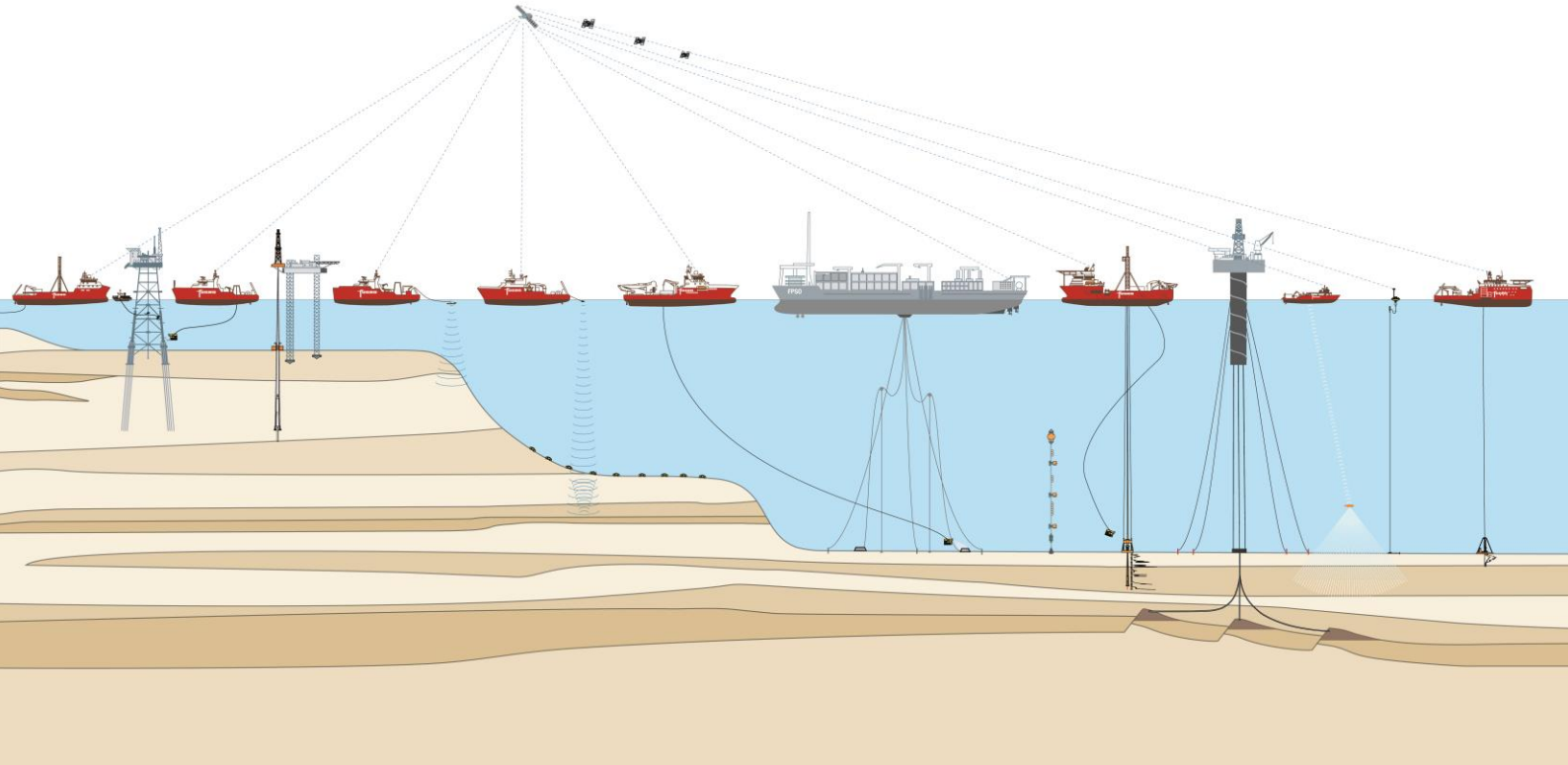
FUGRO EMU LIMITED

South Wight Maritime SAC – reef feature attribute survey

Job Number: 160087
Natural England

Volume 1 of 1

Document Status: Final



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Rev.	Description	Prepared	Checked	Approved	Date
2	Final	Alison Bessell Stefania De Gregorio	Jo Weir	Andy Addleton	15/04/2016
1	Draft for Client review	Alison Bessell Stefania De Gregorio	Jo Weir	Andy Addleton	08/02/2016

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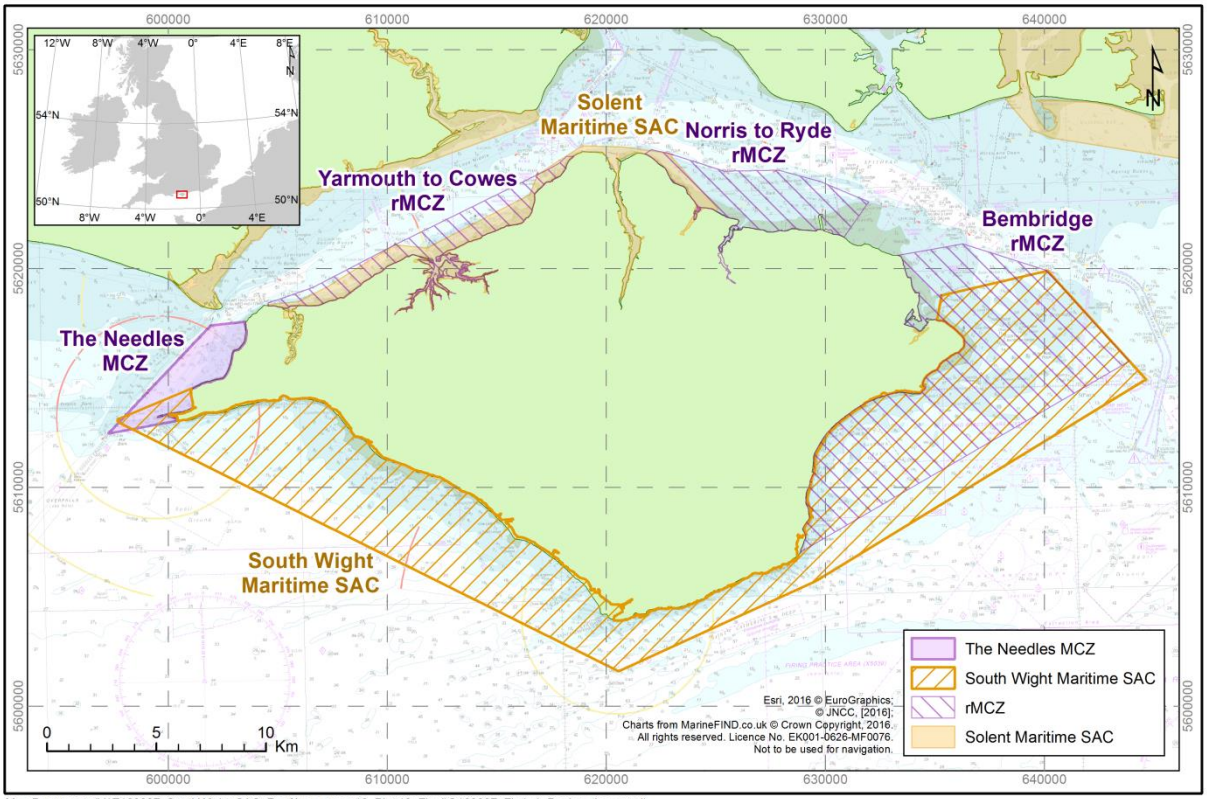

Map Document: (V:\E160087_SouthWight_SAC_ReefAssessment\3_Plots\3_Final\Q160087_Fig1_1_Designations.mxd)
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EXECUTIVE SUMMARY

Fugro EMU Limited were contracted by Natural England, to undertake a diving project in the summer to autumn of 2015, to monitor the species composition attributes of subtidal reef features of the South Wight Maritime Special Area of Conservation (SAC) (Contract Number: ECM_42179). The SAC is located off the southern shore of the Isle of Wight, and qualifies as an SAC for Annex I habitat: Reefs, as listed in the EU Habitats Directive. The area encompasses a large range of reef types and associated marine communities, which include limestone, sandstone and chalk.

Diving operations were conducted between the 7 and 10 September 2015. The remainder of the week was aborted due to poor weather conditions. Diving operations could not be undertaken during the first five days of the second planned week, due to poor on site weather conditions. The remainder of the diving operations were conducted on the 26 and 27 September.

The present survey was to repeat a diving section of a wider survey undertaken in 2003 by Bunker et al. (2005), for Natural England. The aim was to initiate a repeatable monitoring programme against which the condition of the reef features could be measured in the future and was designed to enable the condition of the SAC to be assessed against set targets. Of the original eight sites, six were successfully surveyed. The two remaining sites were not surveyed due to unfavourable weather conditions.

A selection of Annex 1 reef features were to be assessed, 'Kelp Forest communities', 'Subtidal red algae communities' and 'Subtidal faunal turf communities'. The measure to be used to assess the condition of each sub-feature was that the;

'Presence and abundance of composite species (at each site), should not deviate significantly from an established baseline, subject to natural change'.

The methods duplicated the 2003 survey, and entailed quantitative monitoring using stratified random sampling in which the target habitat type acted as the stratified element of the sampling programme. Ten quadrats were then positioned randomly along each transect. The quadrat sampling was supported by a Phase 2 survey of each habitat type to provide a broader context for the quadrats. Video and stills images were taken to support the data gathered. A reference collection of pressed algal specimens was requested and 68 algal species were successfully collected and preserved.

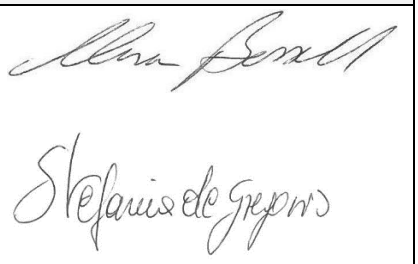
The quadrat data collected were analysed using the statistical package, Plymouth Marine Laboratories PRIMER v6 (Plymouth Routines in Multivariate Ecological Research) suite of programs (Clarke & Gorley, 2006; Clarke & Warwick, 2001).

As raw data from the 2003 survey were not available for statistical comparison, the analyses addressed the robustness of the 2015 data and generated a list of characterising species that could then be compared with the lists provided in the 2005 report (Bunker et al.). Using the

gathered data, habitat types or biotopes were allocated to each site, reviewed against the 2005 report and any changes in allocation between 2005 and 2015, addressed.

An alga rarely found in UK waters was sampled at Site 5, Alum Bay Kelp, to the north of the Needles and was subsequently sent for additional external specialist identification. Professor Martin Wilkinson from Heriot-Watt University and Professor Juliet Brodie from the Natural History Museum both agreed the sample almost certainly to be *Flabellia petiolata,* (molecular studies required for total confirmation), a largely Mediterranean species. Much gratitude must be extended to both Martin Wilkinson and Juliet Brodie for their very kind involvement in the investigation of this alga.

AUTHORISATION PAGE

This Version Authorised By	Name	Date	Signature
Author	Alison Bessell Stefania De Gregorio	15/04/2016	
Technical Checker	Jo Weir	15/04/2016	
Project Manager	Jo Weir	15/04/2016	

Contact Details

Fugro EMU Limited
Trafalgar Wharf (Unit 16)
Hamilton Road
Portchester
Portsmouth
PO8 4PX
United Kingdom

T: +44 (0)239 220 5500
F: +44 (0)239 220 5555
www.fugroemu.com

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1. INTRODUCTION

Fugro EMU Limited were contracted by Natural England, to undertake a diving project in the summer to autumn of 2015, to monitor the species composition attributes of subtidal reef features of the South Wight Maritime Special Area of Conservation (SAC) (Contract Number: ECM_42179).

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.

The South Wight Maritime SAC is located off the southern shore of the Isle of Wight (Figure 1.1), and qualifies as an SAC for Annex I habitat: Reefs, as listed in the EU Habitats Directive. This site encompasses a large range of reef types and associated marine communities, which includes limestone, sandstone and chalk reefs.

"The site includes some of the most important subtidal chalk reefs in Britain, representing 5% of Europe's coastal chalk exposures and supporting a diverse range of species both in the subtidal and intertidal. Vertical and horizontal faces and crevices on the limestone reefs off Bembridge and Whitecliff Bay and areas of large boulders off the south coast of the island provide a range of habitats for a number of marine species." (English Nature, 2001).

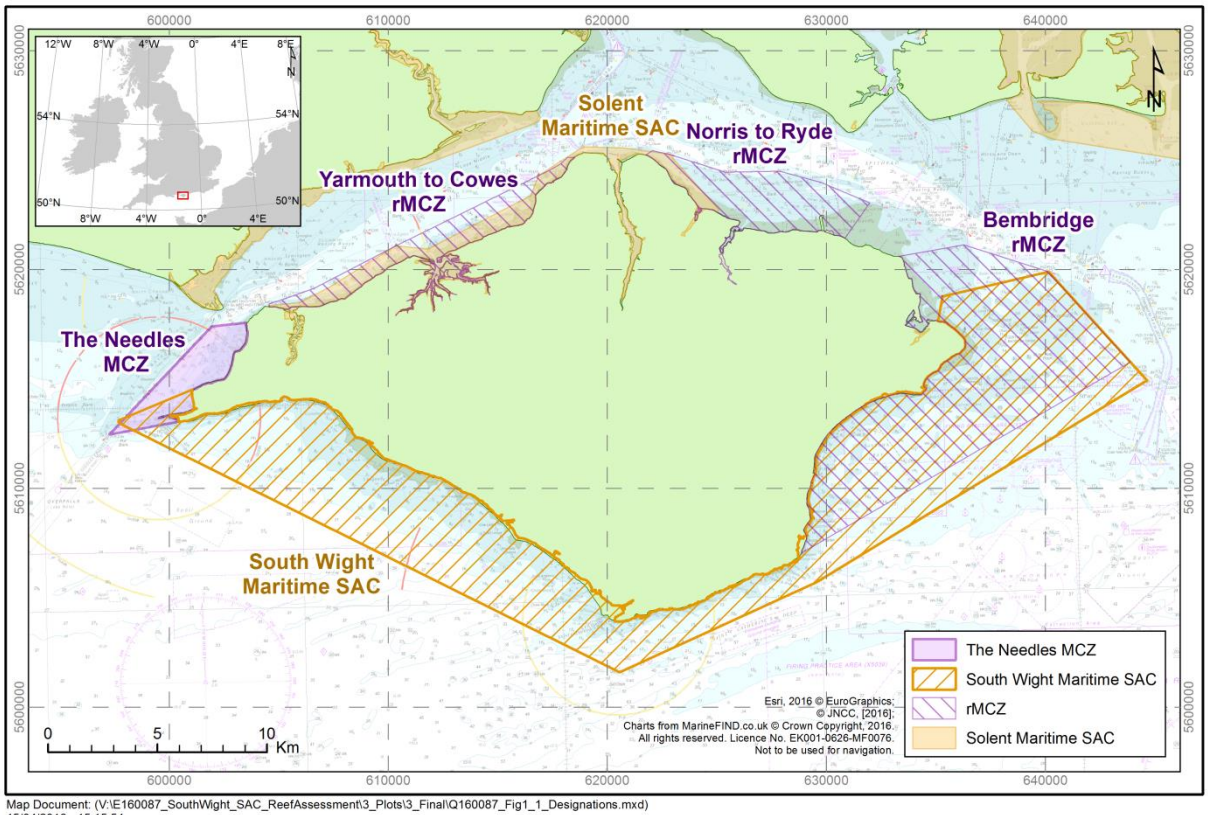


Figure 1.1: The boundary of the South Wight Maritime Special Area of Conservation (SAC), the Needles Marine Conservation Zone (MCZ) and the recommended MCZs.

1.1 Previous Surveys

A series of surveys have been undertaken. These include:

- Seastar Survey Ltd. who in 2010 conducted a habitat mapping survey of the South Wight Maritime SAC in 2010-11 with additional survey work conducted in 2013 (O'Dell et al., 2011, 2013).
- Surveys that have centred on the mapping of the seabed, biotope identification and description. This partial information can be found in reports by Bunker et al. (2000) and Sotheran and Foster-Smith (1995).
- A report by Ball et al. (2000) presented the results of a survey by the GeoData Institute commissioned by English Nature that assessed where littoral and sublittoral surveys had been undertaken in the Solent and South Wight cSAC.
- Seasearch surveys, which have taken place throughout the area. Summary reports are available (Hampshire and Isle of Wight Wildlife Trust (HIWWT) Seasearch 2006-2011).

The main report of particular interest to the current survey (Bunker et al. 2005) was commissioned in 2003 by Natural England, and looked at the extent and diversity of selected habitat types and biotopes of the subtidal reefs within, at that time, the candidate South Wight Maritime SAC (cSAC). The aim was to initiate a repeatable monitoring programme, against which the condition could be measured in the future. The project was designed to enable the condition of the SAC to be assessed against set targets. Both a remote video and diving survey were undertaken to establish a baseline against which the site condition could be assessed. The methods used broadly followed those outlined in the Procedural Guidelines in the Marine Monitoring Handbook (Davies et al. 2001). Fieldwork was conducted during 2003 and 2004, with the data collected establishing a quantitative baseline of information for the site. The report included comparisons between the data collected and other data from various surveys since 1997.

The diving survey undertaken by Bunker et al. in 2003, was used as a baseline for the present sub-feature condition assessment survey. The information gathered by Fugro EMU was required to be of sufficient quality to provide a robust comparison with the previous survey and if time and resources allowed, to provide comprehensive baseline data for any new sites surveyed, relating to the condition of the SAC sub-features according to methodologies outlined in the JNCC Common Standards Monitoring Guidance.

1.2 Project Objectives

The dive survey was designed to gather information on, and allow the condition assessment of the following sub-features of the Annex 1 reef feature within the South Wight Maritime SAC:-

- Kelp forest communities
- Subtidal red algae communities
- Subtidal faunal turf communities

Information of interest regarding the sub-features was presented in the Natural England tender document and is reproduced below:

"Kelp forests colonise a variety of reef substrates within the site. Areas of hard reef, for example, the limestone off Bembridge and Whitecliff Bay, have a rich algal flora in shallow water, particularly to the south of Foreland. Where the limestone occurs within a few metres of the surface the kelps *Laminaria digitata, L. hyperborea* and *L. saccharina* dominate the tops of the outcrops. On South Wight, the natural turbidity of the water restricts kelp forest communities of *Laminaria* spp. (Bunker, 2000).

Red algal communities generally occur at depths in the subtidal where there is insufficient light penetration for green and brown algae to survive and are also often found beneath the canopy of kelp forests. On South Wight, these communities provide an important habitat for marine fauna as well as hosting a number of rare or unusual algal species (Fowler, 1995). On the limestone reefs off Bembridge beyond a depth of about 7 m, the kelp forest becomes less dense and is replaced by a variety of red algae, including *Dilsea carnosa*, *Calliblepharis ciliata* and *Chondrus crispus*.

Within South Wight Maritime SAC the subtidal faunal turf communities vary primarily with the reef substrate and the local hydrography of the area. Off the south-western end of South Wight, the chalk reefs are characterised by extensive burrowing by the piddock *Pholas dactylus*. The high loading of silt in the water column is reflected by crusts of the worm *Sabellaria spinulosa* at a number of locations and in the more current exposed areas, a rich turf of bryozoans, hydroids and sponges are present (Bunker, 2000). The chalk hosts long-lived erect branched species such as the sponge *Stelligera stuposa* and dead man's fingers *Alcyonium digitatum*. Sea anemones, especially the white anemone *Actinothoe sphyrodeta* are also a notable feature on many areas of these chalk reefs. The large reef of harder limestone off Bembridge and Whitecliff Bay comprise horizontal and vertical faces and crevices which provide a range of habitats with rich and diverse faunal communities. The rough vertical surfaces are well colonised by a range of sponges, notably *Dysidea fragilis*, *Haliclona* spp., *Axinella polypoides* and *Hemimycale columella*. The bedrock is extensively bored by the bivalve species *Barnea* and *Hiatella* and sponges such as *Cliona celata*."

The objectives of the present survey were:

- To develop a sampling strategy to allow condition of the three subtidal reef sub-features of South Wight SAC to be assessed against the species composition attributes using JNCC Common Standards Monitoring Guidance which allows for comparison with previous survey data (i.e. Bunker et al., 2005).
- To evaluate the methodology developed by Bunker et al. (2005) and suggest ways to optimise the sampling strategy without deviating from the method to ensure comparable results.
- To employ methods to address each of the attributes relevant to each sub-feature (Table 1.1).

- To employ methods that were repeatable and the data obtained able to support robust statistical comparison with past and future data sets.
- To ensure data collected was accurate with respect to species, and habitat type or biotope identification.

The data collected were required to assess the condition of the following sub-features of the Annex 1 Reef feature within the South Wight Maritime SAC against the relevant attributes using JNCC Common Standards Monitoring Guidance:

Table 1.1: Relevant attributes for sub-features of reef for the South Wight Maritime SAC

Sub-feature	Attribute	Measure	Target
Kelp forest communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change
Subtidal red algae communities	Species composition of characteristic biotope EIR.KFaR.FoR	Monitoring the diversity of species within a subset of biotopes (including EIR.KFaR.FoR). Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change
Subtidal faunal turf communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change

Additionally, it was required that newly collected data were compatible (analytically) with historical survey data, and that such data were subsequently referred to and utilised where appropriate. A comparison with historic data from a variety of sources had been undertaken by Bunker et al. (2005), the result of which was to negate the need to duplicate that review here. For the current purposes, the report by Bunker et al. (2005) is the only report with which a comparison has been made.

Anthropogenic influences, impacting on the ability of the sub-feature to achieve Favourable Condition, were also to be identified and where possible quantified.

The survey work and subsequent analysis is to contribute to Natural England's statutory duty to monitor and report on the condition of a range of features and attributes for SACs.

2. METHODS

2.1 Survey Design

The present survey followed the methodology outlined in Bunker et al. (2005) with reference to the Procedural Guidelines as required. The sites surveyed (Figure 2.1) were required to be repeated and the data previously gathered used for comparison. The current survey also investigated whether additional sites could be surveyed, in particular within the Needles Marine Conservation Zone (MCZ), and if there were any additional kelp forest communities that might be suitable for assessment if time and resources allowed.

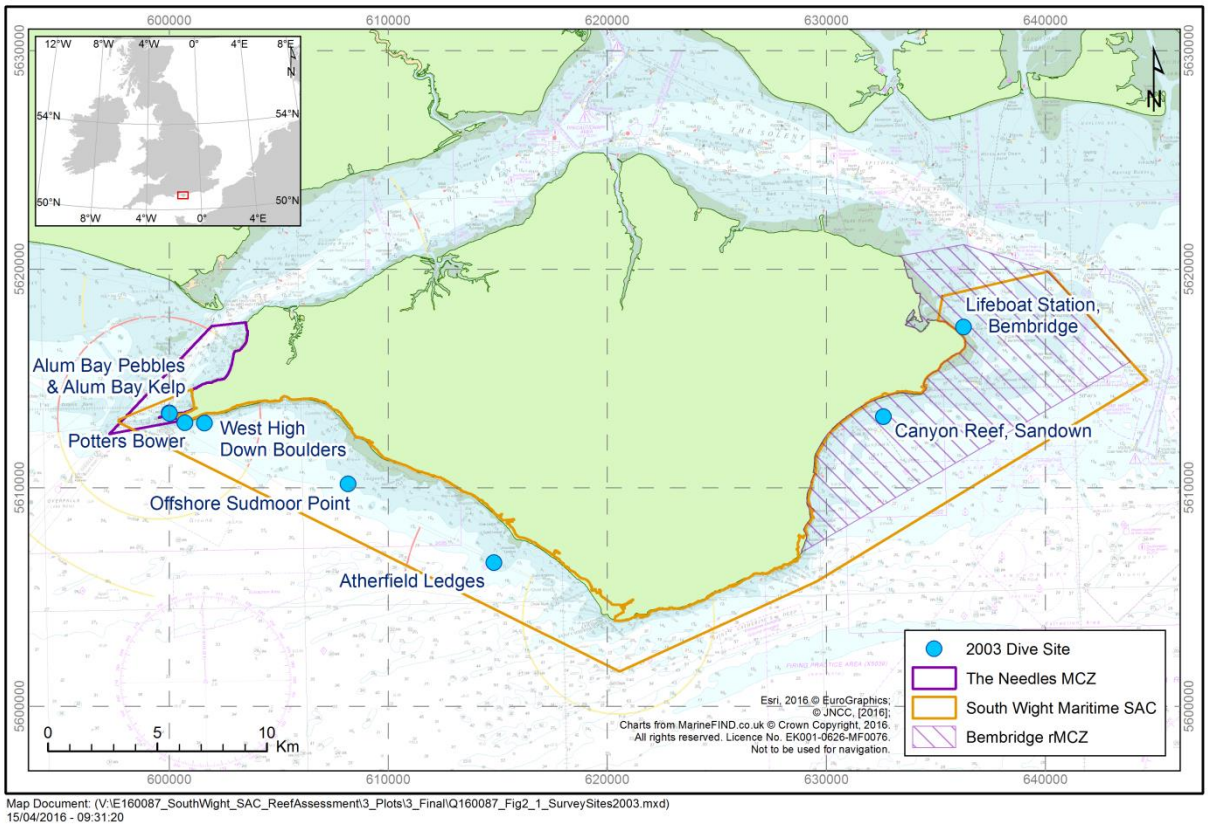


Figure 2.1: Locations of dive sites studied during 2003 survey (Bunker et al., 2005)

The information gathered for the 2005 report was very comprehensive. Comparisons with previous surveys at the time produced mixed results. To maintain comparability, the primary focus was the methodology outlined by Bunker et al. (2005). The possibility of streamlining the methods was reviewed, and would have been considered appropriate as long as no loss in data quality occurred. However, apart from a reduced amount of time spent, resulting in a reduced number of quadrats undertaken per transect at most of the sites, as opposed to the previous survey, no notable deviation in the methods was undertaken.

Table 2.1: Summary details of the original proposed dive locations

Site	Site Name	WGS84		Depth (BCD)
		Latitude	Longitude	
1	West High Down Boulders	50º 39.578'N	001º 33.749'W	11.4 – 14.4 m
2	Offshore Sudmoor Point	50º 38.007'N	001º 28.236'W	11.4 – 14.4 m
3	Atherfield Ledges	50º 35.983'N	001º 22.654'W	15.5 – 15.9 m
4	Alum Bay Pebbles	50º 39.848'N	001º 35.104'W	5.1 – 6.6 m
5	Alum Bay Kelp	50º 39.848'N	001º 35.104'W	0 – 1 m
6	Potters Bower	50º 39.590'N	001º 34.510'W	1 – 2 m
7	Canyon Reef, Sandown	50º 39.358'N	001º 07.437'W	7.4 m
8	Lifeboat Station, Bembridge	50º 41.484'N	001º 04.210'W	4.5 – 5.5 m

The following table (Table 2.2) presents which sites were investigated in 2003 and against which sub-feature. Biotope descriptions have been taken from Bunker et al. (2005). The site numbers and site names remained as per Bunker et al. (2005) for the current survey.

Table 2.2: Local biotope descriptions and sub-feature of each of the 2003 dive sites (Bunker et al., 2005)

Site	Site Name	Local Biotope Description	Sub-feature
1	West High Down Boulders	Small bryozoans and sponges including *Bugula plumosa, Bowerbankia citrina* and *Hymeniacidon perlevis* on chalk bedrock.	Subtidal faunal turf communities
2	Offshore Sudmoor Point	Bryozoans, hydroid and sponges turf including *Bugula plumosa, Hydrallmania falcata,* and *Prosuberites epiphytum* on friable sandstone bedrock.	Subtidal faunal turf communities
3	Atherfield Ledges	Sponges including *Prosuberites epiphytum* and *Esperiopsis fucorum,* the hydroid *Nemertesia antennina,* the bryozoan *Amathia lendigera,* and the red alga *Rhodymenia ardissonei* on *Hiatella* burrowed greensand boulders.	Subtidal faunal turf communities
4	Alum Bay Pebbles	*Dictyota dichotoma* and *Chondria dasyphylla* and other foliose algae on tide-swept pebbles.	Subtidal red algae communities
5	Alum Bay Kelp	*Laminaria hyperborea* forest and foliose red seaweeds on moderately exposed upper infralittoral rock.	Kelp forest communities
6	Potters Bower	*Halidrys siliquosa* with crustose *Corallinaceae, Corallina officinalis and Halurus equisetifolius* on friable chalk bedrock.	Subtidal red algae communities

Site	Site Name	Local Biotope Description	Sub-feature
7	Canyon Reef, Sandown	*Calliblepharis ciliata, Phyllophora pseudoceranoides* and other foliose red algae on silty low lying bedrock reefs scoured by fine sand.	Subtidal red algae communities
8	Lifeboat Station, Bembridge	*Spyridia filamentosa*, *Brongniartella byssoides* and *Gracilaria bursa-pastoris* on a mixed substrata seabed composed of low lying bedrock, boulders, cobbles, gravel and fine sand.	Subtidal red algae communities

2.2 Diving Survey Logistics

All of the diving was carried out in accordance with the Scientific and Archaeological Diving Projects Approved Code of Practice (Health and Safety Executive, 2014).

2.2.1 Survey Dates

Two weeks in September 2015 were selected for diving operations. The first week was considered the optimal week due to neap tides, and the timings of slack water in relation to daylight hours. The second week (21 to 27 September) was planned in case inclement weather occurred over the preferred week.

Diving operations were conducted between the 7 and 10 September 2015. The remainder of the week was aborted due to poor weather conditions. Diving operations could not be undertaken during the first five days of the second planned week, due to poor on site weather conditions. The remainder of the diving operations were conducted on the 26 and 27 September.

2.2.2 Survey Vessel

All diving operations were carried out from a local diving charter boat “Jo-Dan IV”.

2.2.3 Survey Permissions

Two sites (Canyon reef and Bembridge Lifeboat Station) were located within the Queen’ Harbour Master (QHM), Portsmouth Statutory Harbour Authority Limits, and as such permission was obtained ahead of the diving project.

2.3 Survey Methodologies

Bunker et al. (2005) looked at species composition and their abundance. The aim was to broadly follow the procedure outlined in the Procedural Guideline 3-7 (Murray 2001; within Davies et al, eds 2001). Survey recording methods employed during the current study generally replicated those undertaken by Bunker et al. (2005) Survey methods are described in the following sections.

As in 2003, the approach to the quantitative monitoring adopted for the project was stratified random sampling in which the target habitat type acted as the stratified element of the sampling programme, then sampled using quadrats positioned randomly along a transect. The quadrat

sampling was supported by a Phase 2 survey of each site to provide a broader context for the quadrats.

2.3.1 Dive Site Proformas

Using the 2003 survey results, a guidance sheet was prepared for species that could be found in the area, to enable all divers to familiarise themselves with any species that might have been unknown to them, likely only to be relevant regarding some rare algae species that are noted in some areas. The dive site proformas are presented within Appendix G.

A species proforma was produced to assist with underwater recording if required. This was also used to guide the method by which species to be found in the quadrats were logged (counts / % cover).

Randomly generated numbers, between 1 and 10 inclusive (ten per site) were used to establish placement of the quadrats along each transect. The numbers generated were prefixed with either R (right hand side of line), or L (left hand side of the line). As an example, if the number generated was R6, this meant that the quadrat would be placed on the right hand side and at the 6 m mark on the transect line.

2.3.2 Dive Site Positioning

As part of the baseline surveys undertaken by Bunker et al. (2005), a reconnaissance dive was undertaken to establish suitable dive locations. As the original eight baseline dive sites were to be resurveyed, it was considered unnecessary to repeat this element of the original works, as transect positions had already been established. The shot line positions were pre-determined based on the 2003 survey.

Prior to arrival at the site, a shotline was prepared. A loop was made approximately 1 m above the shot weight. A 10 m leaded line (coiled around a reel) was placed into a bag, together with 1 kg lead weights. This bag was attached to the loop by means of a carabiner. At each site, the shot line was deployed at the location surveyed during the 2003 diving surveys. Once deployed, the position of the shot line was checked, and the position recorded using a Differential GPS. This shot line marked the start of the diving transect.

