# Marine communities of the Youghal Bay area, and an assessment of their nature conservation importance

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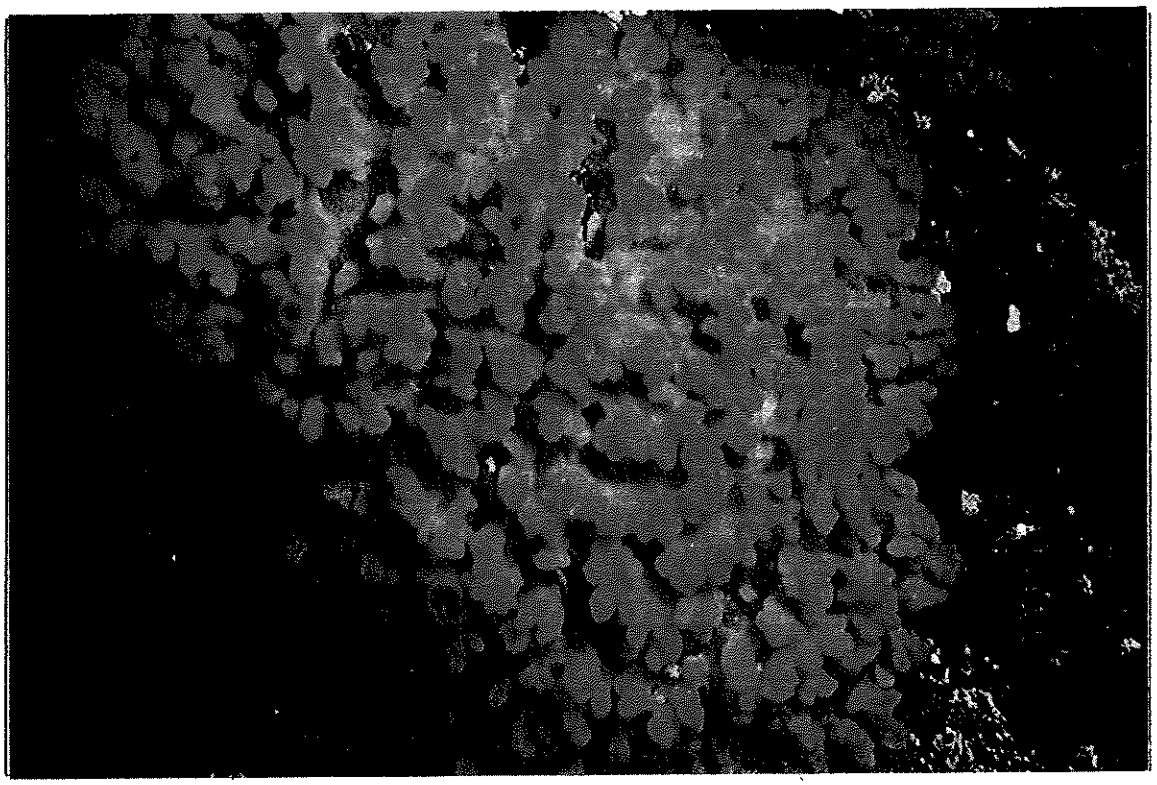

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**Cover Picture** The red form of the encrusting sponge *Oscarella lobularis*. This sponge was common on rock within the survey area.

### Reference


Emblow, C.S., Picton, B.E., Sides, E.M., Morrow, C.C. and Costello, M.J. 1995 Marine communities of the Youghal Bay area, and an assessment of their conservation importance. Field survey report, Environmental Sciences Unit, Trinity College, Dublin.

# INTRODUCTION

As part of a survey of the marine habitats and communities of Ireland, the present study sampled 18 sublittoral sites along the coast between Ballycotton Island and Mine Head. This report presents the results of this survey, summarises the results of previous studies and provides a conservation assessment of the area.

Eleven areas of conservation importance with a maritime component have already been identified along the study area, mainly for their ornithological and botanical interest but none for their marine importance.

# STUDY AREA

## Physical conditions

The survey area covered the coast between Ballycotton Island in County Cork and Mine Head in County Waterford, and centred on the fishing town of Youghal. The coastline was approximately 30 km long. Youghal is set at the entrance of the River Blackwater estuary where it enters into the Youghal Bay. To the west the bay is bounded by Knockadoon Head with Capel Island just offshore. From Knockadoon Head westwards the coastline sweeps around Ballycotton Bay to Ballycotton Point and Ballycotton Island.

Youghal Bay is bounded in the east by Ram Head, where a series of high cliffs drop to the sea. Beyond Ram Head is Ardmore Bay, a small bay with the fishing village of Ardmore nestling at the western end. A narrow strand extends eastwards until Blackrock, where the shoreline becomes more rocky and rises to low cliffs backed by farmland. The coast remains rocky until Helvick Head at the entrance of Dungarvan Harbour.

Much of the area is relatively shallow, between 10 and 15 m BCD within 3 km of the shoreline, except at Ballycotton Island where the seabed drops steeply down to 35 m BCD close into the shore.

The bedrock geology of the area consists of old red sandstone overlying a layer of limestone. The majority of the terrestrial outcropping rock is sandstone although limestone features are found in the Dungarvan area.

The tidal range at Youghal varies from a maximum of 3.7 m on spring tides to 1.9 m on some neap tides. Local variations in the tidal range are minimal throughout the survey area. Tidal streams are weak throughout the area.

## Human impacts

The main centres of population are Youghal and Dungarvan, where in 1971 the populations were 5445 and 5583 respectively (Royal Irish Academy 1979).

The main impact on the area is from fishing carried out from the small harbours along the coast, in particular, Ballycotton, Youghal and Ardmore.

Youghal is the main centre, a small fishing town with a small number of boats. There is a fishery for salmon using drift nets and a number of boats offer day trips for anglers. During the survey period, which was outside of the salmon netting season, numerous unmarked drift nets were observed. These nets were in excess of 400 m long and barely visible from a boat. The fisheries from Ardmore and Ballycotton are probably very small and limited to drift netting and potting.

Youghal is a popular tourist resort although the impact of tourism in the marine environment is likely to be small. The town only has a small beach and access to other stretches of

coastline is limited. Ballycotton Bay however has a large stretch of beach which is adjacent to a tourist caravan site. Ardmore is similar with a small beach and a caravan site backing the foreshore.

## Current nature conservation status

Several sites in the survey area are noted for their nature conservation importance and have been designated as Areas of Scientific Interest (ASIs) (Table 1, Figure 1). Currently ASIs are under review by the Office of Public Works (OPW) to ascertain whether they should be redesignated as National Heritage Areas (NHAs).

The Blackwater estuary, which includes the Kinsale Beg saltmarsh ASI, and the Ballymacoda and Ballycotton Bay ASIs have been proposed as Special Protection Areas for wild birds (SPAs) in 1993 under the provisions of the EC Directive 79/409/EEC (Anon. 1993).

