009)

Sea Cave Name	Geomorphology	Exposure	Tidal Streams	Biological Zone	Previous survey classification	Primary Reason for inclusion	Comments
Compass Cave	Brixham Limestone Solution cave / sea cave	Exposed	Very weak	Eulittoral / infralittoral 4m above chart datum ACD) – 4m below chart datum (BCD)	Moderate	Considered a representative exposed cave	Not particularly well surveyed (Pers Comm, Chris Proctor, 2011).
Garfish Cave	Brixham Limestone Coastal solution cave / sea cave	Moderately exposed	Very weak	Eulittoral / infralittoral 3.5m ACD – 3m BCD	Good	The octocoral, *Alcyonium hibernicum,* the squat lobster, *Galathea nexa,* and the cup coral *Hoplangia durotrix* have been recorded.	Considered a priority cave
Hidden Cleft	Brixham Limestone sea cave	Moderately exposed	Very weak	Eulittoral / infralittoral 2m – 0.3m ACD	Good	The rare geodiid sponge, *Geodia cydonium* has been recorded within this cave	
Ore Stone	Torquay Limestone ?sea cave	Exposed	Strong	Infralittoral (no depth information)	None	An representative example of a tide swept cave	
Oxley Head	Brixham Limestone sea cave	Exposed	Very weak	Eulittoral / infralittoral 2m – 0m ACD	Poor	Considered a representative exposed cave	Not particularly well surveyed (Pers Comm, Chris Proctor, 2011).
Watcombe Cave # 2	Oddicombe breccia sea cave	Moderately strong	Very weak	Eulittoral / infralittoral 1.5m ACD – 2.6mBCD	Poor	Anthropogenic influences at these caves may affect the condition of the caves.	The sea cave has two entrances, and considered a “swim through”.
Watcombe Cave # 3	Oddicombe breccia sea cave	Moderately strong	Very weak	Eulittoral / infralittoral 0.5m ACD – 1.5m BCD	Good	Survey data is incomplete for this cave, with unusual habitats noted.	

Table 2.2 Optional sea cave subset (Source Proctor, 2009)

Sea Cave Name	Geomorphology	Exposure	Tidal Streams	Biological Zone	Previous survey classification	Considered an alternative to sea cave in Table 2.1	Comments
Double Decker	Brixham Limestone sea cave	Exposed	Moderately strong	Eulittoral / infralittoral (no depth information)	None	Ore stone. The three alternatives are presented in order of priority	
Crab Cave	Brixham Limestone sea cave	Moderately strong	Very weak	Infralittoral/Submerged (no depth information)	None		
Hope's nose #4	Daddyhole limestone sea cave	Exposed	Moderately strong	Infralittoral 0.7m ACD – 2m BCD	Moderate		
Durl Head	Brixham Limestone sea cave	Exposed	Very weak	Eulittoral / infralittoral 2m ACD – 1m BCD	None	Watcombe No.2	Durl Head is a popular 'coaststeering' site.
Cuttlefish Cave	Brixham Limestone Coastal solution cave / sea cave	Moderately exposed	Very weak	Eulittoral / infralittoral 0 – 2m BCD	Moderate		
Hope's Nose # 1-3	Daddyhole limestone sea cave	Moderately exposed	Very weak	Infralittoral/ Submerged (no depth information)	Moderate	The sea caves are potentially interesting, and as they are small they would not take long to survey. (Pers. Comm. Chris Proctor, 2011)	
Silty Cave # 1	Torquay Limsteone ?Solution cave	Moderately exposed	Very weak	Infralittoral/ Submerged 2m – 4m BCD	Good	Not an alternative, but if time allows, should be surveyed, as this fully submerged cave is not represented by any of the caves within Table 2.1.	
Gosse's Cave	Torquay Limestone sea cave	Moderately exposed	Very weak	Eulittoral / Sublittoral fringe 0-2m ACD	Good		

3 FIELD SURVEY

Permissions and notifications

3.1 The survey was conducted by Fugro EMU Limited's HSE scientific dive team. A diving permit to undertake diving operations was issued by Adam Fitzpatrick, Torbay Harbour Authority. The Harbour Authority was contacted on a daily basis to inform them of the status of diving operations.

3.2 A Marine Licence (number: L/2011/00135.3) issued to Natural England by the Marine Management Organisation (MMO) was held on board the vessel during diving operations.

3.3 The following organisations were also informed of the diving operations:

- MMO local offices (Brixham and Plymouth); and
- Devon and Severn Inshore Fisheries and Conservation Authority (IFCA).

Vessel

3.4 Diving operations were undertaken from the vessel Jennifer Ann operated by Rick Parker.

Survey dates

3.5 Diving operations were undertaken between Monday 3 and Friday 7 September 2012 inclusive. The weather conditions and underwater visibility were favourable throughout the survey period, with the exception of Wednesday 5 September 2012. After the first dive on this date, sea conditions were too poor to survey any of the sea caves within Table 2.1 and Table 2.2. In order to make use of time on site, the only caves which were suitable for diving operations were the London Bridge Sea Caves, of which Cave 1 was surveyed.

3.6 The sea temperature was recorded as 16^{o}C during survey operations.

Sea Caves surveyed

3.7 Due to the favourable weather and underwater conditions, a total of 13 sea caves were surveyed within the five day period. Table 3.1 below presents a list of the sea caves surveyed.

Table 3.1 Surveyed Sea Caves

Sea Cave Name	Date Surveyed
Oxley Head	Monday 3 September 2012
Watcombe Cave # 2	Tuesday 4 September 2012
Watcombe Cave # 3	Tuesday 4 September 2012
Silty Cave # 2	Tuesday 4 September 2012
Compass Cave	Wednesday 5 September 2012
London Bridge Cave # 1	Wednesday 5 September 2012
Garfish Cave	Thursday 6 September 2012
Cuttlefish Cave	Thursday 6 September 2012
Double Decker Cave / Crab Cave complex	Thursday 6 September 2012
Ore Stone	Thursday 6 September 2012 and Friday 7 September 2012
Slater Cave	Friday 7 September 2012
Durl Head Cave	Friday 7 September 2012
Hidden Cleft	Friday 7 September 2012

Survey methodologies

3.8 Oxley Head Sea Cave (as recommended by Chris Proctor), was the first cave to be surveyed. Two dives were undertaken within this cave as a familiarisation dive, but also to review logistics and suitability of methods to be undertaken during the survey.

3.9 Figure 3.1 presents the locations of the sea caves surveyed.

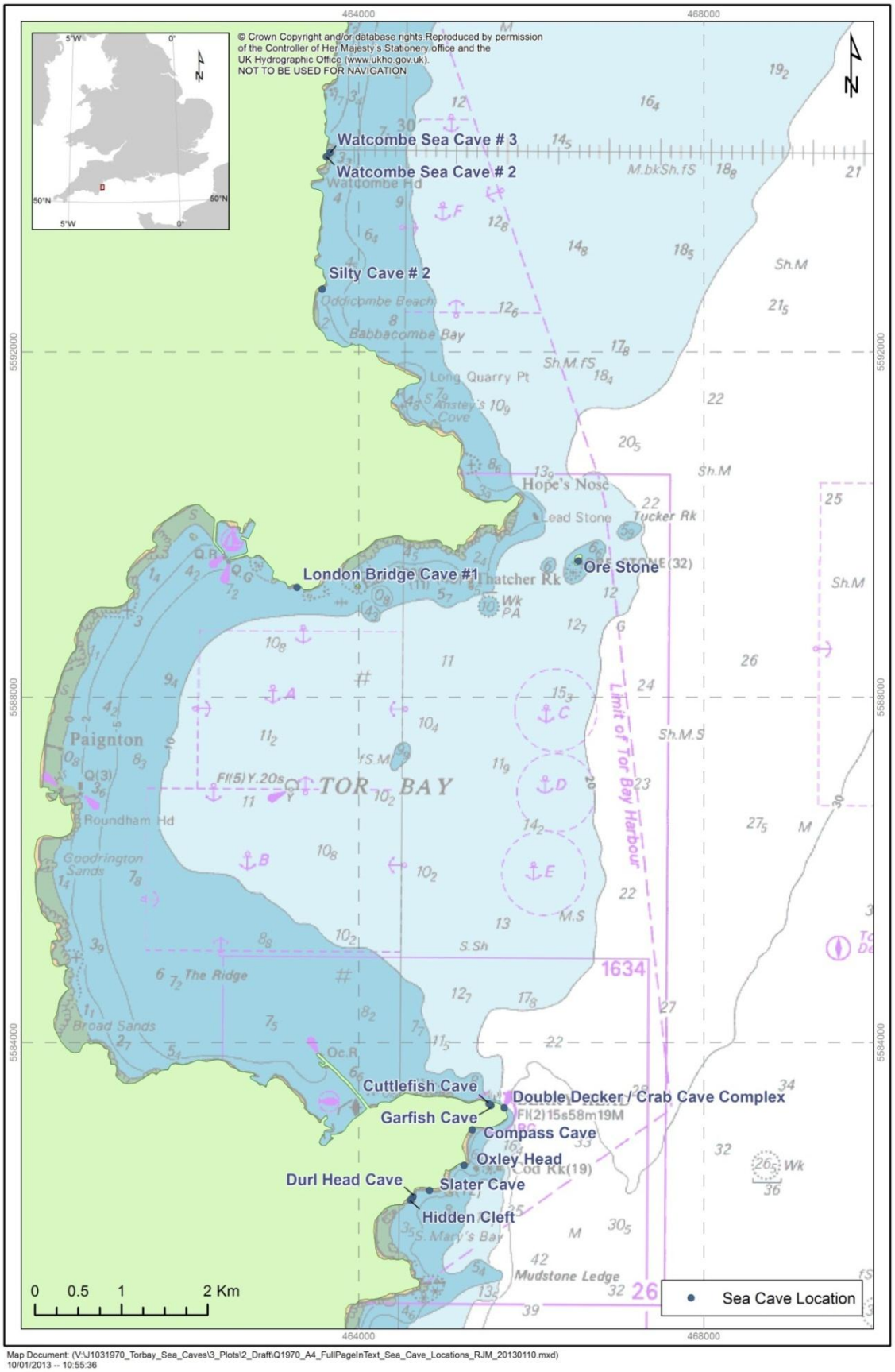

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Figure 3.1 Location of sea caves surveyed

Approach taken for monitoring of sea cave attributes

3.10 The attributes for condition monitoring of sea caves are similar to those for littoral rock, and inshore sublittoral rock. These attributes are shown in Table 3.2.

Table 3.2 Sea Cave Monitoring Attributes

Attribute	Comments
Extent of caves	Baseline partially completed by Proctor, 2009
Number of caves in the site	Baseline established by Proctor, 2009.
Biotope composition of sea caves	Baseline partially completed by Proctor, 2009
Presence of representative / notable sea cave biotopes	Baseline partially completed by Proctor, 2009
Species composition of representative / notable sea cave biotopes	Baseline partially completed by Proctor, 2009
Presence and/or abundance of specified species	Baseline partially completed by Proctor, 2009
Spatial pattern of characteristic sea cave biotopes	Baseline partially completed by Proctor, 2009

3.11 Within this survey, the attributes listed in Table 3.2 above have all been considered. However, some of the attributes listed have been sufficiently addressed by Chris Proctor (2009) and further focus within this survey was not deemed necessary. The approach taken with those attributes that required further investigation is detailed below.

Extent and number of caves

3.12 The level of detail provided within the report produced by Chris Proctor (2009), was deemed to be sufficient regarding the extent and number of caves. Between the current baseline study and the next monitoring study, it is unlikely that the extent of the caves will change (due to the hard rock type although greater complexity within them may be identified.

Biotope composition of sea caves

3.13 As suggested within the CSM Guidance for sea caves (JNCC, 2004b) a broad scale approach to biotope mapping within a suite of caves is considered appropriate for the current study. The requirement of the baseline surveys was to measure the overall variety of communities, rather than pinpoint the exact extent of each biotope within each cave at an exact location. A partial baseline has been established by Proctor, 2009. The aim of this current study has been to expand on the existing data where appropriate.

Presence of representative / notable sea cave biotopes

3.14 The project required that for each cave, data was gathered to allow the allocation of biotopes. A secondary aim was that the biotopes that had already been assigned within a cave, could be recognised during the dive, allowing for subsequent analysis of the condition of the biotope where possible, compared to the previous survey (Proctor, 2009). The allocation of biotopes required an appropriate level of assessment of species present and their approximate density, using the SACFOR scale where possible.

Notable / representative species

3.15 For each cave the survey methodology included a systematic approach to species sampling and recording. Recognisable species such as *Pachymatisma johnstonia* were recorded but not necessary targeted for photography or sampling, but were often present in any photographs taken as overall biotope images.

Species that were particularly noted as nationally rare such as the sponge *Geodia cydonium*, were specifically targeted for photography and / or sampling. Where possible, a photographic record was taken to support the sampling effort. The sampling was often linked to marked tags as seen in the following image (Plate 3.1), and a small, carefully selected section of the species, was sampled, preserved in IDA (Industrial Denatured Alcohol) or Formalin as required, and later analysed to establish or confirm species identity. Sponges and ascidians are particularly suitable for this level of sampling due to the taxonomic complexity of the groups and the potential for misidentification. Both groups are also subject to taxonomic re-classification and would therefore benefit from any record that can be kept for future observations.

Plate 3.1 Image with numbering tag

3.16 Within this survey, along with the species noted for biotope allocation, and those described as rare, attention was paid to the hydroid and foliose bryozoan turf species. These were sampled where appropriate but not necessarily targeted in photographs as they were, by their nature, present in many general photographs taken. Recognisable turf species such as *Tubularia indivisa* were not necessarily sampled, and form part of a photographic log only.

3.17 Anthozoa are, in most cases, best identified from the living fauna so attempts were made to take photographs that highlight the defining features such as the oral disc and column where possible to support identifications made.

Plate 3.2 ***Actinothoe sphyrodeta***

Spatial pattern of characteristic sea cave biotopes

3.18 The spatial pattern of a biotope within a cave was not specifically addressed within this survey. The spatial arrangement of biotopes was extremely difficult to establish due to their tendency to form mosaics and to vary within very short distances on the horizontal plane (from the entrance to the cave to the area of in-depth survey) and the vertical plane, often over no more than a few meters of water depth. Detailed information on the influence of various biotopes within the caves is detailed throughout the report.

General approach to methodologies

3.19 The key points applied to the survey methodologies were the following:

- Utilisation of existing data on the sea caves, where available;
- Collection of sufficient data during the baseline survey suitable for assessment of the attributes;
- Methods of data collection easily replicated during future monitoring events;
- Collection of a permanent record (video/ stills) to aid current and future assessments;
- Methods safe, and cost effective during the current and future surveys; and
- Data collected to provide a robust measure of each attribute obtained.

Survey methodologies

3.20 Positions of the sea caves, together with specific cave relocation information (supplied by Chris Proctor) were used to locate each sea cave.

3.21 On approach to each cave, photographs of the cave entrances were taken together with positional data. Any other identifying features were also noted. This information has been used to compile a sea cave relocation log for use during future monitoring work. Maps of each cave, where available (Proctor, 2009) were used as a guide, and annotated where necessary. These maps proved invaluable during the diving operations and are recommended as an integral part of future monitoring campaigns.

3.22 For each cave surveyed, a shot line was deployed (as a reference point) as close to the cave entrance as possible. The divers descended the shot line, and attached a tape measure to the shot at the bottom of the line. The distance from the shot to the entrance of the cave (the

point below the start of the vertical overhang) was recorded, along with the end of the photic zone where appropriate. Depending on what information was available, divers were able to record the survey locations within the caves as a distance from the end of the photic zone and the cave entrance as well as from the shot position.

3.23 For reasons of safety the deployment of lines and or measures within the caves was kept to a minimum to avoid tangles, which presented a potential safety risk in surge conditions and while navigating through shallow water kelp environments, frequently found at the cave entrances.

3.24 The survey requirements suggested that a distance within the cave of approximately 10 m would be adequate and would also be considered a 'safe' distance within the cave in which to work. This approach has been maintained overall but where suitable or appropriate, slightly greater distances into the cave have been travelled. Where this has occurred it will become apparent within the individual cave descriptions (section 5).

3.25 On entry into a cave, a general overview was established, noting the transition from faunal cover in the outer cave, to that further within the cave. An outer cave section was often more algae dominated with a particular overall faunal assemblage, which then changed to a more low lying and scoured faunal cover within the cave itself. This obviously varied across the caves in relation to wave exposure and general topography. Where a representative biotope or a habitat appearing uniform in nature was observed, the divers positioned themselves centrally within the area and detailed habitat recording was undertaken.

3.26 Within the buddy pair, one diver was allocated the task of taking video footage of a cross section of the cave at the point of survey, namely the floor and both walls, and where appropriate, the roofs of caves. The same diver then took a series of stills, spanning the whole area surveyed, aiming for at least 5 stills images per habitat and species assemblage, which often resulted in a set of images for the upper mussel and/or barnacle zone, a set for the main vertical wall areas of the cave including the lower wall scour zone which was regularly present, and a further set for the cave floor. Given the small and relatively confined nature of the areas being surveyed, the images would often cover transition zones as clear biotope boundaries were not often present. A collapsible ruler was attached to the base of the stills camera, to allow each image to be the same distance from the substrate and therefore of approximately the same surface area. During the course of the diving operations, two set distances of 21 cm and 31 cm (and therefore two surface areas) were trialled in a few caves.

3.27 The second diver reviewed the overall area being surveyed, noting species present and their density, and took photographs focusing on representing notable species and additionally targeting the smaller and rarer species that had a high probability of being missed in the random quadrats photographed by the first diver. Additionally, those species that are classically difficult to identify in the field were photographed, often with a label for ease of later identification, and then sampled for return to the laboratory for species identification checks. Sponges and ascidians often need to undergo more in-depth species identification and were regularly sampled throughout the survey. The additional aim of the species sampling and notable species focus was to ensure that as much information as possible was acquired to inform the post-survey biotope allocation. Recognisable species such as *Pachymatisma johnstonia* were listed but not necessary targeted for photography or sampling. However they may have been present in photographs taken targeting other species or overall biotope images.

3.28 Any specimens collected in the field were retained as part of a reference collection. This will permit verification of taxonomic identification during future comparative surveys.

Video / stills photography

3.29 For each dive, video footage was taken to record a general overview of the area of the cave being surveyed, and surrounding or approaching areas where appropriate. Additionally, stills photographs were taken in the selected survey area. A minimum of five images per biotope, randomly positioned, were taken. The stills images were intended as replicates within the biotope, each of the same known surface area. They were then subjected to post survey analysis. Note that within a cave, it was difficult to truly randomise without creating a random sampling array before the dive, which was not a practical approach to the task. In this respect, the sampling was haphazard, but effectively random as no features were selected. They are also considered to be true replicates within the biotope, rather than pseudoreplicates.

3.30 During image analysis, species were recorded, solitary species enumerated and estimates of abundance of colonial species provided as percentage cover. The aim of the replicate stills photography and the defined distance from the substrate used for each image was to cover sufficient area but equally provide sufficient detail to enable species to be identified to as high a level as possible. The review of fixed distance stills photographs provided the data used for statistical analysis.

3.31 The video footage and stills images have enabled a permanent record to be obtained of defining species and features. They also allow quality control of species and features to be undertaken to ensure compatibility between workers and between subsequent monitoring occasions.

4 POST SURVEY DATA TREATMENT AND ANALYSIS

Samples

4.1 On return to EMU laboratories, species that had been sampled in the field and catalogued and preserved at the end of each survey day, were reviewed and further identification to species undertaken where necessary and/or possible. Where additional incidental species were found within a sample pot, species identification was undertaken unless considered inappropriate for reporting purposes. Additionally, some incidental species were not in a suitable condition or comprised such small amounts of tissue that identification was considered impractical.

4.2 The reference collection was expanded to include many of the additional species found within the survey samples. From an original set of 145 samples taken in the field, the reference list subsequently expanded to comprise 190 species. Some of these are duplicate species entries, particularly regarding sponges and ascidians. Some species which are known to be misleading in their appearance were regularly sampled to try and prevent inaccurate species recording. For example, two white sponges *Stelletta grubii* and *Stryphnus ponderosus*, both able to form low lying crust forms were regularly found and sampled to check the identification. Very often, both types were found to be present in a cave, in close proximity, and often with seemingly very little observed difference between them, making the sampling effort and consistent checks across the survey area, a very worthwhile exercise. However for future monitoring, it may not be necessary to identify these sponges to species if it is beyond the scope of the resources available at the time. It may suffice to record 'white encrusting sponge cover' only.

4.3 The species identified from samples were also used to inform the video and stills analysis. A reference collection including identification notes has been compiled and can be found in Appendix I.

Video and stills review methodology

4.4 On return to EMU, video footage was reviewed, and notes taken on substrate composition and associated species. The footage generally panned from the floor to the top of the water level within the cave, or as far as the cave topography would allow. Where it was possible to reach the top of the cave, and view the area above the water, this was often done for interest only and not necessarily fully reviewed as part of the survey. The upper levels of the cave walls were often mussel or barnacle dominated and could be considered a transition to an intertidal area. Observations of these potentially intertidal areas have often been included, despite the fact that they were not the overall focus of the survey, their inclusion contributing to the broader picture and overall view of the cave.

4.5 From the video and stills review, a species list was compiled for each cave, which included the species identified from samples. The species were then allocated to one or more habitats within the cave and entered into BioScribe to assist with biotope allocation. BioScribe is described as a 'Biotope Decision Support Tool' (JNCC) which can be downloaded from the JNCC website, and allows the data to be interrogated in a variety of ways. However, it was also found very useful to choose one or more key species, from the area being reviewed, which were then used to search directly within the online JNCC biotope manual. For all caves a whole suite of biotopes were considered and final biotope allocation was not always easy or clear cut. In most cases an area was considered to be a mosaic of biotopes, with a main biotope allocated, and a further one or two suggested as having an influence in the area. Biotope allocation was further complicated as the areas over which the surveys were being conducted were often very small and the topography, depth of water and general

dynamics within the cave often provided variable substrate orientations or niches that changed over very small distances. It was also noted that it was not unusual to find both infralittoral and circalittoral biotopes present within a cave. Additionally a biotope noted for an algal component was often the most suitable, losing the algal presence due to increasing distance from the photic zone, but maintaining the overall suite of species that had resulted in its allocation. The biotopes allocated to each cave are discussed within each cave overview section.

4.6 For each habitat or mosaic of habitats within a cave, a series of stills images was selected, the analysis of which was compiled into a spread sheet of raw data. This was then rationalised to make the data suitable for analysis within PRIMER. The raw data and PRIMER ready data can be found within Appendix II.

4.7 The number of stills selected for analysis per biotope was set at a minimum of five. This was based on practical constraints as much as statistical rigour. Effort was made to collect more than five images where possible and given that the preferred statistical analytical method was multivariate, using the PRIMER package, the need to prove univariate power was not attempted, given the unknown levels of data variability before commencing the survey. For most of the survey, five images per biotope were achieved. Where too few images of a suitable quality were collected, either poor images have been used or where too poor, a reduced amount of images. However, this only occurred at a few sites and mainly on faunally poor areas such as lower scoured walls or cave floors, which has meant that for the main habitats within each cave, no overall reduction in species recording as a result of lack of images has occurred. In most instances, a greater number of images than five were taken and analysed, particularly from the main vertical walls.

4.8 Some species or suites of species have been recorded in a way that requires some explanation. A table has been created that presents some of the issues and the approach that has been applied and can be found in Appendix III. Separate cave specific tables have been compiled and can be found within the data on statistical analyses in Appendix II.

Statistical analysis methods

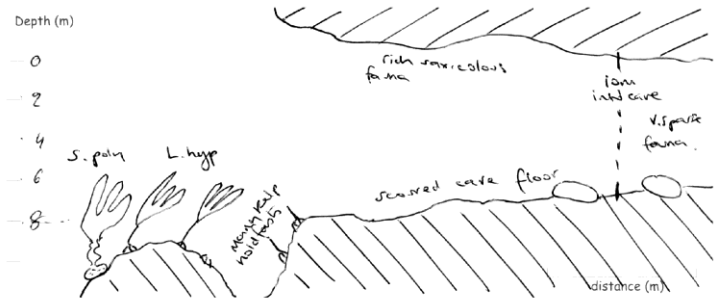
4.9 Data compiled from a review of the stills images have been analysed using multivariate techniques within PRIMER, in order to provide a methodology for repeated future survey. Techniques used include SIMPROF (to look for statistically significant evidence of genuine clusters) and SIMPER (to elucidate key biological components driving any differences between clusters. Outputs include non-metric multi-dimensional scaling plots (MDS).

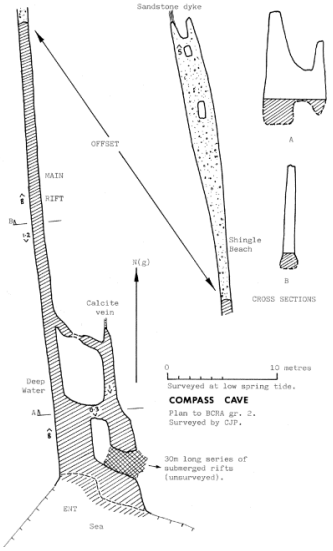
5 RESULTS

5.1 The following sections outline a general cave overview, with information on biotope allocation with accompanying images, on a cave by cave basis. The caves are arranged in alphabetical order.

Compass Cave

Table 5.1 Compass Cave

<table>
<tr><th colspan="2">Compass Cave</th></tr>
<tr><td> 
Overview Surface Photograph</td><td> 
Sea Cave Entrance</td></tr>
<tr><td colspan="2"> 

Elevations of entrance rift passage, Alex Jacobs, 2006 (sourced from Proctor, 2009)</td><td> 

Cave Plan (Proctor, 2009)</td></tr>
<tr><td>Entrance position (WGS84):</td><td>50°23.873’N
003°29.281’W</td></tr>
<tr><td>Distance from base of shot to survey area</td><td>9 m to end of photic zone.
18 m from shot to survey area.</td></tr>
<tr><td>Date surveyed</td><td>Wednesday 5 September 2012</td></tr>
<tr><td>Times surveyed:</td><td>08:49 – 09:39</td></tr>
<tr><td>Weather conditions:</td><td>Wind: NE F2-3
Sea State: Slight
Weather: Warm and sunny</td></tr>
<tr><td>Underwater visibility:</td><td>2-3 m</td></tr>
<tr><td>Ease of orientation within the cave:</td><td>Easy</td></tr>
<tr><td>Ease of location from the surface:</td><td>Easy</td></tr>
<tr><td>On site observations</td><td>None</td></tr>
</table>

General Cave overview

5.2 The position within the cave chosen for the survey had a cave floor comprising large boulders, covered with a low silt covered hydroid/bryozoan turf with a patchy cover of barnacles, expected to be *Balanus crenatus*. Occasionally boring bivalves could be seen along with patches of *Cliona* spp. agg. For guidance on the use of certain abbreviations such as 'agg', see Appendix III. As the boulders met the vertical cave walls, the fauna remained consistent with the noted addition of occasional *Caryophyllia* spp.. Ascending the cave wall, the density of hydroid/bryozoan turf increased, and dense patches of *Phoronis hippocrepia* appeared. The sponge *Haliclona simulans* formed small patches along with tiny amounts of *Terpios gelatinosa*. Continuing up the cave wall, the faunal density increased and the overall turf began to comprise a notable amount of small ascidians, believed to be a mixture of *Dendrodoa grossularia* and *Polycarpa scuba*. Low lying sponge crusts became more evident along with bryozoan crusts, *Caryophyllia smithii* and what was predicted to be *C.inornata* in places, and small patches of the colonial ascidian *Diplosoma* sp. *Didemnum maculosum* and *Lissoclinum perforatum* were also occasionally seen.

5.3 The rock face appeared bored by bivalves across the whole area and is expected to be *Hiatella* sp, in keeping with those sampled for further identification within other caves in the survey. Ascending the wall, the substrate became notably more pitted and the faunal turf continued to increase in density but overall was generally low-lying. In the middle to upper areas of the wall, thicker and more extensive sponge crusts became evident and included *Dysidea fragilis*, *Haliclona simulans*, *Pachymatisma johnstonia*, *Dercitus bucklandi* and *Cliona* spp. agg. Analysis of sponge samples revealed that *Halichondria bowerbanki* and *Myxilla rosacea* were also present in the area, as well as a Microcionidae (*Antho inconstans*). In some areas, the rock face became notably more fissured, undulating with deep clefts in which the larger sponge, *Pachymatisma johnstonia*, was particularly visible, along with *Galathea strigosa*, *Cancer pagurus*, *Necora puber*, *Palaemon serratus* and *Bispira volutacornis*. Throughout the area, small amounts of *Corynactis viridis* could be seen. The hydroid/bryozoan turf became denser on the upper rock areas, with the hydroid *Plumularia setacea* noted on occasion. A low lying and scattered presence of red algal species became noticeable on the upper vertical rock face, and moving towards the jagged and undulating roof of the cave, became mixed with barnacles, *Spirobranchus* worms and coralline crusts. Here one has effectively moved into the intertidal and above the main area of survey focus within this cave.

Biotope allocation

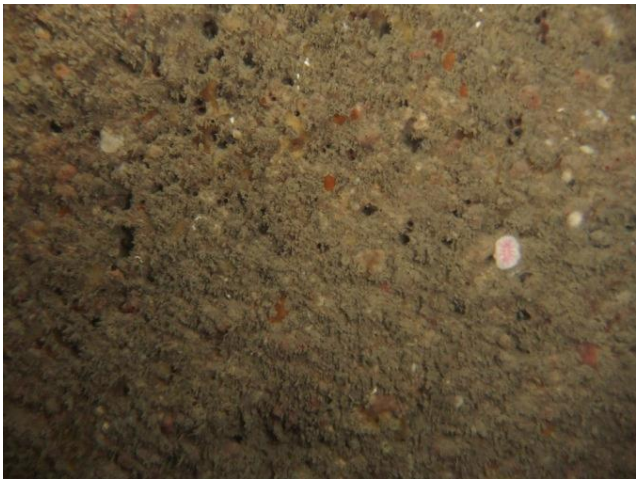
5.4 Due to the consistent presence and density of rock boring bivalves, predicted to be predominantly *Hiatella* sp. but potentially with other species also present, it is felt that a biotope that reflects their dominant presence should be chosen. Given the suite of sponges and the presence of *Polycarpa scuba*, along with *Caryophyllia* spp., *Corynactis viridis*, and a range of didemnid ascidians, the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk.) is considered the most appropriate for the main vertical walls of the cave. Within the biotope description and species list, certain species potentially expected are not present, such as *Alcyonium digitatum*, *Urticina felina* and *Sagartia elegans*, along with *Morchellium argus*. Some of these were however noted in the surveys from 1986 and/or 2006. It is suggested that the absence of these species is a feature directly related to the area of the cave chosen for the survey and that closer to the entrance, some of these additional species relating to this biotope may be seen. It is also noted that red seaweeds are seen within the survey area but are not a dominant feature at this point. It is possible that a variant of **HiaSw** could be suggested, or that it could just be described as an impoverished version of the biotope, resulting from its location in an almost aphotic cave environment.

5.5 Due to the presence of *Dendrodoa grossularia*, believed to be relatively dense in places, another biotope from the family of surge gully biotopes (**IR.FIR.SG**) is suggested as forming a mosaic in the area. The three reviewed are **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock), **IR.FIR.SG.CrSpAsDenB** (Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock) and **IR.FIR.SG.DenCcor** (*Dendrodoa grossularia* and *Clathrina coriacea* on wave-surged vertical infralittoral rock). All three have various aspects that might make them suitable for inclusion but overall, at this point within the cave, an impoverished form of **IR.FIR.SG.DenCcor** is suggested as the most relevant; impoverished mainly due to the lack of *Clathrina coriacea* and a few other sponges noted within this biotope which were not recorded at any point. Its strength lies more in the combination of a few species, *D.grossularia, P.johnstonia, Halichondria* sp., *Diplosoma* spp. and other didemnids, along with its noted position within caves which is stated as being 'in the middle or back of caves but also in gullies and tunnels', and 'the vertical rock.....abutting the cave/gully floor, is likely to be severely scoured, colonised by the robust **CC.BalPom** biotope', (JNCC 04.05). It is probable that at other points within the cave, one or other of the surge gully biotopes may well prove to be more convincingly dominant and display more of the species used in their definitions, but at this point, this is not considered to be the case.

Vertical wall

Vertical wall

Lower vertical wall



Lower vertical wall, scoured area

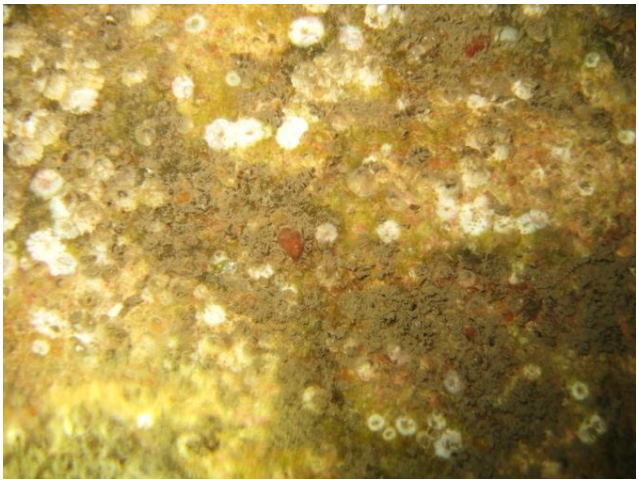


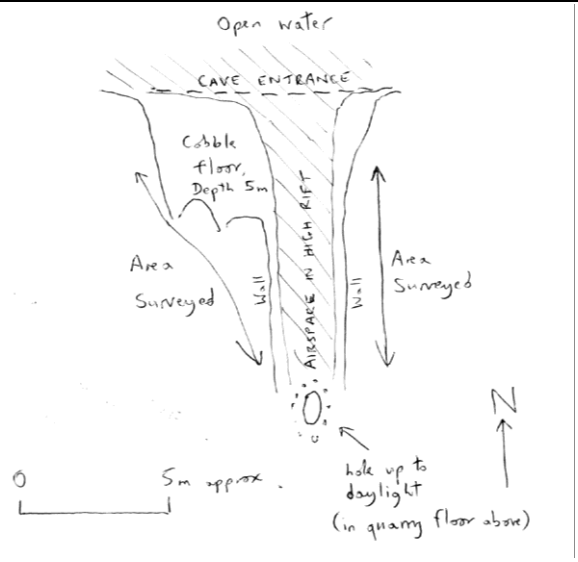
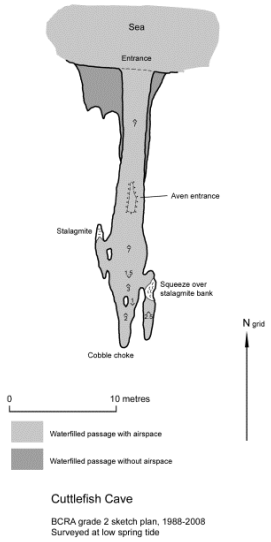
Plate 5.1 Compass Cave images

5.6 The very low scoured vertical bedrock wall has been allocated the biotope **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock), and is also considered appropriate for the boulder dominated cave floor. It is normally applied to vertical surfaces but in this case the size and stability of the boulders within the gully and the continuation of the scoured appearance and the species compliment of the lower walls onto the boulder substrate negates the need for a biotope change. However it is noted that even within this area, the surge gully biotopes considered for the main vertical wall area are still potentially having an influence in the area as the fauna is richer in places than might be expected for a **BalPom** biotope.

Plate 5.2 Compass Cave floor

Cuttlefish Cave

Table 5.2 Cuttlefish Cave

Cuttlefish Cave	
 Overview Surface Photograph	 Sea Cave Entrance
 Plan of Entrance Area (Proctor, 2009)	 Cave Plan (Proctor, 2009)
Entrance position (WGS84):	50°24.036'N 003°29.118'W
Distance from base of shot to survey area	6 m from shot to cave entrance. 11 m to end of photic zone. 19 m to survey area.
Date surveyed	Thursday 6 September 2012
Times surveyed:	10:02 – 11:28
Weather conditions:	Wind: W F1 Sea State: Slight Weather: Warm and sunny
Underwater visibility:	5 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	Surge within the cave due to the narrow rift.

General Cave overview

5.7 The entrance to the cave was wide, with an embayment on the west side, which then curved in to form a narrow channel with the east wall retreating into the rock. The main survey area was within the narrow channel at a point where it narrows to about one metre wide, about 19 m from the shot position, beyond which the constriction made it difficult for the team to work. At this point a cross section of video footage and stills were taken, after which the survey expanded to include the rear walls of the embayment at the front of the cave.

5.8 The floor at the initial point of survey was a slightly sandy, gravelly pebbly cobble mixture. Within the main narrow channel, the lower rock wall was scoured, undulating with a low lying hydroid/bryozoan turf, a few barnacles and the occasional *Asterias rubens*.

5.9 Moving up the east wall, overhangs, holes and recesses containing *Cancer pagurus* and *Necora puber* became visible. The walls appeared to be dominated by red bryozoan crusts. These were sampled and found to be various species of *Schizomavella*, and patches of colonial ascidians, Didemnidae (*Diplosoma listerianum/spongiforme*). *Caryophyllia* spp. were visible in low quantities.

5.10 Further up the wall, the surface became much more pock marked and burrowed. Hydroid/bryozoan turf became denser with larger sheets of colonial ascidians, and large areas of sponge crusts including *Amphilectus fucorum*, *Cliona* spp.agg., *Myxilla rosacea, Halichondria bowerbanki* and *Dysidea fragilis*. The small solitary ascidian *Polycarpa scuba* appeared regularly and the rock surface became noticeably bored by bivalves, which when sampled, were found to *be Hiatella* (= *rugosa*). For guidance on the use of certain abbreviations such as '=', see Appendix III. The shrimp *Palaemon serratus* were seen in clusters in recesses or on small ledges.

5.11 The very upper wall became dominated by barnacles and was considered an intertidal area, and not the subject of further review. The video footage shows a narrow fissure, with rock ledges running longitudinally, which is the channel at the back of the cave, not accessed by the survey team.

5.12 The west wall also had a scoured base with low turf, a few barnacles and *Pomotoceros* worms. The west and east walls had a very similar overall appearance, with the west wall having a slight increase in hydroid/bryozoan turf seen within an overhang in one area. Along the east wall towards the front of the cave, a light covering of coralline algae appeared.

5.13 The area between the east and west wall at the front of the cave was a dense cobble plain with no noted fauna.

5.14 Within the embayment, the rear north facing wall is more densely covered with sponges, bryozoan crusts and the colonial ascidians already seen, and had a rich cover of hydroid/bryozoan turf. The floor of the cave in this area appeared to be a sand deposition over the coarse pebbly, cobbly and small boulder substrate already described. Leopard spotted gobies (*Thorogobius ephippiatus*) were seen within this area. Patches of *Phoronis hippocrepia* appeared in the turf in places, along with small patches of *Aplysilla sulfurea*, and soft worm tubes, potentially *Pseudopotamilla reniformis*. Patches of the small anemone *Epizoanthus couchii* were noticeable, as well as the occasional presence of what appeared to be small clumps of *Morchellium argus*.

5.15 At the rear of the embayment, a narrow gully retreated into the rock where a rich faunal turf was seen and the sponge *Dercitus bucklandi* was visible. Overall, the west wall and the north

facing wall of the embayment appeared to be richer in faunal cover than the east, but did not particularly vary in species composition.

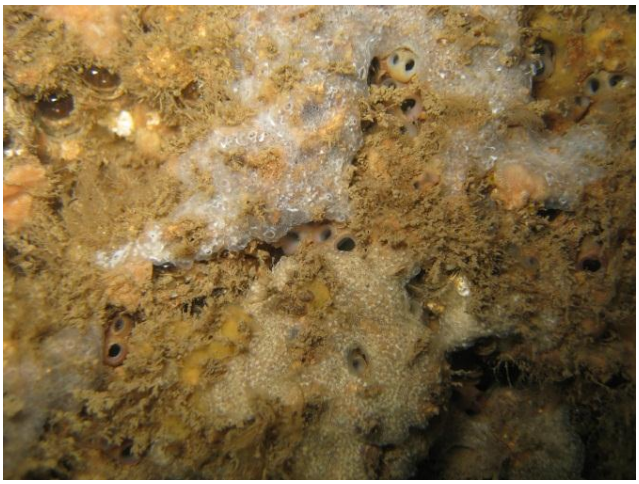
Biotope allocation

5.16 As observed regularly across the survey sites, the boring bivalves, found in this cave to be *Hiatella* (= *rugosa*), are dominant which has led to the allocation of a biotope that reflects its presence. There are only two biotopes that specifically focus on *Hiatella* species and of the two **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk) appears the most appropriate. There is always the option to choose a non *Hiatella* orientated biotope and note the additional presence of *Hiatella*, and this has been done where this has seemed to be the most accurate representation of the areas observed. However, the **HiaSw** biotope has been chosen if the overall species compliment is represented. **HiaSw** is noted as a seaweed biotope, but as mentioned within other caves where this biotope has been identified, the absence of seaweed is considered to be purely a feature of increasing distance within the cave. It would be appropriate to describe a variant biotope on this basis. Without focusing on the red algae, the **HiaSw** biotope notes the presence of *Pachymatisma johnstonia*, *Dercitus bucklandi*, *Cliona* spp. agg., *Amphilectus fucorum*, *Halichondria* spp., and *Dysidea fragilis*, all noted within the cave. Also of note is the presence of *Caryophyllia* spp., and small amounts of *Corynactis viridis*, various bryozoan crusts, here found to be *Schizomavella* spp., and importantly, the presence of *Polycarpa scuba*, found in varying densities across the area. Didemnids noted within the chosen biotope were also found here. Even though the east wall is poorer overall, the species compliment does not differ enough across the area as a whole to need a further biotope allocation for the main vertical walls.

Vertical wall – *Hiatella* sp. and *Polycarpa scuba*

Vertical wall – sponges and bryozoan crusts

Diplosoma sp.



Vertical wall – *Cliona* spp. agg.

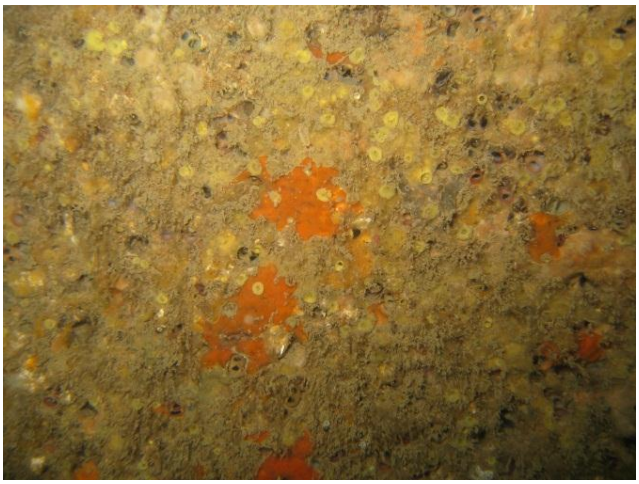


Plate 5.3 Cuttlefish Cave images

5.17 The lower section of the vertical walls, with its scoured appearance and sparse scattering of barnacles and tube worms has been allocated the biotope **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock). The cave floor of sandy gravelly pebbly cobbles, devoid of any notable fauna, has been allocated **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies).

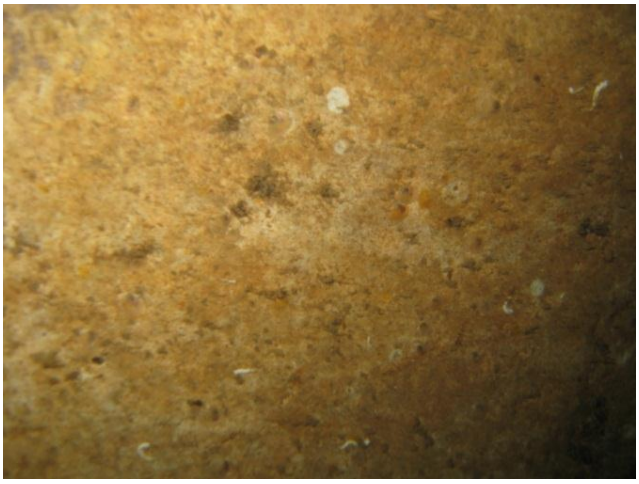
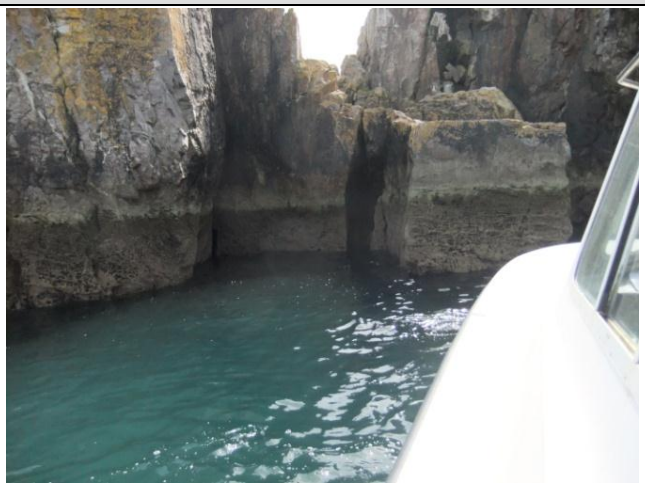
Recess with *Necora puber*	Scoured lower wall
	

Plate 5.4 Scoured sections within Cuttlefish Cave

Double Decker and Crab Cave Complex

Table 5.3 Double Decker and Crab Cave Complex

Double Decker / Crab Cave Complex	
	
Overview Surface Photograph	Sea Cave Entrance
Entrance Position (WGS84):	50°24.011'N 003°28.969'W
Distance from base of shot to survey area	24 – 26 m (note not a direct line due to an angled approach to survey area.)
Date Surveyed	Thursday 6 September 2012
Times surveyed:	12:24 – 13:15
Weather conditions:	Wind: Variable F1 Sea State: Slight Weather: Warm and sunny
Underwater visibility:	15 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	Shore anglers on the rock ledge beside Double Decker / Crab Caves.

General Cave overview

5.18 The set of caves or channels and recesses within the rock named the Double Decker / Crab Cave Complex were difficult from the point of view of establishing which area was the most suitable to survey. The first channel attempted, which was closest to the shore line, was a very surge filled gully that did not have the appearance of a cave and became very narrow and shallow within a short distance. This was not considered suitable.

5.19 The survey team returned to the shot and travelled along the front of the rock face, with the vertical walls to the divers' right. Small fissures extended off into the rock, most too narrow and generally unsuitable for survey purposes. Continuing forward, an overhead section of rock appeared and a very large open cavern environment presented itself. On entering, the floor dropped away and a large opening to the sea could be seen in the distance, through which a notable amount of light could enter. Before fully entering the main cavern, a narrow

channel extended to the right, which had an overhead section and a small ledge at the base, which allowed the team to settle into the area and perform a survey.

5.20 The team faced the wall, with the open cavern entrance dropping away behind them. The main survey was then conducted on one vertical wall, a narrower channel extending to the divers left, and a mussel covered ledge at the base. The second diver in the more outward position was also able to turn and review the bedrock base as it dropped away behind the team towards the open entrance. This area could be seen to have boulders deposited across the bedrock, with a rich cover of *Mytilus edulis* and sponge crusts, with *Alcyonium digitatum* visible on more vertical faces. The same diver was also able to view the area to the right along the vertical wall, the overhang with its dense cover of *Corynactis viridis* and the rock wall as it curved round towards the original direction of entry into the cave. This outer section had a different base hydroid/bryozoan turf, dominated more by *Chartella papyracea* than *Tubularia indivisa*. Coralline algae also appeared to become visible on this outer section in the upper reaches.

Vertical wall

Vertical wall

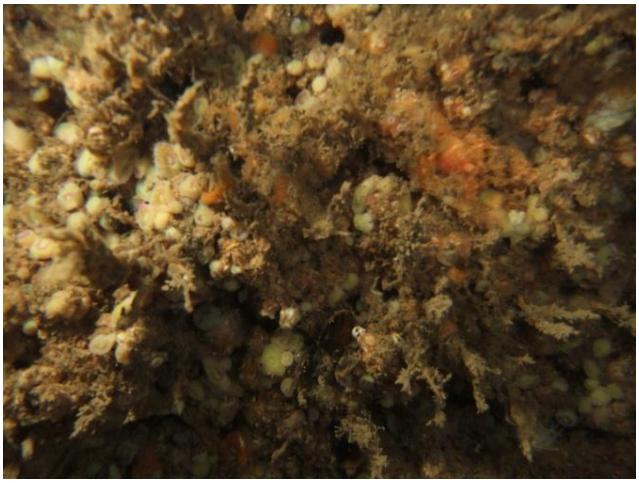


Plate 5.5 Double Decker / Crab Cave complex main vertical walls

5.21 Within the main survey area, the jutting bedrock ledge was covered with dense *Mytilus edulis*, reducing significantly and becoming patchy within the vertical wall. Small patches of coarse gravelly shell deposits were seen on the ledges. A silt deposit was apparent on the fauna. The vertical wall had a dense cover of hydroid/bryozoan turf, dominated by *Tubularia indivisa*, appearing largely dead, and heavily encrusted by additional hydroid and bryozoan species. Large patches of red bryozoan crust were dotted within the turf and identified to *Schizomavella* sp. Various sponge crusts were present and included *Amphilectus fucorum, Phorbas dives, Myxilla rosacea, Stryphnus ponderosus, Pachymatisma johnstonia, Dercitus bucklandi, Cliona celata* and *Cliona* spp.agg.. *Alcyonium digitatum* formed well developed clusters on the lower reaches of the wall. Solitary ascidians were clearly visible and when sampled were found to be *Polycarpa pomaria*. Didemnid ascidian crusts were very notable, *Diplosoma listerianum/spongiforme*. A channel running into the rock to the left when facing the wall was too small to be accessed but the fauna could be seen to be consistent with the main vertical wall, with large patches of *Pachymatisma johnstonia* and a large lobster seen in the recess at the base.

5.22 Within the turf of the main vertical wall, *Zostera* sp. was often found and presumed to be drift, caught in the turf. However on review, it appears well established and healthy and may well be growing within the turf.

5.23 *Corynactis viridis* was dense within overhangs at the top of the vertical walls, continuing to be present as the rock bent away from the main survey area and towards the route of entry to the cavern, with *Alcyonium digitatum* and large patches of *Pachymatisma johnstonia*. The hydroid/bryozoan turf was dominated by *Chartella papyracea*, with *Tubularia indivisa*, Plumulariidae and *Bugula plumosa*. Various sponge crusts were mixed in with the turf. The outer section also had small patches of short red algae within the *Chartella* on the upper reaches of the wall.

5.24 On the very upper walls, *Mytilus edulis* reappeared mixed with barnacles. This area was considered intertidal.

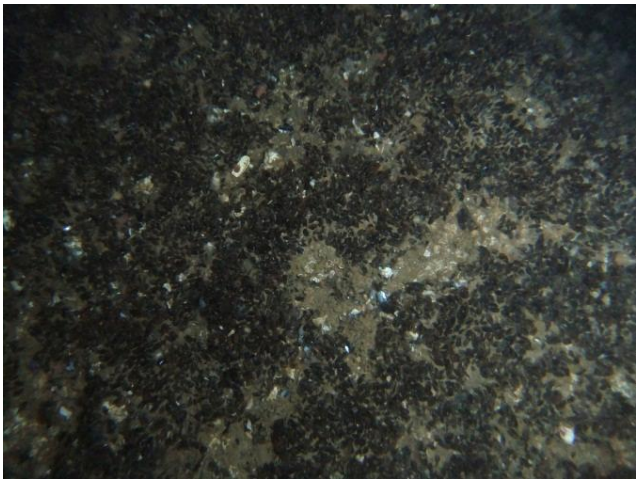
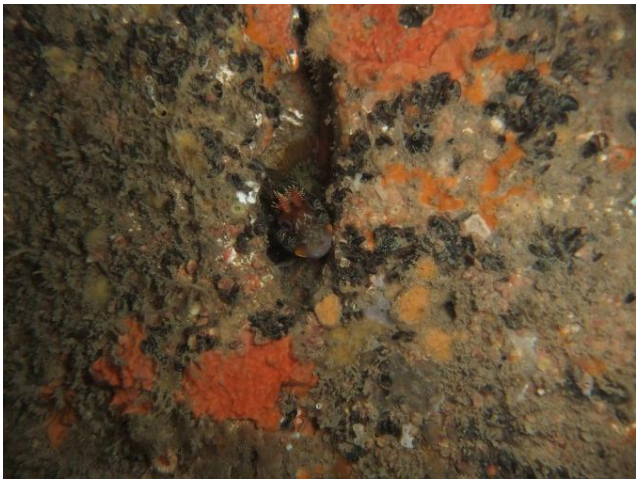
Mussel covered lower ledge	Lower vertical wall
	

Plate 5.6 Double Decker / Crab Cave complex lower sections

Biotope allocation

5.25 The main vertical wall appears to be best represented by the biotope **IR.MIR.KR.HiaSw** *(Hiatella arctica* and seaweeds on vertical limestone / chalk), but without the full complement of red seaweed alluded to within the biotope code.

5.26 However the overall list of species noted for this biotope includes not only *Hiatella* sp. along with the solitary ascidian *Polycarpa* sp, an array of sponge crusts including *Pachymatisma johnstonia, Dercitus bucklandi, Cliona celata* and *Dysidea fragilis*, small patches of *Mytilus edulis* and the common occurrence of various bryozoan crusts. *Alcyonium digitatum* is also seen within the cave and noted within the biotope. The presence of didemnids and the dense hydroid turf also very prevalent within the cave is represented by this biotope. It should be noted that *Hiatella* sp. is very sparsely recorded in comparison to other caves surveyed but it is felt that this is largely due to the highly obscuring nature of the thick hydroid/bryozoan turf and that its presence is actually much higher within the area. On the upper reaches of the vertical walls, sparse red algae can be seen to occur within the turf, adding further support to the **HiaSw** allocation.

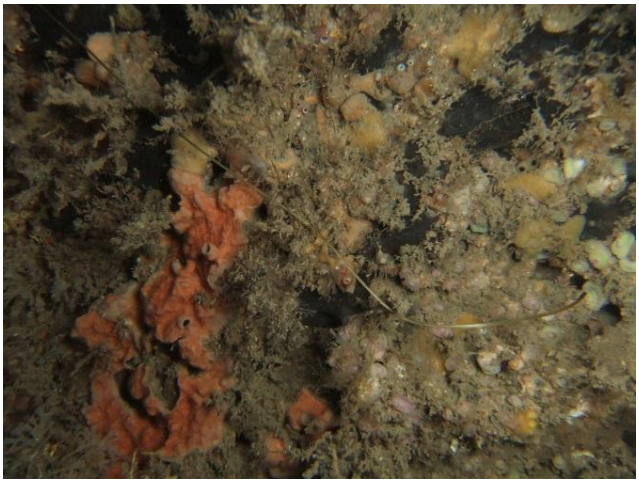
5.27 It is felt that the **HiaSw** biotope is potentially forming a mosaic with **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock), impoverished compared to the overall species compliment expected but does accommodate the presence of *Tubularia indivisa*, not mentioned within the **HiaSw** biotope. The **CrSpAsAn** biotope is also described as having areas where *Corynactis viridis* dominates, which was noted on the upper areas of the vertical walls and within the entrance to the narrow gully to the left of the main working area. However *Urticina felina* and *Metridium senile* are not noted as components of the area surveyed. Echinoderms are also absent within the area. The **CrSpAsAn** biotope also mentions the presence of Corallinaceae which is visible further towards the entrance to the cavern.

5.28 The mussel covered lower wall and ledge, with the additional area that drops away behind the ledge to the wide entrance to the open sea, appears to comprise a series of bedrock ledges and small drop offs towards the cavern opening. Small boulders are present with surface deposits of gravelly shelly sand in places. The surface is covered with *Mytilus edulis*, the small vertical walls with clumps of *Alcyonium digitatum*. Within the mussels are small patches of low lying hydroid turf, the occasional stalk of *Tubularia indivisa* and very occasional small solitary ascidians, *Polycarpa* sp. This second habitat supports the biotope **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock).

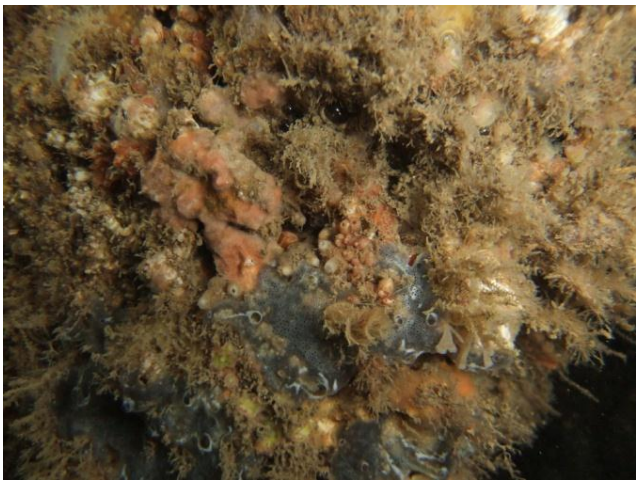
5.29 Mentioned here for interest only, the upper section of the vertical rock which becomes a mussel and barnacle dominated zone would be allocated the biotope code of **LR.HLR.MusB** (Mussel and/or barnacle communities).

Corynactis viridis within overhangs

Bryozoan crusts



Diplosoma sp. on vertical walls

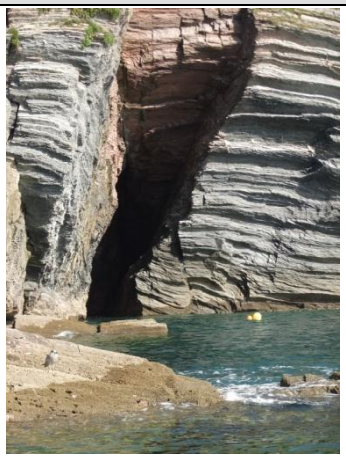
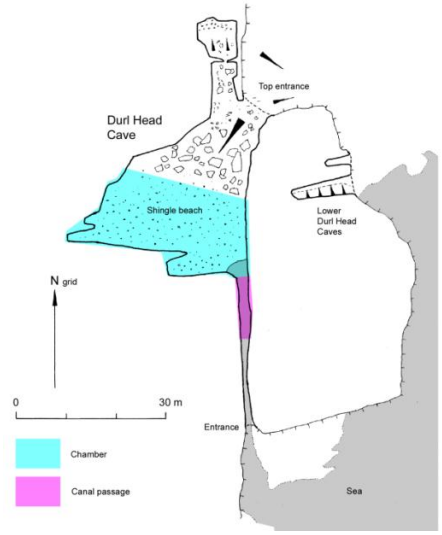


Vertical wall with *Sidnyum elegans*

Plate 5.7 Double Decker / Crab Cave complex species images

Durl Head Cave

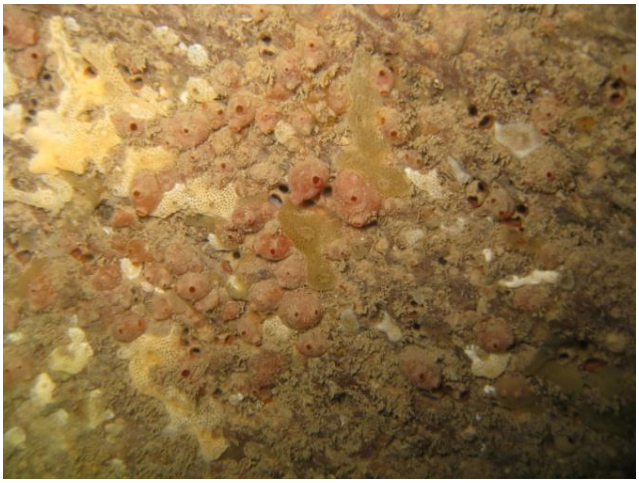
Table 5.4 Durl Head Cave

Durl Head Cave	
 Overview Surface Photograph	 Sea Cave Entrance
 Cave Plan (Proctor, 2009)	
Entrance position (WGS84):	50°23.451'N 003°29.858'W
Distance from base of shot to survey area	12 m from shot to cave entrance 14 m to end of photic zone 33 m to main survey area
Date surveyed	Friday 7 September 2012
Times surveyed:	10:10 – 11:04
Weather conditions:	Wind: W F1 Sea State: Smooth Weather: Warm and sunny
Underwater visibility:	6 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	None

General Cave overview

5.30 The entrance to the cave was a narrow channel, the cave floor densely covered with drift algae. The area chosen for survey was along the narrow channel at the point at which it opened out onto the area at the rear of the cave, noted as the 'beach' by Proctor (2009). Beneath the drift algae, a sandy pebbly cobbly substrate with some small boulders could be seen. *Necora puber* were seen at the base of the vertical walls and within lower wall crevices, along with the occasional large anemone *Urticina* sp., and the shrimp *Palaemon serratus*. The lower section of the vertical walls was very scoured with sparse fauna. Rising up the smooth undulating rock wall, a very low lying hydroid/bryozoan turf (meadow) could be seen, after which a dense ascidian turf developed, appearing to be *Dendrodoa grossularia* but none were sampled for species confirmation. Within the *Dendrodoa* turf, another larger ascidian was present. The larger ascidian sampled in the area at the time was *Corella eumyota*, which may well be the same as all of the larger ascidians observed but this was very hard to establish from the video footage. The surveyor at the time suggested '*Molgula* sp.?' but as none were sampled, this cannot be confirmed. Additionally within the ascidian turf were frequent occurrences of the globular sponge *Tethya citrina*. One small patch of anemones was seen that was suspected to be *Actinothoe/Sagartia* sp, but the video footage was not adequate for species identification. *Sagartia* spp. were clearly present at other points within the cave. Within the faunal turf were occasional bare patches or scoured rock. Along the east wall in particular, small patches of white sponge crust were visible, which were sampled and found to comprise *Stryphnus ponderosus, Leuconia nivea* and *Clathrina coriacea* agg..Throughout the turf, small purple anemones were scattered and are believed to be *Sagartia* (= *rosea*).