Divers descended the shot line, and once at the seabed reeled out the 10 m leaded line, which was marked in 1 m increments. The transect lines were pulled taut and weighted at the end with lead weights to avoid the transect line moving during the dive. The direction of travel was determined by a reef feature identified from the echo sounder, if appropriate. The direction of travel from the shotline is presented within Table 3.1.

2.3.3 Survey Equipment

Divers were equipped with a slate, proforma sheets, digital cameras, sampling bags, quadrat placement numbers and a quadrat.

A four sided 0.25 m^2 gridded quadrat was used. The smaller squares (10 cm by 10 cm) were used to aid with counts and percentage estimates where needed. Three sided 0.25 m^2 un-gridded quadrats were used for surveying in kelp forest sites. The three sided un-gridded quadrat used within the kelp area is more suitable for a kelp substrate which makes placements of four sided quadrats difficult.

2.3.4 Quadrat Recording

At each of the eight baseline sites planned for the current survey, a maximum of 10 quadrats were to be undertaken. Ten quadrats were considered the appropriate amount required to rationalise survey effort while maintaining data quality for comparative purposes, based on previous survey diving project experience.

Positioning of the quadrats followed the guidance stipulated in Bunker et al. (2005) and is shown below:

- Pre-determined random positions were used.
- During the dive, both sides of the line were used; the two sides were clearly identified as Left and Right.

Both divers moved along the line, one undertaking the quadrat monitoring with associated stills images, and the other undertaking more general video and stills recording and a Phase 2 survey of a slightly wider area.

Species recording followed the guidance given in Bunker et al. (2005). This differed between sites with kelp forest communities focusing on the recording of algae, with animal observations omitted. On all other substrate types, both algae and fauna were recorded.

2.3.4.1 Kelp Site Monitoring Methodology

The kelp biotope was surveyed using three sided quadrats. Within the targeted kelp biotopes, to maintain consistency with Bunker et al. (2005), the following was undertaken:

- Only the algae were recorded, not the fauna.
- The percentage cover of each species present on the seabed within the quadrat was recorded.
- Any kelp epiphytes seen were ignored.
- It was noted that the total % cover could be greater than 100% if species were lying over each other.
- It was noted that if a plant was lying partly in and partly out of the quadrat, only the part within the quadrat was recorded.
- Anything less than 0.5% or any other variation was to be recorded as 0.25 so analysis by PRIMER could be carried out.

- Both mature canopy and understorey kelp plants were to be recorded. These categories were to be recorded separately, for example, as *Laminaria hyperborea* (mature) and *Laminaria hyperborea* (medium).
- Kelp sporelings were assessed as percentage cover.
- Encrusting species were recorded – these were often partly covered by silt. If the species could not be separated, or identified accurately, they were recorded, for example, as coralline crusts, dark red algal crusts, or brown algal crusts.
- Plants were recorded to species level where possible..
- Additional notes were made where required, such as 'Present as small, scattered sporelings'.
- The percentage cover of each of the major substrata within the quadrat was recorded.
- A Phase 2 survey was undertaken of the targeted biotope in which each transect has been placed.
- A photographic record was made of the quadrats, communities and individual species. Video was undertaken along each transect.

2.3.4.2 Rock and Sediment Recording Methodology

The rock and sediment biotopes were surveyed using a four-sided quadrat. The approach was broadly the same as outlined within the kelp biotope approach but differed slightly in the following points:

- Both algae and animals were recorded.
- The following were recorded as percentage cover within the quadrat: algae, animals forming crusts, mats or turf, very abundant sessile animals such as barnacles or tube forming polychaete worms, *Spirobranchus* sp., (previously *Pomatoceros* sp.*)*. How any species was recorded is illustrated within the field data sheets.
- Other fauna were counted, recording the number of individuals of each species in the whole quadrat.
- Fish and other highly motile animals such as shrimps were excluded from the quadrat. Their abundance for the biotope was assessed as part of the Phase 2 survey.
- Very numerous small species such as small gastropods were ignored or recorded as Present only.
- Species hiding in crevices or under cobbles were ignored, with only the species conspicuous on the surface recorded.
- If a plant or encrusting/colonial/mat-forming animal was lying partly in and partly out of the quadrat, only the part within the quadrat was recorded.
- Anything observed as less than 0.5% cover, or recorded as Present only, was recorded for statistical purposes as 0.25 % to assist with analysis within PRIMER. This often applied to small, sparsely distributed species where a percentage could not be estimated effectively.

- Accompanying notes were made as appropriate, such as 'present as small, scattered growths' or 'epizooic on *Flustra foliacea'*.
- As within the kelp biotopes, a check for encrusting algal species was made as these were often partly covered by silt. If the species could not be separated, or identified accurately, they were recorded as coralline crusts, dark red algal crusts, or brown algal crusts.
- A Phase 2 survey was undertaken of the targeted biotope in which each transect has been placed.
- A photographic record was made of the quadrats, communities and individual species. Video was undertaken along each transect.

2.3.5 Species Recording and Sampling

All surveyors recorded to the same taxonomic level, even if they were able to separate species in the field which others found difficult. These taxonomic levels were agreed beforehand. However, the dive team was chosen specifically to ensure that a level of identification could be achieved which would allow comparison with survey results from 2003.

Groups that were difficult to identify reliably in situ, and were not deemed relevant to sample for a more in depth identification, were recorded at a higher level than species. This approach followed that taken by Bunker et al. (2005).

Where possible, everything was recorded to species level, unless agreed otherwise beforehand.

If the identity of something was uncertain, and further investigation was deemed of use to the results, a specimen was collected for review at Fugro EMU laboratories. Specimens were subject to quality control checks between workers at the laboratory.

As an algae reference collection was required for this survey, enough provision was made in the way of sampling bags, to both divers, with the main sampling expected to be undertaken by those undertaking the quadrat recording. Collection of algae was undertaken throughout the survey. This resulted in a combination of pressed and formalin preserved specimens, but as requested, pressed specimens were the main aim, where possible.

The pressed algae specimens were photographed for back up purposes.

A reference collection of faunal species was not requested, but where minimal sampling was deemed useful to ground-truth observations, the specimens were gathered, identified and preserved, for additional future review if required.

Specimens were preserved and labelled at the end of each day to prevent a build-up of specimens from occurring. This was undertaken at the Fugro EMU Laboratories in Portsmouth, where access to all facilities were available, including any chemicals required.

2.4 Data Handling and Analysis

The data collected from the quadrat were entered in a Microsoft Excel spreadsheet upon return from the field, and cross checked prior to data processing. All video and static images relating to species and/or habitat information were reviewed and cross checked with the field records to verify the *in-situ* species data, and all written records were amended where appropriate.

Prior to any statistical analysis being undertaken, data were rationalised in order to address inconsistencies namely species nomenclature and/or duplicate species. Where species were recorded to different taxonomic levels (e.g. genus and species) by different surveyors, these were aggregated to the highest taxonomic level recorded, to avoid spurious enhancement of the species list. All records of Present (P) were changed to 0.25, in line with Bunker and al. (2005).

Following data analysis, habitat type or biotope allocations were made using the JNCC Marine Habitats Classification for Britain and Ireland (v15.03) (JNCC, 2015). In keeping with Bunker et al. (2005), local biotope descriptions were compiled for each site, to further aid comparison of any changes that might have occurred.

2.4.1 Quadrat Data Analysis

Statistical analyses were undertaken on the quadrat data using the Primer v6 statistical package. Analyses were undertaken with a view to assessing the following criteria:

- Robustness of the data set for each biotope, with a high degree of similarity between quadrats;
- Similarity of data between biotopes which occurred at more than one site;
- Characterising species of each biotope;
- Identification of characterising species in closely related biotopes.

Of the sites surveyed, Alum Bay, Alum Bay Kelp, Potters Bowers, Canyon Reef and Bembridge, were infralittoral; Sudmoor Point was circalittoral. The sites were analysed individually and in combination, in order to assess similarity within and between sites.

Data were standardised using the facility in Primer v6 to take account of the combination of abundance measures (percentage cover and counts) at any one site. The standardised data were than transformed, using a fourth root transformation, in order to reduce the influence of the more dominant species, allowing the whole biological assemblage to be assessed.

Cluster analysis and ordination tools were used to provide a visual assessment of the similarity of and differences between the various sites and to check for outlying quadrats. The species responsible for the similarities and differences between the resultant clusters were identified. Full statistical methodologies are presented within Appendix A.

All data analysis has been undertaken in line with the approach taken by Bunker et al. (2005), Appendix 3. Where this has not been possible, it has been highlighted and described.

2.4.2 Biotope and Habitat Type Descriptions

In keeping with the approach taken by Bunker et al. (2005), the results from the quadrat analyses, were combined with the Phase 2 records, which enabled the habitat types and biotopes to be distinguished. National Biotope Codes were assigned using the JNCC Marine Habitat Classification for Britain and Ireland (v15.03), updated by Connor et al. (2004). Bunker et al. (2005) used the previous version (Connor et al. 1997). The present system is compatible with and contributes to the European Habitat Classification System (EUNIS), and the relevant codes have been provided within the report (Appendix E). Bunker (er al. 2005) also wrote local biotope descriptions for each site, which made use of all the different levels of information that had been collected during the survey. This approach has been duplicated here, to assist with highlighting how a site may have changed over time, and to highlight the change in characterising species, if and when that occurred. The characterising species included in these descriptions were compiled from the combined results of the SIMPER analyses and the Phase 2 observations.

2.4.3 Comparison with Previous Data

The only survey with which data from the present survey were to have been compared, was Bunker et al. 2005. However, raw data were not available for comparison. Consequently, a broad comparison of habitat types and biotopes has been undertaken, with a view to providing information on their occurrence, distribution, and any changes that is suggested might have occurred. Additionally a comparison of characterising species between the two survey years has been undertaken.

3. RESULTS

3.1 Diving Survey

All eight of the proposed diving sites were attempted. However, two sites could not be surveyed due the following reasons:

- Atherfield Ledges. Diving had to be aborted on the 10 September 2015 due to worsening sea conditions on site.
- West High Down. Diving was aborted due to poor underwater visibility (<20cm) on 10 September 2015. This site was reattempted on the 27 September, but had to be abandoned due to poor sea conditions.

The remainder of the sites were successfully surveyed. Across the six sites, all sub features were represented; Kelp forest communities, Subtidal red algae communities, and Subtidal faunal turf communities.

The underwater visibility during diving operations varied considerably between sites and dates. For the majority of dives, the underwater visibility was approximately 1 -2 m. The best underwater visibility (approximately 8 m) was encountered at Potters Bower on the 26 September 2015.

The dive site named Lifeboat Station, Bembridge had to be relocated approximately 75 m to the northwest due to mooring buoys obstructing the original location.

The original aim was to undertake 10 quadrats at each site. This was achieved at five out of the six sites, with eight quadrats achieved at Offshore Sudmoor Point. The reduced number of quadrats achieved at Offshore Sudmoor Point, has not affected any subsequent analysis. The reduction in quadrats was a result of challenging tidal conditions experienced at the time. Due to weather constraints, this site was surveyed at the end of neap tides, and as such the slack water window was limited.

A return to the site was considered but it was felt that that would adversely affect the data collection at the remaining sites, and that the data potentially collected from the remaining two quadrats would not add a huge amount of additional information to that already gathered. For that reason, along with the predicted conditions on site for the remaining survey period, returning to site was not a viable option.

Additionally, it was hoped that an additional kelp forest site might be located and surveyed as part of this project. Bunker et al. (2005) were unable to find additional kelp sites in 2003. Seastar were also unable to find any kelp forest habitats in previous surveys in the area. It was hoped that a wider data search might produce a likely site for inclusion but this was unsuccessful.

A summary of the dives sites and the data collected is presented in Appendix B.

Table 3.1: Summary details of the actual dive locations undertaken

Site	Site Name	WGS84		Depth (BCD)	Direction of transect from the shotline
		Latitude	Longitude		
2	Offshore Sudmoor Point	50º 38.006'N	001º 28.236'W	11.9 – 13.1 m	SW
4	Alum Bay Pebbles	50º 39.848'N	001º 35.104'W	6.1 – 6.6 m	E
5	Alum Bay Kelp	50º 39.829'N	001º 35.094'W	0 – 1 m	N to the top of the reef, then W along the reef
6	Potters Bower	50º 39.590'N	001º 34.509'W	1 - 2 m	ENE
7	Canyon Reef, Sandown	50º 39.357'N	001º 07.437'W	8.8 – 9.1 m	SE
8	Lifeboat Station, Bembridge	50º 41.522'N	001º 04.237'W	4.6 m	W

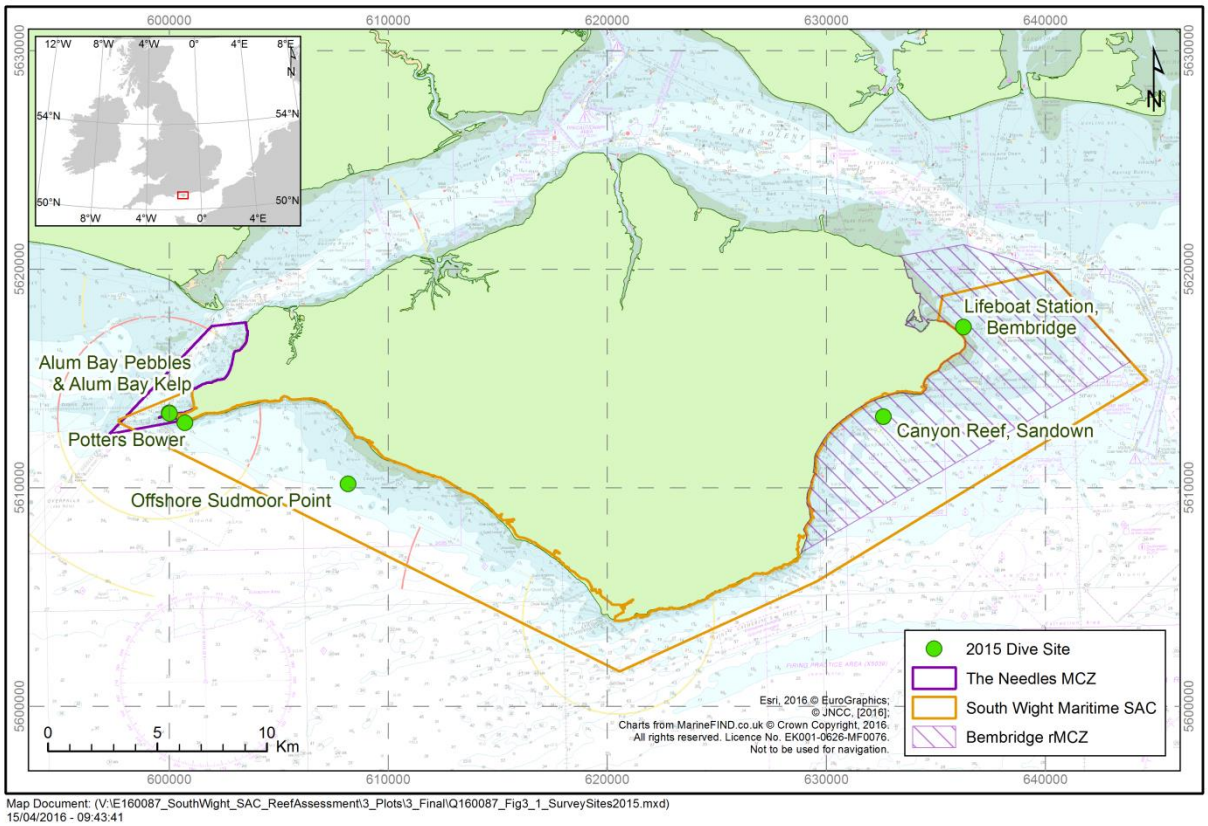


Figure 3.1: Dive sites surveyed in 2015

3.2 Site Descriptions with Habitat Type and Biotope Allocations

Using a combination of the quadrat data and Phase 2 data acquired, along with general substrate composition observations, an assessment has been made regarding habitat type and biotope allocations and is presented site by site in the following section. The characterising species per site are listed here, and comparisons with the characterising species from the 2005 report are included, and are again presented in the statistical analysis section (Appendix A). The full species data lists recorded in the quadrats are presented in Appendix C and the Phase 2 data are presented in Appendix D.

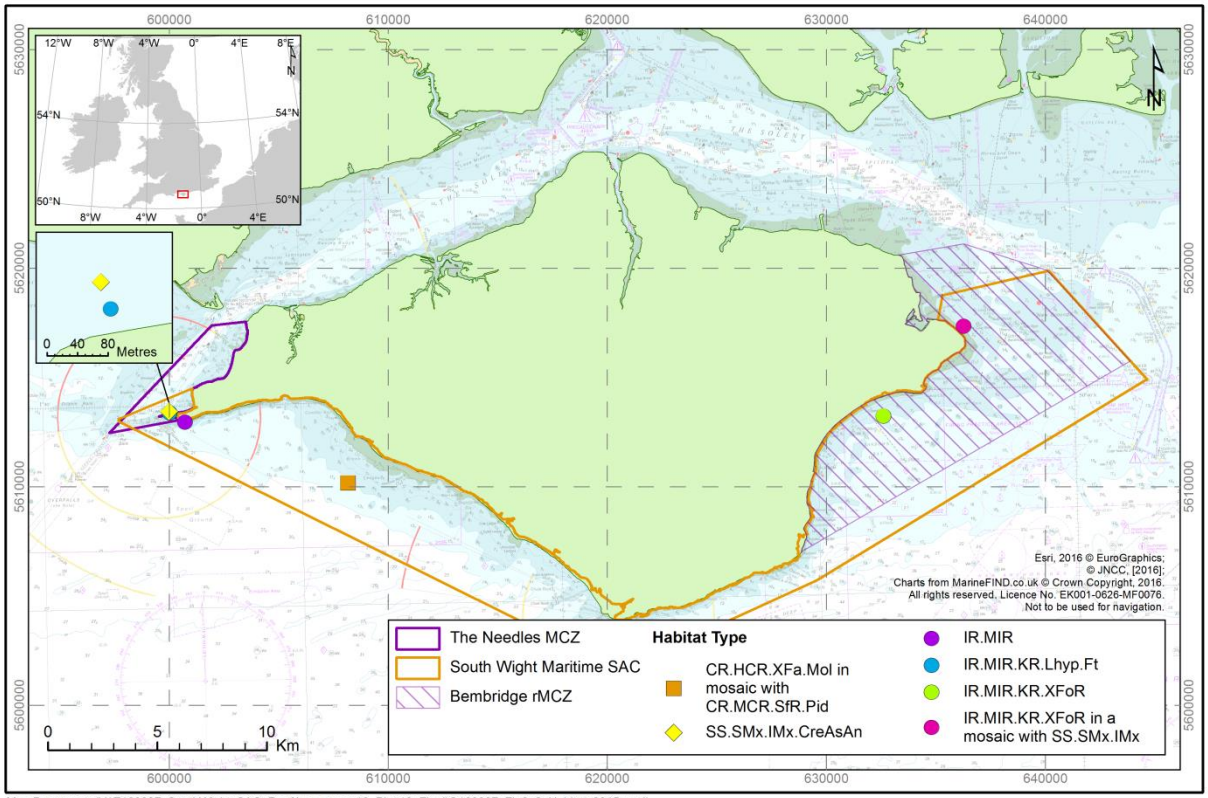


Figure 3.2: Allocated habitat types and biotopes 2015

3.2.1 Site 2 – Offshore Sudmoor Point

Subtidal faunal turf community	
Local Biotope Description (2015)	
A low-lying ascidian turf dominated by *Molgula manhattensis*, mixed with a rich turf of bryozoans (foliose and crusts), hydroids and sponges, and sparse red algae on friable piddock bored sandstone bedrock.	
National Code of Biotope Allocation	**CR.HCR.XFa.Mol**
EUNIS Code	A4.138
National Code Biotope Description	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock
In a mosaic with:-	
National Code of Biotope Allocation	**CR.MCR.SfR.Pid**
EUNIS Code	A4.231
National Code Biotope Description	Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay.
Wave Exposure	Exposed
Tidal Streams	Moderate to strong
Zone	Circalittoral
Depth	11.9 – 13.1 m BCD
National Code of Previous Biotope Allocation (Bunker et al. 2005)	**CR.MCR.SfR.Pid**
EUNIS Code	A4.231
National Code Biotope Description	Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay.
Previous Local Biotope Description (Bunker et al. 2005)	Bryozoans, hydroid and sponges turf including *Bugula plumosa, Hydrallmania falcata,* and *Prosuberites epiphytum* on friable sandstone bedrock.

The substrate was a bedrock reef of friable sandstone, which formed a shallowly undulating terrain, with a coarse fissured surface. The ten metre long transect ran from approximately 16.6 m to 17.8 m, rising periodically in small 30 cm high steps. The high point appeared to be a point over which a greater drop could be seen, before a similar undulation began again. The stepped areas created relatively vertical faces, at the bottom of which smaller broken bedrock and coarse sediment could accumulate. The bedrock was regularly bored by bivalves, potentially of a variety of species, but the species compliment was not investigated. Raised edges of bedrock could be seen to be deeply eroded creating many deep crevices and a potentially wide variety of habitats for a diverse, but low-lying fauna. Occasionally the substrate was fractured enough to create small to medium sized sandstone boulders, resting on the reef. The area in general was very tide-swept and heavily silted.

The flora consisted of sparse red filamentous algae, mainly *Cryptopleura ramosa* and *Plocamium cartilagineum.* The fauna comprised an array of hydroid and bryozoan turf species such as *Flustra foliacea*, *Chartella papyracea*, *Nemertesia antennina* and *N. ramosa*, *Amphisbetia operculata*, *Halecium halicinum*, and fine hydroid turf (Plumularioidea). Bryozoan crusts, where sampled, were found to be *Schizomavella sarniensis*. The fine hydroid turf was found to consist mainly of *Aglaophenia pluma*. A dense covering of small, low lying, ascidians, found to be *Molgula manhattensis* from sample analysis, covered the area. The *Molgula* was mixed with other ascidians including *Polycarpa scuba* and *Polycarpa pomaria*. Regular crusts of the calcareous tube forming

polychaete *Filograna implexa*, occurred across the site, both on upper and vertical surfaces. Yellow, orange and red sponge crusts formed sheets on all surfaces, comprising *Antho inconstans*, *Hymedesmia* sp, *Pseudosuberites sulphureus*, *Microciona armata*, *Microciona spinarcus*, and *Oscarella* sp. Thicker sponges were also present and included *Dysidea fragilis*, *Myxilla rosacea*, *Phorbas plumosum*, *Hymeniacidon perlevis* and *Polymastia penicillus*, along with the erect branching sponge *Stelligers stuposa*, of which many very small examples were present. The occasional small example of *Raspailia ramosa* was also present.

Results of SIMPER Analysis Site 2 (OS). Data standardised and 4th root transformed.

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Molgula manhattensis	15.85
Polycarpa scuba/pomaria	11.59
Sabellaria spinulosa	11.28
Hydroid/bryozoan mixed turf	10.31
Filograna implexa	7.11
Chartella papyracea	6.37
Nemertesia antennina	6.26
Stelligera	5.48
Aglaophenia pluma	5.12
Pseudosuberites sulphureus	4.98
Raspailia ramosa	3.11
Flustra foliacea	2.58
Bryozoan Crust	2.55
Dysidea fragilis	1.24
Hydrallmania falcata	1.16
Polymastia penicillus	0.86

Additional species recorded as Frequent or above in Phase 2 data:

Cancer pagurus

The statistical outputs produced using Primer v6 are presented in Appendix A.1.1. The Bray-Curtis dendrogram shows a slight separation of quadrats one and two from the rest of the quadrats, the explanation for which can be assessed by observing the raw data (Appendix C.1). There it would suggest that the separation might be due to the distribution of some species such as bryozoan crusts (in higher distribution in quadrats one and two, reducing across the rest of the quadrats), *Dysidea fragilis*, (present in one and two but reducing across the rest of the site), and *Flustra foliacea* (not present at all in one and two but occurring sometimes in high density within the remaining quadrats). Other species can be seen to follow similar patterns across the raw data set. However, if the raw video footage is reviewed, it can be seen that those species that might suggest a potential change of distribution along the transect, do not reflect a real change as they can be seen to occur across the whole site. Phase 2 site observations would also support the opinion that no significant difference in substrate and species composition was observed along the transect. The separation seen is therefore suggested to be result of the random placement of quadrats only.

3.2.1.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the report by Bunker et al. (2005). It can be seen that overall, the species list is largely comparable with the present survey, in that many hydroid and bryozoan turf species were present in both survey periods, however in varying degrees of dominance. Some of these differences may be attributable to the time of year at which the survey was undertaken, a summer survey in 2003 compared to a late summer to autumn survey in 2015. In addition, sponges were common to both, again differing slightly in species composition. One observation between 2003 and 2015, is that in the former, *Salmacina dysteri* was recorded as a characterising species, compared to *Filograna implexa* in the latter. No comment can be made about this observation except that samples were taken wherever these potential species were observed for further lab identification and were all found to *be F.implexa*.

The notable change is the presence and dominance of the ascidians *Molgula manhattensis*, and *Polycarpa* spp., and the sand/shell tube forming polychaete *Sabellaria spinulosa*. *M.manhattensis* and *S.spinulosa* are both known for their tolerance of an increase in sedimentation and their ability to recover well from periods of smothering (Hiscock, 2008). This may suggest that in the intervening 10 years between the previous and the current survey, an increase in sedimentation has occurred in the area and influenced the apparent change in characterising species and the subsequent biotope allocation, but this cannot be confirmed and could be the focus of separate investigation.

Species (Bunker et al. 2005)	% Contribution to similarity
Bugula plumosa	14.19
Hydrallmania falcata	12.88
Salmacina dysteri	6.75
Enc. Bryozoa (Pink)	4.95
Flustra foliacea	4.84
Nemertesia antennina	4.43
Enc. Bryozoa (Orange)	4.41
Prosuberites epiphytum	4.12
Stelligera rigida	3.58
Dysidea fragilis	3.5
Plumularia setacea	3.14
Sertularella gaudichaudi	3.05
Leucosolenia complicata	2.47
Scrupocellaria	2.36
Bicellariella ciliata	2.33
Hemimycale columella	2.07
Bugula flabellata	2.06
Polycarpa pomaria	1.98
Plocamilla coriacea	1.88
Mollusc siphons	1.8
Ampelisca	1.79
Hinia reticulata	1.63

No other species were recorded as Frequent or above in the Phase 2 data:

3.2.1.2 Comparison with Previous Biotope Allocation

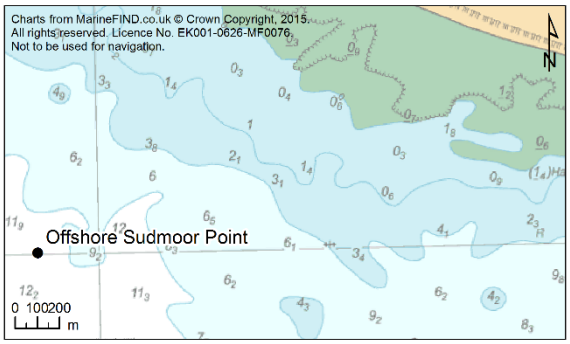
Across the transect, the dominance of an ascidian turf, comprising mainly *Molgula manhattensis* and to a lesser extent, *Polycarpa* spp., suggests the XFa.Mol biotope (A4.138). The soft rock was bored by bivalves across the area, however, the presence of patches of more obviously bored substrate by a variety of bivalves, suggests the validity of the SfR.Pid (A4.231) allocation in places. The wider compliment of sponge fauna is reminiscent of an XFa habitat type but the XFa.Mol biotope description suggests a sparse hydroid and bryozoan turf and a severely reduced compliment of sponges, which was not found to be the case here, where a relatively rich and varied faunal turf of both was present. The SfR.Pid description also suggests a species impoverished substrate, and there were patches where this was the case. Therefore, a mosaic of the XFa.Mol and SfR.Pid is suggested for the area overall.

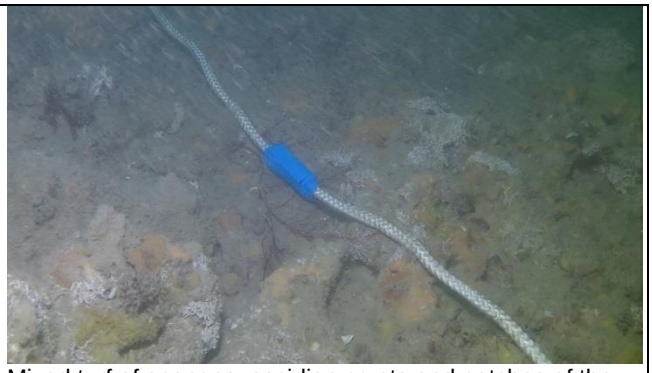
The characterising species for SfR.Pid, as listed in the JNCC Biotope Classification, were not found here, apart from occasional species of red algae. The biotope allocation is based on the presence of red algae, the soft rock exposures, the presence of piddock holes and the overall biotope description. Although many of the characterising species typical of the XFa.Mol biotope, as reported in the JNCC classification, were not recorded, the description of this biotope was considered the closest fit to the habitat and associated species.

In 2003, the biotope SfR.Pid was allocated, without the accompanying biotope suggested here. A low lying turf of many species but few in great abundance was described, which would not be in great contradiction to the biotope seen during this survey. However, in 2003, no mention was made of the ascidian turf that was very prevalent here, to the level that a separate biotope to note its presence was deemed appropriate. Within the JNCC Marine Habitat Classification (2015), the biotope description for CR.HCR.XFa.Mol, notes that it is often found on soft rock substrates and that the 'SfR biotope complex would be observed in close proximity'. It is possible that patches of ascidians were present in the area in 2003 but not in notable quantities to warrant a separate allocation. Conversely, in 2003, the reef building amphipod, *Ampelisca* sp., was noted in patches, but was not evident during the present survey, despite the fact that its presence in the area is known to occur. As *Ampelisca* beds are largely a reponse to the presence of a sediment load of suitable size particles, in the same way that *Sabellaria* spp. are, there may have been a localised change in sediment deposition rates, affecting its ability to reef-build. However, this is speculation and may be suited to an additional investigation. Additionally, the presence of the calcareous tubeworm *Salmacina dysteri* was noted in 2003, but all samples taken in 2015, were identified to be the similar tubeworm, *Filograna implexa,* which occurred in regular clusters throughout the site.

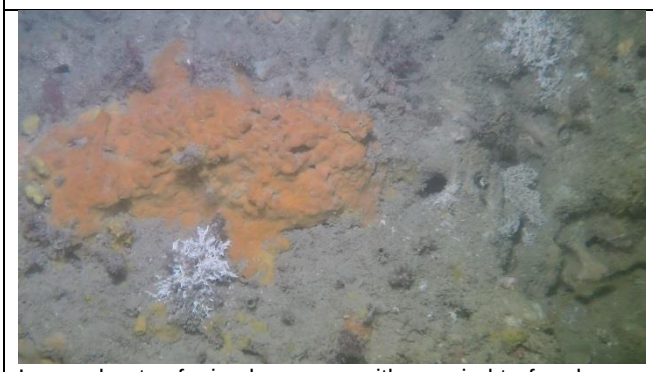
Visually, the few images seen of the area from the 2003 survey indicate a generally similar substrate overall, the hydroid and bryozoan turf, appearing more dense in places than seen here, which may in some part be due to the difference in the time of year that the surveys were undertaken, July in the case of the 2003 survey and mid to late September for the subsequent survey in 2015.

Additionally in the 2005 report, it was noted that in 2003 unusually good conditions for conducting the survey were experienced, which would stand in contrast to the 2015 survey where the area had already undergone many periods of strong winds and storms, which may have adversely affected the density of some species present. To highlight one difference, Bunker et al. (2005) mentioned *Bugula plumosa* in notable quantities, which was not noted at all in the present survey, probably due to autumn die-back that all species of *Bugula* are reported to experience (Biological Traits Information Catalogue, 2006).