**Table 1** Current nature conservation status of coastal Areas of Scientific Interest in the Youghal Bay area (Office of Public Works, 1989).

| No | Name | Importance | Interest | Description | Location |
|---|---|---|---|---|---|
| 1. | Dungarvan Harbour | National | Ornithological Botanical | Intertidal mud and sand flats with *Zostera* spp. which provide feeding area for wintering wildfowl and waders. Numbers of black tailed godwit, grey plover and knot are particularly high. | X 27 91 |
| 2. | Helvick Head | Regional | Ornithological | Breeding site for numerous seabirds particularly razorbills, guillemots and kittiwakes. | X 31 88 |
| 3. | Glennana Wood | Local | Ecological | A small wood in a steep coastal valley with ash, elm, oak, elder, hawthorn and sycamore. | X 25 81 |
| 4. | Ballyeelinan Wood | Local | Ecological | A small wood in a steep coastal valley. | X 21 81 |
| 5. | Ardmore lead mine | Regional | Geological | An early leadmine possibly dating back from the 7-9th century. | X 199 773 |
| 6. | Kinsale Beg saltmarsh | Local | Ornithological | Roosting site for waders and wildfowl that feed in Youghal Bay. | X 11 79 |
| 7. | Ballyvergan Marsh | Regional | Botanical Ornithological | An extensive area of reed swamp with well developed flora and fauna. The shrimp *Neomysis integer* is common. | X 09 76 |
| 8. | Ballymacoda, Clonpriest and Pillmore | National | Botanical Ornithological | Area for wintering waders and wildfowl including internationally important assemblages of golden plover . | X 06 72 |
| 9. | Knockadoon Head | Regional | Geological | A rocky headland with exposures of Carboniferous and Devonian sandstones and a sequence of Quaternary sediments. | X 29 70 |
| 10. | Garryvoe | National | Geomorphological | A high cliff of glacial material showing stratigraphic relationships between the tills resulting from local and major glaciation | W 99 66 |
| 11. | Ballycotton Bay | National | Ornithological | Feeding area for a wide variety of over-wintering birds. | W 99 65 |

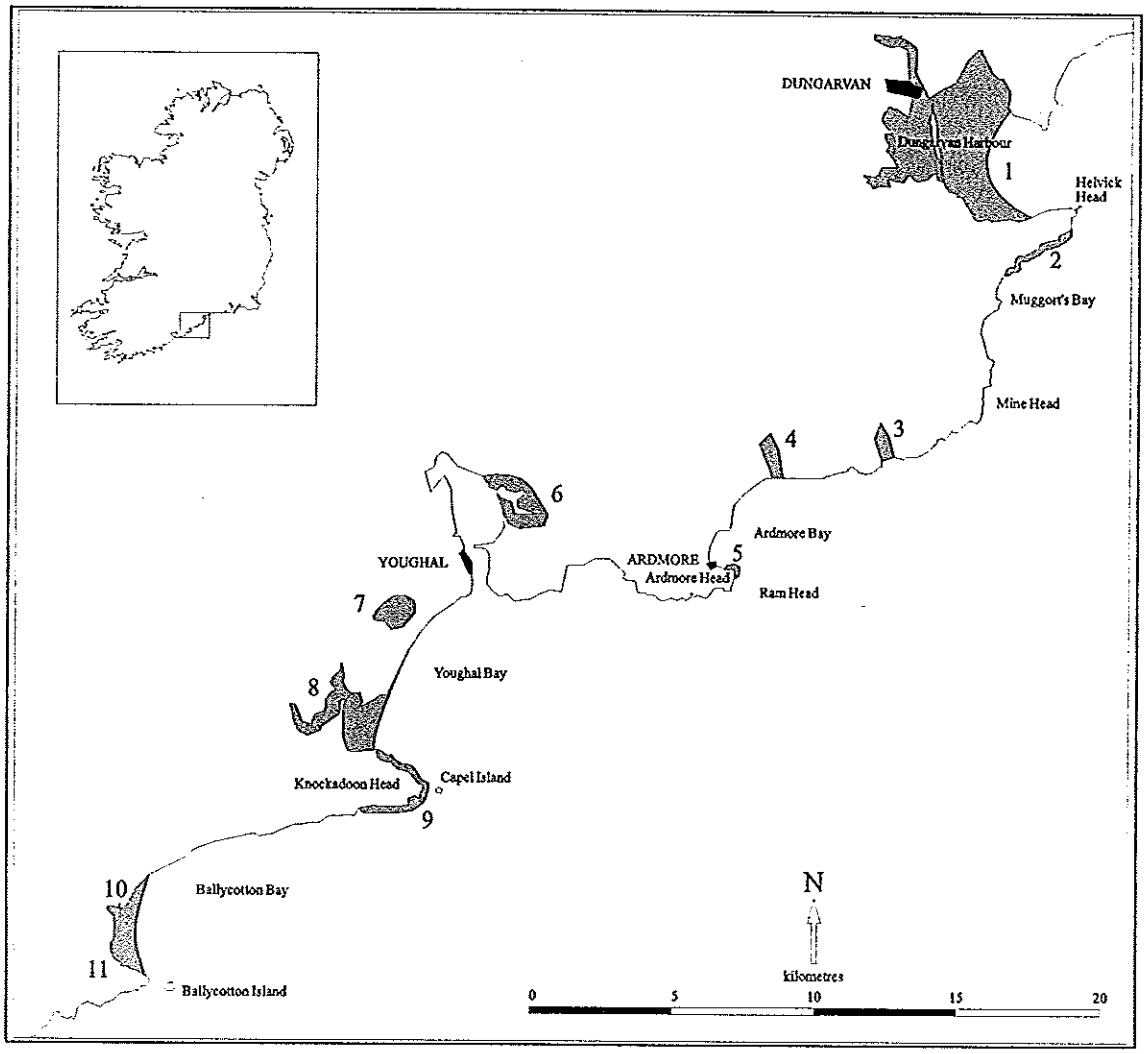


**Figure 1** Areas of conservation interest (listed in Table 1).

## METHODS

The aims of the survey were to firstly provide descriptions of the habitats and associated communities in the sublittoral zone from the Youghal Bay area. The descriptions will contribute to the final BioMar community descriptions of Ireland from which an assessment of the biological interest and nature conservation interest of the area can be made. Secondly, to assess the degree of variability in recording methods between individual and paired surveyors; this is discussed in a separate report.

Sites were selected to give a broad spread of habitats and communities likely to occur in the area. Inspection of Admiralty chart (2049) and Ordnance Survey maps (22) and (25) indicated the topography, range of wave exposures and tidal streams in the area.

Sublittoral sites were surveyed by scuba diving from a rigid inflatable boat. Sites were surveyed following the procedures laid out in Hiscock (1990). For each site, and habitats within each site, a description was made of the main physical and biological features. The relative abundance of all conspicuous species present was recorded, categorised as rare, occasional, frequent, common, abundant or super abundant using the scales in Hiscock (1990). Habitats were selected from the main biological subzones and range of substrata present.

Several sites were surveyed by each member of the team separately to enable a comparison between recorders. To ensure that the area surveyed was the same by each recorder, a

transect line was laid down over the seabed covering an area which was representative of the site. Each surveyor would record individually from the substrata along the line for a period not exceeding 30 minutes. A site form and one habitat form for each recorder was completed for each site. The results of comparative recording are discussed in a separate report.

Details of each site were recorded on sublittoral/littoral site, sublittoral habitat, and littoral habitat forms which facilitate data collation and transfer to a database.

Photographs were taken to illustrate the range of habitats, communities and species present at as many of the sites as possible. Photographs were taken using two Nikon F4 SLR cameras enclosed in Aquatica underwater housings. One camera was fitted with a 20 mm wide angle lens and the other with a 60 mm macro lens. All the pictures were taken on Kodachrome 64 or 200 film.

Specimens were collected to improve *in situ* identification skills and to contribute to a voucher collection of the species present in the survey area. Faunal specimens will be lodged in the National Museum of Ireland, Dublin. A voucher collection of algae present in the area and especially of those that could not be identified was sent to Prof. M. Guiry, University College, Galway for identification. All records of these specimens were added to the appropriate habitat forms to be included in the data analysis.

