

Yarmouth to Cowes MCZ Phase I and II Baseline Survey

of Intertidal Rock, Underboulder Communities and Peat and Clay Exposures

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Foreword

Natural England requested that a Phase I and Phase II habitat survey of the intertidal rock, underboulder communities and peat and clay exposure features was undertaken for the Yarmouth to Cowes Marine Conservation Zone (MCZ).

This survey was to provide baseline data of the features to help inform conservation advice package and provide a foundation for future monitoring, including condition assessments of specified attributes of these features of the MCZ.

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Executive summary

Background

Yarmouth to Cowes Marine Conservation Zone (MCZ) is an inshore site situated along the northwest coast of the Isle of Wight, from Yarmouth Pier in the west to the village of Gurnard in the east. The site was designated in May 2019, however as of summer 2022 no survey of the intertidal features of the site had yet been conducted.

In order to inform a Conservation Advice Package for the site, Natural England commissioned Seastar Survey Ltd. to undertake a Phase I and Phase II baseline survey of three of the features of the MCZ: intertidal rock habitats; intertidal underboulder communities; and peat and clay exposures. The primary aim of the survey was to map the extent and distribution of the three features of interest within the Yarmouth to Cowes MCZ and to characterise the habitats observed by providing semi-quantitative data on species composition of representative and notable biotopes.

Main findings

- A total of 15 Phase I transects were successfully surveyed in accordance with best practice guidance within the specified survey area over a single spring tide in September/October 2022;
- At each transect, all habitat types present within a 40 m wide 'belt' were recorded and assigned a biotope as per the latest iteration of the MNCR Marine Habitat Classification for Britain and Ireland;
- Following the Phase I surveys, Phase II quadrat surveys were undertaken within 13 habitats at 5 transects where habitats of interest (intertidal rock or intertidal underboulder communities) had been identified;
- Maps detailing the type, range and distribution of each identified biotope were created for each transect;
- Intertidal bedrock habitats were recorded at six transects and were generally low-lying, flat or gently sloping, low rugosity habitats, typical of sheltered, low energy environments;
- The underboulder communities biotope **LR.MLR.BF.Fser.Bo** was assigned to two habitats at two separate transects (T08 and T18);
- Additional underboulder communities were however also observed in habitats which did not otherwise fit the description of this biotope, either due to a lack of the primary characterising taxa or because the substrate was dominated by cobbles rather than boulders;
- Clay exposures were recorded at 11 transects and were most prevalent west of the entrance to Newtown Harbour;
- Where clay exposures were observed, these were frequently present either as clay banks backing the beach or underlying superficial soft sediments in the upper- to mid-shore, although areas of stiff but compressible blue clay (likely part of the Bouldnor geological formation) were also present.

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Introduction

Yarmouth to Cowes Marine Conservation Zone (MCZ) is an inshore site along the northwest coast of the Isle of Wight, from Yarmouth Pier in the west to the village of Gurnard in the east. The site was designated in May 2019, however as of summer 2022 no survey of the intertidal features of the site had yet been conducted.

In order to inform a Conservation Advice Package for the site, Natural England commissioned Seastar Survey Ltd. ('Seastar') to undertake a Phase I and Phase II baseline survey of three of the features of the MCZ: intertidal rock habitats; intertidal underboulder communities; and peat and clay exposures.

Objectives

The objectives for the survey were:

- To map the extent and distribution of the three features of interest (i.e. intertidal rock, intertidal underboulder communities and peat and clay exposures) and their associated communities within the Yarmouth to Cowes MCZ;
- To identify and map the extent and distribution of biotopes and biotope complexes associated with the three features of interest;
- To characterise the habitats observed by providing semi-quantitative data on species composition of representative and notable biotopes;
- To provide semi-quantitative data on the physical structure of the intertidal rocky substrate, including surface and structural complexity and stability;
- To record the presence and abundance of any non-indigenous species (NIS);
- To acquire high-quality biological data of suitable resolution to enable key attributes of condition for each of the three intertidal features of interest to be assessed according to Common Standards Monitoring (CSM) guidance;
- To identify anthropogenic influences impacting on the ability of the features of interest to achieve favourable condition;
- Ensure that the collected data are suitable for future use as baseline data to allow assessments of the direction of potential ecological change.

Methodology

Project plan

The survey approach focused on developing a cost-effective sampling strategy using Phase I and Phase II intertidal sampling techniques. In order to ensure analytical consistency within and between datasets, and to allow any spatial and temporal change in habitat condition to be detected, the collection and analysis of the data was completed in accordance with Common Standards Monitoring guidance (JNCC, 2004) and procedural guidelines outlined in the Marine Monitoring Handbook (Davies and others, 2001) and the CCW Handbook for Marine Intertidal Phase I Survey and Mapping (Wyn and others, 2006).

The survey was planned to take place on five days on and around (i.e. two days either side) the spring tide in the last week of September 2022. Prior to selecting sampling locations, aerial photography data were obtained from Channel Coast Observatory (CCO) via coastalmonitoring.org/. Datasets from seven different years between 2007 and 2020 were imported into ArcGIS and investigated to determine which would provide the most assistance given factors including contemporaneousness, data resolution and visible shore width (i.e. tidal state). The most useful dataset was found to be the most recent available (2020). In addition, open-source Ordnance Survey (OS) data were obtained from osdatahub.os.uk/downloads/open to aid survey planning.

Phase I transects were planned at intervals of approximately 750 m along the marine coast of the MCZ. The locations of some transects were however adjusted to avoid man-made structures (e.g. groynes, slipways) that were visible on the OS maps, or moved slightly in order to sample features of interest visible on the aerial photography, such as the areas of intertidal bedrock in the northeast of Thorness Bay (transects T04 and T05). The positions of the planned Phase I transects are given in Table 1 and Figure 1.

Table 1: Start of line (SOL) positions of the 19 planned Phase I transects for the 2022 Yarmouth to Cowes MCZ Phase I and Phase II intertidal surveys.

SOL WP Name	Position WGS84		Position OSGB36		Bearing (deg) to EOL
	Latitude	Longitude	Easting (m)	Northing (m)	
T01_SOL	50.762558	-1.323839	447785	96104	290
T02_SOL	50.757094	-1.330402	447327	95492	337
T03_SOL	50.754424	-1.338955	446727	95190	298
T04_SOL	50.749960	-1.345313	446282	94690	284
T05_SOL	50.743339	-1.347318	446147	93952	288

SOL WP Name	Position WGS84		Position OSGB36		Bearing (deg) to EOL
	Latitude	Longitude	Easting (m)	Northing (m)	
T06_SOL	50.738710	-1.354930	445615	93433	335
T07_SOL	50.737160	-1.365621	444862	93254	337
T08_SOL	50.734881	-1.375744	444150	92994	341
T09_SOL	50.732262	-1.385730	443447	92697	339
T10_SOL	50.729539	-1.395351	442771	92389	334
T11_SOL	50.726896	-1.405254	442074	92089	331
T12_SOL	50.726297	-1.423030	440820	92013	025
T13_SOL	50.724548	-1.432647	440143	91813	317
T14_SOL	50.721680	-1.442315	439463	91489	302
T15_SOL	50.717970	-1.451587	438811	91071	326
T16_SOL	50.713930	-1.460123	438212	90618	330
T17_SOL	50.709888	-1.468647	437614	90164	328
T18_SOL	50.708581	-1.477254	437007	90014	335
T19_SOL	50.706624	-1.490108	436101	89790	358

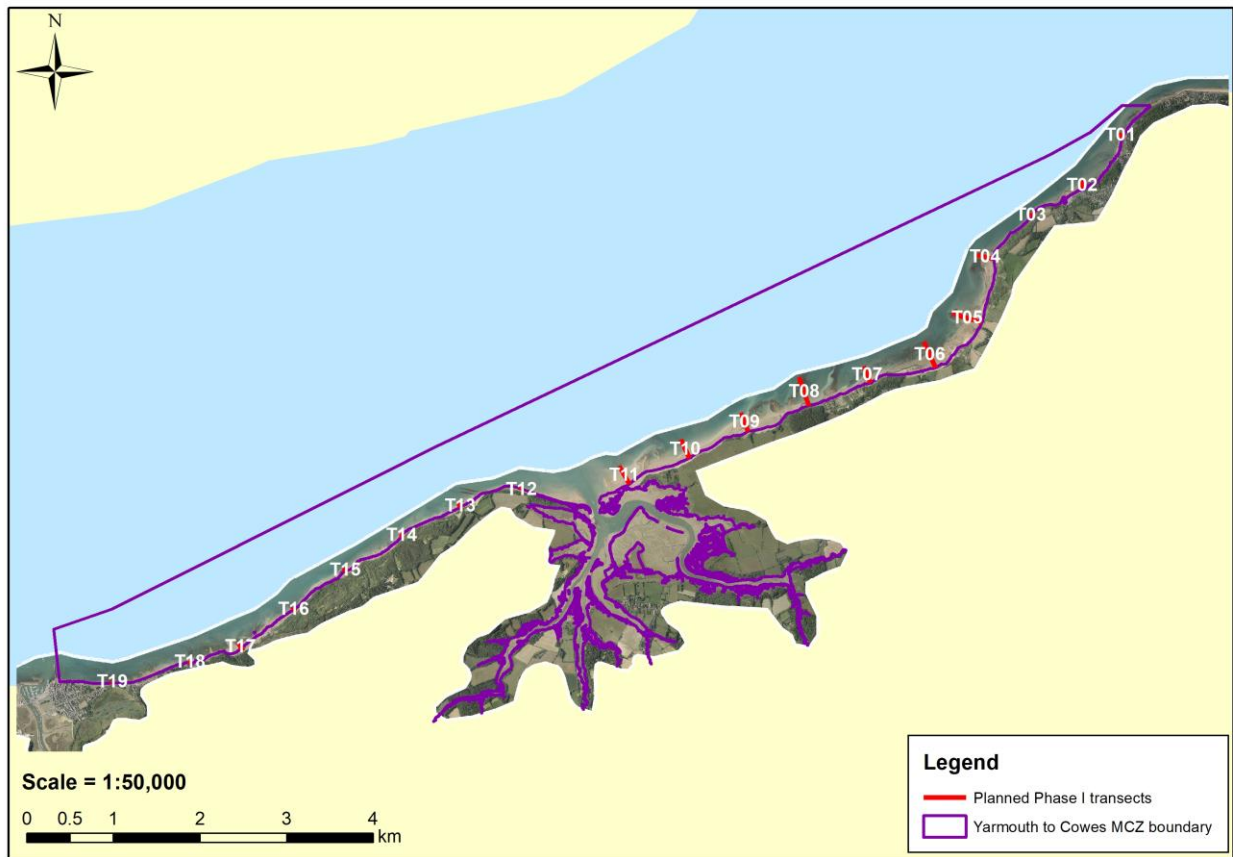


Figure 1: Locations of the planned Phase I intertidal transects surveyed as part of the 2022 Yarmouth to Cowes Phase I and Phase II intertidal surveys.

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Permissions

Prior to mobilisation, necessary permissions for access and survey were obtained. These included permission from National Trust, who own a large section of the foreshore either side of the entrance to Newtown Harbour. In addition, a SSSI (site of special scientific interest) consent was obtained from Natural England.

Several one-time permissions were obtained during the survey period from local landowners to park in locations that enabled relatively easy access to the foreshore via coastal paths and footpaths. Details of these are given in the section titled 'Access points' below.

Achieved survey

The survey was conducted from Monday 26th September 2022 to Saturday 1st October 2022. A total of 15 Phase I transects were successfully completed. Transect T10 was observed (though not at low water) during investigation of access points and was

determined to be primarily composed of soft sediment habitats. Similarly, examination of the aerial photography data indicated that transects T11 and T12 (located either side of the entrance to Newtown Harbour) were composed entirely of soft sediments (likely sands and muddy sands). As these transects were deemed to be of lower priority (as no features of interest were likely to be present) and due to time constraints, transects T10 – T12 were not surveyed. T19, which was located near Yarmouth in a highly anthropogenically-influenced area of coast, was also deemed to be of lower priority and was also not surveyed due to time constraints.

Several transects were moved from the original planned positions, either due to access constraints or in order to survey observed features of interest. A summary of the transects surveyed, including notes on whether and why these were moved, is provided in Table 2, with full details provided in Appendix I (Phase I) and Appendix II (Phase II). The locations of the achieved transects are shown in Figure 2.

Table 2: Summary of the transects surveyed as part of the 2022 Yarmouth to Cowes MCZ Phase I and Phase II intertidal survey.

Transect	Date	SOL Position (WGS84)		No. habitats	Phase II conducted?	Transect notes
		Latitude	Longitude			
T01	26/09/22	50.762583	-1.323900	2	N	Transect adjacent to submarine cable/pipe surrounded by rock armour and man-made sea defences composed of boulders.
T02	26/09/22	50.757213	-1.330031	5	N	Transect originally placed between 2 submarine cables/pipelines in an artificially sheltered area of beach; transect therefore moved ~30 m east to avoid this area.
T03	26/09/22	50.755354	-1.337280	3	N	Transect located on very rugged area of shore composed of cobbles and boulders with dense, slippery algal cover making traversing the area slow. Transect moved ~160 m east of original position because of this (zonation similar throughout area).
T04	27/09/22	50.749996	-1.345132	5	Y	Intertidal rock habitat present on transect.

Transect	Date	SOL Position (WGS84)		No. habitats	Phase II conducted?	Transect notes
		Latitude	Longitude			
T05	27/09/22	50.744944	-1.346698	9	Y	Transect moved ~180 m northeast in order to (i) sample a greater range of features of interest (intertidal rock, boulders and clay exposures) and (ii) avoid large sandflat and anthropogenic features.
T06	27/09/22	50.738515	-1.354769	3	N	Very large quantity of dead seagrass (washed in, not attached) present in low shore - 100% coverage of sediment by dead seagrass and unattached macroalgae.
T07	26/09/22	50.737160	-1.365494	3	N	Bedrock and potential underboulder communities present. Small patch of exposed clay present within 20 m of transect.
T08	29/09/22	50.734760	-1.376049	5	Y	Transect moved ~20 m west to avoid large fallen trees at strandline. Intertidal rock and underboulder communities present.
T09	29/09/22	50.732276	-1.385367	10	Y	Transect moved 24 m east in order to sample features of interest (intertidal rock and boulder habitat).
T13	28/09/22	50.724231	-1.433724	4	N	Transect moved in order to sample 'stepped' bedrock apparently composed of very hard blue clay (in places broken into small easily compressible clay pebbles). Very little biota present.
T14	28/09/22	50.721964	-1.442020	4	N	Transect moved ~35 m in order to avoid large fallen trees at strandline.

Transect	Date	SOL Position (WGS84)		No. habitats	Phase II conducted?	Transect notes
		Latitude	Longitude			
T15	28/09/22	50.719270	-1.448810	4	N	Transect moved ~200 m northeast due to (i) difficulty traversing beach (soft clay present) and (ii) in order to investigate possible underboulder communities habitat.
T16	28/09/22	50.713963	-1.460263	2	N	Soft sediment habitats only.
T17	28/09/22	50.709544	-1.469999	2	N	Transect moved ~40 m southwest due to presence of fallen trees, close to a gravel 'causeway.' Soft sediment habitats only. Very soft mud/clay present so gravel 'causeway' used to measure habitat width and view biota.
T18	28/09/22	50.707686	-1.482472	4	Y	Transect moved to approx. halfway between T18 and T19 due to access constraints. Very anthropogenically-influenced area of coast - breakwater, series of groynes etc. Probable underboulder communities present.

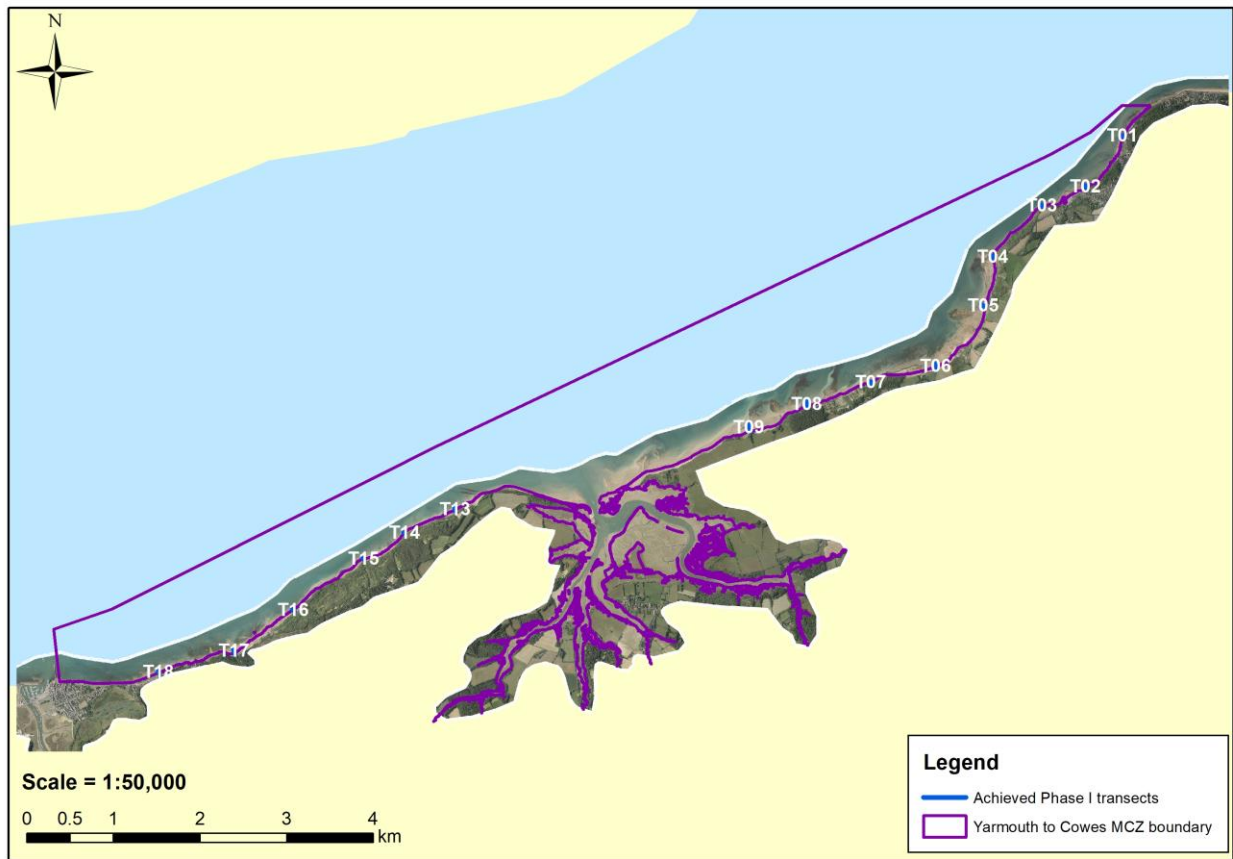


Figure 2: Locations of the achieved Phase I intertidal transects surveyed as part of the 2022 Yarmouth to Cowes Phase I and Phase II intertidal surveys.

Access points

Several points of potential access were identified prior to survey mobilisation, however additional investigation of access points was conducted during downtime (i.e. during periods of high water) on 26th and 27th September. In several cases, reasonable access was only secured upon seeking permission from landowners to park at various locations, before taking footpaths and/or the Isle of Wight coastal path to the foreshore. A summary of access points for each planned transect is provided in Table 3.

Table 3: A summary of the access points used to access each transect surveyed as part of the 2022 Yarmouth to Cowes MCZ Phase I and Phase II intertidal survey.

Transect	Transect surveyed?	SOL Latitude	SOL Longitude	Bearing	Access
T01	Y	50.762583	-1.323900	300	Park on esplanade at Gurnard; take steps to beach.

Transect	Transect surveyed?	SOL Latitude	SOL Longitude	Bearing	Access
T02	Y	50.757213	-1.330031	327	Via a path signposted 'to shore' on Marsh Road near the Little Gloster restaurant (now closed). On road parking available.
T03	Y	50.755354	-1.337280		Access to beach from IoW coastal path on Rew Street along from the Little Gloster restaurant. Take a right down some steep steps to the beach.
T04	Y	50.749996	-1.345132	283	Access Thorness Bay via path from Thorness Bay holiday park and walk east along beach.
T05	Y	50.744944	-1.346698	282	As T04.
T06	Y	50.738515	-1.354769	336	As T04.
T07	Y	50.737160	-1.365494	320	Access Thorness Bay via path from Thorness Bay holiday park and walk west along beach. NB. Some areas of soft clay present in mid shore - mapped using GPS track function.
T08	Y	50.734760	-1.376049	343	Park at Elmsworth Farm (with permission only) and take IoW coastal path to beach. NB. The owner of Elmsworth Farm indicated that if you turn left (west) upon reaching the beach that the ground underfoot is generally stable and safe, however if you turn right (east) the sediment is highly mobile and susceptible to change, and may be very soft and therefore dangerous. While sediments were generally firm during the survey, future surveys should take note.
T09	Y	50.732276	-1.385367	342	As T08.
T10	N	-	-	-	T10 observed as part of access point investigation and was found to be composed of soft sediments (primarily sand). Not surveyed due to time constraints.