Mixed turf of sponges, ascidian crusts and patches of the calcareous tube worm *Filograna implexa*.



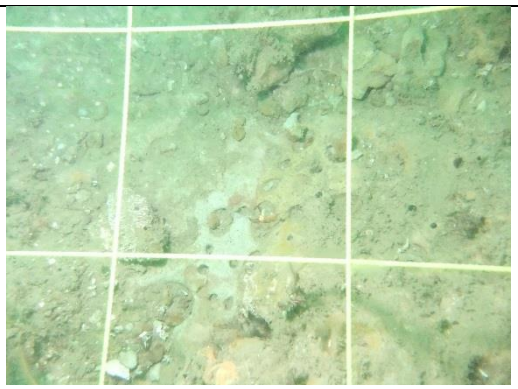
Large sheets of mixed sponges with a varied turf and patches of the calcareous tube worm *Filograna implexa*.

Mixed turf of sponges, ascidian crusts and patches of the calcareous tube worm *Filograna implexa*, with sparse low lying turf of red algae species.

Large sheets of an ascidian turf dominated by *Molgula manhattensis* mixed with *Polycarpa* spp.

Deeply creviced soft rock with sponges, the tubeworm *Filograna implexa* and the edible crab, *Cancer pagurus*.

Bored soft rock with dense patches of *Nemertesia* spp., sponges and sparse red algae.



Exposures of bored soft rock with sparse fauna including low lying sponges.

3.2.2 Site 4 – Alum Bay Pebbles

Subtidal red algae community	
Local Biotope Description (2015)	
Dictyota dichotoma, *Calliblepharis ciliata* and other foliose algae with *Crepidula fornicata* on coarse mixed sediment.	
National Code of Biotope Allocation	**SS.SMx.IMx.CreAsAn**
EUNIS Code	A5.431
National Code Biotope Description	*Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment
Wave Exposure	Very sheltered
Tidal Streams	Moderate to strong
Zone	Infralittoral
Depth	6.1 – 6.6 m BCD
National Code of Previous Habitat Type Allocation (Bunker et al. 2005)	**SS.SMx.IMx**
EUNIS Code	A5.43
National Code Habitat Type Description	Infralittoral mixed sediments
Previous Local Biotope Description (Bunker et al. 2005)	*Dictyota dichotoma* and *Chondria dasyphylla* and other foliose algae on tide-swept pebbles

The site comprised a coarse mixed sediment of sandy gravelly pebbles with around 15% cobbles scattered across the area. Sand accumulated on occasional raised areas of hard or compacted ground. Around 10-15% of the substrate comprised dead *Crepidula* shells. Live clusters of *Crepidula* formed dense patches, up to 20-30% cover in places. Algae formed a patchy low-lying cover of filamentous red turf with larger more robust fronds of species such as *Calliblepharis ciliata, Dictyota dichotoma* and *Gracilaria* sp. in places. Crustose coralline algae were very prevalent.

Fauna were generally sparse with a few small sponge fragments, and the occasional anemone, *Actinothoe sphyrodeta* and *Cereus pedunculatus*. Very small and sparse solitary ascidians were occasionally seen. Small gastropods including *Rissoa parva*, *Gibbula cineraria* and *Hinia* sp., were also present. Hydroids and bryozoan turf species were very sparse with rare specimens of *Nemertesia antennina* and *Amphisbetia operculata* found.

Results of SIMPER Analysis Site 4 (AB). Data standardised and 4th root transformed.

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Crepidula fornicata	13.44
Crustose Corallinaceae	13.23
Filamentous red algae	9.65
Calliblepharis ciliata	7.09
Dictyota dichotoma	6.99
Asparagopsis armata (Falkenbergia)	5.93
Heterosiphonia plumosa	5.88
Spirobranchus	5.03
Rissoa parva	5.03
Cryptopleura ramosa	3.76
Polysiphonia	2.57
Ceramium	2.27
Pterosiphonia ardreana	2.09
Acrosorium ciliolatum	2.02
Ulva	1.83
Pterothamnion plumula	1.80
Plocamium cartilagineum	4.66
Gibbula cineraria	1.30
Gastroclonium ovatum	1.14
Hinia	1.12
Sabellidae	1.08
Hypoglossum hypoglossoides	0.69

Additional species recorded as Frequent or above in Phase 2 data:

Cereus pedunculatus

The statistical outputs produced using Primer v6 are presented in Appendix A.1.2. The statistical outputs appear to cluster quadrats one to five, and six and seven, more closely together, with quadrats eight, nine and ten, appearing to reflect some separation from the rest of the quadrats across the site. On reviewing the raw data (Appendix C.2) along with the video footage, the substrate or *Crepidula fornicata* density would not appear to play a significant part in any supposed difference along the transect. An observation is that the site had a very rich a varied algal composition, dominated by foliose and filamentous reds. A suggestion here is that the observed differences are largely due to the density and occurrence of this algal composition, many identified from very small examples. Another observation is that some of the separation may be attributed to larger or more mobile faunal species such as *Pomatoschistus*, *Hinia* and *Gibbula* spp., whose variable occurrence across the transect, does not in reality reflect a real overall significant difference across the site.

3.2.2.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the report by Bunker et al. (2005). Only six species, all of them algae are represented in both the 2003 and the 2015 characterising species lists. However, both years present a varied suite of species in addition to those that are common to both. The main

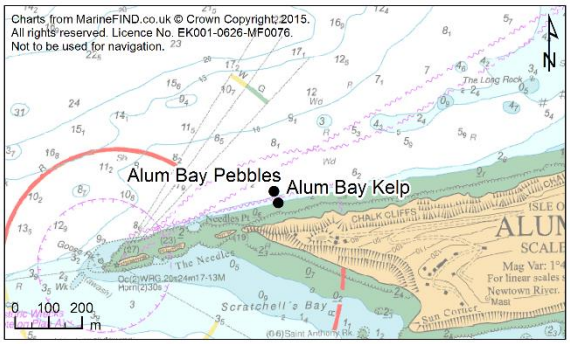
addition to the site characterisation overall, is the gastropod mollusc, *Crepidula fornicata*, that dominates the characterising species in 2015.

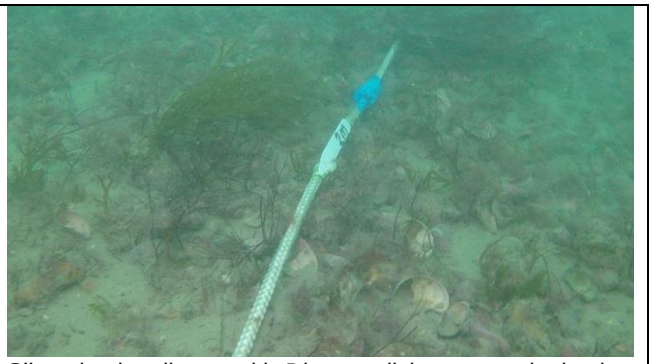
Species (Bunker et al. 2005)	% Contribution to similarity
Dictyota dichotoma	12.67
Chondria dasyphylla	10.01
Brongniartella byssoides	6.95
Calliblepharis ciliata	6.46
Taonia atomaria	6.11
Halarachnion ligulatum	5.77
Aglaothamnion byssoides	5.11
Bryopsis plumosa	4.91
Sporochnus pedunculatus	4.48
Cryptopleura ramosa	4.21
Heterosiphonia plumosa	3.76
Crustose Corallinaceae	3.66
Scinaia interrupta	3.55
Naccaria wiggii	3.48
Polysiphonia stricta	3.27
Polysiphonia elongella	2.78
Polysiphonia elongata	2.12
Erythrodermis traillii?	1.6

3.2.2.2 Comparison with Previous Habitat Type/Biotope Allocation

In general, the habitat type / biotope allocation is similar, with the expansion of the code reflecting the very notable and dense presence of the mollusc *Crepidula fornicata* (slipper limpet). The species did occur in 2003 but apparently not in any density, the main focus in that survey, resting on the species of algae present. With regard to the algae, the dominant species still appears to include *Dictyota dichotoma* but the overall compliment of species has slightly changed and was now found to be further dominated by *Calliblepharis ciliata* and crustose coralline algae. Of interest in the 2003 survey was the presence of the Nationally Scarce algal species *Zanardinia prototypus*, which was not seen on this occasion, but the Nationally Scarce *Gracilaria bursa-pastoris* was found, in very small quantities. Additionally, in comparison with 2003, *Pterosiphonia ardreana* was recorded in regular but small amounts in the present survey, but *Calosiphonia vermicularis* was not found.

Visually, when reviewing the few images of the 2003 survey present, the algal cover is noticeably denser in 2003, and the area appears to be far more silty in 2015. The algal density may in part be the result of seasonal changes for some species. However, overall, the community composition has been maintained, and changes in the abundance of species are likely to be related to natural variability (e.g. seasonal patterns of recruitment, physical disturbance followed by community development, stochastic variability in larval/germling settlement). Various studies have been done on the effect of the introduced species *Crepidula fornicata*, on the various substrates on which it has been found. It is often reported that as the species filters the water column, it deposits amounts of silt as pseudofeces, which may contribute to the siltier appearance of the site in 2015 (Global Invasive Species Database (http://www.issg.org/database).



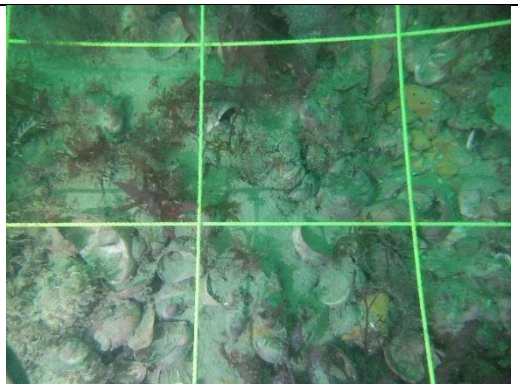


Silty mixed sediment with *Dictyota dichotoma* and mixed red algae, with patches of live and dead *Crepidula fornicata*.

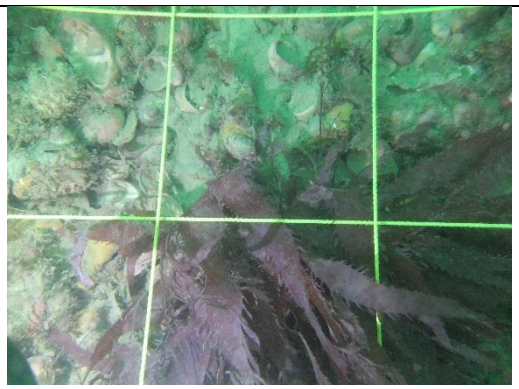
Silty mixed sediment with *Dictyota dichotoma* and mixed red algae, with patches of live and dead *Crepidula fornicata*. Small cuttlefish present.

Crepidula fornicata on a cobble within a silty mixed sediment, with the anemone *Actinothoe sphyrodeta*.

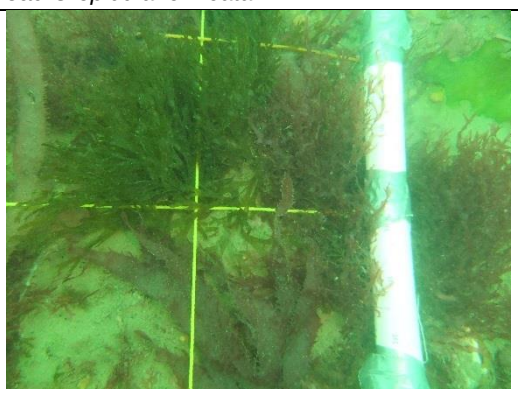
Cereus pedunculatus within a silty mixed sediment.



Silty mixed sediment with red algae and patches of live and dead *Crepidula fornicata*.



Silty mixed sediment with *Calliblepharis ciliata* and patches of live and dead *Crepidula fornicata*.



Silty mixed sediment with *Calliblepharis ciliata* and *Dictyota dichotoma*.

3.2.3 Site 5 – Alum Bay Kelp

Kelp forest community	
Local Biotope Description (2015)	
Laminaria hyperborea and foliose red seaweeds on moderately exposed infralittoral rock	
National Code of Biotope Allocation	**IR.MIR.KR.Lhyp.Ft**
EUNIS Code	A3.2141
National Code Biotope Description	*Laminaria hyperborea* forest and foliose red seaweeds on moderately exposed upper infralittoral rock
Wave Exposure	Very sheltered
Tidal Streams	Moderate
Zone	Infralittoral
Depth	0 – 1m BCD
National Code of Previous Biotope Allocation (Bunker et al. 2005)	**IR.MIR.KR.Lhyp.Ft**
EUNIS Code	A3.2141
National Code Biotope Description	*Laminaria hyperborea* forest and foliose red seaweeds on moderately exposed upper infralittoral rock
Previous Local Biotope Description (Bunker et al. 2005)	*Laminaria hyperborea* and foliose red seaweeds on moderately exposed infralittoral rock

Deeply creviced, fissured, and regularly bored chalk bedrock with gullies around 1-2 m deep in places, dropping into some large 4 m deep areas between crags. The bottom of the gullies contained a coarse mixed sediment of sandy pebbly gravel with around 5% cobbles. The upper faces and the gullies appeared to have a covering of silt over most of the foliose fauna. Stipes of kelp were densely covered with red algae. Overall, the upper faces of the bedrock were richly covered in algae from 60 to 80% in places. *Laminaria hyperborea* and *Sacchoriza polyschides* occurred regularly across the transect, richly supported by a dense variety of red algae. The vertical walls of the gullies were also covered in a low-lying, silt covered foliose red algae, with small amounts of green algae within the turf. The dominating understory algae found comprised *Aglaothamnion tenuissimum*, *Asparagopsis armata* (Falkenbergia), *Callophyllis laciniata*, crustose Corallinaceae, *Cryptopleura ramosa*, *Gymnogongrus crenulatus, Halurus equisetifolius*, *Halurus flosculosus, Heterosiphonia plumosa*, and various red and brown algal crusts. The vertical walls were found to have the additional algal species of *Bonnemasonia hamifera*, *Chaetomorpha melagonium,* and *Griffithsia corallinoides.*

Sponge crusts were present within the algae on the upper surfaces. Small amounts of erect bryozoans were seen along with very small brittlestars. Within the foliose algae on the vertical surfaces, low lying faunal turf was also evident. Sparse small orange and yellow sponge crusts were visible in the rock faces, found to comprise *Hymeniacidon perlevis*, and a variety of species of Microcionidae. Some very small erect branching examples of *Stelligera rigida*, and *Raspailia ramosa* were also found, and concealed within the turf, examples of *Stryphnus ponderosus*. The fan worm *Bispira volutacornis* were seen occasionally along with small amounts of *Chartella papyracea* and clusters of *Morchellium argus*. Very small examples of an anthozoan could be seen within the turf, which it was not possible to identify with confidence to a lower level than

Clavulariidae/Cornulariidae. Within the base of the gullies, the larger fraction of the coarse mixed sediment was found to have low-lying sponge crusts, including *Halisarca/Oscarella* sp., and extensive bryozoan crusts. Very small battered amounts of foliose bryozoans were found (*Bugula fulva*) and the thin low lying crusts of calcareous worm tubes were found to be *Filograna implexa*.

Results of SIMPER Analysis Site 5 (ABK). Data standardised and 4th root transformed.

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Crustose Corallinaceae	20.91
Halurus equisetifolius	11.23
Gymnogongrus crenulatus	10.63
Cryptopleura ramosa	7.58
Halurus flosculosus	6.59
Heterosiphonia plumosa	4.30
Plumaria plumosa	4.26
Laminaria hyperborea	4.08
Kelp Sporelings	4.08
Saccorhiza polyschides	4.00
Apoglossum ruscifolium	3.18
Pleonosporium borreri	2.28
Asparagopsis armata (Falkenbergia)	2.25
Aglaothamnion tenuissimum	2.19
Gelidium spinosum	1.55
Callophyllis laciniata	1.25
Rhodophyta (non calcareous crusts)	1.25
Plocamium cartilagineum	1.11
Callithamnion tetragonum	0.98
Sphondylothamnion multifidum	0.70
Cladophora	0.68

Additional species recorded as Frequent or above in Phase 2 data:

Aglaothamnion tenuissimum
Clavulariidae/Cornularidae
Cyanophyceae
Gelidium spinosum
Halidrys siliquosa
Saccorhiza polyschides

Alum Bay Kelp site was a very challenging site to survey, with difficulties with current surge, and quadrat placement particularly notable. The terrain was consistent across the transect, essentially a very craggy reef. The statistical outputs produced using Primer v6 are presented in Appendix A.1.3. Clusters observed within the statistical outputs do not reflect any notable difference, suggested here to be only a reflection of the natural variability in algal growth across a substrate of this type.

3.2.3.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the report by Bunker et al. (2005). There are nine characterising species that are common to both years, with the accompanying suite of species comprising a selection of red, brown and green algae, the latter only recorded in 2015. The notable difference between the two survey years may be the large brown alga, *Saccorhiza polyschides,* an opportunistic species, found in 2015. It was not noted during the previous survey apart from as a small handful of examples, spotted within the wider video survey undertaken at the time (Bunker et al. 2005). The species is reported to compete for space with *Laminaria hyperborea* (White, 2008), quickly colonising scoured rock, and generally responding quickly to disturbed substrata. This may constitute the only notable change observed on this particular site.

Species (Bunker et al. 2005)	% Contribution to similarity
Crustose Corallinaceae	21.66
Halurus equisetifolius	11.27
Callophyllis laciniata	11.15
Rhodymenia pseudopalmata	7.96
Cryptopleura ramosa	7.16
Laminaria hyperborea (medium)	7.04
Halurus flosculosus	6.08
Delesseria sanguinea	3.76
Dictyota dichotoma	2.34
Brown crust	2.3
Laminaria hyperborea (adult)	2.27
Apoglossum ruscifolium	2.16
Membranoptera alata	2.14
Kelp sporelings	2.03
Gelidium latifolium	1.36

Additional species recorded as Frequent or above in Phase 2 data:

Polymastia mamillaris
Bryozoa indet. crusts
Griffithsia corallioides
Rhodophyta indet. (non-calcareous crusts)

3.2.3.2 Comparison with Previous Biotope Allocation

The biotope allocation between the 2003 and 2015 surveys has remained consistent. The shallow depth of the site supports the Lhyp.Ft biotope as opposed to the Lhyp.Pk, but the *Laminaria hyperborea*, noted in 2003 as forming a dense forest, could not be said of the present survey findings. However, the understory algae previously noted, is broadly represented here and appears as rich and diverse as in 2003.

3.2.3.3 Recording of a Rarely Found Alga

A small coenocytic green fan was found within the algal turf of the vertical walls, and was sent for further investigation to two specialists, Professor Martin Wilkinson (Heriot Watt University) and

Professor Juliet Brodie (Natural History Museum). Both specialists concurred in the identification of the sample Plate 3.1. The comment below was provided;

"*…the specimens are almost certainly Flabellia petiolata (Turra) Nizamuddin. The formalin-preserved specimens show the structure well except that they lack the basal attachment point. They have a more or less cylindrical stipe made of closely intertwined coenocytic filaments supporting a flat blade made of a single layer of adhering parallel coenocytic filaments which become free and occasionally branched at the distal end. The habitat in which it has been found accords with that in the literature for this species. The existing published European distribution for this species in AlgaeBase is largely in the Mediterranean although it is recorded in the Atlantic on the Canary Islands. This finding may be indicative of quite a northward shift*…."

Juliet Brodie added further, that 'molecular studies would be needed to confirm its taxonomic identity'.

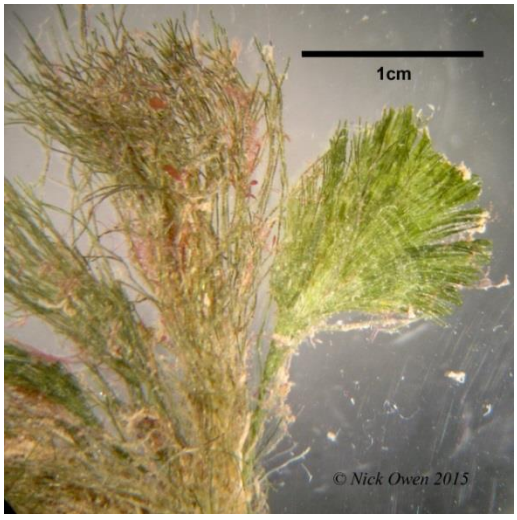
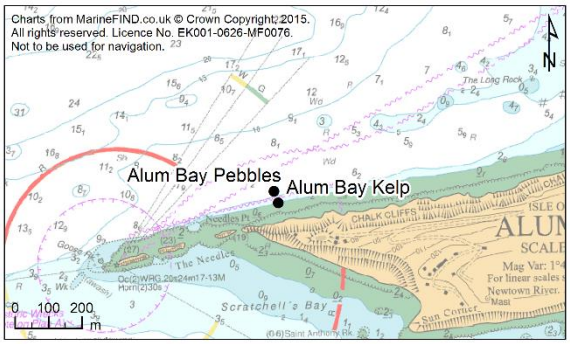


Plate 3.1: Coenocytic green alga, *Flabellia petiolata*



Kelp stipes with a dense coverage of mixed red algae.

Saccorhiza polyschides holdfast and stipe surrounded by mixed red algae.

Small *Halidrys siliquosa* on bored soft chalk bedrock, with *S.polyschides* and mixed red algae.

Mixed red algal turf on silt covered chalk bedrock.

Crustose coralline algae with *Dictyota dichotoma* and mixed red algal turf.

Vertical walls with sponges, small anemones, and low lying red algal turf.

Cobble surface within a gully with mixed bryozoan crusts, calcareous worms, *Spirobranchus* sp., and a small patch of the ascidian *Perophora listeri*.

3.2.4 Site 6 – Potters Bower

Subtidal red algae community	
Local Biotope Description (2015)	
Halidrys siliquosa with crustose Corallinaceae, *Calliblepharis ciliata*, *Heterosiphonia plumosa* and *Halurus equisetifolius* on friable chalk bedrock, boulders and coarse mixed sediment.	
National Code of Habitat Type Allocation	**IR.MIR**
EUNIS Code	A3.2
National Code Habitat Type Description	Moderate energy infralittoral rock
Suggest a close descriptive affiliation to:-	
National Code of Biotope Allocation	**IR.HIR.KSed.XKHal**
EUNIS Code	A3.126
National Code Biotope Description	*Halidrys siliquosa* and mixed kelps on tide-swept infralittoral rock with coarse sediment
Wave Exposure	Exposed
Tidal Streams	Moderate
Zone	Infralittoral
Depth	1 - 2 m BCD
National Code of Previous Habitat Type Allocation (Bunker et al. 2005)	**IR.MIR**
EUNIS Code	A3.2
National Code Habitat Type Description	Moderately exposed infralittoral rock
Previous Local Biotope Description (Bunker et al. 2005)	*Halidrys siliquosa* with crustose Corallinaceae, *Corallina officinalis* and *Halurus equisetifolius* on friable chalk bedrock

The top of the chalk bedrock reef was in 3.8 m of water, dropping to 4.8 to 5 m deep within the gullies. The bedrock was craggy, creviced, fissured, and bored by bivalves in places. In some areas the bedrock had broken to form large boulders, occasionally forming piles of medium to large boulders which also created sheltered areas and large overhangs. The base of the gullies often had a chalk gravelly pebbly cobble sediment deposit.

Upper and some vertical faces of the chalk bedrock were dense with red algae including *Calliblepharis ciliata*, *Phyllophora pseudoceranoides*, *Plocamium cartilagineum, Asparagopsis armata, Dilsea carnosus, Cryptopleura ramosa,* and *Halurus equisetifolius.* Crustose coralline algae formed a dense and regular cover. The low-lying brown alga *Zanardinia prototypus* was regularly seen across the rocks in mainly small patches. The large brown alga *Halidrys siliquosa* occurred occasionally. Small filamentous green algae were present in patches and could be seen in small amounts on vertical walls within the turf.

Fauna largely comprised low lying sponge crusts, often forming large yellow and orange sheets, with small scattered amounts of red crusts. Where sampled these were found to include *Hymeniacidon perlevis, Pseudosuberites sulphureus*, and *Microciona strepsitoxa*. Small amounts of the sponges *Dysidea fragilis*, *Haliclona* sp., and very sparse amounts of the small white sponge *Leuconia nivea* were also found. Very small red solitary red ascidians could be seen within the turf, where sampled, found to be *Polycarpa scuba*. However, other *Polycarpa* spp., and *Dendrodoa grossularia* have been observed during recreational diving undertaken in the general area (Bessell. A, Personal observation). Very small ascidians, *Molgula* sp, and *Molgula manhattensis*,

also formed small patches in the area as well as being scattered sparsely across the rocks. Very small clusters of an ascidian, potentially *Archidistoma aggregatum* or a *Synoicum* species were noted but a sample was not taken to allow confirmation. *Gibbula cineraria* occurred regularly and very small, rare clumps of the colonial ascidian *Morchellium argus* were found. Bryozoan crusts were present but inconspicuous. Visible clusters of the bryozoan *Plagioecia patina/sarniensis* occurred attached to the low-lying turf. Under the rocks, crusts of the calcareous tube forming polychaete *Filograna implexa*, were seen. The vertical faces were covered with a non-descript low lying turf, mixed with the low lying filamentous red algae. The lower areas of the rock and within the overhangs formed by the boulders, appeared very scoured in places. Under the piles of large boulders, the scoured rock appeared to be covered mainly with low lying orange and yellow sponge crusts, sparse *Spirobranchus* sp., and very low lying calcareous worm tubes, which when sampled, were again, as at other sites where sampled, found to be *Filograna implexa*.

Results of SIMPER Analysis Site 6 (PB). Data standardised and 4th root transformed.

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Halurus equisetifolius	13.93
Crustose Corallinaceae	12.49
Heterosiphonia plumosa	11.77
Calliblepharis ciliata	11.76
Asparagopsis armata (Falkenbergia)	10.57
Plocamium cartilagineum	8.79
Sphondylothamnion multifidum	5.94
Gymnogongrus crenulatus	5.53
Cryptopleura ramosa	4.55
Cutleria	2.15
Pterosiphonia ardreana	1.39
Rissoa parva	1.38
Halidrys siliquosa Sporelings	1.32
Ceramium	1.21
Phyllophora crispa	0.99
Dilsea carnosa	0.84
Halidrys siliquosa	0.66

Additional species recorded as Frequent or above in Phase 2 data:

Bispira voluticornis

The statistical outputs produced using Primer v6 are presented in Appendix A.1.4. The statistical outputs indicate a high degree of similarity across sites. The closer grouping of quadrats one and two, is in effect only a marginal increase in similarity and is not believed to represent any observation of significance.

3.2.4.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the report by Bunker et al. (2005). Between the two survey years, six species are common to both lists, with various red, brown and green algae contributing

to the extended species compliment in either year. Two of the main characterising species are still strongly represented, crustose Corallinaceae and *Halurus flosculosus*. One notable observation is that in 2003 *Corallina officinalis* was a significant component of the algal turf, which was not found at all in the present survey. The absence of *C. officinalis* may be related to the natural life cycle and/or to environmental factors affecting the occurrence of this species. *C. officinalis* is reported to show a pattern of frond initiation in autumn, followed by growth and reproduction, with senescence and frond loss the following autumn, although many fronds can overwinter under suitable conditions (Irvine and Chamberlain, 1994) Irvine and Chamberlain (1994) also indicate that the species' optimum growth occurs in spring and autumn at temperatures of between 12°C and 18°C, with most plants dying at 25°C.

Species (Bunker et al. 2005)	% Contribution to similarity
Crustose Corallinaceae	19.36
Corallina officinalis	11.99
Cladophora sp.	9.72
Halurus flosculosus	6.84
Chondrus crispus	6.44
Dasysiphonia sp	6.37
Halurus equisetifolius	5.74
Polysiphonia elongata	4.88
Cryptopleura ramosa	4.05
Pterosiphonia parasitica	3.02
Halidrys siliquosa	2.85
Brown crust	2.8
Crustose dark reds	2.36
Brongniartella byssoides	1.92
Ceramium secundatum	1.89

Additional species recorded as *Frequent* or above in Phase 2 data:

Balanus crenatus
Caprellidae indet.
Tricolia pullus

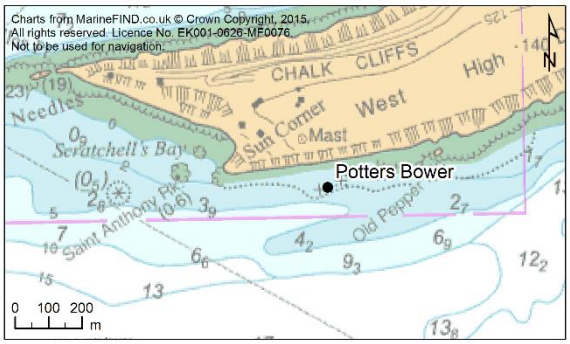
3.2.4.2 Comparison with Previous Habitat Type / Biotope Allocation

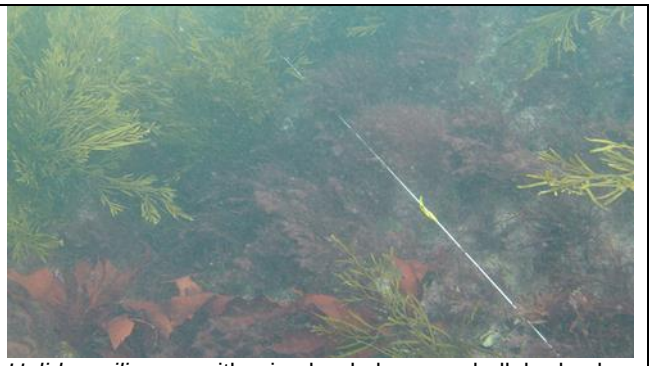
In 2003, the habitat type allocated to this site was MIR (Moderately exposed infralittoral rock). There does not appear to be any biotope within the MIR complex that describes the site to a higher degree, preventing a more specific biotope from being assigned here. The inability to allocate a higher biotope is in large part due to the absence of kelp at the site, the presence of which dominates many of the MIR habitat descriptions. The remaining biotope codes focus on characterising species that are not highly comparable with those seen here, or were located on substrates or within tidal exposures that did not correspond to those observed. Therefore, it has been left, as assigned in 2003.

However, there appear to be many similarities with the HIR site, IR.HIR.KSed.XKHal (A3.126), (*Halidrys siliquosa* and mixed kelps on tide-swept infralittoral rock with coarse sediment). The

presence of mixed kelps is not representative of the area surveyed but the compliment of red algae is not dissimilar, with many of those suggested found at the site within the present survey, *Heterosiphonia plumosa*, *Calliblepharis ciliata*, *Plocamium cartilagineum*, *Cryptopleura ramosa*, and *Phyllophora crispa*. It describes the substratum as comprising 'bedrock, boulders, cobbles with coarse sediment', which even though the extended description does not refer to bedrock, is a fair representation of the substrate found. As coarse mixed sediment was regularly found deposited within the gullies, it was felt that a biotope that reflected its presence might be appropriate. The biotope is also described as having a generally sparse fauna, which would seem consistent with that found here. Low lying sponge crusts, some small ascidians and the polychaete *Spirobranchus* sp., were the most notable fauna found, and evidence of scour within the gullies and on the boulders was very visible in places.

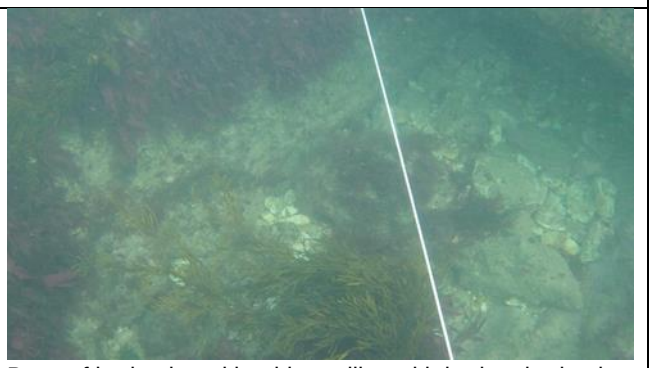
Overall, the local biotope description is broadly similar to that suggested by Bunker et al. (2005), with small changes; the omission of *Corallina officinalis*, an additional reference to more relevant algae, and an extended suggestion of the substrate composition.