All data collected during the survey were entered into a database at Trinity College, Dublin developed by the Marine Nature Conservation Review of the Joint Nature Conservation Committee (UK) (Mills 1991). The species data were analysed using TWINSPAN (Hill 1979) allowing the records to be separated into broad groupings. The groupings formed the basis for community descriptions from the survey area. The dataset analysed was relatively small and the groupings TWINSPAN created were not always biologically meaningful. The results were modified to take into account factors not included within the analysis, such as substratum and sampling variations, with the final groupings adjusted accordingly.

## RESULTS

The survey extended over six days between 23 and 26 September 1993. During the survey 18 sublittoral sites were visited (Table 2, Figure 2 and Appendix 1). Thirty-three habitat records were completed and 254 species or higher taxa were identified (Appendix 3). Three soft substrata communities and two hard substrata communities were described from the data collected (Table 3 and Appendix 2).

**Table 2** Location, surveyors, dates sampled, type of survey and if photographs were taken (P), at the sites surveyed in this study, see Figure 2.

Surveyors: BEP-Bernard E. Picton; CSE-Chris S. Emblow; CCM-Christine C. Morrow; EMS-Elizabeth M. Sides.

| No. | Site name | Grid ref. | Latitude & Longitude | Surveyors | Date | Survey type |
|---|---|---|---|---|---|---|
| 1. | S of Mine Head (outer), Youghal to Dungarvan | X 288 803 | 51°58.4'N 07°34.7'W | CSE,BEP | 27.09.93 | Sublittoral (P) |
| 2. | NE of Longship Rock, Youghal to Dungarvan | X 283 812 | 51°58.9'N 07°35.2'W | CCM,EMS | 27.09.93 | Sublittoral (P) |
| 3. | S of Mine Head (inner), Youghal to Dungarvan | X 280 820 | 51°59.3'N 07°35.4'W | CSE,BEP | 27.09.93 | Sublittoral (P) |
| 4. | NE of Ardmore Bay, Youghal to Dungarvan | X 221 792 | 51°57.8'N 07°40.6'W | EMS,CCM | 27.09.93 | Sublittoral (P) |
| 5. | SE of Ram Head (outer), Youghal Bay | X 205 763 | 51°56.3'N 07°42.0'W | BEP,CCM | 25.09.93 | Sublittoral (P) |
| 6. | SW of Ram Head, Youghal Bay | X 205 765 | 51°56.4'N 07°42.3'W | EMS,CSE | 25.09.93 | Sublittoral (P) |
| 7. | E of Ram Head, Youghal Bay | X 200 768 | 51°56.5'N 07°42.4'W | CCM,BEP | 25.09.93 | Sublittoral (P) |
| 8. | Centre of Whiting Bay, Youghal Bay | X 155 772 | 51°56.8'N 07°46.4'W | EMS,CSE | 25.09.93 | Sublittoral (P) |
| 9. | NE of Knockadoon Head, Youghal Bay | X 101 709 | 51°53.4'N 07°51.1'W | EMS,CSE | 25.09.93 | Sublittoral |
| 10. | S of Whiting Bay, Youghal Bay | X 150 713 | 51°53.6'N 07°46.9'W | BEP,CCM | 24.09.93 | Sublittoral (P) |
| 11. | E of Capel Head, Youghal Bay | X 126 698 | 51°52.8'N 07°48.9'W | CSE,EMS | 24.09.93 | Sublittoral (P) |
| 12. | S of Capel Island, Ballycotton Bay | X100 696 | 51°52.7'N 07°51.2'W | CSE,EMS, CCM,BEP | 26.09.93 | Sublittoral (P) |
| 13. | S of Knockadoon Head, Ballycotton Bay. | X 083 696 | 51°52.6'N 07°52.7'W | EMS,CSE | 26.09.93 | Sublittoral (P) |
| 14. | Centre of Ballycotton Bay. | X 021 667 | 51°51.1'N 07°58.1'W | CSE,EMS, CCM,BEP | 29.09.93 | Sublittoral |
| 15. | W of Shanagarry, Ballycotton Bay. | X 039 666 | 51°51.1'N 07°56.5'W | EMS,CSE | 29.09.93 | Sublittoral |
| 16. | N Ballycotton Bay. | X 016 671 | 51°51.3'N 07°58.5'W | CSE,CCM, BEP,EMS | 28.09.93 | Sublittoral |
| 17. | NE of Ballycotton Island, Ballycotton Bay | X 014 639 | 51°49.6'N 07°58.7'W | CSE,CCM, EMS,BEP | 28.09.93 | Sublittoral (P) |
| 18. | S of Ballycotton Island, Ballycotton Bay | X 015 617 | 51°48.4'N 07°58.6'W | CSE,EMS | 29.09.93 | Sublittoral (P) |

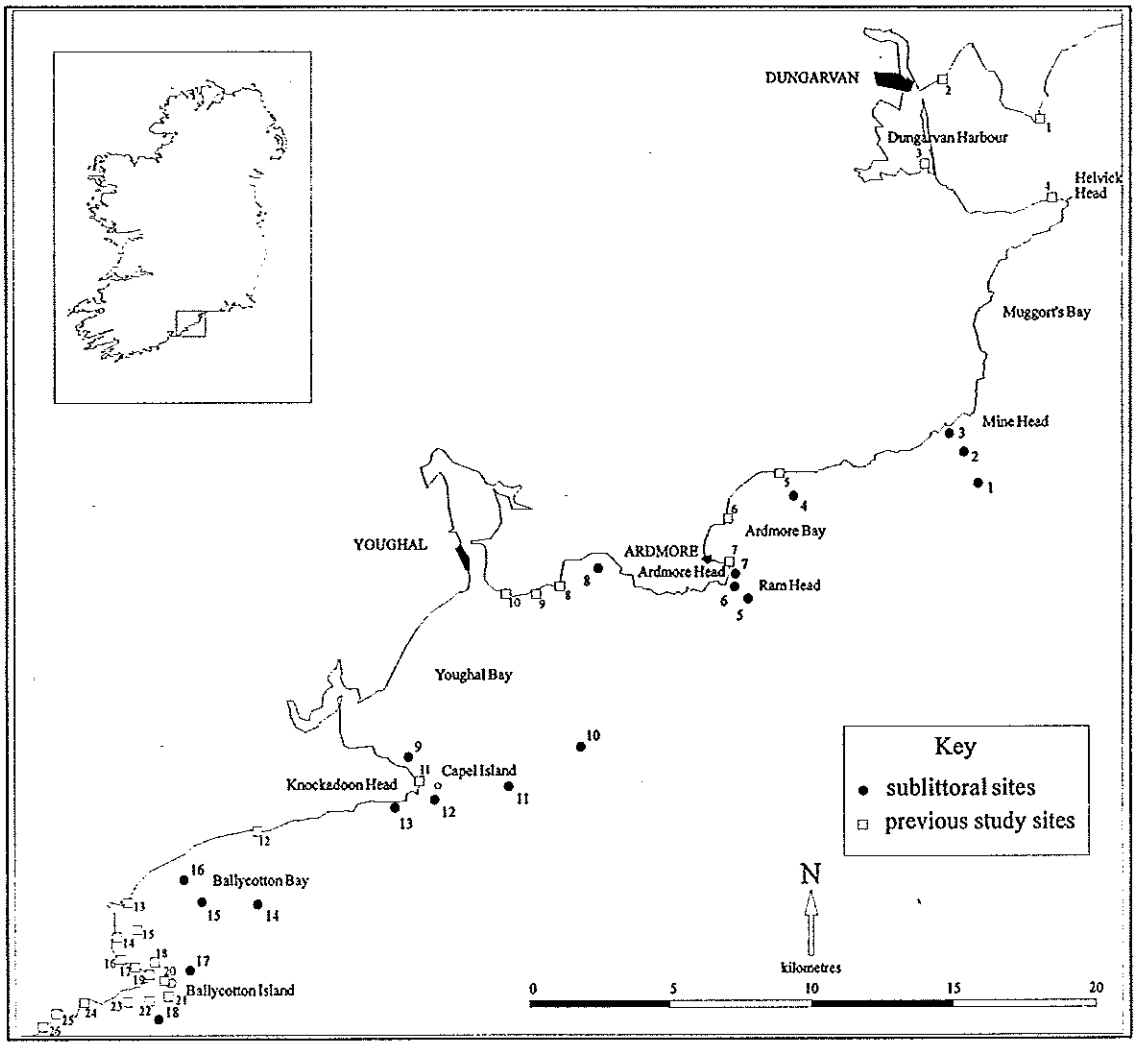


**Figure 2** Survey area and sampling locations (listed in Table 2 and Appendix 4)

**Table 3** Community types and their distribution

Community type SM- sublittoral mud; SS-sublittoral sand; SG-sublittoral gravel; SR-sublittoral rock.