Vertical wall – *Dendrodoa grossularia* and didemnids



Vertical wall – encrusting white sponge

Sagartia (= *rosea*) and *D.grossularia*

Lower wall with scour and sparse *Hiatella* sp.

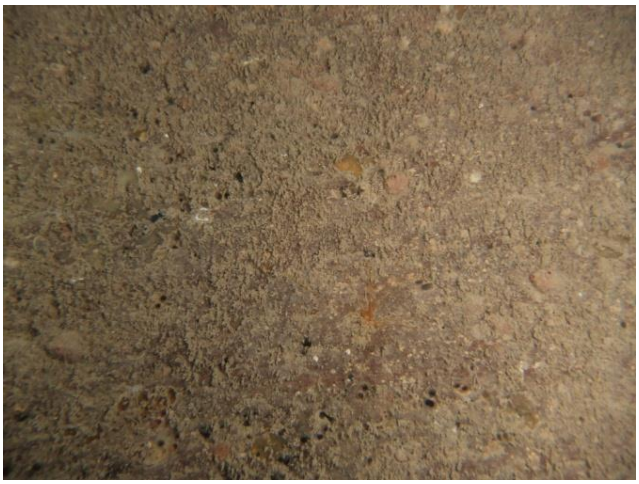


Plate 5.8 Durl Head Cave images

Biotope allocation

5.31 The overall area surveyed consists of a seabed of sandy pebbly cobbles with some small boulders with no noted fauna and a species poor scour zone at the base of the vertical walls. The smooth undulating surface which then rises, with *Necor puber, Urticina felina* and *Palaemon* shrimp were also joined in places by very small amounts of boring bivlaves *Hiatella* sp., the occasional *Dendrodoa grossularia*, a few sparse sponge crusts and some scattered barnacles with very little other fauna present. A very low lying and silt encrusted hydroid/bryozoan 'meadow' is common on the rock, with no species definable at any point.

5.32 The ball sponge *Tethya citrina* is noted, the presence of which would normally indicate a circalittoral biotope, along with the anemone cluster, suspected to be *Actinothoe sphyrodeta*. It might also suggest the *Hiatella* dominated biotope, **IR.MIR.KR.HiaSw**, (*Hiatella arctica* and seaweeds on vertical limestone / chalk), however the overall view of the cave does not support the selection of this biotope to describe this rare occurrence of certain species, and

the approach has been to comment on these species as being an unusual presence within the set of chosen biotopes.

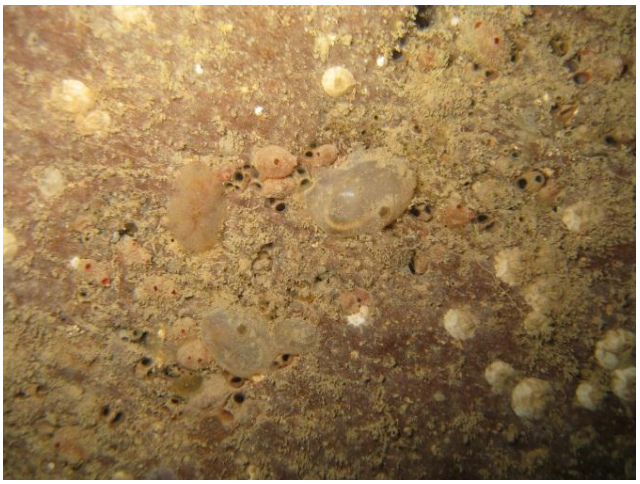


Plate 5.9 *Corella eumyota* with *Dendrodoa grossularia*

5.33 Higher on the cave wall, the presence of *Hiatella* appears to reduce overall but is still present and the density of *Dendrodoa grossularia* greatly increases. The biotope code **IR.FIR.SG.DenCcor**, adequately represents the upper rock level, noting as it does the variably density of *Dendrodoa grossularia* and the patchy occurrence of *Clathrina coriacea* agg. Within the biotope description, various sponges are listed, none of which can be confirmed by this survey as being present, but various sponge crusts, unidentified, are present. Didemnid ascidians are present, *Didemnum maculosum*, *Lissoclinum perforatum* and *Diplosoma listerianum/spongiforme* particularly noted, as are low levels of *Sagartia elegans* (with a number of species variations on *S.elegans* noted). There is some support for an impoverished form of a second biotope, **IR.FIR.SG.CrSp**, attractive particularly due to its addition of *Leuconia nivea* and the mention of spirorbid worms, seen here in quite dense aggregations within the turf. It should also be mentioned that *Stryphnus ponderosus* was also found, confirmed by samples taken at the time, and is recorded within this latter biotope, despite not being mentioned by the overall definitive biotope description. It is suggested that this second biotope forms a small contribution to the main biotope described for the east wall, but becomes a much larger contributor to the overall area on the walls towards the rear of the cave.

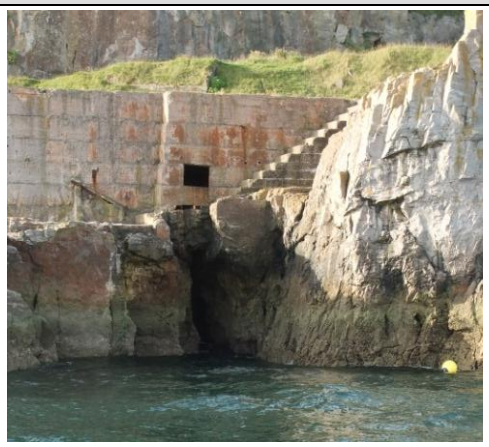
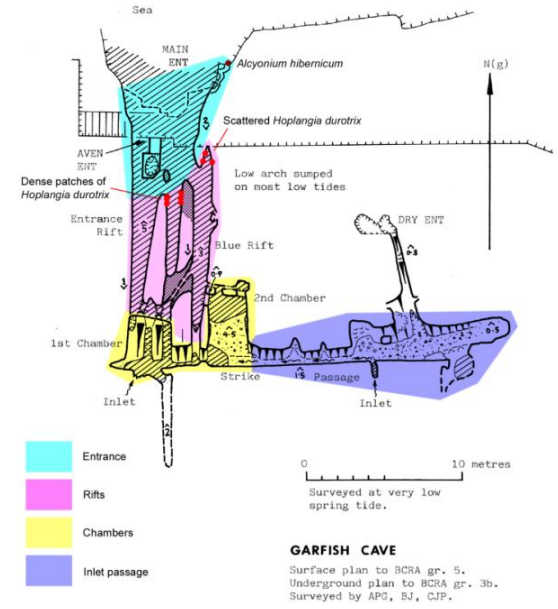
5.34 The presence of *Hiatella* sp. on the lower walls cannot be adequately covered by the present biotopes and the **DenCcor** biotope chosen does not mention or allude to this or any similar species. The overall suggestion is that there is one biotope on the main east wall, **IR.FIR.SG.DenCcor**, mosaicing and then merging into **IR.FIR.SG.CrSp** towards the rear of the cave, and that *Hiatella* has to be mentioned as a component of the area, with no necessarily representative biotope. If *Hiatella* sp. is removed from the lower wall area, the two already mentioned biotopes are adequate to represent the area. It may be the case that at other areas of the cave, or the outer sections, there is a more recognisable *Hiatella* biotope of which the observed *Hiatella* may be the remnants as it grades into the biotopes seen.

5.35 The biotope allocated to the impoverished lower scoured wall section is **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock). The floor of the cave with small boulders and sandy gravelly pebbles with cobbles has been allocated **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies).

Plate 5.10 Durl Head Cave floor

Garfish Cave

Table 5.5 Garfish Cave

Garfish Cave	
 Overview Surface Photograph	 Sea Cave Entrance
 Cave Plan (Proctor, 2009)	

Entrance Position (WGS84):	50°24.026'N 003°29.100'W
Distance from base of shot to survey area	11 m to cave entrance 17 m to survey area (west channel)
Date Surveyed	Thursday 6 September 2012
Times:	08:10 – 09:05
Weather conditions:	Wind: W F1 Sea State: Slight Weather: Warm and Sunny
Underwater visibility:	8 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	Grey seal was seen inside the cave. Litter present.

General Cave overview

5.36 On entering the cave, the diver is presented with a series of channels running back in to the rock, of which the gully to the far left (west) was chosen. The west wall of that channel was surveyed in depth. A maximum depth of 6.5 m was recorded, the shallowest about 2 m, where the roof section became too narrow to ascend further. The opposite (east) wall of the channel displayed similar fauna but was not surveyed in depth.

5.37 The entrance to the cave was bordered by an area of large boulders and cobbles on coarse sediment. The boulder and cobble matrix on coarse mixed sediment, reduced further within the cave and at the point at which the main survey was undertaken, became a coarse mixture of shelly gravelly sand with a few surface deposits of pebbles and small cobbles. Where the coarse substrate abutted the wall, heavy scouring was present with small rounded depressions which became more pitted and bored as height up the wall increased. Low lying hydroid/bryozoan turf species, largely undefinable, formed a consistent cover, along with large red and pink bryozoan crusts, found to be *Schizomavella* sp., small patches of the white bryozoan crust *Disporella hispida*, sponge crusts including *Dysidea fragilis*, *Dercitus bucklandi*, *Phorbas dives*, and *Terpios gelatinosa* amongst others, and occasional small patches of the didemnid ascidian, *Lissoclinum perforatum*. Underneath the surface fauna, the rock was heavily bored by bivalves, consistent in appearance with those observed within other cave walls, and where sampled, found to be *Hiatella* (= *rugosa)*. *Caryophyllia smithii* is present, potentially with other species of *Caryophyllia* but the appearance was often indeterminate. Large patches of *Phoronis hippocrepia* were visible in places. Very rarely, solitary ascidians were seen, *Polycarpa scuba*, and on the lower edge of the main survey area, the larger ascidian *Ascidia conchilega* was found. This main biotope changed towards the upper levels, where the rock curved round onto the roof. Though not surveyed in detail, it was observed that the substrate became more heavily and densely pitted by boring bivalves (*Hiatella* sp.), which formed a dense cover with barnacles, appearing to be dominated by *Verruca stroemia*. Occasional clusters of soft worm tubes projected from the substrate, likely to be the fan worm, *Pseudopotamilla reniformis*. Small patches of hydroid/bryozoan turf were still present along with some thin sparse sponge and bryozoan crusts. *Necora puber* and *Galathea strigosa* were seen within the upper wall recesses.

5.38 Garfish cave is noted for the presence of the nationally rare small cup coral *Hoplangia durotrix*. This species was not found in the area chosen for the overall survey but an additional search was made within the area already noted for its presence, clearly marked on the surface plan for the cave created by Chris Proctor (2009). It was found in dense aggregations within the upper overhanging areas, on *Hiatella* bored rock with sponge and bryozoan crusts, hydroid/bryozoan turf species and very occasional *Corynactis viridis*.

5.39 Also noted within the area is the rarely recorded soft coral, *Alcyonium hibernicum*. An additional search was also made for this species and was found to be present at the position already noted by the previous survey, on the outer western edge of the cave (Proctor, 2009). The colonies appear robust and healthy but no further assessment was made as it was outside of the area of the cave chosen for the present survey.

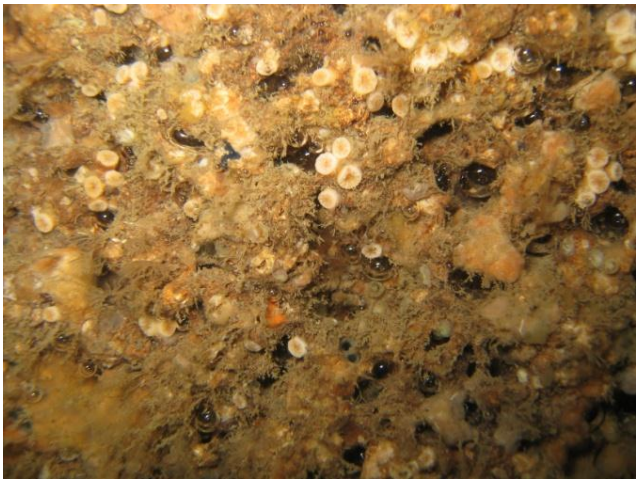
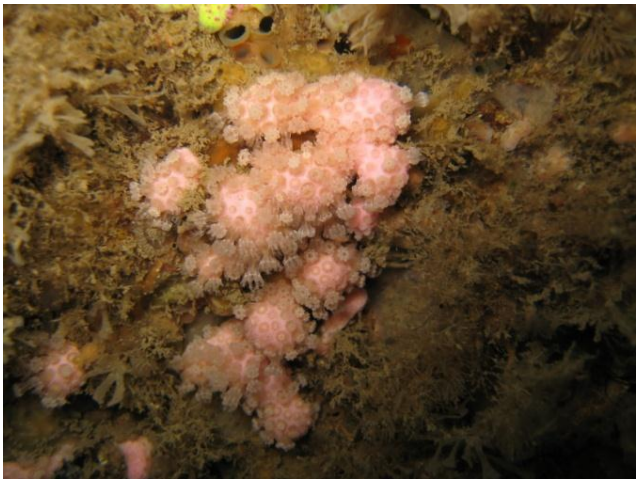
Upper roof section with *Hoplangia durotrix*	Outer cave with *Alcyonium hibernicum*
	

Plate 5.11 Garfish Cave, *H.durotrix* and *A.hibernicum*

Biotope allocation

5.40 Where the cave wall ascends to the dense barnacle and boring bivalve covered rock (*Hiatella* sp.) with sponge and bryozoan crusts, calcareous tube worms, *Spirobranchus* sp. and spirorbids, the allocation of a biotope becomes very difficult to establish. The overall area could be described by the biotope **LR.FLR.CvOv.FaCr**, (Faunal crusts on wave-surged littoral cave walls). This biotope makes a feature of the dense cover of barnacles, with sponge and bryozoan crusts and the presence of spirorbid worms. However, compared to this biotope description, the area would appear impoverished. An additional complication is the dense presence of *Hiatella* sp.. There are two *Hiatella* biotopes, **CR.MCR.SfR.Hia and IR.MIR.KR.HiaSw**, the latter has been used elsewhere within the cave survey project. However, the species compliment associated with either biotope is very different from that seen here and it seems inappropriate to allocate either one as even forming a mosaic with the **FaCr** biotope. It is felt that the most suitable approach is to allocate the **FaCr** biotope and note that an additional feature of this area is the presence of *Hiatella* sp. within the substrate.

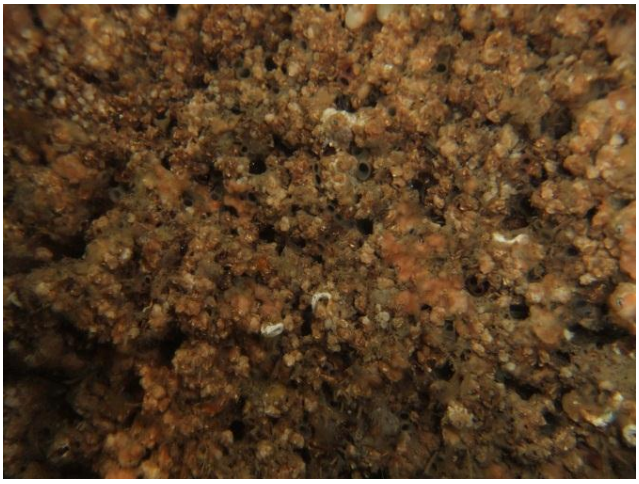
Upper wall – *Munida rugosa*	Upper wall – Boring bivalves and barnacles
	

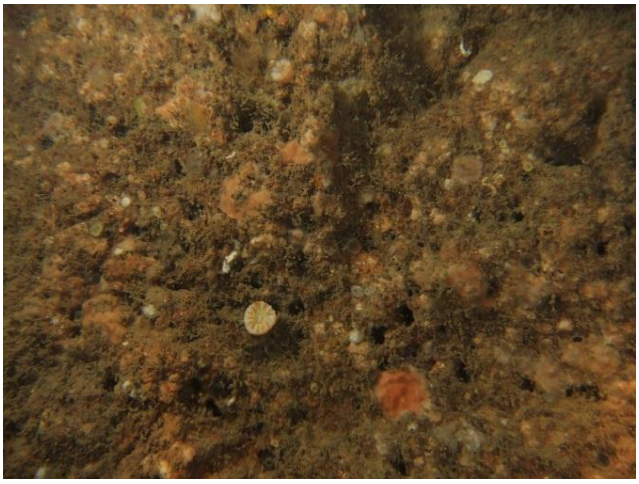
Plate 5.12 Garfish Cave, upper walls

5.41 It is thought that the outer area of the cave where *Hoplangia durotrix* is found should potentially be mentioned as a target note within the overall **FaCr** biotope allocation. However within this outer area, the spatial change from inner to outer cave, may make it more appropriate to suggest an alternative biotope influence. The biotope **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock) does refer to this species specifically, but an in-depth survey was not done on this section and is mentioned here merely as a point of interest.

5.42 The second habitat, referring to the main vertical wall section, is also very difficult to characterise within the current biotope codes. The low boulders marking the entrance to the cave were not surveyed but observed to be a mixture of biotopes, dominated by an impoverished **IR.MIR.KR.HiaSw**, (*Hiatella arctica* and seaweeds on vertical limestone / chalk), having a thicker hydroid/bryozoan turf than that observed in the chosen survey area, an array of low lying sponge crusts, patches of the colonial ascidian, *Morchellium argus*, the occasional solitary ascidian *Polycarpa scuba,* and small tufts of red algae. Other more *Dendrodoa* dominated biotopes may also contribute to the area. It would then appear that the vertical substrate further within the cave at the point of survey may be part of a transition from this **HiaSw** biotope to more clearly defined alternative biotopes further within the cave. In summary, the survey area appears to be a very impoverished form of the outer biotope, the red algae disappearing, thicker sponge crusts such as *Pachymatisma johnstonia* being absent, as well as various anemones, and practically no solitary ascidians. It does seem particularly impoverished in relation to either of the *Hiatella* biotopes described. This substrate may be suitable for a further biotope description and code designation. It is probably the case that further within the cave, in suitably sheltered or creviced areas, richer faunal cover might be found that would further support the **HiaSw** biotope choice, minus the red algal component, or it may be found that the area chosen is merely an impoverished transition area in between two more richly covered and more easily definable substrates.

Vertical wall – *Ascidia conchilega*

Vertical wall – *Caryophyllia* sp.



Vertical wall – *Dysidea fragilis*

Lower wall

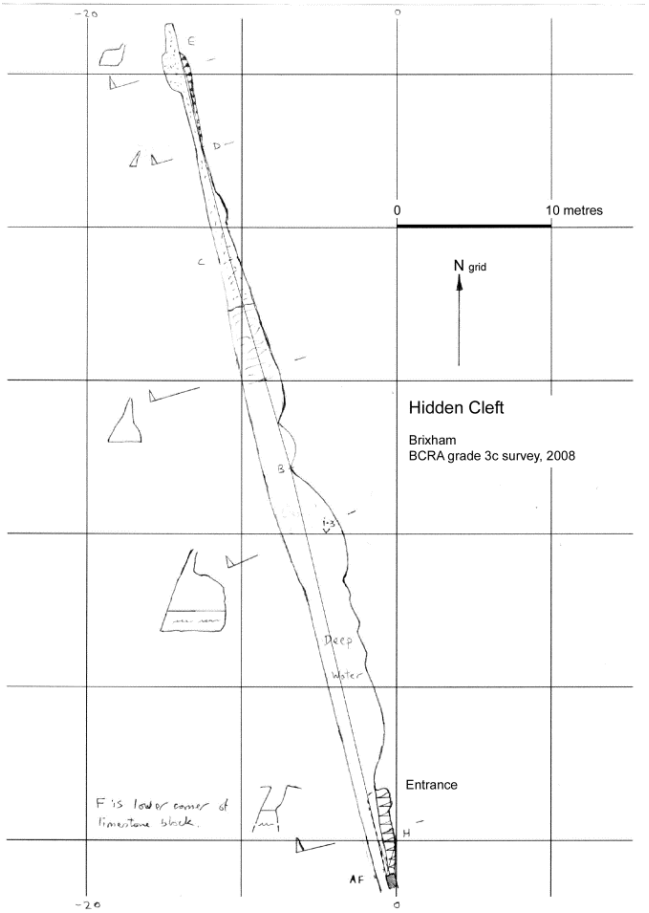
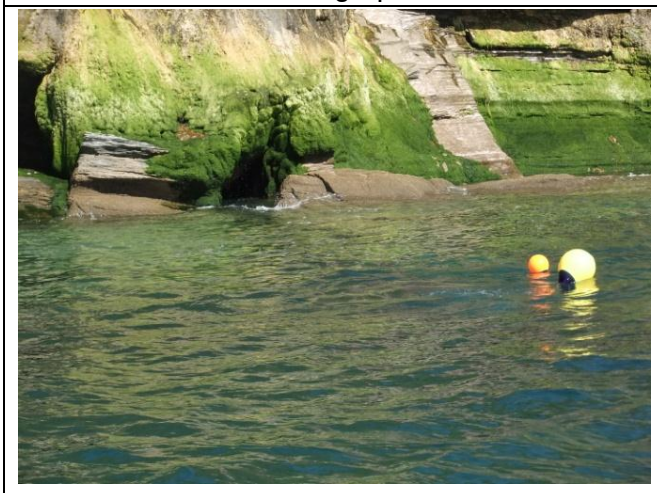
Plate 5.13 Garfish Cave images

5.43 The floor of the cave is essentially a surge gully with no fauna observed. The biotope **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies), is sufficient to describe this area.

5.44 Within the report by Proctor (2009) the occurrence of the squat lobster *Galathea nexa* is noted. This species is uncommon and normally occurs in the sublittoral at depths of 25 metres or more (Hayward & Ryland, 1995). It was not seen when the cave was first explored in the 1980s, then seen in 2005 to 2006, but appearing to reduce again, not seen at all in recent visits. The species was not seen on the current survey but it should be noted that the original sightings are suspected of being further back within the cave than the current survey.

Hidden Cleft Cave

Table 5.6 Hidden Cleft Cave

Hidden Cleft	
 Overview Surface Photograph	 Cave Plan (Proctor, 2009)
 Sea Cave Entrance	
Entrance position (WGS84):	50°23.431'N 003°29.882'W
Distance from base of shot to survey area	29 m
Date surveyed	Friday 7 September 2012
Times surveyed:	11:58 – 13:00
Weather conditions:	Wind: W F1 Sea State: Smooth Weather: Warm and sunny
Underwater visibility:	4-5 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Difficult unless the photograph of the entrance is used.
On site observations	Two Grey seals observed outside the cave before diving commenced.

General Cave overview

5.45 Prior to the dive, seals were seen in the area but disappeared as the dive began. It is suspected that the seals entered the cave and may have retreated to the beach area at the far end, some 40 plus meters from the entrance. The channel gradually narrowed and at one point, the rich sponge covered area being observed appeared to become more impoverished. The decision was made to survey the more fauna rich substrate at that point. The west wall was chosen as the focus of the survey, with a short observation made of the opposite wall.

5.46 The entrance to the cave was a very small opening in the rock when viewed from the surface but beneath the water the entrance opened out to become a light and wide, gully, the floor a mixture of coarse sand, with some scattered boulders with kelp. The long sandy gully ran into the cave, becoming a more obviously overhead environment at some distance from initial opening. A line of boulders appeared a few meters within the more overhead environment section, now without any notable algae presence. Beyond the boulders the gully floor became a mixed sediment of pebbly gravelly sand/sandy gravel, devoid of fauna. The lower edges of the cave wall had horizontally oriented crevices with a very narrow, relatively scoured section abutting the cave floor. Ascending the cave wall, within a very short distance, there appeared to be a thick but relatively low lying hydroid/bryozoan turf. Continuing to ascend, the turf begins to include bryozoan crusts and various sponge crusts, small cup corals *Caryophyllia* sp., occurring regularly across the area, with a few fan worms, *Bispira volutacornis*. Ascending further up the cave wall, patches of crisiid turf become evident within the main turf, found to comprise mainly of *Crisia denticulata* along with *Crisidia cornuta*. Small patches of the white bryozoan crust, *Disporella hispida* are regularly visible. Throughout the area, small patches of *Tubularia indivisa* and the sponge *Pachymatisma johnstonia* are present. The sponge crusts comprise a wide selection, many sampled, including *Terpios gelatinosa*, *Stelletta grubii*, *Stryphnus ponderosus*, *Haliclona simulans*, *Aplysilla rosea* and *sulfurea*, *Dysidea fragilis*, *Dercitus bucklandi*, and *Eurypon major*. Within the crevices the shrimp *Palaemon serratus* could be seen along with *Galathea strigosa* and *Necora puber*. The surface of the rock was sparsely but regularly bored by bivalves. Exiting the cave a large ascidian was sampled, expected to be *Corella eumyota* but was found to be *Ascidia conchilega*. The very upper level of the cave wall curved to create an overhang which was very species poor and largely not reviewed.

Upper vertical wall – *S. grubii* and *D. bucklandi*	Mid-level vertical wall – Turf with *Sidnyum elegans*
	

Plate 5.14 Hidden Cleft sponges and turf

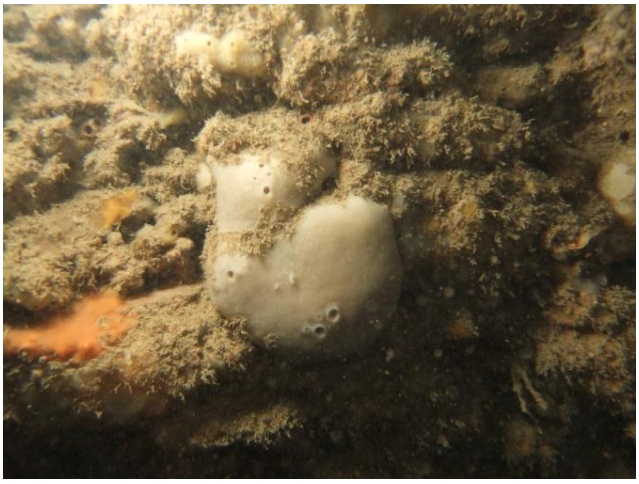
5.47 Hidden Cleft is noted for the presence of the rare and unusual sponge *Geodia cydonium* which was not found within the present survey. Many white sponge crusts were sampled and found to be a mixture of *Stelletta grubii* and *Stryphnus ponderosus.* As *Geodia* is recorded from the rear of the cave which was not visited, it suggests that the sponge is largely confined to that area. A more targeted search at a greater distance within the cave than was undertaken here would be useful in the future, to confirm its continued presence or perhaps comment on its extent if possible.

Biotope allocation

5.48 Hidden Cleft is not an easy cave to define using current biotope codes. There does not appear to be a biotope that adequately describes the species compliment found at the area of cave selected for survey. The area was chosen as the species compliment appeared to be uniform over a given area. Within some other caves surveyed within this project, the presence of for instance *Hiatella* sp., has been dominant enough for a *Hiatella* biotope to be selected and then described with reference to any variation seen. However, in Hidden Cleft, even though boring bivalves are present, the density does not appear to dominate the overall substrate, and the general species compliment for the *Hiatella* biotopes differs markedly from the species found here.

5.49 The dominating species within Hidden Cleft at this particular position appears to be the hydroid/bryozoan turf with notable patches of crisiid turf, and a variety of sponge crusts, namely *Pachymatisma johnstonia, Dercitus bucklandi*, *Stelletta grubii*, *Stryphnus ponderosus*, *Haliclona simulans*, *Aplysilla sulfurea* and *Oscarella lobularis*.

Upper vertical wall – *Pachymatisma johnstonia*



Upper vertical wall – *Haliclona simulans*

Plate 5.15 Hidden Cleft upper walls

5.50 The cup corals *Caryophyllia smithii* and *inornata* are scattered within the turf. The biotope that appears to contribute the most to defining the area seems to be **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock), which makes a feature of practically all the key sponges noted within the cave. It also notes the presence of *Caryophyllia* spp., which occur regularly within the area and *Corynactis viridis*, of which one small patch was spotted. However, the biotope also notes soft corals and other cup corals and anemones notably absent within the cave. Whether these species are found elsewhere within the cave is not known, but they also do not appear to have been found within the previous surveys (Proctor, 2009).

Lower vertical wall – *Caryophyllia* sp.

Lower vertical wall – *Stelletta grubii, Eurypon major*

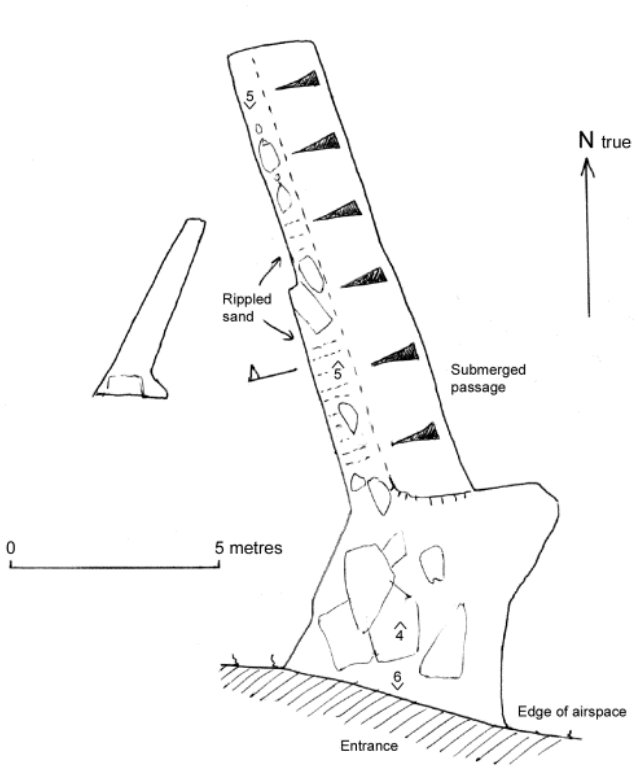
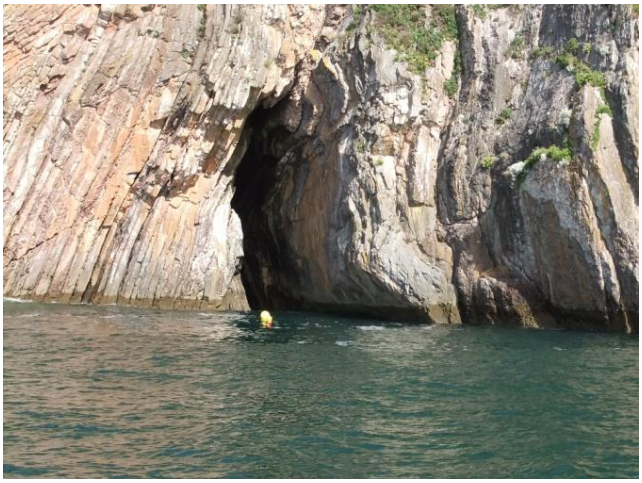
Plate 5.16 Hidden Cleft lower walls

5.51 The suggestion is made that the **SpCup** biotope is used as a base, with perhaps, another variant created that makes more of a feature of the *Hiatella* bored rock and the hydroid and bryozoan mixed turf. Within the current biotopes, those suggested as making a further contribution to the area, are within the group of surge gully biotopes, probably **IR.FIR.SG.CrSp** (Crustose sponges on extremely wave-surged infralittoral cave or gully walls), and **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock). Neither of these biotopes are particularly useful but the description of the surge gully nature of the substrate and the hydroid and bryozoan turf composition hints at a possible connection to the survey area. However overall the species composition is not very closely representative of the substrate surveyed.

5.52 Within Hidden Cleft, the very mobile cave floor consisting of gravelly sand with cobbles and small boulders is best represented by **IR.FIR.SG.CC.Mo,** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies). The area is completely devoid of any notable fauna, with a few *Spirobranchus* tubes visible on the much larger cobbles or small boulders in the area. The base of the cave walls abutting the cave floor were scoured but soon displayed a low faunal turf, for which a very impoverished form of **IR.FIR.SG.CrSpAsDenB** (Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock) is suggested. This very narrow area soon grades into or mixes with the complicated mixture suggested for habitat 1.

London Bridge Cave

Table 5.7 London Bridge Cave # 1

London Bridge Cave # 1	
 Overview Surface Photograph	 London Bridge Sea Cave TN1 BCRA grade 2 sketch plan surveyed at 1 mete below HWMST Cave Plan (Proctor, 2009)
 Sea Cave Entrance	
Entrance position (WGS84):	50°27.257'N 003°31.032'W
Distance from base of shot to survey area	8 m to rear of cave, main survey area.
Date surveyed	Wednesday 5 September 2012
Times surveyed:	14:47 – 11:33
Weather conditions:	Wind: NE F2-3 Sea State: Slight Weather: Warm and sunny
Underwater visibility:	8 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations:	None

General Cave overview

5.53 For orientation, it is noted that the cave entrance faces east, making the right wall as you enter the cave the north wall and the left wall the south. The cave floor comprised a bare scoured shingle of cobbly pebbles with the occasional smaller fraction of sandy gravel. At the entrance, the north wall had a dense covering of mussels with sponge and colonial ascidian crusts particularly visible. The south wall had some low lying bedrock exposures at the base, again with a dense covering of mussels being fed on by *Asterias rubens*. Moving further within the cave, the surface becomes more undulated with fissures, crevices and recesses starting to dominate the vertical substrate. Towards the middle and back of the cave, where mussels reduced in density, piddock bored rock dominated, with sponge crusts, including *Pachymatisma johnstonia*, *Dercitus bucklandi*, and *Leuconia nivea*, bryozoan crusts, colonial ascidians including *Diplosoma* (= *listerianum*) and *Didemnum maculosum*. Hydroid/bryozoan turf appeared particularly dense within the overhangs, particularly at the rear of the north wall. When sampled, these were found to be a dense cover of *Sertularella gaudichaudi*. *Distomus variolosus* formed dense patches with anemones also very visible in places (*Sagartia* spp.). At the rear of the cave on the south side, a narrow vertical fissure could be seen which was not accessible, but appeared to maintain the piddock bored biotope seen within the area. Moving towards the outer cave, along the north wall, boring bivalves again reduced and anemones and burrowing worms could be seen more clearly on the rock. The burrowing worms were sampled and found to be a small fan worm, *Pseudopotamilla reniformis*. In this area, the outer cave with its dense mussel cover, supported clusters of anemones believed to include variably, *Sagartia troglodytes, Sagartia elegans*, and potentially, *Sagartiogeton undatus*, a few sponge crusts and small amounts of the solitary ascidian, *Polycarpa scuba*. The lower scoured area where fauna was substantially reduced had a sparse scattering of mussels, a dense cover of barnacle spat, and patches of the colonial ascidian *Diplosoma = listerianum,* a small unidentified polyclinid, bryozoan crusts and the non-native solitary ascidian *Corella eumyota*.

5.54 Video footage of the upper roof at the rear of the cave appeared to show a barnacle and mussels covered substrate, very likely an intertidal biotope, which has not been reviewed further within this survey.

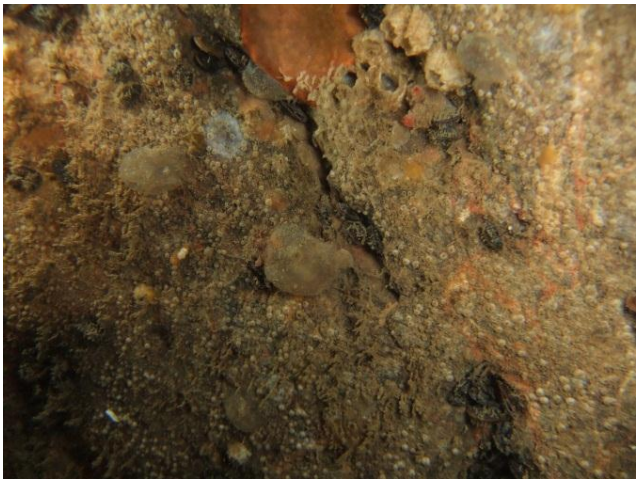
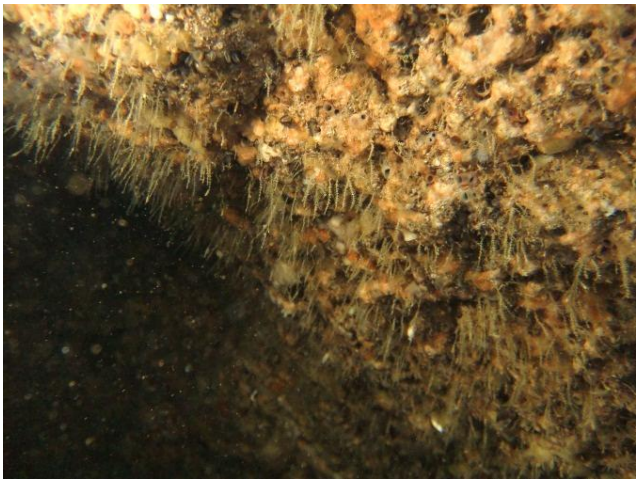
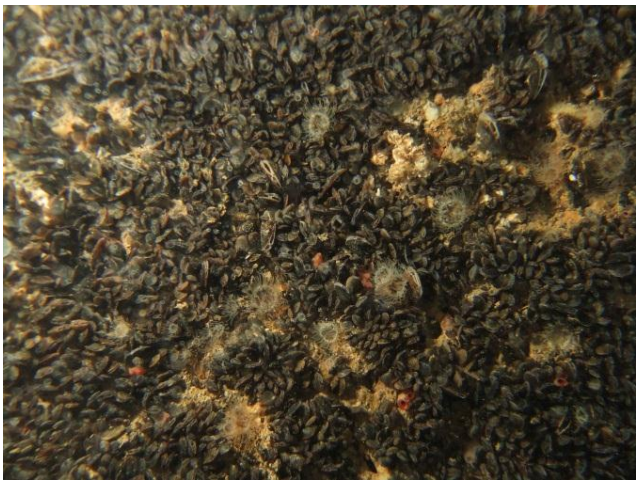
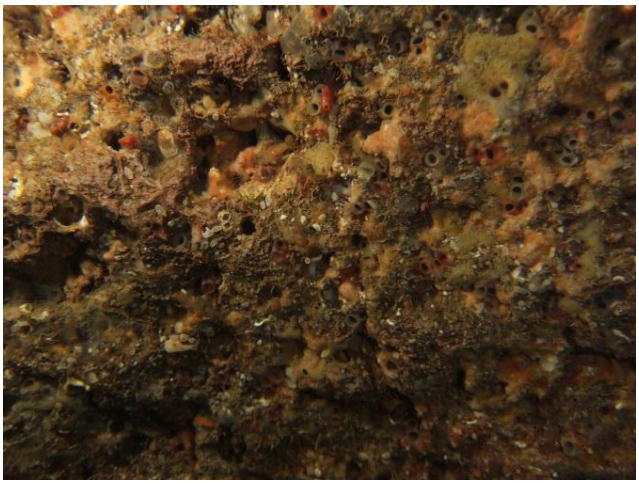
Corella eumyota	*Sertularella gaudichaudi*
	
Mussels with anemones	*Hiatella* bored rock with *Polycarpa scuba*
	

Plate 5.17 London Bridge Cave species images

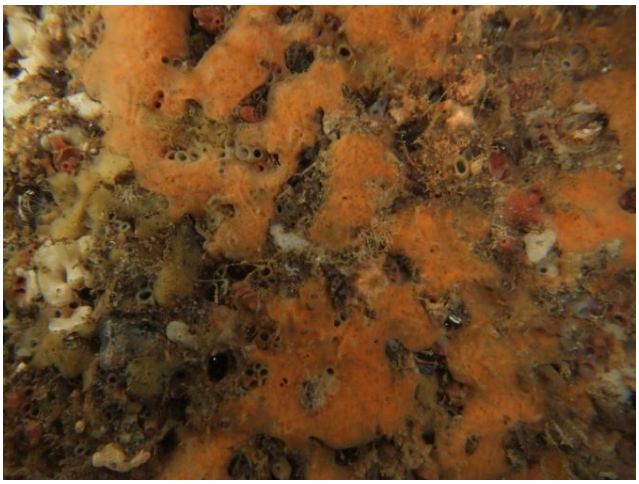
Biotope allocation

5.55 The small size and ease of access of London Bridge Cave allowed most of the cave to be reviewed, but the main focus is the rear of the cave, beyond the mussel dominated area, where boring bivalves with ascidians and sponges form the overall cover.

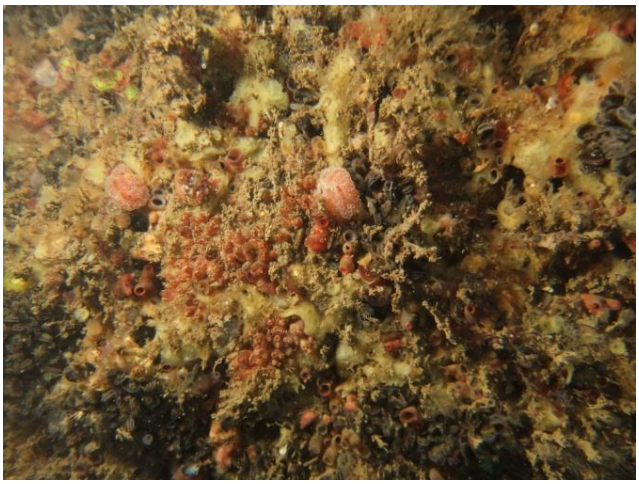
5.56 Due to the density of boring bivalves at the rear of the cave, it was felt that a biotope that reflects their dominance should be represented. This area was designated as Habitat 1 and has been allocated the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). The area is dominated by a dense cover of *Hiatella* sp. (identified by EMU laboratories as *Hiatella rugosa*), along with the sponges *Pachymatisma johnstonia, Dercitus bucklandi, Leuconia nivea*, *Dysidea fragilis*, *Cliona* spp. agg. and various low lying crusts. The ascidians *Distomus variolosus* and *Polycarpa scuba* feature heavily, *Distomus* forming dense clusters throughout the area. The colonial didemnids, *Diplosoma* sp., and *Didemnum maculosum* appear regularly. Polychaetes are mentioned within the **HiaSw** biotope description, and are regularly seen within the rock, including the small fan worm, *Pseudopotamilla reniformis* clearly noted in places. Due to the presence of *Sagartia* spp.,

including *S.troglodytes*, the small ascidian *Distomus variolosus*, and a few of the encrusting sponges, there may be some argument to include an impoverished form of the biotope **CR.MCR.CFaVS.CuSpH.As** (Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock), potentially forming a mosaic with the *Hiatella* biotope that dominates the rear of the cave.

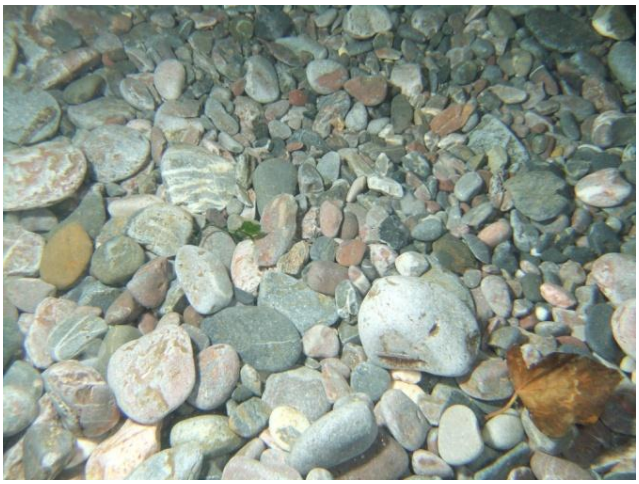
Vertical wall



Vertical wall



Cave floor



Bedrock exposures near entrance

Plate 5.18 London Bridge Cave general images

5.57 The sponges listed for **HiaSw** do appear to bear a close comparison to those found in the cave. Anemones (*Sagartia* spp) and cup corals are present, and very noted within the biotope description, along with the sea squirt *Polycarpa scuba*, also found in great densities. Didemnid ascidians feature heavily. However the biotope notes a strong algal presence as illustrated by the code, which is not evident here. The suggestion would be that this is purely a feature of the reduction of the algal component of the biotope with increasing distance within the cave. The obvious suggestion would be to use the ***S*fR.Hia** biotope, which is closely related and without an algal component, but the species compliment is much further away from that found in London Bridge Cave. As for Compass Cave, it is possible that a variant of **HiaSw** could be suggested, or that it could just be described as an impoverished version of the biotope, that is a result of moving into a cave environment.

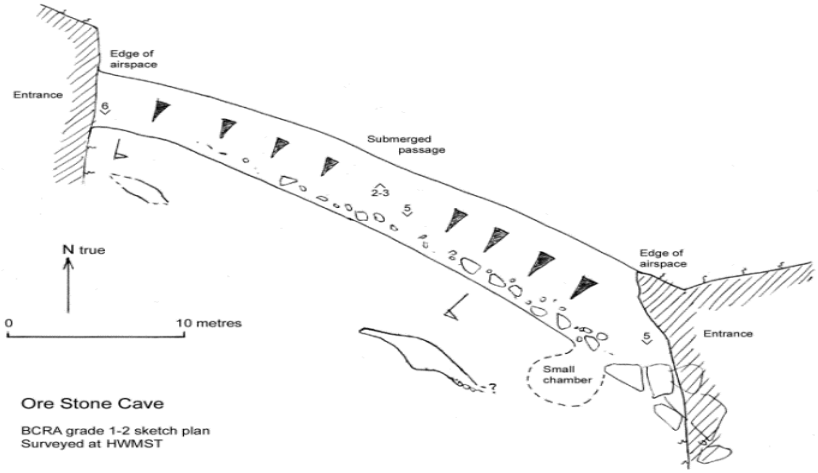
5.58 Drawing towards the middle and front of the cave where *Mytilus edulis* begins to dominate, the area has been described as Habitat 2 and again is ascribed a mosaic of biotopes. Most *Mytilus edulis* biotopes are heavily related to algal dominated substrates, not present here, but their presence is most likely the remnants of a biotope outside the cave, becoming devoid of algae as the biotope progresses inwards. However the biotope **IR.FIR.SG.CrSp**, (Crustose sponges on extremely wave-surged infralittoral cave or gully walls), does describe the presence of mussels in low quantities, and the variety of sponges appears reminiscent of those seen here. The full array of anemones mentioned is not present but *Sagartia* spp. are. Additionally the solitary ascidian *Dendrodoa grossularia* is expected, here appearing to be replaced *by Polycarpa scuba*. It is suggested that from an outer mussel dominated biotope, **IR.FIR.SG.CrSp** grades into and forms a mosaic with **IR.FIR.SG.CrSpAsAn**, (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock) as it moves towards the rear of the cave and becomes Habitat 1. Within London Bridge Cave, **CrSpAsAn** appears to be an impoverished form, with a slightly different array of sponges, a wider array of *Sagartia* spp., fewer anemones overall, and no notable echinoderms apart from *Asterias rubens*.

5.59 The lower scoured walls towards the front of the cave with its dense coverage of barnacle spat with a few didemnid crusts and sparse mussels, has been allocated the biotope **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock), grading into the cave floor, **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies), two very common biotopes found across the entire survey area.

5.60 The allocation of biotopes within London Bridge Cave was not an obvious process as the distances within the cave were very small and the faunal compliment changed over very small distances. Allocating a mosaic of biotopes appears the most logical way to deal with the issue. It would seem appropriate to describe completely new biotope codes to define the caves surveyed, but that is outside the scope of the current project.

Ore Stone

Table 5.8 Ore Stone (Swim through)

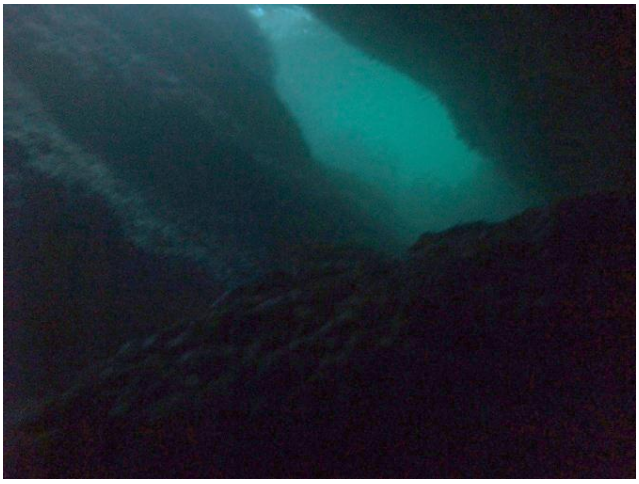
<table>
<tr><th colspan="3">Ore Stone</th></tr>
<tr><td colspan="2"> 
Eastern Sea Cave Entrance</td><td> 
Western Sea Cave Entrance</td></tr>
<tr><td colspan="3"> 

Cave Plan (Proctor, 2009)</td></tr>
<tr><td>Entrance position (WGS84):</td><td>South-east entrance
50°27.404’N
003°28.267’W</td><td>North-west entrance
50°27.421’N
003°28.328’W</td></tr>
<tr><td>Distance from base of shot to survey area</td><td colspan="2">NW entrance – 18 m to entrance, 25 m to survey area
SE entrance – 24 m to entrance, 31 m to survey area</td></tr>
<tr><td>Date surveyed</td><td colspan="2">Thursday 6 September / Friday 7 September 2012</td></tr>
<tr><td>Times surveyed:</td><td colspan="2">Dive 1: 14:22 – 15:24
Dive 2: 14:07 – 15:09</td></tr>
<tr><td>Weather conditions:</td><td colspan="2">Wind: Variable - W F1
Sea State: Slight
Weather: Warm and sunny</td></tr>
<tr><td>Underwater visibility:</td><td colspan="2">Dive 1: 3-4 m
Dive 2: 6-8 m</td></tr>
<tr><td>Ease of orientation within the cave:</td><td colspan="2">Easy</td></tr>
<tr><td>Ease of location from the surface:</td><td colspan="2">Easy</td></tr>
<tr><td>On site observations</td><td colspan="2">None</td></tr>
</table>

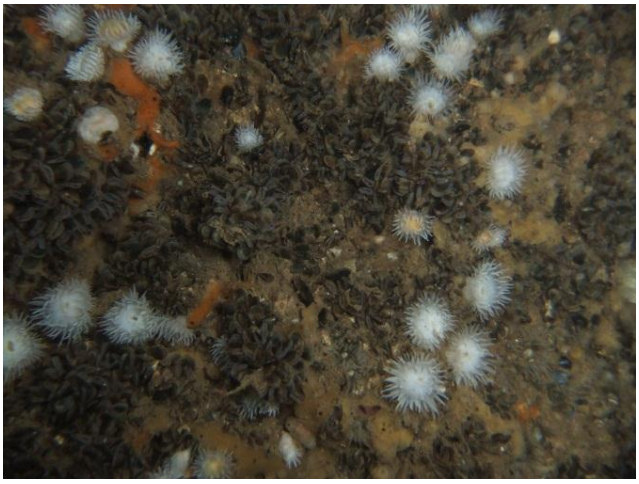
General Cave overview

5.61 During the survey, two dives were undertaken on the Ore Stone site, which is effectively a swim-through. On the Thursday 6 September 2012, the entrance on the north-west side of the site was attempted, but relatively obstructed by a large boulder. The team were only able to survey the first few metres of the cave, and a notable surge also made observations difficult. On the Friday 7 September 2012 the entrance to the south-east was attempted and a greater distance within the cave was achieved. The data compiled and the biotopes applied, combine both surveys as no noted difference was observed between the two aspects. The south-west wall (north-east facing), formed a 45^{o} angled slope, leaning to the north-east, which formed the upper/overhead rock face surveyed. The north-east wall, also angled to the north-east, formed the lower wall aspect of the cave. The passage, including the north-east rock face, the bedrock floor, the boulders within the channel and the lower margins of the south-west wall, was essentially mussel dominated with a notable presence of the anemones, *Actinothoe sphyrodeta* and various species of *Sagartia* anemones. Running along the middle of the upper wall a wide band of mixed faunal turf took the place of the mussels, dominated by hydroid/bryozoan turf species, boring bivalves, sponge crusts, large sponge cushions, the occasional *Sagartia* sp., the soft coral *Alcyonium digitatum*, colonial ascidians (Didemnidae), small solitary ascidians (*Polycarpa* spp.), and patches of jewel anemones throughout, forming particularly dense patches within the small overhangs within the rock face. Within many recesses, large crabs *Necora puber* and *Cancer pagurus* were seen. The spider crab *Maja brachydactyla (*recently changed from *M.squinado*) was also noted on occasion. *Asterias rubens* was common on the gully floor on the mussel substrate. The area was considered to have two habitats that adequately describe the substrates seen.

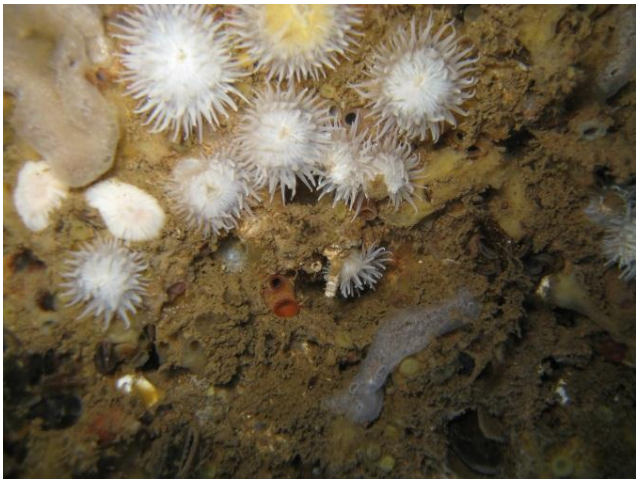
View to the south-east through the swim-through



Gully bedrock with mussels and anemones



Upper wall with rock borers, anemones and ascidians



Upper wall with sponges and *Alcyonium digitatum*

Plate 5.19 Ore Stone general images

Biotope allocation

5.62 Habitat 1 is the upper level south-west wall and forms a band a few metres wide, that blends down into the mussel dominated lower sections. It was dominated by a wide array of sponges, including *Pachymatisma johnstonia*, *Dercitus bucklandi*, *Amphilectus fucorum*, *Halichondria* spp, *Stelletta grubii*, *Stryphnus ponderosus*, *Leuconia nivea*, *Myxilla rosacea*, *Cliona* spp. agg. and *Dysidea fragilis* with occasional *Haliclona simulans* and *Tethya citrina*. The soft coral *Alcyonium digitatum* was very notable, and the area had a varied hydroid and bryozoan turf which included sparse *Tubularia indivisa*, *Plumularia setacea*, *Scrupocellaria* spp., *Aglaophenia pluma*, *Chartella papyracea* and various crisiid turf species. The underlying substrate was bored by bivalves, *Hiatella* sp., with a noted presence of *Polycarpa scuba* within the substrate. *Actinothoe sphyrodeta* was present in low numbers compared to its dense presence within the mussel dominated biotope. Encrusting colonial ascidians were regularly seen, *Diplosoma listerianum* and *Diplsoma* (= *spongiforme*), with small patches of *Lissoclinum perforatum*. *Corynactis viridis* occurred throughout, becoming dense within overhangs and recesses. *Caryophyliia* spp. were also found within the turf. *Tubularia indivisa*

was generally encrusted with amphipod tube masses (*Jassa falcata*), which could also be seen within the mussel zone. Bryozoan crusts were common, forming large sheets in places and where sampled, found to be *Schizomavella* spp.

Corynactis virdis in upper wall overhangs	*Diplosoma* (= *spongiforme*) on upper walls
	

Plate 5.20 Ore Stone upper walls

5.63 The allocation of biotopes to this gully has been problematic, due to the presence in this and other caves within the survey, of the boring bivalve, *Hiatella* sp. (others borers probably present). Its presence in such notable quantities suggests that a biotope that combines this and the dense and varied sponge fauna should be chosen, which again leads to the allocation of **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). This biotope makes a feature of many of the sponges and other fauna seen here, and importantly the solitary ascidian *Polycarpa scuba*, seen in notable quantities within the turf. The obvious omission is the seaweed which as suggested within other sections of this report, is due to the overhead environment, reducing the suitability for its growth. It is very likely that various seaweeds will form part of the turf towards the cave entrances. Two sponges that form a notable part of the community but are not a feature of the **HiaSw** biotope are *Stelletta grubii* and *Stryphnus ponderosus*. These do however form a notable component of the circalittoral biotope **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock), the definition of which does mention that the biotope occurs on shaded and overhanging rock such as cave walls and ceilings. There appears to be some crossover of species between the two biotopes but the overall richness of the **HiaSw** biotope would in my view dominate overall. There is potential that within the development of infralittoral cave biotopes in the future, the present observation would be that there could be a variant of the **HiaSw** biotope that broadens the sponge composition to include among other species, the two additional sponge species noted here. A further biotope is suggested as a contributor to the area, **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock). Many of the species noted within the biotope are seen within the cave at varying densities, and *Corynactis viridis* does occur in dense patches within overhangs but some of the very notable species are not present, particularly some of the sponges, and very relevantly, *Hiatella* sp. and *Polycarpa scuba*. Therefore it is suggested that **CrSpAsAn** may contribute to a mosaic with the main **HiaSw** biotope chosen for the area.

5.64 Many of the species that form part of Habitat 1 can be seen within the mussel dominated areas of the cave, Habitat 2, notably some of the sponges, including *Cliona* spp. agg., which can now be seen in its large cushion form, referred to here as *Cliona celata*. Colonial ascidian crusts are still visible as are patches of bryozoan crust, small clusters of *Alcyonium digitatum*, and very sparse *Hiatella* sp.. However the area is dominated by *Mytilus edulis* with dense *Actinothoe sphyrodeta* including on closer examination of the rock, a dense cover of a variety of *Sagartia* anemones, believed to include, *Sagartia elegans*, *S.troglodytes*, *S.elegans* var *rosea* and var *miniata*. It should be noted here that the *Sagartia* spp. were not picked up in the pictures taken for statistical analysis and this should be taken into account if any subsequent survey manages to fully represent the group within stills images taken and therefore attribute a change to the area that would not be correct. The biotope that appears to best represent the area is **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock). The greater species richness than might be expected, can be attributed to the close proximity of the sponge dominated biotope and the surge gully nature of the local environment, coupled with the 'soft rock' nature of the bedrock in the area.

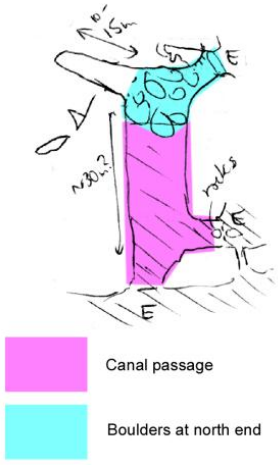
Plate 5.21 *Cliona celata* within mussel bed

5.65 It is suggested here that the title **CR.MCR.CMus.CMyt** appears incorrectly described on the JNCC biotope web site, and should read *'Mytilus edulis* beds with hydroids and **anemones**…..', as that would be appropriate for the substrate seen here and would also be more relevant to the actual description given to that biotope on the JNCC site itself. An even greater improvement would be to describe the biotope as *'Mytilus edulis* beds with sponges and anemones', so maybe there is scope for another variation to be created within the mussel dominated biotopes available.