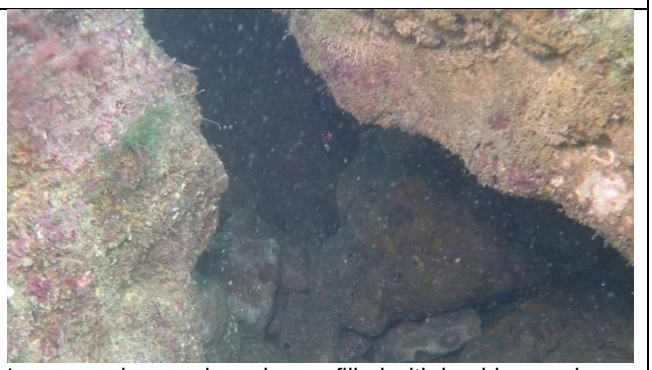
Halidrys siliquosa with mixed red algae on chalk bedrock.

Crustose coralline algae with mixed red algae on chalk bedrock and large boulders.



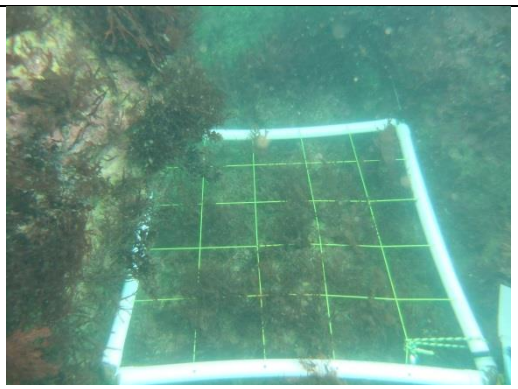
Base of bedrock and boulder gullies with broken bedrock, cobbles and coarse mixed sediment.

Dense cover of sponges on bedrock and boulder substrate with mixed red algae.



Large crevices and overhangs filled with boulders and coarse mixed sediment.

The Nationally Scarce *Zanardinia typus* with crustose coralline algae.



Quadrat over chalk bedrock with mixed algal cover.

3.2.5 Site 7 – Canyon Reef, Sandown

Subtidal red algae community	
Local Biotope Description (2015)	
Asparagopsis armata, *Plocamium cartilagineum* and *Calliblepharis ciliata,* with mixed red seaweeds, sponge crusts, low lying hydroid and bryozoan turf, mixed ascidians, and amphipod tube mats on bedrock and boulders.	
National Code of Biotope Allocation	**IR.MIR.KR.XFoR**
EUNIS Code	A3.215
National Code Biotope Description	Dense foliose red seaweeds on silty moderately exposed infralittoral rock
Wave Exposure	Exposed
Tidal Streams	Moderate
Zone	Lower Infralittoral
Depth	8.8 – 9.1m BCD
National Code of Previous Biotope Allocation (Bunker et al. 2005)	**EIR.KFaR.FoR (now IR.HIR.KFaR.FoR)**
EUNIS Code	A3.116
National Code Biotope Description	Foliose red algae on exposed or moderately exposed lower infralittoral rock (now 'Foliose red seaweeds on exposed lower infralittoral rock')
Previous Local Biotope Description (Bunker et al. 2005)	*Calliblepharis ciliata, Phyllophora pseudoceranoides* and other foliose red algae on silty low lying bedrock reefs scoured by fine sand.

Canyon reef was a bedrock and boulder area, the transect running over the bedrock, slightly up and over a ridge, gradually becoming an area of mixed small, medium and large boulders, on bedrock. The boulders formed overlapping piles creating overhangs and large understory areas in places. Beginning at the bedrock end of the transect, the area was covered with a thin 'Amphipod matting', which continued up to the ridge and was found on the boulder surfaces in reduced amounts. Samples were taken of the matting and the species found within it are listed in Appendix D, specified as being sourced from the *Ampelisca* bed, and were found to comprise *Ampelisca diadema*, *Dexamine spinosa*, *Ericthonius punctatus*, and *Corophium* sp..

The area in general was very silty throughout. A thin scattering of coarse sandy pebbly gravel was also evident in some areas. Boulders were around 0.5 to 1.5 m high, accounting for around 30% of the whole area surveyed.

Red foliose algae was scattered consistently across the site, the more common species being *Asparagopsis armata* and *Plocamium cartilagineum*. Small ascidians, where sampled found to be *Polycarpa scuba,* but expected to include *Dendrodoa grossularia* in places, were seen occasionally at the start of the transect, with sparse Crisiid turf and occasional clumps of the foliose bryozoan *Flustra foliacea*. Small amounts of sponge were recorded, where sampled identified as *Hymeniacidon perlevis*, *Antho inconstans* and *Antho coriacea* (previously known as *Plocamilla coriacea*). Occasionally. *Halichondria bowerbanki*, *Myxilla coriacea*. *Hemimycale columella* and *Stelligera stuposa* were observed. As the transect rose over the ridge, the presence of 'Amphipod matting' reduced, and the turf of foliose red algae, erect bryozoans continued to be present, (*Flustra foliacea* and Crisiid species). The cover of a faunal turf increased, and included mixed low-

lying bryozoans, and clumps of small ascidians clustered within the turf, forming dense aggregations in places (*Molgula manhattenis* and *Perophora listeri*). Bryozoan crusts were regularly present. Under the overhangs created by the boulders, large *Ascida mentula* could be seen within the turf, and large sheets of encrusting yellow sponge.

Results of SIMPER Analysis Site 7 (CR). Data standardised and 4th root transformed

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Asparagopsis armata (Falkenbergia)	15.22
Calliblepharis ciliata	13.13
Amphipod turf	11.33
Plocamium cartilagineum	10.79
Perophora listeri	4.34
Crisiidae	4.2
Drachiella heterocarpa	3.73
Rissoa parva	3.69
Phyllophora pseudoceranoides	3.57
Molgula manhattensis	3.38
Aetea anguina	2.86
Dysidea fragilis	2.8
Rhodymenia pseudopalmata	2.54
Halyphysema tumanowiczii	2.21
Porifera crusts	2.05
Chondria	1.59
Phyllophora crispa	1.27
Cryptopleura ramosa	1.27
Dasysiphonia japonica	1.22
Dictyota dichotoma	1.12
Spyridia filamentosa	1.06
Hypoglossum hypoglossoides	1.06
Thin Flat Reds	0.7

Additional species recorded as Frequent or above in Phase 2 data:

Ascidia mentula
Filamentous red algae
Molgula manhattensis
Perophora listeri
Porifera crusts

The statistical outputs produced using Primer v6 are presented in Appendix A.1.5. The statistical outputs reflect a range of data influences across the site. The clustering in the Bray-Curtis dendrogram, shows a grouping of quadrats four, five, six, seven, eight and ten, with no statistical significance between them. Site one and two are grouped with no statistical significance but with a greater separation from the larger cluster, and from sites three and nine. The main influence on the grouping of quadrats one and two is the presence of an amphipod turf (85% and 80% respectively), and a paucity of additional fauna and foliose red algae. The separation of quadrat three, appears to be due to a slightly increased coverage of amphipod turf (100%), but with an additional slight

increase in foliose red algal species and faunal species, all contributing to its slightly increased separation from quadrats one and two with which it is grouped. One of the main influences on the grouping of the larger cluster is the lack of amphipod matting, occurring only at quadrat four and at a significantly reduced percentage (30%). Quadrat nine appears to be in a position of statistically significant separation from the rest of the sites by the combination of a factors, including the lack of amphipod matting, the reduced suite of red algal species present, and its reduced faunal compliment, further enhanced by the slight reduction overall in the actual density of the fauna and flora that remains.

3.2.5.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the 2005 report by Bunker et al. (2005). There are eight species common to both the 2003 and the 2015 survey results, all represented by species of algae. The major difference is the greater density of fauna, reported as 'not a very notable feature' in 2003, but contributing considerably to the present survey findings. Amphipod turf and the presence of *Molgula manhattensis*, both responsive to silty conditions, and tolerant of fluctuations in sedimentation, were a notable presence within the 2015 survey.

Species (Bunker et al. 2005)	% Contribution to similarity
Calliblepharis ciliata	17.56
Phyllophora pseudoceranoides	15.23
Cryptopleura ramosa	11.86
Drachiella heterocarpa	11.21
Plocamium cartilagineum	10.82
Heterosiphonia plumosa	6.62
Dictyota dichotoma	4.98
Rhodymenia ardissonei	3.53
Brongniartella byssoides	3.32
Spyridia filamentosa	3.16
Rhodophyllis divaricata	3

Additional species recorded as *Frequent* or above in Phase 2 data:

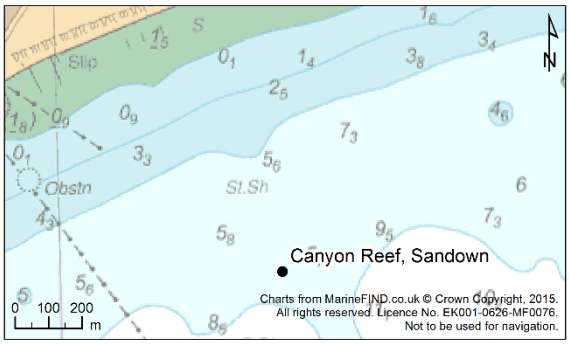
Hinia reticulata
Electra pilosa
Polycarpa scuba
Botryllus schlosseri

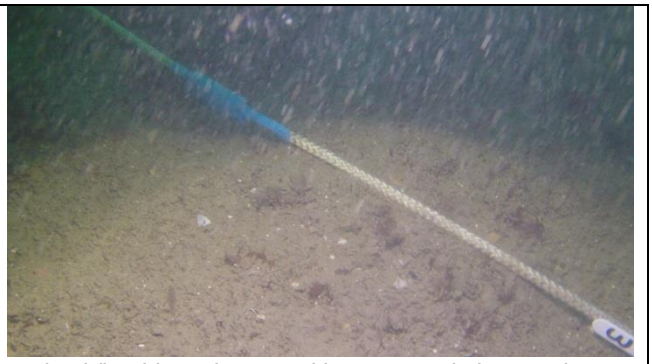
3.2.5.2 Comparison with Previous Biotope Allocation

From 2003 to 2015, a change in biotope allocation has been recorded but that allocated in 2015 (IR.MIR.KR.XFoR - A3.215) is described within the JNCC guide as a related biotope to that chosen in 2005, EIR.KFaR.FoR (now IR.HIR.KFaR.FoR - A3.116). The main difference that has driven the change in biotope allocation is the presence of silt and the resulting fauna, namely large amounts of 'amphipod tube matting', that covered a large area along the transect, and could be seen across the wider area. The change in density of amphipod matting across the transect, may be a reflection of tidal movements, forming a deposit as the ridge is reached, after which the gradual decline of the

slope may affect the silt deposition, and the resulting amphipod density in this area. Neither the silt, nor the presence of amphipod matting was noted within the survey undertaken by Bunker et al. (2005), which implies a condition change of the area, in the intervening years.

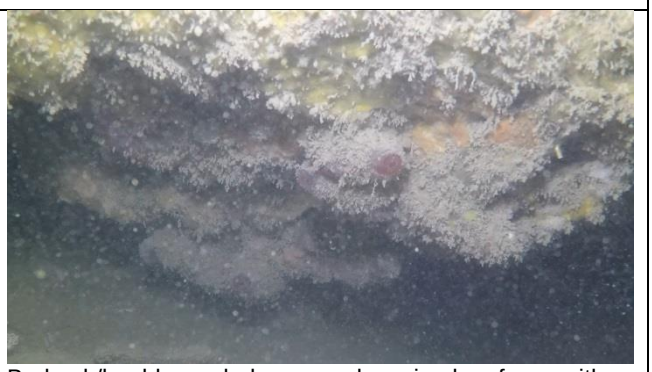
There does not appear to be a biotope that directly describes the presence of amphipod matting, but the KR.XFoR chosen, notes Amphipoda within its characterising species as ‘abundant’. It also notes the presence of silt tolerant species, such as *Molgula manhattensis*, forming mats on the rocks, also seen here, and more sponge crusts, also evident. The biotope lists a series of characterising algae, nearly all seen here, but does however record them as ‘dense’, which was not found, but which may be attributable to the time of year in which the survey was conducted, summer in 2003 and late summer to autumn in 2015. In comparison to the biotope allocated in 2005, the suite of algal species present is not dissimilar, but is more comprehensively represented within the XFoR biotope description.





Bedrock/boulder substrate with sparse red algae and Amphipod (*Ampelisca*) matting.

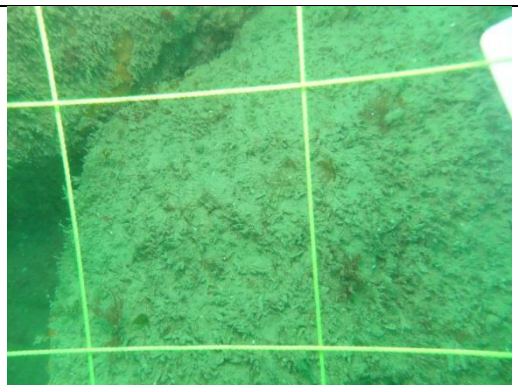
Bedrock/boulder substrate with patches increased red algal density.



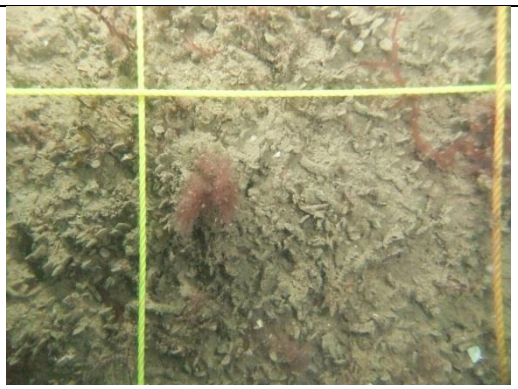
Bedrock/boulder underhangs and creviced surfaces with sponges and the ascidian, *Ascidia mentula*.

Molgula manhattensis with Crisiid bryozoan turf and red algae.

Hemimycale columella with patches of low-lying ascidian turf, *Perophora listeri*.



Amphipod *(Ampelisca*) matting with sparse red algae on boulders.



Amphipod *(Ampelisca*) matting with sparse red algae on boulders.

3.2.6 Site 8 – Lifeboat Station, Bembridge

Subtidal red algae community	
Local Biotope Description (2015)	
Calliblepharis ciliata, *Heterosiphonia plumosa*, *Gracilaria bursa-pastoris* and *Dictyota dichotoma* on a heavily silted mixed substrata seabed composed of low lying bedrock, boulders, cobbles, gravel and fine sand.	
National Code of Biotope Allocation	**IR.MIR.KR.XFoR**
EUNIS Code	A3.215
National Code Biotope Description	Dense foliose red seaweeds on silty moderately exposed infralittoral rock
In a mosaic with:-	
National Code of Habitat Type Allocation	**SS.SMx.IMx.**
EUNIS Code	A5.43
National Code Habitat Type Description	Infralittoral mixed sediments
Wave Exposure	Sheltered
Tidal Streams	Moderately strong
Zone	Infralittoral
Depth	4.6 m BCD
National Code of Previous Habitat Type Allocation (Bunker et al. 2005)	**SS.SMx.IMx.**
EUNIS Code	A5.43
National Code Habitat Type Description	Infralittoral mixed sediments
Previous Local Biotope Description (Bunker et al. 2005)	*Spyridia filamentosa*, *Brongniartella byssoides* and *Gracilaria bursa-pastoris* on a mixed substrata seabed composed of low-lying bedrock, boulders, cobbles, gravel and fine sand.

Mixed substrate of hard ground/bedrock with small to medium low-lying boulders and cobbles with pebbly, gravelly silty sand within the recesses. Silty sand covered all surfaces and formed a deposit over much of the fauna. Much of the substrate had a rich covering of predominantly foliose red algae, dominated by *Calliblepharis ciliata* and *Heterosiphonia plumosa*.

Faunal species were largely noticeable on the bedrock, boulders and cobbles and comprised sparse low lying foliose bryozoan turf species, and low-lying sponges including *Hymeniacidon perlevis*, *Amphilectus fucorum*, *Halichondria bowerbanki*, *Dysidea fragilis*, *Microciona armata*, *Myxilla rosacea*, *Polymastia penicillus*, *Haliclona* spp., *Raspailia* sp., and *Stelligera stuposa*. Sparse ascidian crusts were present (Didemnidae including *Lissoclinum perforatum*), and on the algae, dense clusters of the small ascidian *Perophora listeri*. A few large solitary ascidians were present, *Ascidia mentula* and very sparse small solitary ascidians, *Polycarpa* spp.

Results of SIMPER Analysis Site 8 (B). Data standardised and 4th root transformed.

Characterising species	
(Cut off for low contribution: 95%)	**% Contribution to similarity**
Calliblepharis ciliata	20.49
Heterosiphonia plumosa	19.18
Perophora listeri	9.48
Dictyota dichotoma	8.2
Spyridia filamentosa	8.09
Plocamium cartilagineum	7.26
Asparagopsis armata (Falkenbergia)	5.01
Gracilaria bursa-pastoris	4.79
Crustose Corallinaceae	3.71
Rissoa parva	2.53
Griffithsia devoniensis	2.09
Acrosorium ciliolatum	1.2
Electra pilosa	1.14
Cradoscrupocellaria reptans	1.1
Rhodomela confervoides	0.64
Sphaerococcus coronopifolius	0.56

No additional species were recorded as Frequent or above during Phase 2 survey.

The statistical outputs produced using Primer v6 are presented in Appendix A.1.6.The statistical outputs, indicate that there is no statistical significance between the quadrats overall. Any slight groupings, or separations of quadrats seen in the ordination, are reflecting naturally variable algal densities and the presence/absence of some species. The statistically insignificant separation of quadrats one, two and ten in the ordination, appears to reflect the comparatively reduced faunal presence in those quadrats.

3.2.6.1 Comparison of characterising species with Bunker et al. 2005

The table below is reproduced from the report by Bunker et al. (2005). Between the two survey result lists, six species are recorded as common to both years. An accompanying suite of algae is present in both years, any real variation maybe more a reflection of seasonal differences due to the time of year in which the surveys were conducted, summer in 2003 and late summer to autumn in 2015. As noted in other sites, the presence of some of the additional algae might have occurred but at very variable amounts, only visible in the raw data, which were not available for comparison at this time.

It might be of interest that *Calliblepharis ciliata* matures throughout the winter (Dixon and Irvine, 1977), and is also found forming dense stands on muddy rocks (Sabatini, 2005), suggestive of a tolerance of silty conditions, found to be very notable at this site. This might support the observed dominance of *C.ciliata* during the present survey.

Species (Bunker et al. 2005)	% Contribution to similarity
Spyridia filamentosa	13.32
Brongniartella byssoides	12.89
Gracilaria bursa-pastoris	11.46
Aglaothamnion byssoides	9.91
Chondria dasyphylla	7.84
Griffithsia corallioides	6.23
Dictyota dichotoma	5.16
Crustose Corallinaceae	4.97
Calliblepharis ciliata	4.44
Rhodophyllis divaricata	4.1
Sporochnus pedunculatus	3.71
Heterosiphonia plumosa	1.95
Griffithsia devoniensis	1.81
Crustose dark reds	1.48
Halidrys siliquosa	1.35

Additional species recorded as *Frequent* or above in Phase 2 data:

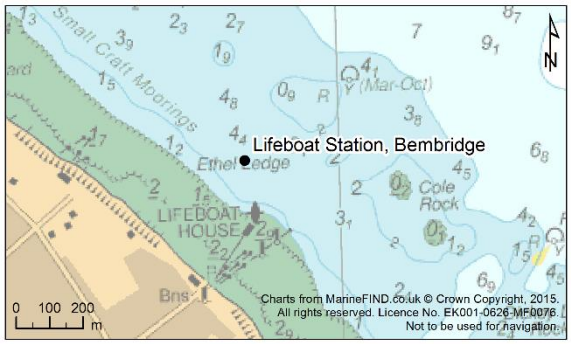
Anemonia viridis
Pisidia longicornis
Amphipholis squamata
Styela clava
Botryllus schlosseri
Crenilabrus melops
Pomatoschistus sp.

3.2.6.2 Comparison with Previous Habitat Type and Biotope Allocation

A biotope addition has been suggested, mainly due to the effect of heavy sedimentation at the site. The validity of the habitat type, SS.SMx.IMx (A5.43) (infralittoral mixed sediments), allocated in 2005, is supported here, as the area comprises a notable coarse mixed sediment within the areas of low-lying hard ground, bedrock and boulders. However, the bedrock, boulders and cobbles, the heavy sedimentation, and the dominant algae seen here, (*Calliblepharis ciliata*, and *Heterosiphonia plumosa*), would suggest that a further biotope would be appropriate. The IR.MIR.KR.XFoR biotope (A3.215) (Dense foliose red seaweeds on silty moderately exposed infralittoral rock), is a fair representation of the suite of algae recorded at Bembridge, and the biotope description within the JNCC documents, does make the point that 'individual sites of this biotope can vary significantly in the species composition.' The fauna was found to be generally sparse, which would support the biotope allocation, with many sediment tolerant species present.

A notable change from the 2003 survey, appears to be the presence of silty sand recorded at the site, which was not reported previously. There also appears to be a change in the dominant algae, now dominated by more sediment tolerant species, *Calliblepharis ciliata*, and *Heterosiphonia plumosa*. The overall faunal paucity and floral density seems consistent between the two studies, the main changes in species composition noted here likely to be a result of the sedimentation. Additionally, the Nationally Scarce *Gracilaria bursa-pastoris*, was recorded in 2015, but at a

reduced level to the observation made in 2003, where it was a more notable species across the area. According to Algaebase, (Guiry, 2016) the alga is often associated with sedimentation, so its disappearance would not necessarily be associated with the high level of sedimentation seen here.

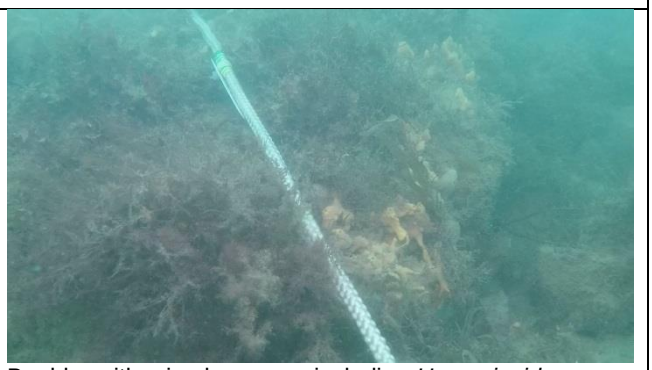


Calliblepharis ciliata with mixed red algae on a silty mixed substrate with hard ground.

Calliblepharis ciliata with mixed red algae on a silty mixed substrate.

Quadrat lying over hard ground and mixed sediment with dense mixed algal turf.

Red algae with dense encrustation of the small ascidian *Perophora listeri*.



Boulder with mixed sponges including *Hymeniacidon perlevis* and *Dysidea fragilis*.

Polymastia penicillus with mixed sponges and short red algal turf on bedrock/boulder substrate.

Dysidea fragilis on vertical boulder face with the ascidian *Ascidia mentula* in the overhang.

4. DISCUSSION

The overall goal of the present survey is that:

'The survey work and subsequent analysis is to contribute to Natural England's statutory duty to monitor and report on a range of features and attributes for SACs.'

Within that the main aims of the survey included:

- The development of a cost effective sampling strategy to allow condition of the three subtidal reef sub-features of South Wight SAC to be assessed against the species composition attributes using JNCC Common Standards Monitoring Guidance, which allows for comparison with previous survey data (Bunker et al., 2005);
- An evaluation of the methodology developed by Bunker et al. (2005), suggesting ways to optimise the sampling strategy without deviating from the method to ensure comparable results.

In the process of undertaking the survey preparations, it was concluded that undertaking 10 m transects in the previously surveyed areas, was a cost effective strategy for undertaking an assessment of the three subtidal reef sub-features. Bunker et al. (2005), undertook many more quadrats at most of the sites, and supported and informed the subsequent analysis using additional information from an extensive video survey that was undertaken across the whole area. A repeat of that very comprehensive approach was not within the scope of the present survey, so the challenge was whether the present much reduced approach would produce an effective data set that allowed the sub-tidal reef features to be assessed to an acceptable level.

The following sections review the more specific aims of the survey.

4.1 Statistical Analysis

A further aim was:

To employ methods that were repeatable and the data obtained able to support robust statistical comparison with past and future data sets.

The data analysis methods and results are presented in Appendix A. The question of whether the data obtained are able to support robust statistical comparison with past and future data sets is dependent on the quality of the gathered data, which is influenced by the confidence in the surveyors to produce a consistent level of recording with regard to species observations. From reviewing the statistical analysis of the present data, it can be seen that the SIMPER results (Similarity Percentage Analysis) of each site (Appendix A.1.1 to A.1.6), showed a degree of similarity, above 50% for most sites, that indicates a satisfactory coherence of data sets between samplers. Canyon Reef showed a reduced level of similarity which when reviewed more closely can be seen to be attributable to a variation in species dominance along the transect, and not

related to the data collection undertaken by the surveyors (Appendix D.5– quadrat data) Therefore It is proposed that the data collected are robust and subsequently fit for purpose.

The bubble plots for a selection of characterising species at each site are presented in Appendix A.3.

The results of the one-way analysis of similarity (ANOSIM) for all data, (Appendix A.4), with a Global R statistic of 0.93, reflects the wide variability found between sites. This corresponds well with the ANOSIM undertaken by Bunker et al. (2005), where a significant statistical difference between sites was also observed.

The raw data for the complete species list from 2003 were not provided at this time. Therefore, a full statistical comparison of the data between the two survey years was not undertaken.

4.2 Species Identification

The allocation of habitat types and biotopes uses a suite of data inputs; species, substrate, depth, wave exposure, tidal effects, overall habitat description etc., and as such can be open to interpretation on some levels. Additionally, the biotope classification system is periodically updated as more research is done and more information produced.

An aim of the present survey was;

- To ensure data collected were accurate with respect to species and biotope identification.

To address the question of accuracy with respect to species identification, the focus is very much dependant on the team of surveyors that are chosen to undertake any survey of this type. Bunker et al. (2005) stated that;

‘The use of a small team of biologists experienced in this type of work proved to be a major factor in collecting data sets that were consistent and robust.’

This needs to be re-iterated here as a very important factor in the subsequent quality of the data produced. The focus of the present survey involved a high level of knowledge, particularly with regard to algae identification. Specialists in that field, combined with diving, photography and general survey skills are hard to find but they are pivotal to the success of a survey of this type. Of equal importance is to know the strengths and weaknesses of each member of the small group chosen and further, to choose a team that compliments each other’s skills. It is always of importance that as few samples are taken for ground-truthing, primarily due to associated costs in time and follow up analysis. However, the team must be sufficiently knowledgeable regarding what needs to be sampled to achieve a high level of data composition. The knowledge of which groups may require this additional sampling, and the information to which the extra effort may contribute, is also a result of the experience of the composite team.

Some specific observations can be made regarding certain species. *Polycarpa scuba* and *Polycarpa pomaria* were both recorded during the survey. An ascidian with red siphons was often seen, along with an ascidian with a reddish body and whiter siphons. Both these colour variations are noted as being features of *Polycarpa scuba* (Picton and Morrow, 2015). Where these two colour variations were sampled, the internal structure was not always clearly *P.scuba*, and *P.pomaria* was definitely identifiable within samples, using internal features. *Polycarpa scuba* was the dominant small ascidian where both *P.scuba* and *P.pomaria* were recorded but an awareness of the variability in appearance should be noted. For the purposes of statistical analysis, the level of genus was used.

Plate 4.1: *Polycarpa scuba*, showing red and white siphoned colour variations. (Offshore Sudmoor Point)

The calcareous tube worm *Salmacina dyste*ri was noted consistently within the report by Bunker et al. (2005). The tube worm *Filograna implexa* has a similar appearance, and for this reason, wherever this potential species was observed, samples were taken for confirmation. Where this was undertaken in the present survey, all identifications were found to be *F.implexa*.

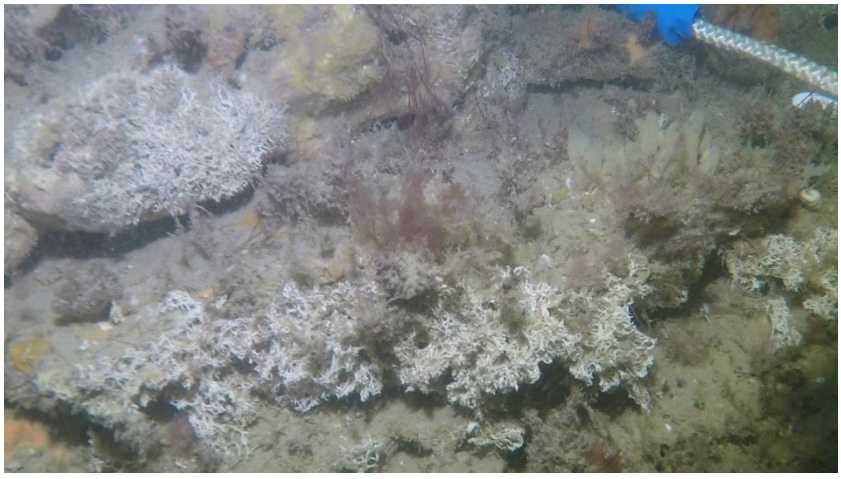


Plate 4.2: *Filograna implexa*. (Offshore Sudmoor Point)

At Offshore Sudmoor Point, in 2003, the red cushion sponge, *Plocamilla coriacea*, now synonymised under *Antho coriacea* (van Soest, 2015) was recorded as a prominent species. In the present survey, red crusts were sampled at this site but found to be *Antho inconstans*, a closely related species, identified from its internal spicule compliment. *A.inconstans* and *A.coriacea* were also sampled at Canyon Reef, at that site, growing separately and in one place, due to the spicule observation, suspected as growing alongside each other, a growth feature noted within Sponge V (2007). The difficulty with identification of these and other red crusts needs to be noted. Future surveys may have to consider how these species are to be recorded if the team that undertakes the work feel that they do not have the facilities to undertake in-depth identification. The identification of various red crusts should always be supported by spicule observation and presumption should be avoided where possible.

Once the compilation of the collected data, including identification of samples for ground-truthing where required was complete, a review of the characterising species from 2003 to 2015 was undertaken, on a site by site basis, and any variation seen addressed (Sections Site 2 – Offshore Sudmoor Point3.2.1 to 3.2.6). This was undertaken to contribute to a further specified aim as presented in Table 4.2

Table 4.1: Relevant attributes for sub-features of reef for the South Wight Maritime SAC.

Sub-feature	Attribute	Measure	Target
Kelp forest communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change
Subtidal red algae communities	Species composition of characteristic biotope EIR.KFaR.FoR	Monitoring the diversity of species within a subset of biotopes (including EIR.KFaR.FoR). Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change
Subtidal faunal turf communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change

Within the three sub-features specified above, the division of sites is specified below.

Table 4.2: Sites and related sub-features

Sub feature	Sub-feature sites
Kelp forest communities	Infralittoral site 5 (Alum Bay Kelp)
Subtidal red algae communities	Infralittoral site 4 (Alum Bay Pebbles), Site 6 (Potters Bower), Site 7 (Canyon Reef), Site 8 (Bembridge)
Subtidal faunal turf communities	Circalittoral site 2 (Offshore Sudmoor Point)

4.3 Species composition

The species composition of each site compared between 2003 and 2015, was found to be broadly similar. In summary, the following points are made here;

4.3.1 Kelp forest communities

At Alum Bay Kelp (Site 5), the species composition was comparable, with variation in dominance of various species, attributed largely to the time of year the survey was undertaken, summer in 2003 and late summer to autumn in 2015. It is also expected to be a result of natural change over the intervening 12 year period.