| Community number | Community type | Community name | Sites present |
|---|---|---|---|
| YB 1 | SM | Mud with burrowing megafauna and *Amphiura filiformis* | 1; |
| YB 2 | SS | Sand with *Pectinaria* sp. and *Arenicola marina* | 8; 9 |
| YB 3 | SG | Mobile gravel and pebbles with few conspicuous species | 3 |
| YB 4 | SR | Exposed bedrock and boulders with urchin grazed *Laminaria hyperborea* forest | 3; 6; 7; |
| YB 5 | SR | Moderately exposed bedrock, boulders, cobbles and pebbles with *Laminaria hyperborea* forest | 13; 14; 16 |
| YB 6 | SR | Upper circalittoral bedrock and boulders with mixed fauna | 4, 12, 17 |
| YB 7 | SR | Lower circalittoral silted bedrock and boulders with brittlestars | 1, 5, 10, 15 |
| YB 8 | SR | Lower circalittoral rock with *Abietinaria abietina*, bryozoans and echinoderms | 1, 11, 18 |

## Sublittoral soft substrata communities

The sediment sites were typical of open coastal areas with large expanses of firm, fine, mobile sand and localised areas of clean gravels and pebbles in areas of increased water movement. Atypical were perhaps patches of mud overlying gravel which held a distinct fauna perhaps more typical, of deeper offshore mud.

An area of mud (YB 1, Table 3) was surveyed which formed one habitat in a mosaic of three adjacent types of substrata and was likely to be limited in extent. The mud was bounded by an area of boulders with an extensive habitat of bored limestone. The mud was shallow, overlying gravel and pebbles to a depth of less than 20 cm but was extensively burrowed by the Dublin Bay prawn *Nephrops norvegicus* and mud runner crab *Goneplax rhomboides*. The surface of the sediment was penetrated by the arms of the burrowing brittlestar *Amphiura filiformis*.

Areas of rippled fine sand occurred mainly in the bays to the east of Capel Island where the seabed was flat or very gently sloping. The faunal community (YB2) was characterised by polychaete worms *Pectinaria* sp. and *Arenicola marina* and the bivalves, *Spisula* sp. and *Mactra stultorum*. Little surface fauna was present apart from the hermit crab *Pagurus prideaux*.

The seabed close into the shore at Mine Head consisted of dunes of mobile cobbles and pebbles. This is likely to be a very localised habitat and only occur in areas where a combination of tidal streams and/or wave exposure have a large influence on the substratum. The highly mobile nature of the substratum had prevented the settlement of attached organisms since the only noticeable species, the starfish *Asterias rubens* and the dragonet fish *Callionymus reticulatus* (YB 3), were mobile.

## Sublittoral hard substrata communities

The uniformity of the stretch of coastline in the survey area was reflected in the low diversity of hard substrata habitats and communities that were described. The seabed consistently supported similar species, the main variations described from the different biological subzones.

At the main headlands, Mine Head, Knockadoon Head and Ballycotton Island and in Ballycotton Bay, stable hard substrata was present in the infralittoral. At many of these sites the seabed consisted of bedrock and boulders although the areas were not particularly extensive. At the headland sites (3, 6, and 7) the hard substrata was formed from outcropping areas of rock and from the extensions of the cliffs themselves into the sea. The majority of the rock was old red sandstone. The kelp *Laminaria hyperborea* was the dominant algae (YB 4) growing in forests on the shallower rocks where light was not limiting. On upward facing areas of rock there was an understorey growth of red algae, particularly *Delesseria sanguinea* and *Phycodrys rubens*. The grazing sea urchin *Echinus esculentus* was present at a number of sites, particularly at site three, and the red algal turf was heavily grazed.

At Ballycotton Bay and Knockadoon Head the main rock type was limestone which formed extensive reefs of broken bedrock and boulders. The main alga species here was also *Laminaria hyperborea* growing in dense forests, but in contrast to YB 4 had a rich understorey and epifauna of red and brown algae (YB 5). The limestone boulders and bedrock formed numerous subhabitats which were characterised by sponges, particularly *Halichondria panicea* and *Esperiopsis fucorum*, and anemones *Sagartia elegans* and *Caryophyllia smithii*. Underboulders, crevices and the rock itself which was heavily bored, all contributed to increasing the number of species present.

Bedrock and boulders in the circalittoral supported a variety of organisms. At the sites surveyed the upper circalittoral (YB 6) was dominated by hydroids, anthozoans and red algae. Bryozoan crusts were abundant on the more exposed ledges and outcrops. The dominant red algae were *Acrosorium uncinatum* and *Phycodrys rubens*. This biotope is likely to be extensive throughout the survey area.

Ardmore Bay, Youghal Bay and Ballycotton Bay supported dense beds of brittlestars in the lower circalittoral (YB 7). Bedrock, boulders and cobbles were covered with a thick layer of silt with hydroids, particularly *Halecium halecinum* and *Abietinaria abietina*, and the sea urchin *Echinus esculentus* frequent on silt free ridges and boulders.

Deeper circalittoral rock supported a wide variety of organisms characterised by the hydroid *Abietinaria abietina* which was common at all sites on exposed rock ridges (YB 8). The encrusting bryozoan *Parasmittina trispinosa* was present on many of the rock faces. Echinoderms, *Marthasterias glacialis* and *Echinus esculentus* were the next best represented taxa. In the survey area, deep water rocky substrata communities are likely to occur but were too far offshore to survey. The deeper inshore communities were from soft substrata. However at site 18, offshore from Ballycotton Island, the sponge *Axinella infundibuliformis* and the erect bryozoan *Porella compressa* were present. Both species are considered typical of deep circalittoral community.

## Previous studies

Few studies have been carried out in the survey area particularly on the sublittoral fauna and flora. The majority of the work is on the marine flora of the area.

Guiry (1977) lists the littoral algae from 10 sites in the County Waterford side of the survey area and provides descriptions of the sites visited (Appendix 4).

Egan (1983) lists algae from 10 littoral sites and 6 sublittoral sites in Ballycotton Bay and around Ballycotton Island. He provides brief descriptions of the sites surveyed including substratum type and the dominant algae present (Appendix 4).

Cullinane (1973) reviewed the work carried out on algae by various collectors from the four counties (Waterford, Cork, Kerry and Limerick) making up the south coast of Ireland. A checklist of algae from each county is given including records from Ballycotton Bay, Youghal Bay, Ardmore Bay, Helvick Head and Dungarvan Bay.