Plate 5.22 Lower section with *Sagartia* spp.

Oxley Head Sea Cave

Table 5.9 Oxley Head Sea Cave

Oxley Head Sea Cave	
 Overview Surface Photograph	 Sea Cave Entrance
 Back of the Cave	 Cave Plan (Proctor, 2009)
Entrance position (WGS84):	50°23.650'N 003°29.358'W
Distance from base of shot to survey area	Dive 1 – 18 m approx. Dive 2 – 26 to 30 m
Date surveyed	Monday 3 September 2012
Times surveyed:	Dive 1: 11:13 – 12:11, Dive 2: 13:10 – 14:11
Weather conditions:	Wind: Variable F1 Sea state: Smooth Weather: Warm and sunny
Underwater visibility:	2-3 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	A Grey seal entered cave and was observed by the divers at the back of the cave. Small static fishing gear buoys were at the entrance of the cave. Care was needed due to the presence of a large boulder within the main entrance.

General Cave overview

5.66 Oxley Head was the first cave to be surveyed and for that reason was undertaken by both dive teams to establish methods and trial the overall approach to be taken throughout the survey. The entrance to the cave was negotiated by a channel on the left as you look at the cave, around a large boulder blocking the channel. Two areas of the cave were reviewed.

5.67 The first dive pair were positioned towards the front of the cave, at approximately 16-18 m distance from the shot. The wall on the left as you enter the cave was the main focus, with the second diver additionally videoing the boulder on the right as you enter the cave.

5.68 The floor of the cave was a scoured and low lying boulder and cobble substrate over bedrock with a coarse mixed substrate of sand pebbles and gravel within the recesses. Larger cobbles and small boulders were more notable on the right of the cave, with a dense cover of *Mytilus edulis* juv., which were still present but comparatively sparse on the left on entry to the cave, with *Asterias rubens* patchily present around the area. The base of the vertical wall was a scoured area of creviced bedrock with sparse patchy fauna. The scoured section was very narrow, before a dense cover of *Mytilus edulis* juv. dominated the lower wall and nearby low-lying rocky surfaces. Within the *M. edulis* cover, the rock could be seen to be bored by piddocks, presumed to be *Hiatella* sp. as found within other caves where they have been sampled. A low lying hydroid/bryozoan faunal turf was interspersed with red bryozoan crusts, a variety of sponge crusts, patches of encrusting didemnids, a few tufts of red algae dotted throughout and sparse barnacles. At this point sparse *Tubularia indivisa*, *Nemertesia antennina* and Plumulariidae could be seen amongst the turf, with sponges including *Amphilectus fucorum*, *Dysidea fragilis*, *Cliona celata*, *Hemimycale columella* and *Halichondria panicea*. *Caryophyllia* spp. were present along with the solitary ascidian *Polycarpa scuba*, and in places, *Dendrodoa grossularia* suspected but not particularly noted. The bryozoan crusts were sampled and found to be *Schizomavella* spp.. Ascending the wall, recesses and steeply angled crevices created overhangs and upward facing surfaces. The density of hydroid/bryozoan turf increased and *Chartella papyracea* became particularly noted. Small sheets of colonial ascidians, *Diplosoma listerianum* and *Lissoclinum perforatum* became evident, with small patches of *Distomus variolosus* and the occasional *Aplidium punctum*. Vertical surfaces again became covered in juvenile mussels. Higher still on the wall, large forms of *Pachymatisma johnstonia* were present, with thick cushions of *Phorbas plumosus*, large sheets of *Dercitus bucklandi* and a variety of yellow and orange sponge crusts. *Alcyonium digitatum* was present in low quantities in this area. Mussels became less evident with increasing height but were still found within the turf. *Necora puber* was seen within the recesses.

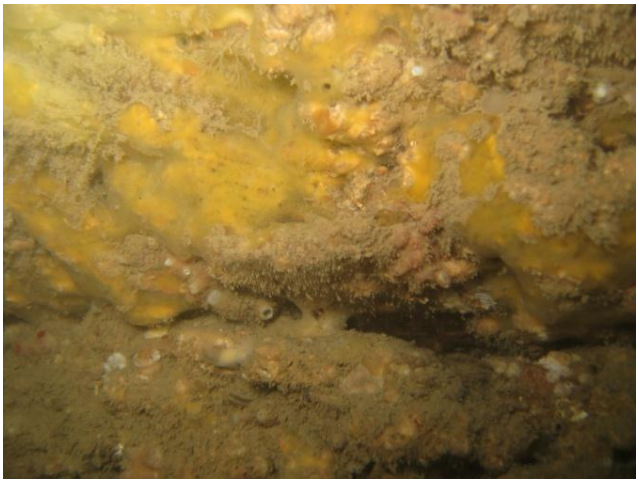
Mussel dominated substrate with *Phorbas plumosus*	*Schizomavella* sp. and *Chartella papyracea*
	

Plate 5.23 Oxley Head general images

5.69 The second dive on the site was undertaken at a point just a few meters short of the rear of the cave. The wall to the left as you enter the cave was the focus of the survey. Surface shots within the cave showed the back of the cave to be a dense pile of boulders on bedrock, and the cave walls to be greatly fissured and creviced and full of variously angled surfaces. The survey began at the top of the water line, and descended over a rich faunal turf, not notably different from that surveyed at the entrance of the cave. However, the red algae were notably absent and small patches of *Corynactis viridis* were also seen. *Dercitus bucklandi* formed very much larger sheets than seen at the entrance but the substrate was otherwise very similar. *Bispira volutacornis* were noted in the crevices and deep within a recess the sponge *Thymosia guernei* was found. Where the vertical walls reached the cave floor, a scour zone was evident and the lower walls and upper facing surfaces were still covered with dense *Mytilus edulis* juv.. The colonial seasquirt *Sidnyum elegans* was seen in small quantities over the lower rock areas. A relatively wide band seemed more species poor than was observed at the same level during dive 1, but overall the species compliment remained comparable. Large sheets of yellow sponge were seen which when sampled, proved to be *Phorbas dives*, and a white crust sampled was found to *be Stryphnus ponderosus. Haliclona simulans* was also present. The rear of the cave was notably more silt covered.

Diplosoma sp. and *Lissoclinum perforatum*

Upper wall sponge crusts with ascidians



P.johnstonia and *D.bucklandi* with bryozoan crusts

Caryophyllia sp. with turf and boring bivalves

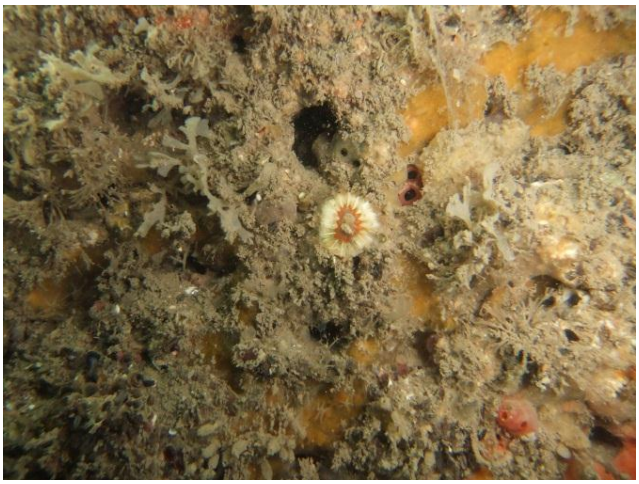


Plate 5.24 Oxley Head species images

5.70 It is felt, that overall, the habitats at the entrance and rear of the cave are comparable with the same suite of species, some dominating more than others in certain places. However this may not be reflected in the images taken for statistical analysis. A problem with a camera during one dive meant that some images were used that were not taken for analysis purposes. On review it can be seen that species such as *Dercitus bucklandi* and *Chartella papyracea* were not represented in the images and therefore appear as a difference between the front and back of the cave, but on reviewing the video, both can be seen to be present in notable quantities in both areas of the cave. Additionally, the substrate at the rear of the cave appears to have more convoluted sections with bare recesses, and deeper fissures. The area at the rear was also more silty and the foliose fauna generally more reduced in density but not enough to establish a different biotope.

Biotope allocation

5.71 The vertical walls near to the entrance to the cave are dominated by *Hiatella* bored rock with *Polycarpa scuba*, sponge crusts and cushions with a hydroid and bryozoan turf. Patches of *Distomus variolosus* are visible throughout and the occasional *Corynactis viridis* is buried in the turf. Colonial ascidians, Didemnidae, are present, with scattered *Caryophyllia* spp.. The survey site towards the back of the cave, retains many of the same features of the faunal turf cover as seen towards the cave entrance but the hydroid and bryozoan turf cover appears less dense, and certain sponges, even though present at the front of the cave, form larger sheets at the rear of the cave. Additionally the compliment of sponges appears to vary or increase slightly to include a few species that are noted to be present in dark, shaded, vertical or overhanging rock such as *Phorbas dives*, *Thymosia guernei* and *Stryphnus ponderosus*, none of which were noted at the entrance to the cave. Regarding biotope allocation, as seen often within the caves surveyed as part of this review, the ubiquitous presence of *Hiatella* bored rock with *Polycarpa scuba* and the sponges *Pachymatisma johnstonia*, *Dercitus bucklandi, Cliona celata*, *Halichondria panicea*, *Amphilectus fucorum* and *Dysidea fragilis* among others, and the noted presence of Didemnid ascidians and bryozoan crusts, suggests that the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk.) is the most suitable. The **HiaSw** biotope also refers to the presence of red algae, which is notably present towards the entrance, reducing with greater distance into the cave. The slight variation in sponge composition lends support to the inclusion of the biotope **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock), making a feature as it does of the additional sponges already mentioned, the presence now increased, of *Corynactis viridis*, and the more visible presence of *Caryophyllia* spp.. It may need to be suggested that this is an impoverished form due to the lack of anthozoans within the area, and that it forms a mosaic at the rear of the cave with the **HiaSw** biotope.

5.72 Towards the front of the cave, various surge gully biotopes such as **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock) and **IR.FIR.SG.CrSpAsDenB** (Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock) can be seen potentially to have an influence but at the point within the cave that the surveys were undertaken, this was not clearly observed.

Plate 5.25 *Corynactis viridis* on upper surfaces

5.73 For the mussel dominated areas within the cave, a mosaic is suggested, with **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock). Here again it is noted that the description of this biotope may be incorrect and that given the species compliment listed on the JNCC website, the description should read *'Mytilus edulis* beds with hydroids and anemones…..' as ascidians are not referred to at all. However within this cave, the reference to ascidians would be more appropriate. The mussel biotope is very appropriate for the densely covered upper facing bedrock and boulders, and the lower wall, the greater species variety in more vertical areas a result of the presence of the suggested **HiaSw** biotope. Other biotopes influencing the species composition of the mussel dominated zone are already discussed within Habitat 1.

5.74 The coarse mixed sediment on bedrock, seen on the floor of the cave was not particularly viewed during this survey and has been left at the level of **IR.FIR.SG** (Infralittoral surge gullies and caves).

Silty Cave No.2

Table 5.10 Silty Cave No.2

Silty Cave No. 2	
Entrance position (WGS84):	50°29.124'N 003°30.807'W The fully submerged sea cave was 12 m east along the rock wall from this position.
Distance from base of shot to survey area	Approx. 14 m
Date surveyed	Tuesday 4 September 2012
Times surveyed:	13:41 – 14:39
Weather conditions:	Wind: NE F1 Sea State: Smooth Weather: Warm and sunny
Underwater visibility:	3-4 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Relatively simple
On site observations	Shore angler on a rock ledge just inshore of the cave. The rock walls on the outside of the cave were covered by spider crabs (*Maja brachydactyla*). On the seabed and within the entrance to the cave, dead or dying *M.brachydactyla* were present. A freshwater input could be felt (thermocline), and seen (freshwater/saltwater mixing layer) within the cave.
Any other information	The two Silty Caves are in close proximity to each other. In order to ensure the correct cave is monitored in the future, this cave is the smaller of the two caves. If the shot was to be dropped at the same location as previously, and the divers moved east, Silty Cave No. 2 should be found easily.

General Cave overview

5.75 The entrance of the cave was more easily seen underwater where it was essentially more like a large recess in a vertical cliff wall than an extended cave within the rock. The floor of the cave sloped upwards from the front to the rear of the cave, the floor completely unseen due to the dense coverage of silt. It became apparent that only one diver could enter the cave at a time, but the cave was so short, approximately two metres, that if a diver were surveying the rear of the cave, the fins would be visible in the entrance. This allowed the second diver to maintain contact with the first diver, then rotating for the second diver to conduct their survey. Of further note, at the back of the cave towards the right side, was a large channel running back into the rock, from which it was suspected that a flow of water was entering the cave. Despite both divers presence in the silty cave, the visibility stayed relatively clear, suspected as being attributable to the perceived flow of water. The outer

walls of the cave are dense with *Alcyonium digitatum* within which a dense cover of live *M.brachydactyla* can be seen, the dead bodies of which are littering the entrance.

5.76 The cave was a small area with deeply creviced and undulating walls, with ledges projecting from the rock face. Large crabs such as *Necora puber* and *Cancer pagurus* were seen within the recesses. Projecting or recessed rock that formed extensive upward facing surfaces were densely covered in *Polydora ciliata* tubes, largely to the exclusion of other species, but with a few sponge crusts and an occasional *Caryophyllia smithii*. The *Polydora* tubes were present in low quantities on the vertical surfaces in places. The walls of the caves were bored by bivalves, largely expected to be *Hiatella* sp. but not sampled within this cave, and other species such as *Gastrochaena dubia* were noted.

Vertical wall turf with *Polycarpa scuba*	Vertical wall turf with rock borers
	

Plate 5.26 Silty Cave general images

5.77 The faunal turf consisted mainly of extensive sponge crusts, a very low lying and silt encrusted hydroid/bryozoan turf, solitary ascidians in low numbers, small patches of didemnid ascidians, large sheets of *Phoronis hippocrepia*, a very notable presence of the anthozoan *Sarcodictyon roseum* and dense amounts of polychaete tubes, some of which were *Polydora ciliata*, but mainly consisted of small fan worms. The only species that was found within any samples taken was *Pseudopotamilla reniformis* but this has a recognisable tube in the stills images, and it was apparent that other tubes were present. Small sheets of Corallinaceae were present and short fronds of red algae, *Schottera nicaeensis* particularly noted. Within an overhang, a large sheet of *Pachymatisma johnstonia* was seen. The upper walls and overhangs became dominated by large sheets of *Corynactis viridis*, which formed an extensive canopy on the roof of the cave. The main vertical wall fauna continued into the *Corynactis* covered areas, the *Hiatella* sp. and *Gastrochaena dubia* bored rock now much more visible, a very much reduced low lying hydroid turf present, and large areas of sponge crusts still very dominant.

Biotope allocation

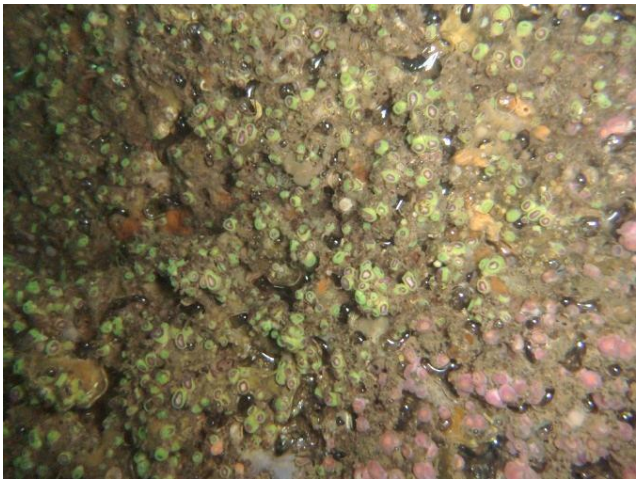
5.78 The presence of densely *Hiatella* bored rock with sponges such as *Cliona celata*, *Dysidea fragilis*, *Pachymatisma johnstonia* and *Dercitus bucklandi*, and the ascidian *Polycarpa scuba* (present in low numbers compared to other caves within the survey), would suggest the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk), dominating the more vertical walls. Red algae is present within the cave, unlike many of the

other caves where this biotope has been used, but this is not unsurprising given its size and therefore proximity to the photic zone. The presence of *Corynactis viridis*, *Caryophyllia smithii* and didemnid ascidian crusts, *Lissoclinum perforatum* and *Diplosoma listerianum* also suggest its allocation. This cave does seem more impoverished overall within the definition of this biotope but this may also be a feature of its size. The upper facing surfaces densely covered with *Polydora* tubes needs to be highlighted and a circalittoral soft rock biotope is suggested, **CR.MCR.SfR.Pol** (*Polydora* sp. tubes on moderately exposed sublittoral soft rock), forming a mosaic with **HiaSw**. Interestingly, the anthozoan *Sarcodictyon roseum* is a species noted as often being associated with **SfR.Pol** or affiliated biotopes, and has a notable presence within the cave

5.79 Moving up to the overhangs dominated by *Corynactis viridis*, the observation is that the main **HiaSw** biotope still forms the back drop to the area but a mosaic is formed, suggested to be composed of either a very impoverished form of **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock), or the more suitable but still impoverished form of **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock). The **CrSpAsAn** biotope appears to be very much richer than the area seen here and to focus on a more varied array of larger anemones, so **Cv.SpCup** appears to offer an alternative that focuses more on small anthozoans, which is more appropriate for the substrate. Overall, both of them have features that could be said to contribute to the area description so both have been proposed as part of the mosaic suggested for the upper and overhanging areas of the cave.

Vertical wall with *Sarcodictyon roseum*

Upper wall with *Corynactis viridis*



Lissoclinum perforatum with rock borers

Horizontal surface with *Polydora ciliata* tubes

Plate 5.27 Silty Cave general images

Slater Cave

Table 5.11 Slater Cave

Slater Cave	
 Overview Surface Photograph	 Sea Cave Entrance
Entrance position (WGS84):	50°23.491'N 003°29.695'W
Distance from base of shot to survey area	26 m
Date surveyed	Friday 7 September 2012
Times surveyed:	08:46 – 09:36
Weather conditions:	Wind: W F1 Sea State: Smooth Weather: Warm and sunny
Underwater visibility:	8 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations	None

General Cave overview

5.80 Slater Cave was a relatively open and generally scoured cave with crevices running longitudinally across the cave wall, with a jagged surface and many small ledges and overhangs. All faunal turf appeared low-lying and generally sparse. The fauna towards the entrance of the cave appears denser, with sponge crusts and hydroid/bryozoan turf notably thicker, sampled and found to comprise mainly crisiid turf species with the solitary ascidian *Dendrodoa grossularia* forming dense aggregations in places. Tufts of red algae were also more notable at the entrance and were still present but very reduced at the position of the main survey within the cave. Overall, the turf was largely similar over a reasonably long distance, the right wall as you enter the cave, appearing to have a richer cover of fauna overall compared to the left. The cave floor was a cobble and boulder dominated gully with a very coarse sandy gravelly pebbly mix within the recesses. The fauna was mainly comprised of a very short silty hydroid/bryozoan turf on the larger more stable fractions, with barnacles, spirorbid and *Spirobranchus* worms, coralline algae and patches of *Dendrodoa grossularia*.

Biotope allocation

5.81 For the main area surveyed at approximately 26 m from the shot position, the wall is dominated by barnacles on the upper wall with coralline crusts soon notably covered in sponge crusts, sparse *Dendrodoa grossularia* and extensive amounts of *Clathrina coriacea* agg.. Spirorbid worms were very notably present and hydroid/bryozoan turf was scoured, low lying and hardly visible overall. The crisiid turf was found to comprise mainly *Crisidia cornuta*. Where sampled the sponges were found to be *Haliclona simulans*, thin crusts of *Halichondria panicea*, *Clathria* (*Microciona*) (= *atrasanguinea*), and thicker forms of *Pachymatisma johnstonia*, *Stryphnus ponderosus* and *Dercitus bucklandi*, in generally small amounts. Additionally, many small crusts of *Leuconia nivea* are seen. A slightly impoverished form of **IR.FIR.SG.DenCcor** (*Dendrodoa grossularia* and *Clathrina coriacea* on wave-surged vertical infralittoral rock) is suggested as the most appropriate code for this area. The presence of *S.ponderosus* and *D.bucklandi* implies another biotope contribution, **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock), which may become more appropriate further into the cave but at this particular point, is only suggested based on a couple of species. Additionally, as the rock is sparingly bored by bivalves, predicted to be *Hiatella* sp., the regularly suggested biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk) may become more appropriate in places. Towards the front of the cave, the richer hydroid/bryozoan turf notably dominated by crisiid turf species and denser aggregations of *Dendrodoa*, may well eventually grade into a related biotope**, IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock).

5.82 The cave floor is best described by one of the surge gully biotopes, **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies) which seems most appropriate overall regarding substrate composition. The larger more stable boulders make **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock) or **IR.FIR.SG.CC** (Coralline crusts in surge gullies and scoured infralittoral rock) a more suitable biotope choice, forming a mosaic with **CC.Mo**.

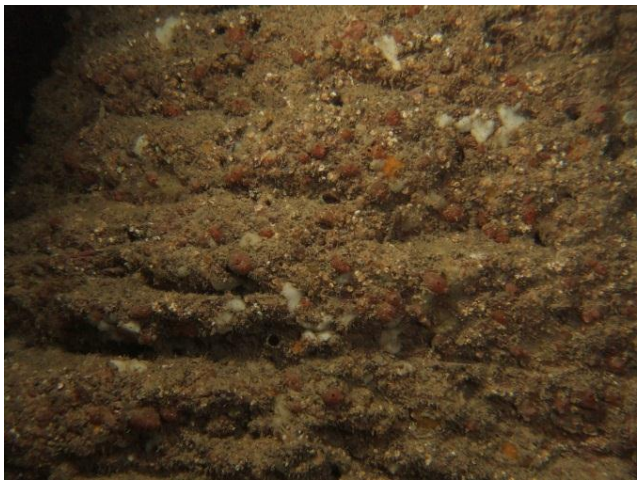
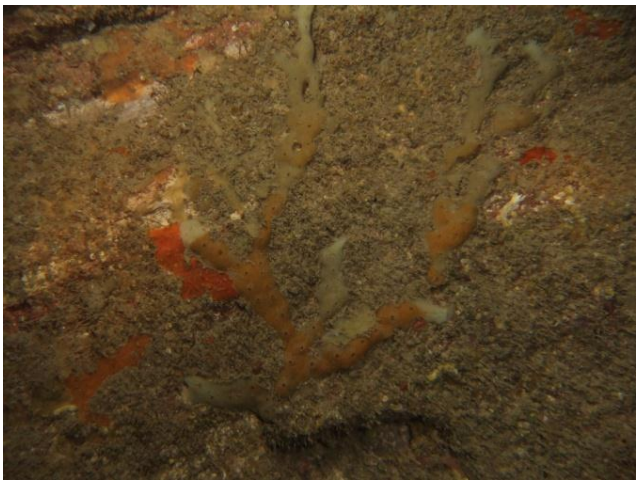
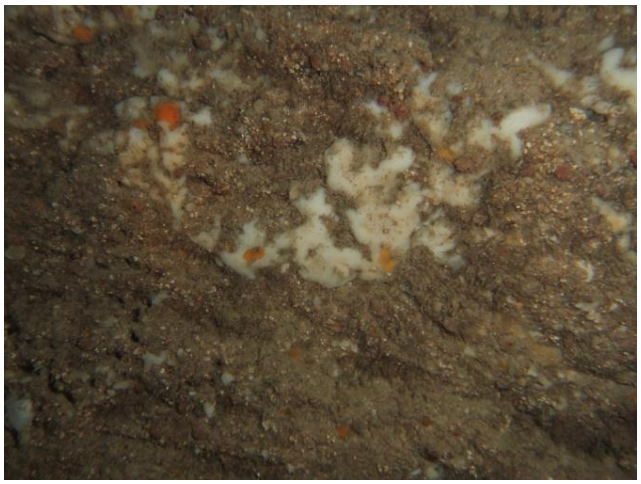
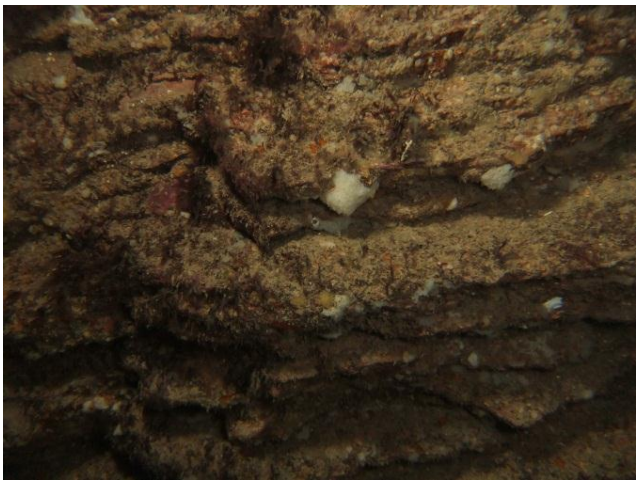
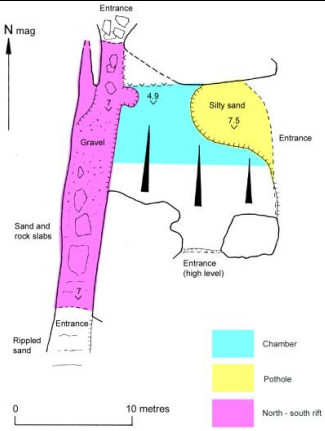
Dendrodoa grossularia and *Leuconia nivea*	*Haliclona simulans*
	
Stryphnus ponderosus	*Clathrina coriacea* agg.
	

Plate 5.28 Slater Cave general images

Watcombe Cave No.2

Table 5.12 Watcombe Cave No.2

<table>
<tr><th colspan="3">Watcombe Cave No. 2</th></tr>
<tr><td> 
Overview Surface Photograph</td><td colspan="2"> 
Main Chamber Entrance</td></tr>
<tr><td> 
Rift Entrance</td><td colspan="2"> 

Cave Plan (Proctor, 2009)</td></tr>
<tr><td>Entrance position (WGS84):</td><td>Main entrance
50°29.978’N
003°30.738’W</td><td>Rift Entrance
50°29.949’N
003°30.750’W</td></tr>
<tr><td>Distance from base of shot to survey area</td><td colspan="2">Main entrance – Cave entrance 10 m from shot
16-18 m to main survey area
24 m to secondary survey area
Rift entrance – Cave entrance 7 m from shot
Main survey area, 26 m from shot</td></tr>
<tr><td>Date surveyed</td><td colspan="2">Tuesday 4 September 2012</td></tr>
<tr><td>Times surveyed:</td><td colspan="2">Dive 1: 08:28 – 09:31, Dive 2: 10:12 – 11:14</td></tr>
<tr><td>Weather conditions:</td><td colspan="2">Wind: Variable F1
Sea state: Smooth
Weather: Warm and sunny</td></tr>
<tr><td>Underwater visibility:</td><td colspan="2">6-8 m</td></tr>
<tr><td>Ease of orientation within the cave:</td><td colspan="2">Easy</td></tr>
<tr><td>Ease of location from the surface:</td><td colspan="2">Easy</td></tr>
<tr><td>On site observations</td><td colspan="2">Small static fishing gear buoys were at the entrance of the cave.</td></tr>
</table>

General Cave overview

5.83 Watcombe Cave No.2 was dived by both dive teams, on the same day. The first team used the east entrance, the second team the south.

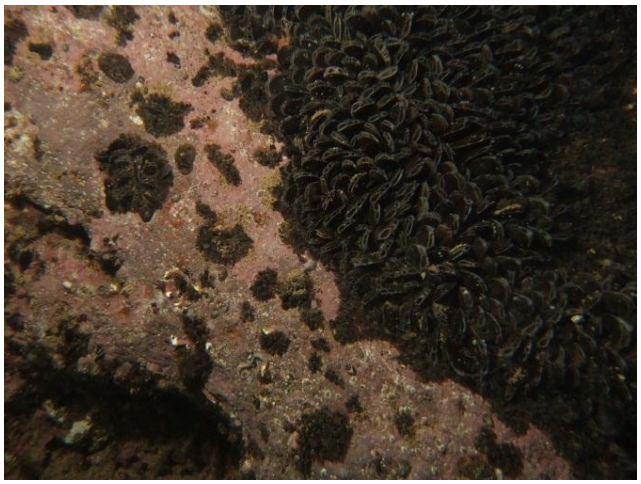
5.84 The east entrance comprised a rock channel who's walls curved and undulated markedly inwards from a wider base, before curving out again, having the effect of creating overhangs and areas of more upwards facing surfaces, on which a dense cover of *Mytilus edulis* could be seen. The two walls curved round to meet each other and created a 2 m high and approximately 2m wide 'sill', over which the team had to swim to drop in to the inner cave area. The outer sill wall, then effectively formed a rock mill area at the front of the cave. Approaching the sill, the gully floor was comprised of a coarse mixed substrate of sandy gravelly cobbles. Closer to the sill itself, the substrate became a more coarse shelly gravelly silty sand. The lower walls of the outer entrance area were scoured clean, with *Asterias rubens* the only fauna noted on the gully floor and a few *Spirobranchus* worms noted on the cobbles and lower scoured walls. With greater height up the outer rock wall, the fauna was noted to comprise coralline algae crusts, barnacles and *Spirobranchus* worms, which then became a zone dominated by *Mytilus edulis*. Swimming over the sill, the walls and upward facing surfaces could be seen to be very densely covered by *Mytilus* from the outer cave, and over into the cave area beyond the sill. Dropping over the sill the cave formed a large curved recess, abutting the sill wall, where a targeted area was surveyed. This position essentially looked at the north and south facing walls and the west facing wall, which is in effect the inner side of the sill. Light from the northern entrance could be seen behind us at this point. The second diver continued past this survey position, and entered into the north-south orientated rift. From the alcove survey position towards the north-south rift, the walls continued to undulate and create overhangs and upward facing ledges. On entering the north-south rift, a position a few metres to the south was surveyed. This area was subsequently found to be the same area of the cave surveyed during the second dive.

5.85 On the second dive, the team entered the north-south rift via the southern entrance and surveyed a section at approx. 26 m from the shot. In this area, the substrate was a cobbly, pebbly slightly gravelly sand with the occasional leopard spotted goby. The lower section of the vertical sandstone wall was very scoured with only a few *Asterias rubens* seen along the lower edge. Higher up the wall small overhangs were seen, and large bedrock ledges jutted out into the channel in places, with crevices abutting the main wall, again scoured. The cave walls have many fissures and crevices, mainly running longitudinally across the rock face within which the fauna was often aggregated. At the upper levels *Mytilus edulis* and barnacles dominated the area. The orientations of the rock faces created many areas of greater protection from scour where the faunal turf could be seen to increase and become denser. Overall the greater density of faunal turf was very noticeable within the north-south rift.

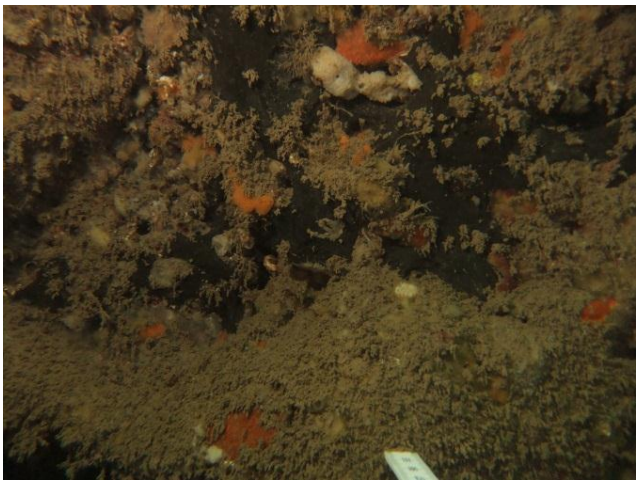
5.86 Whether within the eastern entrance accessed chamber or the north-south rift, the overall faunal appearance of the cave was very consistent, varying mainly in overall richness depending on the position but not massively varying in composition. A scoured coarse mixed sediment was present on the cave floor with a very scoured band on the lower section of the cave walls, the main fauna being a few *Spirobranchus* worms, and depending where in the cave, accompanied by a few barnacles and coralline algal crusts. With increasing height up the walls, the rock became markedly more bored and textured with *Hiatella* sp. and the overall area was covered by a very low hydroid/bryozoan faunal turf with thin sponge crusts, bryozoan crusts, small patches of *Pachymatisma johnstonia*, *Dercitus bucklandi*, *Halichondria panicea*, *Dysidea fragilis*, *Amphilectus fucorum* and a notable amount of white sponge crusts. These were sampled and found in all instances to be *Leuconia nivea*. Other sponge crusts sampled were identified to be *Phorbas dives* and *Clathria* (*Microciona*) (= *atrasanguinea*). *Thymosia guernei* was occasionally seen in small recesses. *Caryophyllia*

smithii was scattered around the area, with *Caryophyllia inornata* also noted in small clusters. A small presence of *Corynactis viridis* was found, but did not seem to form dense carpets on the areas surveyed. Within the rock, notable amounts of *Polycarpa scuba* were present, and small sheets of *Diplosoma listerianum* were seen throughout. The faunal turf even though low lying, was found to comprise *Plumularia setacea* and *Bugula plumosa*, particularly within the north-south rift where the turf was denser overall. The bryozoan crusts seemed mainly to comprise *Schizomavella linearis* but it was noted here that an unusual growth form of this species was sampled in Watcombe Cave No.3, which may just be a response to the creviced environment. However, this has been sent for further review to a bryozoan specialist, who has kindly offered to have a look at the specimen, the results of which may be available in early 2013. To all outside appearances, *S.linearis* appeared to dominate the crusts seen. Within the north-south rift the lower lying and upward facing exposed bedrock or boulders were silt covered and often had a dense cover of very small juvenile mussels. A small hydroid/bryozoan turf was sampled from one area and appeared unidentifiable. The sample had been retained for interest and for further review. Within the rock face, burrowing worms were present in notable amounts, and where sampled were found to be *Pseudopotamilla reniformis*, which also has a very recognizable tube when the worm is retracted, and creates a soft folded cap that seals the end of the tube. However other fan worms are expected to be present in the area. On the upper mussel dominated areas, there was a noted density of barnacles within the turf in the north-south rift, which was hardly notable in the east entrance but that may only be related to a difference in height up the wall surveyed.

Mytilus edulis on upper surfaces



Dercitus bucklandi



Leuconia nivea and bryozoan crusts

Pachymatisma johnstonia

Plate 5.29 Watcombe Cave No.2, general images

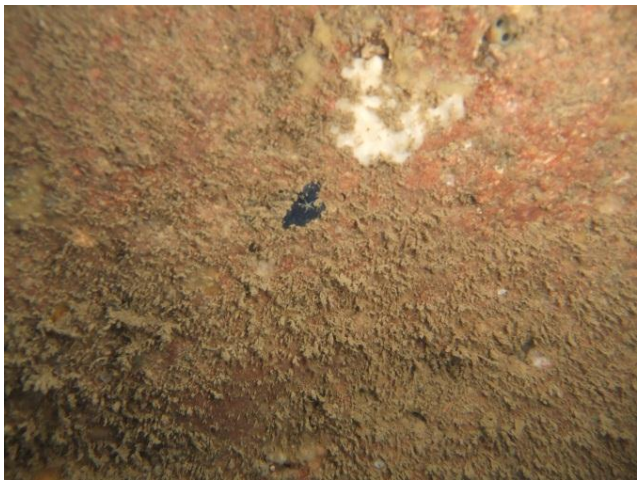
Biotope allocation

5.87 Within the shallower *Mytilus edulis* dominated areas of the cave, the biotope **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock), is considered the most appropriate within the options available. It was allocated as the mussel zone can be seen to have a very low and poor quality hydroid/bryozoan turf present in places, the occasional presence of solitary ascidians and rare patches of *Diploma listerianum*. However, this is probably more useful for the transition zone onto the main vertical walls surveyed. Within a very short distance above the main vertical walls, a less rich substrate becomes more obvious, with mussels, coralline algae and barnacles dominating, and includes a few *Patella* sp., suggesting the biotope is transitioning towards the **LR.HLR.MusB** biotope (Mussel and/or barnacle communities). However for the purposes of the main area reviewed here, the littoral rock biotope is not considered useful overall.

5.88 As seen within many caves within the area, the presence of a substrate extensively bored by bivalves, mostly appearing to be *Hiatella* sp. based on a few sampled within other caves, and the variety of sponge crusts including *Pachymatisma johnstonia*, *Dercitus bucklandi*, *Halichondria panicea*, *Amphilectus fucorum*, and *Dysidea fragilis* among others, coupled with

the presence of cup corals, barnacles, polychaete worms (small fan worms particularly noted), bryozoan crusts, didemnid ascidians and the solitary ascidian *Polycarpa scuba*, strongly suggests the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). Despite the lack of red algae present in the majority of the cave surveyed, sparse amounts were seen in areas closer to the entrance, and it is suggested that the lack of red algae is purely a feature of the increased distance within the cave and from the photic zone.

Lower scour with *T.gelatinosa* and *L.nivea*



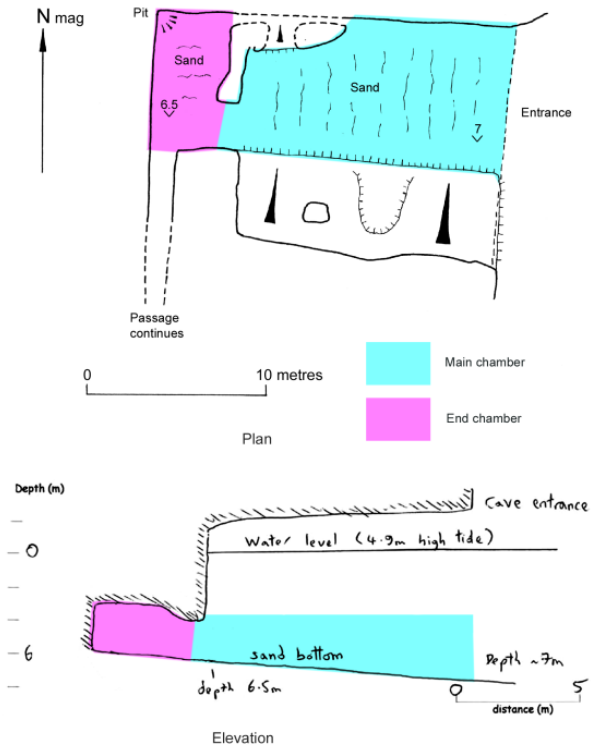
Crevice with low lying crust of *Thymosia guernei*

Plate 5.30 Watcombe Cave No.2 general images

5.89 The eastern entrance to the cave and the main cave floor within the north-south rift are adequately described by the biotope **IR.FIR.SG** (Infralittoral surge gullies and caves), or more specifically **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies). A closely related biotope **IR.FIR.SG.CC.BalPom**, (*Balanus crenatus* and/*or Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock), can be used for the scoured lower sections of the cave walls. Within the north-south rift where the exposed bedrock within the cave floor allowed very small *Mytilus edulis* to form dense aggregations, **CR.MCR.CMus.CMyt** can be used if a biotope allocation is considered necessary for these small pockets. The silty sand seen within the eastern entrance, abutting the outer sill wall is considered an overlay on the main **CC.Mo** biotope, predicted to have formed an area of more dense deposition due to the water flow dynamics within the relatively confined outer channel area. As such it has not been separated out as requiring a biotope allocation of its own.

Watcombe Cave No.3

Table 5.13 Watcombe Cave No.3

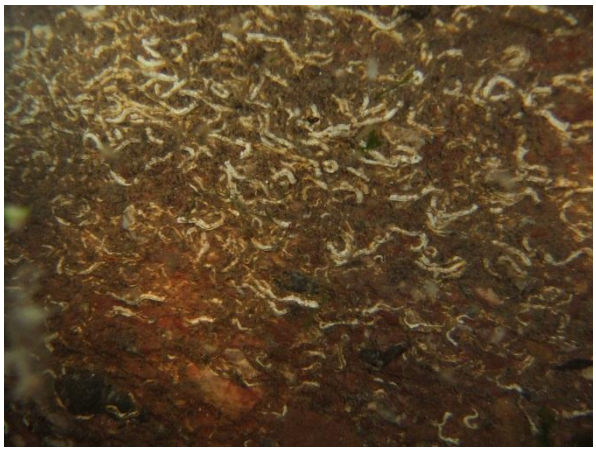
Watcombe Sea Cave No. 3	
 Sea Cave Entrance	 Cave Plan (Proctor, 2009)
Entrance position (WGS84):	50°29.952'N 003°30.775'W
Distance from base of shot to survey area	16 m to cave entrance 22 m to main survey area 26 m to rear of cave survey area
Date surveyed	Tuesday 4 September 2012
Times surveyed:	11:55 – 12:50
Weather conditions:	Wind: Variable F1 Sea state: Smooth Weather: Warm and sunny
Underwater visibility:	6 m
Ease of orientation within the cave:	Easy
Ease of location from the surface:	Easy
On site observations:	A pot with rope and buoy was wedged inside the cave.
Any other information:	None

General Cave overview

5.90 Watcombe Cave No. 3 is a small cave under 20 metres in length, the entrance of which had bedrock and boulders with kelp, algal turf and a dense covering of mussels. The cave floor in

the outer reaches of the cave was dominated by a cobbly pebbly gravelly shelly sand matrix, at this point cobble and pebble dominated overall. Towards the back of the cave, the larger fraction reduced and left a rippled sand substrate, with a few pebbles. No notable fauna was seen. The lower 30 cm of the vertical walls was heavily scoured and in places had a dense cover of *Spirobranchus* worms. Above the lower scoured section, the walls formed a curved and undulating surface with longitudinal fissures, small overhangs, recesses and pockets in the rock within which crabs, prawns and the occasional tom-pot blenny (*Parablennius gattorugine*) were seen. The roof appeared to be quite low, particularly at the rear of the cave. There was a small cavern on the right as you entered the cave but this was not reviewed. At the rear of the cave on the left, a narrow vertical fissure ran into the rock which was not much more than shoulder width and therefore too small to access any further in this survey. It did not appear to contain any variation in fauna to that seen within the main body of the cave.

Scoured section on lower vertical wall



Upper section with *Mytilus edulis*

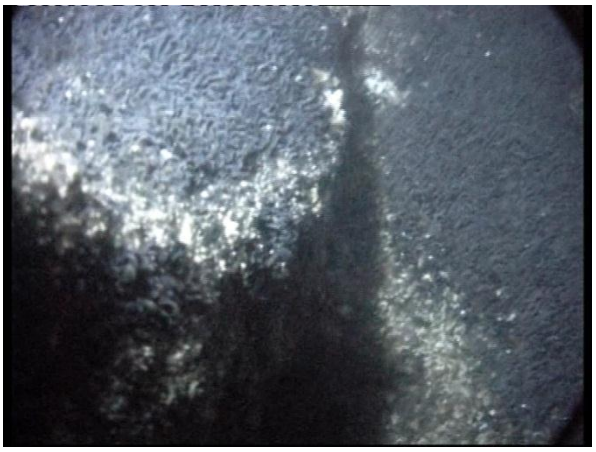


Plate 5.31 Watcombe Cave No.3 general images

5.91 Above the scoured rock of the vertical walls, the main faunal cover consisted of a very low hydroid/bryozoan turf with extensive thin sheets of various sponges, patches of the colonial ascidian *Diplosoma listerianum*, small patches of bryozoan crusts, a scattered presence of *Polycarpa scuba* and *Caryophyllia* spp.

5.92 Towards the front of the cave, the upper levels of the wall had a thick cover of *Mytilus edulis* with sponge and ascidian crusts, scattered barnacles and some *Spirobranchus* worms. The mussels reduced in density further into the cave, leaving the barnacles the more dominating species, with some notable patches of *Spirobranchus* on the upper levels. Within the sponge crusts were *Halichondria bowerbanki*, particularly on the upper wall sections, *Dercitus bucklandi*, *Myxilla incrustans*, *Dysidea fragilis*, *Haliclona simulans*, *Mycale* and *Microciona* spp., *Leuconia nivea* and *Eurypon major*. Thick cushions of *Pachymatisma johnstonia* were present in small amounts. *Phorbas plumosus* was seen towards the front of the cave. Scattered within the turf were small amounts of the jewel anemone *Corynactis viridis* which became more noticeable within the small overhangs and formed small dense clusters in places, particularly on the upper levels of the cave and onto the roof section. Within the rock the boring bivalve predicted to be *Hiatella* sp. was seen but was not very noticeable, especially compared to the density regularly seen within other caves in this current survey.

5.93 Within the crevices and recesses a variety of fauna was seen including *Cancer pagurus*, *Necora puber*, a few *Munida rugosa* and the prawn *Palaemon serratus*. The fan worm *Bispira volutacornis* occured in clusters and in some crevices the burrowing holothurian *Pawsonia saxicola* was seen. The body of the holothurian could be seen to be white when the tentacles

were retracted, making the identification more possible than it might otherwise have been. However, another species, probably *Aslia lefevrei* was present but observing the body colour was not always possible. Small pockets in the rock contained a few unusually placed species, one being the erect branched sponge *Stelligera stuposa*, and within another recesses, two large specimens of the echinoderm, *Psammechinus miliaris*.

Biotope allocation

5.94 The upper cave wall sections, with a dense cover of mussels, sponges, and ascidian crusts, have been coded as **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock). The biotope is not an incredibly good match but is the most appropriate from the array on offer. The small size of the cave means that the substrate and associated species seem to change within a short distance, making the **CMyt** biotope more suitable for the entrance area. The reduction of mussels with greater distance within the cave and the increase in barnacles and *Spirobranchus* worms, has been interpreted as an impoverished **CMyt,** with no attempt made to find a more suitable biotope for this more mid to rear cave section. The intertidal biotope **LR.HLR.MusB.MytB**, (*Mytilus edulis* and barnacles on very exposed eulittoral rock) was considered but no benefit was seen from the allocation of this less than useful biotope to this small area.

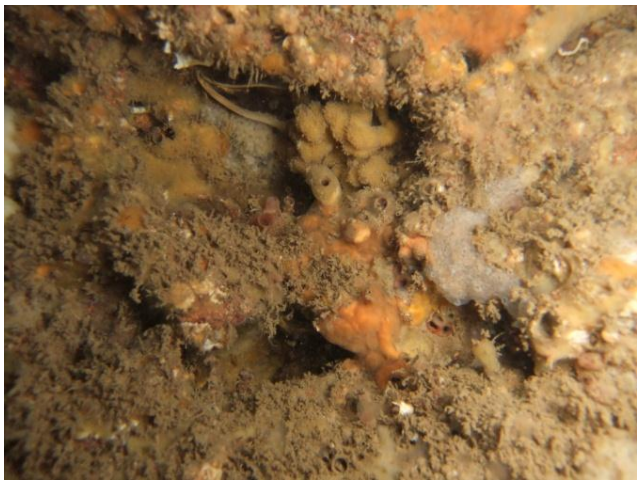
5.95 For the main wall section the presence of *Hiatella* sp. and potentially other rock borers, with the suite of sponges already listed, the presence of *Polycarpa scuba* and the sheets of colonial ascidians, suggests the biotope **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). As has often been described within this report, the reference to seaweed within the code is not useful, and the lack of seaweed is expected to be the result of the increasing distance within the cave, and from the photic zone. It is expected that some of the species of algae listed, or similar species, will be found within the outer cave area. A second biotope is considered **IR.FIR.SG.CrSpAsAn** (Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock) due to the crossover of some species and the presence of a calcareous sponge *Leuconia nivea*, suggested as a replacement to *Clathrina coriacea* agg.. It may also be a useful suggestion regarding the dense pockets of *Corynactis viridis* that occur sparsely throughout the cave, but form dense clusters in recesses, overhangs and the roof area. This second biotope may have an influence in the area but is suggested to be minor, as the main suite of species is more closely represented by **HiaSw**.

5.96 The lower scoured section of the vertical walls can be adequately represented by **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock).The cobble and pebble dominated gravelly shelly sand matrix and the more rippled sand at the rear of the cave has been allocated the code **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies). The sandier substrate seen at the rear of the cave is considered to be a mobile overlay on the coarser mixture and as such was not considered in need of a separate biotope to describe it.

Vertical wall with *Pachymatisma johnstonia*

Bispira volutacornis with HOLOTHUROIDEA

Stelligera stuposa and *Diplosoma listerianum*



Patch of *Corynactis viridis*

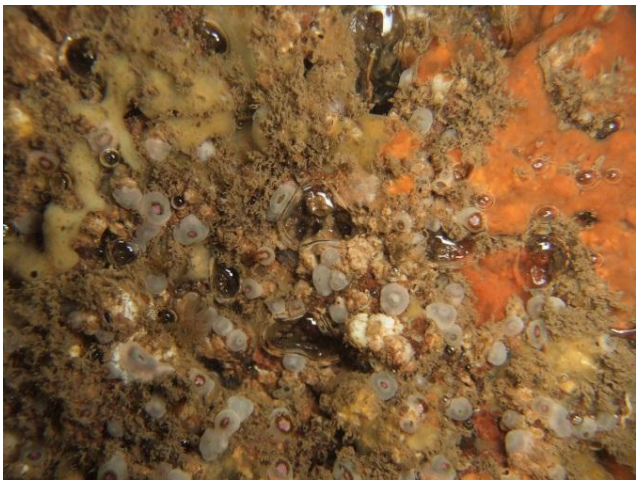


Plate 5.32 Watcombe Cave No.3 general images

6 BIOTOPE EVALUATION AND COMPARISON TO PREVIOUS SURVEYS

6.1 Within the present survey, 15 biotopes have been listed, presented within Table 6.1. From the table, it can be seen that the dominant biotope across the area is considered to be **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk), which has been allocated to the main vertical wall areas in 10 of the 13 caves surveyed. This biotope is considered the main contributor due to the consistent presence of *Hiatella* sp., which occurs at a density that is felt warrants a particular focus. The reference to the presence of seaweed is not considered a restriction due to the observation that towards the front of many caves, seaweeds are present and the lack of algae at the positions surveyed is purely a reflection of distance away from the photic zone. In addition, the suite of species found in combination with the *Hiatell*a sp., supports the allocation, with a hydroid turf, a rich sponge fauna, jewel anemones, cup corals, large anemones, occasionally the presence of soft corals, and frequently a scattering of mussels. In-depth assessments of the allocation of this biotope including comments on species present have been fully described within each cave overview.

6.2 The second most prevalent biotope encountered was **IR.FIR.SG.CC.Mo** (Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies), which is not unexpectedly, regularly applied to the cave floors throughout the area. The allocation could have been left at **IR.FIR.SG** but it was felt that where further definition could be given, it was useful to do so. Where it has not been applied, a decision was made that the substrate composition was not ‘mobile’ enough to warrant the biotope, and may have been replaced, at the point of survey with very large boulders, or as seen within Silty Cave No.2, an obscured cave floor, so densely covered with silt that any disturbance of the seabed would have prevented any further observations. The biotope **IR.FIR.SG.CC.BalPom** (*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock), also occurs regularly due to the consistent presence of scoured areas, very often at the base of the cave walls, adjoining the more mobile substrate of the cave floors.

Table 6.1 Biotopes allocated in 2012

Biotopes allocated in 2012	Number of times recorded
IR.MIR.KR.HiaSw	10
IR.FIR.SG.CC.Mo	8
IR.FIR.SG.CrSpAsAn	8
IR.FIR.SG.CC.BalPom	7
CR.FCR.Cv.SpCup	6
CR.MCR.CMus.CMyt	5
IR.FIR.SG.CrSp	3
IR.FIR.SG.DenCcor	3
IR.FIR.SG	2
IR.FIR.SG.CrSpAsDenB	2
CR.MCR.CFaVS.CuSpH.As	1
CR.MCR.SfR.Pol	1
IR.FIR.SG.CC	1
LR.FLR.CvOv.FaCr	1
LR.HLR.MusB	1

6.3 **CR.MCR.CMus.CMyt** (*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock) is regularly seen and it is probably present at many more sites within the area. Its occurrence here is probably a reflection of the position within the cave that has been chosen for survey and not meant to imply that the caves where it has been allocated are in any way noted for the presence of mussels, more than might be found across the Torbay area as a whole. It was noted that outside of the caves, mussels were often present, along with a strong dominance of kelp and other algae, but the aim of the survey was to focus on restricted areas, so further observations were not made.

6.4 **CR.MCR.SfR.Pol** (*Polydora* sp. tubes on moderately exposed sublittoral soft rock), was a particular feature of Silty Cave No.2. Within the report by Proctor (2009), *Polydora* tubes are noted as present in Durl Head cave, but were not recorded within the present survey. This may again be purely a reflection of the restricted area chosen for the in-depth survey. Also, they may not have occurred at the density noted within Silty Cave No.2 which formed large enough expanses to require particular note and supported its own biotope allocation.

6.5 Most of the remaining biotopes to note are from the surge gully family, and here include **IR.FIR.SG.DenCcor**, **IR.FIR.SG.CrSpAsDenB**, **IR.FIR.SG.CrSpAsAn**, and **IR.FIR.SG.CrSp**. Their inclusion reflects the variety of aggregations of sponges, anemones

and ascidians that occur throughout the area and are often recorded as forming a mosaic within the main allocated biotope, **IR.MIR.KR.HiaSw**. There are occasions when the *Hiatella* sp. dominated biotope is not suggested as the main biotope for the vertical wall areas, and is replaced by one of the surge gully biotopes mentioned, or a mosaic with others from the same group. The biotope **IR.FIR.SG.CrSp**, was suggested within Proctor 2009 to be potentially present in the entrance to Hidden Cleft, and has been suggested within the present survey as forming a mosaic in the same area with the main biotope. It has also been suggested as forming a mosaic with other biotopes in Durl Head and London Bridge Caves.

6.6 **LR.FLR.CvOv.FaCr**, (Faunal crusts on wave-surged littoral cave walls) has been allocated to the upper wall sections of Garfish Cave and is discussed fully within the specific cave review. **CR.FCR.Cv.SpCup** (Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock), has been allocated 5 times within the present survey, either referring to an area specifically or forming a mosaic with either the *Hiatella* sp. biotope, or the family of surge gully biotopes already mentioned. Its sixth allocation refers to the area on the outer edge of Garfish Cave, within the roof of which, a large dense patch of the rare cup coral *Hoplangia durotrix* was found. It is separated from the main biotopes allocated to the area as it was not particularly surveyed, but the result of a small diversion to confirm its continued presence from the record made within Proctor 2009. **CR.MCR.CFaVS.CuSpH.As** (Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock) has been allocated once in London Bridge cave as forming a mosaic with the *Hiatella* sp. biotope. More detailed observations regarding their allocation are discussed within each cave review.

6.7 Table 6.2 presents the biotopes found during the present survey compared to those listed within the report by Proctor 2009. Many biotopes are consistent between the surveys, the main observed difference being the allocation of **IR.MIR.KR.HiaSw**, which, as already discussed, is the approach taken within the present survey, to regard the ubiquitous presence of *Hiatella* sp., as worthy of note and reflection within biotope allocation. The *Mytilus* and *Polydora* defined biotopes are probably a reflection of the area chosen for survey at this present time. The approach taken in the 2009 report, may have been to see the mussels as part of the outer cave seaweed dominated areas and therefore not considered further.

Table 6.2 Biotope Comparison from 2009 to 2012

Recorded in 2012	Biotopes recorded in the report by Proctor 2009
LR.FLR.CvOv.FaCr	LR.FLR.CvOv.FaCr
IR.FIR.SG.DenCcor	IR.FIR.SG.DenCcor
IR.FIR.SG.CrSpAsDenB	IR.FIR.SG.CrSpAsDenB
IR.FIR.SG.CrSpAsAn	IR.FIR.SG.CrSpAsAn
IR.FIR.SG.CrSp	IR.FIR.SG.CrSp
IR.FIR.SG.CC.Mo	IR.FIR.SG.CC.Mo
IR.FIR.SG.CC.BalPom	IR.FIR.SG.CC.BalPom
IR.FIR.SG.CC	IR.FIR.SG.CC
CR.FCR.Cv.SpCup	CR.FCR.Cv.SpCup
IR.MIR.KR.HiaSw	Not recorded within the 2009 report
CR.MCR.CMus.CMyt	Not recorded from the present survey
IR.FIR.SG	LR.FLR.CvOv.SpByAs
CR.MCR.CFaVS.CuSpH.As	LR.FLR.CvOv.ScrFa
CR.MCR.SfR.Pol	IR.FIR.SG.FoSwCC
LR.HLR.MusB	Regarding the biotopes below, 'these algal floras have not been surveyed in the Torbay caves but are known to occur widely (see e.g. the Corbyn's Head caves and Neptune's Cave (Proctor 2009).
	LR.FLR.CvOv.
	LR.FLR.CvOv.AudPil
	LR.FLR.CvOv.GCv
	LR.FLR.CvOv.SpR
	LR.FLR.CvOv.SpR.Den
	LR.FLR.CvOv.VmucHil

6.8 **LR.FLR.CvOv.SpByAs** (Sponges, bryozoans and ascidians on deeply overhanging lower shore bedrock or caves); **LR.FLR.CvOv.ScrFa** (Sparse fauna (barnacles and spirorbids) on sand/pebble-scoured rock in littoral caves); and **IR.FIR.SG.FoSwCC** (Foliose seaweeds and coralline crusts in surge gully entrances) are recorded by Proctor (2009) but not noted in the present survey. Their absence is not considered significant as the outer algal dominated areas of caves were not reviewed, which would explain the omission of **FoSwCC**.

6.9 **LR.FLR.CvOv.ScrFa** may not have been recorded here as the overall impression is that this more often refers to the more upper shore areas, than were surveyed here. A similar biotope used in the present survey that refers to similarly scoured areas is **IR.FIR.SG.CC.BalPom**, which is more relevant to the infralittoral/sublittoral fringe area surveyed. **LR.FLR.CvOv.SpByAs** is suspected to have been replaced by a similar biotope perhaps related to the presence of one or two species in a notable quantity that affected the biotope allocation chosen.

6.10 The algae defined biotopes within the **LR.FLR.CvOv** (Littoral caves and overhangs) group listed in Table 6.2 as un-surveyed by the 2009 report, have also not been the focus of the present survey. The defining algal species within this cluster are green algal films, encrusting red algae, or outer cave area species and were all considered outside the scope of this report.

6.11 It should be noted that the report by Chris Proctor is a result of many years of surveys, looking at the geology and stretching into the upper littoral and beyond where appropriate for cave mapping. The faunal element has been added to this and contributed to by various volunteers over the years. The additional biotopes noted within the 2009 report are not surprising given the extended time spent surveying and the broader area covered overall. This particularly refers to the littoral algal dominated biotopes which were not covered in this survey.

6.12 A table summarising the biotopes found within the present survey, presented for ease of comparison between caves can be found in Appendix IV.

7 STATISTICAL ANALYSIS

Methodology

7.1 To establish a repeatable methodology, the epifaunal macro-invertebrate community composition was investigated by employing multivariate statistical measures drawn from the Plymouth Marine Laboratories PRIMER v6 (Plymouth Routines in Multivariate Ecological Research) suite of programs (Clarke & Gorley, 2006; Clarke & Warwick, 2001). A total of 229 images were analysed and abundance data were recorded following the SACFOR scale. These data have been converted to numerical values, necessary to allow calculations of similarities within PRIMER, which needs a numerical input. The categories have been chosen by assigning a 6 to 1 scale (6 being Superabundant (S) and 1 being Rare (R)). For the species data recorded as percentage cover, the SACFOR scale has been applied directly, for data recorded as counts, the abundance data were converted to abundance/m^2 and the SACFOR scale then applied. The distance from the substrate at which the images were taken was either 21 cm or 31 cm. Initially a distance of 31 cm was used but this was found to be less reliable as a whole, at returning images suitable for analysis. The distance of 21 cm was found more useful for subsequent analysis. The corresponding area for each area was calculated and is shown in Table 7.1 below:-

Table 7.1 Approximate surface area calculations within image replicates.

Distance from substrate	21 cm	31 cm
Area	352 cm^2	651 cm^2
Subsequent Dimensions (Width by Height)	18.8 cm x 18.8 cm	25.5 cm x 25.5 cm

7.2 Faunal data was rationalised to be consistent across all the caves, the progressive stages of which are presented in Appendix II. As the SACFOR scale is essentially $\log_{10}$ in form no transformation was applied to the faunal data imported into PRIMER. Transformations are typically applied to discrete or continuous abundance data in order to downgrade the weight of highly abundant species so as to take greater account of the rarer, less abundant species in the multivariate analysis.