4.3.2 Subtidal red algae communities

Site 4, Alum Bay Pebbles, comprised a suite of algae that was common to both survey years, with additional characterising species present. However, to note is the addition of the gastropod mollusc *Crepidula fornicata*, which dominated the site in 2015, apparently absent as a characterising species in 2003.

At Sites 6, 7, and 8, Potters Bower, Canyon Reef and Bembridge respectively, the compliment of red algae was again found to be broadly comparable with many species common to each site across the intervening survey years. Additional species were noted, and a variation in dominance observed, but this could again be due to the slight difference in the time of year at which the survey was undertaken. Natural change is also expected to be a contributing factor.

At Site 7, Canyon Reef, the presence of amphipod tube mats, dominating sections of the transects and the surrounding area, were a notable addition during 2015, along with patches of silt tolerant ascidians such as *Molgula manhattenis*.

4.3.3 Subtidal faunal turf communities

Site 2, Offshore Sudmoor Point, did have many species that were reflected in both survey years. However, a lot of the variation seen is suggested as attributable to the difference in time of year the survey was undertaken, summer in 2003 and late summer to autumn in 2015. The dominance in 2003 of *Bugula plumosa*, along with the presence in that year of some additional species such as *Scrupocellaria* spp., and *Bicellariella ciliata*, and their omission from the present data, is confidently expected to be a result of seasonal differences. These species and others listed are known from the wider general local area.

However, a notable addition in 2015 is the presence and dominance of the ascidian *Molgula manhattensis* and the presence of *Sabellaria spinulosa*. Both are tolerant of high sedimentation and can recover quickly from smothering events and their presence is potentially a notable change in the area.

The presence of silt during the survey was a consistent observation and at some sites, was particularly dense, Site 2, Sudmoor Point, Site 7, Canyon Reef and Site 8, Bembridge. At two of those sites in particular, 2 and 7, it is suspected of significantly contributing to the species compliment, notably, the dominance of the ascidian *Molgula manhattensis* and sand tube building polychaete worm, *Sabellaria spinulsoa* at Site 2, and the presence of high levels of amphipod tube matting at Site 7. The presence of silt at Site 8, Bembridge, was noted as 15 mm deep on most upward facing surfaces. On a practical level, this proved difficult due to the fact that the surveyors undertaking the quadrat recording, found that if you tried to remove the sediment to enable improved observation of the substrate, the visibility was then obscured to the point where undertaking the required task was nearly impossible. To have continued to do this and wait for the visibility to improve at each quadrat would have compromised dive site logistics. Therefore the effort was made to avoid any disturbance of the substrate during the survey.

The observation of silt may go some way to address another aim within the survey;

- Anthropogenic influences, impacting on the ability of the sub-feature to achieve Favourable Condition, were also to be identified and where possible quantified.

An increase in turbidity through siltation would result in light attenuation and consequently decreased photosynthetic capability; in addition, the abrasive action of silt on the substrate due to seabed hydrodynamics, could wipe out newly established algae germlings and/or faunal larvae. The net results would be a decrease in population community. In order for this hypothesis to have strength, within the context of the current study, it would need to be supported by evidence. There is not enough evidence in the current study to correlate the presence/absence of silt with population density, which would require an additional, more tailored assessment.

It is also beyond the scope of the present survey to confirm if the increase in sedimentation is the result of anthropogenic influence, to the exclusion of other influences. This would require an assessment of increase in sedimentation to be undertaken, and monitored at more frequent intervals, in an attempt to note any natural seasonal change or observed differences in sedimentation as a result of any anthropogenic activities that might be being undertaken in the local area.

4.4 Habitat Type and Biotope Allocation

Table 4.3 summarising the 2005 and 2015 allocated habitat types and biotopes and the suggested local biotope descriptions is presented below. Further habitat type and biotope discussion is presented, site by site in Section 3.2.

Table 4.3: Summary of habitat type and biotope allocation between 2005 and 2015, including local biotope allocations

Site No/Name	Habitat Type / Biotope Allocation 2005	Habitat Type / Biotope Allocation 2015	Local Biotope Description 2005	Local Biotope Description 2015
2 - Offshore Sudmoor Point	MCR.SfR.Pid	CR.HCR.XFa.Mol in a mosaic with CR.MCR.SfR.Pid	Bryozoans, hydroid and sponges turf including *Bugula plumosa, Hydrallmania falcata,* and *Prosuberites epiphytum* on friable sandstone bedrock.	A low lying ascidian turf dominated by *Molgula manhattensis*, mixed with a rich turf of bryozoans (foliose and crusts), hydroids and sponges, and sparse red algae on friable piddock bored sandstone bedrock.
4 - Alum Bay Pebbles	SS.SMx.IMx.	SS.SMx.IMx.CreAsAn	*Dictyota dichotoma* and *Chondria dasyphylla* and other foliose algae on tide-swept pebbles.	*Dictyota dichotoma, Calliblepharis ciliata* and other foliose algae with *Crepidula fornicata* on coarse mixed sediment.
5 - Alum Bay Kelp	MIR.KR.Lhyp.Ft	IR.MIR.KR.Lhyp.Ft	*Laminaria hyperborea* and foliose red seaweeds on moderately exposed infralittoral rock.	*Laminaria hyperborea* and foliose red seaweeds on moderately exposed infralittoral rock.
6 - Potters Bower	IR.MIR.	IR.MIR. with a close descriptive affiliation to IR.HIR.KSed.XKHal	*Halidrys siliquosa* with crustose Corallinaceae, *Corallina officinalis* and *Halurus equisetifolius* on friable chalk bedrock.	*Halidrys siliquosa* with crustose Corallinaceae, *Calliblepharis ciliata*, *Heterosiphonia plumosa* and *Halurus equisetifolius* on friable chalk bedrock, boulders and coarse mixed sediment.
7 - Canyon Reef, Sandown	EIR.KFaR.FoR Now called IR.HIR.KFaR.FoR	IR.MIR.KR.XFoR	*Calliblepharis ciliata, Phyllophora pseudoceranoides* and other foliose red algae on silty low lying bedrock reefs scoured by fine sand.	*Asparagopsis armata*, *Plocamium cartilagineum* and *Calliblepharis ciliata,* with mixed red seaweeds, sponge crusts, low lying hydroid and bryozoan turf, mixed ascidians, and amphipod tube mats on silty bedrock and boulders.
8 - Lifeboat Station, Bembridge	SS.SMx.IMx.	IR.MIR.KR.XFoR in a mosaic with SS.SMx.IMx.	*Spyridia filamentosa*, *Brongniartella byssoides* and *Gracilaria bursa-pastoris* on a mixed substrata seabed composed of low lying bedrock, boulders, cobbles, gravel and fine sand.	*Calliblepharis ciliata*, *Heterosiphonia plumosa*, *Gracilaria bursa-pastoris* and *Dictyota dichotoma* on a heavily silted mixed substrata seabed composed of low lying bedrock, boulders, cobbles, gravel and fine sand.

On review of the summary table, the habitat types and biotopes allocated between 2005 and 2015 are observed to be highly comparable.

Site 2 – Offshore Sudmoor Point

Within this site, the original biotope, which refers to piddock bored rock has been retained but presented in a mosaic with XFa.Mol (A4.138), (*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock). This was felt appropriate to reflect the dominance of the small ascidian in the area, a notable departure from that observed in 2003. The local biotope description has subsequently been expanded to reflect this change.

Site 4 – Alum Bay Pebbles

The biotope allocation has been expanded from a common root, to reflect the presence and dominance of *Crepidual fornicata*, SS.SMx.IMx.CreAsAn (A5.431), (*Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment) which did not feature in an assessment of the site in 2003. The local biotope description has subsequently been expanded to reflect this change.

Site 5 – Alum Bay Kelp

It was felt that overall, despite some variation in the algae present, suggested to be mainly attributed to the time of year of the survey, that the biotope allocation from 2005 was a fair representation of the biotope observed in 2015. The density of kelp, suggested by the biotope code, i.e. Ft, forest, could be said to be an over-representation, but broken kelp stipes and small holdfasts were seen, so potentially the kelp density would be more appropriate to this description in the summer, prior to the later storms.

Site 6 – Potters Bower

Due to the lack of suitable biotopes to confidently assign this site further, the IR.MIR (A3.2) habitat type (Moderately exposed infralittoral rock) has been retained here. The close descriptive affiliation to IR.HIR.KSed.XKHal (A3.126) (*Halidrys siliquosa* and mixed kelps on tide-swept infralittoral rock with coarse sediment), has been suggested as it refers to the variety of substrates within the gullys, the mixed sediment and piles of large boulders, as seen within the survey area. The faunal compliment was largely impoverished overall, but richer than that suggested for the HIR biotope. A biotope that combines features of the MIR and HIR biotope suggested here, would be relatively appropriate. The local biotope suggestion has been expanded in 2015 to reflect these observed differences, including the expansion of the dominating species of algae seen.

Site 7 – Canyon Reef

The IR.HIR.KFaR.FoR (A3.116) biotope (Foliose red seaweeds on exposed lower infralittoral rock), allocated in 2005, was not considered an appropriate allocation for this site in 2015. The biotope chosen, IR.MIR.KR.XFoR (A3.215) (Dense foliose red seaweeds on silty moderately exposed infralittoral rock), was felt to more accurately reflect the substrate seen and within the JNCC description, specifically refers to the presence of silt, a very dominant feature of this site. However, the local biotope descriptions from 2005 and 2015, are not totally dissimilar, the description in 2015 expanded to reflect the faunal compliment seen, and the very dominant presence in some areas of amphipod tube matting. The presence of amphipods is also a notable characterising species in the JNCC description, further supporting the present choice.

Site 8 – Lifeboat Station, Bembridge

In the current survey, the habitat type allocation was consistent with that allocated in 2005, IMx (Infralittoral mixed sediment), but has been expanded in 2015 to include a mosaic with the biotope IR.MIR.KR.XFoR (A3.215) (Dense foliose red seaweeds on silty moderately exposed infralittoral rock). The reason for this inclusion is that the area was seen to comprise notable areas of hard ground and low lying bedrock, reflected well in the chosen 2015 mosaic biotope. However, the presence of areas of mixed sediment, clearly not covered comprehensively in the XFoR description, further supported the suggestion of a mosaic with IMx. The local biotope description in 2005 does however make reference to the low-lying bedrock areas. The local biotope description in 2015, has been expanded to reflect the notable presence of silt and variation in dominant algae seen.

To note here is that the biotope IR.MIR.KR.XFoR, has been allocated at two sites, Canyon Reef (Site 7) and Bembridge (Site 8). The question can be asked;

‘How similar were the data for a biotope which occurred at more than one site?’

Results of the multivariate analysis (Appendix A) showed the maximum degree of similarity in species composition at each site to be high, around 72%. The average similarity at each site, was however more variable, with 38.4% at Canyon Reef and 52.2% at Bembridge. Amphipod turf and silt tolerant ascidians such as *Molgula manhattenis* and the much smaller *Perophora listeri*, contributed to the differences within Site 7, and between Sites 7 and 8. Amphipod tube matting and *Molgula manhattensis* were both absent from Site 8 (Bembridge) in 2015. Differences between the two sites, as identified by the SIMPER analysis, were also associated with the variation in abundance of species common to both sites (e.g. *Calliblepharis ciliata*, *Dictyota dichotoma*, *Spyridia filamantosa*, and *Asparagopsis armata*). *Perophora listeri* was however common to both sites. *Rhodymenia pseudopalmata* was recorded at Bembridge (Site 8); whereas *Gracilaria bursa-pastoris* was not recorded at Canyon Reef (Site 7). Overall, there are some notable differences but as described in the JNCC biotope description, (JNCC (2015),

‘Please notice that individual sites of this biotope can vary significantly in the species composition.’

5. CONCLUSIONS

5.1 Field Survey

As stated in Bunker et al. (2005), 'fast currents, short periods of slack water and often poor underwater visibility make this area difficult to survey.' It was further noted that future surveys should take into account these difficulties and this is re-iterated here. Very good field conditions were experienced in 2003, which were not duplicated in 2015, where work was undertaken in marginal conditions and often limited visibility. Additionally, strong water movements were experienced in particular, at Alum Bay Kelp, Canyon Reef, and Sudmoor Point, whether surges through shallow gullies or strong tidal flow across low lying reef areas. These conditions can be challenging and affect the speed at which you can work, which must be taken into account when trying to establish an expected duration of a survey and what might practicably be achieved.

The methods used in 2003 were found to be easily duplicated, and suitable for the current purposes. The reduced number of quadrats, compared to that undertaken by Bunker et al. (2005) at most sites, were found to be statistically robust enough to achieve the aims of the present survey, as detailed throughout the report and more specifically in Section 4.1.

Additionally, detailed more thoroughly in Section 4.2, it is strongly recommended that for future surveys, a small team of experienced biologists and field surveyors should be used, paying particular attention to the cross-section of skills that may be required to achieve stated aims. For example, of particular note during the present survey was the requirement for surveyors highly skilled in the identification of algae, which was very instrumental in informing the preferred choice of team members.

5.2 Monitoring Targets

Table 5.1 presents the sub-features of Reef, being monitored within the South Wight Maritime SAC. The various aims of the survey have been addressed throughout the report, namely Sections 3.2, 4.3and 4.4. The summary table is to provide a brief overview only and further detail should be reviewed in the relevant sections and appropriate appendices.

As previously stated, raw data from the 2003 survey (Bunker et al. 2005) were not provided for statistical comparison, at this time. As a result, all statistics have been to address the validity of the present data, and provide a list of characterising species. This list has then been compared, to the characterising species for each site within the 2005 report. Therefore, the summary comments within the following table are based on a review of characterising species between the two surveys.

5.3 Potential Further Research

A notable change in the presence and dominance of the ascidians *Molgula manhattensis*, and *Polycarpa* spp., and the sand/shell tube forming polychaete *Sabellaria spinulosa* was noted at site 2 (Offshore Sudmoor Point). *M.manhattensis* and *S.spinulosa* are both known for their tolerance of an increase in sedimentation and their ability to recover well from periods of smothering (Hiscock, 2008). This may suggest that in the intervening 10 years between the previous and the current

survey, an increase in sedimentation has occurred in the area and influenced the apparent change in characterising species and the subsequent biotope allocation, but this cannot be confirmed and could be the focus of separate investigation.

It is beyond the scope of the present survey to confirm if the increase in sedimentation noted at some of the sites is the result of anthropogenic influence, to the exclusion of other influences. This would require an assessment of increase in sedimentation to be undertaken, and monitored at more frequent intervals, in an attempt to note any natural seasonal change or observed differences in sedimentation as a result of any anthropogenic activities that might be being undertaken in the local area.

Table 5.1: Relevant attributes for sub-features of reef for the South Wight Maritime SAC

Sub-feature	Attribute	Measure	Target	Comments
Kelp forest communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change	At **Site 5** (Alum Bay Kelp), the survey found that the species recorded here were broadly comparable to those in the Bunker et al. 2005 report. Around 50% of the characterising species recorded were common to both years. The remaining species listed comprised red, brown and in 2015, green algae. The fact that the survey in 2003 was conducted in July and the 2015 survey in September, must be taken into account regarding some variation in species composition. There is no evidence to suggest that the list of characterising species within 2015, deviates in any significant way from that in 2003, that might not be attributable to natural change.

Sub-feature	Attribute	Measure	Target	Comments
Subtidal red algae communities	Species composition of characteristic biotope EIR.KFaR.FoR	Monitoring the diversity of species within a subset of biotopes (including EIR.KFaR.FoR). Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change	At **Site 4** (Alum Bay Pebbles), a small suite of algae species were common to both surveys, with a varied suite of accompanying species. The notable change within 2015 was the significant presence of *Crepidula fornicata.* Its dominance of the site may represent a notable change in the area. At **Site 6** (Potters Bower), a suite of algae were common to both years, again with an accompanying suite of additional algae. The variation in composite species may be attributable to the time of year of sampling as stated above. There is no evidence to suggest that the list of characterising species within 2015, deviates in any significant way from that in 2003, that might not be attributable to natural change. At **Site 7** (Canyon Reef), a suit of algae species were common to both survey years, with an accompanying suite of species. The notable difference in 2015 was the dominance of amphipod turf across a proportion of the transect and the surrounding area, and the presence of a notable amount of the silt tolerant ascidian *Molgula manhattensis*. The presence of silt and the associated silt tolerant species, not noted to any extent in 2003, may represent a notable change in the area. At **Site 8** (Bembridge) as with other sites, a selection of algae were common to both survey years, along with an accompanying suite of algae species. There is no evidence to suggest that the list of characterising species from 2015, deviates in any significant way from that in 2003, that might not be attributable to natural change. However the density of silt in 2015, 15 mm on upper surfaces, may be a notable change from that observed in 2003.

Sub-feature	Attribute	Measure	Target	Comments
Subtidal faunal turf communities	Species composition of characteristic biotopes	Monitoring the diversity of species within a subset of biotopes. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change	At **Site 2** (Offshore Sudmoor Point), the faunal compliment was found to be broadly similar between the two survey years, with a variety of hydroid and bryozoan turf species recorded. Differences in composite species are expected to be attributable to the time of year in which the surveys were undertaken, summer in 2003 and late summer to autumn in 2015. Regarding the general list of species, there is no evidence to suggest that the list of characterising species within 2015, deviates in any significant way from that in 2003, that might not be attributable to natural change. However, the three main characterising species in 2015 were *Molgula manhattenis*, *Polycarpa scuba/pomaria* and *Sabellaria spinulosa*. Two in particular, *M.manhattensis* and *S.spinulosa*, are noted for silt tolerance, and a rapid recovery from periods of smothering. This development and the noted siltation in the area may signify a notable change from that observed in 2003.

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A. STATISTICAL ANALYSES METHODOLOGIES AND RESULTS

Data were standardised using the facility in Primer v6 to take account of the combination of abundance measures (percentage cover and counts) at any one site. The standardised data were than transformed, using a fourth root transformation, in order to reduce the influence of the more dominant species, allowing the whole biological assemblage to be assessed.

Cluster analysis and ordination tools were used to provide a visual assessment of the similarity of and differences between the various sites and to check for outlying quadrats. The species responsible for the similarities and differences between the resultant clusters were identified.

The transformed data were then analysed employing the hierarchical agglomerative clustering analysis, where samples are grouped on the basis of the nearest neighbour sorting of a matrix of samples' similarities, using the Bray-Curtis similarity measure, the results of which are displayed in a dendrogram. The Multi-Dimensional Scaling (MDS) or ordination analysis was undertaken in conjunction with the cluster analysis The MDS analysis uses the same similarity matrix as that of the cluster analysis to produce a multidimensional ordination of samples. This attempts to construct a map of the samples, in which the more similar two samples are, the closer they appear on the map. The extent to which these relations can be adequately represented in a two-dimensional map is expressed as the stress coefficient statistic, low values (<0.1) indicating a good ordination with no real prospect of misleading interpretation. The combination of clustering and ordination analysis is used to check the adequacy and mutual consistency of both representations (Clarke and Warwick, 2001).

The Similarity Profile (SIMPROF) test was run in conjunction with the cluster analysis in order to identify station groupings that are significantly different in statistical terms. Results are displayed by colour convention, with samples connected by red lines indicating a difference, which is not statistically significant.

The faunal distinctiveness of each site was gauged employing the Similarity Percentage Analysis (SIMPER). SIMPER provides a ranked list of taxa that contribute most to the similarity (dissimilarity) within (between) groups of samples. In the context of the current study, this analysis was undertaken with a view to identifying the sites' characterising species.

A one-way ANOSIM test was performed on the combined infralittoral and circalittoral quadrat data sets, to assess the statistical significance of the differences between sites. The result of an ANOSIM test, referred to as sample statistic R, gives a single measure of the similarity (or difference) between any two samples, based on a large number (999 is the default number in PRIMER v6) of permutations of the replicate samples. When the value of R approaches zero, differences between samples are small and can be considered insignificant. When R approaches ± 1, the samples will contain communities that are statistically different.

To carry out an ANOSIM test, the grouping of samples must be made prior to seeing the data and the test is run on the assumption that there are no differences between the groups of samples (the

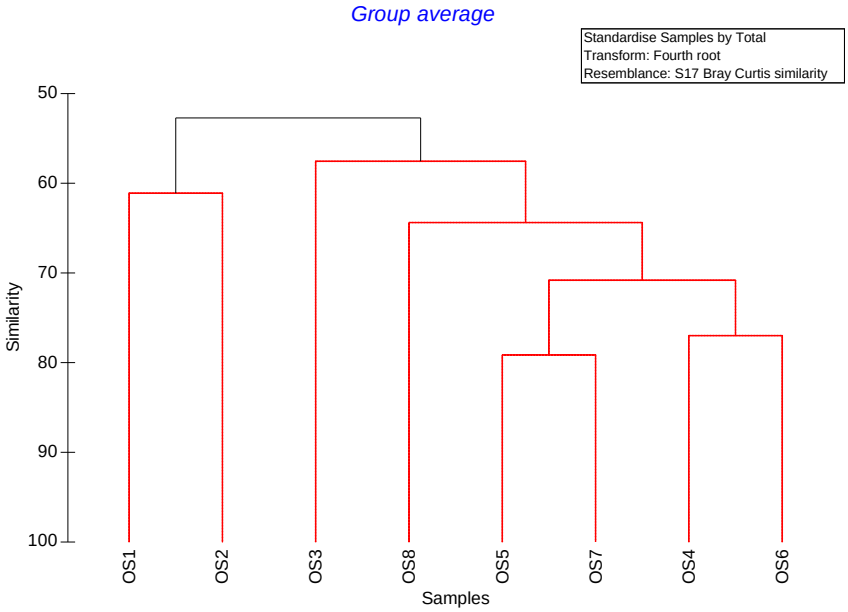
null hypothesis). The test results are graphically represented as a histogram which plots the simulated distribution of the test statistic R under the null hypothesis of no differences between samples. If the null hypothesis is true, the value of R from the test will fall within the simulated distribution (i.e. there are no differences between samples); conversely, if R falls outside the simulated distribution, there is evidence to reject the null hypothesis (i.e. there are large differences between samples). ANOSIM test can be carried out on two or more pair of samples. Where more pairs of samples are compared, the test result is a global R, which indicates that there may be sample differences somewhere that might be worth examining further. Specific pairs of samples can then be compared by means of the pairwise test.

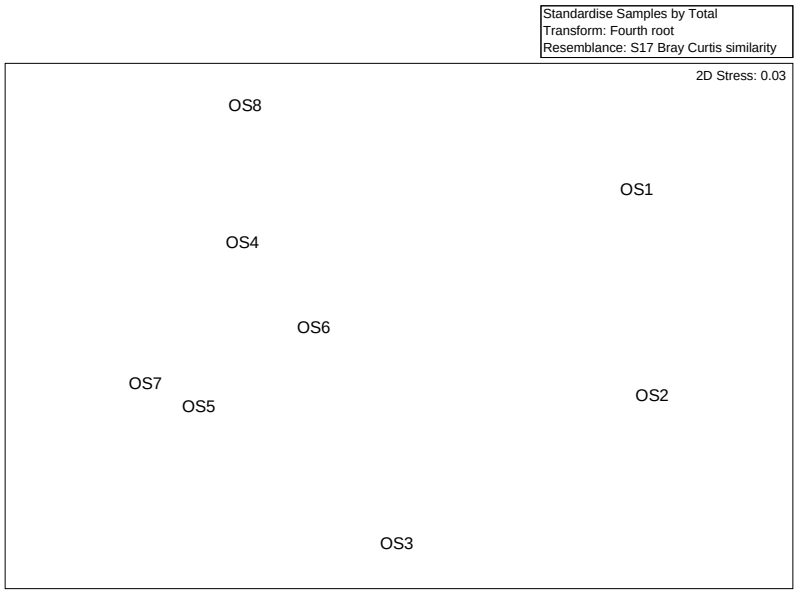
A.1 STATISTICAL ANALYSIS OF WITHIN SITE SPECIES COMPOSITION

This statistical section addresses the question of whether 'the methods used produced a robust data set for each site, with high levels of similarity between quadrats'.

A.1.1 Site 2 - Offshore Sudmoor Point

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.03, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

Results of SIMPER Analysis Site 2 (OS). Data standardised and 4th root transformed.

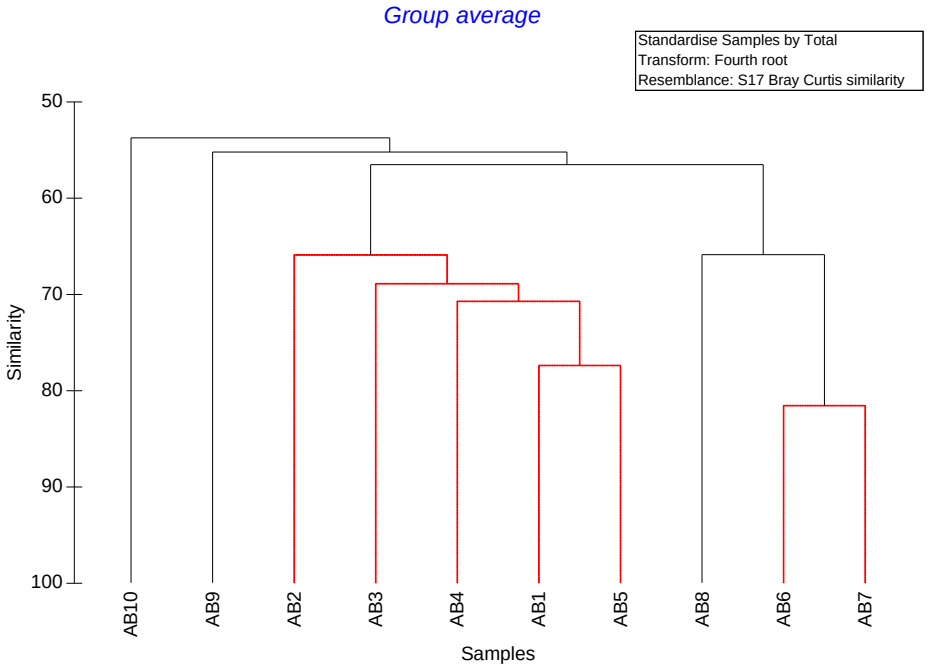
Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
59.9%	Sandstone bedrock (piddock bored)	*Molgula manhattensis*	15.85
		Polycarpa scuba/pomaria	11.59
		Sabellaria spinulosa	11.28
		Hydroid/bryozoan mixed turf	10.31
		Filograna implexa	7.11
		Chartella papyracea	6.37
		Nemertesia antennina	6.26
		Stelligera	5.48
		Aglaophenia pluma	5.12
		Pseudosuberites sulphureus	4.98
		Raspailia ramosa	3.11
		Flustra foliacea	2.58
		Bryozoan Crust	2.55
		Dysidea fragilis	1.24
		Hydrallmania falcata	1.16
		Polymastia penicillus	0.86

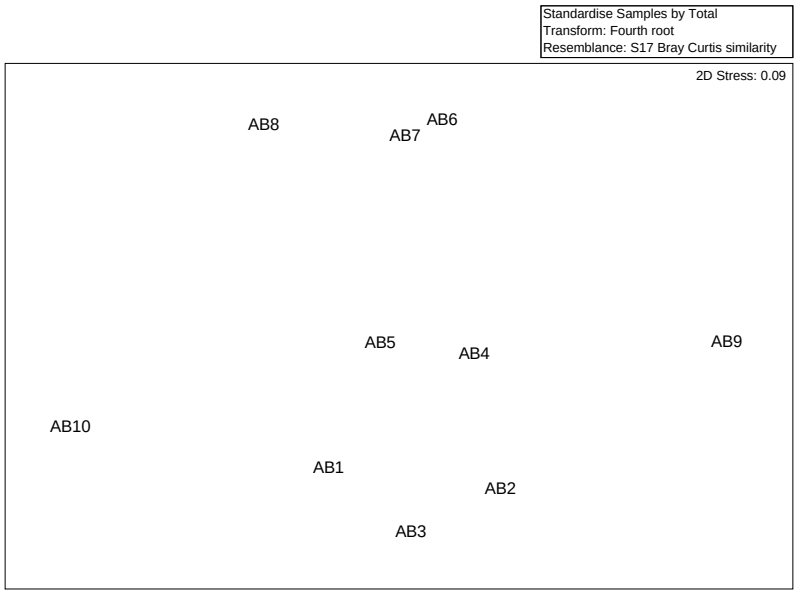
Additional species recorded as Frequent or above in Phase 2 data:

Cancer pagurus

A.1.2 Site 4 – Alum Bay Pebbles

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.09, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

Results of SIMPER Analysis Site 4 (AB). Data standardised and 4th root transformed.

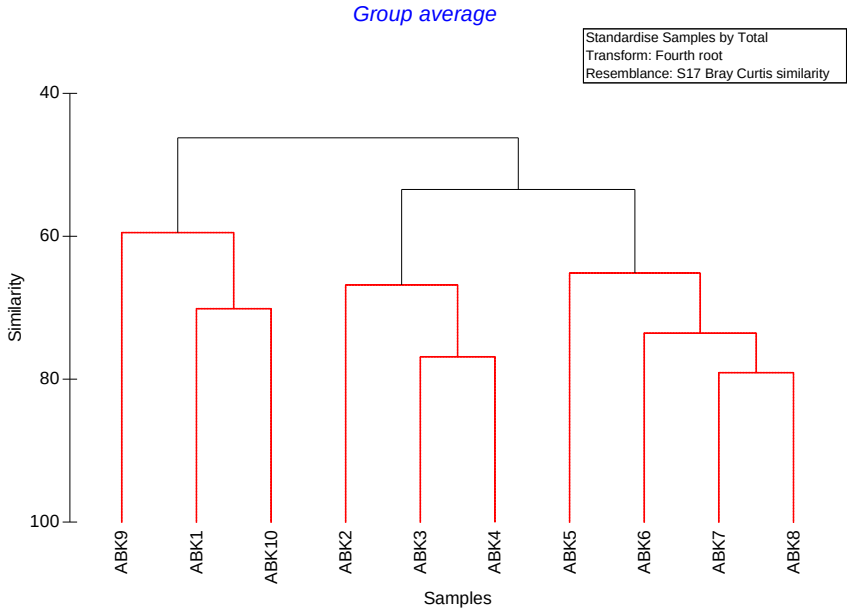
Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
59.5%	*Crepidula*, silty sand, gravel	*Crepidula fornicata*	13.44
		Crustose Corallinaceae	13.23
		Filamentous red algae	9.65
		Calliblepharis ciliata	7.09
		Dictyota dichotoma	6.99
		Asparagopsis armata (Falkenbergia)	5.93
		Heterosiphonia plumosa	5.88
		Spirobranchus	5.03
		Rissoa parva	5.03
		Cryptopleura ramosa	3.76
		Polysiphonia	2.57
		Ceramium	2.27
		Pterosiphonia ardreana	2.09
		Acrosorium ciliolatum	2.02
		Ulva	1.83
		Pterothamnion plumula	1.80
		Plocamium cartilagineum	4.66
		Gibbula cineraria	1.30
		Gastroclonium ovatum	1.14
		Hinia	1.12
		Sabellidae	1.08
		Hypoglossum hypoglossoides	0.69

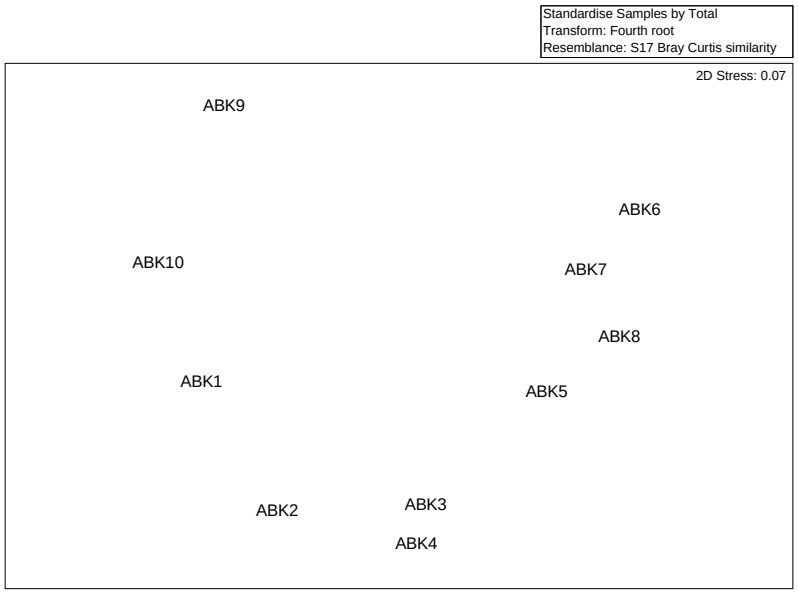
Additional species recorded as Frequent or above in Phase 2 data:

Cereus pedunculatus

A.1.3 Site 5 – Alum Bay Kelp

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.07, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

Results of SIMPER Analysis Site 5 (ABK). Data standardised and 4th root transformed.