Guiry and Kilty (1972) described the intertidal beds of the eelgrasses *Zostera angustifolia* and *Zostera noltii* from Dungarvan Bay. Their importance as a food source for Brent geese and other wildfowl and the apparent decline in the beds due to 'wasting disease' and planting of *Spartina* species is discussed.

Scannell (1969) reviewed the presence of *Zostera* species in County Waterford. He recorded (tentatively) *Zostera angustifolia* from the Blackwater estuary.

# DISCUSSION

## Biotopes present

The communities described from the survey area reflect the uniformity of the coastline and its exposure to wave action. The data collected have provided a basis from which to direct further survey effort. The community descriptions, while based on a small dataset, can be taken as working drafts that will contribute to a wider classification of marine biotopes in Ireland following further survey work.

The number of communities described from the Youghal Bay area is low compared to other areas visited by BioMar during 1993 for three reasons. Firstly, there were no littoral communities described since only sublittoral sites were surveyed. Secondly, the sublittoral topography of the area and its physiographic location also contributed to the low community diversity. Areas of deep bedrock (greater than 30 m BCD) which would add a new biotope component were limited, only occurring in the west of the area surveyed. The majority of

the hard substrata was limited to between 0 and 20 m BCD and occurred close inshore. The seabed was gently sloping across most of the area with the 30 m depth contour occurring 2-3 km out to sea. Thirdly, 50% of the hard substrata records were recorded as being very exposed to wave action and the other 50% as exposed. This low variability in the physical environment also restricts the diversity of habitats available for different communities.

Areas of limestone bedrock and boulders in Ballycotton Bay formed ridges, fissures and crevices increasing the number of subhabitats available for benthic marine biota. Similar communities to those described on the limestone occurring on sandstone bedrock, in the east of the survey area, had a lower species richness. Many of the horizontal habitats were covered with layers of sediment.

The numbers of sublittoral soft substrata biotopes were also low. Much of the area is likely to be of a similar sandy substratum with localised areas of coarser and/or finer material. Such areas of sediment are likely to be extensive and homogenous.

## Human impacts

The Youghal Bay area has minimal heavy industry and is not heavily populated, although it is a popular tourist area with numerous accommodation and recreational facilities. While the affect on the marine life of the area from tourism is likely to be minimal, further developments, without adequate sewage treatment facilities may cause localised problems. The main human impact is likely to be due to dredging, potting and drift netting. All of these can cause disturbance and/or result in a bycatch of non-commercial species and diminish existing stocks of the target species if not adequately controlled.

## Conservation interest

The communities and species recorded from the Youghal Bay area are representative of the type of coastline along the south coast of Ireland and are probably reasonably extensive.

The area can be considered as undisturbed with no obvious signs of damage to the seabed by dredging or trawling. It is likely that moorings within the Blackwater estuary opposite Youghal and towards Kinsalebeg will have caused some impact to the seabed. Their however effect is likely to be minimal.

Very few rare or unusual species were recorded from the survey. However the sponge, *Oscarella lobularis*, which was recorded at eight sites (2, 3, 4, 5, 6, 7, 12, 18), can be described as notable. Although referred to here as *Oscarella lobularis* it is almost certainly not that species. *Oscarella* species have recently been studied in the Mediterranean using electrophoretic and cytological characteristics. The species previously known as *O. lobularis* was shown to be composed of two separate entities (Solé-Cava *et al.* 1992). A third entity, externally more similar to the species recorded from Ireland, is also known from the Mediterranean, but was not studied in this paper. Another name, *Oscarella rubra*, is available in the literature and may be more applicable to the sponge found in the current study. Furthermore, it was notable that the specimens observed in the Youghal area were on sloping rock in well lit situations and were mostly bright red in colour. Previous observations of *Oscarella* in the British Isles and Ireland were of yellow species in poorly lit, turbid situations or vertical surfaces. The development of pigment may therefore be associated to exposure to light. The abundance and large size of the specimens in the Youghal area was unusual.

The sponge, *Thymosia guernei*, recorded from site 14 and 16, is considered rare (Ackers *et al.* 1992). Another sponge, *Dercitus bucklandi* from site 16 is also notable, showing a

distinct preference for limestone habitats. Also recorded was the sea cucumber *Thyone roscovita* of which there are few Irish records (O'Connor *et al.* 1980).

## ACKNOWLEDGEMENTS

Thanks must go to Bruce Bell for his help in offering a suitable launch site and to the members of the Lifeboat Station in Youghal for their helpful advice.

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# APPENDICES

## Appendix 1 Descriptions of sites surveyed in 1993

(as described at the time of survey and exported from the MNCR database)

**1 S of Mine Head (outer), Youghal to Dungarvan 51°58.4'N 07°34.7'W**

The site was located offshore from a prominent headland midway along a south-east facing stretch of coastline. The seabed at 23.9 m BCD was a flat platform of what appeared to be extensively bored limestone rock with a dense layer of silt. Adjacent to the rock were areas of broken boulders formed from the overlying sandstone rock. An area of burrowed soft mud formed a mosaic with the two habitats.

**2 NE of Longship Rock, Youghal to Dungarvan 51°58.9'N 07°35.2'W**

An exposed site on the south coast of Ireland. Upper circalittoral bedrock had a fine covering of silt. The bedrock was very rugged and with thick layers of mud in the small gullies within the bedrock. The burrowing sea cucumber *Thyone roscovita* was characteristic of the pockets of mud with the sea cucumbers *Aslia lefevrei* and *Pawsonia saxicola* present in large numbers in the bedrock crevices. The hydroid *Abietinaria abietina* and the bryozoan *Parasmittina trispinosa* were common.

**3 S of Mine Head (inner), Youghal to Dungarvan 51°59.3'N 07°35.4'W**

The site was located offshore from a headland midway along a south-east facing stretch of linear coastline. The seabed at 15 m BCD consisted of duned pebbles on sand waves, with bedrock outcrops arising steeply from this plain.

**4 NE of Ardmore Bay, Youghal to Dungarvan 51°57.8'N 07°40.6'W**

The site was located on the north-east side of a wide bay. The bedrock at 14.6 m BCD gave way to fine muddy sand.

**5 SE of Ram Head (outer), Youghal Bay 51°56.3'N 07°42.0'W**

The site was located on the open south coast, to the south-east of a headland. There was a horizontal plain of bedrock ridges, 0.5 to 1 m high, covered with *Ophiothrix fragilis*.

**6 SW of Ram Head, Youghal Bay 51°56.4'N 07°42.3'W**

The site was located offshore from an open coast headland. The seabed at 13.3 m BCD was broken bedrock with cobbles and pebbles in gullies and rockmills. The seabed was level but rugged. The community was characterised by red algae, particularly *Acrosorium uncinatum*, with numerous hydroids. The rock faces were densely covered by encrusting bryozoans and coralline algae.

**7 E of Ram Head, Youghal Bay 51°56.5'N 07°42.4'W**

The site was to the east of a headland on an exposed south-facing coast. The seabed was silted and grazed bedrock with mobile pebbles and a sparse fauna and flora.

**8 Centre of Whiting Bay, Youghal Bay 51°56.8'N 07°46.4'W**

The site was located in the centre of a small sandy bay sheltered from prevailing wind by a distinct headland.

**9 NE of Knockadoon Head, Youghal Bay 51°53.4'N 07°51.1'W**

The site was located at the southern end of a wide bay with some shelter from the prevailing wind. Two rivers enter the bay and the site was south of the second, and smaller of the two rivers.

**10 S of Whiting Bay, Youghal Bay** **51°53.6'N 07°46.9'W**

The site was towards the outer part of Youghal Bay. The seabed was a uniform plain of small boulders and gravel in the circalittoral zone with little fauna present.