Transect	Transect surveyed?	SOL Latitude	SOL Longitude	Bearing	Access
T11	N	-	-	-	Aerial photography indicates that this transect is entirely composed of soft sediments (sands and muddy sands) so not surveyed due to time constraints.
T12	N	-	-	-	Aerial photography indicates that this transect is entirely composed of soft sediments (sands and muddy sands) so not surveyed due to time constraints.
T13	Y	50.724231	-1.433724	358	Park at Hampstead Farm (with permission only) and take the footpath to the beach. Egress from beach can also be found via a concrete slipway that leads onto the loW coastal path.
T14	Y	50.721964	-1.442020	328	As T13.
T15	Y	50.719270	-1.448810	340	As T13.
T16	Y	50.713963	-1.460263	297	Park at house at the corner of Marine Drive and The Avenue (with permission only). Take loW coastal path to beach. NB. Beach composed of soft clay - proceed with caution.
T17	Y	50.709544	-1.469999	328	As T16.
T18	Y	50.707686	-1.482472	330	Park at Bouldner View carpark and take steps/path down to the breakwater. Take the slipway to the beach.
T19	N	-	-	-	Transect T18 moved to approx. halfway between T18 and T19 due to access constraints. Very anthropogenically-influenced area of coast so not sampled.

Tide times

The tide times for Cowes for the period of survey are given in Table 4. It was found that survey could be conducted reliably approximately 1.5 hours before and after low water, although in some cases the upper shore could be surveyed up to approximately 2 hours before and after low water. While transiting to and from transects could generally be achieved safely in darkness (with the use of torches), survey could only be conducted in

daylight (generally up to 15 mins before sunrise or after sunset). For this reason the workable window around low water on certain days was restricted or negligible (as was the case on the mornings of 26th and 27th Sept and the evening of 30th Sept). For this reason the survey timings were adjusted so that the survey was conducted over a total of six days rather than on five days as originally planned.

Table 4: Tide times and times of sunrise and sunset for the period in which the Yarmouth to Cowes MCZ Phase I and Phase II surveys were conducted. Tide times given are for Cowes; tide times for Yarmouth were approximately 15 min earlier. All times are in local time (BST).

Date	Sunrise	Sunset	Low Water AM	LW AM Height (m)	High Water 1	HW1 Height (m)	High Water 2	HW2 Height (m)	Low Water PM	LW PM Height (m)
Mon 26 th Sept 2022	06:56	18:56	05:30	0.84	12:11	4.35	13:35	4.23	17:48	0.91
Tue 27 th Sept 2022	06:57	18:54	06:04	0.73	12:41	4.39	14:08	4.23	18:22	0.83
Wed 28 th Sept 2022	06:59	18:52	06:38	0.71	13:15	4.42	14:46	4.24	18:56	0.82
Thu 29 th Sept 2022	07:00	18:50	07:13	0.79	13:31	4.37	16:11	4.18	19:30	0.90
Fri 30 th Sept 2022	07:02	18:47	07:47	0.94	14:12	4.32	16:47	4.12	20:07	1.05
Sat 1 st Oct 2022	07:05	18:44	08:26	1.18	14:50	4.16	17:25	4.02	20:50	1.28

Phase I survey methods

The aim of the Phase I survey was to determine the range, distribution and extent of the three relevant features of interest (i.e. intertidal rock, underboulder communities and peat and clay exposures) by assigning biotopes *in situ* on vertical (i.e. running from high to low shore) transects, in accordance with best practice guidance.

The start of line (SOL) position for each planned Phase I transect was input into a Garmin GPSMAP® 276Cx portable chartplotter prior to the survey. Once a SOL location was identified in the field, the broad intertidal habitat types in the general vicinity were visually assessed in order to determine the presence of any of the three features of interest. If no features of interest were present on the transect, but were present nearby, the transect was moved in order to sample the features of interest. Additionally, if there were constraints to access, the start of line was also moved. In each case a new SOL position and transect bearing was recorded alongside notes regarding the distance the transect was moved and the rationale for doing so.

At each transect, all habitat types present were recorded and assigned a biotope as per the latest iteration of the MNCR Marine Habitat Classification for Britain and Ireland (JNCC, 2022), incorporating information regarding species composition and abundance, position on shore, exposure of the shore and substrate type. The vertical width of each habitat was recorded, and GPS positions were taken using the GPSMAP® portable chartplotter (which used both GPS and GLONASS sensors for improved positional accuracy) at each habitat boundary on the central transect line. For each habitat, a centre-point GPS position was also recorded and photographs were taken (up-shore, down-shore, and along-shore in both directions) at this position in order to document the zonation patterns present.

For each identified habitat, a detailed habitat description was recorded using modified MNCR field forms, including information regarding shore position, substrate type and percentage cover, rock type, surface relief, texture and stability, modifiers such as scour, silt and macroalgal mats, and any anthropogenic influences present. In addition, for each identified habitat a list of the dominant/conspicuous biota present was produced with taxa enumerated using the semi-quantitative SACFOR scale. Any additional relevant metadata, including time, state of tide etc., were also recorded.

Due to time constraints, multiple transects were surveyed during each low water window. This meant that most transects were not surveyed at low water, but rather up to 1.5 hours before or after. As a result, it was not possible to survey down to the low water mark at all transects. However, at each transect all visible habitats, i.e. those not submerged at the time of survey, were fully assessed, and an end of line (EOL) position for each transect was recorded in order to aid the creation of habitat maps.

Once the central transect had been mapped and all field forms completed, a field sketch was created using the wireframe maps in order to map the major biotopes 20 m either side of the central transect. In accordance with guidelines for assignment of biotopes (JNCC, 2022), only habitats measuring greater than 25 m² were mapped, however the presence of smaller habitat features was recorded as part of the habitat description. In addition, the central position of any sub-25 m² target features of interest (i.e. intertidal rock, intertidal underboulder communities and peat and clay exposures) were recorded in the field, however this was not done for areas smaller than approximately 3 m² due to the limitations of GPS accuracy, which was generally ±3 m throughout the survey.

The presence of any Annex I habitats and associated sub-features, including reef sub-features, was recorded for each transect. Reef features were determined using criteria outlined in Irving (2009), with a minimum of 10 % hard substrate (i.e. bedrock, boulders or cobbles) required for assignment of Annex I habitat. As no infaunal samples were taken, the assessment of 'reefiness' (see Table 5) for cobble and boulder reef was based on three criteria only: composition (i.e., percentage coverage of hard substrate), elevation and extent.

Table 5: The main characterising features of a stony reef, after Irving (2009).

Characteristic	Not a reef	Resemblance to being a stony reef		
		Low	Medium	High
Composition	< 10 %	10 - 40 %	40 - 95 %	> 95 %
Elevation	Flat seabed	< 64 mm	64 mm - 5 m	> 5 m
Extent	< 25 m ²	> 25 m ²	> 25 m ²	> 25 m ²
Biota	Dominated by infaunal species	N/A	N/A	> 80 % of species epifauna

Phase II survey methods

The aim of the Phase II survey was to provide data on the species composition (i.e. community structure) of component communities within the features of interest. Due to time constraints, only habitats where features of interest were present were sampled.

Phase II transects were run 'horizontally' (i.e. along-shore), centred on the Phase I transects. In order to avoid transition zones, transects were placed in the middle of the habitat being targeted wherever possible. Along each 20 m transect, 3 x 0.25 m² quadrats were placed using a random approach. A random number generator was used to generate three numbers between -10 and 10, and the quadrats placed this number of metres from the centre point, with negative numbers indicating the left side of the transect (if facing the sea) and positive numbers the right. For ease, the distance was generally paced out rather than measured.

Each quadrat was assigned a unique sample number and photographed prior to further assessment. The GPS position of each quadrat was recorded together with the time and all other relevant metadata (distance from centre line, state of tide, weather etc.).

For each quadrat, a detailed habitat description was recorded using modified MNCR field forms, including information regarding shore position, substrate characteristics and modifiers. In addition, for each quadrat a list of all biota present was produced with taxa enumerated using percentage cover (for encrusting or turf species) or counts (for individuals). Where potential underboulder communities were identified (i.e. where cobbles and boulders were present within the quadrat), additional assessment was undertaken. Cobbles and boulders were lifted and/or turned and the undersides photographed. A modified MNCR field form was used to record boulder characteristics (boulder shape, presence of pitting or crevices etc.) and a list of all taxa present on the underside was produced, with taxa enumerated using the semi-quantitative SACFOR scale. Following identification of biota the boulders were replaced in their original position and orientation in order to minimise any potential damage to the community present.

Where species could not be identified in the field, photographs were taken and identification carried out at a later date. All taxa were recorded with reference to the World Register of Marine Species (WoRMS Editorial Board, 2022) to avoid problems in species nomenclature.

Opportunistic survey methods

When transiting on foot to, from and between transects, any anthropogenic influences, such as freshwater outflows and litter or other anthropogenic materials, and NIS were recorded and documented. In each instance, the position was recorded from the GPS and a photo was taken. Where anthropogenic influences were clearly impacting the surrounding environment, details of this were recorded. Where NIS were encountered, abundance was recorded using the semi-quantitative SACFOR scale.

Habitat features of interest were also noted and recorded where possible (i.e. where time and light levels allowed) either using the track function in the GPS or onto the wireframe maps.

GIS mapping

Data obtained during the Phase I and Phase II surveys were imported into ArcGIS. These included all GPS trackplots and relevant point data from both Phase I (e.g. positions of boundary changes) and Phase II (quadrat data). The data were overlaid on available aerial photography obtained from CCO via coastalmonitoring.org/. Utilising these data together with the wireframe map field sketches created during the Phase I surveys, polygons were created within the GIS in order to map the location of the different biotopes identified at each transect.

Polygons were only created for habitats which were estimated in the field to be greater than 25 m², as per JNCC guidelines for assignment of biotopes (JNCC, 2022). Where sub-25 m² features of interest (i.e. intertidal rock, intertidal underboulder communities and peat and clay exposures) were identified in the field (and where positions were taken), data were included in the habitat maps as points.

All GIS outputs were generated using ArcGIS v10.2 and were produced in accordance with MEDIN standards using the MESH data exchange format (DEF).

Results

Transect and biotope descriptions

The logs and results of the Phase I and Phase II surveys are provided in Appendices I - IV. A glossary of the MNCR biotope codes mentioned in this report is provided in Appendix V. Appendices have been appended separate to this document.

Each of the habitat maps presented in this section shows the position of the central transect line based on the SOL and EOL positions recorded in the field and the biotopes present up to 20 m either side of this transect line. Please note that as most transects were not surveyed at low water, the transect lines do not necessarily run to the low water mark. Furthermore, due to the accuracy of the field GPS (generally ± 3 m) the transect lines may not exactly match the upper/lower boundaries of the biotopes recorded.

T01

Transect T01 was located at Gurnard esplanade in the easternmost part of the Yarmouth to Cowes MCZ. The beach was relatively narrow at this location (~20 m) and was not accessible until approximately 1.5 hours before low water. Prior to this, approximately 2 hours prior to low water, the sea was overtopping the seawall, likely due in part to the strong onshore breeze as well as the proximity to the spring tide. The shore at this site, both on the transect and in the surrounding area, was heavily anthropogenically influenced. The beach was backed by a ~1.5 m seawall, and a series of sea defences in the form of boulder groynes were present along the beach in both directions. In addition, a cable/pipeline was present adjacent to the central transect. In the low shore, boulders, presumably placed as protection, lay atop this cable/pipeline.

The beach along the transect was primarily composed of barren sandy gravel and pebbles (H(abitat)01: **LS.LCS.Sh.BarSh**; 'Barren littoral shingle'). Overlying the coarse sediment were sparse, scattered cobbles and small boulders. The majority of these were devoid of biota, however the green seaweed *Ulva intestinalis* was present on some of the larger boulders. The artificial substrate of the groyne/cable protection was characterised by a mixture of the wracks *Fucus vesiculosus* and *Ascophyllum nodosum*, with lower quantities of *U. intestinalis* and *F. serratus* also present (H02: **LR.LLR.F.Fves.X**; '*Fucus vesiculosus* on mid eulittoral mixed substrata'). The centre of the groyne was more barren, though small patches of the barnacle *Semibalanus balanoides* were present together with the limpet *Patella vulgata*, which was recorded as common.

The distribution of biotopes at this transect is shown in Figure 3.



Figure 3: Distribution of MNCR biotopes identified at Transect 01, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T02

Transect T02 was located in the south of Gurnard Bay, east of Stone Point. The beach here was heavily anthropogenically influenced, with a series of cables/pipelines running across the intertidal into the subtidal, some of which were covered with semi-flexible rock armour. The beach was also backed by a seawall composed of stone-filled gabions and concrete.

The top 10 m of the shore at this transect was composed of barren sand and gravel (H01: **LS.LCS.Sh.BarSh**). Below this was a 4 m band of coarse sediment (sand and gravel), pebbles and occasional cobbles with abundant *U. intestinalis* and occasional *Fucus* spp. (H02: **LR.FLR.Eph.EphX**; 'Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata'). Below this, the shore was dominated by boulders overlying coarse sediment. The upper 10 m of these boulders were characterised by a mosaic of *A. nodosum* and *F. serratus* (both abundant) with rare *F. vesiculosus*. Due to the patchy nature of the wracks present, no single biotope was found to adequately describe the community. This habitat (H03) was therefore recorded as a mosaic of **LR.LLR.F.Asc.X** ('*Ascophyllum nodosum* on full salinity mid eulittoral mixed substrata') and **LR.LLR.F.Fserr.X** ('*Fucus serratus* on full salinity lower eulittoral mixed substrata'). Below this zone the boulders were relatively bare, though the sand binder *Rhodothamniella floridula* was recorded as common (H04: **LR.MLR.BF.Rho**;

'*Rhodothamniella floridula* on sand-scoured lower eulittoral rock'). The rocks in this area were heavily pitted and several patches of dead barnacles were present. This, combined with the abundance of *P. vulgata*, likely indicates that this habitat had recently transitioned from a barnacle-dominated community (e.g. **LR.HLR.MusB.Sem**) to an algal dominated one.

In the low shore, the boulders were dominated by superabundant *F. serratus* (H05: **LR.LLR.F.Fserr.X**). Other seaweeds, including *Ulva* spp., *R. floridula* and *Osmundea pinnatifida*, were also present in this zone, although in very low abundances (rare to occasional).

While the *F. serratus* dominated boulders reached the water on the central transect line, to the west (towards the cables) the habitat was significantly different, being composed of sand with occasional cobbles. High quantities of phytodetritus (mostly seaweeds but also some dead seagrass) were present overlying the sand.

In addition to the cables and associated rock armour, several examples of litter were present at this transect, particularly in the upper shore. These included metal cans, plastic packets and cigarette butts.

The distribution of biotopes at this transect is shown in Figure 4.

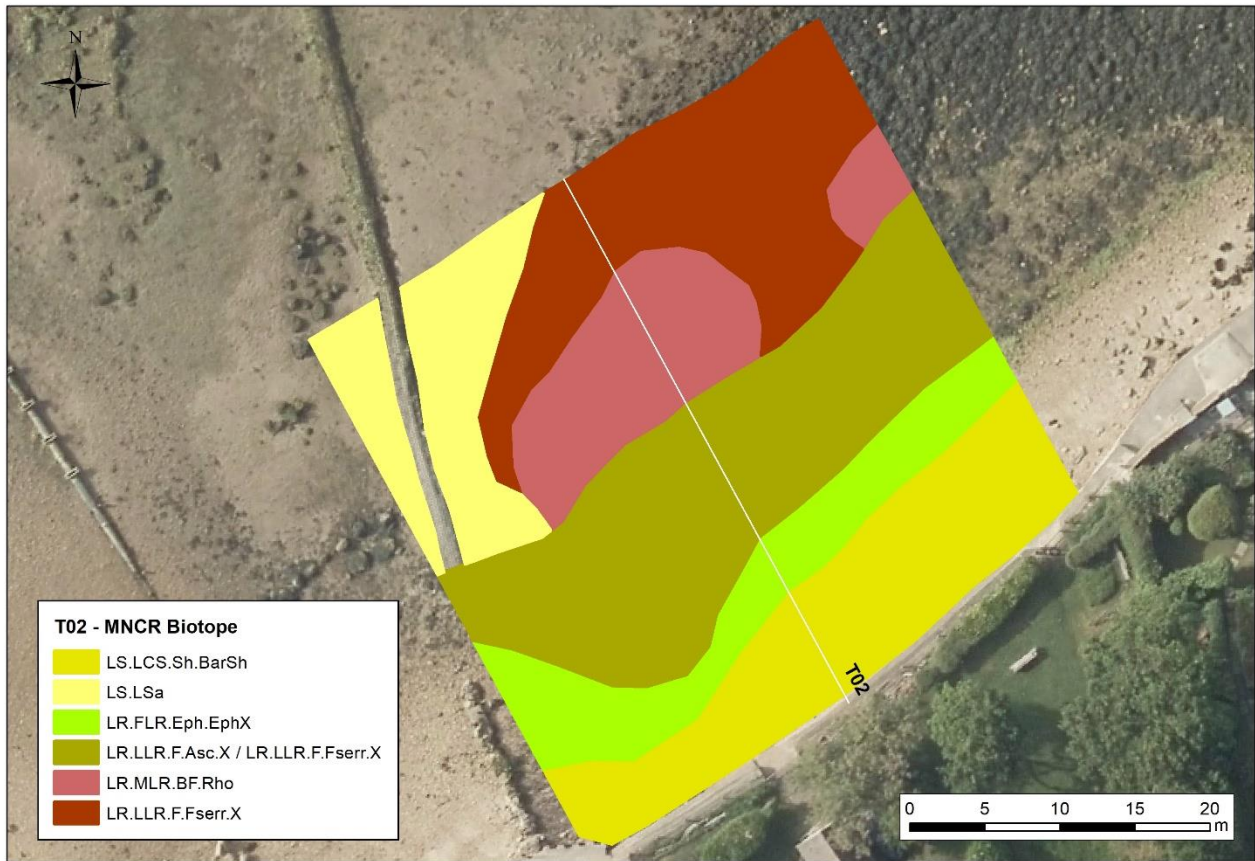


Figure 4: Distribution of MNCr biotopes identified at Transect 02, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T03

Transect T03 was located at Stone Point. The shore at this location was backed by a high bank colonised by terrestrial grasses down to the strandline. The upper and mid shore regions were composed of cobbles and boulders, while soft sediments were present in the low shore.

In the top 6 m of the beach, the cobbles and boulders were relatively bare, with only small patches of the black lichen *Verrucaria maura* present (H01: **LR.FLR.Lic.Ver**; ‘*Verrucaria maura* on littoral fringe rock’). Underlying the boulders were clay exposures. For the most part these exposures were present as small patches, however to the west of the central transect line a larger area (approximately 15 m long by 4 m wide) was also observed.

Below the first habitat, the cobbles and boulders were characterised by a mosaic of *F. serratus* (superabundant) and *A. nodosum* (common) with occasional *F. vesiculosus*. No single biotope was found to adequately describe the observed community; due to the patchy nature of the wracks present, this habitat (H02) was therefore recorded as a mosaic of **LR.LLR.F.Fserr.X** and **LR.LLR.F.Asc.X**. This zone extended through the mid shore for approximately 12 m. In the low shore, the boulders gave way to a mixture of

sand and gravel with sparse/scattered cobbles and boulders which were embedded in the sediment. While the sediment was fairly barren (**LS.LCS.Sh**) the cobbles and boulders were colonised by a variety of filamentous red seaweeds as well as frequent *F. serratus* (H03: **LR.LLR.F.Fserr.X**).

Several examples of litter were present at this transect, particularly in the upper shore. Examples included a wooden pallet, broken glass bottles, unidentifiable rusted metal items, bricks and concrete masonry units.

The distribution of biotopes at this transect is shown in Figure 5.