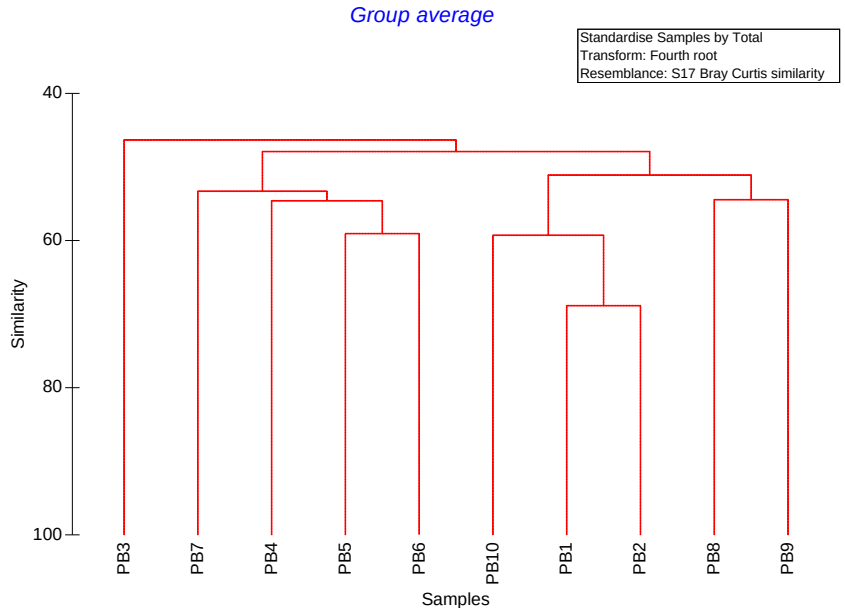
Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
54.1%	Chalk bedrock	Crustose Corallinaceae	20.91
		Halurus equisetifolius	11.23
		Gymnogongrus crenulatus	10.63
		Cryptopleura ramosa	7.58
		Halurus flosculosus	6.59
		Heterosiphonia plumosa	4.30
		Plumaria plumosa	4.26
		Laminaria hyperborea	4.08
		Kelp Sporelings	4.08
		Saccorhiza polyschides	4.00
		Apoglossum ruscifolium	3.18
		Pleonosporium borreri	2.28
		Asparagopsis armata (Falkenbergia)	2.25
		Aglaothamnion tenuissimum	2.19
		Gelidium spinosum	1.55
		Callophyllis laciniata	1.25
		Rhodophyta (non calcareous crusts)	1.25
		Plocamium cartilagineum	1.11
		Callithamnion tetragonum	0.98
		Sphondylothamnion multifidum	0.70
		Cladophora	0.68

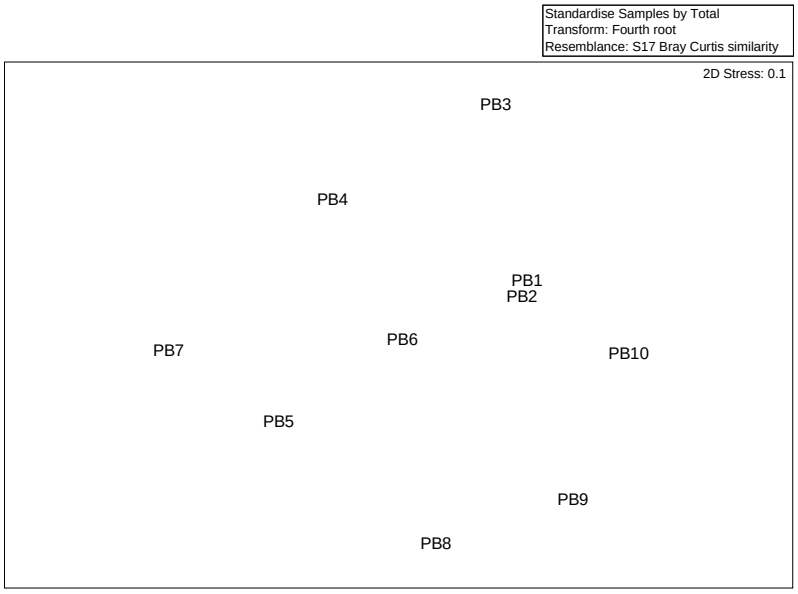
Additional species recorded as Frequent or above in Phase 2 data:

Aglaothamnion tenuissimum
Clavulariidae/Cornularidae
Cyanophyceae
Gelidium spinosum
Halidrys siliquosa
Saccorhiza polyschides

A.1.4 Site 6 – Potters Bower

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.1, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

Results of SIMPER Analysis Site 6 (PB). Data standardised and 4th root transformed.

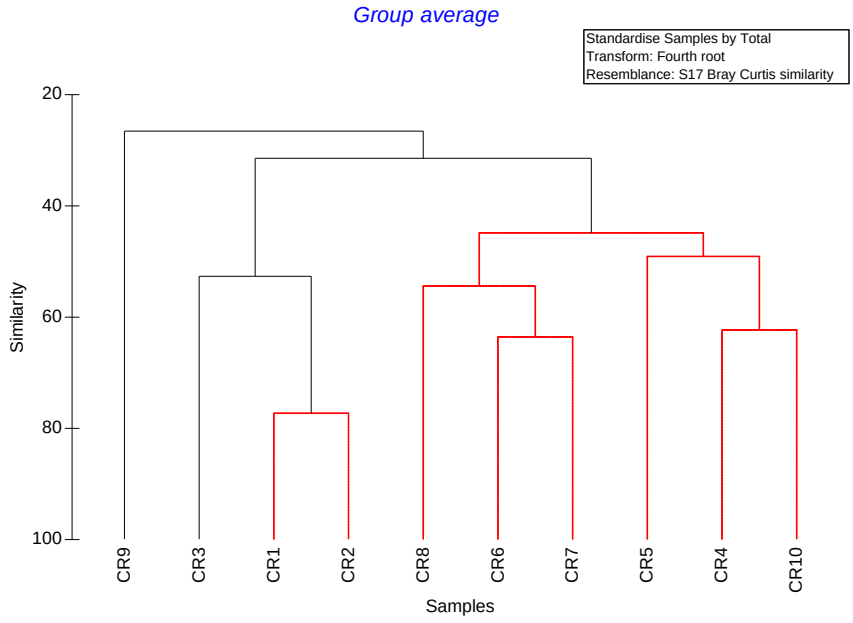
Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
50.1%	Chalk bedrock, shelly gravel	*Halurus equisetifolius*	13.93
		Crustose Corallinaceae	12.49
		Heterosiphonia plumosa	11.77
		Calliblepharis ciliata	11.76
		Asparagopsis armata (Falkenbergia)	10.57
		Plocamium cartilagineum	8.79
		Sphondylothamnion multifidum	5.94
		Gymnogongrus crenulatus	5.53
		Cryptopleura ramosa	4.55
		Cutleria	2.15
		Pterosiphonia ardreana	1.39
		Rissoa parva	1.38
		Halidrys siliquosa Sporelings	1.32
		Ceramium	1.21
		Phyllophora crispa	0.99
		Dilsea carnosa	0.84
		Halidrys siliquosa	0.66

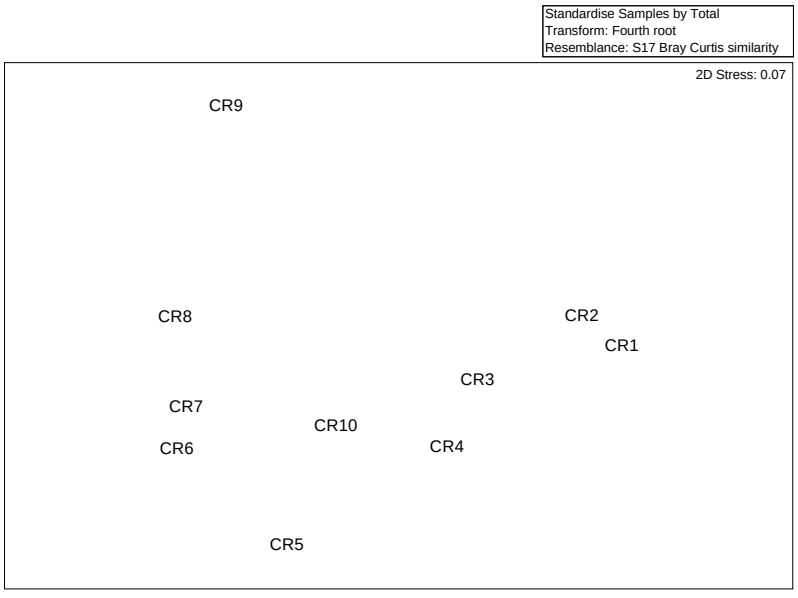
Additional species recorded as Frequent or above in Phase 2 data:

Bispira voluticornis

A.1.5 Site 7 – Canyon Reef

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.07, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

Results of SIMPER Analysis Site 7 (CR). Data standardised and 4th root transformed.

Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
38.4%	Bedrock with thin cover of *Ampelisca* matting in quadrats 1-4 (range 30% to 100%, average 73.3%). Quadrats 5-10 very silty.	*Asparagopsis armata* (Falkenbergia)	15.22
		Calliblepharis ciliata	13.13
		Amphipod turf	11.33
		Plocamium cartilagineum	10.79
		Perophora listeri	4.34
		Crisiidae	4.2
		Drachiella heterocarpa	3.73
		Rissoa parva	3.69
		Phyllophora pseudoceranoides	3.57
		Molgula manhattensis	3.38
		Aetea anguina	2.86
		Dysidea fragilis	2.8
		Rhodymenia pseudopalmata	2.54
		Halyphysema tumanowiczii	2.21
		Porifera crusts	2.05
		Chondria	1.59
		Phyllophora crispa	1.27
		Cryptopleura ramosa	1.27
		Dasysiphonia japonica	1.22
		Dictyota dichotoma	1.12
		Spyridia filamentosa	1.06
		Hypoglossum hypoglossoides	1.06
		Thin Flat Reds	0.7

Summary of the species primarily responsible for the dissimilarity, as identified by the SIMPER analysis, is presented below (top 10 species).

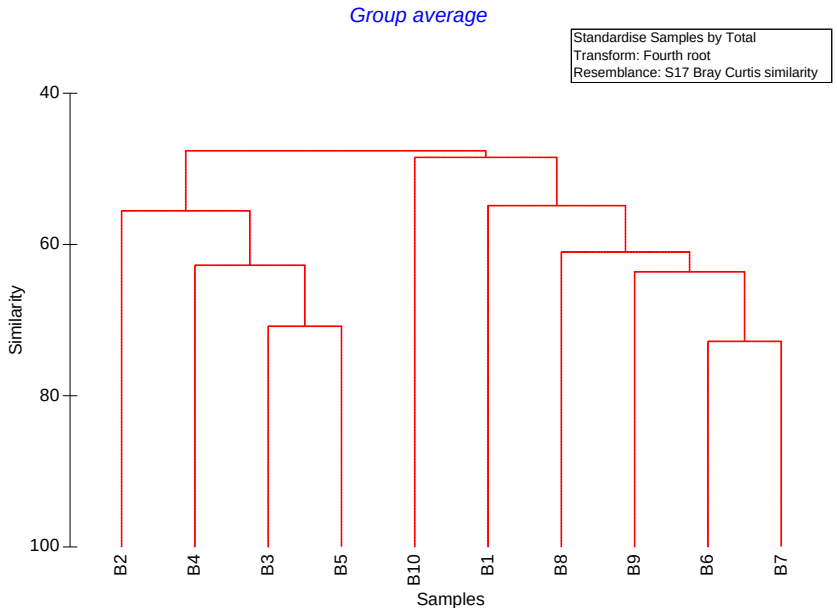
Average dissimilarity	Characterising species	% Contribution to dissimilarity
Between major groups of samples (quadrats CR1, CR2, CR3; and quadrats CR4, CR5, CR6, CR7, CR8 and CR10): 71.4%.	Amphipod turf	9.75
	Calliblepharis ciliata	4.24
	Perophora listeri	3.99
	Rhodymenia pseudopalmata	3.82
Quadrat CR9 showed dissimilarity of 52.2% and 62.6% with the above groups.	*Dysidea fragilis*	3.6
	Molgula manhattensis	3.33
	Plocamium cartilagineum	3.1
	Crisiidae	3.06
	Drachiella heterocarpa	3.05
	Halyphysema tumanowiczii	3.04

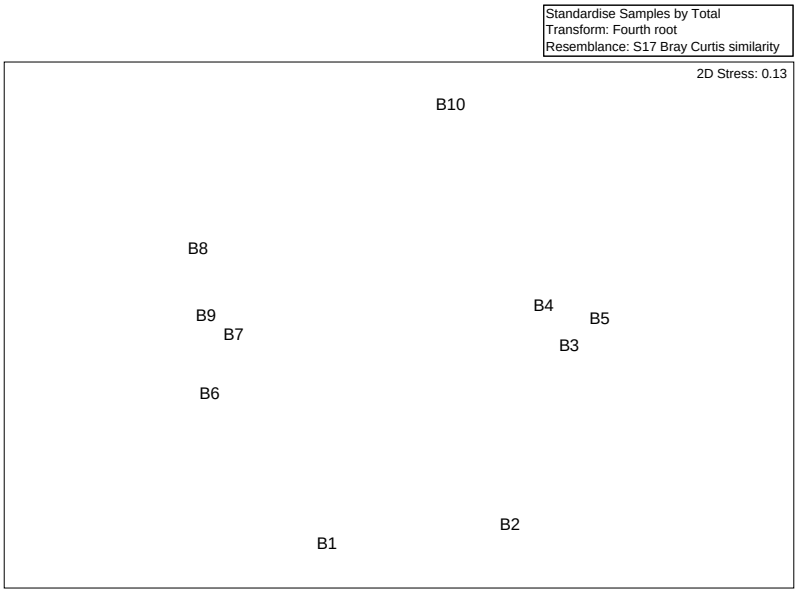
Additional species recorded as Frequent or above in Phase 2 data:

Ascidia mentula
Filamentous red algae
Molgula manhattensis
Perophora listeria
Porifera crusts

A.1.6 Site 8 – Lifeboat Station, Bembridge

Assessment of within site similarities based on quadrat counts using SIMPROF (Similarity Profile).





The ordination plot shows a 2D stress of 0.13, which indicates a 'good ordination with no real prospect of misleading interpretation' (Clarke and Gorley, (2006).

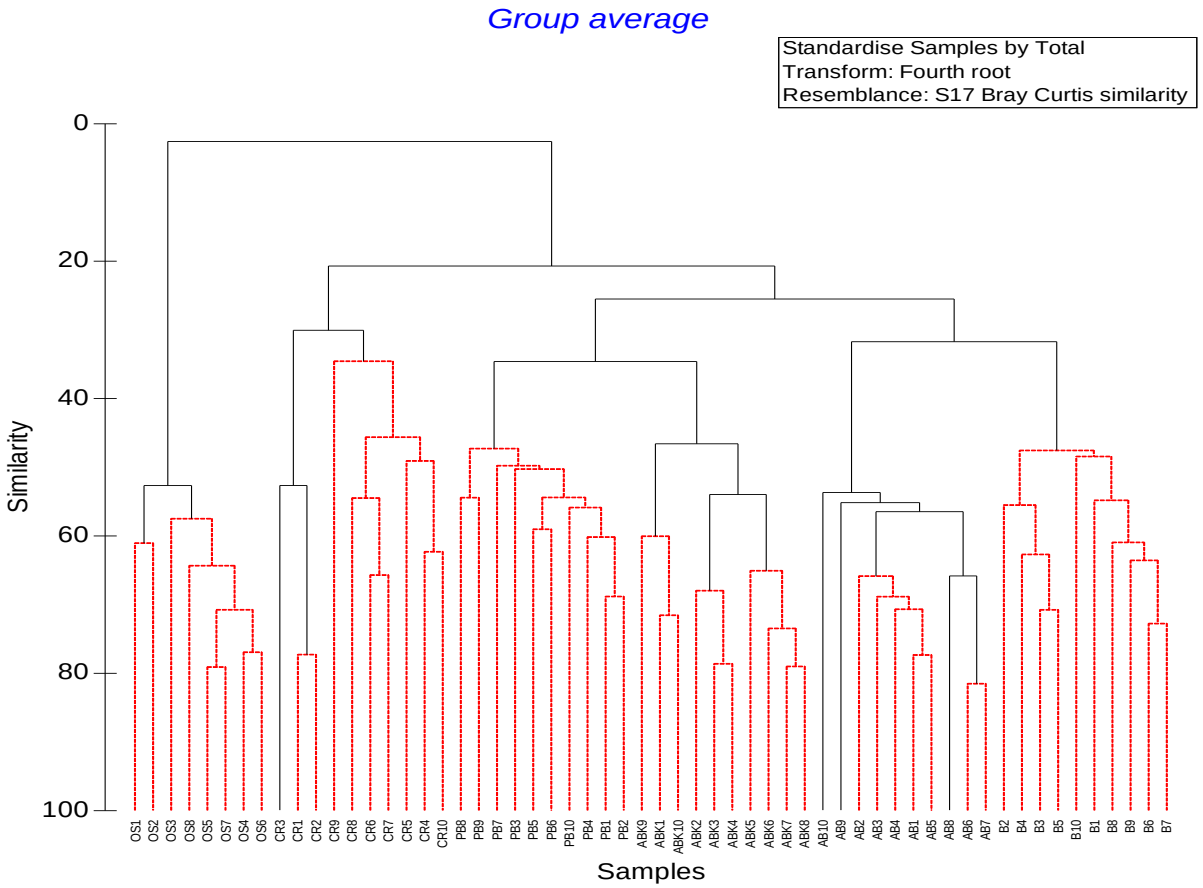
Results of SIMPER Analysis Site 8 (B). Data standardised and 4th root transformed.

Average Similarity	Substrate type	Characterising species	
		(Cut off for low contribution: 95%)	% Contribution to similarity
52.2%	Gravelly sand with shell fragments, including Crepidula, pebbles, silt.	*Calliblepharis ciliata*	20.49
		Heterosiphonia plumosa	19.18
		Perophora listeri	9.48
		Dictyota dichotoma	8.2
		Spyridia filamentosa	8.09
		Plocamium cartilagineum	7.26
		Asparagopsis armata (Falkenbergia)	5.01
		Gracilaria bursa-pastoris	4.79
		Crustose Corallinaceae	3.71
		Rissoa parva	2.53
		Griffithsia devoniensis	2.09
		Acrosorium ciliolatum	1.2
		Electra pilosa	1.14
		Cradoscrupocellaria reptans	1.1
		Rhodomela confervoides	0.64
		Sphaerococcus coronopifolius	0.56

No additional species were recorded as Frequent or above during the Phase 2 survey.

A.2 RESULTS OF CLUSTER ANALYSIS AND MDS ORDINATION OF ALL SITES COMBINED

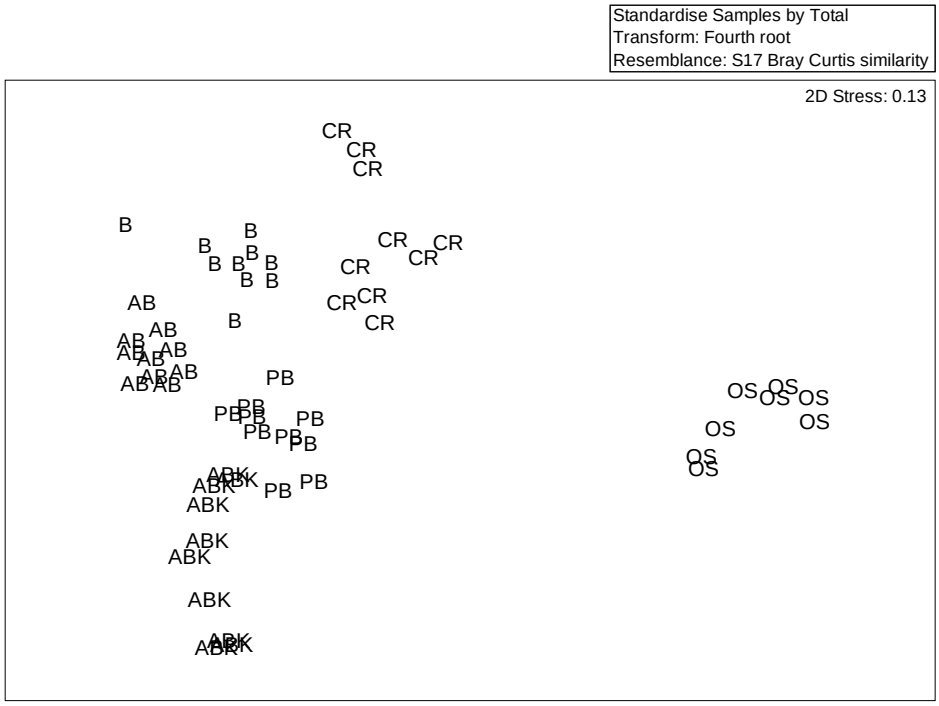
The multi-dimensional scaling (MDS) plots highlight the site groupings, substrate type and selected species characteristics.

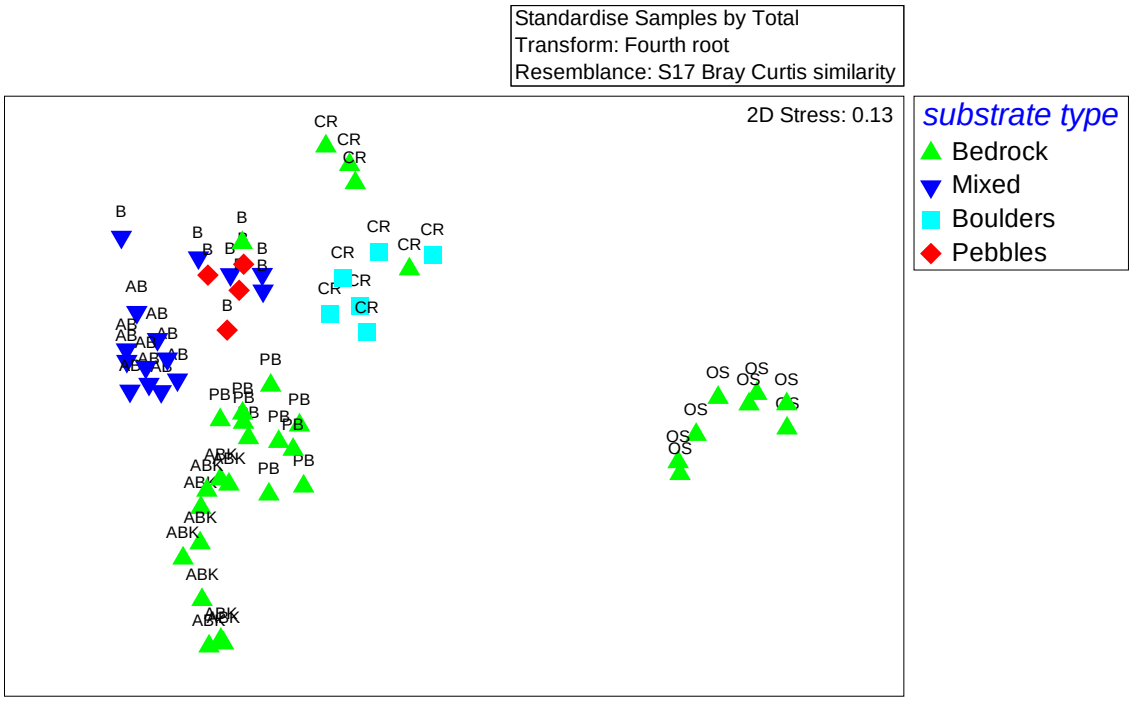


Within the Bray-Curtis dendrogram, the far left of the presentation shows the circalittoral rock site, Offshore Sudmoor Point. The large grouping to the right, is further separated from the infralittoral rock site, Canyon Reef, based on the substrate type and species compliment. Potters Bower and Alum Bay Kelp are both areas of craggy, shallow, seaweed dominated rocky reef, but with various differences in algal dominance and species compilation. The far right grouping is of Alum Bay, a mixed sediment site, and Bembridge, a mixed sediment area mixed with rock substrates.

The ordination plot further highlights the grouping of the infralittoral sites and the separation of the circalittoral rock site.

A 2D stress of 0.13 indicates a ‘good ordination with no real prospect of misleading interpretation’ (Clarke and Gorley, (2006).

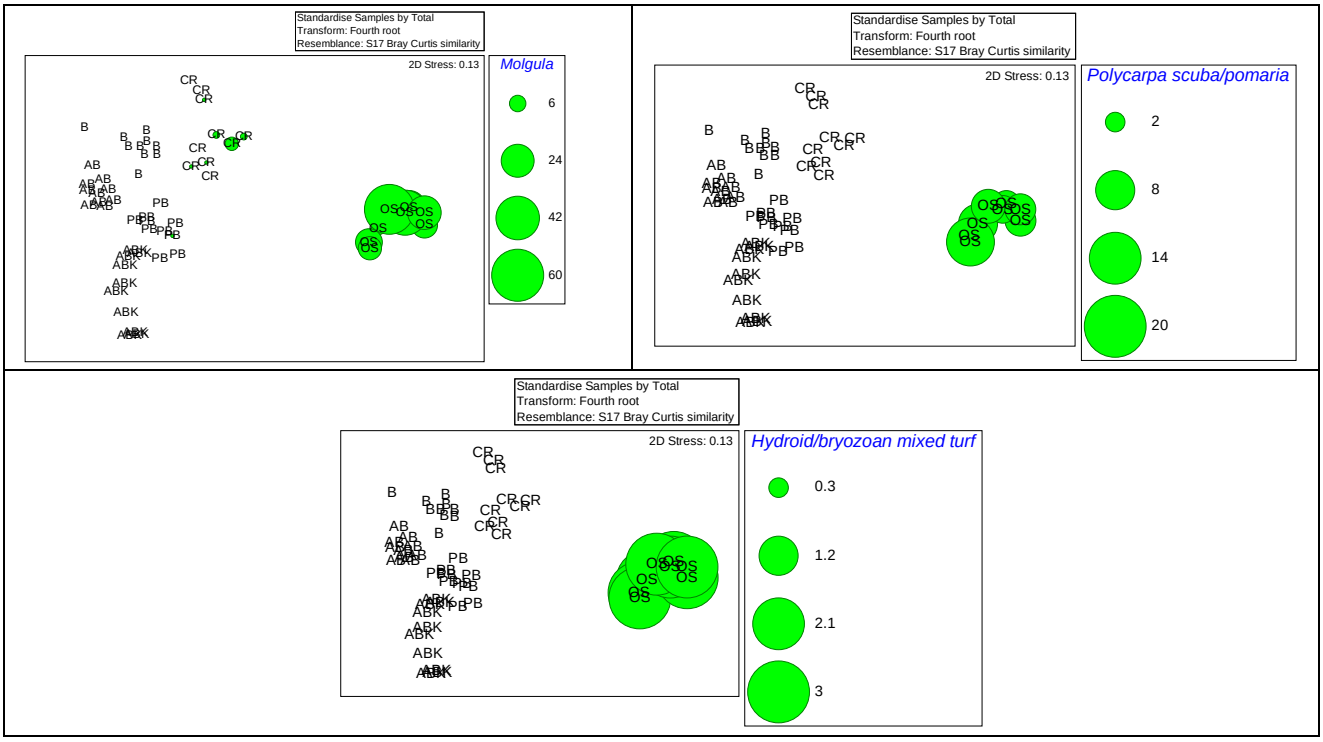

Standardise Samples by Total
Transform: Fourth root
Resemblance: S17 Bray Curtis similarity
2D Stress: 0.13


Standardise Samples by Total
Transform: Fourth root
Resemblance: S17 Bray Curtis similarity
2D Stress: 0.13
substrate type
Bedrock
Mixed
Boulders
Pebbles

A.3 CHARACTERISING SPECIES

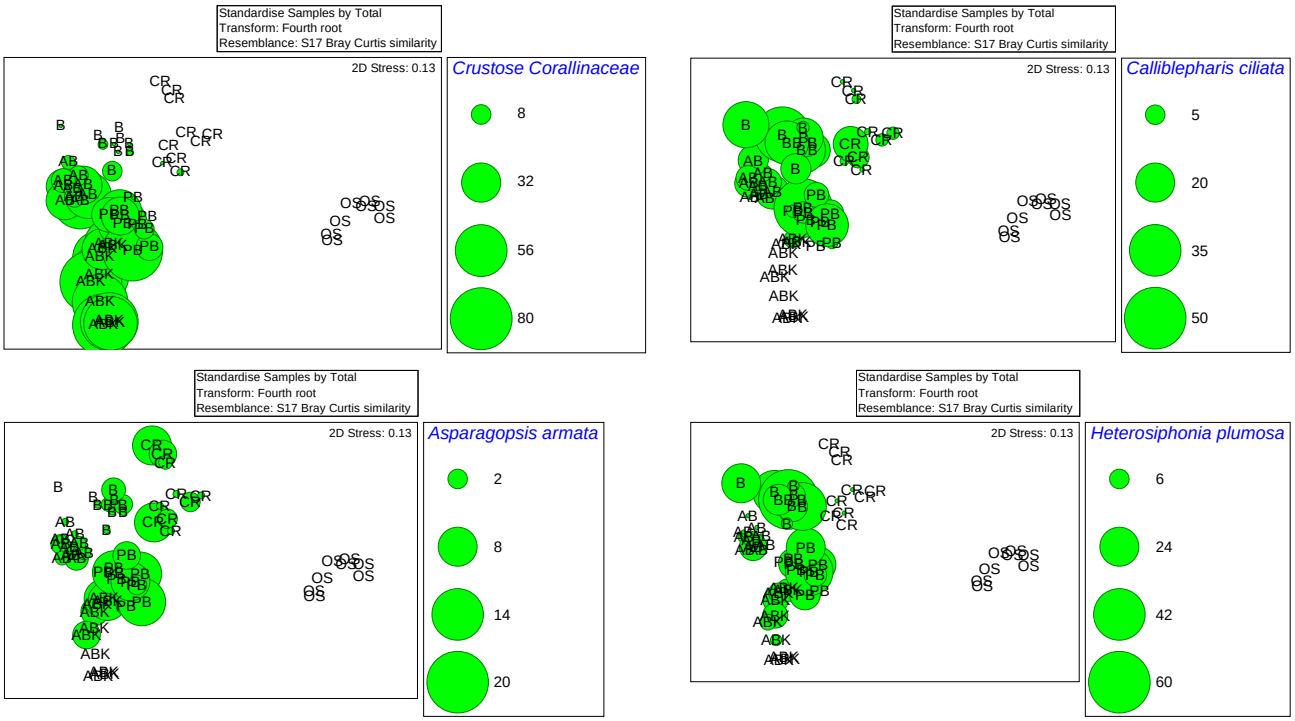
A.3.1 Circalittoral Site 2, Offshore Sudmoor Point (OS)

Three of the top four characterising species from Offshore Sudmoor Point are displayed below in the form of bubble plots. As can be seen, the species all cluster at Offshore Sudmoor Point only, apart from *Molgula*, which has a very small presence at Site 7, Canyon Reef.