7.3 The data were then subjected to hierarchical clustering to identify sample groupings based on the Bray-Curtis index of similarity, a process of clustering which combines samples into groups based on their similarity level, starting with the highest mutual similarities and projecting a dendrogram showing the sequential clustering of sites against relative similarity. The PRIMER routine known as SIMPROF can be applied during the cluster analysis. It identifies those clusters which are statistically significant. However, as noted by Hooper *et al*.(2011),

'such clusters may be significantly different predominantly due to variation in abundance rather than differences in the biological community itself, potentially describing "rich" or "depauperate" (poor) examples of the same biotope. In such cases SIMPROF clusters can be misleading'.

7.4 This was considered to be the case with these data, where variation in observed abundance was, in some cases, high, although composite species were the same. Therefore, to enable an ecologically coherent analysis to proceed, community composition was considered to be more important than abundance differences. This approach was used to provide a degree of latitude with respect to the subsequent interpretation of the cluster analysis. Specifically,

groupings at different levels of similarity were examined for potentially similar and ecologically important features within the derived communities. It is understood that application of this methodology falls outside of a rigid statistical framework, within which PRIMER can function, but is considered appropriate to the nature of the data under investigation particularly to the interpretation of biotopes. SIMPER analysis was subsequently employed to highlight the characterising species for each of the groups identified, based on both the SIMPROF clusters and on a Biotope grouping method based on individual site biotopes as described below.

7.5 Each individual sample image was analysed, and based on the list of species derived (employing rationalised data) a biotope was allocated with the aid of BioScribe (Hooper et al., 2011) supported by additional field information. This was then added to the dataset in the form of a factor. MDS (Multi-dimensional Scaling) was used to provide a plot of sample relatedness. MDS plots are generated from the same similarity matrix used by the cluster analysis to produce a multi-dimensional ordination of sites. This attempts to satisfy all of the between-samples relationships indicated by the similarity matrix, projecting the results on a more accessible and useable 2-dimensional representation. The representativeness of this 2-dimensional version, in comparison to the multi-dimensional array, is indicated by a stress level. The closer this stress level is to zero, the better the representation.

Results

7.6 The survey methodology divided each cave into a variety of habitats, ranging from Habitat 1 through to 4 (H1, H2, H3, H4), and allocated according to the increasing depth profile, with Habitat 1 recorded at the shallowest depth and H4 the deepest. The initial analysis was run on the entire dataset. It was immediately clear that habitats H3 and H4, where they occurred, described an impoverished area of the caves, comprising the highly scoured lower vertical walls or the surge gully cave floors of mixed sediment, with cobbles and / or boulders. The SIMPER analysis highlighted that these areas were colonised by the encrusting red algae of the Corallinaceae family, *Spirobranchus* worms and barnacles, occasionally in conjunction with the common starfish *Asterias rubens*. The biotope identified for this SIMPER subgroup was **IR.FIR.SG.CC** (Coralline crusts in surge gullies and scoured infralittoral rock). As these areas were impoverished compared to Habitats 1 and 2, those samples included in the H3 and H4 habitats (a total of 18) were removed to aid ease of interpretation and the multivariate analysis was re-run on the remaining samples.

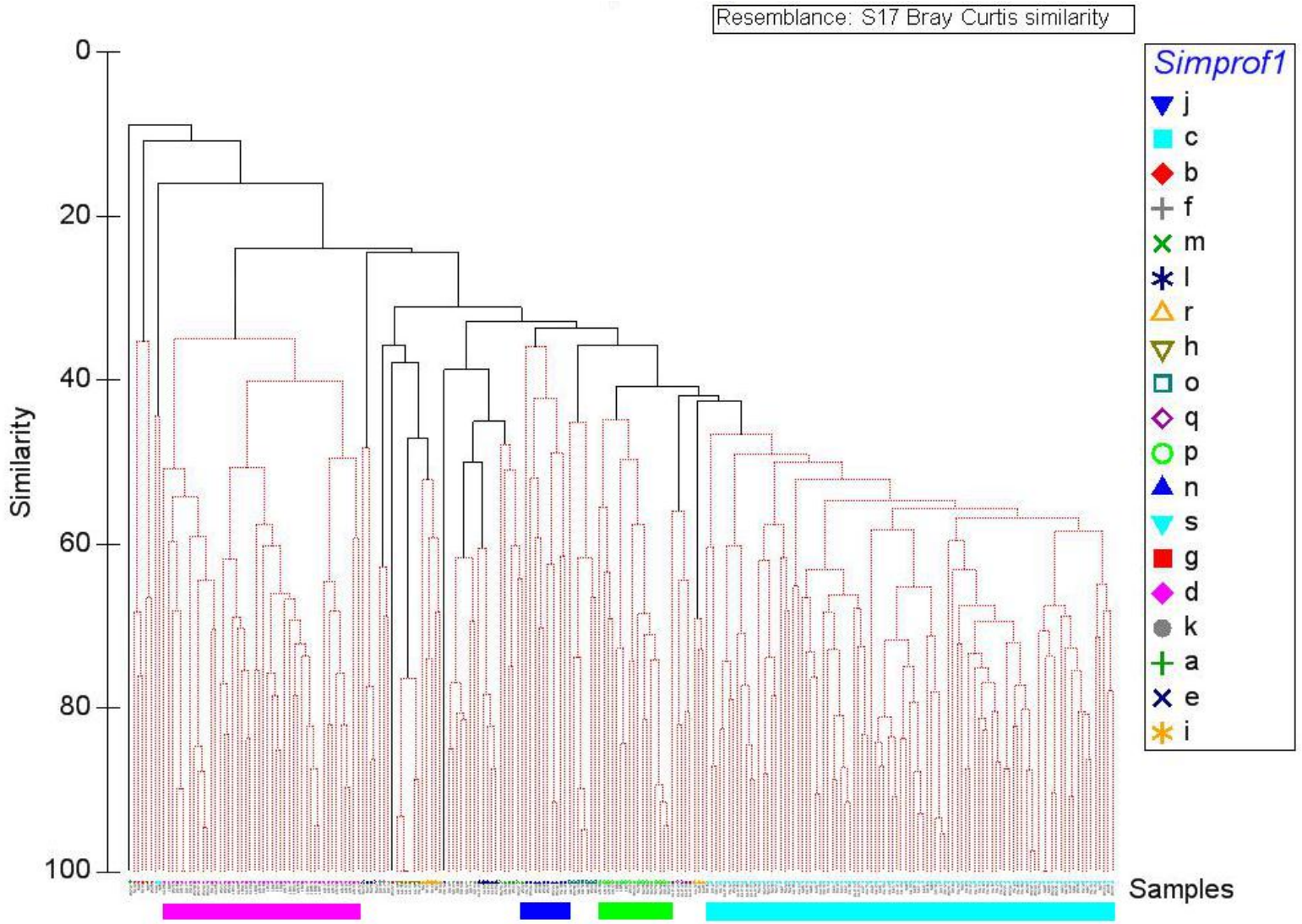


Figure 7.1 Dendrogram based on Bray Curtis similarity matrix, for hierarchical clustering of all samples (images), using group average linking on untransformed data. Main clusters highlighted are s, d, n, and p.

7.7 The cluster analysis (including SIMPROF) on the remaining samples identified a number of statistically significant groups with the majority of the sites occurring in 2 main clusters, s and d. In addition two minor groups, n and p were also noted (see Figures 7.1 and Figure 7.2). These main groupings are highlighted in Figure 7.1, with the smaller groups clearly overlapping and interspersed within the MDS plot (Figure 7.2), suggesting that the value of the SIMPROF separation is limited, and, as can be seen subsequently, did not relate well to the biotope divisions.

7.8 The MDS 2D plots are displaying a stress of 0.23. This value implies that the plot should be cautiously interpreted. Samples which are arbitrarily positioned on the 2D ordination plot show a stress value >0.3 (typically between 0.35 and 0.45, due to totally random positions used for starting the iteration). The range between 0.2 to 0.3 should therefore be treated with a great deal of scepticism, and discarded in the upper half of the range. As the ‘stress is observed to increase with reducing dimensionality’ (Clarke & Warwick, 2001), and by implication reliability of observed output, following the suggestion from Clarke & Warwick (2001), data were plotted in a 3D MDS plot which displayed a stress of 0.18. The clusters derived, did not notably alter, as a result it can be confidently assumed that the 2D presentation is a ‘usable summary of the sample relationship’ (Clarke & Warwick, 2001), therefore suitable for further interpretation.

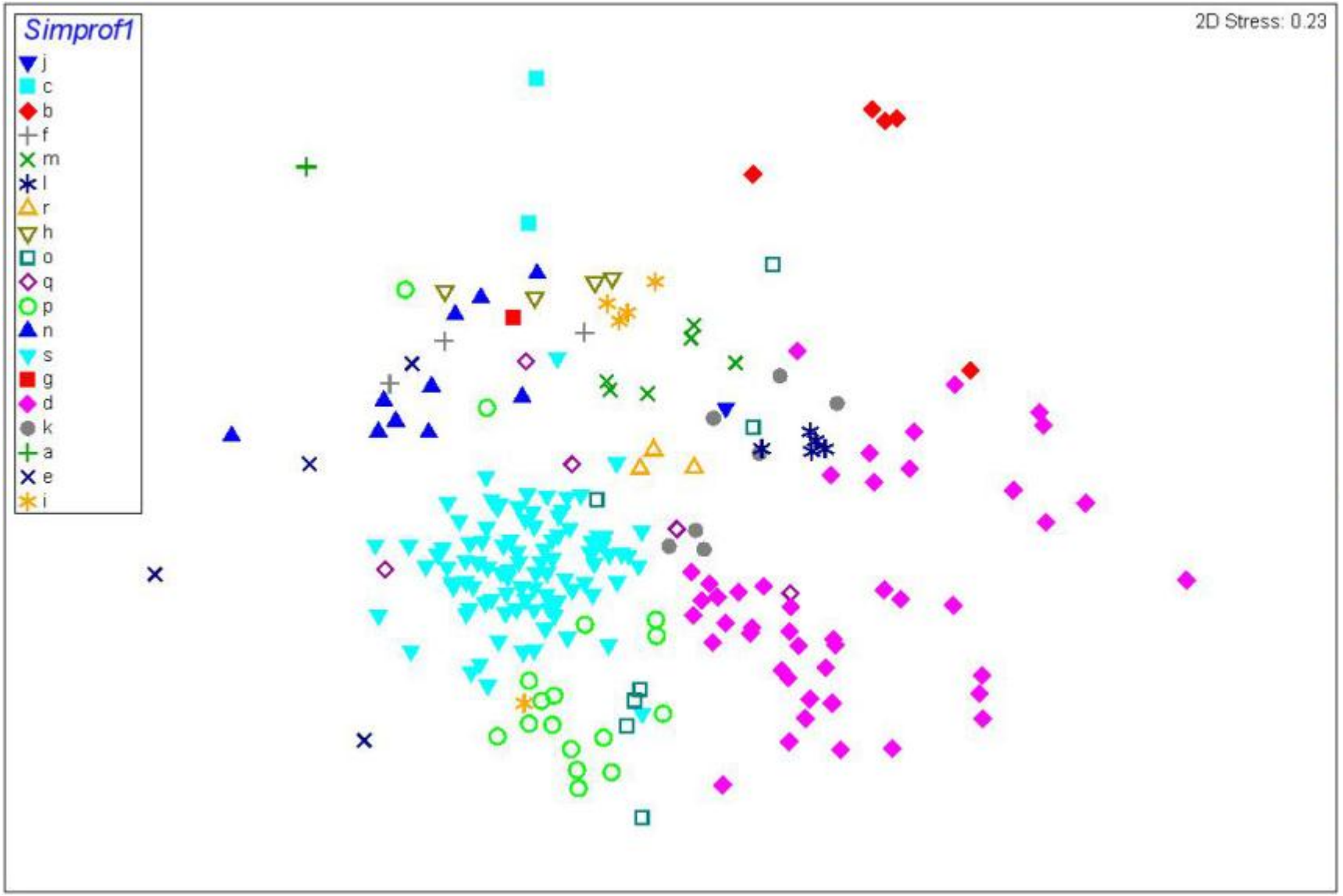


Figure 7.2 Groups highlighted by the cluster analysis from SIMPROF

7.9 The SIMPER routine was then used to identify characteristic species for these clusters. The results showed that the mixed turf Hydrozoa/Bryozoa and *Hiatella* sp. represent the characterising species for group "s", accounting for over 70% of the similarity, whilst *Mytilus edulis* and *Hiatella* sp. account for over 60% of similarity in group "d". *Hiatella* sp. and Hydrozoa/Bryozoa mixed turf are also characterising species for the minor group "p" with the turf also present in group "n". The main SIMPER groups are presented in Table 7.2. An attempt was made to assign a biotope to each cluster, assuming within cluster communities represented an individual biotope, however, the employment of averaged faunal data within each cluster resulted in apparently spurious biotope outcomes, in particular differing considerably from the biotopes clearly observed in the field

Table 7.2 Main SIMPER groups following cluster analysis

Species	Average Abundance	Average Similarity	Sim/SD	Contribution (%)	Cum.%
Group s - Average similarity: 55.08					
HYDRO/BRYO	4.86	20.70	4.01	37.59	37.59
Hiatella sp.	4.74	20.54	4.61	37.29	74.88
PORIFERA	1.65	4.93	1.50	8.95	83.83
ASCIDIACEA	1.34	2.09	0.49	3.79	87.62
Caryophyllia sp.	1.32	1.69	0.34	3.08	90.70
Group d - Average similarity: 45.39					
Mytilus edulis	4.74	22.16	1.62	48.82	48.82
Hiatella sp.	2.48	5.69	0.66	12.54	61.36
Sagartia spp.	2.85	5.12	0.56	11.27	72.63
PORIFERA	1.83	4.09	0.94	9.01	81.64
HYDRO/BRYO	1.30	2.56	0.70	5.65	87.29
Polycarpa sp.	1.48	2.07	0.34	4.56	91.85
Group p - Average similarity: 55.36					
Hiatella sp.	4.41	16.62	1.73	30.02	30.02
PORIFERA	3.65	13.39	1.96	24.19	54.21
Corynactis viridis	3.88	12.44	1.23	22.47	76.68
HYDRO/BRYO	2.65	8.06	1.47	14.56	91.24

Table continued

Species	Average Abundance	Average Similarity	Sim/SD	Contribution (%)	Cum.%
Group n - Average similarity: 46.36					
HYDRO/BRYO	4.40	20.39	1.86	43.99	43.99
Caryophyllia sp.	2.40	7.28	0.67	15.71	59.71
Dysidea fragilis	0.90	4.11	1.73	8.86	68.57
Spirobranchus sp.	2.00	3.45	0.52	7.43	76.00
PORIFERA	1.10	2.73	0.87	5.89	81.90
Dercitus bucklandi	1.80	2.50	0.36	5.39	87.29
ASCIDIACEA	0.70	2.40	0.86	5.18	92.47

7.10 Due to the mismatch between the biotopes allocated to the cluster based collective species lists and the field based determinations, an additional interpretation was employed which allocated biotopes based on a species list per replicate image in combination with generic field information. The biotopes identified were then applied to the ordination plot (MDS) by overlaying the allocated biotopes on the sites as a factor (Figure 7.3).

7.11 The data indicate that several clusters comprised the same biotope and that several transitional or mosaic biotopes were identified. Notably, clusters s and p were considered to support the same biotope (**HiaSw**), while the diverse group of clusters, including n, h, m and i were comprised primarily of the biotope **CrSpAsAn**.

7.12 SIMPER analysis was completed on the different biotope groups identified (Table 7.3) confirming the importance of a small range of species in defining the groups. The table is arranged to show the main biotopes and combined biotopes. Figures 7.4 to 7.7 also illustrate the importance of some of the principal individual species that have driven the groupings. Finally the biotopes that have been defined for each cave are summarised in Table 7.4.

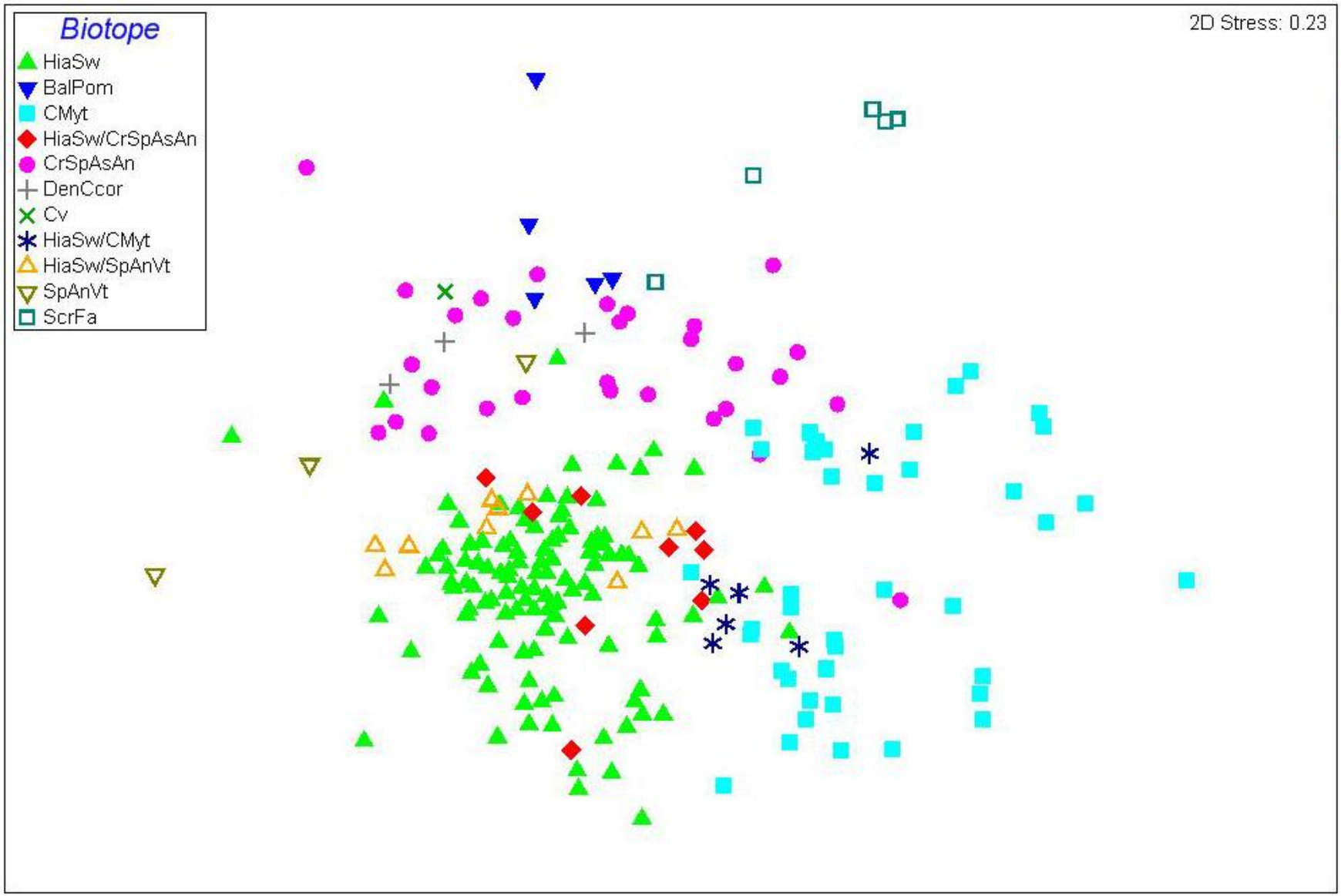


Figure 7.3 Biotope allocation from PRIMER analysis

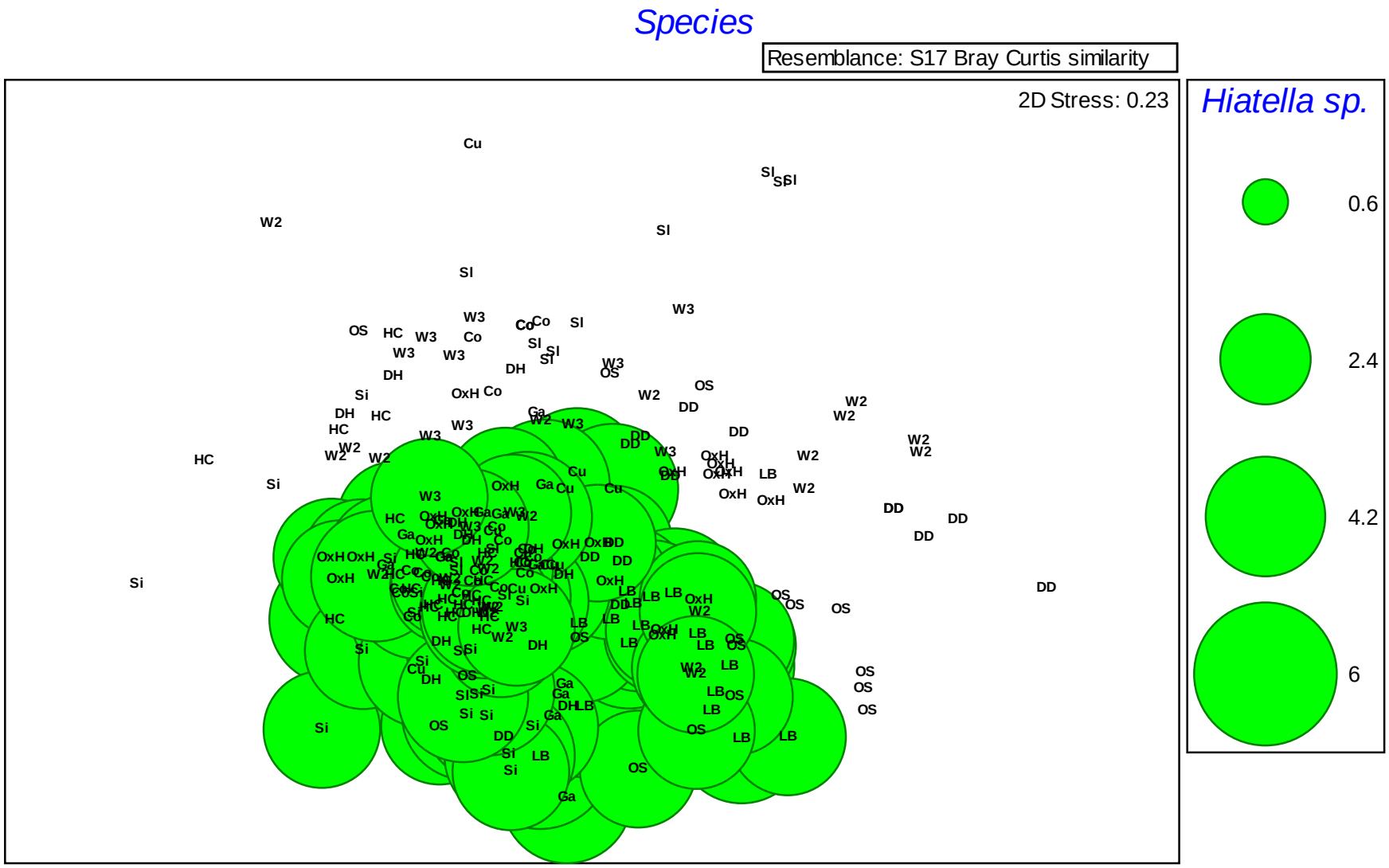


Figure 7.4 ***Hiatella*** **sp. abundance abundance (on the scale 0 to 6, equivalent to SACFOR Rare = 1 to Super abundant = 6) expressed on MDS plot.**

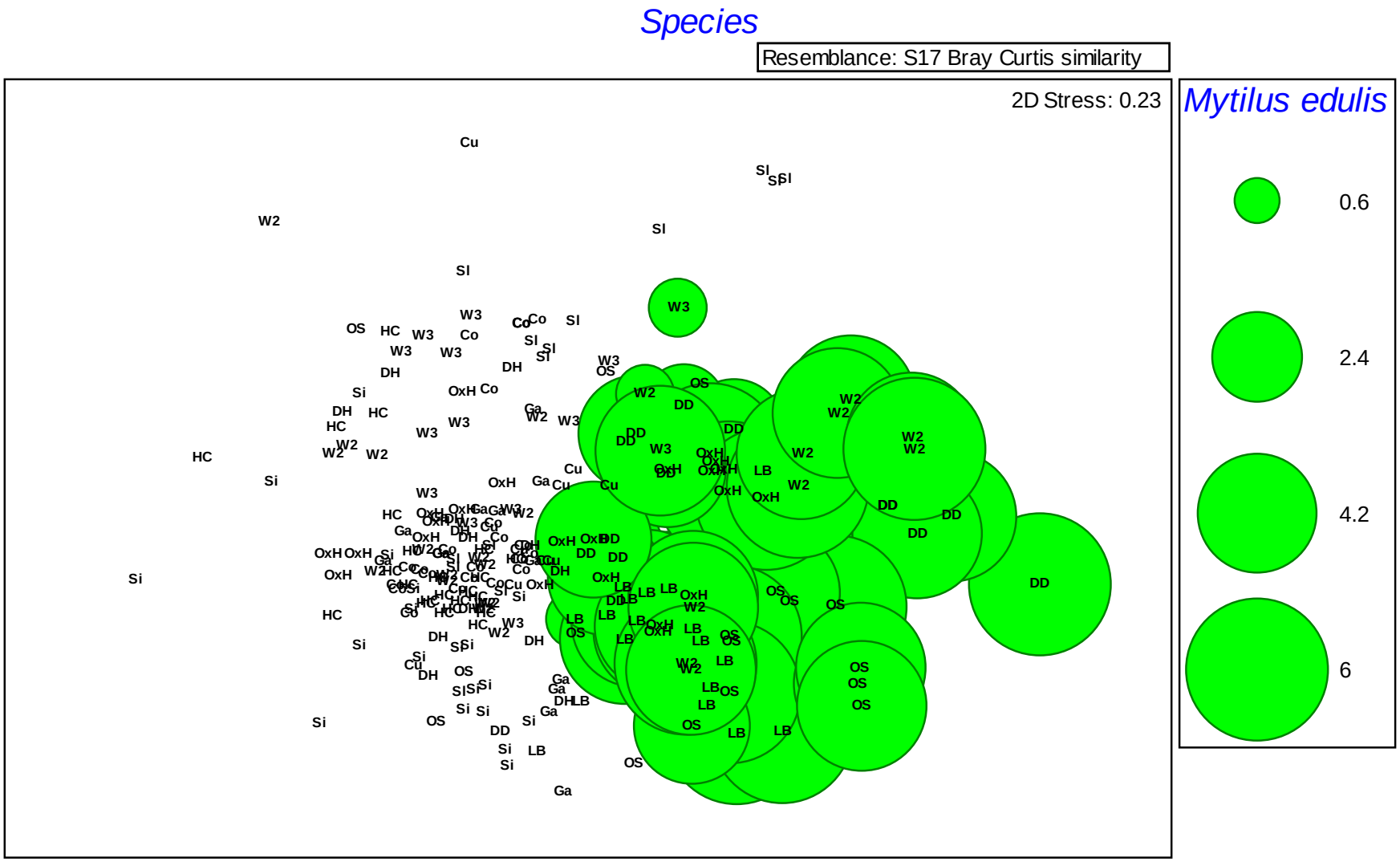


Figure 7.5 ***Mytilus edulis*** **abundance (on the scale 0 to 6, equivalent to SACFOR Rare = 1 to Super abundant = 6) expressed on MDS plot.**

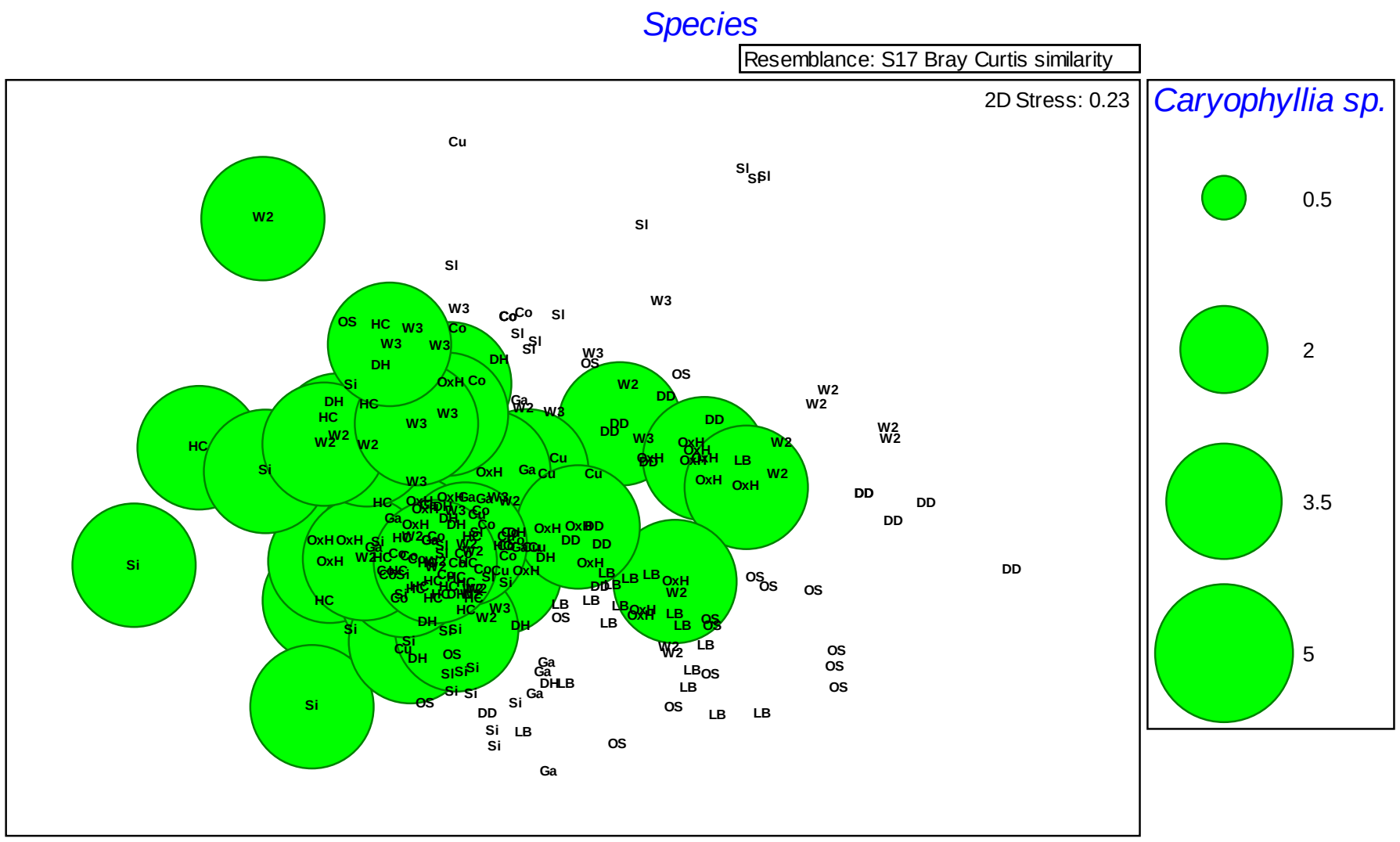


Figure 7.6 ***Caryophyllia*** **sp. abundance (on the scale 0 to 6, equivalent to SACFOR Rare = 1 to Super abundant = 6) expressed on MDS plot.**

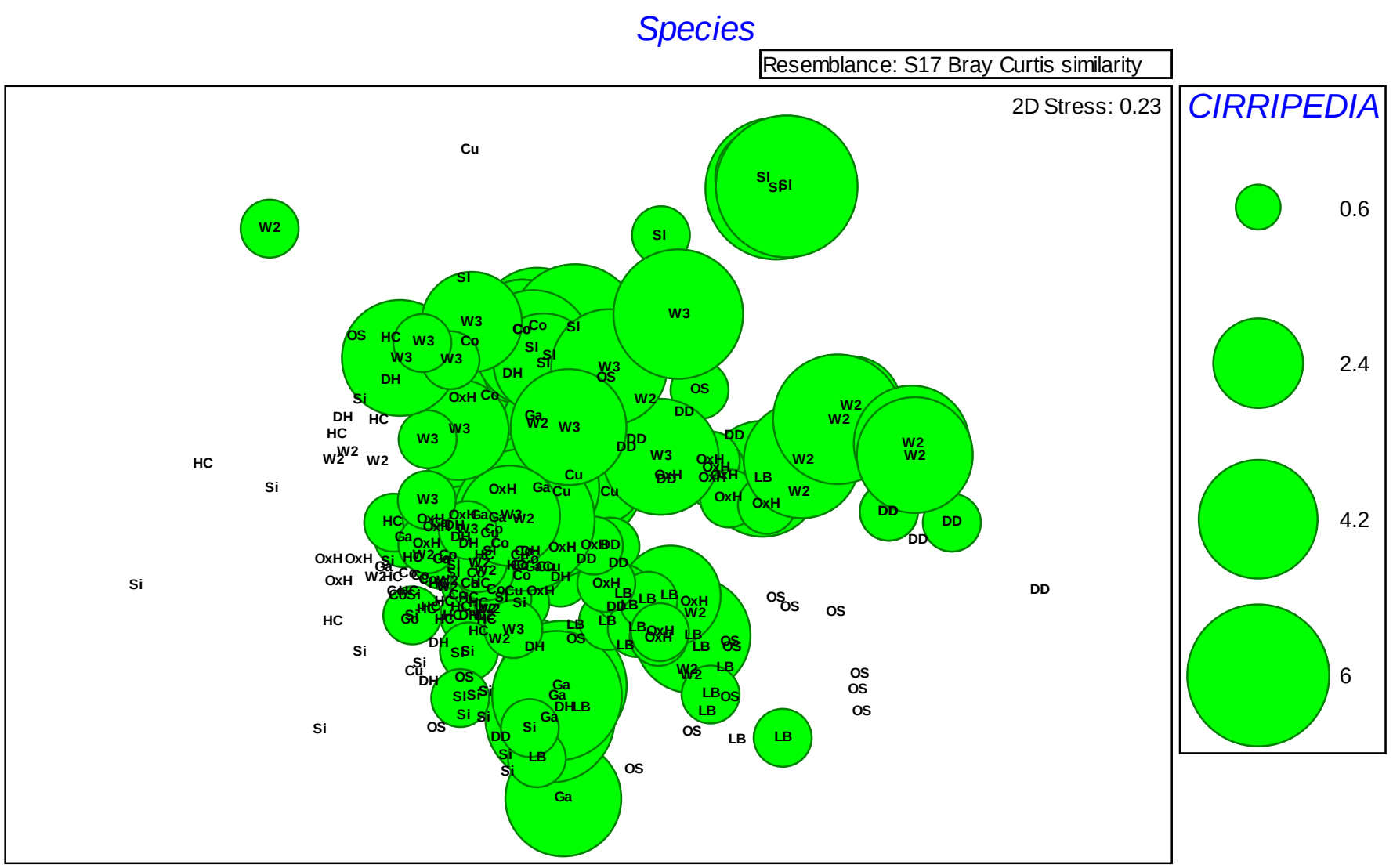


Figure 7.7 CIRRIPEDIA abundance (on the scale 0 to 6, equivalent to SACFOR Rare = 1 to Super abundant = 6) expressed on MDS plot.

7.13 The value of the interpretations presented here is to define a baseline against which future change can be measured. The assumptions for determination of future change are that; the same caves are visited; that essentially the same locations are surveyed with a similar level of photographic recording; the same level of species identification from the photographic records is achieved and, finally; the same method of biotope assessment is followed. This will provide an equivalent degree of data quality to that provided in the current survey. Areas where variation could occur are; different caves are surveyed; the recording location differs; the level of taxonomic identification varies and different biotopes may be arrived at despite similar species compositions occurring. All of these can be mitigated and/or tested for through careful survey planning, employment of appropriately experienced survey personnel, staff trained in taxonomic identification and the employment of those with previous experience with biotope identification. The latter can also be cross checked at the time of analysis by applying pairwise SIMPER comparisons of interpreted biotopes in the different years to identify if they are being based on the same suites of species.

7.14 Testing for change over the period assessed can then be achieved through two 2 x cross ANOSIM tests; time with biotopes and time with caves. The former will allow assessment as to whether the fauna comprising the biotopes have changed with time and the latter will be able to determine if the faunal composition of the caves have changed with time. ANOSIM provides a significance value for this process, although these need to be treated with caution as a significant statistical difference may not represent a relevant ecological change.

Table 7.3 Faunal groups based on biotope clusters

Species	Av.Abund	Contrib%		Species	Av.Abund	Contrib%
Group HiaSW				**Group HiaSw/CMyt**		
Hiatella sp.	4.77	40.81		Mytilus edulis	4.67	31.44
HYDRO/BRYO	4.31	32.86		Hiatella sp.	3.83	19.31
PORIFERA	1.9	10.89		Sagartia spp.	3.83	13.97
Caryophyllia sp.	1.17	2.73		HYDRO/BRYO	2.67	13.04
ASCIDIACEA	1.08	2.61		PORIFERA	2.33	10.3
CIRRIPEDIA	0.86	2.2		Polycarpa sp.	2.17	5.5
Group CrSpAsAn				**Group HiaSw/CrSpAsAn**		
HYDRO/BRYO	4.03	47.65		Hiatella sp.	4.11	32
PORIFERA	1.9	15.6		HYDRO/BRYO	4.11	27.29
Polycarpa sp.	1.77	8.06		PORIFERA	2.44	12.66
CIRRIPEDIA	1.37	6.81		SABELLIDA	0.89	6.26
Pomatoceros sp.	1.23	4.2		CIRRIPEDIA	0.89	3.39
Caryophyllia sp.	1.07	3.77		Corynactis viridis	1.44	2.94
ASCIDIACEA	0.43	2.92		Pomatoceros sp.	1.33	2.89
SABELLIDA	0.4	2.07		Polycarpa sp.	1.56	2.45
				ASCIDIACEA	0.56	2.32
Group CMyt						
Mytilus edulis	5.29	61.25				
Hiatella sp.	1.73	7.31				
PORIFERA	1.49	7.16				
HYDRO/BRYO	1.17	4.92				
Sagartia spp.	1.8	4.84				
Polycarpa sp.	1.46	4.58				
Group SpAnVt				**Group HiaSw/SpAnVt**		
Caryophyllia sp.	4	42.22		HYDRO/BRYO	4.3	26.33
Polydora	4	22.82		Hiatella sp.	4.2	26.1
Phoronis hippocrepia	2.33	11.41		Chartella papyracea	4.4	23.71
PORIFERA	1	10.55		Dercitus bucklandi	2.1	6.15
HYDRO/BRYO	2.33	9.74		PORIFERA	1.7	5.58
				ASCIDIACEA	1	5.18
Group DenCcor						
HYDRO/BRYO	5.33	48.57				
Dendrodoa grossularia	4.33	38.86				
PORIFERA	1	9.71				
				Group ScrFa		
Group BalPom				CIRRIPEDIA	4.2	58.82
HYDRO/BRYO	3.43	69.14		Corallinaceae	2.4	23.39
CIRRIPEDIA	2	27.6		Spirorbinae	1.4	12.73

Table 7.4 Percentage presence of biotopes within each cave

Cave	Biotope	No sites	% sites
Co			
	HiaSw	18	78%
	BalPom	5	22%
Cu			
	HiaSw	9	90%
	BalPom	1	10%
DD			
	CMyt	5	33%
	CrSpAsAn	5	33%
	HiaSw/CrSpAsAn	5	33%
DH			
	HiaSw	10	77%
	DenCcor	3	23%
Ga			
	HiaSw	13	93%
	CrSpAsAn	1	7%
HC			
	HiaSw	21	91%
	CrSpAsAn	1	4%
	Cv	1	4%
LB			
	HiaSw	7	39%
	HiaSw/CMyt	6	33%
	CMyt	5	28%

Cave	Biotope	No sites	% sites
OS			
	CMyt	10	59%
	CrSpAsAn	4	24%
	HiaSw	3	18%
OxH			
	CMyt	11	48%
	HiaSw/SpAnVt	10	43%
	HiaSw	1	4%
	SpAnVt	1	4%
Si			
	HiaSw	16	84%
	SpAnVt	2	11%
	CrSpAsAn	1	5%
Sl			
	HiaSw	5	36%
	ScrFa	5	36%
	CrSpAsAn	3	21%
	BalPom	1	7%
W2			
	HiaSw	11	42%
	CMyt	9	35%
	CrSpAsAn	6	23%
W3			
	CrSpAsAn	9	64%
	HiaSw/CrSpAsAn	4	29%
	CMyt	1	7%

8 DISCUSSION

8.1 The biotopes allocated as a result of the individual image analysis using the PRIMER data produced a very similar array, to those allocated within the main body of the report (Table 8.1).

Table 8.1 Biotopes produced from analysis of PRIMER data and shown in Figure 7.3

Biotopes derived from Statistical Analysis	Biotope description	Biotope notes relating to overall survey
IR.MIR.KR.HiaSw	*Hiatella arctica* and seaweeds on vertical limestone / chalk	Main biotope recorded in 10 of the 13 caves surveyed.
IR.FIR.SG.CC.BalPom	*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Recorded in 7 of the 13 caves surveyed, mainly relating to impoverished scoured areas on the lower section of vertical walls.
CR.MCR.CMus.CMyt	*Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	Recorded in 5 of the 13 caves, varying from areas towards the front of the caves or forming dense beds in areas of strong water movement such as Ore Stone Cave.
IR.FIR.SG.CrSpAsAn	Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Recorded in 8 of the 13 caves surveyed.
IR.FIR.SG.DenCcor	*Dendrodoa grossularia* and *Clathrina coriacea* on wave-surged vertical infralittoral rock	Recorded in 3 of the 13 caves surveyed.
CR.FCR.Cv	Circalittoral caves and overhangs	The root seen here recorded in 6 out of the 13 caves, taken further to CR.FCR.Cv.SpCup within the main section of the report.
CR.HCR.XFa.SpAnVt	Sponges and anemones on vertical circalittoral bedrock	Not recorded within the main biotope assessment.
LR.FLR.CvOv.ScrFa	Sparse fauna (barnacles and spirorbids) on sand/pebble-scoured rock in littoral caves	Not recorded within the main biotope assessment.
Mosaics	IR.MIR.KR.HiaSw / IR.FIR.SG.CrSpAsAn IR.MIR.KR.HiaSw / CR.MCR.CMus.CMyt IR.MIR.KR.HiaSw / CR.HCR.XFa.SpAnVt	Mosaics were frequently recorded within the survey area.

8.2 Most of the biotopes seen here are present in the top 8 of the 15 most frequently recorded biotopes from the overall survey. The less frequently recorded biotopes are not represented, unsurprising given that these often patchy occurrences would be very easily overlooked from this method. Their allocation within the report is a result of analysis of a wider array of data, such as the more focused detailed species images, not taken for statistical analysis, plus in-situ observations and analysis of video footage.

8.3 Two further biotopes have been suggested by the PRIMER data, **CR.HCR.XFa.SpAnVt** (Sponges and anemones on vertical circalittoral bedrock), and **LR.FLR.CvOv.ScrFa** (Sparse fauna (barnacles and spirorbids) on sand/pebble-scoured rock in littoral caves). The first would not have been allocated from the main biotope assessment sections as the turf cover is too specific (*Tubularia indivisa, Halecium halecinum* and *Nemertesia antennina*), and the sponges too restricted, mentioning only a few common sponges, also seen throughout this report but with many other more defining species. Given that the data within PRIMER, included species data amalgamations, of which the sponge species were often raised to record Porifera only, it is not surprising that this biotope was suggested. It is however only applied in a few cases within a couple of caves and therefore is not a significant variation. The second biotope is also only suggested for a few samples (images), and is again considered insignificant overall.

8.4 The clustering seen within Figure 7.3 is a fair representation of the overall survey results found within the report. The dominance of the **HiaSw** biotope is seen, and the additional grouping of sites dominated by *Mytilus edulis*, **CMyt.** The cluster **HiaSw/SpAnVt**, probably serves to represent the mosaicing often seen between *Hiatella* sp. and various 'minor' biotopes. The alternative but probably related codes of which are used within the main report biotope allocation sections. The **HiaSw/CrSpAsAn** mosaic is also a fair reflection of observations recorded elsewhere. The separate grouping of **CrSpAsAn** is again a representative of overall data and given the regularity of its allocation within the main report, its allocation to individual images is not surprising.

8.5 The MDS plot (Figure 7.3) shows that **IR.MIR.KR.HiaSw**, either as the main biotope or part of a mosaic, is found in all caves and the 'minor' biotopes, if not part of a mosaic, often reflect areas of natural transition from main biotope groups to, for instance, upper areas on the vertical walls, or to areas either further to the front or rear of the caves. The other biotope forming a notable cluster is **CR.MCR.CMus.CMyt**. This was observed in Watcombe Cave No.2 (on the upper wall), almost exclusively populated by CIRRIPEDIA and *M. edulis* and in Double Decker/Crab Cave Complex and Oxley Head Cave where *M. edulis* was observed as the dominant species in specific areas within the caves.

8.6 The overall aim of the statistical analysis was to create a statistically robust approach, which can be repeated in the future, enabling any change against the baseline presented here, to be measured. The overall view is that 21 cm from the substrate is the preferred distance at which a series of images per biotope should be taken. The overall reliability of the images appears to be improved at this distance with a greater likelihood of substrate clarity allowing for improved species analysis and data compilation. Due to the small area that 21 cm distance from the substrate was observed to cover, 18 cm by 18 cm, a greater number of stills is suggested to ensure a satisfactory species list to be compiled that adequately represents the survey area under review. This is also more likely to highlight the mosaicing often observed.

8.7 The methods of data analysis detailed here are considered an adequate reflection of the biotope composition across the area. Any future survey, with careful understanding of the complex nature of cave environments, should be able to determine if there has been any major change to the overall biotope composition within the area as a whole. Biotope variation within a specific cave over time, is considered very much more difficult to establish as a very

small change in survey position within a cave, has the potential to vary the suite of species observed. Two parallel methods including location specific photo surveys in combination with a broader view, both of which have been adopted here, would appear to be appropriate. Therefore the use of a wider array of data, such as in-situ observations, video footage review, in combination with targeted in-depth species analysis either from species sampling, species specific stills image collection, or both, is strongly recommended.

Review of field methodologies

8.8 It should be noted that given the difficulties inherent in working within a cave environment, including but not limited to; an overhead environment preventing direct access to the surface, light reduction, silt disturbance potentially resulting in reduced visibility and disorientation, and surge effects, felt in even very mild weather conditions; a suitable weather window must be carefully selected. The present survey was conducted during a, long awaited period of excellent sea conditions, but this did not prevent surge and occasional sediment disturbance resulting in a few challenging situations. These were easily surmounted but it would not take a very great deterioration in weather conditions either to have made a cave impossible to survey, or to reduce substantially the quality of the data gathered, particularly the images taken, on which much of the survey depended.

8.9 The use of a shot line position as a point from which to measure distance travelled into the cave is considered to have been a successful approach. However, in future monitoring surveys, it should be applied carefully with as much reference as possible to photographic records, ensuring greater positional accuracy, given the inherent inaccuracies present in GPS data positioning, and the very close proximity to the shore, where shot deployment is being undertaken.

8.10 A reconnaissance dive, in this case, the same cave surveyed by both dive teams on the first day, was found to be invaluable, and allowed for any problems that occurred to be discussed and any changes to the expected approach to be established. A full and thorough dive briefing was also considered vital, to aid consistency of approach, and in this particular survey, has been greatly assisted by the cave schematics provided by Chris Proctor in his 2009 report.

8.11 The use of a tape measure, attached to the base of the shot line and used to measure distance was found to be acceptable (the robustness of tape measure is paramount). Its use as a contact point for both divers was also sufficient, given the safety measures already in place, regarding limitation on distance travelled within the various caves. With any limiting reduction in visibility or complexity of cave construction, an additional buddy line system was always available. However, if the conditions had been too difficult, the decision to abort a cave dive would have been made.

8.12 The division of tasks proved suitable for current purposes, where one diver took video footage and stills for statistical analysis, whilst taking records of distances travelled, and the second diver took overall notes, made biotope observations, took faunal samples and specific fauna focused images to support sample analysis and detailed substrate observations. It was important that the two divers worked close to each other for the while the photographic stills were collected, given the potential for the biotopes to change over relatively small distances in some cases.

8.13 The use of random photographic quadrats for subsequent species analysis and data compilation is considered to have been successful but not without certain difficulties. Great care will need to be taken with its application. Sea conditions are crucial and will need to be such that allow the diver to take clear focused images. Care will have to be given to water clarity as very little disturbance will result in an obscured substrate that will make any

detailed analysis very challenging. This method was suggested at the start of the project, as opposed to the use of permanent fixed stations, which were considered to be damaging, and to have potentially prohibitive installation and maintenance costs associated with them.

8.14 Two fixed distances from the substrate were trialled for the photo quadrats using a rigid extendable tape measure. Whereas both 21 cm and 31 cm distances produced acceptable images at varying times, overall, the closer images were more reliable. It is also suggested that a much larger number of images are taken, not only allowing for image failure but to provide a much greater number of images for review per biotopes, than the minimum of 5 originally suggested. A tentative proposal of 10 to 15 images is made here.

8.15 It is considered vital that not only are samples catalogued and preserved at the end of each survey day, but that images are downloaded and reviewed to highlight any inherent problems that might affect any subsequent image analysis. This review can then be used to inform the next survey day or if the images are found to be inadequate, a decision can then be made on whether a return to the site is required. A video review is considered useful for the same reasons. Any of these problems are more than likely to have been dealt with in the field, as returning to a site is costly and time consuming but a backup review should always be attempted.

8.16 Compilation of the days data into MNCR forms and/or excel spreadsheets, along with annotated site sketches at the end of each survey day is also considered vital. The information is fresh and also allows the team to discuss any variations in observations between divers and deal quickly with any anomalies found.

8.17 Some of these observations have been similarly commented on within the 'Flamborough Head sublittoral monitoring survey' (Howsen, Mercer and Bunker, 2003). A further observation made in the 2003 report, is that 'The use of a small team of 4 people, all of whom are experienced biologists working together on a number of related projects has proved invaluable.' The same observation can be made for the current survey. Where the current team used had not worked on a cave survey before, few and far between as they are, the use of divers with a great deal of experience between them and as a team, regarding the difficulties and limitations inherent in underwater surveys of all varieties, not only diving, and all experienced in surveys with a biological focus, was indeed invaluable. This will be a key recommendation for any future surveys.

8.18 Linked to the level of experience of the team used for the survey is the consideration of the level of sampling required and the subsequent species identification. It is noted here that extensive sampling was undertaken in the present survey, to ensure adequate species coverage and to support the image analysis. The sampling also focused on groundtruthing those species that are historically misleading or difficult to identify from field analysis alone. An additional problem is that the ability to identify some groups of species accurately is often the preserve of people who are particularly specialised in their identification. This is very relevant for sponges and ascidians and surveyors need to be aware of the difficulties involved. These are also two groups which constantly undergo revision, so a reference collection that recorded the identification of these species groups was considered vital for data quality. However, this is time consuming and costly to undertake, which in the future may be seen as prohibitive, to the level attempted here. However, reduction of effort regarding species sampling and identification, also requires the input of an experienced team of surveyors, who will understand the relevance of the reduced intensity, and any subsequent effect this may have on data production, particularly with reference to any comparison that needs to be made to previous datasets that may have been sampled more heavily.

8.19 As a further comment, the use of a local dive skipper with extensive knowledge of the area, particularly related to the locations of the caves, and the potential conditions which might make them unsuitable for survey at a particular time, was absolutely key to the success of the survey. The use of Rick Parker and the Jennifer Ann for future surveys or similar work within the area cannot be recommended highly enough.

Conservation and management

8.20 The occurrence of nationally rare or scarce species occurring in the caves in 2009 is presented in a combined table with 2012 data below.

Table 8.2 Occurrence of nationally rare or scarce species occurring in the caves

Species	Designation	Where found in 2012	Where found in 2009
Thymosia guernei	Rare	Oxley Head Cave, Watcombe Cave No.2.	Berry Head Cave no 1
Alcyonium hibernicum	Scarce	Outer wall of Garfish Cave.	Rock DoveCave, Outer wall of Garfish Cave
Edwardsia sp (recorded from 2009) Edwardsiidae (recorded from 2012)	Occasional/rare	London Bridge Cave No.1. Ore Stone Cave, Silty Cave No.2 (potential), Watcombe Cave No.2.	Corbridge Cave
Caryophyllia inornata	Rare	Compass Cave, Cuttlefish Cave, Hidden Cleft Cave, Oxley Head Cave, Silty Cave No.2.	Berry Head Cave no 1,Rock Dove Cave, Garfish Cave Cuttlefish to Starfish Caves
Hoplangia durotrix	Rare	Roof section of Garfish Cave.	Southside Caves, Roof section of Garfish Cave
Galathea nexa	Rare (S Britain)	Not recorded.	Garfish Cave

8.21 If should be noted that a difference in the extent of some species seen within the table above, which appears to show an increase in the recording of certain species across the area from 2009 to 2012, is expected to be a reflection of the variety of divers that have taken part over time and possibly a further reflection of their specific interests. It is not expected to be for instance, a result of an expansion of territory. For example, the sponge *Thymosia guernei,* often found in crevices in rock, when seen here, was low lying and formed small patches, so potentially could have been easily overlooked. Additionally, the present survey was aimed at more localised sections of the caves, where historically, it is believed that a more extended and general survey through a cave has been undertaken.

8.22 As the species listed are referred to as rare and scarce, their protection needs to be considered. The 2009 report discusses the problems likely to be encountered and lists them primarily as pollution incidents such as oil spills and visitor pressure.

8.23 Regarding pollution, the current report agrees with the observation that there is no further protection that can be afforded to the caves in this regard, than is already in place against general pollution incidents, applied countrywide.

8.24 Regarding visitor pressure, the present report also agrees with the overall view presented in Proctor, 2009. There is very little that can be done regarding the expected increase in visitors to the caves, potentially linked to the interest in coasteering or the interest of caving clubs. A close working relationship with people and organisations involved in these activities would probably be enough to encourage awareness of the sensitivity of these environments. It is suggested here, that both groups need their participants to be trained to a level that encourages consideration of their environment, from a safety point of view if nothing else so their impact is highly unlikely to be very great if at all noticeable. Cavers are normally highly trained and unlikely to support a high impact approach to their activities. Access to the caves from terrestrial positions and the potential impacts has been sufficiently covered by the 2009 report.

8.25 The species highlighted in Table 8.2 are generally low lying or crevice dwelling and are very unlikely to have any impact from divers' fins. There are already so many naturally restricting conditions regarding any diving within caves, that visits to the area are likely to be minimal. The obstacles are suggested as being, but not limited to, a general aversion by many divers to extensive overhead environments, space restriction, the possibility of silt disturbance and reduced visibility, the potential for disorientation, and the very uncomfortable diving conditions in anything but the most appropriate weather.

8.26 It has been suggested that divers' bubbles have the potential to change the environment within a cave and cause species damage or death. Within the caves dived as part of this survey, the effect is considered to be minimal as they were more often than not, open to air from other sources or to have a channel or fissure through which air could escape. Where air was able to be caught within pockets in the rock, for instance the roof section of Garfish Cave with its cluster of *Hoplangia durotrix*, an observation is that the generally abrasive movement of water in the area, and the not insubstantial surge, would have the effect of moving or dislodging any divers bubbles and would have a much more of an aggressive effect on the local area than that of a visiting diver.

8.27 However, further within the caves, where surge may be reduced and the overhead environment may be much more enclosed, trapped air has the potential to create pockets within which marine species cannot survive for extended periods of time. If water movement is reduced to the extent where the dislodgement of the air pockets is prevented, there is potential for damage to occur. This was not a serious concern in any of the caves dived within this survey, but it is not impossible that this has the potential to occur within other caves in the area.

8.28 Regarding the extraction of edible crustaceans by divers, it is true that this activity is less widespread than it once was so unlikely to be a great pressure, especially given the already significant obstruction to diver impact regarding access to the environment as a whole. The deployment of pots within the area was seen particularly around Silty cave No.2, and is likely to occur along the coast and by default be found within close proximity to caves. It would seem logical to include caves within a statutory marine reserve area that might include no-take zones, as suggested in Proctor 2009, but further comment is outside the scope of this report.

8.29 Overall, the current observation is that diver pressure in the area is unlikely to be causing any adverse effects and much more pressure is likely to come from terrestrial access to the caves. A programme that informs local groups of conservation interest in the area would be beneficial to all involved. It would be useful to obtain records from local dive operators, which

if correctly cleared with local coastguards, should give a useful indication of activity in the area which could then be used to highlight any increase in activity over time. This may then go towards triggering a review of the approach currently used, which is essentially minimal in nature.

Future monitoring recommendations

Field survey

- Undertake a warm-up dive to enable a review of planned methodologies and allow for any suggested revisions to be discussed.
- For an effective repeat survey to be undertaken, it is critical that it is undertaken in extremely favourable weather conditions.
- The use of a local skipper with very specific site knowledge is highly recommended.
- The cave schematics produced by Chris Proctor for his 2009 report is considered an invaluable resource and should be used on any future surveys.
- A small dive team, experienced in biological surveys and the associated difficulties of overhead environments is highly recommended and may make a crucial difference to the quality of the data gathered, regarding consistency and the subsequent comparability with future surveys.
- Despite the original suggestion that 5 images per observed biotope was sufficient to represent an area and provide sufficient data for subsequent statistical analysis, it is strongly suggested here that the complicated mosaicing of the observed species groups will not be sufficiently represented by 5 images and that approximately 10 to 15 would be more likely to reflect the variety of species seen, particularly within the main biotope areas on the vertical walls. Even though it is possible for the images to be analysed independently of the overall review of a cave, the images should still be understood within the greater context of the area as a whole, as provided by *in-situ* observations, additional stills images and the video footage.
- Of the two distances from the substrate trialled within some caves for images to be used for statistical analysis, 21 cm and 31 cm, the closer distance is recommended for overall reliability, and is a further reason for suggesting a greater number of images be taken per 'biotope'. It is considered that the smaller area would benefit from a greater number of stills, to maintain the overall area covered within an area.
- Ensure careful data logging and downloading of images is undertaken on a daily basis and the team confer on any anomalies and problems encountered to ensure a fast resolution of any issues.
- Species sampling and compilation of a reference collection has proved very valuable for supporting biotope allocation and the information acquired is expected to be of use to future surveys.

Post Survey

- Review of video footage and stills images and the subsequent biotope allocation should be undertaken by an experienced biologist, familiar with the limitations of all stages of the review process and of the inherent problems associated with the allocation of biotope codes.

- Statistically based identification of change may be possible through the application of ANOSIM as described in section 20.2. However, this should be considered in an overall interpretation of ecological conditions, which takes account of general conditions as well as specific features and/or individual species of conservation importance that cannot be included within the more specific statistical comparison.

9 CONCLUSIONS

9.1 The aim of the survey of a selection of sea caves from the Torbay area was to develop appropriate monitoring methods, to facilitate condition assessment according to methodologies detailed in the JNCC Common Standard Monitoring Guidance series, and summarised within the attribute Table 9.1 below.

9.2 The selection of sea caves attempted to present a cross-section of the array of caves present and to choose caves that reflected the wide variety of aspects presented along the coast. This was achieved and if the weather had been more challenging, the likelihood is that at least a smaller selection of the caves could have been attempted. In reality, as the weather was favourable, this expectation is purely speculation. As a wider array of caves was surveyed than initially expected, it is very hopeful that any subsequent survey would be able to gather sufficient data, even from a reduced number of caves than presented here, to allow comparison with the present findings.

9.3 The data compiled from species sampling, in-situ observations, and video and stills images, created a list of biotopes, reminiscent of those suggested within the report by Proctor 2009. The list has been expanded within the present report to reflect the observation of the dominance of *Hiatella* sp. across most of the area, and a more detailed approach has been taken regarding the complex mosaicing across the area, the observation of which is dependent on the position within the cave selected for a more detailed survey. However, overall, the findings are not dissimilar.

9.4 The baseline data created here is meant to allow comparison with any future survey, attempting to monitor change in the area. The use of stills images at a defined distance from the substrate, the application of SACFOR categories to species found, and the subsequent data analysis focusing on community composition will, it is believed, allow the assessment of significant biological change. The data collected from the stills images used as replicates, was appropriate for the aims of the survey but the employment of 5 images per biotope is considered to include a risk that insufficient data will be collected. Using these 'replicates' alone, identification of detailed biotopes may be difficult, given the limited suite of species in each image, resulting in biotope complex or habitat level allocation only. Fewer images are needed on species poor areas such as lower wall scour and cave floors, but in other areas a proposed 10-15 images per 'observed biotope' would reduce potential failure to record good images and increase the potential for collective information to be used to interpret separate images. Notwithstanding the employment of repeated replicate image data it is still acknowledged that greater definition of biotopes can be made through collective interpretation of multiple data sets. Any future interpretation of statistical difference should be considered within the context of a more general ecological interpretation.