Figure 5: Distribution of MNCR biotopes identified at Transect 03, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T04

Transect T04 was located at Gurnard Head, northeast of Thorness Bay. The shore at this location comprised a bedrock platform backed by coarse sediment in the upper shore. The beach was backed by a vegetated clay slope, which, at the transect location, appeared to be in a state of erosion.

The top of the beach was composed of a 13 m wide band of barren gravelly sand (H01: **LS.LSa.MoSa.BarSa**; 'Barren littoral coarse sand'). A slightly narrower (8 m) band of

coarser gravel was present below H01 (H02: **LS.LCS.Sh.BarSh**), however this habitat appeared to be restricted to approximately 5 m either side of the transect line, and was not present further along the shore. Below H02, bedrock was present throughout the mid shore region, overlain with a patchy veneer composed variously of clay, sand and gravel. Distinct bands, characterised by different algal taxa, were readily visible on the bedrock. The upper 18 m of bedrock was covered in dense (superabundant) *U. intestinalis* (H03: **LR.FLR.Eph.Ulv**; '*Ulva* spp. on freshwater-influenced and/or unstable upper eulittoral rock') with sparse filamentous red algae also present. Below this zone, *F. vesiculosus* became the dominant species, although *U. intestinalis* was still present on the rock below the clumps of *F. vesiculosus* (H04: **LR.LLR.F.Fves.FS**; '*Fucus vesiculosus* on full salinity moderately exposed to sheltered mid eulittoral rock'). Notably, despite the presence of bedrock, no faunal taxa were recorded in this habitat, likely due to the veneer of silt present throughout this zone. In the low shore, however, this veneer was much reduced, and faunal taxa such as *P. vulgata*, *Littorina* spp., *Steromphala* spp. and the anemone *Actinia equina* were present on the rock beneath the dense algal canopy. The biota in this zone was, however, dominated by superabundant *F. serratus*, with low quantities of other algal taxa including *R. floridula*, *O. pinnatifida*, *A. nodosum* and *Ulva* spp. also present (H05: **LR.LLR.F.Fserr.FS**; '*Fucus serratus* on full salinity sheltered lower eulittoral rock').

The lower boundary of H05 was marked by a 0.5 m 'step' down onto coarse sediment, which could not be assessed fully as the area remained mostly underwater throughout the duration of the survey. The biota on the edge of the bedrock platform was broadly similar to the taxa present in H05, however there were patches of relatively bare rock present on the upper faces of the platform edge. Biota in these patches was sparse, with only small patches of *S. balanoides* (rare) and *P. vulgata* (common) present. While these patches were visually distinct, they were less than 1 m wide and did not form a distinct band along the shore. A separate biotope was therefore not assigned.

Some examples of litter were found close to the start of T04. Most notably these included a large amount of thick rope, likely an anchor rope or mooring line from a large vessel.

The distribution of biotopes at this transect is shown in Figure 6.

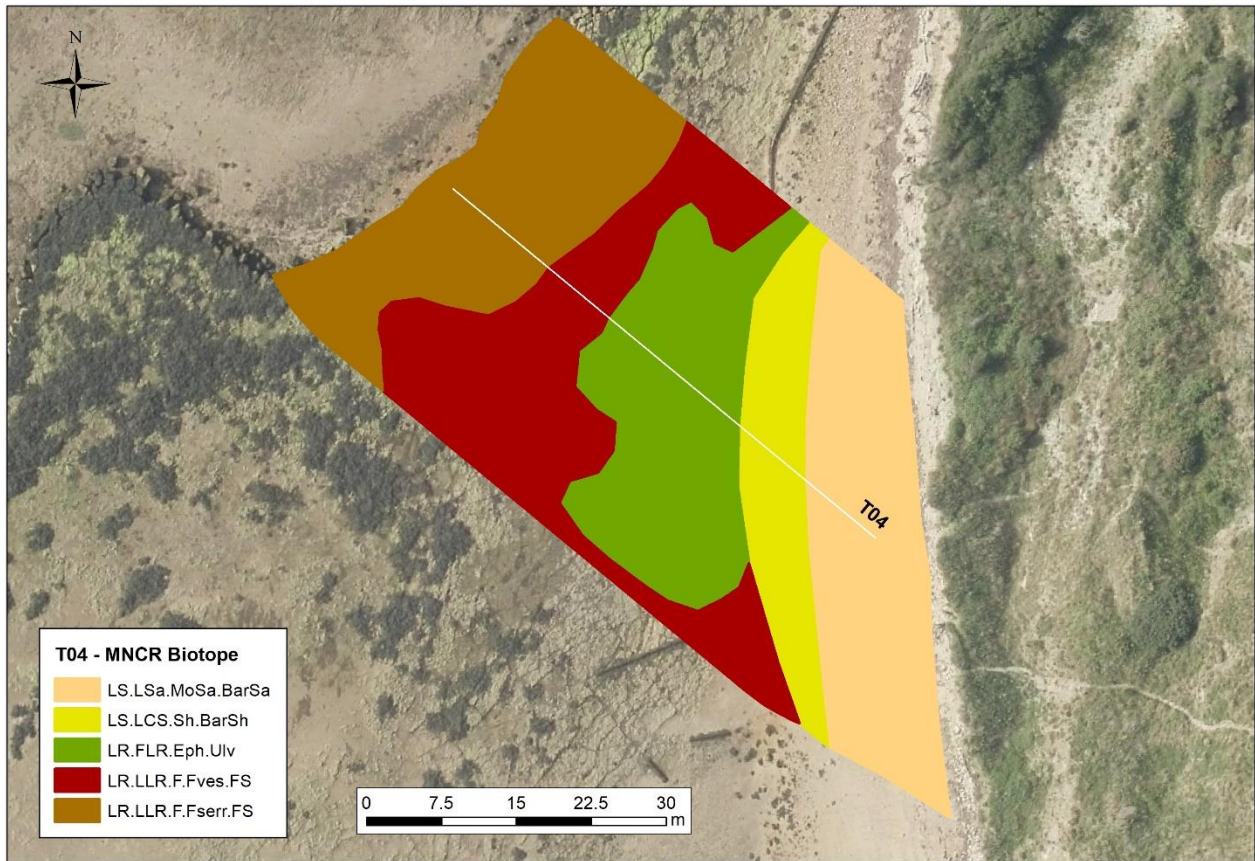


Figure 6: Distribution of MNCR biotopes identified at Transect 04, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T05

Transect T05, located in the north of Thorness Bay, was composed of a mixture of bedrock, cobble and soft sediment habitats. The beach at this location was backed by a vegetated bank, the foot of which was composed of exposed clay. Clay exposures were also visible throughout the strandline, with superficial sand, gravel and occasional cobbles present (H01: **LS.LSa.St**; 'Strandline'). This was followed by a 4 m wide band of slightly gravelly mobile sand, with no biota or lebensspuren observed (H02: **LS.LSa.MoSa.BarSa**).

Below this, the substrate consisted of superficial but dense cobbles overlying gravelly sand. A variety of seaweeds were present on the cobbles, including *A. nodosum* (common), *U. intestinalis* (occasional) and *Blidingia* sp. (frequent), however *F. vesiculosus* (abundant) was the most dominant species (H03: **LR.LLR.F.Fves.X**). Patches of exposed clay were present throughout this zone; in addition, an area of exposed barren stiff clay was also present just to the south of the central transect. A 3 m wide band of barren gravel and pebbles was present below the cobbles and clay (H04: **LS.LCS.Sh.BarSh**). Seaward of this was a wide (29 m) expanse of rippled sand with worm casts frequently observed (H05: **LS.LSa.FiSa.Po**; 'Polychaetes in littoral fine sand'). Some scattered

cobbles were present overlying the sand; where these were present *F. vesiculosus* and *Littorina littorea* were recorded.

At the lower boundary of the sandflat, a relatively narrow (8 m) band of exposed bedrock was present. The bedrock was heavily sand-influenced, with a veneer of muddy sand present throughout. The biota within this zone was dominated by the sand binder *R. floridula* (superabundant) together with common *O. pinnatifida* and sparse *Chondrus crispus* (H06: **LR.MLR.BF.Rho**). The common periwinkle *L. littorea* was observed in very high numbers in this zone (up to several hundred per m²), and the sponge *Hymeniacidon perlevis* was observed in small crevices and fissures in the rock.

Below the bedrock, a narrow (4.5 m) band of rippled sand was present, with small (<5 m²) patches of exposed clay visible (H07: **LS.LSa**; 'Littoral sand'). This was followed by a second band of bedrock, however in contrast to H06, the rock was heavily pitted with high numbers of small boreholes, a very few dead piddocks (i.e. shells) were observed within some of the boreholes, but no live individuals were present. While a large quantity of phytodetritus was present in this zone, attached taxa were very sparse. Algal taxa present included *R. floridula*, *C. crispus*, *F. serratus*, *Cladostephus spongiosus* and *Ulva* spp. (all rare), while the only fauna observed were the gastropods *Steromphala cineraria* and *L. littorea*. A single *Crepidula fornicata* (a NIS) was also present in this zone, attached to a pebble. Due to the lack of biota, it was not possible to assign a biotope to this habitat; instead the habitat complex **IR.MIR** ('Moderate energy infralittoral rock') was recorded. Below the area of bored bedrock, down to the water line, the substrate was composed of soft, fine sand with no obvious biota present (H09: **LS.LSa.FiSa**; 'Polychaete/amphipod dominated fine sand shores').

Several anthropogenic impacts were observed en route to T05. These included: a runoff pipeline in the bank backing the intertidal zone; a series of concrete and metal posts (the remnants of an unidentified structure); several sections of an apparently discarded, partially buried pipeline laying horizontally along the beach (both ends of each section were visible and open); and some large pieces of construction material including part of a wall, with no obvious source. In addition, several submarine cables were observed on and adjacent to the original (planned) T05 transect; a small boat was also moored on the beach at this location.

The distribution of biotopes at this transect is shown in Figure 7.

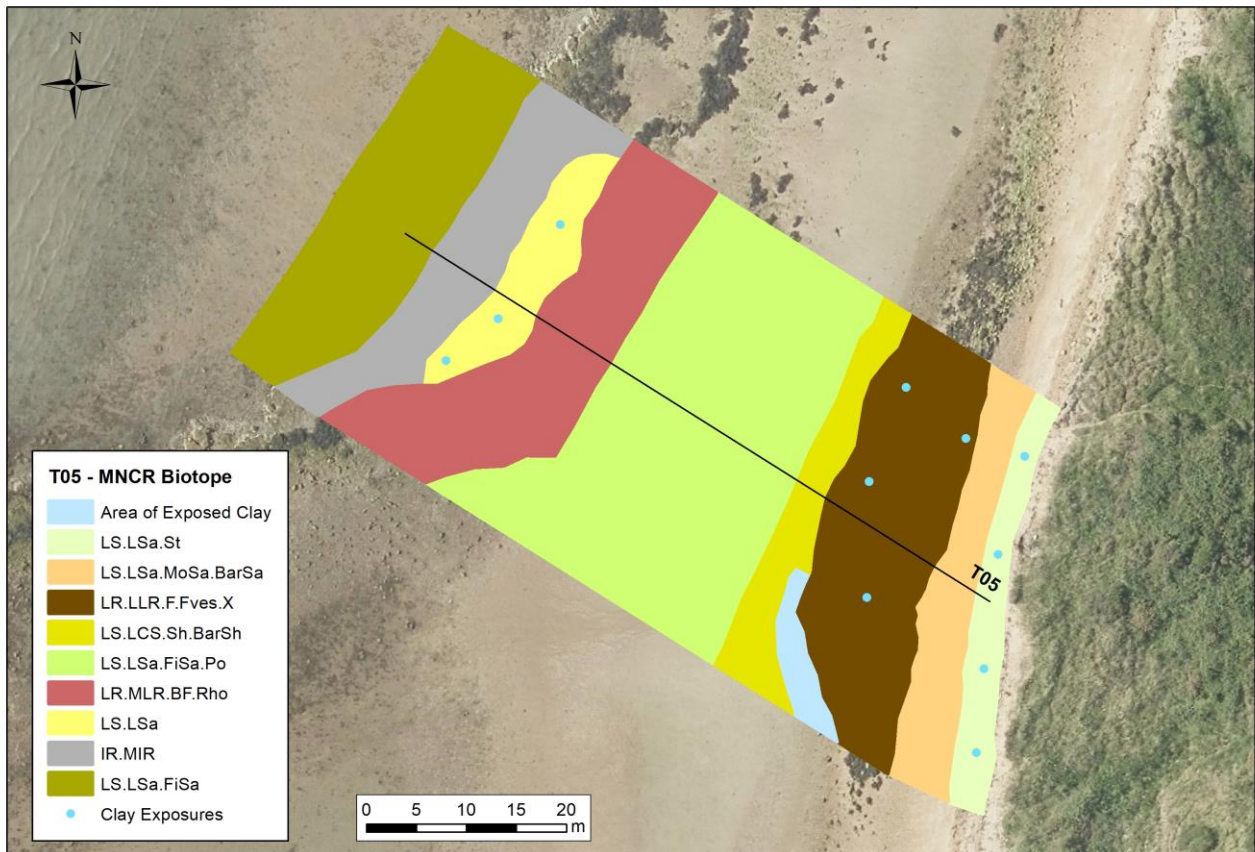


Figure 7: Distribution of MNCR biotopes identified at Transect 05, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T06

Transect T06 was located within Thorness Bay. The beach at this transect comprised a wide flat composed of a variety of soft sediment habitats.

The upper 4 m of the beach comprised a band of mobile fine sand, with no biota or lebensspuren recorded (H01: **LS.LSa.MoSa.BarSa**). The majority of the intertidal area, however, was composed of a wide (~68 m) expanse of pebbles (H02: **LS.LCS.Sh.BarSh**). Very little biota was observed in this zone, but where larger pebbles/small cobbles were present, sparse *S. balanoides* (rare) and scattered *L. littorea* (also rare) were recorded. The lower section of the shore was almost completely (>95 %) covered by a thick layer of phytodetritus, primarily composed of dead (black) seagrass leaves. Beneath the layer of seagrass, the sediment was composed of gravelly mud (H03: **LS.LMx**; 'Littoral mixed sediment').

The distribution of biotopes at this transect is shown in Figure 8.

Figure 8: Distribution of MNCR biotopes identified at Transect 06, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.



T07

Transect T07 was located to the southwest of Thorness Bay. During transit from Thorness Bay Holiday Park to T07, it was noted that large parts of the mid shore region were composed of a mixture of soft mud and exposures of fairly stiff but compressible blue clay. In addition, at the transect location the beach was backed by 6 m clay banks which appeared to be in a state of erosion. Species diversity was very low at T07, with only two taxa recorded.

The beach at T07 was composed of a mixture of coarse sediments and bedrock platform. The upper 8 m of the transect comprised barren, slightly gravelly shelly sand and pebbles (H01: **LS.LSa.MoSa.BarSa**). Below this was a narrow (3 m) band of exposed bedrock 'steps.' The upper 'step' was relatively bare, with only sparse *U. intestinalis* present, however the lower level featured frequent *F. vesiculosus* and relatively dense *U. intestinalis*. Separating the two steps was a band of pebbles and coarse gravel with very little biota present. While the *U. intestinalis* may have been indicative of the biotope **LR.FLR.Eph.Ulv**, the presence and overall dominance of *F. vesiculosus* meant that the biotope **LR.LLR.F.Fves.FS** was assigned to this habitat. The lower 13 m of the beach was composed of pebbles and cobbles, with *F. vesiculosus* and *U. intestinalis* both recorded as common (H03: **LR.LLR.F.Fves.X**).

The distribution of biotopes at this transect is shown in Figure 9.



Figure 9: Distribution of MNCR biotopes identified at Transect 07, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T08

Transect T08 was located close to Burnt Wood. The shore at this location was composed of a mixture of soft sediments and bedrock platform. The beach was backed by a densely vegetated bank fronted by a low (<0.5 m) clay outcrop. The presence of fallen trees and exposed roots in and below the clay indicated that the bank was in a state of erosion.

The upper 9.5 m of the beach was composed of barren gravelly sand and pebbles (H01: **LS.LSa.MoSa.BarSa**). At the lower boundary of this zone, the proportion of pebbles increased significantly; below this was a 4 m band of dense (abundant) *U. intestinalis* on pebbles and scattered cobbles overlying sand (H02: **LR.FLR.Eph.Ulv**). Below this zone, the substrate was composed of mixed sediment (pebbles, cobbles and muddy fine sand) which was present as a veneer overlying flat bedrock. In the top 11 m of this habitat, dense clumps of *F. vesiculosus* (abundant) were present, together with lower quantities of *U. intestinalis* and *F. serratus* (H03: **LR.LLR.F.Fves.X**). Below this, the proportions of these species changed, with *F. serratus* recorded as abundant, while the densities of *U. intestinalis* and *F. vesiculosus* (both frequent) were lower than in the preceding habitat (H04: **LR.LLR.F.Fserr.FS**). In the low shore, the substrate was composed of cobbles and boulders overlying bedrock. The algal community in this zone was dominated by

superabundant *F. serratus* together with common *F. vesiculosus*, however a range of faunal species were present on the undersides of cobbles and boulders. Species recorded included *Littorina* spp., *P. vulgata*, *Steromphala umbilicalis*, the anemone *A. equina*, the broad-clawed porcelain crab *Porcellana platycheles*, and the ascidian *Ascidia conchilega*. This habitat (H05) was therefore assigned the underboulder community biotope **LR.MLR.BF.Fser.Bo** ('*Fucus serratus* and under-boulder fauna on exposed to moderately exposed lower eu littoral boulders'). The lower boundary of H05 was marked by a 0.3 m step down into the water.

The distribution of biotopes at this transect is shown in Figure 10.

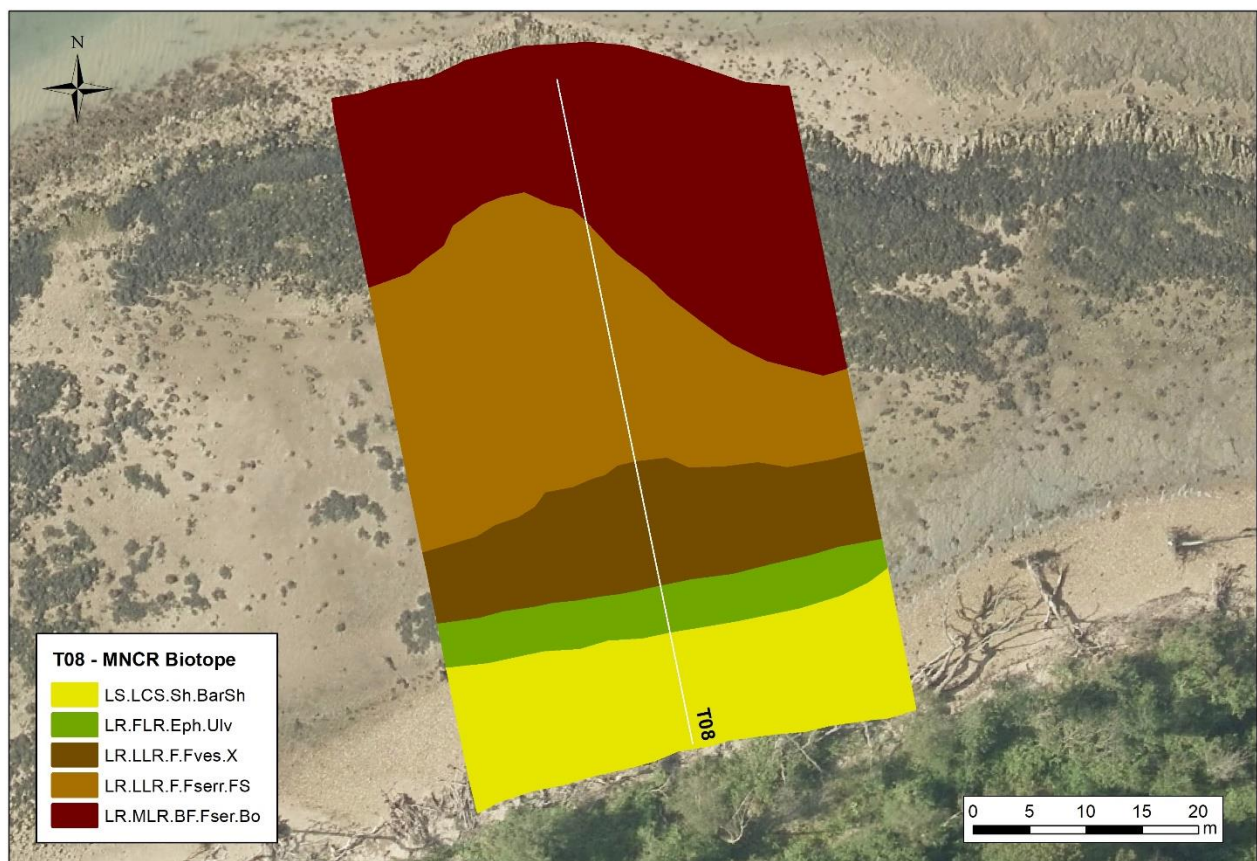


Figure 10: Distribution of MNCR biotopes identified at Transect 08, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T09

The shore at T09 was composed of a mixture of bedrock, boulders and a variety of soft sediment habitats. The beach was backed by a steep vegetated bank with clay outcrops visible at the base. The strandline was littered with dead fallen trees; several trunks were also present further down the beach.