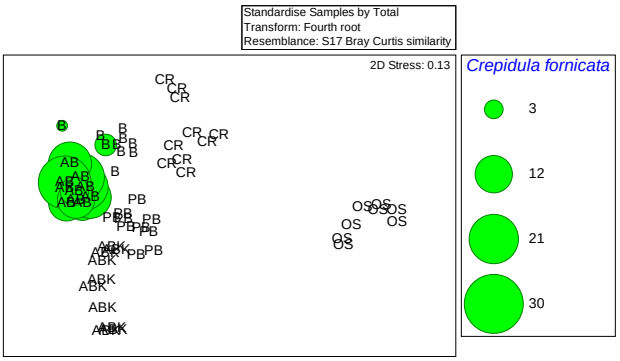
A.3.2 Infralittoral sites; 4-Alum Bay; 5-Alum Bay Kelp; 6-Potters Bower, 7-Canyon Reef, 8-Bembridge

The selection of species presented below in the form of bubble plots, when viewed in combination with substrate type, further illustrates some of the site groupings seen. Crustose coralline algae can be seen to cluster more dominantly on the shallow craggy reef sites of Potters Bower and Alum Bay Kelp, with an added presence on the mixed sediment site of Alum Bay. The remaining red algal species are scattered in varying levels of dominance across the five infralittoral sites.



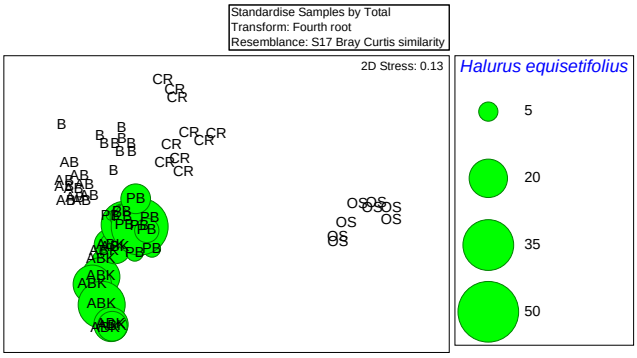
A.3.3 Site 4, Alum Bay (AB)

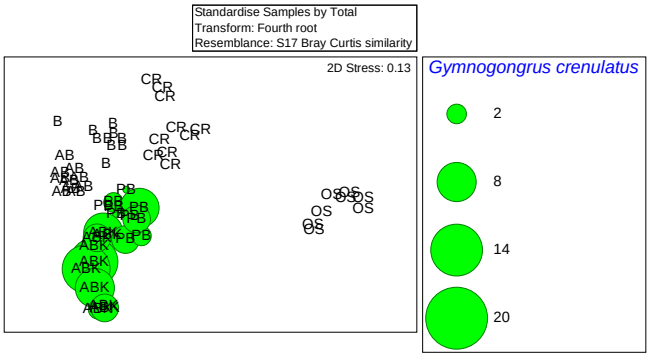
The plot below is presented to highlight the effect of the species *Crepidula fornicata*, on the Alum Bay mixed sediment site. Its dominance and prevalence across the transect, was instrumental in guiding the subsequent biotope allocation, SS.SMx.IMx.CreAsAn (A5.431) (*Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment).



A.3.4 Site 5, Alum Bay Kelp (ABK)

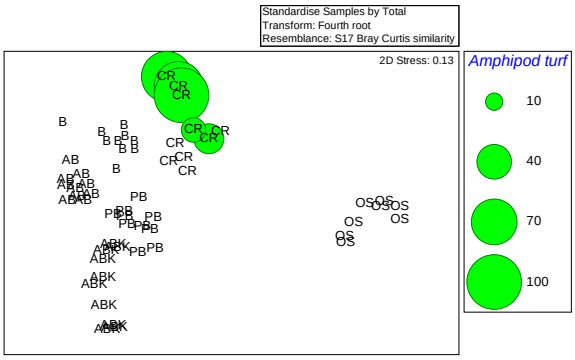
In the two plots below, the species *Halurus equisetifolius* and *Gymnogongrus crenulatus*, are the two top characterising species for Alum Bay Kelp.

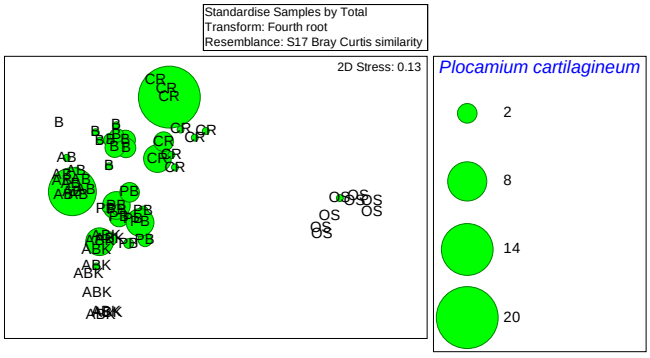




A.3.5 Site 7, Canyon Reef (CR)

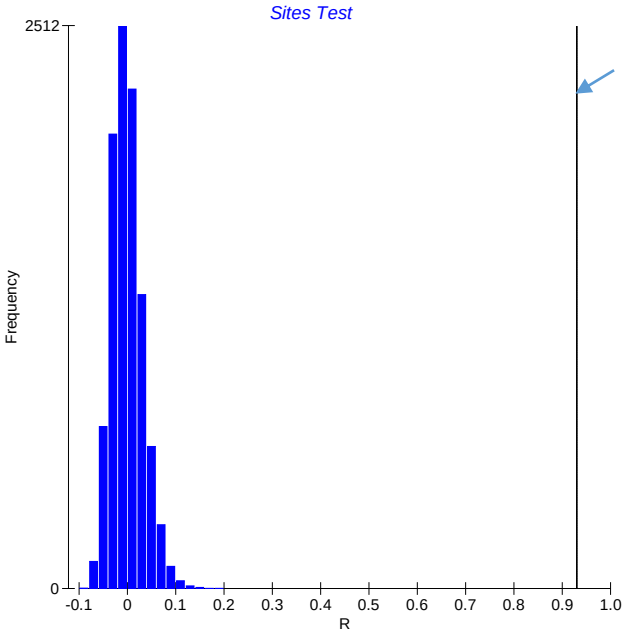
The plots below serve to highlight two things, one, the influence of the amphipod turf in clustering the Canyon Reef site, and two, highlighting the presence of red algal species such as *Plocamium cartilagineum* in further reflecting its grouping with the other infralittoral sites.





A.4 RESULTS OF ONE-WAY ANALYSIS OF SIMILARITY (ANOSIM) FOR ALL THE DATA

The histogram below is the 'permutation distribution of the ANOSIM test statistic, R, under the null hypothesis that there are no assemblage differences between sites…' (Clarke and Gorley, 2006). This is centred around zero. If there were no differences between sites, the Global R statistic would also be near zero. The true value of R for the data used here is shown to be 0.93. This is much larger than the R statistic required (around R = 0.15), to accept the null hypothesis, hence it has to be rejected.



Sample statistic (Global R): 0.93
Significance level of sample statistic: 0.01%
Number of permutations: 9999 (random sample from a large number)
Number of permuted statistics ≥ Global R: 0

Site	No. of Quadrats
2 (OS)	8
4 (AB)	10
5 (ABK)	10
6 (PB)	10
7 (CR)	10
8 (B)	10

Pairwise Tests

Sites	R Statistic (Global R)	Significance Level %
OS, AB	1	0.01
OS, ABK	1	0.01
OS, PB	1	0.01
OS, CR	0.996	0.02
OS, B	1	0.01
AB, ABK	0.988	0.01
AB, PB	0.986	0.02
AB, CR	0.847	0.01
AB, B	0.986	0.01
ABK, PB	0.895	0.01
ABK, CR	0.948	0.01
ABK, B	0.998	0.01
PB, CR	0.8	0.01
PB, B	0.962	0.01
CR, B	0.736	0.01

B. DIVE SITE DETAILS

Site Number	Site Name	Shot Line Position (WGS84)		Dive Number at Site	Date	Dive Start Time	Dive Duration	Tasks undertaken
		Latitude	Longitude					
2	Offshore Sudmoor Point	50º 38.006'N	001º 28.236'W	1	26/09/2015	09:30	64 minutes	Phase 2, Quadrats 1-3
				2	26/09/2015	14:59	58 minutes	Phase 2, Quadrats 4-8
4	Alum Bay Pebbles	50º 39.848'N	001º 35.104'W	1	07/09/2015	11:28	59 minutes	Phase 2, Quadrats 1-5
				2	07/09/2015	12:47	63 minutes	Phase 2, Quadrats 6-9
				3	09/09/2015	13:46	16 minutes	Quadrat 10
5	Alum Bay Kelp	50º 39.829'N	001º 35.094'W	1	10/09/2015	11:52	72 minutes	Phase 2, Quadrats 1-5
				2	10/09/2015	13:37	53 minutes	Phase 2, Quadrats 6-9
				3	27/09/2015	11:54	33 minutes	Quadrat 10
6	Potters Bower	50º 39.590'N	001º 34.509'W	1	26/09/2015	11:53	79 minutes	Phase 2, Quadrats 1-7
				2	26/09/2015	13:38	50 minutes	Phase 2, Quadrats 8-10
7	Canyon Reef, Sandown	50º 39.357'N	001º 07.437'W	1	08/09/2015	07:01	53 minutes	Phase 2, Quadrats 1-5
				2	08/09/2015	08:10	69 minutes	Phase 2, Quadrats 6-9
				3	08/09/2015	11:55	18 minutes	Quadrat 10
8	Lifeboat Station, Bembridge	50º 41.522'N	001º 04.237'W	1	08/09/2015	13:04	78 minutes	Phase 2, Quadrats 1-5
				2	08/09/2015	14:47	58 minutes	Phase 2, Quadrats 6-10

C. QUADRAT DATA

C.1 SITE 2 – OFFSHORE SUDMOOR POINT

Quadrat Number	1	2	3	4	5	6	7	8
Surveyor	NJO	NJO	NJO	BMB	BMB	BMB	BMB	BMB
Substrata %	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock	100% piddock bored sandstone bedrock
Counts								
Alcyonidium diaphanum	3							
Calliostoma zizyphinum	1							
Nemertesia antennina	3	3	1	2	1	3	1	
Nemertesia ramosa		1						
Parablennius gattorugine	1	1						
Pomatoschistus pictus	1							
Raspailia = hispida					0.25			
Raspailia ramosa	1		1		2	3	2	
Stelligera rigida	1			3	5	3	6	3
Stelligera sp.				1				
Tricolia pullus		P						
Percentages								
Algae								
Cryptopleura ramosa		P	1					
Filamentous red algae	P							
Plocamium cartilagineum							0.25	
Percentages								
Fauna								
?Archidistoma aggregatum	1			P				
Aglaophenia pluma	3			2	5	1	3	10
Alcyonium digitatum		1		0.5				
Amathia lendigera								0.25
Ctenostomatida	4							
Bryozoan Crust	16	4	2		0.25	1		

Quadrat Number	1	2	3	4	5	6	7	8
Chartella papyracea	1	1	0.25	0.5	0.5	0.5	0.25	6
Cirripedia			2					
Dysidea fragilis	1	0.25		3		0.5		
Filograna implexa	3	6	2	2	1	3		3
Flustra foliacea			3	2	15		10	
Rocellaria dubia	P	P	P					
Halichondria bowerbanki	1			P				
Hemimycale columella	1	1						0.25
Hydrallmania falcata	0.25	0.25	0.25				0.5	
Hydroid/bryozoan mixed turf	3	3	3	3	3	3	3	3
Hymeniacidon perlevis	P	P						3
Clathria (Microciona) armata					0.5	1	0.25	
Molgula manhattensis	4	16	12	25	15	45	55	25
Phoronida		2						
Polycarpa scuba/pomaria	8	4	12	4	5	4	6	5
Polymastia penicillus				1		1		0.5
Porifera (orange crust)		12			1			
Pseudosuberites sulphureus		4		2	15	6	2	0.5
Sabellaria spinulosa	4	4	6	2	5	15	5	4
Sertularella sp.	P	P						
Sertularia argentea							0.5	
Tubularia sp.	0.25							
Vesicularia spinosa					1		1	

C.2 SITE 4 – ALUM BAY PEBBLES

Quadrat Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Surveyor	BMB	BMB	BMB	BMB	BMB	NJO	NJO	NJO	NJO	BMB
Substrata %	*Crepidula* 70%, Silty sand 20%, Pebbles 10%	*Crepidula* 75%, Silty sand 15%, Pebbles 10%	*Crepidula* 30%, Silty sand 20%, Pebbles 50%	*Crepidula* 35%, Silty sand 50%, Pebbles 15%	*Crepidula* 20%, Silty sand 50%, Pebbles 30%	*Crepidula* and shell 50%, Pebbles and Gravel 50%	*Crepidula* and shell 40%, Pebbles and Gravel 60%	*Crepidula* and shell 50%, Pebbles and Gravel 50%	*Crepidula* and shell 30%, Pebbles and Gravel 40%, Boulder 30%	*Crepidula* 6%, Silty sand 54%, Pebbles 40%
Counts										
Sabellidae	P	P			P	P	P			
Hinia sp.	P	P	P	P	P					
Cliona sp. on shell								1		
Spirobranchus sp.	P	P	P	P	P	P	P	P	P	P
Ciona intestinalis			P							
Gibbula cineraria					P	1	2	1		P
Rissoa parva	P	P	P	P	P	P	P	P	P	P
Tricolia pullus	P			P						
Pomatoschistus pictus						1	1	2		
Anemonia viridis						1				
Amphipholis squamata		P			P					
Percentages										
Algae										
Acrosorium ciliolatum		1		4		0.25	1	0.25	4	
Aglaothamnion tenuissimum	0.25			0.25	0.25					0.5
Asparagopsis armata (Falkenbergia)	2	3	1	1	1	0.25	0.25	0.25	0.25	0.5
Calliblepharis ciliata	10	1	0.25	15	10	4	12	8		1
Cladophora sp.		0.25								
Ceramium sp. (as ref 8)		0.25		0.25	0.25	0.25		0.25	0.25	0.25
Champia parvula			0.25							
Compsothamnion thuyoides	0.25				0.25					
Chondria dasyphylla	0.25				0.25					
Chondria sp.								0.25		

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Crustose Corallinaceae	25	65	30	45	30	8	4	12	8	3
Dark Red Crusts							2			1
Cryptopleura ramosa		0.25	0.25	2	0.25	P		P	4	0.25
Dictyota dichotoma	4	4	1	1	4	2	8	8		10
Drachiella heterocarpa										0.25
Erythroglossum laciniatum			0.25	1						
Filamentous red algae	6	6	8	15	5	12	8	16	12	
Gastroclonium ovatum	0.25				0.25		0.25		0.25	0.25
Gracilaria sp.	3	8								
Gracilaria bursa-pastoris										0.5
Griffithsia corallinoides				0.25	0.25					
Griffithsia sp.							0.25			
Halopithys incurva						0.25	0.25		4	
Haraldiophyllum bonnemaisonii								0.25		
Heterosiphonia plumosa	2	2	1	0.25	0.25	0.25	0.25	0.25	12	4
Dasysiphonia japonica								1		
Hypoglossum hypoglossoides	0.25		0.25		0.25			0.25		
Monosporus pedicellatus		0.25								
Naccaria wiggii		1								
Nitophyllum punctatum								0.25		
Phyllophora pseudoceranoides									1	
Plocamium cartilagineum		0.25		0.25	0.25	0.25	0.25		12	
Polysiphonia elongata		0.25	1	0.25	1					0.25
Polysiphonia elongella	0.25		1	0.25					0.25	
Pterosiphonia ardreana	1	1		1				0.25	2	1
Pterothamnion plumula	0.25	2	0.25		0.25		0.25		0.25	
Rhodomela confervoides						4	4	4		
Rhodymenia sp.										0.25
Radicilingua thysanorhizans		0.25								
Rhodophyllis divaricata	0.25			0.25						
Scinaia interrupta										0.25
Scinaia furcellata								0.25		
Sphondylothamnion multifidum		0.25						0.25		
Ulva rigida	0.25		0.25	0.25						0.25
Ulva sp.						4	1			

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Thin Flat Red algae (TFR)						1	1			
Taonia atomaria										0.5
Percentages										
Fauna										
Crepidula fornicata	8	10	11	15	18	20	16	24	12	7

C.3 SITE 5 – ALUM BAY KELP

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Surveyor	BMB	BMB	BMB	BMB	BMB	NJO	NJO	NJO	NJO	BMB
Substrata %	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef
Counts										
Laminaria hyperborea			4	4	3	7	6	4		
Saccorhiza polyschides	1	1			1	1	1	1		4
Percentages										
Algae										
Acrosorium ciliolatum		0.25	0.25	0.25						
Aglaothamnion tenuissimum	25	15	2	8						15
Apoglossum ruscifolium		0.25	0.25	0.5	1	10	8	0.25		
Asparagopsis armata (Falkenbergia)	4	8	0.25	4					8	0.5
Asterocolax erythroglossi				0.25						
Phaeophyceae crusts	4			4						
Calliblepharis ciliata		4								
Callithamnion tetragonum	0.25	0.25	0.25	0.25	0.25					
Callophyllis laciniata			2	4	8	2				
Ceramium sp.			0.25							
Ceramium siliquosum		2		0.25						
Ceramium secundatum			1							
Chondrus crispus		*2*								
Cladophora pellucida									P	0.25
Cladophora sp.	0.25				0.25				P	
Compsothamnion thuyoides	0.25	0.25			0.25				P	
Crustose Corallinaceae	60	50	*75*	80	65	80	70	60	8	35
Cryptopleura ramosa	4	0.5	0.25	2	2	1	4	0.25	3	4
Dark Red Crusts	4		8							
Delesseria sanguinea					0.5					
Desmarestia ligulata	2									

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Dictyota dichotoma	1	0.25							P	0.25
Erythroglossum laciniatum				0.25	0.25				P	1
Gastroclonium ovatum		0.25								
Gelidium spinosum	2				0.5		0.25		1	4
Griffithsia devoniensis										0.25
Gymnogongrus crenulatus	2	8	12	12	8	2	2	4	1	4
Halurus equisetifolius	4	15	20	20	30	0.25	16	12	14	0.25
Halurus flosculosus	10	2	20	4		1	1	4	P	0.25
Heterosiphonia plumosa	10	2	10	4	2				8	6
Hypoglossum hypoglossoides									P	
Kelp Sporelings	0.5	0.5	1	4	1		0.25	2		0.5
Membranoptera alata				4						
Nitophyllum punctatum									1	
Osmundea osmunda			0.5							
Palmaria palmata		0.25	0.5	0.25						
Phyllophora pseudoceranoides		2								
Phyllophora sicula						0.25				
Pleonosporium borreri	0.25	0.25	0.25	0.25	0.25		0.25		P	
Plocamium cartilagineum	0.25	0.25	0.25						1	4
Plumaria plumosa		2	4	8	12	1	0.25	12		
Neosiphonia elongella	0.25	0.25		0.25					2	
Pterosiphonia ardreana					0.25					
Pterothamnion plumula	0.25									0.5
Rhodophyta (non calcareous crusts)	4	15	10	8						
Rhodymenia pseudopalmata		0.25			0.25			0.25		
Sargassum muticum									1	
Sphaerococcus coronopifolius				4						
Sphondylothamnion multifidum	0.25	0.25				0.25				4
Ulva rigida									P	0.25
Ulva sp.	0.25	0.25								

C.4 SITE 6 – POTTERS BOWER

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Surveyor	BMB	BMB	BMB	BMB	BMB	BMB	BMB	NJO	NJO	NJO
Substrata %	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	100% Chalk Bedrock reef	90% Chalk Bedrock reef. 10% shelly gravel. Copper sheet present.	99% Chalk Bedrock reef. 1% shelly chalk gravel	90% Chalk Bedrock reef. 9% chalk cobbles. 1% chalk gravel.
Counts										
Amphipholis squamata	P									
Calliostoma zizyphinum										1
Halidrys siliquosa				1	3		1			
Lanice conchilega										1
Tricolia pullus										1
Percentages										
Algae										
Asparagopsis armata (Falkenbergia)	0.5	0.5	0.5	2	10	10	12			
Bonnemaisonia asparagoides (Falkenbergia)								8	4	2
Calliblepharis ciliata	15	45	2		10	6	2	4	8	24
Ceramium secundatum	8					2				8
Ceramium sp.		0.25								
Chondrus crispus				0.5			1			P
Cladophora sp.								P		
Cladostephus spongiosus f. verticillatus			3	0.5			1			
Crustose Corallinaceae	50	40	*25*	75		30	15	2	P	8
Cryptopleura ramosa	0.25	4	0.25	1	2	0.5			P	P
Cutleria multifida (Aglaozonia)								P		1
Cutleria sp.	0.25	0.25	4	2						
Dark Red Crusts								2		8
Dasysiphonia japonica								36	24	8
Delesseria sanguinea										4
Dictyopteris polypodioides							1			

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Dictyota dichotoma									P	
Dilsea carnosa	4			15	2					
Drachiella heterocarpa	.		0.5						P	
Filamentous green algae (Coenocytic)									P	20
Gastroclonium ovatum			0.25							
Gymnogongrus crenulatus	0.25	2		4	8		2	1	P	4
Halidrys siliquosa Sporelings	1	4	5							6
Halurus equisetifolius	30	4	1	4	4	8	4	44	12	8
Halurus flosculosus	0.25								P	P
Heterosiphonia plumosa	2	6	2	15	20	15				
Monosporus pedicellatus	0.25		0.5							
Non calcareous red crusts		0.5								
Osmundea osmunda				2		1				
Phyllophora crispa		2				2			P	P
Phyllophora pseudoceranoides					4		12			
Plocamium cartilagineum	2	4	0.25	0.5	0.5	0.5	1	1	2	4
Polysiphonia elongata			0.5							
Pterosiphonia ardreana	0.5	0.25						P	P	4
Radicilingua thysanorhizans				0.25	0.25	0.25				
Rhodymenia holmesii								P		
Schottera nicaeensis	0.5								P	
Sphondylothamnion multifidum	0.25		3	1	0.5	2	6	4		6
Ulva sp.			0.25							
Zanardinia typus	2	1		15						
Percentages										
Fauna										
Aetea anguina								P	P	
Ctenostomatida								30		
Dysidea fragilis	0.5			2						1
Electra pilosa		P			P					
Halichondria bowerbanki									P	
Hymeniacidon perlevis									P	
Leuconia nivea								P		
Molgula sp.										P
Pholadidae									P	

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Porifera crust (orange)				0.25						
Porifera crust (peach)							0.25			
Rissoa parva	P	P	P	P					P	
Spirobranchus sp.			4							

C.5 SITE 7 – CANYON REEF, SANDOWN

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Surveyor	BMB	BMB	BMB	BMB	BMB	NJO	NJO	NJO	NJO	BMB
Substrata %	100% bedrock with 85% cover of thin *Ampelisca* matting	100% bedrock with 80% cover of thin *Ampelisca* matting	100% bedrock with 100% cover of thin *Ampelisca* matting	100% bedrock with 30% cover of thin *Ampelisca* matting	100% small to medium boulders. Area as a whole very silty.	100% medium to large boulders. Area as a whole very silty.	100% medium to large boulders. Area as a whole very silty.	100% medium to large boulders. Area as a whole very silty.	100% medium to large boulders. Area as a whole very silty.	100% medium to large boulders. Area as a whole very silty.
Counts										
Amphipholis squamata			P		P					P
Ascidia mentula				1						1
*Nassarius*sp.						1		P		
Styela clava			1							
Sycon ciliatum					P					
Percentages										
Algae										
Acrosorium ciliolatum						1				
Asparagopsis armata (Falkenbergia)	8	4	1	2	8	2	P	P	P	0.25
Calliblepharis ciliata	0.25	0.25	1	2	1	6	16	2	P	0.5
Ceramium secundatum					0.25					
Chondria dasyphylla	0.25	0.25		0.25						
Chondria sp.						P				
Crustose Corallinaceae					0.25				1	
Cryptopleura ramosa	0.25			0.25	1	1				
Dictyota dichotoma					0.25	1	P			0.25
Drachiella heterocarpa		0.25	0.25	2	4		P	P		
Erythroglossum laciniatum					0.25				P	0.25
Griffithsia corallinoides									P	0.25
Halyphysema tumanowiczii						P	P	P	P	P
Halurus flosculosus					0.25	P	P			
Heterosiphonia plumosa						P	P			0.25
Dasysiphonia japonica					0.25	P	P	P		

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Hypoglossum hypoglossoides			0.25		0.25	P	P			
Monosporus pedicellatus					0.25					
Phyllophora pseudoceranoides			1	2	1	P	P			1
Phyllophora crispa				2	0.5	P				0.5
Plocamium cartilagineum		4	20	0.25	4	P	2	P	P	0.25
Radicilingua thysanorhizans					0.25					
Rhodymenia holmesii							1	1		
Rhodymenia ardissonei									P	
Rhodymenia pseudopalmata				0.25		4	1	1		0.5
Schottera nicaeensis										0.25
Spyridia filamentosa			0.25		0.25	P			P	
Ulva rigida					0.25					
Ulva sp.						P				
Thin Flat Reds (TFR)						1	P		P	
Percentages										
Fauna										
Aetea anguina			P	P	P	P		P		P
Amathia lendigera									P	
Amphipod turf	85	80	100	30						20
Bicellariella ciliata					P					0.25
Botryllus schlosseri				P		P	P			
Bryozoa crusts						P	1			
Bugulidae									1	
Crisiidae			P	P	P	2	P	P		P
Dysidea fragilis						1	P	1	P	2
Electra pilosa						P				P
Eudendrium sp.			P							
Halichondria bowerbanki		0.25								
Hemimycale columella									1	
Molgula manhattensis			P	4	P	P		1		1
Plumularia obliqua					P					
Perophora listeri			P		P	P	P	4	P	P
Porifera crusts				P	0.25	3	P			2
Rissoa parva	P	P	P	P	P					P
Scrupocellaria sp.						P				

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Sertularella sp.						P				
Tubuliporidae						P				

C.6 SITE 8 – LIFEBOAT STATION, BEMBRIDGE

Quadrat Number	1	2	3	4	5	6	7	8	9	10
Surveyor	NJO	NJO	NJO	NJO	NJO	BMB	BMB	BMB	BMB	BMB
Substrata %	Slightly gravelly sand 75%, pebbles 15%. Shell fragments 10%. Silt present.	Slightly shelly sand 75%, pebbles 10%, cobbles 15%. Dead *Crepidula.* Silt present.	Slightly shelly sand 85%, pebbles 10%, cobbles 5%. Silt present.	Slightly shelly slightly gravelly sand 85%, pebbles 15%. Silt present.	Slightly shelly slightly gravelly sand 90%, pebbles 10%. Silt present.	Slightly shelly slightly gravelly sand 25%, pebbles 75%. Silt present.	Slightly shelly slightly gravelly sand 40%, pebbles 55%, *Crepidula* 5%. Silt present.	Slightly shelly slightly gravelly sand 20%, pebbles 71%, *Crepidula* 4%. Silt present.	Slightly shelly slightly gravelly sand 15%, pebbles 85%. Silt present.	Boulder 80%. Slightly shelly slightly gravelly sand 10%, pebbles 10%. Silt present.
Counts										
Amphipholis squamata						P	P			
Gibbula cineraria		1	1							
Saccharina latissima									1	
Sycon ciliatum		1								
Percentages										
Algae										
Acrosorium ciliolatum	4		P		1				0.25	
Cutleria sp.							P	P	P	
Asparagopsis armata (Falkenbergia)			2	1	P	0.25	0.25	0.25	0.25	3
Boergeseniella fruticulosa								2		
Bonnemaisonia asparagoides (Trailliella)			P							
Calliblepharis ciliata	40	28	4	8	16	30	20	25	12	2
Ceramium sp.	P									
Champia parvula								0.25		
Cladophora sp.					P					
Crustose Corallinaceae		P	P	P	1	0.25		2	8	
Cryptopleura ramosa	P						0.25		0.25	
Dark Red Crusts						4			3	

Quadrat Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Dictyota dichotoma	1	P	4	4		0.5	0.5	0.25	4	4
Gastroclonium ovatum				P						
Gracilaria bursa-pastoris		P	4	1	4		2	1	8	
Griffithsia corallinoides							0.25			
Griffithsia devoniensis	P					2	2	4	0.25	
Halopithys incurva				P			0.25			12
Heterosiphonia plumosa	30	24	2	56	36	15	8	15	2	2
Phyllophora crispa				P						6
Polysiphonia elongata							0.25	0.25		
Plocamium cartilagineum	P		2	1	2	2	1	0.25	0.25	0.25
Rhodomela confervoides			P	2	2					
Rhodophyllis divaricata						0.25				
Sphaerococcus coronopifolius		1	4		P					
Spyridia filamentosa	1	1	1	1		0.25	0.5	0.5	2	1
Ulva sp.				P						
Thin Flat Reds (TFR)			4		4					
Percentages										
Fauna										
Amathia lendigera			P			0.25	0.25			
Bryozoan crusts			P	P	P					
Crepidula fornicata		1						4		
Crisiidae									0.25	
Dysidea fragilis			P		P			0.25		
Didemnidae								0.25		
Electra pilosa						0.25	0.25	4	4	
Haliclona sp.								0.5		
Polycarpa sp.								0.25		
Perophora listeri	1	4	1	8	2	0.25	0.25	0.25	0.25	0.25
Porifera crust								0.25		
Rissoa parva			P			0.25	0.25	0.25	0.25	0.25
Cradoscrupocellaria reptans		2	1	P	P					

D. PHASE 2 DATA

D.1 SITE 2 – OFFSHORE SUDMOOR POINT

Species	Category	SACFOR
?Archidistoma aggregatum	Crust/Meadow	P
Aetea anguina	Crust/Meadow	P
Aglaophenia pluma	Mass/Turf	O
Alcyonium digitatum	Mass/Turf	O
Amathia lendigera	Mass/Turf	P
Amphipod soft tubes on erect stems but no fauna seen	Crust/Meadow	O
Amphisbetia operculata	Mass/Turf	P
Antho (Antho) inconstans	Crust/Meadow	R
Bicellariella ciliata	Mass/Turf	P
Crisularia plumosa	Mass/Turf	P
Calliostoma zizyphinum	1-3cm	O
Cancer pagurus	>15cm	F
Chartella papyracea	Mass/Turf	O
Cirripedia	Crust/Meadow	R
Crisia aculeata	Crust/Meadow	P
Ctenolabrus rupestris	>15cm	P
Didemnum maculosum	Crust/Meadow	P
Disporella hispida	Crust/Meadow	P
Dysidea fragilis	Crust/Meadow	O
Escharella immersa	Crust/Meadow	P
Escharella variolosa	Crust/Meadow	P
Filamentous red algae	Mass/Turf	O
Filograna implexa	Crust/Meadow	F
Flustra foliacea	Mass/Turf	F
Halecium halecinum	Mass/Turf	O
Halecium sp.	Mass/Turf	P
Halichondria bowerbanki	Crust/Meadow	O
Hemimycale columella	Crust/Meadow	R
Hydrallmania falcata	Mass/Turf	R
Hymedesmia sp.	Crust/Meadow	P
Hymeniacidon perlevis	Crust/Meadow	O
Leucosolenia sp.	Crust/Meadow	P
Clathria (Microciona) armata	Crust/Meadow	P
Clathria (Microciona) spinarcus	Crust/Meadow	R
Molgula manhattenis	Crust/Meadow	C
Morchellium argus	Crust/Meadow	R
Myxilla (Myxilla) rosacea	Crust/Meadow	P
Nemertesia antennina	3-15cm	F
Oscarella sp.	Crust/Meadow	P
Parablennius gattorugine	3-15cm	P
Phorbas plumosus	Crust/Meadow	R
Polycarpa scuba	Crust/Meadow	O
Polycarpa scuba/pomaria	Crust/Meadow	O
Polycarpa pomaria	Crust/Meadow	O
Polymastia penicillus	Mass/Turf	R
Pomatoschistus sp.	3-15cm	P
Porifera (mixed crusts)	Crust/Meadow	O
Pseudosuberites sulphureus	Crust/Meadow	O
Raspailia ramosa	3-15cm	O