9.5 Additionally, careful attention will need to be paid to repeating the methodologies used here, regarding within-cave positioning of the surveyors, and the collection of supporting data such as thorough in-situ observations, and video and stills images. The use of experienced field biologists will also enhance the quality of the data gathered and the subsequent analysis.

9.6 A secondary aim was proposed that the biotopes that had already been assigned within a cave, could be recognised during the dive, allowing for subsequent analysis of the condition of the biotope where possible, compared to the previous survey (Proctor 2009). In reality, time constraints did not allow for this type of comparison, as efforts had to be focused on the acquisition of data required for this report. However, similar biotopes, to those found in the 2009 study were often observed although it was not possible to compare these on a quantifiable basis.

Table 9.1 Attribute table based on guidance within the Common Standards Monitoring Guidance for Sea Caves, JNCC (2004b)

Attribute	Target	Method of Assessment	Comments
Extent of caves	No change in dimensions of a cave, allowing for natural changes that are part of a wider coastal geomorphological management regime.	The extent or the dimensions of a cave is to be assessed periodically and compared against previous data. However this is unlikely to be required except over extremely long time frames, and as such it has been decided by Natural England and Chris Proctor that any further focus is not required.	Baseline partially completed by Proctor, 2009. Further work on extents of caves was not undertaken in 2012. Due to the nature of the substrate, erosion or change is only expected over extended periods. The extensive mapping of caves within the Torbay area, undertaken by Chris Proctor is considered the baseline against which further assessments for this target could be made. Any change to the extent of the caves would be considered unfavourable, partially destroyed or destroyed depending on the cause of the change.
Number of caves in the site	No reduction in the number of caves within a site allowing for natural change.	Assess the number and location of caves against the baseline area survey.	Baseline established by Proctor, 2009. Further work on assessing the number of caves across the area was not undertaken in 2012. A sub set of caves from the list compiled by Chris Proctor was selected for the present focused survey. Future assessments are likely to focus on the continued presence of those caves within the sub selection. Any change to the extent of the caves would be considered unfavourable, partially destroyed or destroyed depending on the cause of the change.
Biotope composition of sea caves	Maintain the variety of biotopes identified for each cave, allowing for natural succession or known cyclical change.	Repeat assessment of the biotope composition or a subset of specified biotopes identified for each cave.	Baseline partially completed by Proctor, 2009. Baseline reviewed in 2012 with the present survey. A repeat survey should expect to find the biotope or suite of biotopes established for each cave within the current survey, 2012.
Presence of representative / notable sea cave biotopes	Maintain the presence of the specified biotope(s), allowing for natural succession/known cyclical change.	Presence of the limestone related biotope across much of the area, here assessed to be **IR.MIR.KR.HiaSw**, should not deviate significantly from the baseline established within the present survey.	An assessment of the biotopes present in the area was partially completed by Proctor, 2009. This section should be seen in conjunction with the overall biotope composition noted above. The continued presence of *Hiatella* bored rock is very representative of the area as a whole. This is not a species of conservation importance, but any significant variation in its presence would warrant careful review.

Attribute	Target	Method of Assessment	Comments
Species composition of representative / notable sea cave biotopes	No decline in biotope quality due to change in species composition or loss of notable species allowing for natural succession/known cyclical change.	A repeat survey using fixed photographic quadrats as used in the present survey should be sufficient to assess the quality of the biotopes, in relation to a general suite of species seen, within each specified survey area within each cave.	An assessment of the species composition of representative biotopes was partially completed by Proctor, 2009. The present survey has assessed species composition using an array of techniques including species sampling, video footage, targeted stills images and fixed quadrat images suitable for statistical analysis. Although the fixed quadrat approach has been suggested as sufficient for repeatable surveys, it is strongly recommended that a broader view using the range of techniques employed during this survey should be used to support any future survey effort.
Presence and/or abundance of specified species	Maintain presence of the specified nationally rare or scarce species noted within the present survey and within the report by Chris Proctor. *Thymosia guernei* - rare *Alcyonium hibernicum* - scarce *Caryophyllia inornata* - rare *Hoplangia durotrix* - rare	Assessment of the presence/absence of the noted species can be achieved by a targeted search, using the current report as guidance to the place of their occurrences.	The baseline was partially completed by Proctor, 2009. The two sections above are considered the main 'targets' regarding assessment of overall biotope allocation and species composition. This section is used to highlight the rare/scarce species noted throughout the survey. *Thymosia guerne*i was noted in Oxley Head Cave, *A.hibernicum* within the turf on the outside of Garfish Cave, *C.inornata* confirmed within a few caves and suspected of occurring in more caves in the area, and *H.durotrix* seen in one outer roof section, again in Garfish Cave. *Galathea nexa* (rare) was found in Garfish Cave by Chris Proctor, but not in the present survey, which may be due to the focus on a different area, than that in which the species was previously seen.
Spatial pattern of characteristic sea cave biotopes	Maintain the distribution and/or spatial arrangement of biotopes, allowing for natural succession/known cyclical change.	Assessment of the distribution or spatial arrangement of the recorded biotopes is considered a sub section within the other targets already noted and should be seen within that structure.	The baseline was partially completed by Proctor, 2009. Note that the present survey suggests that the distribution or spatial pattern of biotopes is very complex due to the small distances over which biotopes and species assemblages can change. The subject is further complicated by the tendency of an area to form a mosaic of biotopes, within a relatively small area. The focus should be the assessment of the suite of biotopes and their species composition, with less focus on the exact dimensions of the area over which they are present. It is suggested that this would be very hard to accurately record.

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APPENDIX I REFERENCE COLLECTION AND SPECIES LISTS

Master Reference Collection

Ref No.	Species	Cave Site	Notes
1	PORIFERA	Oxley Head	Refs 1, 7, 46 all the same species. Spicule pictures taken. Noted as orange in the field. Pic ref AO2.
2	*Diplosoma listerianum*	Oxley Head	Pic Ref Bag AO4.
3	*Lissoclinum perforatum*	Oxley Head	Pic Ref Bag BO9.
4	*Chlamys* sp. and Suberitidae	Oxley Head	
5	*Caryophyllia* sp. (=*inornata*)	Oxley Head	Hesitant with ID. Columella does seem different to *Caryophyllia smithii.* Septa not a clear separation.
6	*Haliclona simulans*	Oxley Head	
7	PORIFERA	Oxley Head	Refs 1, 7, 46 all the same species. Spicule pictures taken.
8	*Phorbas plumosus*	Oxley Head	Dive 1, picture taken.
9	*Haliclona* (= *rosea*)	Oxley Head	Very soft. Seems most like *H.rosea.*
10	*Schizomavella* sp.	Oxley Head	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate. This particular species is most like *S.teresae* but have left it at the level of genus. Dive1, AMB, picture taken.
11	Microcionidae	Oxley Head	BMB Dive 2, noted as orange in the field.
12	*Mytilus edulis*	Oxley Head	AMB - Dive 1.
13	*Thymosia guernei*	Oxley Head	Dive 2 in deep crevice. Low lying.
14	*Aplidium punctum*	Oxley Head	AMB - Dive 1.
15	*Stryphnus ponderosus*	Oxley Head	Dive 2.
16	*Phorbas dives*	Oxley Head	Yellow crust. *Balanus crenatus* also present. Sponge spicule pictures taken.
17	*Pachymatisma johnstonia*	Oxley Head	
18	*Chartella papyracea*	Oxley Head	
19	*Dysidea fragilis*	Oxley Head	
20	*Aglaophenia pluma*	Oxley Head	Very small and growing within small clumps of *Chartella papyracea*.
21	*Distomus variolosus*	Oxley Head	Very small but gonads aligned so think just very juv end of spectrum, and damaged.
22	*Polycarpa scuba*	Oxley Head	Dug out of crevices in rock. AMB Dive 1, mostly red.

Ref No.	Species	Cave Site	Notes
23	*Schizomavella* sp.	Oxley Head	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate. This particular species is most like *S.teresae* but have left it at the level of genus. Dive1, AMB, picture taken, pink.
24	*Plumularia setacea*	Oxley Head	
25	*Tubularia indivisa*	Oxley Head	Dive 2.
26	*Chartella papyracea*	Oxley Head	
27	*Diplosoma listerianum*	Watcombe 2	Bag AO4. Used 2 lateral ampullae, and 3 adhesive papillae to aid identification.
28	*Leuconia nivea*	Watcombe 2	Pic Ref Bag AB7.
29	*Halichondria panicea*	Watcombe 2	Pic Ref Bag BO5.
30	*Terpios gelatinosa*	Watcombe 2	Pic Ref Bag MX2.
31	*Polycarpa scuba*	Watcombe 2	Pic Ref Bag AB6. See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features.
32	*Pseudopotamilla reniformis*	Watcombe 2	Pic Ref Bag AB6 - lots within rock.
33	*Halichondria* (= *bowerbanki*)	Watcombe 2	Pic Ref Bag AB6.
34	*Pachymatisma johnstonia*	Watcombe 2	Pic Ref Bag BO4.
35	*Leuconia nivea*	Watcombe 2	Pic Ref Bag AX6.
36	*Pachymatisma johnstonia*	Watcombe 2	Pic Ref Bag AX6.
37	*Haliclona* sp.	Silty No.2	Pics BMB 3873/4/5.
38	*Myxilla incrustans*	Watcombe 3	Pic Ref Bag MX1. Spicule pictures taken.
39	*Eurypon major*	Watcombe 3	Pic Ref Bag BO2.
40	*Polycarpa scuba*	Silty No.2	See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features.
41	*Schizomavella linearis*	Watcombe 3	Pic Ref Bag BO8. Pink.
42	*Leuconia nivea*	Watcombe 3	Pic Ref Bag AO6. Spicule pictures taken.
43	*Stelligera* (= *stuposa*)	Watcombe 3	Pic Ref Bag A10.
44	*Pseudopotamilla reniformis*	Silty No.2	Rolled up worm tubes.
45	Microcionidae (*Clathria armata*)	Silty No.2	BMB images 3845/6/7
46	PORIFERA	Silty No.2	Refs 1, 7, 46 all the same species. Spicule pictures taken. Noted as greenish in the field. BMB pics 3548/49/50.

Ref No.	Species	Cave Site	Notes
47	*Sabellaria spinulosa*	Watcombe 3	From Sample A10
48	*Mycale* sp. and *Microciona* sp.	Watcombe 3	From Sample A10. Two thin mixed crusts on the rock, imposs to separate.
49	*Polycarpa scuba*	Watcombe 3	From Sample A10. Features not clear, would believe *P. pomaria* from initial look but left at default position. See Appendix ?? Re Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features.
50	Microcionidae (*Clathria* = *atrasanguinea*)	Silty No.2	BMB Images 3851/2/3.
51	*Pseudopotamilla reniformis*	Silty No.2	
52	*Haliclona* (= *rosea*)	Silty No.2	BMB Images 3866/7/8.
53	*Haliclona simulans*	Watcombe 2	BMB Images 3808/9.
54	*Pachymatisma johnstonia*	Watcombe 2	
55	*Leuconia nivea*	Watcombe 2	BMB Images 3817/18/20.
56	*Haliclona* (= *rosea*)	Watcombe 2	BMB Images 3821/2/3. Images not classic *H.rosea* hence (=).
57	*Schizomavella linearis*	Watcombe 2	
58	*Phorbas dives*	Watcombe 2	BMB Images 3825/6.
59	*Amphilectus fucorum*	Watcombe 2	BMB Images 3830/33. Other sponge present but not possible to separate.
60	*Leuconia nivea*	Watcombe 2	Other species in pot listed on site sheet.
61	*Sertularella gaudichaudi*	Compass	Other species in pot listed on site sheet.
62	Microcionidae (*Antho inconstans*)	Compass	BMB Images 3900/01.
63	*Diplosoma listerianum*	London Bridge	Pic Ref Bag AB7. Used 2 lateral ampullae, and 3 adhesive papillae to aid identification.
64	*Halichondria bowerbanki*	Compass	
65	*Myxilla rosacea* agg.	Compass	BMB Images 3893/94. See Appendix III, Species Recording Methods. Combined *Myxilla rosacea* and *Myxilla* cf. *rosacea* into *M.rosacea* agg.
66	*Pseudopotamilla reniformis*	London Bridge	Pic Ref Bag AO3.
67	*Dercitus bucklandi*	London Bridge	Pic Ref Bag AO3.
68	*Corella eumyota*	London Bridge	Pic Ref Bag BO2.
69	*Sertularella gaudichaudi*	London Bridge	Pic Ref Bag AO4.
70	*Balanus crenatus*	London Bridge	
71	*Leuconia nivea*	London Bridge	
72	*Didemnum maculosum*	London Bridge	

Ref No.	Species	Cave Site	Notes
73	*Distomus variolosus*	London Bridge	
74	*Botrylloides leachi*	London Bridge	
75	*Hymeniacidon perleve*	London Bridge	
76	*Turbicellepora avicularis*	London Bridge	
77	*Polycarpa scuba*	London Bridge	Lots in general turf. See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features. This one appears a more classic *P.scuba.*
78	*Pseudopotamilla reniformis*	London Bridge	
79	*Hiatella rugosa*	London Bridge	
80	*Polycarpa scuba*	Orestone	Features not clear, would believe *P. pomaria* from initial look but left at default position. See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features.
81	*Stelletta grubii*	Orestone	
82	*Stelletta grubii*	Orestone	BMB Images 3948/49.
83	*Myxilla rosacea* agg.	Orestone	See Appendix III, Species Recording Methods. Combined *Myxilla rosacea* and *Myxilla* cf. *rosacea* into *M.rosacea* agg.
84	*Stelletta grubii*	Orestone	
85	*Stelletta grubii*	Orestone	
86	*Caryophyllia smithii*	Garfish	Pic Ref Bag AB7. More confident with ID as used structure of columella consisting of a series of twisted ribbons.
87	*Ascidia conchilega*	Garfish	Pic Ref Bag AO3.
88	*Disporella hispida*	Garfish	Pic Ref Bag BO5.
89	*Dysidea fragilis*	Garfish	Pic Ref Bag AB1.
90	*Diplosoma* (= *spongiforme*)	Orestone	BMB 3957/58/59.
91	*Schizomavella* sp.	Garfish	Pic Ref Bag AB7. This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate. This particular species is most like *S.sarniensis.*

Ref No.	Species	Cave Site	Notes
92	*Schizomavella* sp.	Orestone	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate. This particular species is most like *S.teresae.* Red crust.
93	*Phorbas dives*	Garfish	Pic Ref Bag AO6.
94	*Perophora listeri*	Garfish	Pic Ref Bag AO6.
95	*Haliclona simulans*	Orestone	
96	*Ascidia conchilega*	Garfish	Pic Ref Bag BO2.
97	*Tubularia indivisa* with *Jassa falcata* turf	Orestone	
98	Obeliinae	Orestone	
99	*Scrupocellaria scrupea*	Garfish	
100	*Tubularia indivisa*	Double Decker / Crab Cave Complex	
101	*Phorbas dives*	Double Decker / Crab Cave Complex	
102	*Polycarpa scuba*	Double Decker / Crab Cave Complex	See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features. This one externally looks like the *P. pomaria* but internals inconclusive so have left at *P.scuba* for consistency. But note is one of the white tipped variety with thicker test.
103	*Amphilectus fucorum*	Double Decker / Crab Cave Complex	
104	*Bugula plumosa* and *Chartella papyracea*	Double Decker / Crab Cave Complex	
105	*Polycarpa scuba*	Double Decker / Crab Cave Complex	See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features. This one externally looks like the *P. pomaria* but internals inconclusive so have left at *P.scuba* for consistency. But note is one of the white tipped variety with thicker test.
106	*Stryphnus ponderosus*	Double Decker / Crab Cave Complex	
107	Obeliinae	Cuttlefish	
108	*Phorbas dives*	Cuttlefish	BMB Images 3917/18.
109	*Corella eumyota*	Durl Head	BMB Images 3963/64.
110	*Stryphnus ponderosus*	Durl Head	BMB Images 3972/73.

Ref No.	Species	Cave Site	Notes
111	*Stryphnus ponderosus*	Durl Head	BMB Images 3979/81.
112	*Clathrina coriacea* agg.	Durl Head	Listed as 'agg' due to spicule sizes being over a wider range than listed for *C.coriacea.*
113	*Leuconia nivea*	Durl Head	
114	*Pachymatisma johnstonia*	Slater	
115	*Stryphnus ponderosus*	Durl Head	BMB images 3983/84/8
116	*Haliclona simulans*	Slater	Pic Ref Bag AO6.
117	*Clathria (Microciona) = atrasanguinea*	Slater	Pic Ref Bag A12.
118	*Clathrina coriacea* agg.	Slater	Pic Ref Bag AB1.'Listed as 'agg' due to spicule sizes being over a wider range than listed for *C.coriacea.*
119	*Halichondria panicea*	Slater	Pic Ref Bag AB8.
120	*Clathrina coriacea* agg.	Slater	Pic Ref Bag AB7.
121	*Schizoporella unicornis*	Slater	Pic Ref Bag BO2.
122	*Clathrina coriacea* agg.	Slater	Pic Ref Bag AX6.
123	*Stryphnus ponderosus*	Slater	Pic Ref Bag AX6. As Ref 134.
124	*Stryphnus ponderosus*	Slater	Pic Ref Bag AX6.
125	*Dercitus bucklandi*	Slater	Pic Ref Bag BO6.
126	*Dendrodoa grossularia*	Slater	Pic Ref Bag BO6.
127	*Stelletta grubii*	Hidden Cleft	Pic Ref Bag AO1.
128	*Stelletta grubii*	Hidden Cleft	Pic Ref Bag BO1.
129	*Stryphnus ponderosus*	Hidden Cleft	Pic Ref Bag AO5.
130	*Leuconia nivea*	Orestone	BMB 4003/01? - unreliable image labelling. Ignore.
131	*Stelletta grubii*	Hidden Cleft	Pic Ref Bag LM2. Note lots of small oxeas. Spicule pics taken.
132	*Aplysilla sulfurea*	Hidden Cleft	Pic Ref Bag BO5. Went black in alcohol, yellow live, no spicules. Unusual blackening.
133	*Aglaophenia pluma*	Orestone	
134	*Stryphnus ponderosus*	Hidden Cleft	Pic Ref Bag AO3.
135	*Eurypon major*	Hidden Cleft	Pic Ref Bag LM3.
136	*Clathrina coriacea* agg.	Orestone	
137	*Ascidia conchilega*	Hidden Cleft	Picture only AMB 2820.
138	*Pachymatisma johnstonia*	Orestone	
139	*Stryphnus ponderosus*	Orestone	Three pieces of sponge in pot, 2 were *S.ponderosus,* 1 *Stelletta grubii* (now ref

Ref No.	Species	Cave Site	Notes
			159).
140	*Crisia denticulata*	Hidden Cleft	
141	*Schizomavella* sp.	Hidden Cleft	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate.
142	*Haliclona simulans*	Hidden Cleft	
143	Styelidae	Hidden Cleft	
144	*Mytilus edulis*	Orestone	
145	*Schizomavella* sp.	Orestone	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate.
146	*Plumularia setacea*	Orestone	On mussel from Ref 144.
147	*Jassa falcata*	Orestone	Tube mass on mussel from Ref 144.
148	*Sidnyum*(= *elegans*)	Orestone	Triple languet, lots stomach folds, 8 lobed, but image does not reflect this. From Ref 80.
149	*Diplosoma listerianum/spongiforme*	Orestone	From Ref 80. Distinction not clear.
150	*Amphipholis squamata*	Orestone	From Ref 97.
151	*Polycarpa scuba*	Double Decker / Crab Cave Complex	From turf Ref 104. used default position. See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features. This one externally looks like the *P. pomaria* but internals inconclusive so have left at *P.scuba* for consistency.
152	*Scuparia chelata*	Double Decker / Crab Cave Complex	From turf Ref 104.
153	*Eudendrium album/capillare*	Double Decker / Crab Cave Complex	From turf Ref 104.
154	*Crisidia cornuta*	Orestone	From turf Ref 85.
155	*Myxilla rosacea* agg.	Double Decker / Crab Cave Complex	Yellow. From Ref 106. See Appendix III, Species Recording Methods. Combined *Myxilla rosacea* and *Myxilla cf. rosacea* into *Myxilla rosacea* agg. This one seems more classically *M.rosacea*.

Ref No.	Species	Cave Site	Notes
156	Corynidae	Hidden Cleft	From Ref 140.
157	Obeliinae	Oxley Head	From Ref 25.
158	*Schizomavella cuspidata*	Oxley Head	Taken from Ref 25. Used trifoliation so have left at *S.cuspidata* despite issues with the split as noted for other *Schizomavella* species in this project. I.e., in other areas have written, part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate.
159	*Stelletta grubii*	Orestone	Taken from sponge Ref 139.
160	*Crisia aculeata*	London Bridge	From Ref 78.
161	*Polycarpa scuba*	Watcombe 2	Taken from Ref 57.
162	*Celleporina hassellii*	Watcombe 2	From ref pot 60.
163	*Polycarpa scuba*	Watcombe 2	From ref pot 60. Default position. See Appendix III, Species Recording Methods. Confusion with *P.pomaria* within taxonomy. Variability present in internal features. This one externally looks like the *P. pomaria* but internals inconclusive so have left at *P.scuba* for consistency.
164	*Diplosoma listerianum/spongiforme*	Watcombe 2	From Ref 60. Distinction not clear.
165	Edwardsiidae	Watcombe 2	From Ref 60.
166	*Sabellaria spinulosa*	Watcombe 2	From Ref 60.
167	*Myxilla rosacea* agg.	Watcombe 2	See Appendix III, Species Recording Methods. Combined *Myxilla rosacea* and *Myxilla* cf. *rosacea* into *Myxilla rosacea* agg.
168	*Clathria (Microciona) = atrasanguinea*	Watcombe 2	
169	*Amphilectus fucorum*	Cuttlefish	From Ref 107.
170	*Schizomavella hastata*	Cuttlefish	From Ref 107.
171	*Schizomavella hastata*	Cuttlefish	
172	*Halichondria* (= *bowerbanki*)	Cuttlefish	
173	*Didemnum listerianum/spongiforme*	Cuttlefish	

Ref No.	Species	Cave Site	Notes
174	*Schizomavella* sp.	Cuttlefish	This sample is part of the confusion within the split for *S.sarniensis/cuspidata/teresae*. Features too interchangeable and variable descriptions. Also overall look implies one species with features not backing up investigation. Have left at raised level with various notes within the reference collection raw data to imply the species that appears the most likely if appropriate. This appears most like *S.sarniensis.*
175	*Corynactis viridis*	Double Decker / Crab Cave Complex	From Ref 100.
176	Plumulariidae	Double Decker / Crab Cave Complex	
177	*Clytia hemisphaerica*	Double Decker / Crab Cave Complex	
178	*Eudendrium* (= *capillare*)	Double Decker / Crab Cave Complex	
179	*Cancer pagurus*	Double Decker / Crab Cave Complex	
180	*Hiatella rugosa*	Cuttlefish	
181	*Lembos websteri*	Double Decker / Crab Cave Complex	
182	*Jassa falcata*	Double Decker / Crab Cave Complex	
183	*Scrupocellaria reptans*	Orestone	From Ref 133.
184	*Crisidia cornuta*	Orestone	From Ref 133.
185	*Amphipholis squamata*	Orestone	From Ref 133.
186	*Halichondria* (= *bowerbanki*)	Orestone	From Ref 133.
187	*Dysidea fragilis*	Oxley Head	From Ref 009.
188	Polyclinidae (*Aplidium* sp.)	Double Decker / Crab Cave Complex	Note used to be *Sidnyum* sp. Too retracted, can't tease out zooids.
189	*Morchellium argus*	Double Decker / Crab Cave Complex	Tiny cluster of zooids, used stomach swellings.
190	*Diplosoma* (= *spongiforme*)	Double Decker / Crab Cave Complex	

Compass Cave

Species List ground-truthed and merged from Field Logs, Samples and Video / Stills Image Analysis

Habitat 1	
Aplysilla rosea	R
Aplysilla sulfurea	R
Ascidia mentula	R
Balanus crenatus	P
Bispira volutacornis	R
BRYOZOA crusts	O
Cancer pagurus	R
Caryophyllia inornata	P
Caryophyllia smithii	F
Cliona spp. agg.	F
Corallinaceae	P
Corynactis viridis	F
Ctenolabrus rupestris	O
Dendrodoa grossularia	O
Dercitus bucklandi	O
Didemnum maculosum	P
Diplosoma listerianum/spongiforme	O
Dysidea fragilis	R
Galathea strigosa	O
Halichondria sp.	F
Haliclona simulans	F
Halopteris sp.?	P
HYDROZOA/BRYOZOA low turf	A
Leuconia nivea	R
Leucosolenia sp.	R
Lissoclinum perforatum	R
Hiatella sp. (poss. other borers present)	C
Mytilus edulis	F
Myxilla rosacea agg.	R
Necora puber	O
Pachymatisma johnstonia	F
Palaemon serratus	O
Parablennius gattorugine	R
Perophora listeri	P
Phoronis hippocrepia	P
Plumularia setacea	R
Polycarpa (= *scuba*)	F
PORIFERA crusts	C
Pseudopotamilla reniformis	P
Rocellaria dubia	P
Sabellaria spinulosa	R
Sagartia sp.	R
Schizomavella sp.	O
Serpulidae	P
Sertularella gaudichaudi	P
Terpios gelatinosa	R
Thorogobius ephippiatus	R
Trisopterus minutus	R
Verruca stroemia	P

Habitat 2/Cave Floor	
Balanus crenatus	C
BRYOZOA crusts	P
Cliona spp. agg.	O
Ctenolabrus rupestris	R
Diplosoma listerianum/spongiforme	O
HYDROZOA/BRYOZOA low turf	F
Mytilus edulis	F
Palaemon serratus	R
Polycarpa scuba	R
PORIFERA crusts	P
Sidnyum elegans	R
Terpios gelatinosa	R
Verruca stroemia	P

Species from Samples	Ref Collec No.
Cliona spp. agg.	From Sample 61
Corynactis viridis	From Sample 61
Halichondria bowerbanki	64
Microcionidae (*Antho inconstans*)	62
Myxilla rosacea agg.	65
Plumularia setacea	From Sample 61
Sertularella gaudichaudi	61

SACFOR rating given where possible, left at P where more appropriate

Cuttlefish Cave

Species List ground-truthed and merged from Field Logs, Samples and Video / Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Amphilectus fucorum	O
Aplysilla sulfurea	R
Balanus crenatus	P
BRYOZOA crusts	F
Cancer pagurus	F
Caryophyllia inornata	P
Caryophyllia smithii	R
CIRRIPEDIA	O
Cliona spp. agg.	C
Corynactis viridis	O
Ctenolabrus rupestris	R
Polycarpa scuba	F
Dercitus bucklandi	O
Didemnidae	P
Diplosoma listerianum/spongiforme	F
Dysidea fragilis	R
Epizoanthus couchii	P
Flabellina pedata	P
Hiatella sp. (poss. other borers present)	A
HYDROZOA/BRYOZOA low turf	C
Lissoclinum perforatum	R
Mytilus edulis	O
Myxilla rosacea	R
Necora puber	R
Obelia/Laomedea sp.	O
Pachymatisma johnstonia	R
Palaemon serratus	R
Parablennius gattorugine	R
Perophora listeri	R
Phoronis hippocrepia	R
Plumulariidae	P
Polychaeta tubes	O
PORIFERA crusts	F
Pseudopotamilla reniformis	P
Schizomavella spp.	P
Scrupocellaria sp.	P
Serpulidae	R
Spirobranchus sp.	O
Sycon ciliatum	P
Taurulus bubaris	R
Verruca stroemia	P

Habitat 2	
Anomiidae	R
CIRRIPEDIA	O
Diplosoma listerianum/spongiforme	R
Hiatella sp. (poss. other borers present)	R
HYDROZOA/BRYOZOA low turf	O
PORIFERA crusts	R
Spirobranchus sp.	C

Habitat 3	
Corallinaceae	P
Thorogobius ephippiatus	R

Species from Samples	Ref Collec No.
Amphilectus fucorum	169
Balanus crenatus	From Sample 174
Bugula plumosa	
Campanularia hincksii	
Cliona spp. agg.	
Didemnum listerianum/spongiforme	173
Halichondria (= *bowerbanki*)	172
Hiatella rugosa	180
Myxilla rosacea	
Obeliinae	107
Schizomavella hastata	170
Schizomavella hastata	171
Schizomavella sp.	174
Spirobranchus sp.	
Verruca stroemia	

Double Decker/Crab Cave Complex
Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis
SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Alcyonium digitatum	F
Amphilectus fucorum	O
Amphipod tube mass (*Jassa falcata*)	P
Aplidium punctum/Morchellium argus	R
BRYOZOA crusts	O
Bugula plumosa	O
Caryophyllia smithii	P
Caryophyllia sp.	P
Chartella papyracea	F
CIRRIPEDIA	R
Clavelina lepadiformis	R
Cliona spp. agg.	P
Cliona celata	O
Corynactis viridis	O-F
Dercitus bucklandi	O
Diplosoma listerianum/spongiforme	O
Diplosoma (= *spongiforme*)	P
Distomus variolosus	R
Dysidea fragilis	R
Flabellina pedata	P
Hiatella sp.	F
Hommarus gammarus	P
HYDROZOA/BRYOZOA low turf	S
Lissoclinum perforatum	R
Morchellium argus	R
Mytilus edulis	O
Pachymatisma johnstonia	O-F
Parablennius gattorugine	P
Phoronis hippocrepia	R
Plumulariidae	O
Polycarpa scuba	O
Polycarpa scuba - white tip	C
Polyclinidae	P
Polyclinidae (*Aplidium* sp.)	P
PORIFERA crusts	F
RHODOPHYCOTA	O
Sabellida (Serpulidae/Sabellidae)	P
Sagartia sp.	R
Scrupocellaria scruposa	P
Sidnyum elegans	R
Sycon ciliatum	P
Tubularia indivisa	C

Habitat 2	
BRYOZOA crusts	R
CIRRIPEDIA	P
Cliona celata	R
Mytilus edulis	A
Polycarpa scuba (white tipped)	P
Tubularia indivisa	R
HYDROZOA/BRYOZOA low turf	R

Species from Samples	Ref Collec No.	
Amphilectus fucorum	103	From Sample 100
Bugula plumosa	104	
Campanularia hincksii		From Sample 104
Campanularia hincksii		From Sample 100
Cancer pagurus	179	From Sample 100
Chartella papyracea		From Sample 104
Chartella papyracea		From Sample 100
Cliona spp. agg.		From Sample 104
Clytia hemisphaerica	177	From Sample 100
Corynactis viridis	175	From Sample 100
Crisia sp.		From Sample 100
Diphasia sp.		From Sample 104
Diplosoma (= *spongiforme*)	190	From Sample 105
Electra pilosa		From Sample 100
Eudendrium (= *capillare*)	178	From Sample 100
Eudendrium album/capillare	153	From Sample 104
Haliclona sp.		From Sample 100
Jassa falacata		From Sample 104
Jassa falcata	182	From Sample 100
Lembos websteri	181	From Sample 100
Morchellium argus	189	From Sample 102
Mytilus edulis		From Sample 100
Myxilla rosacea	155	From Sample 106
Phorbas dives	101	From Sample 100
Pisidia longicornis		From Sample 100
Plumulariidae	176	From Sample 100
Polycarpa scuba	102	
Polycarpa scuba	151	From Sample 104
Polycarpa scuba (white tipped)	105	
Polyclinidae (*Aplidium* sp.)	188	From Sample 102
Pseudopotamilla reniformis		From Sample 104
Schizomavella (= *teresae*)		From Sample 100
Scrupocellaria scruposa		From Sample 104
Scuparia chelata	152	From Sample 104
Stryphnus ponderosus	106	
Tubularia indivisa	100	
Verruca stroemia		From Sample 100

Durl Head Cave

Species List ground-truthed and merged from Field Logs, Samples and Video / Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1 and 2 combined due to close mosaicing		Habitat No. suggestion
Balanus crenatus	P	
BRYOZOA crusts	R	
CIRRIPEDIA	P	
Clathrina coriacea agg.	R	
Corella eumyota	R	Hab 2
Dendrodoa grossularia	C	
Dercitus bucklandi	R	Hab 1
Didemnidae	O	Hab 1/2
Didemnum maculosum	O	Hab 1
Diplosoma listerianum/spongiforme	O	Hab 2
Hiatella sp. (poss. other borers present)	F	Hab 2
HYDROZOA/BRYOZOA low turf (meadow)	P	
Leuconia nivea	O	Hab 1
Lissoclinum perforatum	R	Hab 1/2
Molgula sp.?	?	
Morchellium argus	R	Hab 2
Necora puber	O	
OPHIUROIDEA	P	
Palaemon serratus	P	
Polycarpa scuba	R	Hab 2
Polyclinidae	P	
PORIFERA crusts	O	
PORIFERA crusts (white - *Stryphnus/Leuconia*)	O	
Sagartia elegans	P	Hab 1/2
Sagartia elegans (=rosea)	P	Hab 1/2
Sagartia elegans (=venusta)	P	Hab 1/2
Sagartia sp.	F	
Spirobranchus sp.	R	
Spirorbidae	F	Hab 1
Stryphnus ponderosus	P	Hab 1
TEREBELLIDA	P	Hab 1/2
Terpios gelatinosa	R	Hab 1/2
Tethya citrina	O	
Urticina sp.	P	

Species from Samples	Ref Collec No.
Clathrina coriacea agg.	112
Corella eumyota	109
Leuconia nivea	113
Stryphnus ponderosus	110
Stryphnus ponderosus	111
Stryphnus ponderosus	115

Garfish Cave

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
BRYOZOA crusts	R
CIRRIPEDIA	A
Galathea strigosa	F
Hiatella sp. (poss. other borers present)	A
HYDROZOA/BRYOZOA low turf	R
Polycarpa scuba (white tipped)	R
Polychaeta (*Pseudopotamilla reniformis*)	P
PORIFERA crusts	O
Spirobranchus sp.	O
Spirorbinae	C
Verruca stroemia	P

Species from Samples	Ref Collec No.
Ascidia conchilega	96
Ascidia conchilega	87
Beania mirabilis	From Sample 94
Caryophyllia smithii	86
Clytia hemisphaerica	From Sample 94
Clytia hemisphaerica	From Sample 99
Crisia aculeata	From Sample 94
Disporella hispida	88
Dysidea fragilis	89
Perophora listeri	94
Phorbas dives	93
Schizomavella sp.	91
Scrupocellaria scrupea	99
Scuparia chelata	From Sample 99
*Hoplangia durotrix**	P

*The species noted above is highlighted by the report by Proctor from 2009. The specific area itself was not surveyed but as this is a nationally rare species, it is noted here as a target feature of the outer roof area of the cave.

Habitat 2	
Aplysilla sulfurea	R
Ascidia conchilega	O
ASCIDIACEA (solitary)	R
Asterias rubens	O
BRYOZOA crusts	O
Cancer pagurus	O
Caryophyllia smithii	O
Caryophyllia sp.	O
CIRRIPEDIA	P
Cliona spp. agg.	O
Dercitus bucklandi	O
Didemnidae	P
Disporella hispida	R
Dysidea fragilis	R
Haliclona sp.	R
Hiatella sp. (poss. other borers present)	F
HYDROZOA/BRYOZOA low turf	C
Lissoclinum perforatum	R
Necora puber	F
Palaemon serratus	O
Parablennius gattorugine	O
PECTINACEA ?*Chlamys* sp.	R
Perophora listeri	P
Phorbas dives	O
Phoronis hippocrepia	R
Polycarpa scuba	R
Polycarpa scuba (white tipped)	P
Polychaeta (*Pseudopotamilla reniformis*)	P
PORIFERA crusts	F
Serpulidae	P
Sidnyum elegans	R
Spirobranchus sp.	O
Spirorbinae	P
Terpios gelatinosa	R
Verruca stroemia	P

Hidden Cleft Cave

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitats combined due to complex mosaicing within the cave, making clear separation particularly difficult.

Habitat 1, 2 and 3 combined	
Aplysilla rosea	R
Aplysilla sulfurea	R
Ascidia conchilega	R
Bispira volutacornis	O
BRYOZOA crusts	O
Caryophyllia inornata	P
Caryophyllia smithii	F
CIRRIPEDIA	O
Corynactis viridis	O
Crisia denticulata	O
Crisidia cornuta	P
Crisiidae turf	O
Dendrodoa grossularia	P
Dercitus bucklandi	C
Disporella hispida	P
Dysidea fragilis	O
Eurypon major	R
Galathea strigosa	C
Haliclona simulans	O
Hiatella sp. (poss. other borers present)	F
HYDROZOA/BRYOZOA low turf	C
Inachinae	R
Myxilla sp.	O
Necora puber	P
Oscarella lobularis	R
Pachymatisma johnstonia	O
Palaemon serratus	P
Parablennius gattorugine	R
Perophora listeri	P
Polycarpa scuba	O
PORIFERA crusts	F
Pseudopotamilla reniformis	P
Serpulidae	P
Sidnyum elegans	R
Spirobranchus sp.	O
Spirorbinae	P
Stelletta grubii	O
Stryphnus ponderosus	O
Terpios gelatinosa	R
Tubularia indivisa	O

Species from Samples	Ref Collec No.
Aplysilla sulfurea	132
Ascidia conchilega	137
Corynidae	156
Crisia denticulata	140
Crisidia cornuta	From Sample 140
Eurypon major	135
Halichondria bowerbanki	From Sample 140
Haliclona simulans	142
Schizomavella sp.	141
Stelletta grubii	128
Stryphnus ponderosus	134
Tubularia indivisa	From Sample 140
Styelidae	143

London Bridge Cave
Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis
SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
ACTINIARIA	P
BRYOZOA crust	O
CIRRIPEDIA	P
Clathrina coriacea agg.	R
Cliona spp. agg.	P
Corynactis viridis	R
Crisia aculeata	P
Dercitus bucklandi	O
Didemnidae	R
Didemnum maculosum	R
Diplosoma (= *listerianum*)	O
Distomus variolosus	O
Dysidea fragilis	R
Epizoanthus couchii?	R
Halichondria bowerbanki	P
Haliclona simulans	O
Hiatella rugosa (sampled)	P
Hiatella sp. (poss. other borers present)	A
HYDROZOA/BRYOZOA turf	C
Hymeniacidon perleve	P
Leuconia nivea	O
Lissoclinum perforatum	O
Mytilus edulis	R
Oscarella lobularis?	P
Pachymatisma johnstonia	O
Polycarpa scuba	C
PORIFERA - orange crust	P
PORIFERA - yellow crust	O
Pseudopotamilla reniformis	P
Sagartia (= *troglodytes*)	F
Sargartia sp.	F
Serpulidae	P
Sertularella gaudichaudi	O
Sidnyum elegans	P

Habitat 3	
Floor of Cave	
Gobiidae	P
Callionymidae	P
Lower scoured walls	
CIRRIPEDIA spat	S
Diplosoma (= *listerianum*)	R
Mytilis edulis	P
Spirobranchus sp.	R

Habitat 2	
Aglaophenia sp. ?	P
Alcyonium digitatum	R
Aplidium punctum	R
Ascidiacea - (Large - *Corella/Ascidia/Ascidiella*)	P
Asterias rubens	R
BRYOZOA crust	O
CIRRIPEDIA	P
Cliona spp. agg.	O
Corella eumyota	R
Corynactis viridis	O
Didemnum maculosum	R
Diplosoma (= *listerianum*)	R
Distomus variolosus	O
Edwardsiidae	P
Halichondria bowerbanki	O
Hiatella sp. (poss. other borers present)	C
HYDROZOA/BRYOZOA low turf	C
Leuconia nivea	R
Mytilis edulis	O with S patches
Phoronis hippocrepia	P
Plumularia setacea	P
Polycarpa scuba	O
Polyclinidae	R
PORIFERA crust	O
Pseudopotamilla reniformis	P
Sagartia (= *troglodytes*)	P
Sagartia elegans	P
Sagartia sp	C
Sagartiogeton undatus?	O
Serpulidae	P
Sidnyum elegans	R
Trivia monacha	R

Species from Samples	Ref Collec No.
Balanus crenatus	70
Botrylloides leachi	74
Clytia hemisphaerica	From Sample 70
Corella eumyota	68
Crisia aculeata	160
Dercitus bucklandi	67
Didemnum maculosum	From Sample 77
Diplosoma listerianum	63
Distomus variolosus	73
Hiatella rugosa	79
Hymeniacidon perleve	75
Leuconia nivea	71
Mytilus edulis	
Polycarpa scuba	77
Pseudopotamilla reniformis	66
Pseudopotamilla reniformis	78
Sertularella gaudichaudi	69
Turbicellepora avicularis	76

Ore Stone Cave

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Hab 1	
Actinothoe sphyrodeta	O
Aglaophenia pluma	F
Alcyonium digitatum	C
Amphilectus fucorum	O
Amphipholis squamata	P
Amphipod tube mass -(*Jassa falcata*)	P
Ascidia conchilega?	R
Asterias rubens	O
Balanus sp.	P
Bicellariella ciliata	P
BRYOZOA crust	O
Bugula sp.	P
Cancer pagurus	F
Caprellidae	P
Caryophyllia smithii	R
Chaetopterus variopedatus	R
Chartella papyracea	F
Clathrina coriacea agg.	R
Cliona celata	O
Cliona spp. agg.	F
Corynactis viridis	F
Crisiidae	R
Ctenolabrus rupestris	R
Dendrodoa grossularia	R
Dercitus bucklandi	F
Didemnidae	O
Didemnum maculosum	R
Diplosoma (= *spongiforme*)	R
Diplosoma listerianum	R
Doto sp.	R
Dysidea fragilis	O
Galathea strigosa	R
Grantia compressa	P
Halichondria (= *bowerbanki*)	R
Halichondria panicea	O
Haliclona simulans	R
Haliclona viscosa	R
Halopteris sp.	P
Hiatella sp. (poss. other borers present)	F
HYDROZOA/BRYOZOA low turf	C
Obeliinae ?	P

Hab 1	
Leuconia nivea	R
Lissoclinum perforatum	R
Maja brachydactyla	O
Morchellium argus	R
Mytilis edulis	F
Myxilla rosacea agg.	O
Necora puber	O
Ophiothrix fragilis	P
Pachymatisma johnstonia	O
Palaemon serratus	R
Parablennius gattorugine	R
Plumularia setacea	O
Polycarpa scuba	O
Polycarpa scuba (white tips)	O
Polychaeta tubes	P
PORIFERA crusts	C
Pseudopotomilla reniformis	P
Sagartia elegans	R
Schizomavella linearis	P
Schizomavella sp.	O
Scrupocellaria spp.	P
Serpulidae	R
Sertularella gaudichaudi	P
Sidnyum elegans	R
Sidnyum turbinatum	P
Spirobranchus sp.	R
Stelletta grubii	F
Stryphnus ponderosus	R
Sycon ciliatum	P
Taurulus bubaris	R
Terebellidae	R
Tethya citrina	R
Trisopterus minutus	R
Tubularia indivisa	O
Verruca stroemia	P
Zeugopterus punctatus	R

Ore Stone Cave

Hab 2	
Actinothoe sphyrodeta	F
Alcyonium digitatum	O
Amphipholis squamata	P
Amphipholis squamata	P
Amphipod tube mass - (*Jassa falcata*)	P
Asterias rubens	O
Balanus crenatus	O
BRYOZOA crust	R
Cancer pagurus	R
Cerianthus loydii	R
Cliona celata	R
Cliona spp. agg.	F
Corynactis viridis	O
Ctenolabrus rupestris	R
Diadumene cincta	P
Didemnidae	R
Edwardsiella carnea?	P
Halichondria bowerbanki	R
Halichondria panicea	R
Hiatella sp. (poss. other borers present)	O
HYDROZOA/BRYOZOA low turf	F
Leuconia nivea	R
Lissoclinum perforatum	R
Morchellium argus	R
Mytilus edulis	S
Myxilla rosacea agg.	O
Necora puber	R
Pachymatisma johnstonia	R
Palaemon serratus	R
Plumularia setacea	O
Polycarpa scuba	R
PORIFERA crusts	F
Sagartia elegans	P
Sagartia elegans var *miniata*	P
Sagartia elegans var *rosea*	P
Sagartia sp.	C
Sagartia troglodytes	P
Spirorbinae	R
Sycon ciliatum	P
Tubularia indivisa	O

Species from Samples	Ref Collec No.
Aglaophenia pluma	133
Amphilectus fucorum	From Sample 97
Amphipholis squamata	150, 185, and sample 85
Bicellariella ciliata	From Sample 81, 97
Chartella papyracea	From Sample 81, 85
Clytia hemisphaerica	From Sample 97
Corynactis viridis	From Sample 85
Crisidia cornuta	154
Crisidia cornuta	184
Diplosoma (= *spongiforme*)	90
Diplosoma listerianum/spongiforme	149
Halichondria (= *bowerbanki*)	186
Haliclona simulans	95
Jassa falcata	147
Jassa falcata	From Sample 81, 97, 85, 133, 98
Leuconia nivea	130
Mytilus edulis	144
Myxilla rosacea agg.	83
Obelia sp.	From Sample 81
Obeliinae	From Sample 97
Obeliinae	98
Pachymatisma johnstonia	138
Plumularia setacea	146
Plumularia setacea	From Sample 81, 98
Polycarpa scuba/pomaria	80
Schizomavella sp.	92
Schizomavella sp.	145
Scrupocellaria reptans	183
Scrupocellaria scruposa	From Sample 85
Scuparia chelata	From Sample 85
Sertularella gaudichaudi	From Sample 98
Sidnyum elegans	148
Stelletta grubii	81, 82, 85, 159, 84
Stryphnus ponderosus	139
Tubularia indivisa	97

Oxley Head Cave

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Aglaophenia pluma	O
Alcyonium digitatum	O
Amphilectus fucorum	O
Aplidium punctum	R
ASCIDIACEA (colonial)	P
ASCIDIACEA (small solitary)	P
Bispira volutacornis	O
BRYOZOA crusts	F
Caprellidae	P
Caryophyllia inornata	O
Caryophyllia smithii	F
Caryophyllia sp.	O
Cellepora pumicosa	R
Chaetopterus variopedatus	P
Chartella papyracea	A
CIRRIPEDIA	C
Cliona spp.agg.	F
Clytia hemisphaerica	P
Corynactis viridis	F
Crisiidae	P
Dendrodoa grossularia	P
Dercitus bucklandi	F
Diplosoma listerianum	O
Distomus variolosus	O
Dysidea fragilis	O
Eudendrium sp.	P
Galathea strigosa	R
Gastrochoena dubia	P
Halichondria panicea	R
Haliclona simulans	R
Hemimycale columella	R
Hiatella sp. (poss. other borers present)	A
HYDROZOA/BRYOZOA low turf	A
Lissoclinum perforatum	R
Mytilus edulis	F
Necora puber	O
Nemertesia antennina	O
Oscarella lobularis	R
Pachymatisma johnstonia	F
Palaemon serratus	P
Perophora listeri	P
Phorbas plumosus	O
Plumularia setacea	O
Plumulariidae	P
Polycarpa scuba	P
Polycarpa sp.	F
Polychaeta tubes	R
PORIFERA crusts	C

Habitat 1 (cont.)	
RHODOPHYCOTA	R
SABELLIDA (Serpulidae/Sabellidae)	P
Schizomavella sp.	O
Scrupocellaria spp.	P
Sidnyum elegans	R
Spirobranchus sp.	P
Stryphnus ponderosus	R
Sycon ciliatum	P
Thymosia guernei	R
Trivia monacha	R
Tubularia indivisa	O
Verruca stroemia	P

Oxley Head Cave

Habitat 2	
Aplidium punctum	R
ASCIDIACEA (colonial)	P
ASCIDIACEA (small solitary)	P
BRYOZOA crusts	F
Cancer pagurus	O
Caryophyllia smithii	F
Caryophyllia sp.	O
Chartella papyracea	O
CIRRIPEDIA	O
Cliona spp. agg.	O
Cliona celata	R
Corynactis viridis	R
Ctenolabrus rupestris	R
Dendrodoa grossularia	P
Diplosoma listerianum	R
Distomus variolosus	O
Dysidea fragilis	R
Hiatella sp. (poss. other borers present)	F
HYDROZOA/BRYOZOA low turf	F
Lepophrys pholis	P
Mytilus edulis	S
Necora puber	F
Nemertesia antennina	O
Pachymatisma johnstonia	R
Palaemon serratus	P
Parablennius gattorugine	O
Phorbas plumosus	O
Plumulariidae	P
Polycarpa scuba	P
PORIFERA crusts	O
RHODOPHYCOTA	R
SABELLIDA (Serpulidae/Sabellidae)	P
Schizomavella sp.	O
Spirobranchus sp.	P
Taurulus bubalis	R
Trivia monacha	R
Tubularia indivisa	O
Verruca stroemia	P

Species from Samples	Ref Collec No.
Aglaophenia pluma	From Sample 26
Aglaophenia pluma	20
Amphipholis squamata	From Sample 26
Aplidium punctum	14
Balanus crenatus	From Sample 16
Campanularia hincksii	From Sample 25
Caryophyllia sp. (= *inornata*)	5
Chartella papyracea	From Sample 25
Chartella papyracea	26
Chlamys sp. and Suberitidae	4
Crisia sp.	From Sample 26
Diplosoma listerianum	2
Distomus variolosus	
Distomus variolosus	21
Dysidea fragilis	From Sample 25, and 26
Dysidea fragilis	19, 187
Eudendrium sp.	From Sample 25
Haliclona (= *rosea*)	9
Haliclona simulans	6
Lissoclinum perforatum	3
Microcionidae	11
Mytilus edulis	12
Mytilus edulis	From Sample 26
Obeliinae	157
Pachymatisma johnstonia	17
Phorbas dives	16
Phorbas plumosus	8
Pista cristata	From Sample 25
Plumularia setacea	24
Plumularia setacea	From Sample 25 and 26
Polycarpa scuba	On *Mytilus edulis*
Polycarpa scuba	22
PORIFERA sp.	1
PORIFERA sp.	7
Schizomavella cuspidata	158
Schizomavella sp.	10 and 23
Scrupocellaria reptans	From Sample 26
Scrupocellaria scrupea	From Sample 26
Sertularella gaudichaudi	From Sample 14 and 26
Stryphnus ponderosus	15
Stryphnus ponderosus	From Sample 25
Thymosia guernei	13
Tubularia indivisa	25
Verruca stroemia	On *Mytilus edulis*

Silty Cave No. 2

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Aplysilla rosea	R
ASCIDIACEA (small solitary)	R
Aurelia aurita	P
Balanus crenatus	O
Caryophyllia inornata	P
Caryophyllia smithii	O
Chlamys sp.	R
Clavelina lepadiformis	R
Cliona spp. agg.	O
Clytia hemisphaerica	P
Corallinaceae	R
Corynactis viridis	A
Distomus variolosus	O
Dysidea fragilis	O
HEXACORALLIA (?*Epizoanthus* sp,?,*Edwardsiella* sp.)	P
Hiatella sp. (poss. other borers present)	C
HYDROZOA/BRYOZOA low turf	O
Lissocliinum perforatum	R
Maja brachydactyla	O
Necora puber	F
Pachymatisma johnstonia	R
Phoronis hippocrepia	O
Pisidia longicornis	P
Polycarpa scuba	F
Polychaeta tubes	C
Polydora ciliata (meadow)	O
PORIFERA crust	C
Pseudopotamilla reniformis	P
RHODOPHYCOTA (*Schottera nicaeensis*)	O
SABELLIDA (Sabellidae/Serpulidae)	O
Sarcodictyon roseum	F
Spirobranchus sp.	P
Tritonia lineata	O

Species from Samples	Ref Collec No.
Polycarpa scuba	40
Pseudopotamilla reniformis	51
Campanularia hincksii	From Sample 51
Polycarpa pomaria	From Sample 51
Mycale sp.	From Sample 51
Pseudopotamilla reniformis	44
Haliclona (= *rosea*)	52
Haliclona sp.	37
PORIFERA sp.	46

Habitat 2 including *Polydora ciliata* biotope	
Pectinidae	R
Alcyonium digitatum	O
Aplysilla rosea	R
Ascidia mentula	R
ASCIDIACEA (small solitary)	
Aurelia aurita	P
Boscia anglica	R
Cancer pagurus	R
Caryophyllia inornata	R
Caryophyllia smithii	O
CIRRIPEDIA	O
Clavelina lepadiformis	R
Cliona spp. agg.	R
Corallinaceae	O
Corynactis viridis	O
Cottidae (*Taurulus bubalis*)	R
Dercitus bucklandi	O
Diplosoma listerianum	F
Dysidea fragilis	O
Gastrochaena dubia	O
Hiatella sp. (poss. other borers present)	C
HYDROZOA/BRYOZOA low turf	C
Lissoclinum perforatum	R
Necora puber	O
Pachymatisma johnstonia	F
Palaemon serratus	O
Parablennius gattorugine	R
Phoronis hippocrepia	P
Polycarpa scuba	C
Polydora ciliata (meadow)	F-A
Pomatoschistus pictus	R
PORIFERA crusts	A
Pseudopotamilla reniformis	P
SABELLIDA (Sabellidae/Serpulidae)	O
Sarcodictyon roseum	O
Schizomavella linearis	O
Serpulidae	F
Spirobranchus sp.	P
Trisopterus luscus	C
Tritonia lineata	P
Trivia monacha	R

Slater Cave

Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis

SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Balanus crenatus	P
Cancer pagurus	O
CIRRIPEDIA	O
Clathria (Microciona) = atrasanguinea	R
Clathrina coriacea agg.	R
Corallinaceae	F
Crisidia cornuta	P
Dendrodoa grossularia	C
Dercitus bucklandi	R
Galathea strigosa	R
Halichondria panicea	R
Haliclona simulans	R
Hiatella sp. (poss. other borers present)	C
HYDROZOA/BRYOZOA low turf	C
Leuconia nivea	O
Necora puber	O
Pachymatisma johnstonia	R
Palaemon serratus	P
Patella sp.	R
PORIFERA (assorted white crusts)	C
PORIFERA crusts	C
RHODOPHYCOTA (*Schottera nicaeensis*)	F
Schizoporella unicornis	R
Spirobranchus sp.	R
Spirorbinae	P
Stryphnus ponderosus	R
Sycon ciliatum	R
Trochinae (*Gibbula/Osilinus*)	O

Habitat 2	
ASCIDIACEA (small solitary - obscured)	O
CIRRIPEDIA	O
Corallinaceae	R
Hiatella sp. (poss. other borers present)	O
HYDROZOA/BRYOZOA low turf	O
Palaemon serratus	P
Spirobranchus sp.	P
PORIFERA crusts	R
Spirorbinae	O
Trochinae (*Gibbula/Osilinus*)	R

Species from Samples	Ref Collec No.
Clathria (Microciona) = atrasanguinea	117
Clathrina coriacea agg.	120
Clathrina coriacea agg.	122
Crisidia cornuta	From pot 122
Dendrodoa grossularia	126
Dercitus bucklandi	125
Halichondria panicea	119
Haliclona simulans	116
Haliclona sp.	From pot 122
Pachymatisma johnstonia	114
Schizoporella unicornis	121
Stryphnus ponderosus	123
Stryphnus ponderosus	124

Watcombe Cave No. 2
Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis
SACFOR rating given where possible, left at P where more appropriate.

Hab 2	
Aplysilla rosea	R
Aplysilla sulfurea	R
Ascidiidae (*Ascidia/Ascidiella*)	R
Asterias rubens	F
Boscia angelica	R
Botryllus schlosseri	R
BRYOZOA crust	O
Caryophyllia smithii	O
Caryophyllia sp.	O
Chaetopterus variopedatus	R
CIRRIPEDIA	O
Clavelina lepadiformis	R
Cliona spp. agg.	O
Corallinaceae	P
Corynactis viridis	O
Dercitus bucklandi	F
Diplosoma listerianum	O
Disporella hispida	O
Dysidea fragilis	F
Halichondria spp.	O
Haliclona simulans	F
Hiatella sp. (poss. other borers present)	C
HYDROZOA/BRYOZOA low turf	C
Labrus bergylta	R
Leuconia nivea	O
Liocarcinus sp.	O
Lipophrys pholis	O
Lissoclinum perforatum	R
Mytilus edulis	O
Necora puber	O
OPHIURIDA	P
Pachymatisma johnstonia	F
Palaemon serratus	O
Parablennius gattorugine	O
Phoronis hippocrepia	R
Polycarpa scuba	C
PORIFERA crusts	F
Pseudopotamilla reniformis	P
RHODOPHYCOTA	F
Sabellaria spinulosa	R
Schizomavella linearis	O
Serpulidae	F
Spirobranchus sp.	P
Terpios gelatinosa	R
Thorogobius ephippiatus	O
Thymosia guernei	R
Verruca stroemia	P

Habitat 1	
Asterias rubens	F
CIRRIPEDIA	C
Cliona celata	R
Corallinaceae	C
Diplosoma listerianum	O
Halichondria bowerbanki	P
Halichondria panicea	O
Hiatella sp. (poss. other borers present)	C
Mytilus edulis	SA
Parablennius gattorugine	P
Patella sp.	O
PORIFERA crusts	O
Sagartia sp.	R
Schizomavella linearis	O

Hab 3	
Asterias rubens	F
Pomatoschistus sp.	P

Species from Samples	Ref Collec No.
Amphilectus fucorum	59
Bugula plumosa	
Celleporina hassellii	62
Clathria (*Microciona*) = *atrasanguinea*	168
Dercitus bucklandi	From Sample 57
Didemnidae	From Sample 57
Diplosoma listerianum	27
Diplosoma listerianum/spongiforme	164
Edwardsiidae	165
Halichondria (= *bowerbanki*)	33
Halichondria panicea	29
Haliclona simulans	53
Leuconia nivea	35, 28, 60, 55
Myxilla rosacea	167
Pachymatisma johnstonia	34, 36, 54
Phorbas dives	From Sample 57
Phorbas dives	58
Plumularia setacea	From Sample 57
Polycarpa scuba	161, 163
Pseudopotamilla reniformis	32
Sabellaria spinulosa	166
Schizomavella linearis	57
Verruca stroemia	From Sample 57
Polycarpa scuba	31
Haliclona simulans	53

Watcombe Cave No. 3
Species List ground-truthed and merged from Field Logs, Samples and Video and Stills Image Analysis
SACFOR rating given where possible, left at P where more appropriate.

Habitat 1	
Amphilectus fucorum	O
ASCIDIACEA (small solitary)	O
BRYOZOA crust	O
CIRRIPEDIA	C
Corynactis viridis	O
Diplosoma listerianum	R
Halichondria bowerbanki	O
Hiatella sp. (poss. other borers present)	F
HYDROZOA/BRYOZOA low turf	C
Mytilus edulis	A
Necora puber	O
Polycarpa scuba	O
PORIFERA crusts	O
SABELLIDA (Serpulidae/Sabellidae)	P
Spirobranchus sp.	P

Habitat 4	
Asterias rubens	O
Pomatoschistus sp.	R
Spirobranchus sp.	P
TEREBELLIDA	R

Species from Samples	Ref Collec No.
Eurypon major	39
Leuconia nivea	42
Mycale sp. and *Microciona* sp.	48
Myxilla incrustans	38
Polycarpa scuba	49
Sabellaria spinulosa	From Sample 48
Sabellaria spinulosa	47
Schizomavella linearis	41
Stelligera stuposa	42
Verruca stroemia	From Sample 48

Habitat 2 (and 3)	
ACTINIARIA (large solitary)	O
Amphilectus fucorum	O
ANTHOATHECATAE	P
ASCIDIACEA (small solitary)	P
Asterias rubens	O
Bispira volutacornis	F
BRYOZOA crust	F
Cancer pagurus	F
Caryophyllia smithii	O
Caryophyllia sp.	O
Chaetopterus tubes	P
CIRRIPEDIA	R
Corallinaceae	P
Corynactis viridis	O
Dercitus bucklandi	O
Diplosoma listerianum	R
Disporella hispida	R
Dysidea fragilis	R
Eurypon major	R
Flabellina pedata	P
Halichondria bowerbanki	O
Haliclona simulans	R
Hiatella sp. (poss. other borers present)	C
Pawsonia saxicola (?and others)	F
HYDROZOA/BRYOZOA low turf	C
Leuconia nivea	O
Lissoclinum perforatum	R
Munida rugosa	F
Mytilus edulis	O
Myxilla incrustans	O
Necora puber	O
OPHIURIDA	P
Ostreoidea	R
Pachymatisma johnstonia	O
Palaemon serratus	P
Parablennius gattorugine	O
Pawsonia saxicola	F
Phorbas plumosus	R
Plumulariidae	P
Polycarpa scuba	C
Polyclinidae	R
PORIFERA crusts	C
Psammechinus miliaris	O
Pseudopotamilla reniformis	P
SABELLIDA (Serpulidae/Sabellidae) amb 2563	P
Schizomavella linearis	O
Spirobranchus sp.	P
Stelligera stuposa	O
Sycon ciliatum	R

APPENDIX II ANALYSIS DATA

Data Analysis for Compass Cave.