At the very top of the beach, the substrate comprised barren pebbles and sand overlying stiff blue clay exposures (H01: **LS.LCS.Sh.BarSh**). Below this was a very narrow (1 m) but visually distinct band of *U. intestinalis* on large pebbles (H02: **LR.FLR.Eph.Ulv**). This was followed by a 9 m wide zone of rippled sand (H03: **LS.LSa.MoS**a; 'Barren or

amphipod-dominated mobile sand shores'). The lower boundary of this zone was marked by the trunk of a fallen tree, lying horizontally across the transect. While the tree itself was covered in dense *F. vesiculosus*, the area seaward of the tree consisted of gravelly sand with patches of *U. intestinalis* present, presumably attached to rock underlying the sediment as well as to any pebbles present (H04: **LR.FLR.Eph.Ulv**).

The mid shore region at this transect was also characterised by soft sediments overlying bedrock. Below H04, the sediment consisted of muddy fine sand (H05: **LS.LSa.MuSa**; 'Polychaete/bivalve dominated muddy sand shores'), which transitioned into a wide (22 m) flat of gravelly sand and shell (H06: **LS.LSa.MoSa**). While a range of taxa were observed within this zone, all were recorded at very low (rare) abundance, with most only being attached to small pebbles.

The lower boundary of H06 was marked by a large bedrock ridge, approximately 19 m wide and 1 - 1.5 m higher than the surrounding sediment. The biota here was dominated by superabundant *F. serratus* (H07: **LR.LLR.F.Fserr.FS**). Beneath the dense (>95 % cover) canopy, a few faunal taxa were present, including *Spirobranchus* sp., *Littorina* spp. and *S. umbilicalis*. On the seaward side of the bedrock reef, a narrow (1 m) band of boulders was present overlying coarse sediment and flat bedrock. In contrast to the preceding habitat, the biota here was dominated by the red seaweeds *R. floridula* and *O. pinnatifida* (both common) together with lower quantities of *F. serratus* (H08: **LR.MLR.BF.Rho**). Several faunal taxa were recorded on the boulders in and amongst the algae; these included the gastropods *L. littorea*, *S. umbilicalis* and *Calliostoma zizyphinum*, the worms *Spirobranchus* sp. and *Eulalia viridis*, and the sponge *H. perlevis*. Underneath the boulders, the crabs *P. platycheles* and *Carcinus maenas* were observed, as were brittlestars (*Ophiura* sp.) and amphipods. Despite the richness of the underboulder communities observed, the relatively low abundance of *F. serratus* meant that the underboulder biotope **LR.MLR.BF.Fser.Bo** could not be assigned.

Below H08, the beach consisted of a thin veneer of muddy sand and scattered pebbles overlying flat bedrock with sparse biota (H09: **LS.LSa.MuSa**). This zone extended for 19 m, however in the lower 9 m of the beach, down to the low water mark, the underlying bedrock was more exposed. The rock in this area was sand-scoured and very little biota was observed (though some phytodetritus was present) meaning that no biotope could be assigned (H10: **LR.MLR**; 'Moderate energy littoral rock').

The distribution of biotopes at this transect is shown in Figure 11.

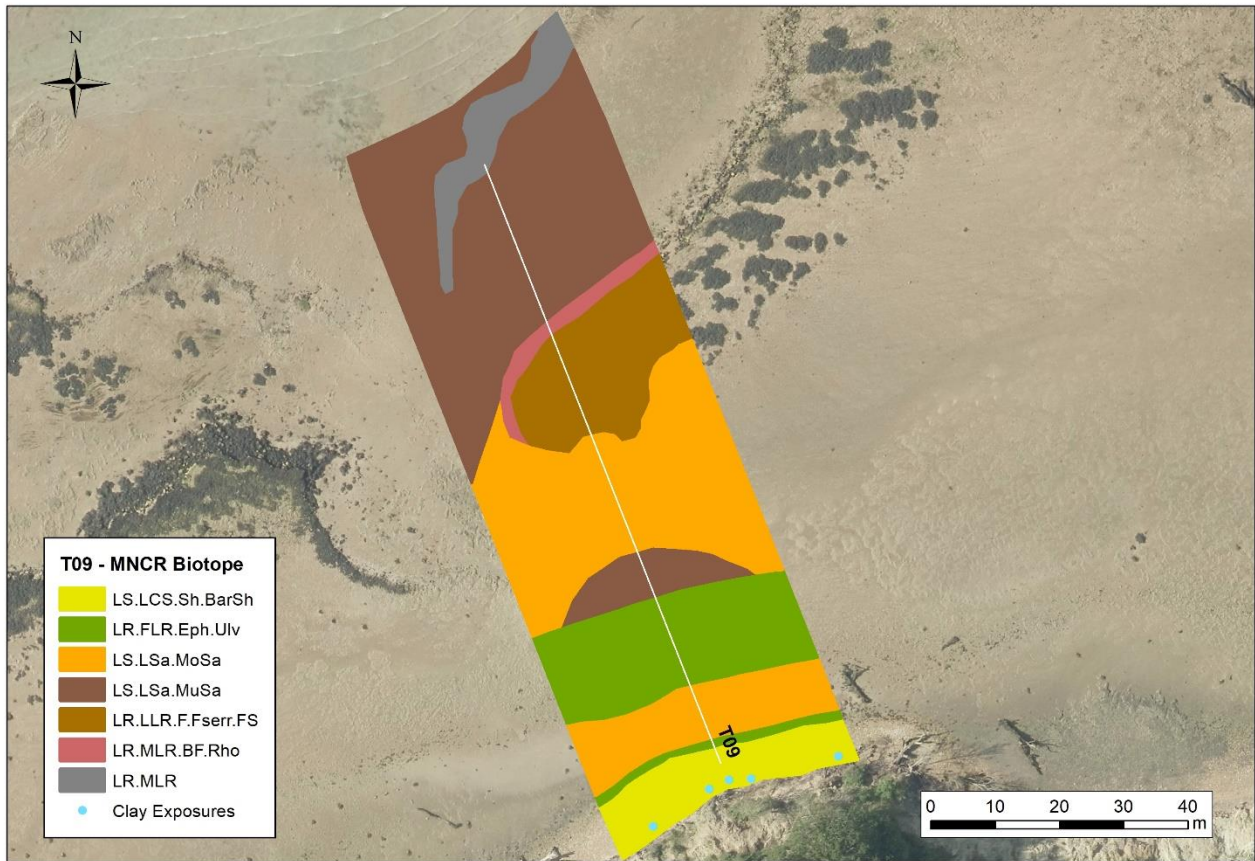


Figure 11: Distribution of MNCR biotopes identified at Transect 09, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T13

The shore at T13, located southwest of Hamstead Point, was primarily composed of very stiff blue clay ‘steps.’ The clay was clearly layered and in many places had fragmented into small slabs and ‘clay pebbles’ which were easily compressed. The beach was backed by a low (<1 m) clay bank with several dead fallen trees littering the strandline.

The upper 5 m of the beach was composed of barren coarse gravel overlying the stiff blue clay, which was solid enough to be considered bedrock (H01: **LS.LCS.Sh.BarSh**). The remainder of the beach, with the exception of a small patch of cobbles covered with a mosaic of *U. intestinalis* and *F. vesiculosus* (H03: **LR.FLR.Eph.Ulv**), was composed of the same stiff blue clay. Biota was very sparse, with clumps of *F. serratus* and other sparse seaweeds only recorded where other substate (including fallen trees and non-clay cobbles) was present. The lack of biota meant that a biotope could not be assigned to this habitat; the area was therefore recorded at the habitat complex level (H02 & H04: **LR.LLR**; ‘Low energy littoral rock’).

The distribution of biotopes at this transect is shown in Figure 12.

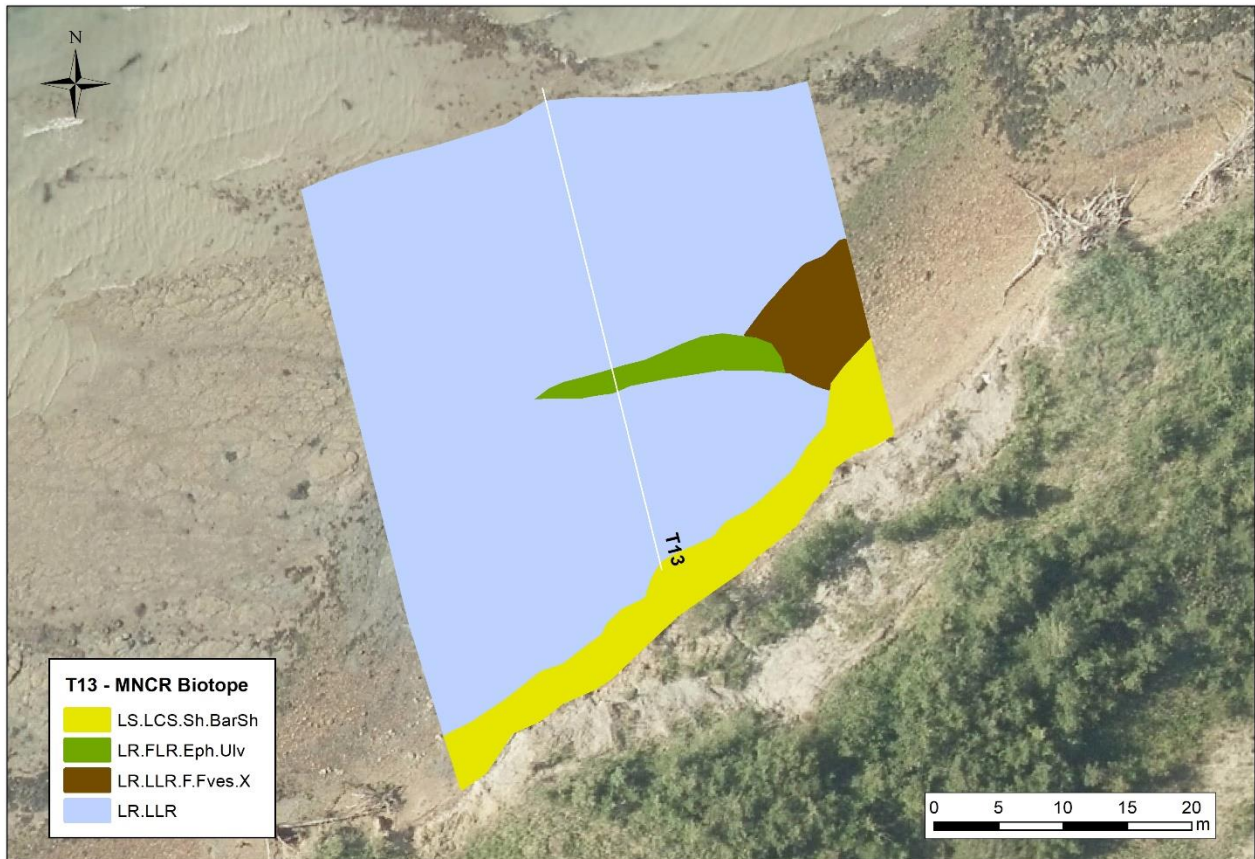


Figure 12: Distribution of MNCR biotopes identified at Transect 13, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T14

The intertidal area at T14, located near Hamstead, was composed of coarse sediment and cobbles overlying stiff blue clay, similar to that present at T13. The top of the beach, which was backed by a low clay bank in a state of erosion, comprised barren large pebbles and small cobbles (H01: **LS.LCS.Sh.BarSh**). Several dead fallen trees were present close to the start of line, both against the clay bank and sticking out of the sediment of the beach. Below the barren shingle was a 5 m wide band of dense *U. intestinalis* on pebbles and cobbles (H02: **LR.FLR.Eph.Ulv**). The sediment in this zone was slightly more coarse than in the preceding zone, with a greater proportion of cobbles present, however beneath the superficial layer of coarse material stiff clay and softer mud were present. Beneath H02 these clay exposures became a more prevalent feature, particularly in H03, where the biota on the cobbles was dominated by abundant *F. vesiculosus* (H03: **LR.LLR.F.Fves.X**). In the low shore, *F. serratus* was the dominant species (H04: **LR.LLR.F.Fserr.X**), increasing in density (up to superabundant) with proximity to the low water mark.

Several examples of anthropogenic influences were observed on transit to T14. Predominantly these were items of plastic litter, including plastic bags and plastic bottles.

The distribution of biotopes at this transect is shown in Figure 13.

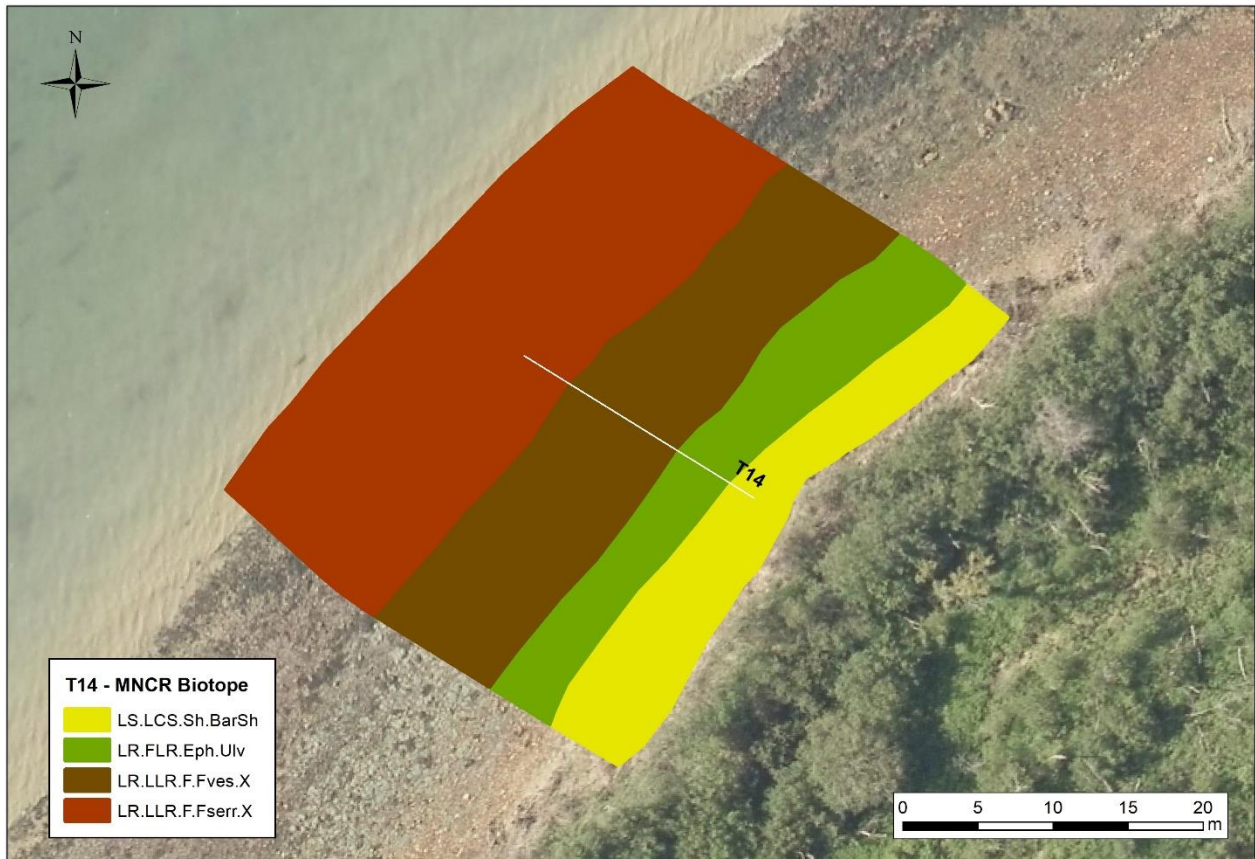


Figure 13: Distribution of MNCR biotopes identified at Transect 14, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T15

The zonation at T15 was very similar to that at T14. The upper 5 m of the beach, beneath the clay cliffs, was composed of barren sand, gravel and cobbles (H01:

LS.LCS.Sh.BarSh). This was followed by a 4 m zone of dense *U. intestinalis* and occasional *F. vesiculosus* on cobbles and pebbles overlying clay exposures (H02:

LR.FLR.Eph.Ulv). Below this, the shore was primarily composed of cobbles and occasional small boulders, characterised by common *F. vesiculosus* (H03:

LR.LLR.F.Fves.X). In the low shore, boulders were less common and the beach was instead composed of cobbles and pebbles overlying stiff blue clay exposures. The biota here was more diverse, being characterised by *F. serratus* (common) and *F. vesiculosus* (frequent), with fauna present on the undersides of the cobbles, including *Littorina* spp., *A. equina*, *P. vulgata* and *C. maenas*. Due to the lack of boulders and relatively sheltered situation, however, this habitat (H04) could not be assigned the underboulder communities biotope **LR.MLR.BF.Fser.Bo**, and was instead assigned the biotope **LR.LLR.F.Fserr.X**.

Several examples of anthropogenic influences were observed en route to T15. These included a series of pipes running over the top of the banks, as well as several different types of litter. Some of these were quite large, including an old rusted metal trolley and large (>1 m) concrete slabs. Other litter observed included a plastic waste bin, building

Several examples of anthropogenic influences were observed en route to T15. These included a series of pipes running over the top of the banks, as well as several different types of litter. Some of these were quite large, including an old rusted metal trolley and large (>1 m) concrete slabs. Other litter observed included a plastic waste bin, building

materials (bricks etc.), a fully inflated balloon, and nylon rope. Rope was also present in the upper shore at the transect location.

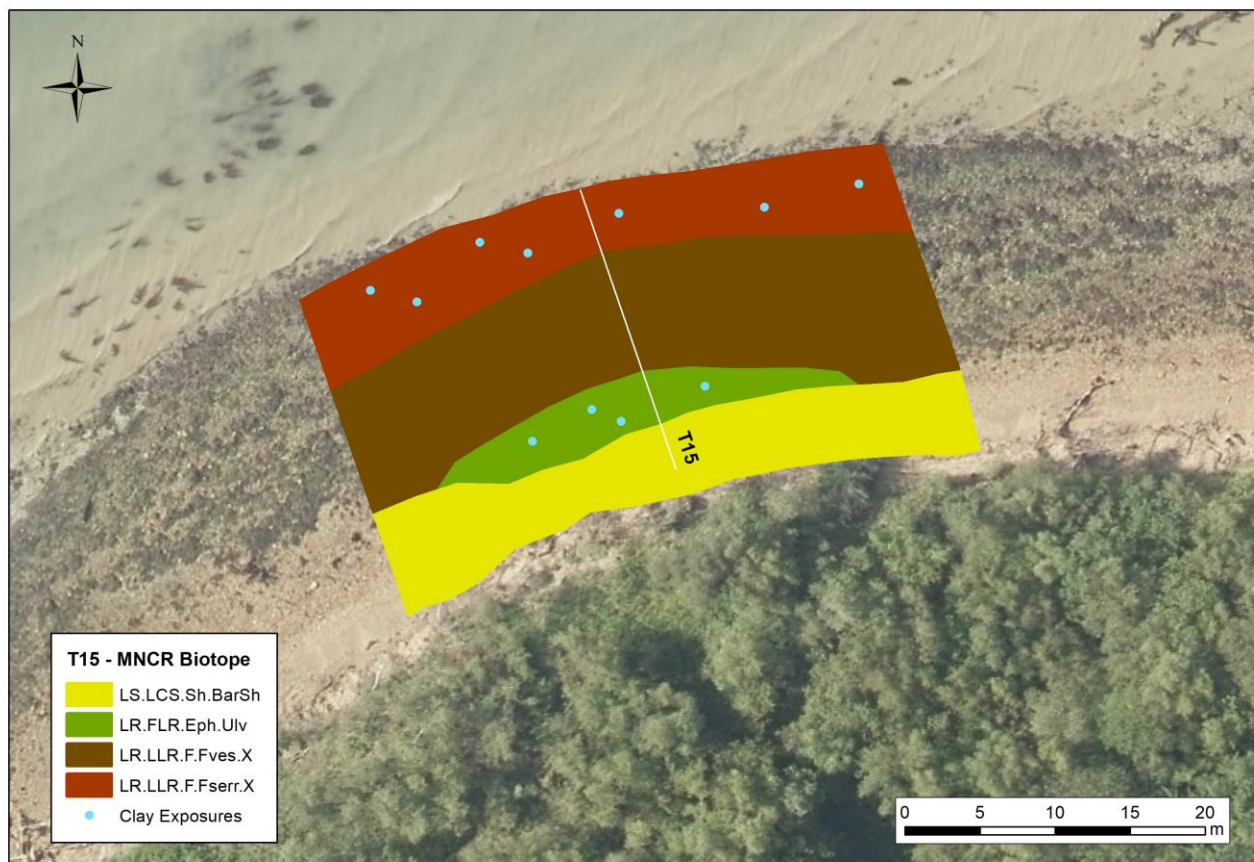


Figure 14: Distribution of MNCR biotopes identified at Transect 15, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

The distribution of biotopes at this transect is shown in Figure 14.