**11 E of Capes Head, Youghal Bay** **51°52.8'N 07°48.9'W**

The site was located at the west side of a wide bay to the east of a small island. The site was an exposed bedrock ridge of steeply sloping, silty slate like rock, with some cobbles at the base.

**12 S of Capel Island, Ballycotton Bay** **51°52.7'N 07°51.2'W**

The site was on the south side of a small island on the open south coast of Ireland. The seabed consisted of small ridges of bedrock and cobbles in the lower infralittoral. There was a layer of fine sediment on the rock. The species abundance and diversity were both very low.

**13 S of Knockadoon Head, Ballycotton Bay** **51°52.6'N 07°52.7'W**

The site was located on the southern side of a uniform stretch of 'hard' coast between two headlands. The site was adjacent to a cave in a shallow cove. The cave went back into the cliff and was predominantly intertidal. The entrance to the cave had a bank of *Sabellaria spinulosa* in the entrance and a sandy base. Outside the cave there was an area of broken bedrock with gullies and crevices, and dense *Laminaria digitata* and red algae although not particularly diverse.

**14 Centre of Ballycotton Bay** **51°51.1'N 07°58.1'W**

The site consisted of exposed bedrock at the outer reaches of an open bay on the south coast of Ireland. The upper infralittoral consisted of ridges of limestone rock. *Laminaria hyperborea* was common and foliose red algae covered the stipes of the kelp. The brittle star *Ophiactis balli* and the sponges *Cliona celata* and *Thymosia guernei* were characteristic of the limestone.

**15 W of Shanagarry, Ballycotton Bay** **51°51.1'N 07°56.5'W**

The site was located close to the centre of a wide bay protected from the prevailing south westerly winds by some offshore islands.

**16 N Ballycotton Bay** **51°51.3'N 07°58.5'W**

The site was located at the northern side of shallow bay sheltered from the prevailing south-west winds by a headland and offshore island.

**17 NE of Ballycotton Island, Ballycotton Bay** **51°49.6'N 07°58.7'W**

The site was located on the south-west side of an island offshore from a mainland headland. The general aspect of the coast was south-easterly. The seabed at 15 m BCD consisted of broken bedrock and cobbles forming jagged outcrops 1 - 1.5 m high. The area was heavily silted with many broken off kelp plants in the troughs and gullies. The rock had little intrinsic appeal and held sparse fauna and flora.

**18 S of Ballycotton Island, Ballycotton Bay** **51°48.4'N 07°58.6'W**

The site was located in deep water to the south of an offshore island from a mainland headland. The seabed at 27.8 m BCD was silted bedrock outcrops with ridges running parallel to the coast in a north-east to south-west direction. The rock was dominated by *Antedon bifida* with some lower circalittoral sponges, particularly *Axinella infundibuliformis*.

## Appendix 2: Biotope descriptions

A detailed description of each community recorded during the present survey is given below. Where possible a photograph is included to illustrate the habitat and community. Each description comprises the following sections:

a. A title for the **biotope type**, which indicates the main characterising taxa. The biotope types are numbered consecutively with the prefix YB denoting the survey area, Youghal Bay and surrounding area. These numbers do not relate to numbers given for biotope descriptions in other BioMar or MNCR type survey reports.

b. The key physical characteristics of the **habitat type**.

c. A **site and habitat classification** according to MNCR terms (Hiscock 1990). Where the habitat is present over a range of conditions the range within each category is indicated.

d. The recorded **distribution** of the community within the survey area. The numbers given refer to the site and habitat records, which correspond with MNCR database records (e.g., 14(1) is site record 14 and habitat record 1). Where the record includes more than one community this is marked with an asterisk (*).

e. The known or expected **extent** of the habitat within the survey area.

f. A **description** of the habitat, including the important physical and biological features, and any variations in community structure at particular sites.

g. The **species composition** of the community. Species included occurred at 35% or more of the stations from which the community was recorded, unless otherwise stated. Beside each species the range and median abundance within the community is shown (see Hiscock 1990 for abundance scales). **Frequency** is the number of records from which the species was recorded. The % displays this as a percentage of the total number of records assigned to that biotope. The **abundance** relates to those defined in Hiscock 1990. i.e.

P-present
R-rare
O-occasional
F-frequent
C-common
A-abundant
S-super abundant

**BIOTOPE YB 1** Mud with burrowing megafauna and *Amphiura filiformis*

**HABITAT** Soft mud

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Full |
| Wave exposure: | Moderately exposed |
| Geology: | Not applicable |
| Tidal streams: | Uncertain |
| Zone/range: | Not applicable; 24 m BCD |
| Substratum: | Soft mud with some pebbles and gravel |

**Distribution**

1(3)

**Extent**

Likely to be limited within the survey area to small localised patches.

**Description**

This biotope was restricted to an area of fine soft mud which formed part of a mosaic of substrata with boulders and bedrock. The mud was less than 20 cm deep and overlay a mixed coarse layer of gravels and pebbles.

The sediment was well worked by the Dublin Bay prawn *Nephrops norvegicus* and the mud runner crab *Goneplax rhomboides*. The burrowing brittlestar *Amphiura filiformis* was abundant just below the surface.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 1) | % | Range | Median |
| *Adamsia carciniopados* | 1 | 100 | O - O | O |
| *Nephrops norvegicus* | 1 | 100 | O - O | O |
| *Pagurus prideaux* | 1 | 100 | O - O | O |
| *Goneplax rhomboides* | 1 | 100 | O - O | O |
| *Amphiura filiformis* | 1 | 100 | A - A | A |

**BIOTOPE YB 2** Moderately exposed sand with *Pectinaria* sp. and *Arenicola marina*

**HABITAT** Sand with mud and gravel

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Moderately exposed |
| Geology: | Not applicable |
| Tidal streams: | Very weak |
| Zone/range: | Not applicable; 4 to 5 m BCD |
| Substratum: | Sand with some mud ,gravel and pebbles |

**Distribution**

8(1), 9(1)

**Extent**

Likely to be very extensive throughout the survey area, particularly the Youghal Bay area.

**Description**

The soft substrata of much of the Youghal Bay area is likely to be sand with limited exposures of rock. At the sites surveyed, firm fine sand overlaid a coarser sediment of pebbles and shelly sand to a depth of 3-4 cm in some areas.

The dominant species in the sand was the polychaete *Pectinaria* sp. which was common at the site with coarser sediment. The sand mason worm *Lanice conchilega* was frequent as where the bivalves, *Mactra stultorum* and *Spisula* sp.. The lugworm *Arenicola marina* was occasional at the sandier site although fewer other infaunal species were present. The sediment surface was well worked through with unidentified polychaete tubes.

The hermit crab *Pagurus prideaux* was notable on the surface with several specimens 'wearing' their commensal anemones *Adamsia carciniopados*.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 2) | % | Range | Median |
| Polychaeta indet. | 1 | 50 | C - C | C |
| *Arenicola marina* | 1 | 50 | O - O | O |
| *Owenia fusiformis* | 1 | 50 | P - P | P |
| *Pectinaria* sp. | 1 | 100 | P - C | C |
| *Lanice conchilega* | 1 | 50 | F - F | F |
| *Pagurus prideaux* | 1 | 50 | O - O | O |
| *Mactra stultorum* | 1 | 50 | F - F | F |
| *Spisula* sp. | 1 | 50 | F - F | F |

**BIOTOPE YB 3** Exposed mobile gravel and pebbles with few conspicuous species

**HABITAT** Mobile gravel and pebbles

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Exposed |
| Geology: | Not applicable |
| Tidal streams: | Weak |
| Zone/range: | Not applicable; 15 m BCD |
| Substratum: | Pebbles and gravels with sand |

**Distribution**

3(2)

**Extent**

This habitat is likely to occur throughout the survey area although limited in extent to localised patches.