Note 3 biotopes have been listed as contributing to the area surveyed.	
IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Main vertical walls
IR.FIR.SG.DenCcor	Hab 1 secondary
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	Mosaic with Hab 1
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower scour and cave floor

Image Analysis Notes for Compass Cave.

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate. ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Very rough count as very hard to see through substrate cover.
Polycarpa scuba	Very rough count as very hard to see through substrate cover. Also very possible that some *Dendrodoa grossularia* present.
CIRRIPEDIA	Very rough as obscured and often unable to tell if live or dead.
BRYOZOA crusts	Species not sampled within this cave.
Caryophyllia sp.	Left at this where I might have a reason to suspect that it is *C.inornata* or *C.smithii* juv.
Diplosoma (= *listerianum*)	Within this survey, it is believed that *Diplosoma listerianum* and *D.spongiforme* are both present within the area. It may be the feeling at times that one or the other of these species is definitely present. However, due to the difficulty in telling them apart, that relies on colony features, not always present at the time of sampling such as larvae, a species may have been suggested but often marked with (=) to highlight the inherant problems with certainty in may cases. For the purposes of Primer analysis, they have all been raised to *Diplosoma* sp.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf.
ASCIDIACEA (small solitary)	Where practical, Polycarpa scuba or Dendrodoa grossularia have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two, % cover has been used. Unfortunately no sample of these species were taken from this cave.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.

Compass Cave – Analysis			East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	West 3.9m depth	West 3.9m depth	West 3.9m depth	West 5.1m depth
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7846	7848	7850	7852	7854	7856	7858	7860	7862	7864	7866	7868	7870	7830
Species	**Counts / Cover%**	**SACFOR size**														
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	10	25	25	25	60	60	60	70	50	20	2	2	2	30
Aplysilla rosea	% cover	Crust/Meadow														
Balanus crenatus	% cover	Crust/Meadow														
BRYOZOA crusts	% cover	Crust/Meadow	5	2	2	1		1	1	2	1	1	1		2	2
Caryophyllia smithii	Counts	1-3 cm			1			1						2		1
Caryophyllia sp.	Counts	1-3 cm														
Cliona spp. agg.	% cover	Crust/Meadow	10	20			40	20	10	10	10		25		20	20
Corallinaceae	% cover	Crust/Meadow														
CIRRIPEDIA	% cover	Crust/Meadow			5	1	2		3	10	5	15		1	2	
Corynactis viridis	% cover	Crust/Meadow														1
Dercitus bucklandi	% cover	Crust/Meadow											20	10		
Diplosoma (= *listerianum*)	% cover	Crust/Meadow					2	1								
Didemnum maculosum	% cover	Crust/Meadow						1								
Dysidea fragilis	% cover	Crust/Meadow	2													
Haliclona simulans	% cover	Crust/Meadow												2		
Hiatella sp.	Counts	1-3 cm	25	25	35	50	21	40	22		40	20	37	45	50	27
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	80	80	80	80	60	80	70	65	60	30	40	60	80	80
Leuconia nivea	% cover	Crust/Meadow														
Lissoclinum perforatum	% cover	Crust/Meadow							1	1						
Mytilus edulis	% cover	Crust/Meadow														
Pachymatisma johnstonia	% cover	Massive/Turf											1			4
Polycarpa scuba	Counts	1-3 cm	17	4												
Polycarpa scuba (white tipped)	Counts	1-3 cm				1								1	1	
PORIFERA crusts	% cover	Crust/Meadow	3	5	5	3	5	3	3	5	10	3	3	2	2	5
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow		P	P	P	P	P							P	

Compass Cave – Analysis (cont.)			West 5.1m depth	West 5.1m depth	West 5.1m depth	West 5.1m depth	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7832	7834	7836	7838	7840	7841	7842	7843	7844
Species	**Counts / Cover%**	**SACFOR size**									
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	15	40	20	10					
Aplysilla rosea	% cover	Crust/Meadow			1						
Balanus crenatus	% cover	Crust/Meadow									
BRYOZOA crusts	% cover	Crust/Meadow	3		2	2					
Caryophyllia smithii	Counts	1-3 cm		1	1	3					
Caryophyllia sp.	Counts	1-3 cm			2	1					
Cliona spp. agg.	% cover	Crust/Meadow		10		5					
Corallinaceae	% cover	Crust/Meadow		1							
CIRRIPEDIA	% cover	Crust/Meadow					20	10	10	3	15
Corynactis viridis	% cover	Crust/Meadow				1					
Dercitus bucklandi	% cover	Crust/Meadow									
Diplosoma (= *listerianum*)	% cover	Crust/Meadow									
Didemnum maculosum	% cover	Crust/Meadow									
Dysidea fragilis	% cover	Crust/Meadow		1	2						
Haliclona simulans	% cover	Crust/Meadow	2			1					
Hiatella sp.	Counts	1-3 cm	40	30	30	25					
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	70	70	60	70	30	20	20	20	30
Leuconia nivea	% cover	Crust/Meadow	1	1							
Lissoclinum perforatum	% cover	Crust/Meadow									
Mytilus edulis	% cover	Crust/Meadow									
Pachymatisma johnstonia	% cover	Massive/Turf									
Polycarpa scuba	Counts	1-3 cm									
Polycarpa scuba (white tipped)	Counts	1-3 cm									
PORIFERA crusts	% cover	Crust/Meadow	5	4	5	4					
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow		P	P						

Compass Cave - Raw abundance			East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	West 3.9m depth	West 3.9m depth	West 3.9m depth	West 5.1m depth
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7846	7848	7850	7852	7854	7856	7858	7860	7862	7864	7866	7868	7870	7830
		Primer label	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9	Co.10	Co.16	Co.17	Co.18	Co.19
	Counts / Cover%	SACFOR size														
Aplysilla rosea	Cover%	Crust/Meadow (%)														
ASCIDIACEA	Cover%	Crust/Meadow (%)	10	25	25	25	60	70	50	20	60	60	2	2	2	30
BRYOZOA	Cover%	Crust/Meadow (%)	5	2	2	1		1	1	2	1	1	1		2	2
Caryophyllia sp.	Count	1-3cm			1			1						2		1
CIRRIPEDIA	Cover%	Crust/Meadow (%)			5	1	2		3	10	5	15		1	2	
Cliona spp. agg.	Cover%	Crust/Meadow (%)	10	20			40	20	10	10	10		25		20	20
Corallinaceae	Cover%	Crust/Meadow (%)														
Corynactis viridis	Cover%	Crust/Meadow (%)														1
Dercitus bucklandi	Cover%	Crust/Meadow (%)											20	10		
Didemnum maculosum	Cover%	Crust/Meadow (%)						1								
Diplosoma sp.	Cover%	Crust/Meadow (%)					2	1								
Dysidea fragilis	Cover%	Crust/Meadow (%)	2													
Haliclona simulans	Cover%	Crust/Meadow (%)												2		
Hiatella sp.	Count	1-3cm	25	25	35	50	21	40	22		40	20	37	45	50	27
HYDRO/BRYO	Cover%	Crust/Meadow (%)	80	80	80	80	60	80	70	65	60	30	40	60	80	80
Leuconia nivea	Cover%	Crust/Meadow (%)														
Lissoclinum perforatum	Cover%	Crust/Meadow (%)							1	1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)											1			4
Polycarpa sp.	Count	1-3cm	17	4		1								1	1	
PORIFERA	Cover%	Crust/Meadow (%)	3	5	5	3	5	3	3	5	10	3	3	2	2	5
SABELLIDA	Cover%	Crust/Meadow (%)		0	0	0	0	0							0	

Compass Cave - Raw abundance (cont.)			West 5.1m depth	West 5.1m depth	West 5.1m depth	West 5.1m depth	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7832	7834	7836	7838	7840	7841	7842	7843	7844
		Primer label	Co.20	Co.21	Co.22	Co.23	Co.11	Co.12	Co.13	Co.14	Co.15
	Counts / Cover%	SACFOR size									
Aplysilla rosea	Cover%	Crust/Meadow (%)									
ASCIDIACEA	Cover%	Crust/Meadow (%)	15	40	10						
BRYOZOA	Cover%	Crust/Meadow (%)	3		2						
Caryophyllia sp.	Count	1-3cm		1	4						
CIRRIPEDIA	Cover%	Crust/Meadow (%)				20	10	10	3	15	
Cliona spp. agg.	Cover%	Crust/Meadow (%)		10	5						
Corallinaceae	Cover%	Crust/Meadow (%)		1							
Corynactis viridis	Cover%	Crust/Meadow (%)			1						
Dercitus bucklandi	Cover%	Crust/Meadow (%)									
Didemnum maculosum	Cover%	Crust/Meadow (%)									
Diplosoma sp.	Cover%	Crust/Meadow (%)									
Dysidea fragilis	Cover%	Crust/Meadow (%)		1							
Haliclona simulans	Cover%	Crust/Meadow (%)	2		1						
Hiatella sp.	Count	1-3cm	40	30	25						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	70	70	70	30	20	20	20	30	
Leuconia nivea	Cover%	Crust/Meadow (%)	1	1							
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									
Pachymatisma johnstonia	Cover%	Mass/Turf (%)									
Polycarpa sp.	Count	1-3cm									
PORIFERA	Cover%	Crust/Meadow (%)	5	4	4						
SABELLIDA	Cover%	Crust/Meadow (%)		0							

Compass Cave - SACFOR Categorie			East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	East Wall	West 3.9m depth	West 3.9m depth	West 3.9m depth	West 5.1m depth
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7846	7848	7850	7852	7854	7856	7858	7860	7862	7864	7866	7868	7870	7830
		Primer label	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9	Co.10	Co.16	Co.17	Co.18	Co.19
	Counts / Cover%	SACFOR size														
Aplysilla rosea	Cover%	Crust/Meadow (%)														
ASCIDIACEA	Cover%	Crust/Meadow (%)	3	4	4	4	5	5	5	4	5	5	1	1	1	4
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1		1	1	1	1	1	1		1	1
Caryophylli	Count	1-3cm			4			4						4		4
CIRRIPEDIA	Cover%	Crust/Meadow (%)			1	1	1		1	3	1	3		1	1	
Cliona spp. agg.	Cover%	Crust/Meadow (%)	3	4			5	4	3	3	3		4		4	4
Corallinaceae	Cover%	Crust/Meadow (%)														
Corynactis viridis	Cover%	Crust/Meadow (%)														1
Dercitus bucklandi	Cover%	Crust/Meadow (%)											4	3		
Didemnum maculosum	Cover%	Crust/Meadow (%)						1								
Diplosoma sp.	Cover%	Crust/Meadow (%)					1	1								
Dysidea fragilis	Cover%	Crust/Meadow (%)	1													
Haliclona simulans	Cover%	Crust/Meadow (%)												1		
Hiatella sp.	Count	1-3cm	5	5	5	5	5	5	5		5	5	5	5	5	5
HYDRO/BRYO	Cover%	Crust/Meadow (%)	6	6	6	6	5	6	5	5	5	4	5	5	6	6
Leuconia nivea	Cover%	Crust/Meadow (%)														
Lissoclinum perforatum	Cover%	Crust/Meadow (%)							1	1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)											2			2
Polycarpa sp.	Count	1-3cm	5	4		4								4	4	
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	1	1	1	1	1	3	1	1	1	1	1
SABELLIDA	Cover%	Crust/Meadow (%)		1	1	1	1	1							1	

Compass Cave - SACFOR Categorie			West 5.1m depth	West 5.1m depth	West 5.1m depth	West 5.1m depth	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7832	7834	7836	7838	7840	7841	7842	7843	7844
		Primer label	Co.20	Co.21	Co.22	Co.23	Co.11	Co.12	Co.13	Co.14	Co.15
	Counts / Cover%	SACFOR size									
Aplysilla rosea	Cover%	Crust/Meadow (%)									
ASCIDIACEA	Cover%	Crust/Meadow (%)	3	5	3						
BRYOZOA	Cover%	Crust/Meadow (%)	1		1						
Caryophylli	Count	1-3cm		4	8						
CIRRIPEDIA	Cover%	Crust/Meadow (%)				4	3	3	1	3	
Cliona spp. agg.	Cover%	Crust/Meadow (%)		3	1						
Corallinaceae	Cover%	Crust/Meadow (%)		1							
Corynactis viridis	Cover%	Crust/Meadow (%)			1						
Dercitus bucklandi	Cover%	Crust/Meadow (%)									
Didemnum maculosum	Cover%	Crust/Meadow (%)									
Diplosoma sp.	Cover%	Crust/Meadow (%)									
Dysidea fragilis	Cover%	Crust/Meadow (%)		1							
Haliclona simulans	Cover%	Crust/Meadow (%)	1		1						
Hiatella sp.	Count	1-3cm	5	5	5						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	5	5	4	4	4	4	4	
Leuconia nivea	Cover%	Crust/Meadow (%)	1	1							
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									
Pachymatisma johnstonia	Cover%	Mass/Turf (%)									
Polycarpa sp.	Count	1-3cm									
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1						
SABELLIDA	Cover%	Crust/Meadow (%)		1							

Data Analysis for Cuttlefish Cave.

Note 3 biotopes have been listed as contributing to the area surveyed.	
IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Main vertical walls
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower vertical wall, scoured area
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Cave floor

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.	
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.	
Cliona spp.agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Very rough count as very hard to see through substrate cover. Additionally suspect deep retraction into the substrate.
BRYOZOA crusts	Samples taken and various species of *Schizomavella* present but for analysis, recording left at the higher level.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf.
Colonial cover of 1%	Note that 1% is also used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
CIRRIPEDIA	Often a strange mix where larger species can be seen, and then a low lying crust of barnacles seems apparent, suspected to be a mixture and judged to include a lot of low lying *Verruca stroemia*. Surface often obscured.
Corallinaceae	Note that on the very mobile cobble substrate of the cave floor, coralline algae was the only species particularly noted but quite hard to establish cover as colouration of the stones themselves may be misleading at times.
Lower scour	Additional pictures were not good enough for analysis.
Main wall	The personal observation is made that these represent the upper edge of the main habitat, moving up to the roof area.

Cuttlefish Cave – Analysis			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Lower scour	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	BMB	BMB	BMB	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7954	7982	7985	7986	7990	7992	7997	3916	3934	3907	7966	7967	7968	7969	7970	
Species	**Counts/ %cover**	**SACFOR size**												No fauna		No fauna		
Anomiidae	Counts	<1 cm										12						
BRYOZOA crusts	% cover	Crust/Meadow		2		5		1	5	10	10							
Caryophyllia smithii	Counts	1-3 cm				1												
Caryophyllia sp.	Counts	1-3 cm					4	4										
CIRRIPEDIA	% cover	Crust/Meadow	40	80	1		1		1	1								
CIRRIPEDIA scars	% cover	Crust/Meadow	1									1						
Cliona spp.agg.	% cover	Crust/Meadow	20	5		2				30	60							
Corynactis viridis	% cover	Crust/Meadow			1			2	1	2								
Corallinaceae	% cover	Crust/Meadow											2		3		5	
Didemnidae	% cover	Crust/Meadow						1										
Diplosoma sp.	% cover	Crust/Meadow							10									
Diplosoma (= *listerianum*)	% cover	Crust/Meadow								2								
Dysidea fragilis	% cover	Crust/Meadow		1				1										
Flabellina pedata	Counts	1-3 cm									1							
Hiatella sp.	Counts	1-3 cm	15	56	65	60	30	35	15	64	70							
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	30	40	85	85	60	50	80	30	50	1						
Lissoclinum perforatum	% cover	Crust/Meadow		1						1	1							
Phoronis hippocrepia	% cover	Crust/Meadow				5	10	15										
Polycarpa scuba	Counts	1-3 cm	4	13	1	4	1	1	2	2								
Plumulariidae	% cover	Massive/Turf								25	2							
Spirobranchus sp. tubes	Counts	1-3 cm	1			2						10						2
PORIFERA crusts	% cover	Crust/Meadow	5		10	5	15	20	10		5							
Serpulidae	Counts	1-3 cm	1	1	1					1								
Sycon ciliatum	Counts	1-3 cm		1						20								
Holes in rock - predict Hiatella, not confirmed	Present		P	P	P	P	P	P	P	P	P							

Cuttlefish Cave - Raw abundance			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Lower scour	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	BMB	BMB	BMB	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7954	7982	7985	7986	7990	7992	7997	3916	3934	3907	7966	7967	7968	7969	7970
		Primer label	Cu.5	Cu.6	Cu.7	Cu.8	Cu.9	Cu.10	Cu.11	Cu.12	Cu.13	Cu.4	Cu.1		Cu.2		Cu.3
	Counts/Cover%	SACFOR size															
Anomiidae	Count	<1cm										12					
BRYOZOA	Cover%	Crust/Meadow (%)		2		5		1	5	10	10						
Caryophyllia sp.	Count	1-3cm				1	4	4									
CIRRIPEDIA	Cover%	Crust/Meadow (%)	40	80	1		1		1	1							
Cliona spp.agg.	Cover%	Crust/Meadow (%)	20	5		2				30	60						
Corallinaceae	Cover%	Crust/Meadow (%)											2		3		5
Corynactis viridis	Cover%	Crust/Meadow (%)			1			2	1	2							
Didemnidae	Cover%	Crust/Meadow (%)						1									
Diplosoma sp.	Cover%	Crust/Meadow (%)							10	2							
Dysidea fragilis	Cover%	Crust/Meadow (%)		1				1									
Flabellina pedata	Count	1-3cm									1						
Hiatella sp.	Count	1-3cm	15	56	65	60	30	35	15	64	70						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	30	40	85	85	60	50	80	30	50	1					
Lissoclinum perforatum	Cover%	Crust/Meadow (%)		1						1	1						
Phoronis hippocrepia	Cover%	Crust/Meadow (%)				5	10	15									
Plumulariidae	Cover%	Mass/Turf (%)								25	2						
Polycarpa sp.	Count	1-3cm	4	13	1	4	1	1	2	2							
PORIFERA	Cover%	Crust/Meadow (%)	5		10	5	15	20	10		5						
Serpulidae	Count	1-3cm	1	1	1					1							
Spirobranchus sp.	Count	1-3cm	1			2						10					2
Sycon ciliatum	Count	1-3cm		1						20							

Cuttlefish Cave - SACFOR Categories			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Lower scour	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	BMB	BMB	BMB	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7954	7982	7985	7986	7990	7992	7997	3916	3934	3907	7966	7967	7968	7969	7970
		Primer label	Cu.5	Cu.6	Cu.7	Cu.8	Cu.9	Cu.10	Cu.11	Cu.12	Cu.13	Cu.4	Cu.1		Cu.2		Cu.3
	Counts/Cover%	SACFOR size															
Anomiidae	Count	<1cm										4					
BRYOZOA	Cover%	Crust/Meadow (%)		1		1		1	1	3	3						
Caryophyllia sp.	Count	1-3cm				4	4	4									
CIRRIPEDIA	Cover%	Crust/Meadow (%)	5	6	1		1		1	1							
Cliona spp.agg.	Cover%	Crust/Meadow (%)	4	1		1				4	5						
Corallinaceae	Cover%	Crust/Meadow (%)											1		1		1
Corynactis viridis	Cover%	Crust/Meadow (%)			1			1	1	1							
Didemnidae	Cover%	Crust/Meadow (%)						1									
Diplosoma sp.	Cover%	Crust/Meadow (%)							3	1							
Dysidea fragilis	Cover%	Crust/Meadow (%)		1				1									
Flabellina pedata	Count	1-3cm									4						
Hiatella sp.	Count	1-3cm	5	5	6	5	5	5	5	5	6						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	5	6	6	5	5	6	4	5	1					
Lissoclinum perforatum	Cover%	Crust/Meadow (%)		1						1	1						
Phoronis hippocrepia	Cover%	Crust/Meadow (%)				1	3	3									
Plumulariidae	Cover%	Mass/Turf (%)								5	2						
Polycarpa sp.	Count	1-3cm	4	5	4	4	4	4	4	4							
PORIFERA	Cover%	Crust/Meadow (%)	1		3	1	3	4	3		1						
Serpulidae	Count	1-3cm	4	4	4					4							
Spirobranchus sp.	Count	1-3cm	4			4						5					4
Sycon ciliatum	Count	1-3cm		4						5							

Data Analysis for Double Decker/Crab Cave Complex

Note 4 biotopes have been listed as contributing to the area surveyed.	
IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic with HiaSw
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
LR.HLR.MusB	
Mussel and/or barnacle communities	

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp.agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Very rough count as very hard to see through substrate cover. Substrate particulary obscured in this cave.
Polycarpa scuba	Very rough count as very hard to see through substrate cover. Also very possible that some Dendrodoa mixed in. Small amount if present. Samples taken and found to to be *Polycarpa scuba*.
CIRRIPEDIA	Very rough count as obscured and often unable to tell if live.
BRYOZOA crusts	*Schizimavella* sp. found to be present in samples but left at higher level for analysis.
Caryophyllia sp.	Left at this where I might have a reason to suspect that it is *C.inornata* or *C.smithii* juv.
Diplosoma (= *listerianum*)	Within this survey , it is believed that *Diplosoma listerianum* and *D.spongiforme* are both present within the area. It may be the feeling at times that one or the other of these species is definitely present. However, due to the difficulty in telling them apart, that relies on colony features, not always present at the time of sampling such as larvae, a species may have been suggested but often marked with (=) to highlight the inherant problems with certainty in may cases. For the purposes of Primer analysis, they have all been raised to *Diplosoma* sp.
HYDROZOA / BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf. Withini this cave, very foliose turf and %cover very difficult to establish.
SABELLIDA (Serpulidae / Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.
Sertularella gaudichaudi	This species is confirmed as present due to sampling undertaken within the cave. It would otherwise have been logged under HYDROZOA/BRYOZOA low turf. As a result, only entered as 'Present', as no meaningful SACFOR rating can be given.
Cliona celata	For taxonomic reasons, where the low lying boring form of *Cliona* is seen, the identification is left at *Cliona* agg.. Where the large cushion form is seen to be clearly established, the species is recorded as *Cliona celata*. Additionally this continually allows the distinction to be made throughout the report, on the growth form present.
Pachymatisma johnstonia	Large cushions forms of this species were seen in the area but not picked up by quadrat pictures. This is mainly due to the sponge being slightly further within the crevice in which the main survey work was being undertaken. It was also seen slightly further out of the area, and just missing in the area where quadrat images were being taken.
Dercitus bucklandi	As for *Pachymatisma johnstonia.*
ASCIDIACEA (small solitary)	Where it is considered impossible to either clearly see the substrate or distinguish between the ascidians % cover has been used.

Double Decker/Crab Cave Complex – Analysis			Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	8018	8019	8023	8025	8027	8030	8031	8036	8043	8037	8008	8009	8013	8015	8044
Species	**Counts/%cover**	**SACFOR size**															
Alcyonium digitatum	% cover	Massive/Turf	25	1		5				25							
Amphilectus fucorum	% cover	Crust/Meadow			3			5	1		1						
Amphipod tube mass - (*Jassa falcata*)	% cover	Crust/Meadow		P	P	P	P	P	P	P							
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	1									1					
BRYOZOA crusts	% cover	Crust/Meadow	3	3	2		1		5	8	10					1	1
Caryophyllia sp.	Counts	1-3 cm									1						
Chartella papyracea	% cover	Massive/Turf		20													
CIRRIPEDIA	% cover	Crust/Meadow	2		1				1				2	1		1	
Clavelina lepadiformis	% cover	Crust/Meadow		1													
Cliona spp. agg.	% cover	Crust/Meadow									1						
Cliona celata	% cover	Massive/Turf														2	
Corynactis viridis	% cover	Crust/Meadow	1	1		1	1	2		1	1	80					
Diplosoma (= *listerianum*)	% cover	Crust/Meadow			1	10	3	2	2		3						
Distomus variolosus	% cover	Crust/Meadow			1						2						
Hiatella sp.	Counts	1-3 cm	4			3	3		4			14					
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	20	10	60	40	60	40	60	25	40	5					
Lissoclinum perforatum	% cover	Crust/Meadow									1						
Mytilus edulis	% cover	Crust/Meadow	10	10	10	10	3	5	10	8	20		85	80	95	75	75
Parablennius gattorugine	Counts	3-15 cm									1						
Plumulariidae	% cover	Massive/Turf			5		3										
Polycarpa scuba	Counts	1-3 cm						1					4	3			1
Polycarpa scuba (white tips)	Counts	1-3 cm		8	9	10	5	25	10	5							
Polyclinidae	% cover	Crust/Meadow									1						
PORIFERA crusts	% cover	Crust/Meadow	5	5	10	10	10	10	5	5	10	20					
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow			P	P	P	P	P		P	P					
Sagartia sp.	Counts	3-15 cm	1														
Tubularia indivisa (largely dead)	% cover	Massive/Turf		5	1	5	10	2	10	10						1	
Zostera sp. (appears alive and growing from vertical wall)	Counts	3-15 cm	P	P		P	P										

Double Decker/Crab Cave Complex - Raw abundance			Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	8018	8019	8023	8025	8027	8030	8031	8036	8043	8037	8008	8009	8013	8015	8044
		Primer label	DD.6	DD.7	DD.8	DD.9	DD.10	DD.11	DD.12	DD.13	DD.14	DD.15	DD.1	DD.2	DD.3	DD.4	DD.5
	Counts/Cover%	SACFOR size															
Alcyonium digitatum	Cover%	Mass/Turf (%)	25	1		5				25							
Amphilectus fucorum	Cover%	Crust/Meadow (%)			3			5	1		1						
ASCIDIACEA	Cover%	Crust/Meadow (%)	1									1					
BRYOZOA	Cover%	Crust/Meadow (%)	3	3	2		1		5	8	10					1	1
Caryophyllia sp.	Count	1-3cm									1						
Chartella papyracea	Cover%	Mass/Turf (%)		20													
CIRRIPEDIA	Cover%	Crust/Meadow (%)	2		1				1				2	1		1	
Clavelina lepadiformis	Cover%	Crust/Meadow (%)		1													
Cliona spp. agg.	Cover%	Crust/Meadow (%)									1						
Cliona celata	Cover%	Mass/Turf (%)														2	
Corynactis viridis	Cover%	Crust/Meadow (%)	1	1		1	1	2		1	1	80					
Diplosoma sp.	Cover%	Crust/Meadow (%)			1	10	3	2	2		3						
Distomus variolosus	Cover%	Crust/Meadow (%)			1						2						
Hiatella sp.	Count	1-3cm	4			3	3		4			14					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	20	10	60	40	60	40	60	25	40	5					
Jassa falcata mass	Cover%	Crust/Meadow (%)		0	0	0	0	0	0	0							
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									1						
Mytilus edulis	Cover%	Crust/Meadow (%)	10	10	10	10	3	5	10	8	20		85	80	95	75	75
Parablennius gattorugine	Count	3-15cm									1						
Plumulariidae	Cover%	Mass/Turf (%)			5		3										
Polycarpa sp.	Count	1-3cm		8	9	10	5	26	10	5			4	3			1
Polyclinidae	Cover%	Crust/Meadow (%)									1						
PORIFERA	Cover%	Crust/Meadow (%)	5	5	10	10	10	10	5	5	10	20					
SABELLIDA	Cover%	Crust/Meadow (%)			0	0	0	0	0		0	0					
Sagartia spp.	Count	3-15cm	1														
Tubularia indivisa	Cover%	Mass/Turf (%)		5	1	5	10	2	10	10						1	

Double Decker/Crab Cave Complex - SACFOR Categories			Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Vert Wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	8018	8019	8023	8025	8027	8030	8031	8036	8043	8037	8008	8009	8013	8015	8044
		Primer label	DD.6	DD.7	DD.8	DD.9	DD.10	DD.11	DD.12	DD.13	DD.14	DD.15	DD.1	DD.2	DD.3	DD.4	DD.5
	Counts/Cover%	SACFOR size															
Alcyonium digitatum	Cover%	Mass/Turf (%)	5	2		2				5							
Amphilectus fucorum	Cover%	Crust/Meadow (%)			1			1	1		1						
ASCIDIACEA	Cover%	Crust/Meadow (%)	1									1					
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1		1		1	2	3					1	1
Caryophyllia sp.	Count	1-3cm									4						
Chartella papyracea	Cover%	Mass/Turf (%)		5													
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1		1				1				1	1		1	
Clavelina lepadiformis	Cover%	Crust/Meadow (%)		1													
Cliona spp. agg.	Cover%	Crust/Meadow (%)									1						
Cliona celata	Cover%	Mass/Turf (%)														2	
Corynactis viridis	Cover%	Crust/Meadow (%)	1	1		1	1	1		1	1	6					
Diplosoma sp.	Cover%	Crust/Meadow (%)			1	3	1	1	1		1						
Distomus variolosus	Cover%	Crust/Meadow (%)			1						1						
Hiatella sp.	Count	1-3cm	4			4	4		4			5					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	3	5	5	5	5	5	4	5	1					
Jassa falcata mass	Cover%	Crust/Meadow (%)		1	1	1	1	1	1	1							
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									1						
Mytilus edulis	Cover%	Crust/Meadow (%)	3	3	3	3	1	1	3	2	4		6	6	6	5	5
Parablennius gattorugine	Count	3-15cm									5						
Plumulariidae	Cover%	Mass/Turf (%)			2		2										
Polycarpa sp.	Count	1-3cm		5	5	5	4	5	5	4			4	4			4
Polyclinidae	Cover%	Crust/Meadow (%)									1						
PORIFERA	Cover%	Crust/Meadow (%)	1	1	3	3	3	3	1	1	3	4					
SABELLIDA	Cover%	Crust/Meadow (%)			1	1	1	1	1		1	1					
Sagartia spp.	Count	3-15cm	5														
Tubularia indivisa	Cover%	Mass/Turf (%)		2	2	2	4	2	4	4						2	

Data Analysis for Durl Head Cave.

Note 4 biotopes have been listed as contributing to the area surveyed.	
IR.FIR.SG.DenCcor	Hab 1/2
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	
IR.FIR.SG.CrSp	Hab 2/1
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Mosaic
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower scoured wall
IR.FIR.SG.CC.Mo	Hab 4
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Rough count.
CIRRIPEDIA	Rough count.
BRYOZOA crusts	No samples taken so all observances left at this level.
Diplosoma (= *listerianum*)	Within this survey , it is believed that *Diplosoma listerianum* and *D.spongiforme* are both present within the area. It may be the feeling at times that one or the other of these species is definitely present. However, due to the difficulty in telling them apart, that relies on colony features, not always present at the time of sampling such as larvae, a species may have been suggested but often marked with (=) to highlight the inherant problems with certainty in may cases. For the purposes of Primer analysis, they have all been raised to *Diplosoma* sp.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf. Within this cave, very foliose turf and %cover very difficult to establish. In this cave, a very low lying 'fuzz' is present on the rock in places and is unidentified.
31cm/21cm distance from substrate	In this cave, both 31 cm and 21 cm distances were trialled and 21 cm found to be much better re lighting, clarity, very little blurring etc. Hence 21 cm used for stats table compilation.
Habitats 1 and 2	A difficult mosaic, separated on the observation that Habitat 1 is a dense *Dendrodoa grossularia* biotope with few *Hiatella* sp., and Hab 2 has lots of *Hiatella*sp. present with far less *Dendrodoa* and is more scoured.
Colonial cover of 1%	Note that 1% is also used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Believe that most of the ascidians present are *Dendrodoa grossularia* but at some points there is the possibility that a few *Polycarpa scuba* are present.
Images from rear of cave included here for interest only.	Images were found from the rear of the cave. Explanation is that this was visited for interest but does not represent the actual area surveyed. However this area proved interesting and a few images have been included here for observation.

Images from rear of cave included here for interest only.

Durl Head Cave – Analysis			Upper @ 2-3 m	Upper @ 2-3 m	Upper @ 2-3 m	Upper @ 2-3 m	Upper @ 2-3 m	Upper @ 2-3 m	Upper @ 2-3 m	47m along	47m along	47m along	47m along	47m along
			Wall	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21cm**	**21cm**	**21cm**	**21cm**	**21cm**
		Image Number	**8204**	**8205**	**8207**	**8194**	**8196**	**8197**	**8198**	**8214**	**8215**	**8216**	**8217**	**8218**
Species	**Counts/%cover**	**SACFOR size**												
ASCIDIACEA (solitary)	Counts	3-15 cm	1				1		1					
ASCIDIACEA (solitary / *Corella eumyota*)	Counts	3-15 cm												
BRYOZOA crusts	% cover	Crust/Meadow				2								
CIRRIPEDIA	% cover	Crust/Meadow		1			1	3	1					
Clathrina coriacea agg.	% cover	Crust/Meadow				1				1				
Dendrodoa grossularia	% cover	Crust/Meadow	20	35	60	5	8	8	8	60	25	10	30	5
Didemnidae	% cover	Crust/Meadow	2			2		2	3					
Hiatella sp.	Counts	1-3 cm				35	40	11	15					
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	80	70	70	30	35	10	35	40	70	60	60	60
Leuconia nivea	% cover	Crust/Meadow	1					1			1			
Lissoclinum perforatum	% cover	Crust/Meadow				4		3						
OPHIURIDA	% cover	Crust/Meadow				1								
Polycarpa scuba	Counts	1-3 cm												
Polyclinidae	% cover	Crust/Meadow						1						
Spirobranchus sp. tubes	Counts	1-3 cm						1	1		2			
PORIFERA crusts	% cover	Crust/Meadow	2	5	5	2	2	1	2		1	3		2
PORIFERA crusts (white - *Stryphnus/Leuconia*)	% cover	Crust/Meadow								1	1	2	2	
Sagartia (= *elegans (rosea)*)	Counts	3-15 cm		1										
Sagartia (= *elegans (venusta)*)	Counts	3-15 cm					1							
Sagartia sp.	Counts	3-15 cm					1	1						
Spirorbinae	% cover	Crust/Meadow			1		1	1		10	5	15	4	2
TEREBELLIDA	Counts	1-3 cm				1		1		1				
Terpios gelatinosa	% cover	Crust/Meadow	1	1		1								
Urticina felina	Counts	3-15 cm												
Holes in rock - predict *Hiatella*, not confirmed	Present									P	P	P	P	P
Drift algae	Present													

Durl Head Cave – Analysis (cont.)			Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m					
			Wall	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Cave Floor**	**Cave Floor**	**Cave Floor**	**Cave Floor**	**Cave Floor**
		Habitat Number	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 4**	**Hab 4**	**Hab 4**	**Hab 4**	**Hab 4**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**
		Image Number	**8164**	**8166**	**8168**	**8184**	**8185**	**8187**	**8174**	**8175**	**8176**	**8177**	**8178**
Species	**Counts/%cover**	**SACFOR size**							**No fauna**	**No fauna**	**No fauna**	**No fauna**	**No fauna**
ASCIDIACEA (solitary)	Counts	3-15 cm											
ASCIDIACEA (solitary / *Corella eumyota*)	Counts	3-15 cm		3	1		1						
BRYOZOA crusts	% cover	Crust/Meadow											
CIRRIPEDIA	% cover	Crust/Meadow	1	1	2	1	1						
Clathrina coriacea agg.	% cover	Crust/Meadow											
Dendrodoa grossularia	% cover	Crust/Meadow	1	2	10	1	1	3					
Didemnidae	% cover	Crust/Meadow											
Hiatella sp.	Counts	1-3 cm	30	35	26	30	10	60					
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	80	70	30	15	20	70					
Leuconia nivea	% cover	Crust/Meadow											
Lissoclinum perforatum	% cover	Crust/Meadow				1							
OPHIURIDA	% cover	Crust/Meadow											
Polycarpa scuba	Counts	1-3 cm		1		1							
Polyclinidae	% cover	Crust/Meadow											
Spirobranchus sp. tubes	Counts	1-3 cm			4		1						
PORIFERA crusts	% cover	Crust/Meadow	1	1	2	1	1	3					
PORIFERA crusts (white - *Stryphnus/Leuconia*)	% cover	Crust/Meadow											
Sagartia (= *elegans (rosea)*)	Counts	3-15 cm											
Sagartia (= *elegans (venusta)*)	Counts	3-15 cm											
Sagartia sp.	Counts	3-15 cm											
Spirorbinae	% cover	Crust/Meadow											
TEREBELLIDA	Counts	1-3 cm						1					
Terpios gelatinosa	% cover	Crust/Meadow				1		1					
Urticina felina	Counts	3-15 cm	1										
Holes in rock - predict *Hiatella*, not confirmed	Present												
Drift algae	Present										P	P	

										Images from rear of cave included here for interest only.				
Durl Head Cave - Raw abundance			**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**47m along**	**47m along**	**47m along**	**47m along**	**47m along**
			Wall	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21cm**	**21cm**	**21cm**	**21cm**	**21cm**
		Image Number	**8204**	**8205**	**8207**	**8194**	**8196**	**8197**	**8198**	**8214**	**8215**	**8216**	**8217**	**8218**
		Primer label	**DH.1**	**DH.2**	**DH.3**	**DH.4**	**DH.5**	**DH.6**	**DH.7**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
	Counts/Cover%	**SACFOR size**												
ASCIDIACEA	Count	3-15cm	1				1		1					
BRYOZOA	Cover%	Crust/Meadow (%)				2								
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1			1	3	1					
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)				1				1				
Dendrodoa grossularia	Cover%	Crust/Meadow (%)	20	35	60	5	8	8	8	60	25	10	30	5
Didemnidae	Cover%	Crust/Meadow (%)	2			2		2	3					
Hiatella sp.	Count	1-3cm				35	40	11	15					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	80	70	70	30	35	10	35	40	70	60	60	60
Leuconia nivea	Cover%	Crust/Meadow (%)	1					1			1			
Lissoclinum perforatum	Cover%	Crust/Meadow (%)				4		3						
OPHIURIDA	Cover%	Crust/Meadow (%)				1								
Polycarpa sp.	Count	1-3cm												
Polyclinidae	Cover%	Crust/Meadow (%)						1						
PORIFERA	Cover%	Crust/Meadow (%)	2	5	5	2	2	1	2	1	2	5	2	2
Sagartia spp.	Count	3-15cm		1			2	1						
Spirobranchus sp.	Count	1-3cm						1	1		2			
Spirorbinae	Cover%	Crust/Meadow (%)			1		1	1		10	5	15	4	2
TEREBELLIDA	Count	1-3cm				1		1		1				
Terpios gelatinosa	Cover%	Crust/Meadow (%)	1	1		1								
Urticina felina	Count	3-15cm												

Durl Head Cave - Raw abundance (cont.)			Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m					
			Wall	Wall	Wall	Wall	Wall	Wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8164	8166	8168	8184	8185	8187	8174	8175	8176	8177	8178
		Primer label	DH.8	DH.9	DH.10	DH.11	DH.12	DH.13					
	Counts/Cover %	SACFOR size											
ASCIDIACEA	Count	3-15cm		3	1		1						
BRYOZOA	Cover%	Crust/Meadow (%)											
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1	1	2	1	1						
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)											
Dendrodoa grossularia	Cover%	Crust/Meadow (%)	1	2	10	1	1	3					
Didemnidae	Cover%	Crust/Meadow (%)											
Hiatella sp.	Count	1-3cm	30	35	26	30	10	60					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	80	70	30	15	20	70					
Leuconia nivea	Cover%	Crust/Meadow (%)											
Lissoclinum perforatum	Cover%	Crust/Meadow (%)				1							
OPHIURIDA	Cover%	Crust/Meadow (%)											
Polycarpa sp.	Count	1-3cm		1		1							
Polyclinidae	Cover%	Crust/Meadow (%)											
PORIFERA	Cover%	Crust/Meadow (%)	1	1	2	1	1	3					
Sagartia spp.	Count	3-15cm											
Spirobranchus sp.	Count	1-3cm			4		1						
Spirorbinae	Cover%	Crust/Meadow (%)											
TEREBELLIDA	Count	1-3cm						1					
Terpios gelatinosa	Cover%	Crust/Meadow (%)				1		1					
Urticina felina	Count	3-15cm	1										

										Images from rear of cave included here for interest only.				
Durl Head Cave - SACFOR Categories			**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**Upper @ 2-3 m**	**47m along**	**47m along**	**47m along**	**47m along**	**47m along**
			Wall	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**	**Wall**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21 cm**	**21cm**	**21cm**	**21cm**	**21cm**	**21cm**
		Image Number	**8204**	**8205**	**8207**	**8194**	**8196**	**8197**	**8198**	**8214**	**8215**	**8216**	**8217**	**8218**
		Primer label	**DH.1**	**DH.2**	**DH.3**	**DH.4**	**DH.5**	**DH.6**	**DH.7**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
	Counts/Cover%	**SACFOR size**												
ASCIDIACEA	Count	3-15cm	5				5		5					
BRYOZOA	Cover%	Crust/Meadow (%)				1								
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1			1	1	1					
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)				1				1				
Dendrodoa grossularia	Cover%	Crust/Meadow (%)	4	4	5	1	2	2	2	60	25	10	30	5
Didemnidae	Cover%	Crust/Meadow (%)	1			1		1	1					
Hiatella sp.	Count	1-3cm				6	6	5	5					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	6	5	5	4	4	3	4	40	70	60	60	60
Leuconia nivea	Cover%	Crust/Meadow (%)	1					1			1			
Lissoclinum perforatum	Cover%	Crust/Meadow (%)				1		1						
OPHIURIDA	Cover%	Crust/Meadow (%)				1								
Polycarpa sp.	Count	1-3cm												
Polyclinidae	Cover%	Crust/Meadow (%)						1						
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	1	1	1	1	1	2	5	2	2
Sagartia spp.	Count	3-15cm		5			5	5						
Spirobranchus sp.	Count	1-3cm						4	4		2			
Spirorbinae	Cover%	Crust/Meadow (%)			1		1	1		10	5	15	4	2
TEREBELLIDA	Count	1-3cm				4		4		1				
Terpios gelatinosa	Cover%	Crust/Meadow (%)	1	1		1								
Urticina felina	Count	3-15cm												

Durl Head Cave - SACFOR Categories (cont.)			Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m	Lower @ 4-5 m					
			Wall	Wall	Wall	Wall	Wall	Wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8164	8166	8168	8184	8185	8187	8174	8175	8176	8177	8178
		Primer label	DH.8	DH.9	DH.10	DH.11	DH.12	DH.13					
	Counts/Cover %	SACFOR size											
ASCIDIACEA	Count	3-15cm		5	5		5						
BRYOZOA	Cover%	Crust/Meadow (%)											
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1	1	1	1	1						
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)											
Dendrodoa grossularia	Cover%	Crust/Meadow (%)	1	1	3	1	1	1					
Didemnidae	Cover%	Crust/Meadow (%)											
Hiatella sp.	Count	1-3cm	5	6	5	5	5	6					
HYDRO/BRYO	Cover%	Crust/Meadow (%)	6	5	4	3	4	5					
Leuconia nivea	Cover%	Crust/Meadow (%)											
Lissoclinum perforatum	Cover%	Crust/Meadow (%)				1							
OPHIURIDA	Cover%	Crust/Meadow (%)											
Polycarpa sp.	Count	1-3cm		4		4							
Polyclinidae	Cover%	Crust/Meadow (%)											
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	1	1	1					
Sagartia spp.	Count	3-15cm											
Spirobranchus sp.	Count	1-3cm			5		4						
Spirorbinae	Cover%	Crust/Meadow (%)											
TEREBELLIDA	Count	1-3cm						4					
Terpios gelatinosa	Cover%	Crust/Meadow (%)				1		1					
Urticina felina	Count	3-15cm	5										

Data Analysis for Garfish Cave.

Complicated cave with additional notes that further describe the biotope problems. The biotopes listed below are heavily caveated as they do not appear to be very representative.

Note 3 biotopes have been listed as contributing to the area surveyed.	
LR.FLR.CvOv.FaCr	Hab 1
Faunal crusts on wave-surged littoral cave walls	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	

CR.FCR.Cv.SpCup	
(Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock)	Area relating to *Hoplangia durotrix*, outside of main survey area but added here for interest.

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.

ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Very rough count as very hard to see through substrate cover. Additionally suspect deep retraction into the substrate.
CIRRIPEDIA	The upper wall and roof appear to have a dense cover of barnacles that seem to be mainly comprised of *Verruca stroemia*, with the occasional *Balanus* sp..
BRYOZOA crusts	*Schizimavella* sp. found to be present in samples but left at higher level for analysis.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf. Percent cover difficult to establish.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polychaete tubes	These appear to be soft bodied tubes. No worms seen.
Pseudopotamilla reniformis	Recognisable soft tube, so where seen, recorded separately from general polychaete tubes.
ASCIDIACEA (small solitary)	1 x small clear ascidian and what is believed to be a few *Distomus variolosus*.

Garfish Cave – Analysis			Very Upper Wall	Very Upper Wall	Very Upper Wall	Very Upper Wall	Main wall	Main wall	Main wall	Main wall	Main wall
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	2657	2662	2663	2664	2630	2631	2634	2635	2636
Species	**Counts/%cover**	**SACFOR size**									
ASCIDIACEA (small solitary)	% cover	Crust/Meadow						4			
Aplysilla sulfurea	% cover	Crust/Meadow						1		1	
Ascidia conchilega	Counts	3-15 cm									
Asterias rubens	Counts	>15 cm						1			
BRYOZOA crusts	% cover	Crust/Meadow	3	5	3	2	1	5	20	8	3
Caryophyllia smithii	Counts	1-3 cm					1	4	1	1	
Caryophyllia sp.	Counts	1-3 cm							1		
CIRRIPEDIA	% cover	Crust/Meadow	30	70	60	60	1		1	20	5
Cliona spp. agg.	% cover	Crust/Meadow							3		
Corallinaceae	% cover	Crust/Meadow									
Dercitus bucklandi	% cover	Crust/Meadow									
Disporella hispida	% cover	Crust/Meadow					1	1	1	1	
Dysidea fragilis	% cover	Crust/Meadow					2		1	3	
Galathea strigosa	Counts	3-15 cm	1								
Hiatella sp.	Counts	1-3 cm	22	45	22	27	3	5	30	10	7
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow		2	5	3	85	40	50	10	50
Lissoclinum perforatum	% cover	Crust/Meadow							1		
Perophora listeri	% cover	Crust/Meadow									
Polycarpa scuba (white tipped)	Counts	1-3 cm							1		2
Polycarpa scuba	Counts	1-3 cm								1	
Spirobranchus sp.	Counts	1-3 cm		4	15	5	1	1	2		
Pseudopotamilla reniformis	% cover	Crust/Meadow		P							
PORIFERA crusts	% cover	Crust/Meadow	4	5	10	3	2	6	3		5
PORIFERA crusts (CALCAREA))	% cover	Crust/Meadow				3					
Phoronis hippocrepia	% cover	Crust/Meadow							4	2	40
Spirorbinae	% cover	Crust/Meadow	10			5					
Terpios gelatinosa	% cover	Crust/Meadow								1	
Verruca stroemia	% cover	Crust/Meadow	P	P	P	P				P	P
Holes in rock - predict *Hiatella*, not confirmed	Present		P	P	P	P	P	P	P	P	P

Garfish Cave – Analysis (cont.)			Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3
		Images by	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	31 cm	31 cm	31 cm
		Image Number	2640	2650	2652	2667	2672	7927	7928	7929
Species	**Counts/%cover**	**SACFOR size**							**No Fauna**	**No Fauna**
ASCIDIACEA (small solitary)	% cover	Crust/Meadow								
Aplysilla sulfurea	% cover	Crust/Meadow								
Ascidia conchilega	Counts	3-15 cm				1				
Asterias rubens	Counts	>15 cm								
BRYOZOA crusts	% cover	Crust/Meadow	2	5	3	1	3			
Caryophyllia smithii	Counts	1-3 cm			1	2				
Caryophyllia sp.	Counts	1-3 cm		1						
CIRRIPEDIA	% cover	Crust/Meadow	50	5	5	3	5			
Cliona spp. agg.	% cover	Crust/Meadow	1	1	1	1	1			
Corallinaceae	% cover	Crust/Meadow						3		
Dercitus bucklandi	% cover	Crust/Meadow	2							
Disporella hispida	% cover	Crust/Meadow		1	1	1	1			
Dysidea fragilis	% cover	Crust/Meadow	1	2	2	2	2			
Galathea strigosa	Counts	3-15 cm								
Hiatella sp.	Counts	1-3 cm	10	5	10	7				
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	50	60	70	30	60			
Lissoclinum perforatum	% cover	Crust/Meadow		1	1					
Perophora listeri	% cover	Crust/Meadow	P			P				
Polycarpa scuba (white tipped)	Counts	1-3 cm					1			
Polycarpa scuba	Counts	1-3 cm								
Spirobranchus sp.	Counts	1-3 cm				2	2			
Pseudopotamilla reniformis	% cover	Crust/Meadow								
PORIFERA crusts	% cover	Crust/Meadow	5	5	3	5	5			
PORIFERA crusts (CALCAREA))	% cover	Crust/Meadow				1				
Phoronis hippocrepia	% cover	Crust/Meadow	20			5				
Spirorbinae	% cover	Crust/Meadow								
Terpios gelatinosa	% cover	Crust/Meadow				1				
Verruca stroemia	% cover	Crust/Meadow	P	P	P		P			
Holes in rock - predict *Hiatella*, not confirmed	Present		P	P	P	P	P			

Garfish Cave - Raw abundance			Very Upper Wall	Very Upper Wall	Very Upper Wall	Very Upper Wall	Main wall	Main wall	Main wall	Main wall	Main wall
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image number	2657	2662	2663	2664	2630	2631	2634	2635	2636
		Primer label	Ga.12	Ga.13	Ga.14	Ga.15	Ga.2	Ga.3	Ga.4	Ga.5	Ga.6
	Counts/Cover %	SACFOR size									
Aplysilla sulfurea	Cover%	Crust/Meadow (%)						1		1	
Ascidia conchilega	Count	3-15cm									
ASCIDIACEA	Cover%	Crust/Meadow (%)						4			
Asterias rubens	Count	>15cm						1			
BRYOZOA	Cover%	Crust/Meadow (%)	3	5	3	2	1	5	20	8	3
Caryophyllia sp.	Count	1-3cm					1	4	2	1	
CIRRIPEDIA	Cover%	Crust/Meadow (%)	30	70	60	60	1		1	20	5
Cliona spp. agg.	Cover%	Crust/Meadow (%)							3		
Corallinaceae	Cover%	Crust/Meadow (%)									
Dercitus bucklandi	Cover%	Crust/Meadow (%)									
Disporella hispida	Cover%	Crust/Meadow (%)					1	1	1	1	
Dysidea fragilis	Cover%	Crust/Meadow (%)					2		1	3	
Galathea strigosa	Count	3-15cm	1								
Hiatella sp.	Count	1-3cm	22	45	22	27	3	5	30	10	7
HYDRO/BRYO	Cover%	Crust/Meadow (%)		2	5	3	85	40	50	10	50
Lissoclinum perforatum	Cover%	Crust/Meadow (%)							1		
Perophora listeri	Cover%	Crust/Meadow (%)									
Phoronis hippocrepia	Cover%	Crust/Meadow (%)							4	2	40
Polycarpa sp.	Count	1-3cm							1	1	2
PORIFERA	Cover%	Crust/Meadow (%)	4	5	10	6	2	6	3		5
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)		0							
Spirobranchus sp.	Count	1-3cm		4	15	5	1	1	2		
Spirorbinae	Cover%	Crust/Meadow (%)	10			5					
Terpios gelatinosa	Cover%	Crust/Meadow (%)								1	
Verruca stroemia	Cover%	Crust/Meadow (%)	0	0	0	0				0	0

Garfish Cave - Raw abundance (cont.)			Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3
		Images by	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	31 cm	31 cm	31 cm
		Image number	2640	2650	2652	2667	2672	7927		
		Primer label	Ga.7	Ga.8	Ga.9	Ga.10	Ga.11	Ga.1	NO fauna	NO fauna
	Counts/Cover%	SACFOR size								
Aplysilla sulfurea	Cover%	Crust/Meadow (%)								
Ascidia conchilega	Count	3-15cm				1				
ASCIDIACEA	Cover%	Crust/Meadow (%)								
Asterias rubens	Count	>15cm								
BRYOZOA	Cover%	Crust/Meadow (%)	2	5	3	1	3			
Caryophyllia sp.	Count	1-3cm		1	1	2				
CIRRIPEDIA	Cover%	Crust/Meadow (%)	50	5	5	3	5			
Cliona spp. agg.	Cover%	Crust/Meadow (%)	1	1	1	1	1			
Corallinaceae	Cover%	Crust/Meadow (%)						3		
Dercitus bucklandi	Cover%	Crust/Meadow (%)	2							
Disporella hispida	Cover%	Crust/Meadow (%)		1	1	1	1			
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	2	2	2	2			
Galathea strigosa	Count	3-15cm								
Hiatella sp.	Count	1-3cm	10	5	10	7				
HYDRO/BRYO	Cover%	Crust/Meadow (%)	50	60	70	30	60			
Lissoclinum perforatum	Cover%	Crust/Meadow (%)		1	1					
Perophora listeri	Cover%	Crust/Meadow (%)	0			0				
Phoronis hippocrepia	Cover%	Crust/Meadow (%)	20			5				
Polycarpa sp.	Count	1-3cm					1			
PORIFERA	Cover%	Crust/Meadow (%)	5	5	3	6	5			
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)								
Spirobranchus sp.	Count	1-3cm				2	2			
Spirorbinae	Cover%	Crust/Meadow (%)								
Terpios gelatinosa	Cover%	Crust/Meadow (%)				1				
Verruca stroemia	Cover%	Crust/Meadow (%)	0	0	0		0			

Garfish Cave - SACFOR Categories			Very Upper Wall	Very Upper Wall	Very Upper Wall	Very Upper Wall	Main wall	Main wall	Main wall	Main wall	Main wall
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image number	2657	2662	2663	2664	2630	2631	2634	2635	2636
		Primer label	Ga.12	Ga.13	Ga.14	Ga.15	Ga.2	Ga.3	Ga.4	Ga.5	Ga.6
	Counts/Cover %	SACFOR size									
Aplysilla sulfurea	Cover%	Crust/Meadow (%)						1		1	
Ascidia conchilega	Count	3-15cm									
ASCIDIACEA	Cover%	Crust/Meadow (%)						1			
Asterias rubens	Count	>15cm						6			
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1	1	1	4	2	1
Caryophyllia sp.	Count	1-3cm					4	5	8	4	
CIRRIPEDIA	Cover%	Crust/Meadow (%)	4	5	5	5	1		1	4	1
Cliona spp. agg.	Cover%	Crust/Meadow (%)							1		
Corallinaceae	Cover%	Crust/Meadow (%)									
Dercitus bucklandi	Cover%	Crust/Meadow (%)									
Disporella hispida	Cover%	Crust/Meadow (%)					1	1	1	1	
Dysidea fragilis	Cover%	Crust/Meadow (%)					1		1	1	
Galathea strigosa	Count	3-15cm	5								
Hiatella sp.	Count	1-3cm	5	6	5	5	4	5	5	5	5
HYDRO/BRYO	Cover%	Crust/Meadow (%)		1	1	1	6	5	5	3	5
Lissoclinum perforatum	Cover%	Crust/Meadow (%)							1		
Perophora listeri	Cover%	Crust/Meadow (%)									
Phoronis hippocrepia	Cover%	Crust/Meadow (%)							1	1	5
Polycarpa sp.	Count	1-3cm							4	4	4
PORIFERA	Cover%	Crust/Meadow (%)	1	1	3	2	1	2	1		1
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)		1							
Spirobranchus sp.	Count	1-3cm		5	5	5	4	4	4		
Spirorbinae	Cover%	Crust/Meadow (%)	3			1					
Terpios gelatinosa	Cover%	Crust/Meadow (%)								1	
Verruca stroemia	Cover%	Crust/Meadow (%)	1	1	1	1				1	1

Garfish Cave - SACFOR Categories (cont.)			Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3
		Images by	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	31 cm	31 cm	31 cm
		Image number	2640	2650	2652	2667	2672	7927		
		Primer label	Ga.7	Ga.8	Ga.9	Ga.10	Ga.11	Ga.1	NO fauna	NO fauna
	Counts/Cover%	SACFOR size								
Aplysilla sulfurea	Cover%	Crust/Meadow (%)								
Ascidia conchilega	Count	3-15cm				5				
ASCIDIACEA	Cover%	Crust/Meadow (%)								
Asterias rubens	Count	>15cm								
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1	1			
Caryophyllia sp.	Count	1-3cm		4	4	4				
CIRRIPEDIA	Cover%	Crust/Meadow (%)	5	1	1	1	1			
Cliona spp. agg.	Cover%	Crust/Meadow (%)	1	1	1	1	1			
Corallinaceae	Cover%	Crust/Meadow (%)						1		
Dercitus bucklandi	Cover%	Crust/Meadow (%)	1							
Disporella hispida	Cover%	Crust/Meadow (%)		1	1	1	1			
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	1	1	1	1			
Galathea strigosa	Count	3-15cm								
Hiatella sp.	Count	1-3cm	5	5	5	5				
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	5	5	4	5			
Lissoclinum perforatum	Cover%	Crust/Meadow (%)		1	1					
Perophora listeri	Cover%	Crust/Meadow (%)	1			1				
Phoronis hippocrepia	Cover%	Crust/Meadow (%)	4			1				
Polycarpa sp.	Count	1-3cm					4			
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	2	1			
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)								
Spirobranchus sp.	Count	1-3cm				4	4			
Spirorbinae	Cover%	Crust/Meadow (%)								
Terpios gelatinosa	Cover%	Crust/Meadow (%)				1				
Verruca stroemia	Cover%	Crust/Meadow (%)	1	1	1		1			

Data Analysis for Hidden Cleft Cave.

Complicated cave with additional notes that further describe the biotope problems. The biotopes listed below are heavily caveated as they do not appear to be very representative.

Note 5 biotopes have been listed as contributing to the area surveyed.	
CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSp	Hab 1 mosaic
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Possible contribution to the area
IR.FIR.SG.CrSpAsAn	Hab 1 mosaic
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Possible contribution to the area
IR.FIR.SG.CrSpAsDenB	Hab 2
Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock	Lower wall. Too narrow and scoured to separate clearly.
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.

ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Rough count as often hard to see through substrate cover. Additionally suspect deep retraction into the substrate.
BRYOZOA crusts	*Schizimavella* sp. found to be present in samples but left at higher level for analysis.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf. Percent cover difficult to establish.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polychaete tubes	Appear to be soft bodied tubes. No worms seen.
Pseudopotamilla reniformis	Recognisable soft tube, so separated from general polychaete tubes.
PORIFERA crusts (Ancorinidae - *Stelletta/Stryphnus*)	Both species were found within this cave and found to have a very similar surface appearance, hence not seperated within the stills. Where one was sampled, and a species was established, that has been seperated within the data sheet.
Crisiidae turf	Found to consist of *Crisia denticulata*, with smaller tufts of *Crisidia cornuta.*
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two, % cover has been used.
Oscarella lobularis	Surface appearance consistent with this sponge but unable to be absolutley sure and was not sampled.
AMB picture selection	Additional images done as quadrat stills did not really pick up the some of the key species that occurred a lot through the survey area. Obviously as often species focused, the stills are not random and heavily slanted to sponges but added here for interest. Not suitable for inclusion in stats analysis.