Species	Category	SACFOR
Sabellaria spinulosa	Crust/Meadow	F
Schizomavella (Schizomavella) sarniensis	Crust/Meadow	R
Sertularella gaudichaudi	Crust/Meadow	P
Sertularella polyzonias	Crust/Meadow	P
Spirobranchus sp.	Crust/Meadow	P
Stelligera rigida	3-15cm	R
Stelligera sp.	3-15cm	R
Stelligera stuposa	3-15cm	O
Suberitidae	Crust/Meadow	R
Tubularia sp.	Mass/Turf	R
Vesicularia spinosa	Mass/Turf	P

D.2 SITE 4 – ALUM BAY PEBBLES

Species	Category	SACFOR
Actinothoe sphyrodeta	1-3cm	R
Amphisbetia operculata	Mass/Turf	R
Ascidiacea	<1cm	O
Balanus crenatus	Crust/Meadow	R
Calliblepharis ciliata	Mass/Turf	O
Callionymus lyra	3-15cm	O
Cellepora pumicosa	Crust/Meadow	R
Ceramium sp.	Mass Turf	P
Cereus pedunculatus	3-15cm	O-F
Crepidula fornicata	1-3cm	C
Crustose Corallinaceae	Crust/Meadow	C
Dictyota dichotoma	Mass/Turf	R
Escharella variolosa	Crust/Meadow	P
Filamentous red algae	Mass/Turf	C
Gibbula sp.	1-3cm	O
Gracilaria sp.	Mass/Turf	O
Heterosiphonia plumosa	Mass/Turf	O
Hinia reticulata	1-3cm	O
Lucerniopsis campanulata	<1cm	P
Molgula manhattensis	Crust/Meadow	O
Nemertesia antennina	3-15cm	R-O
Ocenebra erinaceus	1-3cm	R
Ostrea edulis	3-15cm	O
Phoronis hippocrepia	<1cm	P
Pisces (juvenile)	3-15cm	P
Plocamium cartilagineum	Mass/Turf	O
Polycarpa/Pyuridae	1-3cm	O
Polysiphonia sp.	Mass/Turf	R
Pomatoschistus sp.	3-15cm	P
Porifera crusts	Crust/Meadow	R
Rissoa parva	<1cm	P
Sabellaria spinulosa	Crust/Meadow	O
Sepia officinalis (juv)	>15cm	R-O
Spirobranchus sp.	<1cm	R
Ulva sp.	Mass/Turf	R

D.3 SITE 5 – ALUM BAY KELP

Species	Category	SACFOR
Aglaothamnion tenuissimum	Mass/Turf	C
Asparagopsis armata (Falkenbergia)	Mass/Turf	F
Bispira volutacornis	3-15cm	O
Bryozoan crusts	Crust/Meadow	O
Calliblepharis ciliata	Mass/Turf	R
Calliostoma zizyphinum	1-3cm	R
Callithamnion granulatum	Mass/Turf	P
Callithamnion tetragonum	Mass/Turf	O
Ceramium secundatum	Mass/Turf	O
Chartella papyracea	Mass/Turf	O
Chondrus crispus	Mass/Turf	O
Cladophora pellucida	Mass/Turf	O
Clathria (Microciona) armata	Crust/Meadow	R
Clavulariidae/Cornulariidae	1-3cm	F
Cryptopleura ramosa	Mass/Turf	O
Cyanophyceae	Crust/Meadow	F
Delesseria sanguinea	Mass/Turf	O
Dictyopteris polypodioides	Mass/Turf	R
Dictyota dichotoma	Mass/Turf	R
Dysidea fragilis	Crust/Meadow	R
Filograna implexa	Crust/Meadow	R
Furcellaria lumbricalis	Mass/Turf	R
Gastroclonium ovatum	Mass/Turf	R
Gelidium spinosum	Mass/Turf	F
Gibbula cineraria	1-3cm	R
Gymnogongrus crenulatus	Mass/Turf	F
Halidrys siliquosa	Mass/Turf	F
Halisarca/Oscarella sp. (tiny amount)	Crust/Meadow	R
Halurus equisetifolius	Mass/Turf	F
Hymeniacidon perlevis	Crust/Meadow	R
Hypoglossum hypoglossoides	Mass/Turf	O
Laminaria hyperborea	Mass/Turf	O
Meredithia microphylla	Crust/Meadow	R
Microcionidae	Crust/Meadow	R
Morchellium argus	1-3cm	O
Nitophyllum punctatum	Mass/Turf	O
Osmundea osmunda	Mass/Turf	O
Phoronis hippocrepia	Crust/Meadow	O
Phyllophora pseudoceranoides	Mass/Turf	O
Plocamium cartilagineum	Mass/Turf	F
Plumaria plumosa	Mass/Turf	O
Porifera (Crusts)	Crust/Meadow	O
Raspailia ramosa	1-3cm	R
Sabellidae	1-3cm	P
Saccorhiza polyschides	Mass/Turf	F
Sargassum muticum	Mass/Turf	R
Sphondylothamnion multifidum	Mass/Turf	F
Stelligera rigida	1-3cm	O
Stryphnus ponderosus	Crust/Meadow	R
Ulva sp.	Mass/Turf	R

Species	Category	SACFOR
On Cobble		
Bugulina fulva	Mass/Turf	R
Chorizopra brongniarti	Crust/Meadow	P
Escharella immersa	Crust/Meadow	P
Escharella variolosa	Crust/Meadow	P
Escharella ventricosa	Crust/Meadow	P
Escharoides coccinea	Crust/Meadow	P
Filograna implexa	Crust/Meadow	P
Hymedesmia paupertas	Crust/Meadow	R
Nolella sp.	Mass/Turf	P
Perophora listeri	Crust/Meadow	P
Schizomavella auriculata/cuspidata	Crust/Meadow	P
Schizomavella cornuta	Crust/Meadow	P
Schizomavella sarniensis	Crust/Meadow	P
Spirobranchus sp.	Crust/Meadow	P
Random collection of algae from vertical walls in the gullies found to comprise;		
Bonnemaisonia hamifera	Mass Turf	P
Chaetomorpha melagonium	Mass Turf	P
Coenocytic green fan	Mass Turf	P
Griffithsia corallinoides	Mass Turf	P
Pleonosporium borreri	Mass Turf	P
Plocamium cartilagineum	Mass Turf	P
Pterothamnion plumula	Mass Turf	P

D.4 SITE 6 – POTTERS BOWER

Species	Category	SACFOR
Ascidiacea (Polyclinidae/Polycitoridae)	Crust/Meadow	P
Asparagopsis armata	Mass/Turf	O
Balanus crenatus	Crust/Meadow	R
Bispira voluticornis	3-15cm	F
Bryozoa (crusts)	Crust/Meadow	R
Calliblepharis ciliata	Mass/Turf	C
Calliostoma zizyphinum	1-3cm	O
Centrolabrus exoletus	3-15cm	P
Ceramium sp.	Mass/Turf	P
Cirripedia	Crust/Meadow	R
Clathria (Microciona) strepsitoxa	Crust/Meadow	R
Crustose coralline algae	Crust/Meadow	C
Cryptopleura ramosa	Mass/Turf	O
Dictyopteris polypodioides	Mass/Turf	R
Dilsea carnosus	Mass/Turf	O
Disporella hispida	Crust/Meadow	P
Dysidea fragilis	Crust/Meadow	R
Filamentous green algae	Mass/Turf	O
Filograna implexa	Crust/Meadow	R
Gibbula cineraria	1-3cm	P
Haliclona sp.	Crust/Meadow	R
Halidrys siliquosa	Mass/Turf	O
Halidrys siliquosa sporeling	Mass/Turf	O
Halurus equisetifolius	Mass/Turf	F
Heterosiphonia plumosa	Mass/Turf	F
Hydroid/Bryozoan turf	Mass/Turf	R
Hymeniacidon perlevis	Crust/Meadow	O
Labrus bergylta	>15cm	P
Leuconia nivea	Crust/Meadow	R
Molgula sp. (tiny)	Crust/Meadow	O
Morchellium argus	Crust/Meadow	R
Nassarius reticulatus	1-3cm	F
Parablennius gattorugine	3-15cm	R
Perophora listeri	Crust/Meadow	R
Pholadidae	1-3cm	P
Phyllophora pseudoceranoides	Mass/Turf	O
Plagioecia patina/sarniensis	Crust/Meadow	P
Plocamium cartilagineum	Mass/Turf	F
Pollachius pollachius	>15cm	P
Polycarpa scuba/pomaria	Crust/Meadow	O
Porifera crusts (orange/yellow)	Crust/Meadow	O
Porifera crusts (red)	Crust/Meadow	R
Pseudosuberites sulphureus	Crust/Meadow	O
Saccorhiza polyschides	Mass/Turf	R-O
Scrupocellaria sp.	Mass/Turf	P
Spermothamnium repens	Mass/Turf	O
Sphondylothamnion multifidum	Mass/Turf	O
Spirobranchus sp.	Crust/Meadow	C

Species	Category	SACFOR
Stelligera rigida	3-15cm	R
Ulva sp.	Mass/Turf	R
Zanardinia typus	Crust/Meadow	R

D.5 SITE 7 – CANYON REEF, SANDOWN

Species	Category	SACFOR
Aetea anguina	Crust/Meadow	P
Amathia lendigera	Crust/Meadow	P
Amphipholis squamata	1-3cm	P
Amphipod tube mat	Crust/Meadow	A
Species within Amphipod tube mat		
Dexamine spinosa		P
Ampelisca diadema		P
Corophium sp.		P
Ericthonius punctatus		P
Antho (Antho) inconstans	Mass/Turf	P
Antho (Antho) inconstans/coriacea	Crust/Meadow	R
Aplysia = punctata	3-15cm	P
Ascidia mentula	3-15cm	F
Ascidiacea	3-15cm	O
Bicellariella ciliata	Crust/Meadow	R
Bispira volutacornis	3-15cm	O
Botryllus schlosseri	Crust/Meadow	R
Crisularia plumosa	Mass/Turf	R
Bugulidae	Mass/Turf	R
Calliblepharis ciliata	Mass/Turf	O
Crisia aculeata	Mass/Turf	O
Crisia denticulata	Mass/Turf	P
Crisiidae	Mass/Turf	O
Ctenolabrus rupestris	3-15cm	P
Dendrodoa grossularia	1-3cm	R
Didemnidae	Crust/Meadow	R
Didemnum maculosum	Crust/Meadow	R
Disporella hispida	Crust/Meadow	P
Dysidea fragilis	Crust/Meadow	P
Electra pilosa	Crust/Meadow	P
Epistomia bursaria	Crust/Meadow	P
Filamentous red algae	Mass/Turf	F
Filograna implexa	Crust/Meadow	P
Flustra foliacea	Mass/Turf	O
Halichondria bowerbanki	Crust/Meadow	O
Hemimycale columella	Crust/Meadow	R
Nassarius reticulatus	1-3cm	O
Hymeniacidon perlevis	Crust/Meadow	R
Liocarcinus sp.	3-15cm	O
Lissoclinum perforatum	Crust/Meadow	P
Moglula manhattensis	1-3cm	F
Plumularia obliqua	Crust/Meadow	P
Myxilla rosacea	Crust/Meadow	R
Necora puber	3-15cm	O
Pandalus sp.	3-15cm	P
Parablennius gattorugine	3-15cm	R
Perophora listeri	Crust/Meadow	F
Phoronis hippocrepia	Crust/Meadow	P
Plocamium cartilagineum	Mass/Turf	O
Polycarpa scuba/pomaria	1-3cm	O
Polycera sp.	1-3cm	P

Species	Category	SACFOR
Polymastia penicillus	Crust/Meadow	P
Polysiphonia sp.	Mass/Turf	P
Porifera crusts	Crust/Meadow	F
Pseudosuberites sulphureus	Crust/Meadow	R
Pycnogonida	<1cm	P
Pyuridae/Styelidae	1-3cm	O
Rissoa parva	<1cm	P
Cradoscrupocellaria reptans	Crust/Meadow	P
Scrupocellaria scrupea	Mass/Turf	P
Stelligera stuposa	1-3cm	O
Styela clava	3-15cm	R
Styelidae	1-3cm	O
Sycon ciliatum	1-3cm	P
Trisopterus luscus	>15cm	O

D.6 SITE 8 – LIFEBOAT STATION, BEMBRIDGE

Species	Category	SACFOR
Amphilectus fucorum	Crust/Meadow	O
Ascidia mentula	3-15cm	O
Bispira volutacornis	3-15cm	O
Bryozoa crusts	Crust/Meadow	P
Calliblepharis ciliata	Mass/Turf	C
Chalinidae	Crust/Meadow	R
Crepidula fornicata	Mass/Turf	O
Crustose Corallinaceae	Crust/Meadow	F
Didemnidae	Crust/Meadow	R
Dysidea fragilis	Crust/Meadow	O
Dysidea fragilis/pallescens	Crust/Meadow	R
Electra pilosa	Crust/Meadow	P
Flustra foliacea	Mass/Turf	P
Gobiidae	3-15cm	P
Halichondria bowerbanki	Crust/Meadow	O
Haliclona = simulans	Crust/Meadow	R
Haliclona sp.	Crust/Meadow	R
Halopithys incurva	Mass/Turf	P
Heterosiphonia plumosa	Mass/Turf	C
Hymeniacidon perlevis	Crust/Meadow	O
Lissoclinum perforatum	Crust/Meadow	R
Microciona armata	Crust/Meadow	P
Myxilla rosacea	Crust/Meadow	R
Necora puber	3-15cm	P
Perophora listeri	Crust/Meadow	O
Plocamium cartilagineum	Mass/Turf	P
Polymastia penicillus	Crust/Meadow	R
Pomatoschistus microps	3-15cm	P
Raspailia sp.	1-3cm	R
Scrupocellaria sp. (Candidae)	Crust/Meadow	R
Spirobranchus sp.	1-3cm	P
Spirorbidae	Crust/Meadow	P
Stelligera stuposa	1-3cm	O
Suberites sp.	Mass/Turf	R
Ulva sp.	Mass/Turf	P

E. EUNIS CODES

Allocated Habitat Types / Biotopes 2015		EUNIS code 2007	EUNIS level	EUNIS name 2007
Site 2	CR.HCR.XFa.Mol	A4.138	5	[Molgula manhattensis] with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock
	In a mosaic with;			
	CR.MCR.SfR.Pid	A4.231	5	Piddocks with a sparse associated fauna in sublittoral very soft chalk or clay
Site 4	SS.SMx.IMx.CreAsAn	A5.431	5	[Crepidula fornicata] with ascidians and anemones on infralittoral coarse mixed sediment
Site 5	IR.MIR.KR.Lhyp.Ft	A3.2141	6	[Laminaria hyperborea] forest and foliose red seaweeds on moderately exposed upper infralittoral rock
Site 6	IR.MIR.	A3.2	3	Atlantic and Mediterranean moderate energy infralittoral rock
	Suggest a close descriptive affiliation to:-			
	IR.HIR.KSed.XKHal	A3.126	5	[Halidrys siliquosa] and mixed kelps on tide-swept infralittoral rock with coarse sediment
Site 7	IR.MIR.KR.XFoR	A3.215	5	Dense foliose red seaweeds on silty moderately exposed infralittoral rock
Site 8	IR.MIR.KR.XFoR	A3.215	5	Dense foliose red seaweeds on silty moderately exposed infralittoral rock
	In a mosaic with;			
	SS.SMx.IMX	A5.43	4	Infralittoral mixed sediments

F. REFERENCE COLLECTION

Ref ID	Species	Site	ID by	Notes
1	*Pterothamnion plumula*	Alum Bay	BMB/NJO	
2	*Neosiphonia elongella*	Alum Bay	BMB	
3	*Asparagopsis armata*	Alum Bay	BMB	
4	*Aglaothamnion tenuissimum*	Alum Bay	BMB	
5	*Rhodophyllis divaricata*	Alum Bay	BMB/NJO	
7	*Calliblepharis ciliata*	Alum Bay	NJO	Juvenile
8	*Ceramium* sp.	Alum Bay	BMB	
9	*Cryptopleura ramosa*	Alum Bay	NJO	Balled mass growing on Crepidula.
10	*Ulva rigida*	Alum Bay	BMB	
11	*Scinaia furcellata*	Alum Bay	NJO	
12	*Pterosiphonia ardreana*	Alum Bay	BMB/NJO	
13	*Hypoglossum hypoglossoides*	Alum Bay	BMB/NJO	
14	*Naccaria wiggii*	Alum Bay	BMB	
15	*Polysiphonia elongata*	Alum Bay	BMB	
17	*Acrosorium ciliolatum*	Alum Bay	NJO	
18	*Plocamium cartilagineum*	Alum Bay	NJO	Q7 epiphyte on Cal.ciliata.
19	*Halopithys incurva*	Alum Bay	NJO	Q7
20	*Phyllophora pseudoceranoides*	Canyon Reef	BMB	Q4
21	*Phyllophora crispa*	Canyon Reef	NJO	Q6
22	*Schottera nicaeensis*	Canyon Reef	BMB	Q10
23	*Rhodymenia holmesii*	Canyon Reef	BMB	Q10
24	*Spyridia filamentosa*	Canyon Reef	NJO	Q6
25	*Cryptopleura ramosa*	Canyon Reef	NJO	Q6
26	*Dasysiphonia japonica*	Canyon Reef	NJO	Q6
27	*Plumularia obliqua*	Canyon Reef	BMB	Q5
28	*Plocamium cartilagineum*	Canyon Reef	BMB	General Survey
29	*Erythroglossum laciniatum*	Canyon Reef	NJO	Q9
30	*Drachiella heterocarpa*	Canyon Reef	BMB	General Survey
31	*Heterosiphonia plumosa*	Bembridge	BMB/NJO	Q1
32	*Halopithys incurva*	Bembridge	BMB	Q7
33	*Griffithsia devoniensis*	Bembridge	BMB/NJO	Q1
34	*Griffithsia devoniensis*	Bembridge	BMB	Q6.

Ref ID	Species	Site	ID by	Notes
35	*Gracilaria bursa-pastoris*	Bembridge	BMB	Q7
36	*Spyridia filamentosa*	Bembridge	NJO	Poor condition. Common in quadrat.
37	*Polysiphonia elongata*	Bembridge	BMB	Q8
38	*Boergeseniella fruticulosa*	Bembridge	BMB	Q8
39	*Acrosorium ciliolatum*	Bembridge	NJO	Q1
40	*Gastroclonium ovatum*	Bembridge	NJO	Q1
41	*Hymeniacidon perlevis*	Bembridge	BMB/FTT	
42	*Haliclona* cf. *simulans*	Bembridge	FTT	
43	*Rhodymenia pseudopalmata*	Bembridge	BMB	
44	*Neosiphonia elongella*	Bembridge	NJO/FTT	
45	*Bonnemaisonia asparagoides*	Bembridge	BMB/NJO	Q3
46	*Antho inconstans*	Canyon Reef	NJO	
47	*Rhodomela confervoides*	Bembridge	NJO	Q3
48	*Taonia atomaria*	Alum Bay	BMB	Q10
49	*Sphaerococcus coronopifolius*	Bembridge	NJO	Q2
50	*Cradoscrupocellaria reptans*	Bembridge	NJO	
51	*Dictyota dichotoma*	Alum Bay	BMB/FTT	General
52	*Walkeria uva*	Bembridge	NJO/FTT	Q2
53	*Aglaothamnion tenuissimum*	Alum Bay	BMB/FTT	General
54	*Halurus flosculosus*	Kelp Site Alum Bay	BMB	Q1
55	*Desmarestia ligulata*	Kelp Site Alum Bay	BMB	Q1
56	*Apoglossum ruscifolium*	Kelp Site Alum Bay	NJO	Q6
57	*Sphondylothamnion multifidum*	Kelp Site Alum Bay	BMB	Q1
58	*Plumaria plumosa*	Kelp Site Alum Bay	NJO	Q6
59	*Callophyllis laciniata*	Kelp Site Alum Bay	NJO	Q6
60	*Gymnogongrus crenulatus*	Kelp Site Alum Bay	NJO	Q6
61	*Callithamnion tetragonum*	Kelp Site Alum Bay	BMB	Q1
62	*Gelidium spinosum*	Kelp Site Alum Bay	BMB	Q1
63	*Aglaothamnion tenuissimum*	Kelp Site Alum Bay	BMB	Q1
64	*Halurus equisetifolius*	Kelp Site Alum Bay	BMB	Q6
65	*Ceramium siliquosum*	Kelp Site Alum Bay	BMB	Q1
66	*Pleonosporium borreri*	Kelp Site Alum Bay	BMB/NJO	Q7. Downward-growing filaments on main axis
67	*Halopteris filicina*	Kelp Site Alum Bay	BMB	Q1
68	*Callithamnion ?tetragonum*	Kelp Site Alum Bay	BMB	Q2

Ref ID	Species	Site	ID by	Notes
69	*Membranoptera alata*	Kelp Site Alum Bay	BMB	Q4
70	*Apoglossum ruscifolium*	Kelp Site Alum Bay	BMB	Q4
71	Coenocytic Green Fan, *Flabellia petiolata*	Kelp Site Alum Bay	BMB	Collected from vertical wall of crevice during Phase 2 survey. Confirmed by external specialists
72	*Asterocolax erythroglossi*	Kelp Site Alum Bay	BMB	Q4
73	*Callithamnion tetragonum*	Kelp Site Alum Bay	BMB	Q4
74	*Ceramium secundatum*	Kelp Site Alum Bay	BMB	Q3
75	*Hypoglossum hypoglossoides*	Kelp Site Alum Bay	NJO/FTT	Q6. Phase 2
76	*Osmundea osmunda*	Kelp Site Alum Bay	BMB	Q4
77	*Hymeniacidon perlevis*	Kelp Site Alum Bay	BMB	Q5.
78	*Ceramium secundatum*	Kelp Site Alum Bay	BMB/FTT	Q9
79	*Nitophyllum punctatum*	Kelp Site Alum Bay	BMB/FTT	Q9
80	*Cladophora* sp.	Kelp Site Alum Bay	BMB/FTT	Q9
81	*Haraldiophyllum bonnemaisonii*	Kelp Site Alum Bay	BMB/FTT	Q9
82	*Delesseria sanguinea*	Kelp Site Alum Bay	NJO/FTT	Q9
83	*Pterosiphonia ardreana*	Potters Bower	BMB	Q1
84	*Zanardinia typus*	Potters Bower	BMB	Q1
85	*Polysiphonia elongata*	Potters Bower	BMB	Q3
86	*Halidrys siliquosa*	Potters Bower	BMB	Q3 Sporeling
87	*Gastroclonium ovatum*	Potters Bower	BMB	Q3
88	*Cladostephus spongiosus f. verticillatus*	Potters Bower	BMB	Q3
89	*Monosporus pedicellatus*	Potters Bower	BMB	Q3
90	*Phyllophora pseudoceranoides*	Potters Bower	BMB	Q5
91	*Drachiella heterocarpa*	Potters Bower	NJO	Q9
92	*Cryptopleura ramosa*	Potters Bower	NJO/BMB	Q8 and Q10
93	*Chondrus crispus*	Potters Bower	BMB	Q7
94	*Delesseria sanguinea*	Kelp Site Alum Bay	BMB	Phase II
95	*Cryptopleura ramosa*	Kelp Site Alum Bay	NJO	Phase II
96	*Hypoglossum hypoglossoides*	Kelp Site Alum Bay	NJO	Phase II
97	*Cladophora pellucida*	Kelp Site Alum Bay	NJO/BMB	Q9
98	*Furcellaria lumbricalis*	Kelp Site Alum Bay	NJO	Phase II
99	*Dictyopteris polypodioides*	Potters Bower	JLW/BMB	Phase II

G. DIVE SITE PROFORMAS

G.1 CIRCALITTORAL ROCK SITES

Circ Rock Sites Quadrat position: Prep from 2003:	Quad No.	Quad No.	Quad No.	Quad No.	Quad No.
Depth					
Substrata %					
Counts	**1**	**2**	**3**	**4**	**5**
Bispira voluticornis					
Hinia reticulata					
Ostrea edulis					
Tethya citrina					
Haliclona oculata					
Leucosolenia complic					
Nemertesia ant					
Pin head squirt					
Polycarpa pomaria					
Polycarpa scuba					
Scypha ciliata					
Stelligera rigida					
Raspailia ramosa					
Percentages Algae	**1**	**2**	**3**	**4**	**5**
Acrosorium					
Drachiella heterocarpa					
Halurus flosculosus					
Hypoglossum hypoglossoides					
Rhodymenia holmesii					

G.2 KELP FOREST SITES

Kelp Sites **Quadrat position: Prep from 2003 Record Algae only**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**
Depth					
Substrata %					
Algae Counts	**1**	**2**	**3**	**4**	**5**
Halidrys siliquosa					
Laminaria hyperborea					
Sacchoriza polyschides					
Algae Percentages	**1**	**2**	**3**	**4**	**5**
Acrosorium reptans					
Aglaothamnion tenuissimum					
Apoglossum					
Arthrocladia villosa					
Brongniartella					
Bryopsis plumosa					
Calliblepharis ciliata					
Callithamnion tetragonum					
Callophyllis laciniata					
Ceramium echinotum					
Ceramium secundatum					
Ceramium siliquosum					
Chondrus crispus					
Cladophora					
Corallina officianalis					
Crustose browns					
Crustose corallinacea					
Crustose dark red					
Cryptopleura ramosa					
Delesseria sanguinea					
Derbesia marina					
Desmarestia ligulata					
Dictyota dichotoma					
Dilsea carnosa					
Drachiella heterocarpa					
Gastroclonium ovatum					
Gelidium latifolium					
Griffithsia corallioides					

Kelp Sites **Quadrat position: Prep from 2003 Record Algae only**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**
Halarachnion ligulatum					
Halurus equisetifolius					
Halurus flosculosus					
Heterosiphonia plumosa					
Hypoglossum hypoglossoides					
Kelp sporelings					
Membranoptera alata					
Meredithia microphylla					
Mesophyllum lichenoides					
Palmaria palmata					
Phycodrys rubens					
Phyllophora crispa					
Phyllophora pseudoceranoides					
Plocamium cartilagineum					
Plumaria elegans					
Polysiphonia elongata					
Polysiphonia elongella					
Polysiphonia fucoides					
Polysiphonia stricta					
Pterosiphonia ardreana					
Pterosiphonia parasitica					
Red sporelings					
Rhodophyllis divaricata					
Rhodophyta (non-calcareous crusts)					
Rhodymenia					
Rhodymenia pseudopalmata					
Spondylothamnion					
Ulva					
Zanardinia					
Zanardinia typus					
Fauna for Phase 2 only	**1**	**2**	**3**	**4**	**5**
Count					
Bispira volutacornis					
Gibbula cineraria					
Hinia reticulata					
Polycarpa scuba					
Tricolia pullus					

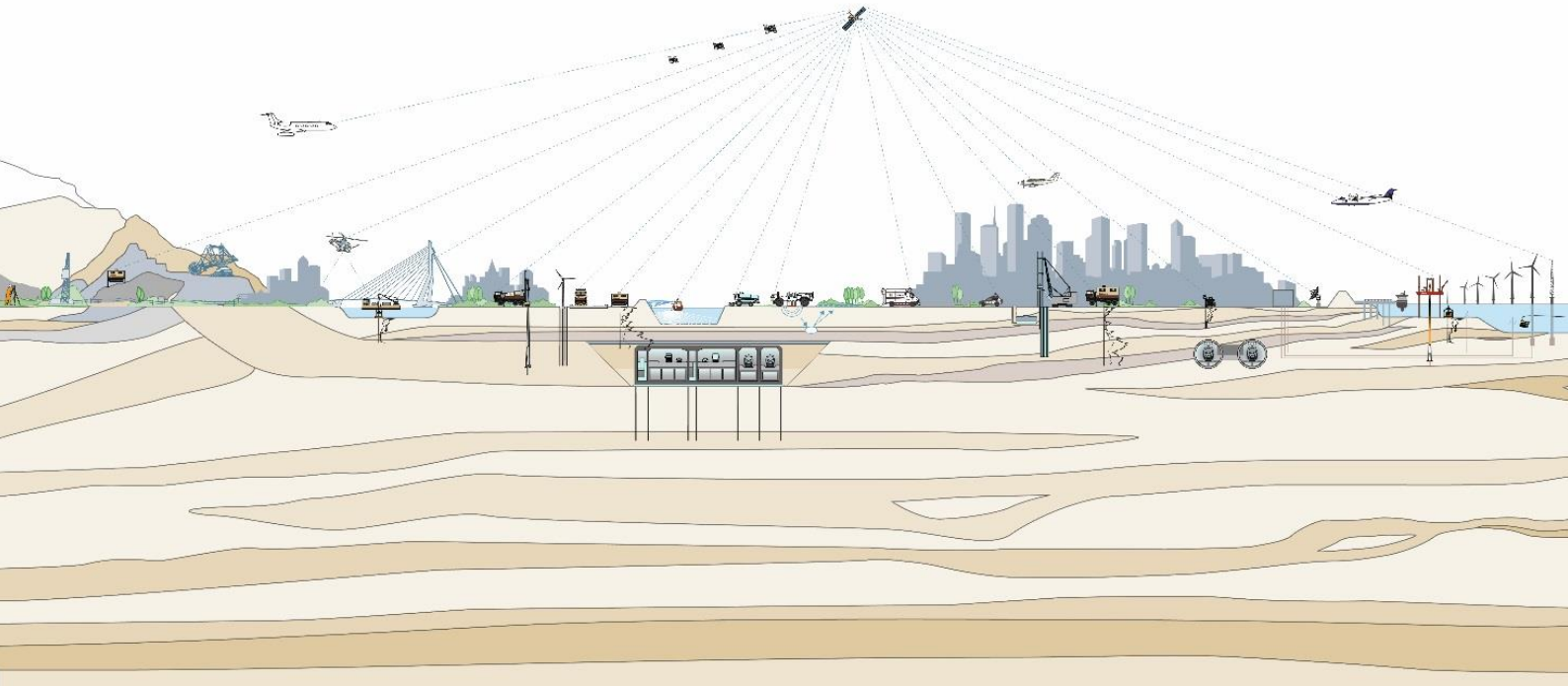
Kelp Sites **Quadrat position: Prep from 2003 Record Algae only**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**
Percentages					
Balanus crenatus					
Botryllus schlosseri					
Bryozoa crusts					
Caprellidae					
Membranipora membranacea					
Electra pilosa					
Pholas dactylus					
Patella pellucida					

G.3 TIDE SWEPT PEBBLE SITES

Tide Swept Pebble Quadrat position: Prep from 2003:	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**	**Quad No.**
Depth					
Substrata %					
Counts	**1**	**2**	**3**	**4**	**5**
Amphipholis squamata					
Anemonia viridis					
Crenilabrus melops					
Pisidia longicornis					
Pomatoschistus					
Styela clava					
Percentages	**1**	**2**	**3**	**4**	**5**
Algae					
Aglaothamnion byssoides					
Brongniartella byssoides					
Calliblepharis ciliata					
Chondria dasyphylla					
Crustose Corallinaceae					
Crustose dark reds					
Cryptopleura ramosa					
Dictyota dichotoma					
Erythrodermis traillii?					
Gracilaria bursa-pastoris					
Griffithsia corallioides					
Griffithsia devoniensis					
Halarachnion ligulatum					
Halidrys siliquosa					
Heterosiphonia plumosa					
Naccaria wiggii					
Polysiphonia elongata					
Polysiphonia elongella					
Polysiphonia stricta					
Rhodophyllis divaricata					
Scinaia interrupta					
Sporochnus pedunculatus					
Spyridia filamentosa					
Taonia atomaria					
Percentages	**1**	**2**	**3**	**4**	**5**
Fauna					
Botryllus schlosseri					

Fugro EMU Limited
Trafalgar Wharf (Unit 16)
Hamilton Road
Portchester
Portsmouth
PO8 4PX
United Kingdom

T: +44 (0)239 220 5500
F: +44 (0)239 220 5555
www.fugroemu.com



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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Report number RP02742
ISBN 978-1-78354-339-7