T16

Transect T16, located northeast of Bouldnor and near to Bouldnor Forest Nature Reserve, was a soft sediment shore. The strandline was littered with dead fallen trees, likely due to the retreat of the low cliffs in the area. The upper 17 m of the beach was composed of pebbles and gravel with very sparse biota (H01: **LS.LCS.Sh.BarSh**). While the transit to T16 was slow going due to the presence of soft clay along most of the route, the upper shore at T16 was relatively firm, with only small patches of clay present.

Below the gravel upper shore, the beach was composed of soft, uneven mud with a very thin covering of filamentous green algae. Patches of rippled fine sand were also scattered throughout the area, and pebbles and small cobbles were present in low quantities. The habitat complex **LS.LMx** was therefore assigned to this zone.

The distribution of biotopes at this transect is shown in Figure 15.



Figure 15: Distribution of MNCR biotopes identified at Transect 16, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T17

Transect T17 was broadly similar to T16. The upper 13 m of the shore comprised gravel and pebbles overlying soft, clay-rich sediment (H01: **LS.LCS.Sh.BarSh**), backed by a low (<1 m) clay bank. The remainder of the intertidal area was composed of a wide (~66 m) mudflat with scattered/patchy pebbles and a very thin/sparse cover of ephemeral filamentous green algae (H02: **LS.LMu**; 'Littoral mud').

Just to the west of the transect line, an artificial gravel 'causeway' was present. As the mudflat was too soft to traverse safely, this 'causeway' was used to measure the habitat width, as well as to better attempt to observe any biota present.

The distribution of biotopes at this transect is shown in Figure 16.



Figure 16: Distribution of MNCR biotopes identified at Transect 17, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

T18

Transect T18 was located close to the Bouldnor View carpark. The shore in this area was highly anthropogenically-influenced; the beach was backed by a high seawall and there were several concrete groynes present along the shore in both directions. The transect itself was accessed via a concrete slipway, and what appeared to be the remnants of old wooden groynes were present in the immediate area. In addition, several items of litter were present, including ceramic shards and rusted metal posts.

The shore was relatively narrow (<20 m) and composed of pebbles, cobbles and boulders overlying coarse sediment. The upper 3 m of the transect, immediately below the seawall, was composed of barren pebbles and sparse cobbles with patchy *U. intestinalis* (H01: **LS.LCS.Sh.BarSh**). This was followed by a narrow (2 m) zone of superabundant *U. intestinalis* on pebbles and cobbles with rare *F. vesiculosus* and *A. nodosum* (H02: **LR.FLR.Eph.Ulv**). Below this was a relatively wide (8 m) zone where the abundance of both *F. vesiculosus* (abundant) and *A. nodosum* (common) increased (H03: **LR.LLR.F.Fves.X**). Faunal diversity was relatively high in this zone. Taxa recorded included the gastropods *L. littorea*, *P. vulgata* and *S. umbilicalis* and the barnacles *S. balanoides* and *Chthamalus montagui*, although abundance of all of these taxa was low.

The low shore region was composed of cobbles and boulders (as opposed to the pebbles and cobbles present in the mid shore) which were dominated by superabundant *F. serratus*. Some biota was present on the undersides of the boulders, including encrusting taxa such as *S. balanoides*, *Spirobranchus* sp., spirorbid worms and coralline crusts, as well as mobile fauna including the brittlestar *Ophiura* sp. and the crabs *Macropodia* sp. and *P. platycheles*. While the area was very sheltered, the presence of superabundant *F. serratus* and a diverse underboulder community mean that the biotope **LR.MLR.BF.Fser.Bo** was assigned to this habitat.

The distribution of biotopes at this transect is shown in Figure 17.

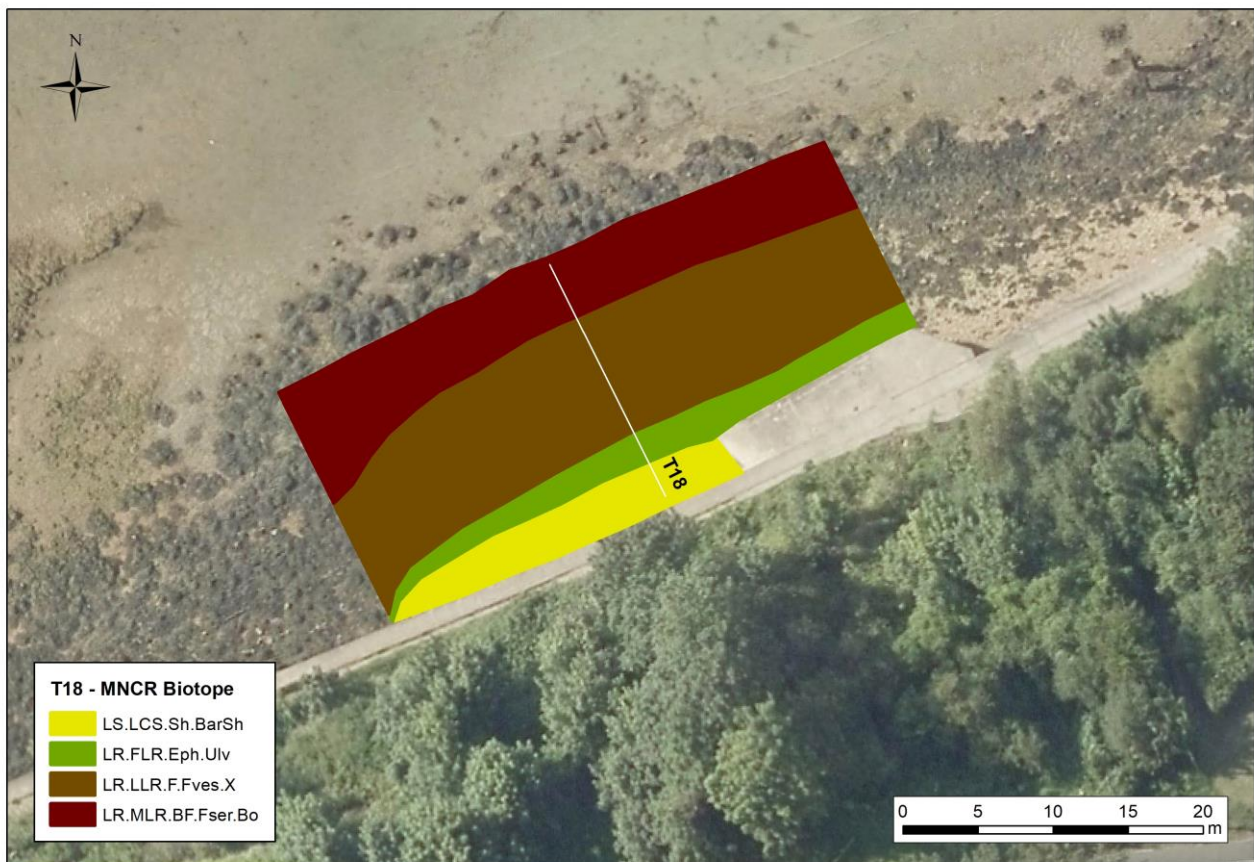


Figure 17: Distribution of MNCR biotopes identified at Transect 18, surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022.

Presence and distribution of features of interest

Intertidal rock

Intertidal bedrock habitats were recorded at six transects. For the most part, where bedrock was present it was overlain with a thin, sometimes patchy veneer of soft sediments, pebbles and cobbles and characterised by fucoid algae dominated communities, particularly *F. vesiculosus* (in the mid shore) and *F. serratus* (in the low shore). A summary of the observed bedrock habitats is given in Table 6.

Table 6: A summary of the intertidal bedrock habitats observed on transects surveyed as part of the 2022 Yarmouth to Cowes MCZ Phase I and Phase II intertidal survey.

Transect	General description	Exposure	Shore height	Rugosity	Veneer	Biotopes assigned
T04	Algal-dominated bedrock platform	Low	Mid, low	Low	Very thin, patchy veneer of mud, sand and gravel	LR.FLR.Eph.Ulv LR.LLR.F.Fves.FS LR.LLR.F.Fserr.FS
T05	Algal-dominated bedrock platform	Moderate	Mid, low	Moderate	Thin veneer of sand and muddy sand	LR.MLR.BF.Rho IR.MIR
T07	Algal-dominated bedrock platform	Low	Mid	Low	Gravel and pebbles	LR.LLR.F.Fves.FS LR.LLR.F.Fves.X
T08	Algal-dominated bedrock platform	Low	Mid, low	Low	Muddy sand, gravel, pebbles, cobbles	LR.LLR.F.Fves.X LR.LLR.F.Fserr.FS
T09	Algal-dominated bedrock ridge	Moderate	Low	High	None	LR.LLR.F.Fserr.FS
T13	Very solid stiff blue clay	Low	High, mid, low	Moderate	None	LR.LLR

The bedrock habitats observed during the survey were generally low-lying, flat or gently sloping, low rugosity habitats, typical of sheltered, low energy environments such as found on the northern coast of the Isle of Wight. The exception to this was the bedrock ridge present in the low shore at T09, which was a raised bedrock reef outcrop, approximately 1.5 m high compared to the surrounding habitats. However, the biota present was nevertheless representative of low energy rock, being dominated by near-total coverage by *F. serratus*.

Intertidal underboulder communities

Of the two described biotopes listed as being representative of underboulder communities, only one was recorded, with the biotope **LR.MLR.BF.Fser.Bo** assigned to habitats in the low shore at transects T08 and T18. However, underboulder communities were also present in habitats which did not otherwise fit the description of this biotope, either due to a lack of the primary characterising species *F. serratus* or because the substrate was dominated by cobbles rather than boulders. In these cases, the rocky habitat biotope best matching the substrate and community present was assigned.

The underboulder biota recorded in the low shore at T18 included *Spirobranchus* sp., spirorbid worms, *S. umbilicalis* and coralline crusts. On the sediment underneath the boulders, mobile fauna including amphipods, the brittlestar *Ophiura* sp., and the crabs *Macropodia* sp. and *P. platycheles* were present. While the majority of the same taxa were also identified in the low shore at T08, the underboulder communities observed at T08, where the boulders were generally larger, were more diverse. A range of taxa was identified attached to the undersides of the boulders, including coralline crusts, encrusting sponges such as *Amphilectus fucorum* and *Halisarca dujardini*, encrusting bryozoans, *Spirobranchus* sp. and spirorbid worms, *Steromphala* spp., *Acanthochitona* sp. and *A. conchilega*. In the sediment beneath the boulders, species including *Lanice conchilega*, *P. platycheles*, *C. maenas* and the shanny *Lipophrys pholis* were recorded.

In addition to the 'true' underboulder community habitats recorded at T08 (H05) and T18 (H04), potential underboulder communities were identified at transects T03, T05, T09 and T15.

Boulders comprised the bulk of the substrate at T03, particularly in the mid shore (H02). Boulder size ranged from small (<0.5 m diameter) to very large (>1 m diameter), and the community was characterised by a mosaic of *F. serratus* and *A. nodosum* with low quantities of *F. vesiculosus*. Many of the boulders were too large and/or stable to move, however inspection of the undersides using an endoscope camera revealed that while some taxa were present on overhangs, these were very sparse and limited to small patches of barnacles, *P. vulgata* and *L. littorea*. Due to time constraints, however, no Phase II survey was undertaken at this location.

H03 at T05 consisted of cobbles overlying sediment and patchy clay exposures, characterised by *F. vesiculosus* and *A. nodosum* together with lower quantities of green algae. As such the habitat was assigned the biotope **LR.LLR.F.Fves.X**, however a range of taxa were identified on the undersides of the cobbles. Taxa recorded were similar to the species observed at T08 and T18, and included *A. equina*, spirorbid worms, *Steromphala* spp., *Littorina* spp. and *Nucella lapillus* as well as more mobile species including the porcelain crab *P. platycheles* and the *L. pholis*.

At T09, a very narrow (1 m) band of boulders was present along the seaward edge of the bedrock ridge present in the low shore. Due to the relative abundances of the dominant algal taxa (*R. floridula*, *O. pinnatifida* and *F. serratus*), it was deemed more appropriate to assign this habitat the biotope **LR.MLR.BF.Rho** rather than the underboulder community

biotope **LR.MLR.BF.Fser.Bo**, however a range of underboulder taxa were recorded in this zone. On the boulders themselves, encrusting taxa, including algal crusts, *H. perlevis*, spirorbid and serpulid worms and encrusting bryozoans, were recorded in low abundances, while the sediment beneath the boulders was home to more mobile taxa including amphipods, *Ophiura* spp., *P. platycheles* and *C. maenas*. In contrast to other sites, however, gastropods were relatively sparse.

Examples of 'underboulder-like' communities were also observed on the undersides of sheltered, stable cobbles at T15 and T18. In the low shore (H04) at transect T15 the substrate consisted of stiff clay exposures with superficial pebbles and (mostly small) cobbles, however faunal taxa typical of underboulder communities were recorded on the undersides and beneath of the cobbles. These included *Littorina* spp., *A. equina*, *P. vulgata* and *C. maenas*. Due to the lack of boulders and relatively sheltered situation, however, the habitat was assigned the biotope **LR.LLR.F.Fserr.X**. Similar communities were also found to be present on the undersides of cobbles in the mid shore at T18 (H03: **LR.LLR.F.Fves.X**), including a range of encrusting species (e.g. spirorbid worms, barnacles), gastropods (*Littorina* spp., *S. cineraria*) and more mobile taxa (robust amphipods, *L. pholis*).

Peat and clay exposures

While no peat exposures were observed during any part of the survey, clay exposures appeared to be relatively common within the survey area. Clay exposures were recorded at 11 of the 15 transects surveyed, only being absent from T01, T02, T06 and T18, and were most prevalent west of the entrance to Newtown Harbour (i.e. between T13 – T17). At T04 and T08, exposed clay was restricted to the banks backing the beach. Clay banks/cliffs were also present at T05, T07, T09, and T13 – T17.

Where clay exposures were observed in the intertidal zone, these were frequently present underlying superficial soft sediments, most commonly in the upper shore (T03, T09, T14, T15). At T05, patches of clay were visible underlying pebbles, cobbles and sand in the upper, mid and low shore regions, and included a larger area of exposed stiff clay in the mid shore, adjacent to H03. Similarly, the intertidal areas at T14 and T15 were composed of superficial sediments, cobbles and boulders overlying otherwise flat stiff blue clay throughout the transects. At T13 the beach was composed almost exclusively of a series of very solid stiff blue clay 'steps' with clear layering (likely part of the Bouldnor geological formation), although in places the clay had fragmented into small clay slabs and 'pebbles' which were found to be highly compressible.

Softer clays were observed during transit to and from transects T16 and T17; the upper shore in this area (along the coastline of Bouldnor Forest Nature Reserve) was found to be composed of clay with a significant albeit superficial gravel component, while the mid and low shore regions were generally composed of soft muds which were not traversable. Softer clays were also observed en route to T07, where large swaths of the mid shore region of the southern end of Thorness Bay were composed of a mixture of soft fine mud and fairly stiff clay exposures.

Where clay exposures were observed, biota was generally extremely sparse; where taxa were present, these were generally attached to superficial mobile hard substrate (i.e. pebbles, cobbles and boulders). Piddock boreholes were observed in the low shore at T13, although no piddocks (living or dead) were found to be present in the holes. Piddock boreholes were also observed at T05 in soft rock.

Species of interest

No protected species (e.g. as listed under the Wildlife & Countryside Act 1981 or under Annex II the Habitats Directive), or species listed as nationally scarce or nationally scarce, were observed at any point during the survey. While the native oyster *Ostrea edulis* is listed as a protected feature of the Yarmouth to Cowes MCZ, no live individuals were observed, although shells were rarely present at and near the strandline at several locations.

Three NIS were observed during the survey. The most frequently encountered of these was oyster thief, *Colpomenia peregrina*, which was generally observed in and amongst phytodetritus at the strandline. The small hollow spheres were observed at several locations, but were most common in Thorness Bay between transects T04 and T07, although even here overall abundances did not exceed occasional. This species was also observed near the beach access point for T03, on the concrete slipway at T18, at the very top of the beach near the start of T09, and en route to T14.

The slipper limpet *Crepidula fornicata* was recorded in the low shore at three transect locations (T05, T08 and T09) although the number of individuals at each site was low (≤ 3 individuals). Wireweed, *Sargassum muticum*, was also observed at on three occasions. At two of these locations (between T08 and T09 and between T14 and T15), the *S. muticum* was found unattached to the substrate, however a small amount was found attached to hard substrate in a small rockpool present within H07 on T09.

Discussion

Issues encountered

On 26th and 27th September, the morning low water fell approximately 1.5 to 1 hours prior to sunrise, meaning that these tides could not be utilised for survey. Similarly, on 30th September the evening low water fell approximately 1.3 hours after sunset, meaning that it was also not possible to utilise this tide. For these reasons, the survey timings were adjusted, with mobilisation occurring on the morning of 26th September and work conducted on six separate days (26th September – 1st October) rather than on five days as originally planned. However, the timing of low water on each day meant that in several cases the usual window of opportunity for work (LW±1.5 hours) could not be utilised. It is strongly recommended that in future repeat surveys are conducted during the summer months when hours of daylight are longer and more work can therefore be carried out.

While access to the majority of Phase I transects was identified, these were often difficult, with permission needed from landowners prior to parking (e.g. at Elmsworth and Hampstead farms). Some planned transects (e.g. T03) were moved due to access constraints. It is however hoped that in moving these transects the chance for survey replication in future years is increased.

Recommendations

The results of the intertidal survey described in this report should be considered as an ecological baseline for the intertidal features of the survey area, against which potential future change can be measured. The data collected are of sufficient quality and resolution to be suitable in supporting future assessments of feature condition based on CSM guidance.

It is recommended that the transects established in this survey be considered as monitoring transects for future surveys, in order to identify and measure any potential spatial and temporal changes in the composition, distribution and extent of representative and/or notable biotopes and habitat condition.

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Appendices

Appendices have been included within the main report and appended separately. The appendices are as follows;

- Appendix I: Phase I survey logs (summary)
- Appendix II: Phase I species matrix
- Appendix III: Phase II survey logs (summary)
- Appendix IV: Phase II species matrix
- Appendix V: Biotope glossary

Appendix I: Phase I survey logs (summary)

Transect	Date	Start time (BST)	Timing notes	SOL Position WGS84		EOL Position WGS84		No. habitats	Phase II conducted?	Rationale	No. Phase II habitats surveyed	Transect notes
				Latitude	Longitude	Latitude	Longitude					
T01	26/09/22	16:24	~1.5 hours before LW; on site 2 hrs before LW but beach not visible.	50.762583	-1.323900	50.762664	-1.324131	2	N	Primarily artificial substrate.	-	Transect adjacent to submarine cable/pipe surrounded by rock armour and man-made sea defences composed of boulders.
T02	26/09/22	16:48	~1 hour before LW.	50.757213	-1.330031	50.757530	-1.330289	5	N	Features of interest not present.	-	Transect originally placed between 2 submarine cables/pipelines in an artificially sheltered area of beach; transect therefore moved ~30 m east to avoid this area.
T03	26/09/22	17:36	~10 min to LW.	50.755354	-1.337280	50.755529	-1.337380	3	N	Boulders present, however time constraints prevented survey.	-	Transect located on very rugged area of shore composed of cobbles and boulders with dense, slippery algal cover making traversing the area slow. Transect moved ~160 m east of original position because of this (zonation similar throughout area).
T04	27/09/22	16:49	~1.5 hours before LW.	50.749996	-1.345132	50.750318	-1.345719	5	Y	Feature(s) of interest present (intertidal rock).	3	Intertidal rock habitat present on transect.