Hidden Cleft Cave – Analysis			Lower	Lower	Lower	Lower	Mid to High	Mid to High	Mid area small overhang	Mid area small overhang	Mid area small overhang	Mid area small overhang	2.9m deep	2.9m deep	2.9m deep	2.9m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep					
			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8252	8254	8255	8256	8265	8267	8236	8239	8242	8244	2771	2773	2774	2776	2780	2782	2786	2787	2799	2811	2815	2826	8246	8247	8248	8249	8250
Species	**Counts/%cover**	**SACFOR size**																							No fauna			No fauna	
Aplidium elegans	% cover	Crust/Meadow					2	1																					
Aplysilla rosea	% cover	Crust/Meadow				1	1				1							1				1							
Aplysilla sulfurea	% cover	Crust/Meadow		1																	3								
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	3	1	4	2																1	1						
BRYOZOA crusts	% cover	Crust/Meadow	2			1	2			1	10	5	2		3	1	1	1	1	3		2							
Caryophyllia (= *inornata*)	Counts	1-3 cm			1																								
Caryophyllia smithii	Counts	1-3 cm									1	1				1		1											
Caryophyllia sp.	Counts	1-3 cm																	2			1							
CIRRIPEDIA	% cover	Crust/Meadow								1	1				1														
Crisiidae turf	% cover	Crust/Meadow														10													
Dercitus bucklandi	% cover	Crust/Meadow			70				1		1					60		50	50										
Disporella hispida	% cover	Crust/Meadow							1								1												
Dysidea fragilis	% cover	Crust/Meadow	1	3		2	2		2		2	2			1	2	5	1	1		1	1	1						
Eurypon major	% cover	Crust/Meadow																					2						
Haliclona simulans	% cover	Crust/Meadow								10				8	4			3	3										
Hiatella sp.	Counts	1-3 cm	5	1	8	3	3	13	6	9	3	4	5	9	3	4	3			6	2	15							
Holes in rock - predict *Hiatella*, not confirmed	Present		P	P		P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	P						
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	40	80	20	70	80	70	60	50	50	60	40	80	40	10	60	5	40	70	70	50	40				30		
Oscarella lobularis	% cover	Crust/Meadow	20		1	2					1									2	3	3							
Pachymatisma johnstonia	% cover	Massive/Turf											10																
Perophora listeri	% cover	Crust/Meadow																			P								
Polycarpa scuba	Counts	1-3 cm	2																										
PORIFERA crusts	% cover	Crust/Meadow	5	5	1	10	3	3	5	5		5	10	4	5		10	5	5	4	5	5	2						
PORIFERA crusts (Ancorinidae - *Stelletta/Stryphnus*)	% cover	Crust/Meadow		1		2	2	1	2			1	4	1	1	1			2	1	1	1	25						
Pseudopotamilla reniformis	% cover	Crust/Meadow									2																		
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow						1			1						1												
Spirobranchus sp. tubes	Counts	1-3 cm									2	2										1							
Spirobranchus sp. tubes - dead	Counts	1-3 cm																						2			40		
Spirorbinae	% cover	Crust/Meadow						1																					
Stelletta grubii	% cover	Crust/Meadow																10											
Stryphnus ponderosus	% cover	Crust/Meadow																		4		20							
Terpios gelatinosa	% cover	Crust/Meadow					1			1	1	1		1			1												
Tubularia indivisa	% cover	Massive/Turf													5														

Hidden Cleft Cave - Raw abundance			Lower	Lower	Lower	Lower	Mid to High	Mid to High	Mid area small overhang	Mid area small overhang	Mid area small overhang	Mid area small overhang	2.9m deep	2.9m deep	2.9m deep	2.9m deep	4.2m deep
			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	AMB	AMB	AMB	AMB	AMB
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8252	8254	8255	8256	8265	8267	8236	8239	8242	8244	2771	2773	2774	2776	2780
		Primer label	HC.1	HC.2	HC.3	HC.4	HC.5	HC.6	HC.7	HC.8	HC.9	HC.10	HC.11	HC.12	HC.13	HC.14	HC.15
	Counts/Cover%	SACFOR size															
Ancorinidae	Cover%	Crust/Meadow (%)		1		2	2	1	2			1	4	1	1	1	4
Aplidium elegans	Cover%	Crust/Meadow (%)					2	1									
Aplysilla rosea	Cover%	Crust/Meadow (%)				1	1				1						
Aplysilla sulfurea	Cover%	Crust/Meadow (%)		1													
ASCIDIACEA	Cover%	Crust/Meadow (%)	3	1	4	2											3
BRYOZOA	Cover%	Crust/Meadow (%)	2			1	2			1	10	5	2		3	1	2
Caryophyllia sp.	Count	1-3cm			1						1	1				1	
CIRRIPEDIA	Cover%	Crust/Meadow (%)								1	1				1		
Crisiidae	Cover%	Crust/Meadow (%)														10	
Dercitus bucklandi	Cover%	Crust/Meadow (%)			70				1		1					60	
Disporella hispida	Cover%	Crust/Meadow (%)							1								
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	3		2	2		2		2	2			1	2	1
Haliclona simulans	Cover%	Crust/Meadow (%)								10				8	4		
Hiatella sp.	Count	1-3cm	5	1	8	3	3	13	6	9	3	4	5	9	3	4	4
HYDRO/BRYO	Cover%	Crust/Meadow (%)	40	80	20	70	80	70	60	50	50	60	40	80	40	10	30
Oscarella lobularis	Cover%	Crust/Meadow (%)	20		1	2					1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)											10				
Perophora listeri	Cover%	Crust/Meadow (%)															
Polycarpa sp.	Count	1-3cm	2														
PORIFERA	Cover%	Crust/Meadow (%)	5	5	1	10	3	3	5	5		5	10	4	5		40
SABELLIDA	Cover%	Crust/Meadow (%)						0			0						
Spirobranchus sp.	Count	1-3cm									2	2					
Spirorbinae	Cover%	Crust/Meadow (%)						1									
Stelletta grubii	Cover%	Crust/Meadow (%)															
Stryphnus ponderosus	Cover%	Crust/Meadow (%)															
Terpios gelatinosa	Cover%	Crust/Meadow (%)					1			1	1	1		1			
Tubularia indivisa	Cover%	Mass/Turf (%)													5		

Hidden Cleft Cave - Raw abundance (cont.)			4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep					
			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	AMB	AMB	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	2782	2786	2787	2799	2811	2815	2826	8246	8247	8248	8249	8250
		Primer label	HC.16	HC.17	HC.18	HC.19	HC.20	HC.21	HC.22				HC.23	
	Counts/Cover %	SACFOR size												
Ancorinidae	Cover%	Crust/Meadow (%)			2	1	1	1	25					
Aplidium elegans	Cover%	Crust/Meadow (%)												
Aplysilla rosea	Cover%	Crust/Meadow (%)		1				1						
Aplysilla sulfurea	Cover%	Crust/Meadow (%)					3							
ASCIDIACEA	Cover%	Crust/Meadow (%)						1	1					
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	3		2						
Caryophyllia sp.	Count	1-3cm		1	2			1						
CIRRIPEDIA	Cover%	Crust/Meadow (%)												
Crisiidae	Cover%	Crust/Meadow (%)												
Dercitus bucklandi	Cover%	Crust/Meadow (%)		50	50									
Disporella hispida	Cover%	Crust/Meadow (%)	1											
Dysidea fragilis	Cover%	Crust/Meadow (%)	5	1	1		1	1	1					
Haliclona simulans	Cover%	Crust/Meadow (%)		3	3									
Hiatella sp.	Count	1-3cm	3			6	2	15						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	60	5	40	70	70	50	40				30	
Oscarella lobularis	Cover%	Crust/Meadow (%)				2	3	3						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)												
Perophora listeri	Cover%	Crust/Meadow (%)					0							
Polycarpa sp.	Count	1-3cm												
PORIFERA	Cover%	Crust/Meadow (%)	10	5	5	4	5	5	4					
SABELLIDA	Cover%	Crust/Meadow (%)	0											
Spirobranchus sp.	Count	1-3cm						1						
Spirorbinae	Cover%	Crust/Meadow (%)												
Stelletta grubii	Cover%	Crust/Meadow (%)		10										
Stryphnus ponderosus	Cover%	Crust/Meadow (%)				4		20						
Terpios gelatinosa	Cover%	Crust/Meadow (%)	1											
Tubularia indivisa	Cover%	Mass/Turf (%)												

Hidden Cleft Cave - SACFOR Categories			Lower	Lower	Lower	Lower	Mid to High	Mid to High	Mid area small overhang	Mid area small overhang	Mid area small overhang	Mid area small overhang	2.9m deep	2.9m deep	2.9m deep	2.9m deep	4.2m deep
			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	AMB	AMB	AMB	AMB	AMB
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8252	8254	8255	8256	8265	8267	8236	8239	8242	8244	2771	2773	2774	2776	2780
		Primer label	HC.1	HC.2	HC.3	HC.4	HC.5	HC.6	HC.7	HC.8	HC.9	HC.10	HC.11	HC.12	HC.13	HC.14	HC.15
	Counts/Cover%	SACFOR size															
Ancorinidae	Cover%	Crust/Meadow (%)		1		1	1	1	1			1	1	1	1	1	1
Aplidium elegans	Cover%	Crust/Meadow (%)					1	1									
Aplysilla rosea	Cover%	Crust/Meadow (%)				1	1				1						
Aplysilla sulfurea	Cover%	Crust/Meadow (%)		1													
ASCIDIACEA	Cover%	Crust/Meadow (%)	1	1	1	1											1
BRYOZOA	Cover%	Crust/Meadow (%)	1			1	1			1	3	1	1		1	1	1
Caryophyllia sp.	Count	1-3cm			4						4	4				4	
CIRRIPEDIA	Cover%	Crust/Meadow (%)								1	1				1		
Crisiidae	Cover%	Crust/Meadow (%)														3	
Dercitus bucklandi	Cover%	Crust/Meadow (%)			5				1		1					5	
Disporella hispida	Cover%	Crust/Meadow (%)							1								
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	1		1	1		1		1	1			1	1	1
Haliclona simulans	Cover%	Crust/Meadow (%)								3				2	1		
Hiatella sp.	Count	1-3cm	5	4	5	4	4	5	5	5	4	5	5	5	4	5	5
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	6	4	5	6	5	5	5	5	5	5	6	5	3	4
Oscarella lobularis	Cover%	Crust/Meadow (%)	4		1	1					1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)											4				
Perophora listeri	Cover%	Crust/Meadow (%)															
Polycarpa sp.	Count	1-3cm	4														
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	3	1	1	1	1		1	3	1	1		5
SABELLIDA	Cover%	Crust/Meadow (%)						1			2						
Spirobranchus sp.	Count	1-3cm									4	4					
Spirorbinae	Cover%	Crust/Meadow (%)						1									
Stelletta grubii	Cover%	Crust/Meadow (%)															
Stryphnus ponderosus	Cover%	Crust/Meadow (%)															
Terpios gelatinosa	Cover%	Crust/Meadow (%)					1			1	1	1		1			
Tubularia indivisa	Cover%	Mass/Turf (%)													2		

Hidden Cleft Cave - SACFOR Categories (cont.)			4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep	4.2m deep					
			Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Main wall	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	AMB	AMB	AMB	AMB	AMB	AMB	AMB	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	2782	2786	2787	2799	2811	2815	2826	8246	8247	8248	8249	8250
		Primer label	HC.16	HC.17	HC.18	HC.19	HC.20	HC.21	HC.22				HC.23	
	Counts/Cover%	SACFOR size												
Ancorinidae	Cover%	Crust/Meadow (%)			1	1	1	1	4					
Aplidium elegans	Cover%	Crust/Meadow (%)												
Aplysilla rosea	Cover%	Crust/Meadow (%)		1				1						
Aplysilla sulfurea	Cover%	Crust/Meadow (%)					1							
ASCIDIACEA	Cover%	Crust/Meadow (%)						1	1					
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1		1						
Caryophyllia sp.	Count	1-3cm		4	4			4						
CIRRIPEDIA	Cover%	Crust/Meadow (%)												
Crisiidae	Cover%	Crust/Meadow (%)												
Dercitus bucklandi	Cover%	Crust/Meadow (%)		5	5									
Disporella hispida	Cover%	Crust/Meadow (%)	1											
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	1	1		1	1	1					
Haliclona simulans	Cover%	Crust/Meadow (%)		1	1									
Hiatella sp.	Count	1-3cm	4			5	4	5						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	1	5	5	5	5	5				4	
Oscarella lobularis	Cover%	Crust/Meadow (%)				1	1	1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)												
Perophora listeri	Cover%	Crust/Meadow (%)					1							
Polycarpa sp.	Count	1-3cm												
PORIFERA	Cover%	Crust/Meadow (%)	3	1	1	1	1	1	1					
SABELLIDA	Cover%	Crust/Meadow (%)	1											
Spirobranchus sp.	Count	1-3cm						4						
Spirorbinae	Cover%	Crust/Meadow (%)												
Stelletta grubii	Cover%	Crust/Meadow (%)		3										
Stryphnus ponderosus	Cover%	Crust/Meadow (%)				1		4						
Terpios gelatinosa	Cover%	Crust/Meadow (%)	1											
Tubularia indivisa	Cover%	Mass/Turf (%)												

Data Analysis for London Bridge Cave.

Note 6 biotopes have been listed as contributing to the area surveyed	
IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Hiatella dominated - rear of cave
CR.MCR.CFaVS.CuSpH.As	Hab 1
Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock	Forming a mosaic with HiaSw
IR.FIR.SG.CrSp	Hab 2
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Mussel zone - towards outer area of cave
IR.FIR.SG.CrSpAsAn	Hab 2
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mussel zone - towards outer area of cave
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Mosaic towards cave walls with CC.Mo

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Hiatella sp. (possible that other species present)	Very rough count as very hard to see through substrate cover.
Polycarpa scuba	Very rough count as very hard to see through substrate cover. Also very possible that some *Dendrodoa grossularia* present. Samples taken and found to to be *P.scuba*.
CIRRIPEDIA	Very rough as obscured and often unable to tell if live or dead.
BRYOZOA crusts	Potentially a few species present but left at this level. Only *Turbicellepora avicularis* particularly noted.
Caryophyllia sp.	Left at this where I might have a reason to suspect that it is *C.inornata* or *C.smithii* juv.
Diplosoma (= *listerianum*)	Within this survey , it is believed that *Diplosoma listerianum* and *D.spongiforme* are both present within the area. It may be the feeling at times that one or the other of these species is definitely present. However, due to the difficulty in telling them apart, that relies on colony features, not always present at the time of sampling such as larvae, a species may have been suggested but often marked with (=) to highlight the inherant problems with certainty in may cases. For the purposes of Primer analysis, they have all been raised to *Diplosoma* sp.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been seperated, this will be logged as Massive/Turf.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.
Sertularella gaudichaudi	This species is confirmed as present due to sampling undertaken within the cave. It would otherwise have been logged under HYDROZOA/BRYOZOA low turf. As a result, only entered as 'Present', as no meaningful SACFOR rating can be given.
Corallinaceae	Cave floor comprising very mobile cobbles on which only coralline algae particulalrly noted. Hard to establish cover as colouration of stones themselves may contribute in places.
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two, % cover has been used.

London Bridge Cave – Analysis		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7900	7901	7902	7903	7904	7905	7906	7885	7886	7887	7888	7889	7890	7891	7892	7893	7894	7895	7873	7874	7875	7876	7877	7878
Species	**Counts/%cover**	**SACFOR size**																									
ASCIDIACEA (small solitary)	% cover	Crust/Meadow											8														
ACTINIARIA	Counts	3-15 cm			1										1					8							
Asterias rubens	Counts	>15 cm																		1							
BRYOZOA crusts	% cover	Crust/Meadow		3			2		1		3																
Cliona spp. agg.	% cover	Crust/Meadow			2				2		3	10	50	5													
Clathrina coriacea agg.	% cover	Crust/Meadow			1		2	1	1																		
CIRRIPEDIA	% cover	Crust/Meadow		20	10	1		2		30	1			2	2			2		2							
Corynactis viridis	% cover	Crust/Meadow	4																								
Corallinaceae	% cover	Crust/Meadow																			10	10	10	10	10	10
Didemnidae	% cover	Crust/Meadow	1				1	2	2		1																
Diplosoma (= *listerianum*)	% cover	Crust/Meadow								4																	
Didemnum maculosum	% cover	Crust/Meadow							2				1														
Haliclona simulans	% cover	Crust/Meadow					2																				
Haliclona sp.	% cover	Crust/Meadow			1																						
Hiatella sp.	Counts	1-3 cm	30	2	20	100	100	100	150		16	3	10	9	5	2	10	8	10	3							
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	20	1	10	10	10		2	5	25	5	20	10	10												
Leuconia nivea	% cover	Crust/Meadow				1	3	3	1																		
Mytilus edulis	% cover	Crust/Meadow	20	20	20	5	2			20	20	60	40	60	70	95	95	95	95	95							
Pachymatisma johnstonia	% cover	Crust/Meadow						1																			
PORIFERA crusts	% cover	Crust/Meadow	10	10	20	20	20	25	25	10	30	20	5	3	1	2	1	1									
Polycarpa scuba	Counts	1-3 cm	2		2	10	12		5	8	2	2					1										
Pseudopotamilla reniformis	% cover	Crust/Meadow							P		P																
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow	P			P	P	P			P																
Sagartia = troglodytes	Counts	3-15 cm	13	11	5	8					1	17	10	20			8	8									
Sagartia (= *elegans*)	Counts	3-15 cm											3				2	3	21								
Sagartia sp.	Counts	3-15 cm			2															2							
Sertularella gaudichaudi	% cover	Crust/Meadow	P																								
Styelidae (colonial)	% cover	Crust/Meadow	1		1																						

London Bridge Cave - Raw abundance		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7900	7901	7902	7903	7904	7905	7906	7885	7886	7887	7888	7889	7890	7891	7892	7893	7894	7895	7873	7874	7875	7876	7877	7878
		Primer label	LB.1	LB.2	LB.3	LB.4	LB.5	LB.6	LB.7	LB.8	LB.9	LB.10	LB.11	LB.12	LB.13	LB.14	LB.15	LB.16	LB.17	LB.18	LB.19	LB.20	LB.21	LB.22	LB.23	LB.24
	Counts/Cover%	SACFOR size																								
ACTINIARIA	Count	3-15cm			1										1					8						
ASCIDIACEA	Cover%	Crust/Meadow (%)											8													
Asterias rubens	Count	>15cm																		1						
BRYOZOA	Cover%	Crust/Meadow (%)		3			2		1		3															
CIRRIPEDIA	Cover%	Crust/Meadow (%)		20	10	1		2		30	0			2	2			2		2						
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)			1		2	1	1																	
Cliona spp. agg.	Cover%	Crust/Meadow (%)			2				2		3	10	50	5												
Corallinaceae	Cover%	Crust/Meadow (%)																			10	10	10	10	10	10
Corynactis viridis	Cover%	Crust/Meadow (%)	4																							
Didemnidae	Cover%	Crust/Meadow (%)	1				1	2	2		1															
Didemnum maculosum	Cover%	Crust/Meadow (%)							2				1													
Diplosoma sp.	Cover%	Crust/Meadow (%)								4																
Haliclona simulans	Cover%	Crust/Meadow (%)					2																			
Haliclona sp.	Cover%	Crust/Meadow (%)			1																					
Hiatella sp.	Count	1-3cm	30	2	20	100	100	100	150		16	3	10	9	5	2	10	8	10	3						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	20	1	10	10	10		2	5	25	5	20	10	10											
Leuconia nivea	Cover%	Crust/Meadow (%)				1	3	3	1																	
Mytilus edulis	Cover%	Crust/Meadow (%)	20	20	20	5	2			20	20	60	40	60	70	95	95	95	95	95						
Pachymatisma johnstonia	Cover%	Crust/Meadow (%)						1																		
Polycarpa sp.	Count	1-3cm	2		2	10	12		5	8	2	2					1									
PORIFERA	Cover%	Crust/Meadow (%)	10	10	20	20	20	25	25	10	30	20	5	3	1	2	1	1								
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									0															
SABELLIDA	Cover%	Crust/Meadow (%)	0			0	0	0	0																	
Sagartia spp.	Count	3-15cm	13	11	7	8					1	17	13	20			10	11	21	2						
Sertularella gaudichaudi	Cover%	Crust/Meadow (%)	0																							
Styelidae	Cover%	Crust/Meadow (%)	1		1																					

London Bridge Cave - SACFOR Categories		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7900	7901	7902	7903	7904	7905	7906	7885	7886	7887	7888	7889	7890	7891	7892	7893	7894	7895	7873	7874	7875	7876	7877	7878
		Primer label	LB.1	LB.2	LB.3	LB.4	LB.5	LB.6	LB.7	LB.8	LB.9	LB.10	LB.11	LB.12	LB.13	LB.14	LB.15	LB.16	LB.17	LB.18	LB.19	LB.20	LB.21	LB.22	LB.23	LB.24
	Counts/Cover%	SACFOR size																								
ACTINIARIA	Count	3-15cm			5										5					6						
ASCIDIACEA	Cover%	Crust/Meadow (%)											2													
Asterias rubens	Count	>15cm																		6						
BRYOZOA	Cover%	Crust/Meadow (%)		1			1		1		1															
CIRRIPEDIA	Cover%	Crust/Meadow (%)		4	3	1		1		4	1			1	1			1		1						
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)			1		1	1	1																	
Cliona spp. agg.	Cover%	Crust/Meadow (%)			1				1		1	3	5	1												
Corallinaceae	Cover%	Crust/Meadow (%)																			3	3	3	3	3	3
Corynactis viridis	Cover%	Crust/Meadow (%)	1																							
Didemnidae	Cover%	Crust/Meadow (%)	1				1	1	1		1															
Didemnum maculosum	Cover%	Crust/Meadow (%)							1				1													
Diplosoma sp.	Cover%	Crust/Meadow (%)								1																
Haliclona simulans	Cover%	Crust/Meadow (%)					1																			
Haliclona sp.	Cover%	Crust/Meadow (%)			1																					
Hiatella sp.	Count	1-3cm	5	4	5	6	6	6	6		5	4	5	5	4	4	5	5	5	4						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	1	3	3	3		1	1	4	1	4	3	3											
Leuconia nivea	Cover%	Crust/Meadow (%)				1	1	1	1																	
Mytilus edulis	Cover%	Crust/Meadow (%)	4	4	4	1	1			4	4	5	5	5	5	6	6	6	6	6						
Pachymatisma johnstonia	Cover%	Crust/Meadow (%)						1																		
Polycarpa sp.	Count	1-3cm	4		4	5	5		4	5	4	4					4									
PORIFERA	Cover%	Crust/Meadow (%)	3	3	4	4	4	4	4	3	4	4	1	1	1	1	1	1								
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									1															
SABELLIDA	Cover%	Crust/Meadow (%)	1			1	1	1	1																	
Sagartia spp.	Count	3-15cm	6	6	6	6					5	6	6	6			6	6	6	5						
Sertularella gaudichaudi	Cover%	Crust/Meadow (%)	1																							
Styelidae	Cover%	Crust/Meadow (%)	1		1																					

Data Analysis for Ore Stone (swim through).

Note 5 biotopes have been listed as contributing to the area surveyed.	
IR.MIR.KR.HiaSw	
Hiatella arctica and seaweeds on vertical limestone / chalk.	Hab 1
CR.FCR.Cv.SpCup	Hab 1 secondary
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSpAsAn	Hab 1 secondary
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.FIR.SG	Hab 3
Infralittoral surge gullies and caves	

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate. ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Cliona celata	This has not been picked up in the stills images but is recorded on site. A distinction is made between the low lying boring version of the sponge (*Cliona* agg.) and the large cushion form which is then referred to as *Cliona celata*. Within this survey overall, the likelihood is that both forms recorded are *Cliona celata* but the distinction in form has been maintained.
Hiatella sp. (possible that other species present)	Rough count. Substrate very obscured. Additionally suspect that well retracted into the substrate.
BRYOZOA crusts	*Schizomavella* sp. found but left at this level for analysis.
HYDROZOA / BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf. Within this cave, very few species formed any recognisable erect form, apart from the occasional presence of *Tubularia indivisa* and Plumulariidae (*Plumularia setacea* and/or *Kirchenpaueria* spp.).
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
PORIFERA crusts (white - *Stelletta*/*Stryphnus*/*Leuconia*)	All three species were found within this cave, the large forms very clearly found to be *Stelletta grubii* but not picked up within the stills selected for image analysis. Where the white crusts were more low-lying, and subsequently sampled, there was found to be a mixture of *S.grubii and Stryphnus ponderosus*. The observation is that in their low lying form, the two have a very similar surface appearance. *Leuconia nivea* was also present but this has been logged under PORIFERA crust if suspected of being present, often due to the quality of the images, preventing definite separation.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in Appendix III. Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
Sagartia (= *troglodytes*)	There is a common anemone seen across the area that if reviewed on-line on various web sites is presented as *Sargartia troglodytes*. However the images are very variable for this species and they do not appear to be the classic images included within the guide to Anemones and Corals by Chris Wood (2005). For this reason, they have been caveated as (=). Where not caveated by an (=), the view is that the more classic appearance is present. For the purposes of the statistical analysis it is thought that some raising of all to *Sagartia* sp. might be required.
Amphipod tube mass - (*Jassa falcata*)	It is impossible to give any meaningful coverage to the presence of the soft tubes. Where present they are adhering in small quantities to the other low lying hydroid/bryozoan turf within the area or forming thin deposits on other fauna. They were most clearly seen within the mussels but were present in variable amounts across the area.
Tubularia sp.	This example has been separated from *T.indivisa* because the form appears small, low and creeping, possibly *Tubularia larynx*. It may be an unusual juvenile form of *T.indivisa* but it was impossible to be sure.
SABELLIDA (Serpulidae / Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.

Ore Stone – Analysis			South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	South wall. Sponge dominated by *Alcyonium digitatum.*	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.
			Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12
			South Wall	South Wall	South Wall	Underhang	South Wall	Underhang	South wall	Boulder in gully	Boulder in gully	Boulder in gully	N. wall 2m deep	N. wall 2m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep
			Mixed turf	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**8060**	**8065**	**8080**	**8095**	**8098**	**8100**	**8299**	**8046**	**8048**	**8091**	**8276**	**8277**	**8286**	**8287**	**8288**	**8289**	**8290**
Species	**Counts/%cover**	**SACFOR size**																	
ACTINIARIA	Counts	3-15 cm	1												1				1
Actinothoe sphyrodeta	Counts	3-15 cm	24	34						30	31	48	1				8	12	10
Alcyonium digitatum	% cover	Massive/Turf		40	3	8	8	20	20					2					
Amphilectus fucorum	% cover	Crust/Meadow	5	3	3					1	2	3		2					
Amphipod tube mass - (*Jassa falcata*)	% cover	Crust/Meadow	P	P					P						P				
ANTHOATHECATAE	% cover	Crust/Meadow				1													
BRYOZOA crusts	% cover	Crust/Meadow	2	2	1	1	1	1	2			2			1				
Cerianthus loydii	Counts	3-15 cm																	1
Chartella papyracea	% cover	Massive/Turf	2			2	1	10	1										
CIRRIPEDIA	% cover	Crust/Meadow		1			10												
Cliona spp.agg.	% cover	Crust/Meadow											5	3		2		3	3
Corynactis viridis	% cover	Crust/Meadow			40	30	4	10	10										
Dercitus bucklandi	% cover	Crust/Meadow		3		2	20												
Diplosoma (= *listerianum*)	% cover	Crust/Meadow			3	3		2		2			1	4		1			
Hiatella sp.	Counts	1-3 cm			12			2	10	1	1			1	3	6			
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	15	10	20	20	25	15	20	5	2	2	10	5	2				
Mytilus edulis	% cover	Crust/Meadow								60		85	60	90	90	30	60	75	65
Myxilla sp.	% cover	Crust/Meadow	2		1														
OPHIURIDA	% cover	Crust/Meadow														1			
Pachymatisma johnstonia	% cover	Massive/Turf					10												
Plumulariidae	% cover	Massive/Turf	1											2			2		
Polycarpa scuba	Counts	1-3 cm	6	8					6	1				2					
Polycarpa scuba (white tipped)	Counts	1-3 cm	7	4			1		2										
PORIFERA crusts	% cover	Crust/Meadow		10	5	5	10	5	30	20	25	25	10	5	1	60	25	10	20
PORIFERA crusts (*Stryphnus/Leuconia*)	% cover	Crust/Meadow	20																
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow														1			
Sagartia (= *elegans*)	Counts	3-15 cm														1			
Sagartia (= *troglodytes*)	Counts	3-15 cm								1	4		37	13		30	11	21	8
Sagartia sp.	Counts	3-15 cm	1											1	1		4		1
Tethya citrina	Counts	3-15 cm				1													
Tubularia indivisa	% cover	Massive/Turf		1					1	1	1		1		1	1		1	1
Holes in rock - predict *Hiatella*, not confirmed	Present				P	P	P	P	P	P	P	P	P		P	P			

Ore Stone - Raw abundance			South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.
			Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12
			South Wall	South Wall	South Wall	Underhang	South Wall	Underhang	South wall	Boulder in gully	Boulder in gully	Boulder in gully	N. wall 2m deep	N. wall 2m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep
			Mixed turf	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**8060**	**8065**	**8080**	**8095**	**8098**	**8100**	**8299**	**8046**	**8048**	**8091**	**8276**	**8277**	**8286**	**8287**	**8288**	**8289**	**8290**
		Primer label	**OS.11**	**OS.12**	**OS.13**	**OS.16**	**OS.14**	**OS.17**	**OS.15**	**OS.1**	**OS.2**	**OS.3**	**OS.4**	**OS.5**	**OS.6**	**OS.7**	**OS.8**	**OS.9**	**OS.10**
	Counts/Cover%	**SACFOR size**																	
ACTINIARIA	Count	3-15cm	1												1				1
Actinothoe sphyrodeta	Count	3-15cm	24	34						30	31	48	1				8	12	10
Alcyonium digitatum	Cover%	Mass/Turf (%)		40	3	8	8	20	20					2					
Amphilectus fucorum	Cover%	Crust/Meadow (%)	5	3	3					1	2	3		2					
ANTHOATECATA	Cover%	Crust/Meadow (%)				1													
BRYOZOA	Cover%	Crust/Meadow (%)	2	2	1	1	1	1	2			2			1				
Cerianthus loydii	Count	3-15cm																	1
Chartella papyracea	Cover%	Mass/Turf (%)	2			2	1	10	1										
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1			10												
Cliona spp.agg.	Cover%	Crust/Meadow (%)											5	3		2		3	3
Corynactis viridis	Cover%	Crust/Meadow (%)			40	30	4	10	10										
Dercitus bucklandi	Cover%	Crust/Meadow (%)		3		2	20												
Diplosoma sp.	Cover%	Crust/Meadow (%)			3	3		2		2			1	4		1			
Hiatella sp.	Count	1-3cm			12			2	10	1	1			1	3	6			
HYDRO/BRYO	Cover%	Crust/Meadow (%)	15	10	20	20	25	15	20	5	2	2	10	5	2				
Jassa falcata mass	Cover%	Crust/Meadow (%)	0	0					0						0				
Mytilus edulis	Cover%	Crust/Meadow (%)								60		85	60	90	90	30	60	75	65
Myxilla sp.	Cover%	Crust/Meadow (%)	2		1														
OPHIURIDA	Cover%	Crust/Meadow (%)														1			
Pachymatisma johnstonia	Cover%	Mass/Turf (%)					10												
Plumulariidae	Cover%	Mass/Turf (%)	1											2			2		
Polycarpa sp.	Count	1-3cm	13	12			1		8	1				2					
PORIFERA	Cover%	Crust/Meadow (%)	20	10	5	5	10	5	30	20	25	25	10	5	1	60	25	10	20
SABELLIDA	Cover%	Crust/Meadow (%)														0			
Sagartia spp.	Count	3-15cm	1							1	4		37	14	1	31	15	21	9
Tethya citrina	Count	3-15cm				1													
Tubularia indivisa	Cover%	Mass/Turf (%)		1					1	1	1		1		1	1		1	1

Ore Stone - SACFOR Categories			South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	South wall. Sponge dominated by *Alcyonium digitatum*.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.	North wall, central gully, base of south wall, boulders in gully.
			Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 06/09/12	Dive 06/09/12	Dive 06/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12	Dive 07/09/12
			South Wall	South Wall	South Wall	Underhang	South Wall	Underhang	South wall	Boulder in gully	Boulder in gully	Boulder in gully	N. wall 2m deep	N. wall 2m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep	N. wall 2.9m deep
			Mixed turf	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mixed turf**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**	**Mussel zone**
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**8060**	**8065**	**8080**	**8095**	**8098**	**8100**	**8299**	**8046**	**8048**	**8091**	**8276**	**8277**	**8286**	**8287**	**8288**	**8289**	**8290**
		Primer label	**OS.11**	**OS.12**	**OS.13**	**OS.16**	**OS.14**	**OS.17**	**OS.15**	**OS.1**	**OS.2**	**OS.3**	**OS.4**	**OS.5**	**OS.6**	**OS.7**	**OS.8**	**OS.9**	**OS.10**
	Counts/Cover%	**SACFOR size**																	
ACTINIARIA	Count	3-15cm	5												5				5
Actinothoe sphyrodeta	Count	3-15cm	6	6						6	6	6	5				6	6	6
Alcyonium digitatum	Cover%	Mass/Turf (%)		6	2	3	3	5	5					2					
Amphilectus fucorum	Cover%	Crust/Meadow (%)	1	1	1					1	1	1		1					
ANTHOATECATA	Cover%	Crust/Meadow (%)				1													
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1	1	1	1			1			1				
Cerianthus loydii	Count	3-15cm																	5
Chartella papyracea	Cover%	Mass/Turf (%)	2			2	2	4	2										
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1			3												
Cliona spp. agg.	Cover%	Crust/Meadow (%)											1	1		1		1	1
Corynactis viridis	Cover%	Crust/Meadow (%)			5	4	1	3	3										
Dercitus bucklandi	Cover%	Crust/Meadow (%)		1		1	4												
Diplosoma sp.	Cover%	Crust/Meadow (%)			1	1		1		1			1	1		1			
Hiatella sp.	Count	1-3cm			5			4	5	4	4			4	4	4			
HYDRO/BRYO	Cover%	Crust/Meadow (%)	3	3	4	4	4	3	4	1	1	1	3	1	1				
Jassa falcata mass	Cover%	Crust/Meadow (%)	1	1					1						1				
Mytilus edulis	Cover%	Crust/Meadow (%)								5		6	5	6	6	4	5	5	5
Myxilla sp.	Cover%	Crust/Meadow (%)	1		1														
OPHIURIDA	Cover%	Crust/Meadow (%)														1			
Pachymatisma johnstonia	Cover%	Mass/Turf (%)					4												
Plumulariidae	Cover%	Mass/Turf (%)	2											2			2		
Polycarpa sp.	Count	1-3cm	5	5			4		5	4				4					
PORIFERA	Cover%	Crust/Meadow (%)	4	3	1	1	3	1	4	4	4	4	3	1	1	5	4	3	4
SABELLIDA	Cover%	Crust/Meadow (%)														1			
Sagartia spp.	Count	3-15cm	5							5	5		6	6	5	6	6	6	6
Tethya citrina	Count	3-15cm				5													
Tubularia indivisa	Cover%	Mass/Turf (%)		2					2	2	2		2		2	2		2	2

Data Analysis for Oxley Head Cave

Note 6 biotopes have been listed as contributing to the area surveyed.	
IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	
CR.FCR.Cv.SpCup	Hab 1 secondary
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSpAsAn	Hab 1 secondary
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	
IR.FIR.SG.CrSpAsDenB	Hab 1 secondary
Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock	
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.FIR.SG	Hab 3
Infralittoral surge gullies and caves	Not reviewed

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate. ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp.agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Cliona celata	This has not been picked up in the stills images but is recorded on site. A distinction is made between the low lying boring version of the sponge (*Cliona* agg.) and the large cushion form which is then referred to as *Cliona celata*. Within this survey overall, the likelihood is that both forms recorded are *Cliona celata* but the distinction in form has been maintained.
Hiatella sp. (possible that other species present)	Rough count. Substrate very obscured. Additionally suspect that well retracted into the substrate.
BRYOZOA crusts	*Schizomavella* sp. found but left at this level for analysis.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf. Within this cave, very few species formed any recognisable erect form, apart from the occasional presence of *Tubularia indivis, Nemertesia* spp. and Plumulariidae (*Plumularia setacea* and/or *Kirchenpaueria* spp.).
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in another Appendix III. Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
Nemertesia antennina	Samples and images of this species often poor . Note that a count of 1 is 1 cluster. As *Nemertesia* grows from a cluster of rhizomes, one colony of many stalks, is counted as 1.
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two, or a third, *Distomus variolosus*, % cover has been used.
Distomus variolosus	Sampled within the cave and therefore recognized within the images despite the often difficult and silty turf covered substrate.
Dendrodoa grossularia	Potentially seen a few times, but unconfirmed. Where *Polycarpa scuba* has been seen, it has been confidently seperated but many clusters are within recesses, covered by silty turf, and largely obscured. All samples taken from the cave were either *D.variolosus* or *P.scuba.* Where a 'P' is entered, there is a strong suspicion that some *Dendrodoa* are present.
RHODOPHYCOTA	Very small red tufts of algae, species not known and not sampled.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.

Oxley Head Cave – Analysis			Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave
			Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**AMB**	**AMB**	**AMB**	**AMB**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**NST**	**NST**	**NST**	**NST**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**2361**	**2365**	**2369**	**2371**	**2390**	**2395**	**2398**	**2422**	**2425**	**2428**	**2430**	**2414**	**2415**	**2417**	**1396**	**1397**	**1398**	**1399**	**2401**	**2403**	**2404**	**2405**	**2406**
Species	**Counts/%cover**	**SACFOR size**																							
Aplidium punctum	% cover	Crust/Meadow																		1					
ASCIDIACEA (colonial)	% cover	Crust/Meadow		1											1										
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	5	2	10	5	1		1	1	1	2	1	3	1	1		5	5	5		10	10	5	5
BRYOZOA crusts	% cover	Crust/Meadow			1	2	8	2	8			2	1									1	1	3	
Caryophyllia smithii	Counts	1-3 cm		1						1				2											
Caryophyllia sp.	Counts	1-3 cm	1	1											2	1		1				1			
Chartella papyracea	% cover	Massive/Turf				1	20	20	25	25	20	40	40	15	20	35								1	
CIRRIPEDIA	% cover	Crust/Meadow		1	1	1		1			5	5	5		2		2		1	1	3	1	1	3	2
Cliona spp. agg.	% cover	Crust/Meadow															1	1							
Cliona celata	% cover	Massive/Turf																		2					
Corynactis viridis	% cover	Crust/Meadow			2	1								1				1	1					1	
Dendrodoa grossularia	% cover	Crust/Meadow															P	P		P					
Dercitus bucklandi	% cover	Crust/Meadow						25	25	40	25	5	10												
Diplosoma (= *listerianum*)	% cover	Crust/Meadow				2																			
Distomus variolosus	% cover	Crust/Meadow	1	1		4								2	2		2	2	1	1				2	1
Dysidea fragilis	% cover	Crust/Meadow										2	1		1		1		1	1					
Halichondria panicea	% cover	Crust/Meadow	20																						
Haliclona simulans	% cover	Crust/Meadow					1					2													
Hemimycale columella	% cover	Crust/Meadow		2					1	1															
Hiatella sp.	Counts	1-3 cm	1	3		6	8	2	1	2	5	2	8		4	3							2	2	3
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	5	40	25	60	30	40	25	30	25	30	25	20	30	30	20	10	20	20	10	5	5	10	2
Lissoclinum perforatum	% cover	Crust/Meadow			1	1											1	1		1					1
Mytilus edulis	% cover	Crust/Meadow	70	20	30												80	95	95	90	90	85	70	20	40
Nemertesia antennina	Counts	3-15 cm	1	1											1	1	3	1	1	1					
Oscarella lobularis	% cover	Crust/Meadow					1						1												
Pachymatisma johnstonia	% cover	Massive/Turf							1					4											
Plumulariidae	% cover	Massive/Turf			1			1											3						
Polycarpa scuba	Counts	1-3 cm	4	4	8	2									3		23	6	8	5					
Polycarpa scuba (white tipped)	Counts	1-3 cm		1	3	2	4							1	1		2		2						
Spirobranchus sp. tubes	Counts	1-3 cm							2																
PORIFERA crusts	% cover	Crust/Meadow	25	10	5	30	10	10		2	2	3	3	3	2		5	5	5	1	3	2	1	2	4
RHODOPHYCOTA	% cover	Massive/Turf															1	3	1	4					
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow									1		1		1		1		1						1
Trivia monacha	Counts	<1 cm																	1						
Tubularia indivisa	% cover	Massive/Turf				1											1	1	1						
Holes in rock - predict *Hiatella*, not confirmed	Present		P	P	P	P	P	P	P	P		P	P		P	P	P	P	P	P		P	P	P	P

Oxley Head Cave - Raw Abundance			Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave
			Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**AMB**	**AMB**	**AMB**	**AMB**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**NST**	**NST**	**NST**	**NST**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**2361**	**2365**	**2369**	**2371**	**2390**	**2395**	**2398**	**2422**	**2425**	**2428**	**2430**	**2414**	**2415**	**2417**	**1396**	**1397**	**1398**	**1399**	**2401**	**2403**	**2404**	**2405**	**2406**
		SACFOR size																							
		Primer label	OxH.10	OxH.23	OxH.11	OxH.12	OxH.13	OxH.14	OxH.15	OxH.16	OxH.17	OxH.18	OxH.19	OxH.20	OxH.21	OxH.22	OxH.1	OxH.2	OxH.3	OxH.4	OxH.5	OxH.6	OxH.7	OxH.8	OxH.9
	Counts/Cover%	SACFOR size	2361	2365	2369	2371	2390	2395	2398	2422	2425	2428	2430	2414	2415	2417	1396	1397	1398	1399	2401	2403	2404	2405	2406
Aplidium punctum	Cover%	Crust/Meadow (%)																		1					
ASCIDIACEA	Cover%	Crust/Meadow (%)	5	3	10	5	1		1	1	1	2	1	3	2	1		5	5	5		10	10	5	5
BRYOZOA	Cover%	Crust/Meadow (%)			1	2	8	2	8			2	1									1	1	3	
Caryophyllia sp.	Count	1-3cm	1	2						1				2	2	1		1				1			
Chartella papyracea	Cover%	Mass/Turf (%)				1	20	20	25	25	20	40	40	15	20	35								1	
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1	1	1		1			5	5	5		2		2		1	1	3	1	1	3	2
Cliona agg.	Cover%	Crust/Meadow (%)															1	1							
Cliona celata	Cover%	Mass/Turf (%)																		2					
Corynactis viridis	Cover%	Crust/Meadow (%)			2	1								1				1	1					1	
Dendrodoa grossularia	Cover%	Crust/Meadow (%)															0	0		0					
Dercitus bucklandi	Cover%	Crust/Meadow (%)						25	25	40	25	5	10												
Diplosoma sp.	Cover%	Crust/Meadow (%)				2																			
Distomus variolosus	Cover%	Crust/Meadow (%)	1	1		4								2	2		2	2	1	1				2	1
Dysidea fragilis	Cover%	Crust/Meadow (%)										2	1		1		1		1	1					
Halichondria panicea	Cover%	Crust/Meadow (%)	20																						
Haliclona simulans	Cover%	Crust/Meadow (%)					1					2													
Hemimycale columella	Cover%	Crust/Meadow (%)		2					1	1															
Hiatella sp.	Count	1-3cm	1	3		6	8	2	1	2	5	2	8		4	3							2	2	3
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	40	25	60	30	40	25	30	25	30	25	20	30	30	20	10	20	20	10	5	5	10	2
Lissoclinum perforatum	Cover%	Crust/Meadow (%)			1	1											1	1		1					1
Mytilus edulis	Cover%	Crust/Meadow (%)	70	20	30												80	95	95	90	90	85	70	20	40
Nemertesia antennina	Count	3-15cm	1	1											1	1	3	1	1	1					
Oscarella lobularis	Cover%	Crust/Meadow (%)					1						1												
Pachymatisma johnstonia	Cover%	Mass/Turf (%)							1					4											
Plumulariidae	Cover%	Mass/Turf (%)			1			1											3						
Polycarpa sp.	Count	1-3cm	4	5	11	4	4							1	4		25	6	10	5					
PORIFERA	Cover%	Crust/Meadow (%)	25	10	5	30	10	10		2	2	3	3	3	2		5	5	5	1	3	2	1	2	4
RHODOPHYCOTA	Cover%	Mass/Turf (%)															1	3	1	4					
SABELLIDA	Cover%	Crust/Meadow (%)									0		0		0		0		0						0
Spirobranchus sp.	Count	1-3cm							2																
Trivia monacha	Count	<1cm																	1						
Tubularia indivisa	**Cover%**	**Mass/Turf (%)**				1											1	1	1						

Oxley Head Cave - SACFOR Categories			Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near entrance	Site near entrance	Site near entrance	Site near entrance	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave	Site near end of cave
			Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Main faunal turf	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone	Lower wall Mytilus/Scour zone
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**AMB**	**AMB**	**AMB**	**AMB**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**NST**	**NST**	**NST**	**NST**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**2361**	**2365**	**2369**	**2371**	**2390**	**2395**	**2398**	**2422**	**2425**	**2428**	**2430**	**2414**	**2415**	**2417**	**1396**	**1397**	**1398**	**1399**	**2401**	**2403**	**2404**	**2405**	**2406**
		Primer label	**OxH.10**	**OxH.23**	**OxH.11**	**OxH.12**	**OxH.13**	**OxH.14**	**OxH.15**	**OxH.16**	**OxH.17**	**OxH.18**	**OxH.19**	**OxH.20**	**OxH.21**	**OxH.22**	**OxH.1**	**OxH.2**	**OxH.3**	**OxH.4**	**OxH.5**	**OxH.6**	**OxH.7**	**OxH.8**	**OxH.9**
	Counts/ Cover%	**SACFOR size**																							
Aplidium punctum	Cover%	Crust/Meadow (%)																		1					
ASCIDIACEA	Cover%	Crust/Meadow (%)	1	2	3	1	1		1	1	1	1	1	1	2	1		1	1	1		3	3	1	1
BRYOZOA	Cover%	Crust/Meadow (%)			1	1	2	1	2			1	1									1	1	1	
Caryophyllia sp.	Count	1-3cm	4	8						4				4	4	4		4				4			
Chartella papyracea	Cover%	Mass/Turf (%)				2	5	5	5	5	5	6	6	4	5	5								2	
CIRRIPEDIA	Cover%	Crust/Meadow (%)		1	1	1		1			1	1	1		1		1		1	1	1	1	1	1	1
Cliona spp. agg.	Cover%	Crust/Meadow (%)															1	1							
Cliona celata	Cover%	Mass/Turf (%)																		2					
Corynactis viridis	Cover%	Crust/Meadow (%)			1	1								1				1	1					1	
Dendrodoa grossularia	Cover%	Crust/Meadow (%)															1	1		1					
Dercitus bucklandi	Cover%	Crust/Meadow (%)						4	4	5	4	1	3												
Diplosoma sp.	Cover%	Crust/Meadow (%)				1																			
Distomus variolosus	Cover%	Crust/Meadow (%)	1	1		1								1	1		1	1	1	1				1	1
Dysidea fragilis	Cover%	Crust/Meadow (%)										1	1		1		1		1	1					
Halichondria panicea	Cover%	Crust/Meadow (%)	4																						
Haliclona simulans	Cover%	Crust/Meadow (%)					1					1													
Hemimycale columella	Cover%	Crust/Meadow (%)		1					1	1															
Hiatella sp.	Count	1-3cm	4	4		4	5	4	4	4	4	4	5		4	4							4	4	4
HYDRO/BRYO	Cover%	Crust/Meadow (%)	1	5	4	5	4	5	4	4	4	4	4	4	4	4	4	3	4	4	3	1	1	3	1
Lissoclinum perforatum	Cover%	Crust/Meadow (%)			1	1											1	1		1					1
Mytilus edulis	Cover%	Crust/Meadow (%)	5	4	4												6	6	6	6	6	6	5	4	5
Nemertesia antennina	Count	3-15cm	5	5											5	5	5	5	5	5					
Oscarella lobularis	Cover%	Crust/Meadow (%)					1						1												
Pachymatisma johnstonia	Cover%	Mass/Turf (%)							2					2											
Plumulariidae	Cover%	Mass/Turf (%)			2			2											2						
Polycarpa sp.	Count	1-3cm	4	4	5	4	4							4	4		5	4	5	5					
PORIFERA	Cover%	Crust/Meadow (%)	4	3	1	4	3	3		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
RHODOPHYCOTA	Cover%	Mass/Turf (%)															2	2	2	2					
SABELLIDA	Cover%	Crust/Meadow (%)									1		1		1		1		1						1
Spirobranchus sp.	Count	1-3cm							4																
Trivia monacha	Count	<1cm																	3						
Tubularia indivisa	Cover%	Mass/Turf (%)				2											2	2	2						

Data Analysis for Silty Cave No. 2

Note 4 biotopes have been listed as contributing to the area surveyed.	
IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Forming a mosaic
CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	Forming a mosaic
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
CR.MCR.SfR.Pol	Hab 3
Polydora sp. tubes on moderately exposed sublittoral soft rock	

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

Cliona spp.agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature.
Cliona celata	This has not been picked up in the stills images but is recorded on site. A distinction is made between the low lying boring version of the sponge (*Cliona* agg.) and the large cushion form which is then referred to as *Cliona celata*. Within this survey overall, the likelihood is that both forms recorded are *Cliona celata* but the distinction in form has been maintained.
HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in another Appendix (III). Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two % cover has been used. Within this site, all ascidians sampled were *Polycarpa* species but within the stills they were often small and largely obscured. There is the possibility that some of them may be *Dendrodoa grossularia.*
RHODOPHYCOTA	Very small red tufts of algae, with *Schottera nicaeensis* identified within the turf.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.
Polydora tubes	On many of the upward facing surfaces, a dense cover of *Polydora* can be seen. Occasional clusters of tubes believed to be the same genus are seen in places within the more vertical surface turf.
Phoronis hippocrepia	All coverage approximate.
Hiatella sp. (possible that other species present)	Rough count. Substrate very obscured. Additionally suspect that well retracted into the substrate.
Pseudopotamilla reniformis	Occasionally the distinctive tube of this worm is visible but allocating a percentage cover is impossible so recorded as 'Present'.
Sarcodictyon roseum	Note that where this species has been recorded, it is a default position, as other species do exist with which this can be potentially confused. Additionally the WORMS database appears to accept a species name (*S.catenatum*) that in other literature is listed as being synonymised wth *S.roseum*. Additionally there is the species *Cervera cf. atlantica*, rarely found and small. Within the area, *S.roseum* is believed to be the species seen but for interest and completeness, awareness of other species should be noted.

Silty Cave No. 2 – Analysis											
		Habitat Number	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Images by	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**
		Distance from substrate	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Image Number	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
Species	**Counts/%cover**	**SACFOR size**	**7779**	**7780**	**7782**	**7783**	**7784**	**7788**	**7766**	**7767**	**7770**
Aplysilla rosea	% cover	Crust/Meadow									
ASCIDIACEA (small solitary)	% cover	Crust/Meadow								2	3
Caryophyllia smithii	Counts	1-3 cm							1	1	3
Caryophyllia sp.	Counts	1-3 cm								1	
CIRRIPEDIA	% cover	Crust/Meadow	1								
Cliona spp.agg.	% cover	Crust/Meadow			1				5	2	
Corallinaceae	% cover	Crust/Meadow									
Corynactis viridis	% cover	Crust/Meadow	95	70	80	90	90	60			
Cottidae (scorpion fish)	Counts	3-15 cm		1	1						
Diplosoma (= *listerianum*)	% cover	Crust/Meadow									
Dysidea fragilis	% cover	Crust/Meadow									
Hiatella sp.	Counts	1-3 cm	8	22	22	15	5	10		1	
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	5	20	10	5	5	20			10
Pachymatisma johnstonia	% cover	Massive/Turf						2			
Phoronis hippocrepia	% cover	Crust/Meadow		15					20	20	10
Polydora tubes	% cover	Crust/Meadow							85	80	80
Spirobranchus sp.	Counts	1-3 cm									
PORIFERA crusts	% cover	Crust/Meadow	20	50	15	60	60	60	3	5	1
Pseudopotamilla reniformis	% cover	Crust/Meadow		P	P	P	P	P			
RHODOPHYCOTA (*Schottera nicaeensis*)	% cover	Massive/Turf		1				1			
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow					P	1			P
Sarcodictyon roseum	% cover	Crust/Meadow						2			
Holes in rock - predict *Hiatella,* not confirmed	Present		P	P	P	P	P	P	P	P	P

Silty Cave No. 2 – Analysis (cont.)			Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Habitat Number	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**7771**	**7772**	**7774**	**7775**	**7776**	**7777**	**7786**	**7799**	**7809**	**7810**
Species	**Counts/%cover**	**SACFOR size**										
Aplysilla rosea	% cover	Crust/Meadow	1									
ASCIDIACEA (small solitary)	% cover	Crust/Meadow		2		1	1	1	1		1	1
Caryophyllia smithii	Counts	1-3 cm				1					1	
Caryophyllia sp.	Counts	1-3 cm			1	1			1	3		
CIRRIPEDIA	% cover	Crust/Meadow			1			1	1			
Cliona spp.agg.	% cover	Crust/Meadow	1	2							2	
Corallinaceae	% cover	Crust/Meadow			2	20		15	5		3	
Corynactis viridis	% cover	Crust/Meadow					25	1	1			
Cottidae (scorpion fish)	Counts	3-15 cm										
Diplosoma (= *listerianum*)	% cover	Crust/Meadow	2									
Dysidea fragilis	% cover	Crust/Meadow	1	1	3							
Hiatella sp.	Counts	1-3 cm	6	6	14	20	10	15	10	8	8	
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	30	20	20	10	10	30	10	50	20	10
Pachymatisma johnstonia	% cover	Massive/Turf										
Phoronis hippocrepia	% cover	Crust/Meadow	20	40	20	20	20		25	4	20	
Polydora tubes	% cover	Crust/Meadow		10	10							60
Spirobranchus sp.	Counts	1-3 cm							2		2	
PORIFERA crusts	% cover	Crust/Meadow	10		10	20	20	10	20	5	5	20
Pseudopotamilla reniformis	% cover	Crust/Meadow		P	P	P	P	P	P		P	
RHODOPHYCOTA (*Schottera nicaeensis*)	% cover	Massive/Turf	2					1	1	4	1	
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow	P	1		1				1		
Sarcodictyon roseum	% cover	Crust/Meadow		1	1	2	4	2				
Holes in rock - predict *Hiatella,* not confirmed	Present		P	P	P	P	P	P	P	P	P	P

Silty Cave No. 2 - Raw Abundance			Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**7779**	**7780**	**7782**	**7783**	**7784**	**7788**	**7766**	**7767**	**7770**
		Primer label	**Si2.14**	**Si2.15**	**Si2.16**	**Si2.17**	**Si2.18**	**Si2.19**	**Si2.1**	**Si2.2**	**Si2.3**
	Counts/Cover %	**SACFOR size**									
Aplysilla rosea	Cover%	Crust/Meadow (%)									
ASCIDIACEA	Cover%	Crust/Meadow (%)								2	3
Caryophyllia sp.	Count	1-3cm							1	2	3
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1								
Cliona spp. agg.	Cover%	Crust/Meadow (%)			1				5	2	
Corallinaceae	Cover%	Crust/Meadow (%)									
Corynactis viridis	Cover%	Crust/Meadow (%)	95	70	80	90	90	60			
Cottidae	Count	3-15cm		1	1						
Diplosoma sp.	Cover%	Crust/Meadow (%)									
Dysidea fragilis	Cover%	Crust/Meadow (%)									
Hiatella sp.	Count	1-3cm	8	22	22	15	5	10		1	
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	20	10	5	5	20			10
Pachymatisma johnstonia	Cover%	Mass/Turf (%)						2			
Phoronis hippocrepia	Cover%	Crust/Meadow (%)		15					20	20	10
Polydora sp.	Cover%	Crust/Meadow (%)							85	80	80
PORIFERA	Cover%	Crust/Meadow (%)	20	50	15	60	60	60	3	5	1
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									
RHODOPHYCOTA	Cover%	Mass/Turf (%)		1				1			
SABELLIDA	Cover%	Crust/Meadow (%)		0	0	0	0	0			0
Sarcodictyon roseum	Cover%	Crust/Meadow (%)						2			
Spirobranchus sp.	Count	1-3cm									

Silty Cave No. 2 - Raw Abundance (cont.)			Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Habitat Number	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**7771**	**7772**	**7774**	**7775**	**7776**	**7777**	**7786**	**7799**	**7809**	**7810**
		Primer label	**Si2.4**	**Si2.5**	**Si2.6**	**Si2.7**	**Si2.8**	**Si2.9**	**Si2.10**	**Si2.11**	**Si2.12**	**Si2.13**
	Counts/Cover%	**SACFOR size**										
Aplysilla rosea	Cover%	Crust/Meadow (%)	1									
ASCIDIACEA	Cover%	Crust/Meadow (%)		2		1	1	1	1		1	1
Caryophyllia sp.	Count	1-3cm			1	2			1	3	1	
CIRRIPEDIA	Cover%	Crust/Meadow (%)			1			1	1			
Cliona spp. agg.	Cover%	Crust/Meadow (%)	1	2							2	
Corallinaceae	Cover%	Crust/Meadow (%)			2	20		15	5		3	
Corynactis viridis	Cover%	Crust/Meadow (%)					25	1	1			
Cottidae	Count	3-15cm										
Diplosoma sp.	Cover%	Crust/Meadow (%)	2									
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	1	3							
Hiatella sp.	Count	1-3cm	6	6	14	20	10	15	10	8	8	
HYDRO/BRYO	Cover%	Crust/Meadow (%)	30	20	20	10	10	30	10	50	20	10
Pachymatisma johnstonia	Cover%	Mass/Turf (%)										
Phoronis hippocrepia	Cover%	Crust/Meadow (%)	20	40	20	20	20		25	4	20	
Polydora sp.	Cover%	Crust/Meadow (%)		10	10					0		60
PORIFERA	Cover%	Crust/Meadow (%)	10		10	20	20	10	20	5	5	20
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)		0	0	0	0		0		0	
RHODOPHYCOTA	Cover%	Mass/Turf (%)	2					1	1	4	1	
SABELLIDA	Cover%	Crust/Meadow (%)	0	0		0		0		0		
Sarcodictyon roseum	Cover%	Crust/Meadow (%)		1	1	2	4	2				
Spirobranchus sp.	Count	1-3cm							2		2	

Silty Cave No. 2 - SACFOR Categories			Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Roof - Corynactis	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Habitat Number	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 1**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**7779**	**7780**	**7782**	**7783**	**7784**	**7788**	**7766**	**7767**	**7770**
		Primer label	**Si2.14**	**Si2.15**	**Si2.16**	**Si2.17**	**Si2.18**	**Si2.19**	**Si2.1**	**Si2.2**	**Si2.3**
Species	**Counts/Cover %**	**SACFOR size**									
Aplysilla rosea	Cover%	Crust/Meadow (%)									
ASCIDIACEA	Cover%	Crust/Meadow (%)								1	1
Caryophyllia sp.	Count	1-3cm							4	8	4
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1								
Cliona spp. agg.	Cover%	Crust/Meadow (%)			1				1	1	
Corallinaceae	Cover%	Crust/Meadow (%)									
Corynactis viridis	Cover%	Crust/Meadow (%)	6	5	6	6	6	5			
Cottidae	Count	3-15cm		5	5						
Diplosoma sp.	Cover%	Crust/Meadow (%)									
Dysidea fragilis	Cover%	Crust/Meadow (%)									
Hiatella sp.	Count	1-3cm	5	5	5	5	4	5		4	
HYDRO/BRYO	Cover%	Crust/Meadow (%)	1	4	3	1	1	4			3
Pachymatisma johnstonia	Cover%	Mass/Turf (%)						2			
Phoronis hippocrepia	Cover%	Crust/Meadow (%)		3					4	4	3
Polydora sp.	Cover%	Crust/Meadow (%)							6	6	6
PORIFERA	Cover%	Crust/Meadow (%)	4	5	3	5	5	5	1	1	1
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									
RHODOPHYCOTA	Cover%	Mass/Turf (%)		2				2			
SABELLIDA	Cover%	Crust/Meadow (%)		1	1	1	1	1			1
Sarcodictyon roseum	Cover%	Crust/Meadow (%)						1			
Spirobranchus sp.	Count	1-3cm									

Silty Cave No. 2 - SACFOR Categories (cont.)			Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings	Verticals and upper facings
		Habitat Number	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**	**Hab 2**
		Images by	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**	**JLW**
		Distance from substrate	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**	**31 cm**
		Image Number	**7771**	**7772**	**7774**	**7775**	**7776**	**7777**	**7786**	**7799**	**7809**	**7810**
		Primer label	**Si2.4**	**Si2.5**	**Si2.6**	**Si2.7**	**Si2.8**	**Si2.9**	**Si2.10**	**Si2.11**	**Si2.12**	**Si2.13**
Species	**Counts/Cover%**	**SACFOR size**										
Aplysilla rosea	Cover%	Crust/Meadow (%)	1									
ASCIDIACEA	Cover%	Crust/Meadow (%)		1		1	1	1	1		1	1
Caryophyllia sp.	Count	1-3cm			4	8			4	4	4	
CIRRIPEDIA	Cover%	Crust/Meadow (%)			1			1	1			
Cliona spp. agg.	Cover%	Crust/Meadow (%)	1	1							1	
Corallinaceae	Cover%	Crust/Meadow (%)			1	4		3	1		1	
Corynactis viridis	Cover%	Crust/Meadow (%)					4	1	1			
Cottidae	Count	3-15cm										
Diplosoma sp.	Cover%	Crust/Meadow (%)	1									
Dysidea fragilis	Cover%	Crust/Meadow (%)	1	1	1							
Hiatella sp.	Count	1-3cm	4	4	5	5	5	5	5	5	5	
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	4	4	3	3	4	3	5	4	3
Pachymatisma johnstonia	Cover%	Mass/Turf (%)										
Phoronis hippocrepia	Cover%	Crust/Meadow (%)	4	5	4	4	4		4	1	4	
Polydora sp.	Cover%	Crust/Meadow (%)		3	3					1		5
PORIFERA	Cover%	Crust/Meadow (%)	3		3	4	4	3	4	1	1	4
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)		1	1	1	1		1		1	
RHODOPHYCOTA	Cover%	Mass/Turf (%)	2					2	2	2	2	
SABELLIDA	Cover%	Crust/Meadow (%)	1	1		1		1		1		
Sarcodictyon roseum	Cover%	Crust/Meadow (%)		1	1	1	1	1				
Spirobranchus sp.	Count	1-3cm							4		4	

Data Analysis for Slater Cave

Note 6 biotopes have been listed as contributing to the area surveyed.	
IR.FIR.SG.DenCcor	Hab 1
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	
CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	Mosaic
IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic
IR.FIR.SG.CC.Mo	Hab 2
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Mosaic
IR.FIR.SG.CC	Hab 2
Coralline crusts in surge gullies and scoured infralittoral rock	Mosaic

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf.
Crisiid turf	Nearer the centre of the cave the turf became very thick, was sampled and found to be a crisiid turf comprising mainly *Crisidia cornuta*.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in another Appendix. Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between the two % cover has been used. Within this site, all ascidians sampled were *Dendrodoa grossularia* but as they were often very obscured logging was raised for simplicity.
RHODOPHYCOTA	Very small red tufts of algae, with *Schottera nicaeensis* identified within the turf.
Hiatella sp. (possible that other species present)	Bored rock present but bivalves relatively scarce compared to other caves within the survey. Much more obvious nearer the entrance of the cave.
Corallinaceae	It is thought that a variety present but none sampled.
CIRRIPEDIA	*Balanus crenatus* sampled, but left at CIRRIPEDIA as sure for example that *Elminius modestus*and *Verruca stroemia* present. Also hard to establish cover in lots of images due to discolouration or species coverage of some sort. Very approximate % cover.