**Description**

The seabed at 15 m BCD consisted of duned gravels and pebbles formed by wave action. The substrata was obviously mobile with no conspicuous infauna or attached epifaunal species. The dunes of pebbles were adjacent to steep bedrock outcrops which possibly accentuate the action of the waves.

The only fauna of note were both mobile scavengers, the starfish *Asterias rubens* and the reticulated dragonet *Callionymus reticulatus*; both were frequent.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 2) | % | Range | Median |
| *Asterias rubens* | 1 | 100 | F - F | F |
| *Callionymus reticulatus* | 1 | 100 | F - F | F |

**BIOTOPE YB 4** Exposed bedrock and boulders with urchin grazed *Laminaria hyperborea* forest

**HABITAT** Upper infralittoral bedrock and boulders

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Exposed |
| Geology: | Hard; sandstone |
| Tidal streams: | Very weak to weak |
| Zone/range: | Upper infralittoral; 5 to 15 m BCD |
| Substratum: | Bedrock and boulders with some cobbles and pebbles |

**Distribution**

3(1), 6(1), 7(1)

**Extent**

Likely to be typical of the infralittoral along much of the coastline in the survey area where hard substratum occurs.

**Description**

In the eastern side of the survey area, around Ram Head and Mine Head, bedrock and boulders in the infralittoral supported a forest of *Laminaria hyperborea*. An understorey of red algae was present, particularly *Delesseria sanguinea* and *Phycodrys rubens*. The only other algal species were the brown seaweeds *Dictyopteris membranacea* and *Dictyota dichotoma*. The number of sea urchins, *Echinus esculentus* which were grazing the algae were notable. Sponges were absent apart from the notable *Oscarella lobularis* which was frequent at all sites. Dean man's fingers *Alcyonium digitatum* were also frequent on the upward facing rock surfaces.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 3) | % | Range | Median |
| *Oscarella lobularis* | 3 | 100 | F - C | F |
| *Cliona celata* | 2 | 67 | O - F | O |
| *Halecium halecinum* | 2 | 67 | O - C | O |
| *Aglaophenia pluma* | 3 | 100 | O - F | F |
| *Abietinaria abietina* | 2 | 67 | O - C | O |
| *Sertularia argentea* | 3 | 100 | O - O | O |
| *Alcyonium digitatum* | 3 | 100 | F - F | F |
| *Anemonia viridis* | 2 | 67 | O - F | O |
| *Urticina felina* | 3 | 100 | O - O | O |
| *Metridium senile* | 2 | 67 | O - F | O |
| *Sagartia elegans* | 2 | 67 | O - O | O |
| *Actinothoe sphyrodeta* | 2 | 67 | F - C | F |
| *Corynactis viridis* | 2 | 67 | O - F | O |
| *Caryophyllia smithii* | 2 | 67 | O - F | O |
| *Pomatoceros triqueter* | 2 | 67 | O - F | O |
| *Cancer pagurus* | 2 | 67 | R - R | R |
| *Liocarcinus puber* | 3 | 100 | O - O | O |
| *Calliostoma zizyphinum* | 3 | 100 | R - O | O |

| | | | | |
|---|---|---|---|---|
| *Cadlina laevis* | 2 | 67 | R - O | R |
| *Parasmittina trispinosa* | 3 | 100 | O - C | C |
| *Cellepora pumicosa* | 2 | 67 | O - F | O |
| *Membranipora membranacea* | 2 | 67 | F - F | F |
| *Electra pilosa* | 2 | 67 | F - F | F |
| *Antedon bifida* | 2 | 67 | O - O | O |
| *Asterias rubens* | 3 | 100 | F - A | C |
| *Marthasterias glacialis* | 3 | 100 | R - O | O |
| *Echinus esculentus* | 3 | 100 | F - C | C |
| *Pollachius pollachius* | 2 | 67 | O - O | O |
| *Acrosorium uncinatum* | 2 | 67 | F - F | F |
| *Delesseria sanguinea* | 3 | 100 | O - C | F |
| *Phycodrys rubens* | 3 | 100 | F - F | F |
| *Dictyopteris membranacea* | 3 | 100 | O - C | F |
| *Dictyota dichotoma* | 3 | 100 | F - F | F |
| *Desmarestia aculeata* | 2 | 67 | O - F | O |
| *Laminaria hyperborea* | 3 | 100 | O - C | C |

**BIOTOPE YB 5** Moderately exposed bedrock and boulders, cobbles and pebbles with *Laminaria hyperborea* forest

**HABITAT** Upper infralittoral bedrock and boulders

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Moderately exposed to exposed |
| Geology: | Hard; sandstone |
| Tidal streams: | Very weak |
| Zone/range: | Upper infralittoral; 1 to 13 m BCD |
| Substratum: | Bedrock, boulders, cobbles, pebbles and gravel with some sand |

**Distribution**

13(1), 14(1), 16(1)

**Extent**

Likely to occur in much of the survey area where suitable substratum occurs in the infralittoral.

**Description**

In the western end of the survey area limestone rock outcropping in the infralittoral supported a dense forest of *Laminaria hyperborea*. The upward facing rock surfaces and kelp stipes supported dense red algae, most notably *Plocamium cartilagineum*, *Acrosorium uncinatum*, *Delesseria sanguinea* and *Phycodrys rubens*. Sponges were characteristic of the fauna, in particular *Halichondria panicea*, *Esperiopsis fucorum*, *Hemimycale columella* and *Dysidea fragilis*. *Urticina felina* occurred in many of the crevices on the rock faces and between boulders. *Sagartia elegans* and *Caryophyllia smithii* colonised the more open upward facing rock faces.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 3) | % | Range | Median |
| *Tethya aurantium* | 2 | 67 | O - F | O |
| *Cliona celata* | 2 | 67 | F - F | F |
| *Halichondria panicea* | 2 | 67 | F - C | F |
| *Esperiopsis fucorum* | 3 | 100 | O - F | O |
| *Hemimycale columella* | 3 | 100 | O - F | F |
| *Haliclona cinerea* | 2 | 67 | O - O | O |
| *Haliclona simulans* | 2 | 67 | F - C | F |
| *Dysidea fragilis* | 3 | 100 | O - F | O |
| *Aglaophenia pluma* | 2 | 67 | R - F | R |
| *Obelia geniculata* | 2 | 67 | C - C | C |
| *Urticina felina* | 3 | 100 | R - O | O |
| *Sagartia elegans* | 2 | 67 | O - O | O |
| *Caryophyllia smithii* | 2 | 67 | O - F | O |
| *Pomatoceros triqueter* | 2 | 67 | O - F | O |
| *Galathea squamifera* | 2 | 67 | O - O | O |
| *Liocarcinus puber* | 2 | 67 | O - F | O |
| *Gibbula cineraria* | 2 | 67 | O - O | O |

| | | | | |
|---|---|---|---|---|
| *Hinia incrassata* | 2 | 67 | O - O | O |
| *Parasmittina trispinosa* | 2 | 67 | O - F | O |
| *Henricia oculata* | 2 | 67 | O - O | O |
| *Asterias rubens* | 2 | 67 | F - C | F |
| *Aslia lefevrei* | 2 | 67 | F - F | F |
| *Didemnum maculosum* | 2 | 67 | O - O | O |
| *Ascidia mentula* | 2 | 67 | R - R | R |
| *Scyliorhinus canicula* | 2 | 67 | R - R | R |
| *Pollachius pollachius* | 2 | 67 | F - F | F |
| *Gobiusculus flavescens* | 2 | 67 | O - C | O |
| *Dilsea carnosa* | 3 | 100 | R - F | O |
| *Callophyllis laciniata* | 2 | 67 | O - F | O |
| *Kallymenia reniformis* | 2 | 67 | O - F | O |
| Corallinaceae indet. | 2 | 67 | F - F | F |
| *Phyllophora crispa* | 2 | 67 | O - F | O |
| *Calliblepharis ciliata* | 2 | 67 | C - C | C |
| *Acrosorium uncinatum* | 3 | 100 | F - F | F |
| *Delesseria sanguinea* | 2 | 67 | F - C | F |
| *Phycodrys rubens* | 3 | 100 | O - A | F |
| *Laminaria hyperborea* | 3 | 100 | F - A | A |
| *Saccorhiza polyschides* | 2 | 67 | R - R | R |