Transect	Date	Start time (BST)	Timing notes	SOL Position WGS84		EOL Position WGS84		No. habitats	Phase II conducted?	Rationale	No. Phase II habitats surveyed	Transect notes
				Latitude	Longitude	Latitude	Longitude					
T05	27/09/22	17:44	~40 mins before LW.	50.744944	-1.346698	50.745286	-1.347514	9	Y	Feature(s) of interest present (intertidal rock, underboulder communities, clay exposures).	3	Transect moved ~180 m northeast in order to (i) sample a greater range of features of interest (intertidal rock, boulders and clay exposures) and (ii) avoid large sandflat and anthropogenic features.
T06	27/09/22	18:42	~20 min after LW. ~15 min before sunset. Getting dark.	50.738515	-1.354769	50.739237	-1.355172	3	N	Features of interest not present.	-	Very large quantity of dead seagrass (washed in, not attached) present in low shore - 100% coverage of sediment by dead seagrass and unattached macroalgae.
T07	26/09/22	18:53	~1 hour after LW, ~10 min to sunset. Tide rapidly incoming by 19:00. Too dark to ID biota by 19:15.	50.737160	-1.365494	50.737335	-1.365663	3	N	Intertidal rock and clay exposures present, however time constraints prevented survey.	-	Bedrock and potential underboulder communities present. Small patch of exposed clay present within 20 m of transect.
T08	29/09/22	08:07	~1 hour after LW.	50.734760	-1.376049	50.735292	-1.376201	5	Y	Feature(s) of interest present (intertidal rock, underboulder communities).	2	Transect moved ~20 m west to avoid large fallen trees at strandline. Intertidal rock and underboulder communities present.
T09	29/09/22	06:40	~20 before LW and sunrise. First light.	50.732276	-1.385367	50.733119	-1.385859	10	Y	Feature(s) of interest present (intertidal rock, underboulder communities).	2	Transect moved 24 m east in order to sample features of interest (intertidal rock and boulder habitat).

Transect	Date	Start time (BST)	Timing notes	SOL Position WGS84		EOL Position WGS84		No. habitats	Phase II conducted?	Rationale	No. Phase II habitats surveyed	Transect notes
				Latitude	Longitude	Latitude	Longitude					
T13	28/09/22	18:38	~20 mins to LW and to sunset. Getting dark.	50.724231	-1.433724	50.724569	-1.433844	4	N	Clay exposures/intertidal soft rock present however time constraints prevented survey. Lower priority as very little biota present.	-	Transect moved in order to sample 'stepped' bedrock apparently composed of very hard blue clay (in places broken into small easily compressible clay pebbles). Very little biota present.
T14	28/09/22	17:54	~1 hour before LW.	50.721964	-1.442020	50.722052	-1.442234	4	N	Clay exposures/intertidal soft rock present however time constraints prevented survey.	-	Transect moved ~35 m in order to avoid large fallen trees at strandline.
T15	28/09/22	17:05	~2 hours before LW (beach not yet wholly visible).	50.719270	-1.448810	50.719438	-1.448895	4	N	Cobbles and boulders present, however time constraints prevented survey.	-	Transect moved ~200 m northeast due to (i) difficulty traversing beach (soft clay present) and (ii) in order to investigate possible underboulder communities habitat.
T16	28/09/22	06:44	At first light. ~20 mins after LW.	50.713963	-1.460263	50.714159	-1.460508	2	N	Features of interest not present.	-	Soft sediment habitats only.

Transect	Date	Start time (BST)	Timing notes	SOL Position WGS84		EOL Position WGS84		No. habitats	Phase II conducted?	Rationale	No. Phase II habitats surveyed	Transect notes
				Latitude	Longitude	Latitude	Longitude					
T17	28/09/22	07:13	~55 min after LW.	50.709544	-1.469999	50.710215	-1.470319	2	N	Features of interest not present.	-	Transect moved ~40 m southwest due to presence of fallen trees, close to a gravel 'causeway.' Soft sediment habitats only. Very soft mud/clay present so gravel 'causeway' used to measure habitat width and view biota.
T18	28/09/22	07:38	~1.3 hours after LW	50.707686	-1.482472	50.707826	-1.482577	4	Y	Feature(s) of interest present (underboulder communities).	3	Transect moved to approx. halfway between T18 and T19 due to access constraints. Very anthropogenically-influenced area of coast - breakwater, series of groynes etc. Probable underboulder communities present.

Appendix II: Phase I species matrix

Species recorded during the Phase I habitat surveys at each transect surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022. Species abundances were recorded using the semi-quantitative SACFOR scale.

Transect no.	T01	T01	T02	T02	T02	T02
Habitat no.	1	2	1	2	3	4
Shore position	High	Mid	High	Mid	Mid	Low
Biotope	LS.LCS.Sh.BarSh	LR.LLR.F.Fves.X	LS.LCS.Sh.BarSh	LR.FLR.Eph.EphX	LR.LLR.F.Asc.X / LR.LLR.F.Fserr.X	LR.MLR.BF.Rho
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow					
Hymeniacion perlevis		crust/meadow					
Actinia equina		1 - 3 cm					
Diadumene lineata		1 - 3 cm					
Lanice conchilega		1 - 3 cm					
Spirobranchus	sp.	crust/meadow					
Spirorbinae		crust/meadow					
Chthamalus montagui		crust/meadow					
Semibalanus balanoides		crust/meadow	R				
Amphipoda		1 - 3 cm					
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm					
Steromphala umbilicalis		1 - 3 cm					
Calliostoma zizyphinum		1 - 3 cm					
Patella vulgata		3 - 15 cm	C				F
Littorina littorea		1 - 3 cm					R
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm					
Littorina saxatilis		1 - 3 cm					
Crepidula fornicata		3 - 15 cm					
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf					
Rhodophyta	filamentous red	massive/turf					
Rhodophyta	small fan shaped red	massive/turf					
Palmaria palmata		massive/turf					
Rhodothamniella floridula		massive/turf	R			R	C
Corallinaceae	indet. red calcareous crusts	crust/meadow					O
Chondrus crispus		massive/turf					
Osmundea pinnatifida		massive/turf					
Cladostephus spongiosus		massive/turf					
Fucales	sporelings	crust/meadow					
Ascophyllum nodosum		crust/meadow	O		R	A	
Fucus	sp. indet.	crust/meadow			R		R
Fucus serratus		crust/meadow	O		O	A	
Fucus spiralis		crust/meadow					
Fucus vesiculosus		crust/meadow	C		R	R	
Pelvetia canaliculata		crust/meadow					
Chlorophyta	filamentous green	massive/turf					
Chlorophyta	finely branching green indet	massive/turf					
Blidingia	sp.	massive/turf					
Ulva	sp.	massive/turf					
Ulva intestinalis		massive/turf	O	O	A	R	
Ulva lactuca		massive/turf				R	

Transect no.	T02	T03	T03	T03	T04	T04
Habitat no.	5	1	2	3	1	2
Shore position	Low	High	Mid	Low	Strandline	High
Biotope	LR.LLR.F.Fserr.X	LR.FLR.Lic.Ver	LR.LLR.F.Asc.X / LR.LLR.F.Fserr.X	LR.LLR.F.Fserr.X	LS.LSa.MoSa.BarSa	LS.LCS.Sh.BarSh
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow		R			
Hymeniacion perlevis		crust/meadow					
Actinia equina		1 - 3 cm					
Diadumene lineata		1 - 3 cm					
Lanice conchilega		1 - 3 cm					
Spirobranchus	sp.	crust/meadow					
Spirorbinae		crust/meadow					
Chthamalus montagui		crust/meadow			R		
Semibalanus balanoides		crust/meadow					
Amphipoda		1 - 3 cm					
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm					
Steromphala umbilicalis		1 - 3 cm					
Calliostoma zizyphinum		1 - 3 cm					
Patella vulgata		3 - 15 cm	F		O		
Littorina littorea		1 - 3 cm			R		
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm					
Littorina saxatilis		1 - 3 cm					
Crepidula fornicata		3 - 15 cm					
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf				R	
Rhodophyta	filamentous red	massive/turf				C	
Rhodophyta	small fan shaped red	massive/turf					
Palmaria palmata		massive/turf					
Rhodothamniella floridula		massive/turf	O		R		
Corallinaceae	indet. red calcareous crusts	crust/meadow					
Chondrus crispus		massive/turf					
Osmundea pinnatifida		massive/turf	R				
Cladostephus spongiosus		massive/turf					
Fucales	sporelings	crust/meadow					
Ascophyllum nodosum		crust/meadow			C		R
Fucus	sp. indet.	crust/meadow					
Fucus serratus		crust/meadow	S		S	F	
Fucus spiralis		crust/meadow		R			
Fucus vesiculosus		crust/meadow			O		
Pelvetia canaliculata		crust/meadow		R			
Chlorophyta	filamentous green	massive/turf			R		
Chlorophyta	finely branching green indet	massive/turf					
Blidingia	sp.	massive/turf					
Ulva	sp.	massive/turf					
Ulva intestinalis		massive/turf	R		F	R	R
Ulva lactuca		massive/turf	O			O	

Transect no.	T04	T04	T04	T05	T05	T05
Habitat no.	3	4	5	1	2	3
Shore position	Mid	Mid	Low	Strandline	High	Mid
Biotope	LR.FLR.Eph.Ulv	LR.LLR.F.Fves.FS	LR.LLR.F.Fserr.FS	LS.LSa.St	LS.LSa.MoSa.BarSa	LR.LLR.F.Fves.X
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow					
Hymeniacion perlevis		crust/meadow					
Actinia equina		1 - 3 cm			O		
Diadumene lineata		1 - 3 cm					
Lanice conchilega		1 - 3 cm					
Spirobranchus	sp.	crust/meadow					
Spirorbinæ		crust/meadow					
Chthamalus montagui		crust/meadow					
Semibalanus balanoides		crust/meadow			R		
Amphipoda		1 - 3 cm					
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm					
Steromphala umbilicalis		1 - 3 cm					
Calliostoma zizyphinum		1 - 3 cm					
Patella vulgata		3 - 15 cm			F		R
Littorina littorea		1 - 3 cm			R		R
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm					
Littorina saxatilis		1 - 3 cm					
Crepidula fornicata		3 - 15 cm					
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf					
Rhodophyta	filamentous red	massive/turf	O	R			
Rhodophyta	small fan shaped red	massive/turf					
Palmaria palmata		massive/turf					
Rhodothamniella floridula		massive/turf			O		
Corallinaceae	indet. red calcareous crusts	crust/meadow					
Chondrus crispus		massive/turf					
Osmundea pinnatifida		massive/turf			R		
Cladostephus spongiosus		massive/turf					
Fucales	sporelings	crust/meadow					
Ascophyllum nodosum		crust/meadow			R	R	C
Fucus	sp. indet.	crust/meadow					
Fucus serratus		crust/meadow	R	O	S		R
Fucus spiralis		crust/meadow					
Fucus vesiculosus		crust/meadow			C		A
Pelvetia canaliculata		crust/meadow					
Chlorophyta	filamentous green	massive/turf					R
Chlorophyta	finely branching green indet	massive/turf					
Blidingia	sp.	massive/turf					F
Ulva	sp.	massive/turf					
Ulva intestinalis		massive/turf	S	C	F		O
Ulva lactuca		massive/turf			R		

Transect no.	T05	T05	T05	T05	T05	T05
Habitat no.	4	5	6	7	8	9
Shore position	Mid	Mid	Mid	Low	Low	Low
Biotope	LS.LCS.Sh.BarSh	LS.LSa.FiSa.Po	LR.MLR.BF.Rho	LS.LSa	IR.MIR	LS.LSa.FiSa
Comments						

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Hymeniacion perlevis		crust/meadow			R			
Actinia equina		1 - 3 cm						
Diadumene lineata		1 - 3 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow						
Spirorbinæ		crust/meadow						
Chthamalus montagui		crust/meadow						
Semibalanus balanoides		crust/meadow						
Amphipoda		1 - 3 cm						
Porcellana platycheles		3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Steromphala umbilicalis		1 - 3 cm	R					
Calliostoma zizyphinum		1 - 3 cm						
Patella vulgata		3 - 15 cm						
Littorina littorea		1 - 3 cm	R	F	A	F	F	
Littorina fabalis		1 - 3 cm						
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm					R	
Nucella lapillus		1 - 3 cm						
Ascidia conchilega		3 - 15 cm						
Rhodophyta	finely branching red indet	massive/turf						
Rhodophyta	filamentous red	massive/turf			R			
Rhodophyta	small fan shaped red	massive/turf						
Palmaria palmata		massive/turf						
Rhodothamniella floridula		massive/turf		R	S			
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Chondrus crispus		massive/turf			R			
Osmundea pinnatifida		massive/turf		R	C	R		
Cladostephus spongiosus		massive/turf						
Fucales	sporelings	crust/meadow						
Ascophyllum nodosum		crust/meadow						
Fucus	sp. indet.	crust/meadow						
Fucus serratus		crust/meadow						
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow		O				
Pelvetia canaliculata		crust/meadow						
Chlorophyta	filamentous green	massive/turf						
Chlorophyta	finely branching green indet	massive/turf						
Blidingia	sp.	massive/turf						
Ulva	sp.	massive/turf						
Ulva intestinalis		massive/turf		R				
Ulva lactuca		massive/turf		R	R			

Transect no.	T06	T06	T06	T07	T07	T07
Habitat no.	1	2	3	1	2	3
Shore position	High	Mid	Low	High	Mid	Low
Biotope	LS.LSa.MoSa.BarSa	LS.LCS.Sh.BarSh	LS.LMx	LS.LSa.MoSa.BarSa	LR.FLR.Eph.Ulv / LR.LLR.F.Fves.FS	LR.LLR.F.Fves.X
Comments						

Taxon	Qualifier	SACFOR class				
Verrucaria maura		crust/meadow				
Hymeniacion perlevis		crust/meadow				
Actinia equina		1 - 3 cm				
Diadumene lineata		1 - 3 cm				
Lanice conchilega		1 - 3 cm				
Spirobranchus	sp.	crust/meadow				
Spirorbinae		crust/meadow				
Chthamalus montagui		crust/meadow				
Semibalanus balanoides		crust/meadow		R		
Amphipoda		1 - 3 cm				
Porcellana platycheles		3 - 15 cm				
Carcinus maenas		3 - 15 cm				
Steromphala umbilicalis		1 - 3 cm				
Calliostoma zizyphinum		1 - 3 cm				
Patella vulgata		3 - 15 cm				
Littorina littorea		1 - 3 cm		R		
Littorina fabalis		1 - 3 cm				
Littorina obtusata		1 - 3 cm				
Littorina saxatilis		1 - 3 cm				
Crepidula fornicata		3 - 15 cm				
Nucella lapillus		1 - 3 cm				
Ascidia conchilega		3 - 15 cm				
Rhodophyta	finely branching red indet	massive/turf				
Rhodophyta	filamentous red	massive/turf				
Rhodophyta	small fan shaped red	massive/turf				
Palmaria palmata		massive/turf				
Rhodothamniella floridula		massive/turf				
Corallinaceae	indet. red calcareous crusts	crust/meadow				
Chondrus crispus		massive/turf				
Osmundea pinnatifida		massive/turf				
Cladostephus spongiosus		massive/turf				
Fucales	sporelings	crust/meadow				
Ascophyllum nodosum		crust/meadow				
Fucus	sp. indet.	crust/meadow				
Fucus serratus		crust/meadow				
Fucus spiralis		crust/meadow				
Fucus vesiculosus		crust/meadow			F	C
Pelvetia canaliculata		crust/meadow				
Chlorophyta	filamentous green	massive/turf		R		
Chlorophyta	finely branching green indet	massive/turf				
Blidingia	sp.	massive/turf				
Ulva	sp.	massive/turf				
Ulva intestinalis		massive/turf			F	C
Ulva lactuca		massive/turf				

Transect no.	T08	T08	T08	T08	T08	T09
Habitat no.	1	2	3	4	5	1
Shore position	Strandline	High	Mid	Mid	Low	Strandline
Biotope	LS.LCS.Sh.BarSh	LR.FLR.Eph.Ulv	LR.LLR.F.Fves.X	LR.LLR.F.Fserr.FS	LR.MLR.BF.Fserr.Bo	LS.LCS.Sh.BarSh
Comments						

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Hymeniacion perlevis		crust/meadow						
Actinia equina		1 - 3 cm					R	
Diadumene lineata		1 - 3 cm						
Lanice conchilega		1 - 3 cm				O		
Spirobranchus	sp.	crust/meadow					R	
Spirorbinæ		crust/meadow					R	
Chthamalus montagui		crust/meadow						
Semibalanus balanoides		crust/meadow						
Amphipoda		1 - 3 cm					R	
Porcellana platycheles		3 - 15 cm					O	
Carcinus maenas		3 - 15 cm						
Steromphala umbilicalis		1 - 3 cm					R	
Calliostoma zizyphinum		1 - 3 cm						
Patella vulgata		3 - 15 cm					O	
Littorina littorea		1 - 3 cm		R			F	
Littorina fabalis		1 - 3 cm					R	
Littorina obtusata		1 - 3 cm		F		O	F	
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm						
Ascidia conchilega		3 - 15 cm					O	
Rhodophyta	finely branching red indet	massive/turf				R		
Rhodophyta	filamentous red	massive/turf				R		
Rhodophyta	small fan shaped red	massive/turf						
Palmaria palmata		massive/turf						
Rhodothamniella floridula		massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Chondrus crispus		massive/turf						
Osmundea pinnatifida		massive/turf						
Cladostephus spongiosus		massive/turf						
Fucales	sporelings	crust/meadow						
Ascophyllum nodosum		crust/meadow		R				
Fucus	sp. indet.	crust/meadow						
Fucus serratus		crust/meadow			F	A	S	
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow		O	A	F	C	R
Pelvetia canaliculata		crust/meadow						
Chlorophyta	filamentous green	massive/turf						
Chlorophyta	finely branching green indet	massive/turf					O	
Blidingia	sp.	massive/turf						
Ulva	sp.	massive/turf						R
Ulva intestinalis		massive/turf		A	C	F	F	
Ulva lactuca		massive/turf		R		R		

Transect no.	T09	T09	T09	T09	T09	T09
Habitat no.	2	3	4	5	6	7
Shore position	High	High	Mid	Mid	Mid	Mid
Biotope	LR.FLR.Eph.Ulv	LS.LSa.MoSa	LR.FLR.Eph.Ulv	LS.LSa.MuSa	LS.LSa.MoSa	LR.LLR.F.Fserr.FS
Comments						

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow			R			
Hymeniacion perlevis		crust/meadow						R
Actinia equina		1 - 3 cm	R					
Diadumene lineata		1 - 3 cm						
Lanice conchilega		1 - 3 cm					R	
Spirobranchus	sp.	crust/meadow						
Spirorbinæ		crust/meadow					R	
Chthamalus montagui		crust/meadow					R	
Semibalanus balanoides		crust/meadow			R		R	
Amphipoda		1 - 3 cm					R	
Porcellana platycheles		3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Steromphala umbilicalis		1 - 3 cm					R	
Calliostoma zizyphinum		1 - 3 cm						
Patella vulgata		3 - 15 cm						O
Littorina littorea		1 - 3 cm	R					
Littorina fabalis		1 - 3 cm					R	R
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm					R	
Ascidia conchilega		3 - 15 cm						
Rhodophyta	finely branching red indet	massive/turf			R	R		F
Rhodophyta	filamentous red	massive/turf					R	
Rhodophyta	small fan shaped red	massive/turf						
Palmaria palmata		massive/turf						
Rhodothamniella floridula		massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow					R	
Chondrus crispus		massive/turf						
Osmundea pinnatifida		massive/turf						
Cladostephus spongiosus		massive/turf						
Fucales	sporelings	crust/meadow			R			
Ascophyllum nodosum		crust/meadow			R			
Fucus	sp. indet.	crust/meadow					R	
Fucus serratus		crust/meadow						S
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow	O	R	R		R	R
Pelvetia canaliculata		crust/meadow						
Chlorophyta	filamentous green	massive/turf	R					
Chlorophyta	finely branching green indet	massive/turf				R		
Blidingia	sp.	massive/turf						
Ulva	sp.	massive/turf						
Ulva intestinalis		massive/turf	C	R	C	R	R	R
Ulva lactuca		massive/turf			R			