Slater Cave – Analysis												Crisiid turf				
			West Upper	West Upper	West Upper	West	West	West	East Upper	East	East	East nearer entrance				
			Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8144	8146	8148	8111	8113	8115	8140	8130	8134	8153	8118	8120	8122	8123
Species	**Counts/ %cover**	**SACFOR size**														
ASCIDIACEA (small solitary)	% cover	Crust/Meadow					5							25		25
CIRRIPEDIA	% cover	Crust/Meadow	85	15	95	70	25	10	1	1	P	P		1		
Clathrina coriacea agg.	% cover	Crust/Meadow				1	20	20	1	25	10					
Corallinaceae	% cover	Crust/Meadow	P	10	10			2	60	5	15		5			
Dendrodoa grossularia	% cover	Crust/Meadow										10				
Dercitus bucklandi	% cover	Crust/Meadow									1					
Haliclona simulans	% cover	Crust/Meadow								1						
Hiatella sp.	Counts	1-3 cm								6		20		20	4	2
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow				10	30	30	2	10	30	70	10	70	80	60
Patella sp.	Counts	1-3 cm							1							
Spirobranchus sp.	Counts	1-3 cm						2					10	1	4	
PORIFERA crusts	% cover	Crust/Meadow				1	5	10	2		15	10	4	10	1	1
RHODOPHYCOTA	% cover	Massive/Turf									1					
Spirorbinae	% cover	Crust/Meadow	2	5	25	4	5	5		5	5		15	20	5	4
Stryphnus ponderosus	% cover	Crust/Meadow					1			5		2				
Trochinae (*Gibbula/Osilinus*)	Counts	1-3 cm											1			
Holes in rock - predict *Hiatella,* not confirmed	Present									P	P	P		P	P	P

Slater Cave - Raw Abundance			West Upper	West Upper	West Upper	West	West	West	East Upper	East	East	East nearer entrance				
			Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8144	8146	8148	8111	8113	8115	8140	8130	8134	8153	8118	8120	8122	8123
		Primer label	SI.9	SI.10	SI.11	SI.12	SI.13	SI.14	SI.1	SI.2	SI.3	SI.4	SI.5	SI.6	SI.7	SI.8
Species	**Counts /Cover%**	**SACFOR size**														
ASCIDIACEA	Cover%	Crust/Meadow (%)					**5**							**25**		**25**
CIRRIPEDIA	Cover%	Crust/Meadow (%)	85	15	95	70	25	10	1	1	0	0		1		
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)				1	20	20	1	25	10					
Corallinaceae	Cover%	Crust/Meadow (%)	1	10	10			2	60	5	15		5			
Dendrodoa grossularia	Cover%	Crust/Meadow (%)										10				
Dercitus bucklandi	Cover%	Crust/Meadow (%)									1					
Haliclona simulans	Cover%	Crust/Meadow (%)								1						
Hiatella sp.	Count	1-3cm								6		20		20	4	2
HYDRO/BRYO	Cover%	Crust/Meadow (%)				10	30	30	2	10	30	70	10	70	80	60
Patella sp.	Count	1-3cm							1							
PORIFERA	Cover%	Crust/Meadow (%)				1	5	10	2		15	10	4	10	1	1
RHODOPHYCOTA	Cover%	Mass/Turf (%)									1					
Spirobranchus sp.	Count	1-3cm						2					10	1	4	
Spirorbinae	Cover%	Crust/Meadow (%)	2	5	25	4	5	5		5	5		15	20	5	4
Stryphnus ponderosus	Cover%	Crust/Meadow (%)					1			5		2				
Trochinae	Count	1-3cm											1			

Slater Cave - SACFOR Categories			West Upper	West Upper	West Upper	West	West	West	East Upper	East	East	East nearer entrance				
			Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF	PMF
		Distance from substrate	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm	21 cm
		Image Number	8144	8146	8148	8111	8113	8115	8140	8130	8134	8153	8118	8120	8122	8123
		Primer label	SI.9	SI.10	SI.11	SI.12	SI.13	SI.14	SI.1	SI.2	SI.3	SI.4	SI.5	SI.6	SI.7	SI.8
Species	**Counts/ Cover%**	**SACFOR size**														
ASCIDIACEA	Cover%	Crust/Meadow (%)					1							4		4
CIRRIPEDIA	Cover%	Crust/Meadow (%)	6	3	6	5	4	3	1	1	1	1		1		
Clathrina coriacea agg.	Cover%	Crust/Meadow (%)				1	4	4	1	4	3					
Corallinaceae	Cover%	Crust/Meadow (%)	1	3	3			1	5	1	3		1			
Dendrodoa grossularia	Cover%	Crust/Meadow (%)										3				
Dercitus bucklandi	Cover%	Crust/Meadow (%)									1					
Haliclona simulans	Cover%	Crust/Meadow (%)								1						
Hiatella sp.	Count	1-3cm								5		5		5	5	4
HYDRO/BRYO	Cover%	Crust/Meadow (%)				3	4	4	1	3	4	5	3	5	6	5
Patella sp.	Count	1-3cm							4							
PORIFERA	Cover%	Crust/Meadow (%)				1	1	3	1		3	3	1	3	1	1
RHODOPHYCOTA	Cover%	Mass/Turf (%)									2					
Spirobranchus sp.	Count	1-3cm						4					5	4	5	
Spirorbinae	Cover%	Crust/Meadow (%)	1	1	4	1	1	1		1	1		3	4	1	1
Stryphnus ponderosus	Cover%	Crust/Meadow (%)					1			1		1				
Trochinae	Count	1-3cm											4			

Data Analysis for Watcombe Cave No.2

Note 4 biotopes have been listed as contributing to the area surveyed.	
CR.MCR.CMus.CMyt	Hab 1
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Main Hab 3
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Extending to scoured lower cave walls.

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in another Appendix. Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
ASCIDIACEA (small solitary)	Where practical, species have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between species present, % cover has been used. Within this site, all ascidians sampled were *Polycarpa scuba* but not impossible that *Dendrodoa* present in places.
RHODOPHYCOTA	Very small red tufts of algae.
Hiatella sp. (possible that other species present)	Bored rock present but often hard to see within the substrate. Counts very approximate.
Corallinaceae	Difficult to see in places.
CIRRIPEDIA	*Balanus crenatus* sampled, but left at CIRRIPEDIA as sure that *Elminius modestus* and *Verruca stroemia* present. Also hard to establish cover in lots of images due to discolouration or species coverage of some sort. Very approximate.
OPHIURIDA	Very small and seen particularly on *Halichondria panicea*, forming loose aggregations.
Pseudopotamilla reniformis	Known to be present and found in samples but only logged where distinctive curved tube can be seen within the turf. Impossible to count.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families.

Watcombe Cave No.2 – Analysis																		
													Cobble dominated	Cobble dominated	Cobble dominated	Shelly sandy gravel	Shelly silty sand	Shelly silty sand
			Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1
			Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift
			Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7645	7648	7649	7650	7651	7639	7640	7641	7642	7643	7644	7631	7632	7633	7634	7636	7637
Species	**Counts/%cover**	**SACFOR size**																**No fauna**	**No fauna**
Aplysilla rosea	% cover	Crust/Meadow						1	1										
Aplysilla sulfurea	% cover	Crust/Meadow						1											
ASCIDIACEA (small solitary)	% cover	Crust/Meadow											5						
Asterias rubens	Counts	>15 cm												3	1	1	1		
BRYOZOA crust	% cover	Crust/Meadow						5	2	3									
Caryophyllia smithii	Counts	1-3 cm						1	3		1								
Caryophyllia sp.	Counts	1-3 cm						2	2										
CIRRIPEDIA	% cover	Crust/Meadow					10												
Clavelina lepadiformis	% cover	Crust/Meadow																	
Cliona spp.agg.	% cover	Crust/Meadow						1											
Corallinaceae	% cover	Crust/Meadow	6	6	8	15	30					3		1					
Corynactis viridis	% cover	Crust/Meadow																	
Dercitus bucklandi	% cover	Crust/Meadow									30								
Diplosoma (= *listerianum*)	% cover	Crust/Meadow																	
Dysidea fragilis	% cover	Crust/Meadow						2	1	1	2								
Halichondria panicea	% cover	Crust/Meadow										25	10						
Haliclona simulans	% cover	Crust/Meadow									1								
Hiatella sp.	Counts	1-3 cm		4	3	3		4		2	7		3						
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	1	1	2	2	1	50	85	85	40	25	20						
Leuconia nivea	% cover	Crust/Meadow							1										
Lissoclinum perforatum	% cover	Crust/Meadow											1						
Mytilus edulis	% cover	Crust/Meadow	85	85	60	60	50					5							
OPHIURIDA	% cover	Crust/Meadow										20	2						
Pachymatisma johnstonia	% cover	Massive/Turf																	
Patella sp.	Counts	1-3 cm					6												
Polycarpa scuba	Counts	1-3 cm	1		2							1							
Spirobranchus sp.	Counts	1-3 cm	3	3				5	2					1					
PORIFERA crusts	% cover	Crust/Meadow	1	1	10	5		10	5	35		15	30						
Pseudopotamilla reniformis	% cover	Crust/Meadow																	
RHODOPHYCOTA	% cover	Massive/Turf		1	1	1			1										
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow						1		1	1								
Holes in rock - predict *Hiatella*, not confirmed	Present			P	P	P		P	P	P	P	P	P						

Watcombe Cave No.2 – Analysis (cont.)																		Cobble dominated	Cobble dominated	Cobble dominated	Cobble dominated	Bedrock
			Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2
			North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift
			Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7675	7678	7681	7682	7683	7671	7672	7694	7695	7697	7698	7699	7700	7701	7702	7706	7707	7708	7709	7712
Species	**Counts/%cover**	**SACFOR size**																	No fauna		No fauna	
Aplysilla rosea	% cover	Crust/Meadow																				
Aplysilla sulfurea	% cover	Crust/Meadow																				
ASCIDIACEA (small solitary)	% cover	Crust/Meadow	1					1	2	4	2	2	2	2	2	1	1					
Asterias rubens	Counts	>15 cm																		1		
BRYOZOA crust	% cover	Crust/Meadow	1					2		3	5	2	2	2	2	1	2					
Caryophyllia smithii	Counts	1-3 cm								1			2				2					
Caryophyllia sp.	Counts	1-3 cm							2			1										
CIRRIPEDIA	% cover	Crust/Meadow	90	30	50	30	20	2	2													
Clavelina lepadiformis	% cover	Crust/Meadow													1							
Cliona spp.agg.	% cover	Crust/Meadow										1										
Corallinaceae	% cover	Crust/Meadow			3													1				
Corynactis viridis	% cover	Crust/Meadow												1								
Dercitus bucklandi	% cover	Crust/Meadow																				
Diplosoma (= *listerianum*)	% cover	Crust/Meadow						3	1		1	1			1	1						
Dysidea fragilis	% cover	Crust/Meadow									1	1	2		1	2	2					
Halichondria panicea	% cover	Crust/Meadow																				
Haliclona simulans	% cover	Crust/Meadow																				
Hiatella sp.	Counts	1-3 cm	11					7	5		1	2			10	14						
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	30	1	1			90	40	75	90	90	70	95	90	85	80					
Leuconia nivea	% cover	Crust/Meadow						1			1											
Lissoclinum perforatum	% cover	Crust/Meadow																				
Mytilus edulis	% cover	Crust/Meadow		55	50	70	80															90
OPHIURIDA	% cover	Crust/Meadow																				
Pachymatisma johnstonia	% cover	Massive/Turf	1																			
Patella sp.	Counts	1-3 cm																				
Polycarpa scuba	Counts	1-3 cm												1								
Spirobranchus sp.	Counts	1-3 cm	4																			
PORIFERA crusts	% cover	Crust/Meadow	20	1				5	20	5	5	20		5	20	20	10					
Pseudopotamilla reniformis	% cover	Crust/Meadow									P				P	P						
RHODOPHYCOTA	% cover	Massive/Turf																				
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow								1			1		1	1						
Holes in rock - predict *Hiatella*, not confirmed	Present		P					P	P	P	P	P	P	P	P	P	P					

Watcombe Cave No.2 - Raw Abundance																			
														Cobble dominated	Cobble dominated	Cobble dominated	Shelly sandy gravel	Shelly silty sand	Shelly silty sand
			Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1
			Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift
			Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7645	7648	7649	7650	7651	7639	7640	7641	7642	7643	7644	7631	7632	7633	7634	7636	7637
		Primer label	W2.1	W2.2	W2.3	W2.4	W2.5	W2.6	W2.7	W2.8	W2.9	W2.10	W2.11	W2.12	W2.13	W2.14	W2.15		
Species	**Counts/Cover%**	**SACFOR size**																	
Aplysilla rosea	Cover%	Crust/Meadow (%)						1	1										
Aplysilla sulfurea	Cover%	Crust/Meadow (%)						1											
ASCIDIACEA	Cover%	Crust/Meadow (%)											5						
Asterias rubens	Count	>15cm												3	1	1	1		
BRYOZOA	Cover%	Crust/Meadow (%)						5	2	3									
Caryophyllia sp.	Count	1-3cm						3	5		1								
CIRRIPEDIA	Cover%	Crust/Meadow (%)					10												
Clavelina lepadiformis	Cover%	Crust/Meadow (%)																	
Cliona spp. agg.	Cover%	Crust/Meadow (%)						1											
Corallinaceae	Cover%	Crust/Meadow (%)	6	6	8	15	30					3		1					
Corynactis viridis	Cover%	Crust/Meadow (%)																	
Dercitus bucklandi	Cover%	Crust/Meadow (%)									30								
Diplosoma sp.	Cover%	Crust/Meadow (%)																	
Dysidea fragilis	Cover%	Crust/Meadow (%)						2	1	1	2								
Halichondria panicea	Cover%	Crust/Meadow (%)										25	10						
Haliclona simulans	Cover%	Crust/Meadow (%)									1								
Hiatella sp.	Count	1-3cm		4	3	3		4		2	7		3						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	1	1	2	2	1	50	85	85	40	25	20						
Leuconia nivea	Cover%	Crust/Meadow (%)							1										
Lissoclinum perforatum	Cover%	Crust/Meadow (%)											1						
Mytilus edulis	Cover%	Crust/Meadow (%)	85	85	60	60	50					5							
OPHIURIDA	Cover%	Crust/Meadow (%)										20	2						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)																	
Patella sp.	Count	1-3cm					6												
Polycarpa sp.	Count	1-3cm	1		2							1							
PORIFERA	Cover%	Crust/Meadow (%)	1	1	10	5		10	5	35		15	30						
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)																	
RHODOPHYCOTA	Cover%	Mass/Turf (%)		1	1	1			1										
SABELLIDA	Cover%	Crust/Meadow (%)						0		0	0								
Spirobranchus sp.	Count	1-3cm	3	3				5	2					1					

Watcombe Cave No.2 - Raw Abundance (cont.)																	Cobble dominated	Cobble dominated	Cobble dominated	Cobble dominated	Bedrock
			Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2
			North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift
			Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7675	7678	7681	7682	7683	7671	7672	7694	7695	7697	7698	7699	7700	7701	7702	7706	7707	7708	7709	7712
		Primer label	W2.16	W2.17	W2.18	W2.19	W2.20	W2.21	W2.22	W2.23	W2.24	W2.25	W2.26	W2.27	W2.28	W2.29	W2.30	W2.31		W2.32		W2.33
Species	**Counts/Cover%**	**SACFOR size**																				
Aplysilla rosea	Cover%	Crust/Meadow (%)																				
Aplysilla sulfurea	Cover%	Crust/Meadow (%)																				
ASCIDIACEA	Cover%	Crust/Meadow (%)	1					1	2	4	2	2	2	2	2	1						
Asterias rubens	Count	>15cm																		1		
BRYOZOA	Cover%	Crust/Meadow (%)	1					2		3	5	2	2	2	2	1	1					
Caryophyllia sp.	Count	1-3cm							2	1		1	2				2					
CIRRIPEDIA	Cover%	Crust/Meadow (%)	90	30	50	30	20	2	2								2					
Clavelina lepadiformis	Cover%	Crust/Meadow (%)													1							
Cliona spp. agg.	Cover%	Crust/Meadow (%)										1										
Corallinaceae	Cover%	Crust/Meadow (%)			3													1				
Corynactis viridis	Cover%	Crust/Meadow (%)												1								
Dercitus bucklandi	Cover%	Crust/Meadow (%)																				
Diplosoma sp.	Cover%	Crust/Meadow (%)						3	1		1	1			1	1						
Dysidea fragilis	Cover%	Crust/Meadow (%)									1	1	2		1	2						
Halichondria panicea	Cover%	Crust/Meadow (%)																				
Haliclona simulans	Cover%	Crust/Meadow (%)															2					
Hiatella sp.	Count	1-3cm	11					7	5		1	2			10	14						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	30	1	1			90	40	75	90	90	70	95	90	85						
Leuconia nivea	Cover%	Crust/Meadow (%)						1			1											
Lissoclinum perforatum	Cover%	Crust/Meadow (%)															80					
Mytilus edulis	Cover%	Crust/Meadow (%)		55	50	70	80															90
OPHIURIDA	Cover%	Crust/Meadow (%)																				
Pachymatisma johnstonia	Cover%	Mass/Turf (%)	1																			
Patella sp.	Count	1-3cm																				
Polycarpa sp.	Count	1-3cm												1								
PORIFERA	Cover%	Crust/Meadow (%)	20	1				5	20	5	5	20		5	20	20						
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									0				0	0						
RHODOPHYCOTA	Cover%	Mass/Turf (%)															10					
SABELLIDA	Cover%	Crust/Meadow (%)								0			0		0	0						
Spirobranchus sp.	Count	1-3cm	4																			

Watcombe Cave No.2 - SACFOR Categroies																			
														Cobble dominated	Cobble dominated	Cobble dominated	Shelly sandy gravel	Shelly silty sand	Shelly silty sand
			Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1	Dive 1
			Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift	Eastern entrance to start of N-S rift
			Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Upper mussel zone	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7645	7648	7649	7650	7651	7639	7640	7641	7642	7643	7644	7631	7632	7633	7634	7636	7637
		Primer label	W2.1	W2.2	W2.3	W2.4	W2.5	W2.6	W2.7	W2.8	W2.9	W2.10	W2.11	W2.12	W2.13	W2.14	W2.15		
Species	**Counts/Cover%**	**SACFOR size**																	
Aplysilla rosea	Cover%	Crust/Meadow (%)						1	1										
Aplysilla sulfurea	Cover%	Crust/Meadow (%)						1											
ASCIDIACEA	Cover%	Crust/Meadow (%)											1						
Asterias rubens	Count	>15cm												6	6	6	6		
BRYOZOA	Cover%	Crust/Meadow (%)						1	1	1									
Caryophyllia sp.	Count	1-3cm						8	8		4								
CIRRIPEDIA	Cover%	Crust/Meadow (%)					3												
Clavelina lepadiformis	Cover%	Crust/Meadow (%)																	
Cliona spp. agg.	Cover%	Crust/Meadow (%)						1											
Corallinaceae	Cover%	Crust/Meadow (%)	2	2	2	3	4					1		1					
Corynactis viridis	Cover%	Crust/Meadow (%)																	
Dercitus bucklandi	Cover%	Crust/Meadow (%)									4								
Diplosoma sp.	Cover%	Crust/Meadow (%)																	
Dysidea fragilis	Cover%	Crust/Meadow (%)						1	1	1	1								
Halichondria panicea	Cover%	Crust/Meadow (%)										4	3						
Haliclona simulans	Cover%	Crust/Meadow (%)									1								
Hiatella sp.	Count	1-3cm		4	4	4		4		4	5		4						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	1	1	1	1	1	5	6	6	5	4	4						
Leuconia nivea	Cover%	Crust/Meadow (%)							1										
Lissoclinum perforatum	Cover%	Crust/Meadow (%)											1						
Mytilus edulis	Cover%	Crust/Meadow (%)	6	6	5	5	5					1							
OPHIURIDA	Cover%	Crust/Meadow (%)										4	1						
Pachymatisma johnstonia	Cover%	Mass/Turf (%)																	
Patella sp.	Count	1-3cm					4												
Polycarpa sp.	Count	1-3cm	4		4							4							
PORIFERA	Cover%	Crust/Meadow (%)	1	1	3	1		3	1	4		3	4						
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)																	
RHODOPHYCOTA	Cover%	Mass/Turf (%)		2	2	2			2										
SABELLIDA	Cover%	Crust/Meadow (%)						1		1	1								
Spirobranchus sp.	Count	1-3cm	4	4				4	4					4					

Watcombe Cave No.2 - SACFOR Categroies (cont.)																	Cobble dominated	Cobble dominated	Cobble dominated	Cobble dominated	Bedrock
			Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2	Dive 1 and 2
			North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift	North-South Rift
			Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Upper - Mussels and barnacles	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Main Vertical Walls (east wall @4.4m)	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 3	Hab 3	Hab 3	Hab 3	Hab 3
		Images by	NST	NST	NST	NST	NST	NST	NST	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW	JLW
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7675	7678	7681	7682	7683	7671	7672	7694	7695	7697	7698	7699	7700	7701	7702	7706	7707	7708	7709	7712
		Primer label	W2.16	W2.17	W2.18	W2.19	W2.20	W2.21	W2.22	W2.23	W2.24	W2.25	W2.26	W2.27	W2.28	W2.29	W2.30	W2.31		W2.32		W2.33
Species	**Counts/Cover %**	**SACFOR size**																				
Aplysilla rosea	Cover%	Crust/Meadow (%)																				
Aplysilla sulfurea	Cover%	Crust/Meadow (%)																				
ASCIDIACEA	Cover%	Crust/Meadow (%)	1					1	1	1	1	1	1	1	1	1						
Asterias rubens	Count	>15cm																		6		
BRYOZOA	Cover%	Crust/Meadow (%)	1					1		1	1	1	1	1	1	1	1					
Caryophyllia sp.	Count	1-3cm							4	4		4	4				4					
CIRRIPEDIA	Cover%	Crust/Meadow (%)	6	4	5	4	4	1	1								1					
Clavelina lepadiformis	Cover%	Crust/Meadow (%)													1							
Cliona spp. agg.	Cover%	Crust/Meadow (%)										1										
Corallinaceae	Cover%	Crust/Meadow (%)			1													1				
Corynactis viridis	Cover%	Crust/Meadow (%)												1								
Dercitus bucklandi	Cover%	Crust/Meadow (%)																				
Diplosoma sp.	Cover%	Crust/Meadow (%)						1	1		1	1			1	1						
Dysidea fragilis	Cover%	Crust/Meadow (%)									1	1	1		1	1						
Halichondria panicea	Cover%	Crust/Meadow (%)																				
Haliclona simulans	Cover%	Crust/Meadow (%)															1					
Hiatella sp.	Count	1-3cm	5					5	4		4	4			5	5						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	1	1			6	5	5	6	6	5	6	6	6						
Leuconia nivea	Cover%	Crust/Meadow (%)						1			1											
Lissoclinum perforatum	Cover%	Crust/Meadow (%)															6					
Mytilus edulis	Cover%	Crust/Meadow (%)		5	5	5	6															6
OPHIURIDA	Cover%	Crust/Meadow (%)																				
Pachymatisma johnstonia	Cover%	Mass/Turf (%)	2																			
Patella sp.	Count	1-3cm																				
Polycarpa sp.	Count	1-3cm												4								
PORIFERA	Cover%	Crust/Meadow (%)	4	1				1	4	1	1	4		1	4	4						
Pseudopotamilla reniformis	Cover%	Crust/Meadow (%)									1				1	1						
RHODOPHYCOTA	Cover%	Mass/Turf (%)															4					
SABELLIDA	Cover%	Crust/Meadow (%)								1			1		1	1						
Spirobranchus sp.	Count	1-3cm	4																			

Data Analysis for Watcombe Cave No.3

Note 5 biotopes have been listed as contributing to the area surveyed.	
CR.MCR.CMus.CMyt	Hab 1
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CrSpAsAn	Hab 2
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Scoured lower walls
IR.FIR.SG.CC.Mo	Hab 4
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Cave Floor

Image Analysis Notes

Note that counts are very approximate due to difficulty in seeing the species due to turf cover or retraction into the substrate.
ID simplified to try and represent situation where only images used for stats analysis, so no additional information used unless relevant.

HYDROZOA/BRYOZOA low turf	As most low lying faunal turf comprises a mixture of these groups, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger more notable species have been separated, this will be logged as Massive/Turf.
Colonial cover of 1%	Note this is additionally used to represent cover that is under 1% to avoid using 0.5 or the symbol <.
Polycarpa scuba	Specimen identified as *P.scuba* but be aware of issues with identification which are covered in another Appendix. Very possible that this may be *Polycarpa pomaria* and as described in the appendix, this is a default species ID for the purposes of this report.
ASCIDIACEA (small solitary)	Where practical, species have been entered as counts. Where it is considered impossible to either clearly see the substrate or distinguish between species present, % cover has been used. Within this site, all ascidians sampled were *Polycarpa scuba* but not impossible that *Dendrodoa* present in places.
Hiatella sp. (possible that other species present)	Bored rock present but often hard to see within the substrate. Counts very approximate.
Corallinaceae	Difficult to see in places.
CIRRIPEDIA	Hard to establish cover in lots of images due to back scatter, rock being obscured by other fauna, general clarity. Very approximate.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* which we found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families. Within this cave, Serpulids the noteable spieces in low volume but not ruling out others due to image clarity.
Corynactis viridis	Scattered on the vertical walls and in pcoket of overhangs forming clusters. Also on upper walls in places. Very approximate as substrate often obscured.
Spirobranchus sp.	Very hard to tell if live or dead and often obscured by faunal turf.
PORIFERA crusts	Very hard to establish cover in some images due to thin undulating crusts over other fauna.
Holes in rock	Holes in rock as frequently seen in other caves but boring bivalves not very visible at all, which is a noted difference between this and other caves where their presence and density was much more obvious.

Watcombe Cave No.3 – Analysis			Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	NST	NST	AMB	AMB	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	21 cm	21 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7741	7742	2534	2535	7735	7736	7737	7738	7739	7740
Species	**Counts/%cover**	**SACFOR size**										
ACTINIARIA	Counts	3-15 cm										
ASCIDIACEA (small solitary)	% cover	Crust/Meadow				3	1	1	1	1	1	1
Bispira volutacornis	Counts	3-15 cm										
BRYOZOA crust	% cover	Crust/Meadow		2			2	2	2		3	2
Caryophyllia smithii	Counts	1-3 cm						3	3			
Caryophyllia sp.	Counts	1-3 cm								1		
CIRRIPEDIA	% cover	Crust/Meadow	20	25	30	70	10	10	5	30	15	5
Corallinaceae	% cover	Crust/Meadow										
Corynactis viridis	% cover	Crust/Meadow	5	2					15		3	25
Dercitus bucklandi	% cover	Crust/Meadow								20		
Diplosoma (= *listerianum*)	% cover	Crust/Meadow		2			5	8	2	4	5	1
Disporella hispida	% cover	Crust/Meadow										
Dysidea fragilis	% cover	Crust/Meadow						1		1	1	
Haliclona simulans	% cover	Crust/Meadow					2		3		1	1
Hiatella sp.	Counts	1-3 cm					1					1
HOLOTHUROIDEA (*Pawsonia saxicola*)	Counts	3-15 cm										
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	20	30	60		35	40	30	30	30	30
Leuconia nivea	% cover	Crust/Meadow		1			2		3			2
Lissoclinum perforatum	% cover	Crust/Meadow						1			1	
Mytilus edulis	% cover	Crust/Meadow	60			2						
Myxilla incrustans	% cover	Crust/Meadow										
Necora puber	Counts	3-15 cm									2	
Ostreoidea	Counts	3-15 cm								1		
Polycarpa scuba	Counts	1-3 cm		3	3							
Spirobranchus sp.	Counts	1-3 cm	10		2	15	3	2		1	2	
PORIFERA crusts	% cover	Crust/Meadow	20		10	10	10	15	10			40
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow			P	P	P	P	P	P		P
Sycon ciliatum	Counts	1-3 cm										
Holes in rock - predict *Hiatella*, not confirmed	Present			P	P	P	P	P	P	P	P	P

Watcombe Cave No.3 – Analysis (cont.)			Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 4	Hab 4	Hab 4	Hab 4	Hab 4
		Images by	AMB	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	2556	2559	2566	2569	7724	7725	7726	7727	7728
Species	**Counts/%cover**	**SACFOR size**						**No fauna**			
ACTINIARIA	Counts	3-15 cm				1					
ASCIDIACEA (small solitary)	% cover	Crust/Meadow		1	1	2					
Bispira volutacornis	Counts	3-15 cm				3					
BRYOZOA crust	% cover	Crust/Meadow	1	1	1	1					
Caryophyllia smithii	Counts	1-3 cm									
Caryophyllia sp.	Counts	1-3 cm									
CIRRIPEDIA	% cover	Crust/Meadow	4	2	1	2					
Corallinaceae	% cover	Crust/Meadow					3		1	1	1
Corynactis viridis	% cover	Crust/Meadow									
Dercitus bucklandi	% cover	Crust/Meadow			35	20					
Diplosoma (= *listerianum*)	% cover	Crust/Meadow		1							
Disporella hispida	% cover	Crust/Meadow				1					
Dysidea fragilis	% cover	Crust/Meadow	1			1					
Haliclona simulans	% cover	Crust/Meadow	2								
Hiatella sp.	Counts	1-3 cm	2		1						
HOLOTHUROIDEA (*Pawsonia saxicola*)	Counts	3-15 cm			2						
HYDROZOA/BRYOZOA low turf	% cover	Crust/Meadow	70	20	35	30					
Leuconia nivea	% cover	Crust/Meadow									
Lissoclinum perforatum	% cover	Crust/Meadow									
Mytilus edulis	% cover	Crust/Meadow									
Myxilla incrustans	% cover	Crust/Meadow		35							
Necora puber	Counts	3-15 cm				1					
Ostreoidea	Counts	3-15 cm									
Polycarpa scuba	Counts	1-3 cm									
Spirobranchus sp.	Counts	1-3 cm	1		1	1					
PORIFERA crusts	% cover	Crust/Meadow	5	5	5	15					
SABELLIDA (Serpulidae/Sabellidae)	% cover	Crust/Meadow	P	P	P	P					
Sycon ciliatum	Counts	1-3 cm		3							
Holes in rock - predict *Hiatella*, not confirmed	Present		P	P	P	P					

Watcombe Cave No.3 - Raw Abundance			Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	NST	NST	AMB	AMB	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	21 cm	21 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7741	7742	2534	2535	7735	7736	7737	7738	7739	7740
		Primer label	W3.1	W3.2	W3.3	W3.4	W3.5	W3.6	W3.7	W3.8	W3.9	W3.10
Primer Species	**Counts/Cover%**	**SACFOR size**										
ACTINIARIA	Count	3-15cm										
ASCIDIACEA	Cover%	Crust/Meadow (%)				3	1	1	1	1	1	1
Bispira volutacornis	Count	3-15cm										
BRYOZOA	Cover%	Crust/Meadow (%)		2			2	2	2		3	2
Caryophyllia sp.	Count	1-3cm						3	3	1		
CIRRIPEDIA	Cover%	Crust/Meadow (%)	20	25	30	70	10	10	5	30	15	5
Corallinaceae	Cover%	Crust/Meadow (%)										
Corynactis viridis	Cover%	Crust/Meadow (%)	5	2					15		3	25
Dercitus bucklandi	Cover%	Crust/Meadow (%)								20		
Diplosoma sp.	Cover%	Crust/Meadow (%)		2			5	8	2	4	5	1
Disporella hispida	Cover%	Crust/Meadow (%)										
Dysidea fragilis	Cover%	Crust/Meadow (%)						1		1	1	
Haliclona simulans	Cover%	Crust/Meadow (%)					2		3		1	1
Hiatella sp.	Count	1-3cm					1					1
HOLOTHUROIDEA	Count	3-15cm										
HYDRO/BRYO	Cover%	Crust/Meadow (%)	20	30	60		35	40	30	30	30	30
Leuconia nivea	Cover%	Crust/Meadow (%)		1			2		3			2
Lissoclinum perforatum	Cover%	Crust/Meadow (%)						1			1	
Mytilus edulis	Cover%	Crust/Meadow (%)	60			2						
Myxilla sp.	Cover%	Crust/Meadow (%)										
Necora puber	Count	3-15cm									2	
Ostreoidea	Count	3-15cm								1		
Polycarpa sp.	Count	1-3cm		3	3							
PORIFERA	Cover%	Crust/Meadow (%)	20		10	10	10	15	10			40
SABELLIDA	Cover%	Crust/Meadow (%)			0	0	0	0	0	0		0
Spirobranchus sp.	Count	1-3cm	10		2	15	3	2		1	2	
Sycon ciliatum	Count	1-3cm										

Watcombe Cave No.3 - Raw Abundance (cont.)			Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 4	Hab 4	Hab 4	Hab 4	Hab 4
		Images by	AMB	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	2556	2559	2566	2569	7724	7725	7726	7727	7728
		Primer label	W3.11	W3.12	W3.13	W3.14	W3.15	No Fauna	W3.16	W3.17	W3.18
Primer Species	**Counts/Cover%**	**SACFOR size**									
ACTINIARIA	Count	3-15cm				1					
ASCIDIACEA	Cover%	Crust/Meadow (%)		1	1	2					
Bispira volutacornis	Count	3-15cm				3					
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1					
Caryophyllia sp.	Count	1-3cm									
CIRRIPEDIA	Cover%	Crust/Meadow (%)	4	2	1	2					
Corallinaceae	Cover%	Crust/Meadow (%)					3		1	1	1
Corynactis viridis	Cover%	Crust/Meadow (%)									
Dercitus bucklandi	Cover%	Crust/Meadow (%)			35	20					
Diplosoma sp.	Cover%	Crust/Meadow (%)		1							
Disporella hispida	Cover%	Crust/Meadow (%)				1					
Dysidea fragilis	Cover%	Crust/Meadow (%)	1			1					
Haliclona simulans	Cover%	Crust/Meadow (%)	2								
Hiatella sp.	Count	1-3cm	2		1						
HOLOTHUROIDEA	Count	3-15cm			2						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	70	20	35	30					
Leuconia nivea	Cover%	Crust/Meadow (%)									
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									
Mytilus edulis	Cover%	Crust/Meadow (%)									
Myxilla sp.	Cover%	Crust/Meadow (%)		35							
Necora puber	Count	3-15cm				1					
Ostreoidea	Count	3-15cm									
Polycarpa sp.	Count	1-3cm									
PORIFERA	Cover%	Crust/Meadow (%)	5	5	5	15					
SABELLIDA	Cover%	Crust/Meadow (%)	0	0	0	0					
Spirobranchus sp.	Count	1-3cm	1		1	1					
Sycon ciliatum	Count	1-3cm		3							

Watcombe Cave No.3 - SACFOR Categories			Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Upper wall - Mussels and barnacles dominated	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls
		Habitat Number	Hab 1	Hab 1	Hab 1	Hab 1	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2	Hab 2
		Images by	NST	NST	AMB	AMB	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	21 cm	21 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	7741	7742	2534	2535	7735	7736	7737	7738	7739	7740
		Primer label	W3.1	W3.2	W3.3	W3.4	W3.5	W3.6	W3.7	W3.8	W3.9	W3.10
Species	**Counts/Cover%**	**SACFOR size**										
ACTINIARIA	Count	3-15cm										
ASCIDIACEA	Cover%	Crust/Meadow (%)				1	1	1	1	1	1	1
Bispira volutacornis	Count	3-15cm										
BRYOZOA	Cover%	Crust/Meadow (%)		1			1	1	1		1	1
Caryophyllia sp.	Count	1-3cm						4	4	4		
CIRRIPEDIA	Cover%	Crust/Meadow (%)	4	4	4	5	3	3	1	4	3	1
Corallinaceae	Cover%	Crust/Meadow (%)										
Corynactis viridis	Cover%	Crust/Meadow (%)	1	1					3		1	4
Dercitus bucklandi	Cover%	Crust/Meadow (%)								4		
Diplosoma sp.	Cover%	Crust/Meadow (%)		1			1	2	1	1	1	1
Disporella hispida	Cover%	Crust/Meadow (%)										
Dysidea fragilis	Cover%	Crust/Meadow (%)						1		1	1	
Haliclona simulans	Cover%	Crust/Meadow (%)					1		1		1	1
Hiatella sp.	Count	1-3cm					4					4
HOLOTHUROIDEA	Count	3-15cm										
HYDRO/BRYO	Cover%	Crust/Meadow (%)	4	4	5		4	5	4	4	4	4
Leuconia nivea	Cover%	Crust/Meadow (%)		1			1		1			1
Lissoclinum perforatum	Cover%	Crust/Meadow (%)						1			1	
Mytilus edulis	Cover%	Crust/Meadow (%)	5			1						
Myxilla sp.	Cover%	Crust/Meadow (%)										
Necora puber	Count	3-15cm									5	
Ostreoidea	Count	3-15cm								5		
Polycarpa sp.	Count	1-3cm		4	4							
PORIFERA	Cover%	Crust/Meadow (%)	4		3	3	3	3	3			5
SABELLIDA	Cover%	Crust/Meadow (%)			1	1	1	1	1	1		1
Spirobranchus sp.	Count	1-3cm	5		4	5	4	4		4	4	
Sycon ciliatum	Count	1-3cm										

Watcombe Cave No.3 - SACFOR Categories (cont.)			Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Main Vertical Walls	Cave Floor	Cave Floor	Cave Floor	Cave Floor	Cave Floor
		Habitat Number	Hab 2	Hab 2	Hab 2	Hab 2	Hab 4	Hab 4	Hab 4	Hab 4	Hab 4
		Images by	AMB	NST	NST	NST	NST	NST	NST	NST	NST
		Distance from substrate	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm	31 cm
		Image Number	2556	2559	2566	2569	7724	7725	7726	7727	7728
		Primer label	W3.11	W3.12	W3.13	W3.14	W3.15	No Fauna	W3.16	W3.17	W3.18
Species	**Counts/Cover%**	**SACFOR size**									
ACTINIARIA	Count	3-15cm				5					
ASCIDIACEA	Cover%	Crust/Meadow (%)		1	1	1					
Bispira volutacornis	Count	3-15cm				5					
BRYOZOA	Cover%	Crust/Meadow (%)	1	1	1	1					
Caryophyllia sp.	Count	1-3cm									
CIRRIPEDIA	Cover%	Crust/Meadow (%)	1	1	1	1					
Corallinaceae	Cover%	Crust/Meadow (%)					1		1	1	1
Corynactis viridis	Cover%	Crust/Meadow (%)									
Dercitus bucklandi	Cover%	Crust/Meadow (%)			4	4					
Diplosoma sp.	Cover%	Crust/Meadow (%)		1							
Disporella hispida	Cover%	Crust/Meadow (%)				1					
Dysidea fragilis	Cover%	Crust/Meadow (%)	1			1					
Haliclona simulans	Cover%	Crust/Meadow (%)	1								
Hiatella sp.	Count	1-3cm	4		4						
HOLOTHUROIDEA	Count	3-15cm			5						
HYDRO/BRYO	Cover%	Crust/Meadow (%)	5	4	4	4					
Leuconia nivea	Cover%	Crust/Meadow (%)									
Lissoclinum perforatum	Cover%	Crust/Meadow (%)									
Mytilus edulis	Cover%	Crust/Meadow (%)									
Myxilla sp.	Cover%	Crust/Meadow (%)		4							
Necora puber	Count	3-15cm				5					
Ostreoidea	Count	3-15cm									
Polycarpa sp.	Count	1-3cm									
PORIFERA	Cover%	Crust/Meadow (%)	1	1	1	3					
SABELLIDA	Cover%	Crust/Meadow (%)	1	1	1	1					
Spirobranchus sp.	Count	1-3cm	4		4	4					
Sycon ciliatum	Count	1-3cm		4							

APPENDIX III SPECIES RECORDING METHODOLOGIES

Species and/or Recording Method Overview	
Abbreviations used	agg. – I.e. *Cliona* spp. agg. The term 'agg.' seen after a genus or species, refers to the fact that the species being referred to is described in literature but is thought to be made up of more than 1 species that are yet to be defined. *Diplosoma* (= *listerianum*) – the inclusion of the '=' symbol between the genus and the species is to alert the reader to the fact that the genus allocation is confident, and the species is believed to be the one presented, but that the potential for doubt exists. It may be that a feature that would confirm the identification absolutely was not seen, such as larvae in the case of *Didemnum listerianum*. *Hiatella* (= *rugosa*) is another example and is present to imply that the species is expected to be *H.rugosa*, in keeping with the samples taken but that a sample may not have been taken in that particular cave. *Sagartia* (= *rosea*) is another example and the '=' is presented to imply that the species is believed to be *S.rosea* but again is to suggest possible doubt, in this case due to lack of confidence in the identification of this particular group of species. For data analysis, this group was raised to *Sagartia* sp. or spp.
Amphipod tube mass - (*Jassa falcata*)	It is impossible to give any meaningful coverage to the presence of the soft amphipod tubes, sampled and identified to *Jassa falcata*. Where present they are adhering in small quantities to the other low lying hydroid/bryozoan turf within the area or forming thin deposits on species such as mussels. Where logged they have been treated as 'Present'.
ASCIDIACEA (small solitary)	Where practical, *Polycarpa scuba* or *Dendrodoa grossularia* have been entered as counts. Where it is considered impossible either to clearly see the substrate or distinguish between these or similar species, they have been raised and % cover has been used.
BRYOZOA crusts	Bryozoan crusts are found in many caves and have been regularly but patchily sampled. It is also known that where sampled, other species will more than likely be present. In the majority of images, the exact species will not be known, so for the purposes of the stills analysis spread sheet and the subsequent analysis using Primer, it has been considered more useful to log their presence as BRYOZOA crusts only. Where a species has been identified, it has been logged within the reference collection and referred to in specific cave data.
Caryophyllia sp.	*Caryophyllia smithii* has often clearly been the species present within a stills image. It is known that small *C.smithii* are often confused with *C.inornata*. Due to this possible confusion it has been considered practical to record *C.smithii* and *C.inornata* where they are believed to be present and to raise up to *Caryophyllia* sp. where the distinction between *C.inornata* or juvenile *C.smithii* is unclear.
CIRRIPEDIA	The percentage cover for CIRRIPEDIA is a very rough figure as the substrate is often very obscured. In many instances, it is not possible to tell if live or dead. Sometimes species are sampled, and include *Balanus crenatus* and *Verruca stroemia* but within an image, a mixture is suspected. Therefore, the recording level has been raised.
Cliona spp. agg.	This is measured as % cover and at times an extrapolation about its coverage is made, linking small outcrops, to represent its boring and ramifying nature. Also note that as there are various species of boring forms of *Cliona*, where only the low lying boring form is seen, this has been recorded as *Cliona* spp. agg.. Where the form has developed and become the distinctive massive growth form, this has been recorded as *Cliona celata*. It may be valid to note here that it is believed that within the present survey, the low lying boring form is also *Cliona celata* but the separation has been maintained for consistency. It also allows additional knowledge of the form present to be immediately noted when referred to or seen in any data table within the document. It should also be noted that Sponge V states that the 'boring' form of *Cliona* can only be identified to genus (presumably the case until the species have been satisfactorily separated the literature has been updated).

Species and/or Recording Method Overview	
Colonial cover of 1%	Note that 1% is also used to represent cover that is under 1% to avoid using 0.5 or the symbol <. This is not expected to have made any difference to subsequent statistical analysis.
Corallinaceae	Where recorded, it has often been hard to establish area covered as in some places the colouration of substrate itself may have affected a clear assessment. This is not expected to be significant or to have made any difference to subsequent statistical analysis.
Counts	Counts are often very approximate due to the difficulty in seeing the species, mainly due to turf cover or species retraction into the substrate. This is particularly noticeable with boring bivalves such as *Hiatella* sp., and various solitary ascidians, particularly *Polycarpa scuba/pomaria*.
Diplosoma (= *listerianum*)	Within this survey, it is believed that *Diplosoma listerianum* and *D.spongiforme* are both present within the area. It may be the feeling at times that one or the other of these species is definitely present. However, due to the difficulty in telling them apart, that relies on colony features, not always present at the time of sampling such as larvae, a species may have been suggested but often marked with (=) to highlight the inherent problems with certainty in many cases. For the purposes of Primer analysis, they have all been raised to *Diplosoma* sp.. Also, the variability in appearance of each species, means that methods of identification often considered clear within live specimens and images, may not be convincing at all times. Where this doubt is present, it will be reflected throughout the document.
Hiatella sp.	Throughout the survey, rock boring bivalves have dominated the substrate and are expected to be a mixture of species in places, dominated by *Hiatella* sp. Where the borers have been sampled, the species *Hiatella rugosa* has been identified. Using the samples and *in-situ* images, it is said with confidence that the most clearly observed species is *Hiatella* sp.. However, there is confusion or inconsistency within the wider taxonomic world regarding *Hiatella rugosa*, with *H.arctica* regarded as a synonym by some sources (Conchological Society), and *H.rugosa* regarded as a separate species within the WoRMS database. Additionally, the JNCC website records a biotope, used regularly within this survey, **IR.MIR.KR.HiaSw** (*Hiatella arctica* and seaweeds on vertical limestone / chalk). Due to this observation, despite the identification to species made, the species has been referred to as *Hiatella* sp. throughout the majority of the document.
HYDROZOA/ BRYOZOA low turf (Crust/Meadow)	As most low lying faunal turf comprises a mixture of hydroids and bryozoans, their amalgamation is considered the most practical approach to recording their presence. Where larger and more visible species can be seen or have been sampled, these are duly noted. The low turf cover has been logged as Crust/Meadow within SACFOR terminology, to reflect the low lying nature of the turf seen. Where larger and more notable species have been seen, such as *Tubularia indivisa,* they have been separated, and logged as Massive/Turf. Where turf has been sampled, the identification of the species present has been logged within the reference collection and specific cave data.
Maja brachydactyla	Note that this is name change from *Maja squinado*.
Myxilla rosacea agg.	References to *Myxilla rosacea* agg. will be seen within this report, on reference collection data sheets, and within specific cave species data sheets. This 'aggregate' has been created specifically for this report to cover a certain observation made during species identification. The difference between *Myxilla rosacea* and *M.cf.rosacea* is considered to be established by the difference in the arrangement of spines on the end of the tornotes and the density of spines and size range of the acanthostyles. There appears to be some size variation in the acanthostyles between the samples taken, but with inconclusive spine density and the division based on the spines on the tornotes appears highly variable. Also Sponge V, makes an observation within the section on *Myxilla rosacea* that there is a possibility that more than one species is involved. The aggregate tag is to link the *M.rosacea* and *M.cf.rosacea*, and alludes to the suggestion of the more species yet unidentified. The approach could have been taken to raise them all to *Myxilla* sp., but taking the identification as far as possible was the preferred option.

Species and/or Recording Method Overview	
Nemertesia antennina	Samples and images of this species were often poor. Note that a count of 1 is 1 cluster. As *Nemertesia* grows from a fibrous mass of rootlets, one colony of many stalks is counted as 1.
Polycarpa scuba	*Polycarpa scuba* has been identified frequently from samples and within images as part of this survey. There are identification problems with this species that are detailed here and have been applied through the document. It is certain that there are many occurrences of *Polycarpa scuba*, but confusion exists between this and a closely related species *Polycarpa pomaria*. There are updates within the taxonomic literature regarding this species that have been applied here and there are probably more not yet found. Within a paper by Vasquez et al (1995), this species is referred to a '*pomaria* group' that comprises *P.scuba, P.pomaria* and *P.mamillaris*. From the present samples, *P.mamillaris* can be excluded as the taxonomy is sufficiently different to prevent confusion. Between *P.pomaria* and *P.scuba*, there is much more overlap in the samples dissected. The paper describes the separation of the two species to be most easily seen by the structure of the rim of the anus, the smaller number of polycarps and the presence of stomach folds. Within reality, the number of polycarps in the preserved material would indicate *Polycarpa scuba*, and the rim of the anus is inconclusive as both forms described appear visible within different samples, and the presence of stomach folds, not clearly visible, would suggest *P.pomaria*. However I would suggest the stomach folds may not be a useful feature in preserved samples. This problem may also apply to the rim of the anus. It is certain the *Polycarpa scuba* is present in the caves, and some of the images would support the classic depiction of *Polycarpa scuba*, as having a relatively thin test, square ended siphons with an observed twist and a predominantly red colouration. However some images do appear to show a species with a thicker test, and a white tip to the siphons, but a similar shape and twist to the classic *Polycarpa scuba*. These were specifically sampled and found to be *Polycarpa scuba/pomaria* with the identification problems already described and have given rise to the species overview that it was felt necessary to include here. The white tipped version of the species, with what appears to be a thicker test, is shown on the MarLIN website so this visual variation appears well known. **Approach taken within this report** Within the samples, and the reference list, the '*pomaria* group' link has been recorded, and includes notes on the identification that have been repeated here. As *Polycarpa scuba* clearly does occur within the caves, at a notable density, this has been left as the default position for the purposes of the report, to avoid confusion and maintain consistency. It is suggested here that *P.pomaria* does contribute to the *Polycarpa* species present and the correct approach may have been to assign a 'complex' to the grouping. This was considered unnecessary at this time, as a more straightforward approach in keeping with the aims of the report is considered the priority, and it was felt adequate to record its presence here to alert other surveyors to the possible 'group' of species that exists, and the possible confusion with identification. Within species data tables, the default position of *Polycarpa scuba* has been used, as to try and separate the two species suspected as being present in images is impractical, but for the purposes of Primer analysis, all recordings were raised to *Polycarpa* sp. The existence of *P.pomaria* within the caves does not affect the allocation of the biotope **IR.MIR.KR.HiaSw,** as its close link to *P.scuba*, continues to supports the allocation.
Polydora tubes	On many of the upward facing surfaces in Silty Cave, a dense cover of *Polydora* (=*ciliata*) tubes can be seen. Occasional clusters of tubes believed to be the same genus are seen in places within the turf on the more vertical surfaces.
Pomatoceros sp.	Note that the genus name has now changed to *Spirobranchus*. Where the species is listed within the biotope codes as *Pomatoceros* sp., it remains unchanged. Where incorporated within the Primer analysis, the name has also been changed. Within the body of the report, the genus name has been altered.

Species and/or Recording Method Overview	
PORIFERA crusts – (white – *S.grubii*, *S.ponderosus*, and/or *L.nivea*)	All three species were found regularly throughout the survey, the large forms very often found to be *Stelletta grubii*. Where the white crusts were more low-lying, and subsequently sampled, there was found to be a mixture of *S.grubii and Stryphnus ponderosus*. The observation is that in their low lying form, the two have a very similar surface appearance. The calcareous sponge *Leuconia nivea* was also regularly present. This has been logged under PORIFERA crust if suspected of being present, often due to the quality of the images, preventing definite separation.
PORIFERA crusts (Crust/Meadow)	All sponges have been recorded using the SACFOR % cover rating of Crust/Meadow. This may deviate from that expected for some species. The only species for which the Massive/Turf category has been used are those that form thick dense raised forms such as *Pachymatisma johnstonia* and *Cliona celata*.
SABELLIDA (Serpulidae/Sabellidae)	Small fan worms can be seen at times but it is often impossible to tell if it is a Serpulid or *Pseudopotamilla reniformis* found regularly across the area, which is a Sabellidae. For the purposes of still analysis, SABELLIDA has been used to cover both families where appropriate.
Sagartia (= *troglodytes*)	There is a common anemone seen across the area that if reviewed on-line on various web sites is presented as *Sargartia troglodytes*. However the images are very variable for this species and they do not appear to be the classic images included within the guide to Anemones and Corals by Chris Wood (2005). For this reason, they have often been caveated as (=). For the purposes of the statistical analysis within Primer, all have been raised to either *Sagartia* sp. or spp. as appropriate.
Sarcodictyon roseum	Note that where this species has been recorded, it is a default position, as other species do exist with which this can potentially be confused. Additionally the WoRMS database appears to accept a species name (*S.catenatum*) that in other literature is listed as being synonymised with *S.roseum*. Additionally there is the species *Cervera cf. atlantica*, rarely found and small. Within the area, *S.roseum* is believed to be the species seen but for interest and completeness, awareness of other species should be noted.
Schizomavella spp.	Throughout the survey, bryozoan crusts have been regularly sampled. *Schizomavella* spp., have often been recorded. Initially, it appeared very straightforward to allocate a species, namely *S.sarniensis*, *S.cuspidata* or *S.teresae*. With more observation, it became apparent that features appeared interchangeable and the samples were not completely fitting species descriptions. Additionally, one sample of the normally obvious *Schizomavella linearis*, was found to display a growth form not recognized, which may be a result of the cave environment, found as it was in a fold within the substrate, but essentially the reason is unknown. At this present time, no further so species descriptions have been found to explain the sample seen. Therefore, these species have often been referred to in the document as *Schizomavella* spp.
Sertularella gaudichaudi	This species is confirmed as present due to sampling undertaken within the caves. It would otherwise have been logged under HYDROZOA/BRYOZOA low turf. As a result, references to this species are only entered as 'Present', as no meaningful SACFOR rating can be given.

APPENDIX IV BIOTOPE SUMMARY

Compass

IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Main vertical walls
IR.FIR.SG.DenCcor	Hab 1 secondary
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	Mosaic with Hab 1
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower scour and cave floor

Cuttlefish

IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Main vertical walls
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower vertical wall, scoured area
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Cave floor

Double Decker and Crab Cave Complex

IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic with HiaSw
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
LR.HLR.MusB	
Mussel and/or barnacle communities	

Durl Head

IR.FIR.SG.DenCcor	Hab 1/2
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	
IR.FIR.SG.CrSp	Hab 2/1
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Mosaic
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Lower scoured wall
IR.FIR.SG.CC.Mo	Hab 4
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	

Garfish

LR.FLR.CvOv.FaCr	Hab 1
Faunal crusts on wave-surged littoral cave walls	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	
CR.FCR.Cv.SpCup	
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	Outer upper recess
This biotope is noted here as applying to the outer area of the cave within the roof, specifically highlighting the presence of an extensive and dense cluster of Hoplangia durotrix. The overall area in this section was not surveyed in depth so is not included in the main array of biotopes found. It is mentioned here for completeness.	

Hidden Cleft

CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSp	Hab 1 mosaic
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Possible contribution to the area
IR.FIR.SG.CrSpAsAn	Hab 1 mosaic
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Possible contribution to the area
IR.FIR.SG.CrSpAsDenB	Hab 2
Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock	Lower wall. Too narrow and scoured to separate clearly.
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	

London Bridge

IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	Hiatella dominated - rear of cave
CR.MCR.CFaVS.CuSpH.As	Hab 1
Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock	Forming a mosaic with HiaSw
IR.FIR.SG.CrSp	Hab 2
Crustose sponges on extremely wave-surged infralittoral cave or gully walls	Mussel zone - towards outer area of cave
IR.FIR.SG.CrSpAsAn	Hab 2
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mussel zone - towards outer area of cave
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Mosaic towards cave walls with CC.Mo

Ore Stone

IR.MIR.KR.HiaSw	
Hiatella arctica and seaweeds on vertical limestone / chalk.	Hab 1
CR.FCR.Cv.SpCup	Hab 1 secondary
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSpAsAn	Hab 1 secondary
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.FIR.SG	Hab 3
Infralittoral surge gullies and caves	

Oxley Head

IR.MIR.KR.HiaSw	Hab 1
Hiatella arctica and seaweeds on vertical limestone / chalk.	
CR.FCR.Cv.SpCup	Hab 1 secondary
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	
IR.FIR.SG.CrSpAsAn	Hab 1 secondary
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	
IR.FIR.SG.CrSpAsDenB	Hab 1 secondary
Crustose sponges and colonial ascidians with *Dendrodoa grossularia* or barnacles on wave-surged infralittoral rock	
CR.MCR.CMus.CMyt	Hab 2
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.FIR.SG	Hab 3
Infralittoral surge gullies and caves	Not reviewed

Silty No. 2

IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Forming a mosaic
CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	Forming a mosaic
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
CR.MCR.SfR.Pol	Hab 3
Polydora sp. tubes on moderately exposed sublittoral soft rock	

Slater

IR.FIR.SG.DenCcor	Hab 1
Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock	
CR.FCR.Cv.SpCup	Hab 1
Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	Mosaic
IR.FIR.SG.CrSpAsAn	Hab 1
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic
IR.FIR.SG.CC.Mo	Hab 2
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	
IR.FIR.SG.CC.BalPom	Hab 2
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Mosaic
IR.FIR.SG.CC	Hab 2
Coralline crusts in surge gullies and scoured infralittoral rock	Mosaic

Watcombe 2

CR.MCR.CMus.CMyt	Hab 1
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CC.Mo	Hab 3
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Main Hab 3
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Extending to scoured lower cave walls.

Watcombe 3

CR.MCR.CMus.CMyt	Hab 1
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	
IR.MIR.KR.HiaSw	Hab 2
Hiatella arctica and seaweeds on vertical limestone / chalk.	
IR.FIR.SG.CrSpAsAn	Hab 2
Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	Mosaic
IR.FIR.SG.CC.BalPom	Hab 3
Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely-scoured vertical infralittoral rock	Scoured lower walls
IR.FIR.SG.CC.Mo	Hab 4
Coralline crusts and crustaceans on mobile boulders or cobbles in surge gullies	Cave Floor

Further information

Natural England evidence can be downloaded from our **Access to Evidence Catalogue**. For more information about Natural England and our work see **Gov.UK**. For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk**.

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