Transect no.	T09	T09	T09	T13	T13	T13
Habitat no.	8	9	10	1	2	3
Shore position	Low	Low	Low	Strandline	High	Mid
Biotope	LR.MLR.BF.Rho	LS.LSa.MuSa	LR.MLR	LS.LCS.Sh.BarSh	LR.LLR	LR.FLR.Eph.Ulv
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow					
Hymeniacion perlevis		crust/meadow	R		R		
Actinia equina		1 - 3 cm					
Diadumene lineata		1 - 3 cm			R		
Lanice conchilega		1 - 3 cm		O	F		
Spirobranchus	sp.	crust/meadow					
Spirorbinae		crust/meadow					
Chthamalus montagui		crust/meadow					
Semibalanus balanoides		crust/meadow					
Amphipoda		1 - 3 cm					
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm					
Steromphala umbilicalis		1 - 3 cm	R				
Calliostoma zizyphinum		1 - 3 cm	R				
Patella vulgata		3 - 15 cm					
Littorina littorea		1 - 3 cm	R				
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm					
Littorina saxatilis		1 - 3 cm					
Crepidula fornicata		3 - 15 cm	R				
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf		R	O		
Rhodophyta	filamentous red	massive/turf	O				
Rhodophyta	small fan shaped red	massive/turf	R				
Palmaria palmata		massive/turf					
Rhodothamniella floridula		massive/turf	C				
Corallinaceae	indet. red calcareous crusts	crust/meadow					
Chondrus crispus		massive/turf	R		R		
Osmundea pinnatifida		massive/turf	C				
Cladostephus spongiosus		massive/turf					
Fucales	sporelings	crust/meadow					
Ascophyllum nodosum		crust/meadow					
Fucus	sp. indet.	crust/meadow					
Fucus serratus		crust/meadow	F				
Fucus spiralis		crust/meadow					
Fucus vesiculosus		crust/meadow					R
Pelvetia canaliculata		crust/meadow					
Chlorophyta	filamentous green	massive/turf			O	R	
Chlorophyta	finely branching green indet	massive/turf		R			
Blidingia	sp.	massive/turf					
Ulva	sp.	massive/turf					A
Ulva intestinalis		massive/turf	O				
Ulva lactuca		massive/turf	R	R	R		

Transect no.	T13	T14	T14	T14	T14	T15
Habitat no.	4	1	2	3	4	1
Shore position	Low	Strandline	High	Mid	Low	High
Biotope	LR.LLR	LS.LCS.Sh.BarSh	LR.FLR.Eph.Ulv	LR.LLR.F.Fves.X	LR.LLR.F.Fserr.X	LS.LCS.Sh.BarSh
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow					R
Hymeniacion perlevis		crust/meadow					
Actinia equina		1 - 3 cm					
Diadumene lineata		1 - 3 cm					
Lanice conchilega		1 - 3 cm					
Spirobranchus	sp.	crust/meadow					R
Spirorbinæ		crust/meadow					
Chthamalus montagui		crust/meadow					
Semibalanus balanoides		crust/meadow			R		R
Amphipoda		1 - 3 cm					
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm					
Steromphala umbilicalis		1 - 3 cm					R
Calliostoma zizyphinum		1 - 3 cm					
Patella vulgata		3 - 15 cm		O	O		
Littorina littorea		1 - 3 cm		R	R		F
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm		R			F
Littorina saxatilis		1 - 3 cm					
Crepidula fornicata		3 - 15 cm					
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf	R				
Rhodophyta	filamentous red	massive/turf	R				R
Rhodophyta	small fan shaped red	massive/turf					R
Palmaria palmata		massive/turf	R				
Rhodothamniella floridula		massive/turf					
Corallinaceae	indet. red calcareous crusts	crust/meadow					R
Chondrus crispus		massive/turf					
Osmundea pinnatifida		massive/turf	R				
Cladostephus spongiosus		massive/turf	R				
Fucales	sporelings	crust/meadow	R		R		R
Ascophyllum nodosum		crust/meadow					
Fucus	sp. indet.	crust/meadow					
Fucus serratus		crust/meadow	R			F	S
Fucus spiralis		crust/meadow					
Fucus vesiculosus		crust/meadow		R	O	A	F
Pelvetia canaliculata		crust/meadow					
Chlorophyta	filamentous green	massive/turf					
Chlorophyta	finely branching green indet	massive/turf					
Blidingia	sp.	massive/turf					
Ulva	sp.	massive/turf					
Ulva intestinalis		massive/turf	R		S	O	
Ulva lactuca		massive/turf	R				R

Transect no.	T15	T15	T15	T16	T16	T17
Habitat no.	2	3	4	1	2	1
Shore position	Mid	Mid	Low	High	Low	High
Biotope	LR.FLR.Eph.Ulv	LR.LLR.F.Fves.X	LR.LLR.F.Fserr.X	LS.LCS.Sh.BarSh	LS.LMx	LS.LCS.Sh.BarSh
Comments						

Taxon	Qualifier	SACFOR class					
Verrucaria maura		crust/meadow					
Hymeniacion perlevis		crust/meadow					
Actinia equina		1 - 3 cm			R		
Diadumene lineata		1 - 3 cm					
Lanice conchilega		1 - 3 cm					
Spirobranchus	sp.	crust/meadow					
Spirorbinae		crust/meadow					
Chthamalus montagui		crust/meadow					
Semibalanus balanoides		crust/meadow		R	R		
Amphipoda		1 - 3 cm		R			
Porcellana platycheles		3 - 15 cm					
Carcinus maenas		3 - 15 cm			O		
Steromphala umbilicalis		1 - 3 cm					
Calliostoma zizyphinum		1 - 3 cm					
Patella vulgata		3 - 15 cm			O		
Littorina littorea		1 - 3 cm	F	O	F		O
Littorina fabalis		1 - 3 cm					
Littorina obtusata		1 - 3 cm		F	C		
Littorina saxatilis		1 - 3 cm			C		
Crepidula fornicata		3 - 15 cm					
Nucella lapillus		1 - 3 cm					
Ascidia conchilega		3 - 15 cm					
Rhodophyta	finely branching red indet	massive/turf					
Rhodophyta	filamentous red	massive/turf					
Rhodophyta	small fan shaped red	massive/turf					
Palmaria palmata		massive/turf					
Rhodothamniella floridula		massive/turf					
Corallinaceae	indet. red calcareous crusts	crust/meadow					
Chondrus crispus		massive/turf					
Osmundea pinnatifida		massive/turf					
Cladostephus spongiosus		massive/turf					
Fucales	sporelings	crust/meadow			F		
Ascophyllum nodosum		crust/meadow					
Fucus	sp. indet.	crust/meadow	R	O			
Fucus serratus		crust/meadow		R	C		
Fucus spiralis		crust/meadow					
Fucus vesiculosus		crust/meadow	O	C	O		
Pelvetia canaliculata		crust/meadow					
Chlorophyta	filamentous green	massive/turf	F		O		
Chlorophyta	finely branching green indet	massive/turf					
Blidingia	sp.	massive/turf					
Ulva	sp.	massive/turf				R	
Ulva intestinalis		massive/turf	A	C	O	O	
Ulva lactuca		massive/turf					

Transect no.	T17	T18	T18	T18	T18
Habitat no.	2	1	2	3	4
Shore position	Low	Strandline	High	Mid	Low
Biotope	LS.LMu	LS.LCS.Sh.BarSh	LR.FLR.Eph.Ulv	LR.LLR.F.Fves.X	LR.MLR.BF.Fserr.Bo
Comments					

Taxon	Qualifier	SACFOR class				
Verrucaria maura		crust/meadow		R	R	
Hymeniacion perlevis		crust/meadow				
Actinia equina		1 - 3 cm				O
Diadumene lineata		1 - 3 cm				
Lanice conchilega		1 - 3 cm				
Spirobranchus	sp.	crust/meadow				
Spirorbinae		crust/meadow			R	R
Chthamalus montagui		crust/meadow			R	
Semibalanus balanoides		crust/meadow			R	R
Amphipoda		1 - 3 cm				
Porcellana platycheles		3 - 15 cm				
Carcinus maenas		3 - 15 cm				
Steromphala umbilicalis		1 - 3 cm			R	
Calliostoma ziphyphium		1 - 3 cm				
Patella vulgata		3 - 15 cm		F	R	F
Littorina littorea		1 - 3 cm		O	F	R
Littorina fabalis		1 - 3 cm				
Littorina obtusata		1 - 3 cm		R		
Littorina saxatilis		1 - 3 cm				
Crepidula fornicata		3 - 15 cm				
Nucella lapillus		1 - 3 cm				
Ascidia conchilega		3 - 15 cm				
Rhodophyta	finely branching red indet	massive/turf				
Rhodophyta	filamentous red	massive/turf				
Rhodophyta	small fan shaped red	massive/turf				
Palmaria palmata		massive/turf				
Rhodothamniella floridula		massive/turf				
Coralliaceae	indet. red calcareous crusts	crust/meadow				
Chondrus crispus		massive/turf				
Osmundea pinnatifida		massive/turf				
Cladostephus spongiosus		massive/turf				
Fucales	sporelings	crust/meadow				
Ascophyllum nodosum		crust/meadow	R	R	C	O
Fucus	sp. indet.	crust/meadow				
Fucus serratus		crust/meadow			R	S
Fucus spiralis		crust/meadow				
Fucus vesiculosus		crust/meadow	O	R	A	
Pelvetia canaliculata		crust/meadow				
Chlorophyta	filamentous green	massive/turf	F		R	
Chlorophyta	finely branching green indet	massive/turf				
Blidingia	sp.	massive/turf				
Ulva	sp.	massive/turf	R			
Ulva intestinalis		massive/turf	F	S		
Ulva lactuca		massive/turf				

Appendix II: Phase II survey logs (summary)

Phase I Transect	Phase I habitat no.	Quadrat no.	Sample no.	Date	Time (BST)	Distance from centre line (m)	Lat WGS84	Lon WGS84
T04	2	1	563_04#1	30/09/2022	06:40	0	50.750057	-1.345468
T04	2	2	563_04#2	30/09/2022	06:45	-1	50.750046	-1.345467
T04	2	3	563_04#3	30/09/2022	06:48	4	50.750116	-1.345419
T04	3	1	563_05#1	30/09/2022	06:53	3	50.750149	-1.345624
T04	3	2	563_05#2	30/09/2022	06:58	5	50.750191	-1.345657
T04	3	3	563_05#3	30/09/2022	07:02	6	50.750201	-1.345684
T04	4	1	563_06#1	30/09/2022	07:09	-2	50.750229	-1.345888
T04	4	2	563_06#2	30/09/2022	07:16	-5	50.750215	-1.345949
T04	4	3	563_06#3	30/09/2022	07:24	4	50.750250	-1.345802
T05	8	1	563_07#1	30/09/2022	07:59	1	50.745178	-1.347631
T05	8	2	563_07#2	30/09/2022	08:04	2	50.745184	-1.347604
T05	8	3	563_07#3	30/09/2022	08:09	-4	50.745207	-1.347678
T05	6	1	563_08#1	30/09/2022	08:14	3	50.745816	-1.347418
T05	6	2	563_08#2	30/09/2022	08:28	-3	50.745180	-1.347502
T05	6	3	563_08#3	30/09/2022	08:30	-4	50.745160	-1.347493
T05	3	1	563_09#1	30/09/2022	08:43	3	50.745035	-1.346890
T05	3	2	563_09#2	30/09/2022	08:55	2	50.745011	-1.346866

Phase I Transect	Phase I habitat no.	Quadrat no.	Sample no.	Date	Time (BST)	Distance from centre line (m)	Lat WGS84	Lon WGS84
T05	3	3	563_09#3	30/09/2022	09:04	-4	50.744998	-1.346940
T08	5	1	563_12#1	01/10/2022	08:30	-2	50.735248	-1.376604
T08	5	2	563_12#2	01/10/2022	08:37	1	50.735269	-1.376578
T08	5	3	563_12#3	01/10/2022	08:45	5	50.735278	-1.376530
T08	4	1	563_13#1	01/10/2022	08:55	-2	50.735166	-1.376552
T08	4	2	563_13#2	01/10/2022	09:01	3	50.735171	-1.376489
T08	4	3	563_13#3	01/10/2022	09:07	4	50.735154	-1.376454
T09	7	1	563_10#1	01/10/2022	07:03	0	50.732867	-1.385573
T09	7	2	563_10#2	01/10/2022	07:11	-4	50.732878	-1.385617
T09	7	3	563_10#3	01/10/2022	07:18	3	50.732879	-1.385531
T09	8	1	563_11#1	01/10/2022	07:34	-1	50.732905	-1.385658
T09	8	2	563_11#2	01/10/2022	07:47	-2	50.732913	-1.385685
T09	8	3	563_11#3	01/10/2022	07:56	6	50.732967	-1.385623
T18	2	1	563_01#1	29/09/2022	18:05	Not recorded	50.707731	-1.482525
T18	2	2	563_01#2	29/09/2022	18:18	Not recorded	50.707773	-1.482425
T18	2	3	563_01#3	29/09/2022	18:22	Not recorded	50.707714	-1.482543
T18	4	1	563_02#1	29/09/2022	18:32	-7	50.707787	-1.482617
T18	4	2	563_02#2	29/09/2022	18:43	4	50.707768	-1.482463
T18	4	3	563_02#3	29/09/2022	18:48	6	50.707789	-1.482436

Phase I Transect	Phase I habitat no.	Quadrat no.	Sample no.	Date	Time (BST)	Distance from centre line (m)	Lat WGS84	Lon WGS84
T18	3	1	563_03#1	29/09/2022	18:56	-2	50.707734	-1.482530
T18	3	2	563_03#2	29/09/2022	19:05	3	50.707717	-1.482434
T18	3	3	563_03#3	29/09/2022	19:10	7	50.707777	-1.482437

Appendix IV: Phase II species matrix

Species recorded during the Phase I habitat surveys at each transect surveyed as part of the Yarmouth to Cowes MCZ intertidal survey 2022. Species abundances were recorded using either percentage cover (for crust/meadow and massive/turf taxa) or counts (for individual taxa).

Phase II Transect no.	T04_3	T04_3	T04_3	T04_2	T04_2	T04_2
Habitat no.	3	3	3	4	4	4
Shore position	High	High	High	Mid	Mid	Mid
Quadrat no.	1	2	3	1	2	3
Sample no.	563_04#1	563_04#2	563_04#3	563_05#1	563_05#2	563_05#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Verrucaria	sp.	crust/meadow						
Porifera	encrusting orange	crust/meadow						
Hymeniacion perlevis		crust/meadow						
Actinia equina		1 - 3 cm						
Eulalia viridis		3 - 15 cm						
Lanice conchilega		1 - 3 cm					1	
Spirobranchus	sp.	crust/meadow						
Spirobranchus		crust/meadow					<1	
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm					C	
Brachyura	juvenile	3 - 15 cm						
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm					2	2
Steromphala umbilicalis		1 - 3 cm					1	
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm					10	11
Littorina fabalis		1 - 3 cm						
Littorina obtusata		1 - 3 cm					3	
Littorina saxatilis		1 - 3 cm						
Cellaria	sp.	massive/turf						
Rhodophyta	finely branching red indet	crust/meadow	<1					<1
Rhodophyta	dark red crusts	massive/turf						
Rhodophyta	filamentous indet.	massive/turf						
Rhodophyta	fan shaped	massive/turf						
Rhodothamniella floridula		massive/turf				10		1
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Calliblepharis ciliata		massive/turf						
Chondrus crispus		massive/turf						
Ceramium	sp.	massive/turf						
Osmundea pinnatifida		massive/turf						
Polysiphonia	sp.	massive/turf				<1		
Cladostephus spongiosus		massive/turf					<1	4
Fucales	sporelings	crust/meadow				<1		
Ascophyllum nodosum		crust/meadow						
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow				30		
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow					85	75
Chlorophyta	filamentous indet.	massive/turf				1		<1
Ulva intestinalis		massive/turf	40	60	40	15	5	5
Ulva	sp.	massive/turf						
Ulva lactuca		massive/turf				<1		
Cladophora	sp.	massive/turf					1	1

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow						
Porifera	encrusting orange	crust/meadow						
Hymeniacion perlevis		crust/meadow						
Amphilectus fucorum		crust/meadow						
Halysarca dujardini	cf.	crust/meadow						
Actinia equina		1 - 3 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow						
Spirobranchus		crust/meadow						
Oligochaeta		1 - 3 cm						
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm						
Porcellana platycheles		3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Acanthochitona	sp.	3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm						
Steromphala umbilicalis		1 - 3 cm						
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm						
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm						
Bryozoa	encrusting beige	crust/meadow						
Ophiura	sp.	3 - 15 cm						
Ascidia conchilega		3 - 15 cm						
Lipophrys pholis		3 - 15 cm						
Rhodophyta	dark red crusts	massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Rhodophyta	filamentous indet.	massive/turf						
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf						

Phase II Transect no.	T04_1	T04_1	T04_1	T05_3	T05_3	T05_3
Habitat no.	5	5	5	3	3	3
Shore position	Low	Low	Low	High	High	High
Quadrat no.	1	2	3	1	2	3
Sample no.	563_06#1	563_06#2	563_06#3	563_09#1	563_09#2	563_09#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Verrucaria	sp.	crust/meadow						
Porifera	encrusting orange	crust/meadow						<1
Hymeniacidon perlevis		crust/meadow						
Actinia equina		1 - 3 cm				2	3	2
Eulalia viridis		3 - 15 cm						
Lanice conchilega		1 - 3 cm	2	1				
Spirobranchus	sp.	crust/meadow	<1	<1	<1			
Spirobranchus		crust/meadow	<1	<1	<1		<1	
Semibalanus balanoides		crust/meadow				<1	<1	5
Balanus balanus		crust/meadow		<1				
Amphipoda		1 - 3 cm						
Brachyura	juvenile	3 - 15 cm		1				
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm						1
Steromphala	sp.	1 - 3 cm			1			
Steromphala cineraria		1 - 3 cm		5	2			2
Steromphala umbilicalis		1 - 3 cm		3	1			3
Patella vulgata		3 - 15 cm				4	2	4
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm					30	2
Littorina fabalis		1 - 3 cm			1			
Littorina obtusata		1 - 3 cm	1	2				2
Littorina saxatilis		1 - 3 cm					1	
Cellaria	sp.	massive/turf						
Rhodophyta	finely branching red indet	crust/meadow						
Rhodophyta	dark red crusts	massive/turf	<1	<1	<1			
Rhodophyta	filamentous indet.	massive/turf						
Rhodophyta	fan shaped	massive/turf						
Rhodothamniella floridula		massive/turf	10	10	10			
Corallinaceae	indet. red calcareous crusts	crust/meadow				1	5	20
Calliblepharis ciliata		massive/turf						
Chondrus crispus		massive/turf						
Ceramium	sp.	massive/turf	<1					
Osmundea pinnatifida		massive/turf						<1
Polysiphonia	sp.	massive/turf						
Cladostephus spongiosus		massive/turf						
Fucales	sporelings	crust/meadow			5			
Ascophyllum nodosum		crust/meadow					25	
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow	80	100	5			
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow				50	20	50
Chlorophyta	filamentous indet.	massive/turf			35			
Ulva intestinalis		massive/turf	5					
Ulva	sp.	massive/turf					<1	
Ulva lactuca		massive/turf	<1					
Cladophora	sp.	massive/turf	10		<1		<1	

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow						
Porifera	encrusting orange	crust/meadow						
Hymeniacidon perlevis		crust/meadow						
Amphilectus fucorum		crust/meadow						
Halisarca dujardini	cf.	crust/meadow						
Actinia equina		1 - 3 cm				C	C	F
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow	R	R	R		R	
Spirobranchus		crust/meadow				O	C	
Oligochaeta		1 - 3 cm						
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow				R		
Amphipoda		1 - 3 cm						C
Porcellana platycheles		3 - 15 cm				F	A	
Carcinus maenas		3 - 15 cm						
Acanthochitona	sp.	3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm				F	F	F
Steromphala umbilicalis		1 - 3 cm				C	F	F
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm				F		
Littorina littorea		1 - 3 cm				A	C	C
Littorina obtusata		1 - 3 cm				F		
Littorina saxatilis		1 - 3 cm				C		
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm				F		
Bryozoa	encrusting beige	crust/meadow						
Ophiura	sp.	3 - 15 cm						
Ascidia conchilega		3 - 15 cm						
Lipophrys pholis		3 - 15 cm				A	C	
Rhodophyta	dark red crusts	massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Rhodophyta	filamentous indet.	massive/turf						
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf						

Phase II Transect no.	T05_2	T05_2	T05_2	T05_1	T05_1	T05_1
Habitat no.	6	6	6	8	8	8
Shore position	Mid	Mid	Mid	Low	Low	Low
Quadrat no.	1	2	3	1	2	3
Sample no.	563 08#1	563 08#2	563 08#3	563 07#1	563 07#2	563 07#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow			1			
Verrucaria	sp.	crust/meadow						
Porifera	encrusting orange	crust/meadow						
Hymeniacidon perlevis		crust/meadow						
Actinia equina		1 - 3 cm						
Eulalia viridis		3 - 15 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow			<1			
Spirobinae		crust/meadow	<1		<1		<1	
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm		C				
Brachyura	juvenile	3 - 15 cm						
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm				2		
Steromphala umbilicalis		1 - 3 cm		5	3			
Patella vulgata		3 - 15 cm			1			
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm	>100	55	27		3	
Littorina fabalis		1 - 3 cm						
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Cellaria	sp.	massive/turf						
Rhodophyta	finely branching red indet	crust/meadow						
Rhodophyta	dark red crusts	massive/turf		1	<1			
Rhodophyta	filamentous indet.	massive/turf					<1	
Rhodophyta	fan shaped	massive/turf						
Rhodothamniella floridula		massive/turf	5	40			5	
Corallinaceae	indet. red calcareous crusts	crust/meadow	3		10			
Calliblepharis ciliata		massive/turf						<1
Chondrus crispus		massive/turf						1
Ceramium	sp.	massive/turf						
Osmundea pinnatifida		massive/turf	35	35	40			
Polysiphonia	sp.	massive/turf						
Cladostephus spongiosus		massive/turf					<1	<1
Fucales	sporelings	crust/meadow		<1			<1	
Ascophyllum nodosum		crust/meadow						
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow					5	
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow						
Chlorophyta	filamentous indet.	massive/turf						
Ulva intestinalis		massive/turf						5
Ulva	sp.	massive/turf						
Ulva lactuca		massive/turf			<1		<1	
Cladophora	sp.	massive/turf						

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow						
Porifera	encrusting orange	crust/meadow	R					
Hymeniacidon perlevis		crust/meadow	R					
Amphilectus fucorum		crust/meadow						
Halysarca dujardini	cf.	crust/meadow						
Actinia equina		1 - 3 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow	R					
Spirobinae		crust/meadow			R			
Oligochaeta		1 - 3 cm	F					
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm						
Porcellana platycheles		3 - 15 cm			A			
Carcinus maenas		3 - 15 cm						
Acanthochitona	sp.	3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm	F					
Steromphala umbilicalis		1 - 3 cm	F		C			
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm			A			
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm						
Bryozoa	encrusting beige	crust/meadow						
Ophiura	sp.	3 - 15 cm						
Ascidia conchilega		3 - 15 cm						
Lipophrys pholis		3 - 15 cm						
Rhodophyta	dark red crusts	massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow			O			
Rhodophyta	filamentous indet.	massive/turf			R			
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf						

Phase II Transect no.	T08_2	T08_2	T08_2	T08_1	T08_1	T08_1
Habitat no.	4	4	4	5	5	5
Shore position	Mid	Mid	Mid	Low	Low	Low
Quadrat no.	1	2	3	1	2	3
Sample no.	563 13#1	563 13#2	563 13#3	563 12#1	563 12#2	563 12#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Verrucaria	sp.	crust/meadow						
Porifera	encrusting orange	crust/meadow						
Hymeniacidon perlevis		crust/meadow						
Actinia equina		1 - 3 cm				1		
Eulalia viridis		3 - 15 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow				<1		
Spirobranchus		crust/meadow				<1		
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm						
Brachyura	juvenile	3 - 15 cm						
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm		1			2	
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm						
Steromphala umbilicalis		1 - 3 cm						
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm		1				
Littorina littorea		1 - 3 cm	1	1			2	3
Littorina fabalis		1 - 3 cm			1		1	
Littorina obtusata		1 - 3 cm		4	1			
Littorina saxatilis		1 - 3 cm						
Cellaria	sp.	massive/turf					<1	
Rhodophyta	finely branching red indet	crust/meadow						
Rhodophyta	dark red crusts	massive/turf		<1		<1		<1
Rhodophyta	filamentous indet.	massive/turf				<1		
Rhodophyta	fan shaped	massive/turf						1
Rhodothamniella floridula		massive/turf		1		20	10	15
Corallinaceae	indet. red calcareous crusts	crust/meadow				2		1
Calliblepharis ciliata		massive/turf						
Chondrus crispus		massive/turf						
Ceramium	sp.	massive/turf						
Osmundea pinnatifida		massive/turf					5	
Polysiphonia	sp.	massive/turf						<1
Cladostephus spongiosus		massive/turf				2	1	
Fucales	sporelings	crust/meadow	1	2				4
Ascophyllum nodosum		crust/meadow						
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow		5	45	50	55	45
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow		85	10			
Chlorophyta	filamentous indet.	massive/turf						
Ulva intestinalis		massive/turf	30	1	5	8	2	5
Ulva	sp.	massive/turf						
Ulva lactuca		massive/turf	1	<1	<1	1	<1	1
Cladophora	sp.	massive/turf		1	5			1

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow						
Porifera	encrusting orange	crust/meadow					R	R
Hymeniacidon perlevis		crust/meadow						
Amphilectus fucorum		crust/meadow						R
Halisarca dujardini	cf.	crust/meadow					R	
Actinia equina		1 - 3 cm						
Lanice conchilega		1 - 3 cm				F		
Spirobranchus	sp.	crust/meadow					R	R
Spirobranchus		crust/meadow		R			R	O
Oligochaeta		1 - 3 cm						
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm				C		
Porcellana platycheles		3 - 15 cm				A	A	A
Carcinus maenas		3 - 15 cm						C
Acanthochitona	sp.	3 - 15 cm						C
Steromphala	sp.	1 - 3 cm						F
Steromphala cineraria		1 - 3 cm				F		F
Steromphala umbilicalis		1 - 3 cm					F	C
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm						
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm					C	
Nucella lapillus		1 - 3 cm						
Bryozoa	encrusting beige	crust/meadow						O
Ophiura	sp.	3 - 15 cm						
Ascidia conchilega		3 - 15 cm					R	
Lipophrys pholis		3 - 15 cm					C	
Rhodophyta	dark red crusts	massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow		O			R	R
Rhodophyta	filamentous indet.	massive/turf						
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf						

Phase II Transect no.	T09_2	T09_2	T09_2	T09_1	T09_1	T09_1
Habitat no.	7	7	7	8	8	8
Shore position	Mid	Mid	Mid	Low	Low	Low
Quadrat no.	1	2	3	1	2	3
Sample no.	563_10#1	563_10#2	563_10#3	563_11#1	563_11#2	563_11#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow						
Verrucaria	sp.	crust/meadow						
Porifera	encrusting orange	crust/meadow					<1	
Hymeniacidon perlevis		crust/meadow						5
Actinia equina		1 - 3 cm						
Eulalia viridis		3 - 15 cm			1			1
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow	<1	<1		<1	<1	
Spirobranchus		crust/meadow	<1	<1			<1	
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm						
Brachyura	juvenile	3 - 15 cm						
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm						
Steromphala umbilicalis		1 - 3 cm	5	5	2	1	10	1
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm	2			2	3	2
Littorina fabalis		1 - 3 cm	2	2	3			
Littorina obtusata		1 - 3 cm	4	5	14			1
Littorina saxatilis		1 - 3 cm						
Cellaria	sp.	massive/turf						
Rhodophyta	finely branching red indet	crust/meadow						
Rhodophyta	dark red crusts	massive/turf	<1	<1	<1		<1	3
Rhodophyta	filamentous indet.	massive/turf					<1	<1
Rhodophyta	fan shaped	massive/turf						1
Rhodothamniella floridula		massive/turf				60	15	70
Corallinaceae	indet. red calcareous crusts	crust/meadow	5	<1			30	
Calliblepharis ciliata		massive/turf						
Chondrus crispus		massive/turf				1		
Ceramium	sp.	massive/turf						
Osmundea pinnatifida		massive/turf				15	5	20
Polysiphonia	sp.	massive/turf						
Cladostephus spongiosus		massive/turf				1		<1
Fucales	sporelings	crust/meadow				<1		
Ascophyllum nodosum		crust/meadow						
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow	100	100	100	7	20	5
Fucus spiralis		crust/meadow						
Fucus vesiculosus		crust/meadow						
Chlorophyta	filamentous indet.	massive/turf						
Ulva intestinalis		massive/turf				4		1
Ulva	sp.	massive/turf						
Ulva lactuca		massive/turf	<1	<1				2
Cladophora	sp.	massive/turf	<1	5	5		3	

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow						
Porifera	encrusting orange	crust/meadow					R	
Hymeniacidon perlevis		crust/meadow						
Amphilectus fucorum		crust/meadow						
Halysarca dujardini	cf.	crust/meadow						
Actinia equina		1 - 3 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow					R	R
Spirobranchus		crust/meadow					R	R
Oligochaeta		1 - 3 cm					F	
Semibalanus balanoides		crust/meadow						
Balanus balanus		crust/meadow						
Amphipoda		1 - 3 cm					F	F
Porcellana platycheles		3 - 15 cm					F	A
Carcinus maenas		3 - 15 cm						C
Acanthochitona	sp.	3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm						
Steromphala umbilicalis		1 - 3 cm				F		F
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm				F		
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm						
Crepidula fornicata		3 - 15 cm						A
Nucella lapillus		1 - 3 cm						
Bryozoa	encrusting beige	crust/meadow						R
Ophiura	sp.	3 - 15 cm					F	F
Ascidia conchilega		3 - 15 cm						
Lipophrys pholis		3 - 15 cm						
Rhodophyta	dark red crusts	massive/turf				R		
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Rhodophyta	filamentous indet.	massive/turf				R	R	
Ulva lactuca		massive/turf				R		
Cladophora	sp.	massive/turf				O		

Phase II Transect no.	T18_3	T18_3	T18_3	T18_2	T18_2	T18_2
Habitat no.	2	2	2	3	3	3
Shore position	High	High	High	Mid	Mid	Mid
Quadrat no.	1	2	3	1	2	3
Sample no.	563_01#1	563_01#2	563_01#3	563_03#1	563_03#2	563_03#3

Taxon	Qualifier	SACFOR class						
Verrucaria maura		crust/meadow	<1	1			<1	<1
Verrucaria	sp.	crust/meadow					<1	<1
Porifera	encrusting orange	crust/meadow						
Hymeniacion perlevis		crust/meadow						
Actinia equina		1 - 3 cm					1	
Eulalia viridis		3 - 15 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow						
Spirobinae		crust/meadow	4					
Semibalanus balanoides		crust/meadow				1		
Balanus balanus		crust/meadow					<1	
Amphipoda		1 - 3 cm						
Brachyura	juvenile	3 - 15 cm						
Macropodia	sp.	3 - 15 cm						
Carcinus maenas		3 - 15 cm		1				
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm	4			3	1	3
Steromphala umbilicalis		1 - 3 cm	1		1	3	1	
Patella vulgata		3 - 15 cm	1		1			
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm	1				6	5
Littorina fabalis		1 - 3 cm			1			
Littorina obtusata		1 - 3 cm	1					1
Littorina saxatilis		1 - 3 cm	1		1	32	7	
Cellaria	sp.	massive/turf						
Rhodophyta	finely branching red indet	crust/meadow						
Rhodophyta	dark red crusts	massive/turf						
Rhodophyta	filamentous indet.	massive/turf						
Rhodophyta	fan shaped	massive/turf						
Rhodothamniella floridula		massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Calliblepharis ciliata		massive/turf						
Chondrus crispus		massive/turf						
Ceramium	sp.	massive/turf						
Osmundea pinnatifida		massive/turf						
Polysiphonia	sp.	massive/turf						
Cladostephus spongiosus		massive/turf						
Fucales	sporelings	crust/meadow	2	<1	1	4	1	
Ascophyllum nodosum		crust/meadow			1			
Fucus	sp.	crust/meadow						
Fucus serratus		crust/meadow						
Fucus spiralis		crust/meadow	5					
Fucus vesiculosus		crust/meadow			8	5	25	50
Chlorophyta	filamentous indet.	massive/turf						
Ulva intestinalis		massive/turf	15	5	55			
Ulva	sp.	massive/turf						
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf	10	8	15			

Under-boulder taxa (where present, enumerated using SACFOR)								
Verrucaria maura		crust/meadow				R		
Porifera	encrusting orange	crust/meadow						
Hymeniacion perlevis		crust/meadow						
Amphilectus fucorum		crust/meadow						
Halysarca dujardini	cf.	crust/meadow						
Actinia equina		1 - 3 cm						
Lanice conchilega		1 - 3 cm						
Spirobranchus	sp.	crust/meadow						
Spirobinae		crust/meadow				R		R
Oligochaeta		1 - 3 cm						
Semibalanus balanoides		crust/meadow						F
Balanus balanus		crust/meadow				R		
Amphipoda		1 - 3 cm	F	F	F	C	C	
Porcellana platycheles		3 - 15 cm						
Carcinus maenas		3 - 15 cm						
Acanthochitona	sp.	3 - 15 cm						
Steromphala	sp.	1 - 3 cm						
Steromphala cineraria		1 - 3 cm						F
Steromphala umbilicalis		1 - 3 cm						
Patella vulgata		3 - 15 cm						
Littorina	sp.	1 - 3 cm						
Littorina littorea		1 - 3 cm				F		F
Littorina obtusata		1 - 3 cm						
Littorina saxatilis		1 - 3 cm				C		
Crepidula fornicata		3 - 15 cm						
Nucella lapillus		1 - 3 cm						
Bryozoa	encrusting beige	crust/meadow						
Ophiura	sp.	3 - 15 cm						
Ascidia conchilega		3 - 15 cm						
Lipophrys pholis		3 - 15 cm				C		
Rhodophyta	dark red crusts	massive/turf						
Corallinaceae	indet. red calcareous crusts	crust/meadow						
Rhodophyta	filamentous indet.	massive/turf						
Ulva lactuca		massive/turf						
Cladophora	sp.	massive/turf						

Phase II Transect no.	T18_1	T18_1	T18_1
Habitat no.	4	4	4
Shore position	Low	Low	Low
Quadrat no.	1	2	3
Sample no.	563_02#1	563_02#2	563_02#3

Taxon	Qualifier	SACFOR class			
Verrucaria maura		crust/meadow		<1	
Verrucaria	sp.	crust/meadow			
Porifera	encrusting orange	crust/meadow			
Hymeniacidon perlevis		crust/meadow			
Actinia equina		1 - 3 cm			
Eulalia viridis		3 - 15 cm			
Lanice conchilega		1 - 3 cm			
Spirobranchus	sp.	crust/meadow	1		<1
Spirobranchus		crust/meadow		2	<1
Semibalanus balanoides		crust/meadow			<1
Balanus balanus		crust/meadow			
Amphipoda		1 - 3 cm			
Brachyura	juvenile	3 - 15 cm			
Macropodia	sp.	3 - 15 cm			2
Carcinus maenas		3 - 15 cm			
Steromphala	sp.	1 - 3 cm			
Steromphala cineraria		1 - 3 cm			3
Steromphala umbilicalis		1 - 3 cm			
Patella vulgata		3 - 15 cm	1		
Littorina	sp.	1 - 3 cm			
Littorina littorea		1 - 3 cm		3	6
Littorina fabalis		1 - 3 cm			
Littorina obtusata		1 - 3 cm	1	1	
Littorina saxatilis		1 - 3 cm			
Cellaria	sp.	massive/turf			
Rhodophyta	finely branching red indet	crust/meadow			
Rhodophyta	dark red crusts	massive/turf			
Rhodophyta	filamentous indet.	massive/turf			
Rhodophyta	fan shaped	massive/turf			
Rhodothamniella floridula		massive/turf			
Corallinaceae	indet. red calcareous crusts	crust/meadow		2	
Calliblepharis ciliata		massive/turf			
Chondrus crispus		massive/turf			
Ceramium	sp.	massive/turf			
Osmundea pinnatifida		massive/turf			
Polysiphonia	sp.	massive/turf			
Cladostephus spongiosus		massive/turf			
Fucales	sporelings	crust/meadow		2	20
Ascophyllum nodosum		crust/meadow			
Fucus	sp.	crust/meadow	<1		
Fucus serratus		crust/meadow	80	75	6
Fucus spiralis		crust/meadow			
Fucus vesiculosus		crust/meadow		8	
Chlorophyta	filamentous indet.	massive/turf			
Ulva intestinalis		massive/turf			
Ulva	sp.	massive/turf			
Ulva lactuca		massive/turf			
Cladophora	sp.	massive/turf			

Under-boulder taxa (where present, enumerated using SACFOR)					
Verrucaria maura		crust/meadow			
Porifera	encrusting orange	crust/meadow			
Hymeniacidon perlevis		crust/meadow			
Amphilectus fucorum		crust/meadow			
Halisarca dujardini	cf.	crust/meadow			
Actinia equina		1 - 3 cm			
Lanice conchilega		1 - 3 cm			
Spirobranchus	sp.	crust/meadow		R	
Spirobranchus		crust/meadow	R	F	
Oligochaeta		1 - 3 cm			
Semibalanus balanoides		crust/meadow			
Balanus balanus		crust/meadow			
Amphipoda		1 - 3 cm	F		C
Porcellana platycheles		3 - 15 cm	C	C	
Carcinus maenas		3 - 15 cm			
Acanthochitona	sp.	3 - 15 cm			
Steromphala	sp.	1 - 3 cm			
Steromphala cineraria		1 - 3 cm			
Steromphala umbilicalis		1 - 3 cm	F		
Patella vulgata		3 - 15 cm	C		
Littorina	sp.	1 - 3 cm			
Littorina littorea		1 - 3 cm			
Littorina obtusata		1 - 3 cm			
Littorina saxatilis		1 - 3 cm			
Crepidula fornicata		3 - 15 cm			
Nucella lapillus		1 - 3 cm			
Bryozoa	encrusting beige	crust/meadow			
Ophiura	sp.	3 - 15 cm	F		
Ascidia conchilega		3 - 15 cm			
Lipophrys pholis		3 - 15 cm			
Rhodophyta	dark red crusts	massive/turf			
Corallinaceae	indet. red calcareous crusts	crust/meadow	R		
Rhodophyta	filamentous indet.	massive/turf			
Ulva lactuca		massive/turf			
Cladophora	sp.	massive/turf			

Appendix V: MNCR biotope code glossary

Definitions of all MNCR biotope codes used in this report.

MNCR Biotope code	MNCR biotope name
LR.MLR	Moderate energy littoral rock.
LR.MLR.BF.Fser.Bo	<i>Fucus serratus</i> and under-boulder fauna on exposed to moderately exposed lower eulittoral boulders.
LR.MLR.BF.Rho	<i>Rhodothamniella floridula</i> on sand-scoured lower eulittoral rock.
LR.LLR	Low energy littoral rock.
LR.LLR.F.Fves.FS	<i>Fucus vesiculosus</i> on full salinity moderately exposed to sheltered mid eulittoral rock.
LR.LLR.F.Fves.X	<i>Fucus vesiculosus</i> on mid eulittoral mixed substrata.
LR.LLR.F.Asc.X	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral mixed substrata.
LR.LLR.F.Fserr.FS	<i>Fucus serratus</i> on full salinity sheltered lower eulittoral rock.
LR.LLR.F.Fserr.X	<i>Fucus serratus</i> on full salinity lower eulittoral mixed substrata.
LR.FLR.Lic.Ver	<i>Verrucaria maura</i> on littoral fringe rock.
LR.FLR.Eph.EphX	Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata.
LR.FLR.Eph.Ulv	<i>Ulva</i> spp. on freshwater-influenced and/or unstable upper eulittoral rock.
LS.LCS.Sh.BarSh	Barren littoral shingle.
LS.LSa	Littoral sand.
LS.LSa.St	Strandline.

LS.LSa.MoSa	Barren or amphipod-dominated mobile sand shores.
LS.LSa.MoSa.BarSa	Barren littoral coarse sand.
LS.LSa.FiSa	Polychaete/amphipod dominated fine sand shores.
LS.LSa.FiSa.Po	Polychaetes in littoral fine sand.
LS.LSa.MuSa	Polychaete/bivalve dominated muddy sand shores.
LS.LMu	Littoral mud.
LS.LMx	Littoral mixed sediment.
IR.MIR	Moderate energy infralittoral rock.