**BIOTOPE YB 6** Upper circalittoral bedrock, boulders and cobbles with hydroids, anthozoans, echinoderms and red algae

**HABITAT** Upper circalittoral bedrock, boulders and cobbles

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Moderately exposed to exposed |
| Geology: | Hard; limestone and sandstone |
| Tidal streams: | Very weak to weak |
| Zone/range: | Upper circalittoral; 13 to 18 m BCD |
| Substratum: | Bedrock, boulders with some cobbles |

**Distribution**

4(1), 12(5), 17(5)

**Extent**

Likely to occur throughout the survey area in the 'shallower' (less than 20 to 25 m BCD) circalittoral

**Description**

Bedrock and boulders in the circalittoral supported a variety of organisms. At the sites surveyed the upper circalittoral was dominated by hydroids, particularly *Halecium halecinum* and *Sertularella polyzonias*, with anthozoans, *Alcyonium digitatum*, *Anemonia viridis* and *Urticina felina*. The abundance of these species however was low. Bryozoan crusts and the keel worm *Pomatoceros triqueter* were abundant on the more exposed ledges and outcrops. *Antedon bifida* and *Echinus esculentus* characterised the open rock faces. The dominant red algae were *Acrosorium uncinatum* and *Phycodrys rubens*.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 3) | % | Range | Median |
| *Leuconia nivea* | 3 | 100 | R - O | O |
| *Oscarella lobularis* | 2 | 67 | O - F | O |
| *Suberites carnosus* | 2 | 67 | O - F | O |
| *Cliona celata* | 2 | 67 | O - S | O |
| *Tubularia indivisa* | 2 | 67 | O - O | O |
| *Halecium halecinum* | 3 | 100 | R - O | R |
| *Nemertesia antennina* | 2 | 67 | R - O | R |
| *Sertularella polyzonias* | 3 | 100 | O - O | O |
| *Sertularia argentea* | 2 | 67 | O - O | O |
| *Alcyonium digitatum* | 3 | 100 | R - O | O |
| *Anemonia viridis* | 3 | 100 | R - O | R |
| *Urticina felina* | 3 | 100 | O - F | O |
| *Metridium senile* | 2 | 67 | O - O | O |
| *Sagartia elegans* | 2 | 67 | R - F | R |
| *Caryophyllia smithii* | 3 | 100 | O - F | O |
| *Chaetopterus variopedatus* | 2 | 67 | R - O | R |
| *Pomatoceros triqueter* | 3 | 100 | F - F | F |
| *Palaemon serratus* | 2 | 67 | O - C | O |
| *Pandalus montagui* | 2 | 67 | O - F | O |

| | | | | |
|---|---|---|---|---|
| *Pagurus bernhardus* | 2 | 67 | R - O | R |
| *Pagurus prideaux* | 2 | 67 | R - O | R |
| *Galathea squamifera* | 3 | 100 | O - F | F |
| *Pisidia longicornis* | 3 | 100 | O - F | O |
| *Inachus phalangium* | 2 | 67 | O - F | O |
| *Cancer pagurus* | 2 | 67 | O - O | O |
| *Liocarcinus puber* | 3 | 100 | O - O | O |
| *Gibbula cineraria* | 3 | 100 | O - F | O |
| *Calliostoma zizyphinum* | 3 | 100 | O - O | O |
| *Hinia incrassata* | 3 | 100 | R - O | O |
| *Archidoris pseudoargus* | 2 | 67 | R - R | R |
| *Chlamys varia* | 2 | 67 | R - F | R |
| *Parasmittina trispinosa* | 2 | 67 | F - F | F |
| *Schizomavella linearis* | 2 | 67 | O - O | O |
| Bryozoa indet crusts | 2 | 67 | F - C | F |
| *Antedon bifida* | 3 | 100 | O - F | F |
| *Henricia oculata* | 2 | 67 | R - O | R |
| *Asterias rubens* | 3 | 100 | F - C | F |
| *Marthasterias glacialis* | 3 | 100 | O - O | O |
| *Ophiothrix fragilis* | 2 | 67 | O - F | O |
| *Ophiura albida* | 3 | 100 | O - F | F |
| *Echinus esculentus* | 3 | 100 | F - A | C |
| *Aslia lefevrei* | 3 | 100 | R - F | R |
| *Corella parallelogramma* | 2 | 67 | R - R | R |
| *Trisopterus minutus* | 3 | 100 | F - C | C |
| *Ctenolabrus rupestris* | 3 | 100 | O - F | O |
| *Callionymus lyra* | 3 | 100 | R - O | O |
| *Callionymus reticulatus* | 2 | 67 | O - F | O |
| *Gobiusculus flavescens* | 2 | 67 | O - F | O |
| *Pomatoschistus pictus* | 2 | 67 | R - O | R |
| *Zeugopterus punctatus* | 2 | 67 | R - R | R |
| *Callophyllis laciniata* | 2 | 67 | R - O | R |
| Corallinaceae indet. | 2 | 67 | O - F | O |
| *Acrosorium uncinatum* | 3 | 100 | R - C | F |
| *Delesseria sanguinea* | 2 | 67 | O - O | O |
| *Phycodrys rubens* | 3 | 100 | R - O | O |
| *Heterosiphonia plumosa* | 2 | 67 | F - A | F |
| *Dictyopteris membranacea* | 2 | 67 | O - F | O |
| *Dictyota dichotoma* | 2 | 67 | F - F | F |

**BIOTOPE YB 7** Lower circalittoral silted bedrock, boulders and cobbles with brittlestars

**HABITAT** Lower circalittoral bedrock, boulders and cobbles

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Moderately exposed to exposed |
| Geology: | Hard; limestone and sandstone |
| Tidal streams: | Weak |
| Zone/range: | Lower circalittoral; 18 to 26 m BCD |
| Substratum: | Bedrock, boulders and cobbles |

**Distribution**

1(1), 5(1), 10(1), 15(1)†

† incomplete record

**Extent**

Likely to occur throughout the survey area on similarly silted substratum

**Description**

Ardmore Bay, Youghal Bay and Ballycotton Bay supported dense beds of brittlestars, *Ophiothrix fragilis* and *Ophiocomina nigra*, in the lower circalittoral. Bedrock, boulders and cobbles were covered with a thick layer of silt with hydroids, particularly *Halecium halecinum* and *Abietinaria abietina*. *Echinus esculentus* were frequent on silt free ridges and boulders. The burrowing brittlestar *Ophiura albida* was abundant in more heavily silted areas.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 3) | % | Range | Median |
| *Halecium halecinum* | 3 | 100 | O - F | F |
| *Abietinaria abietina* | 2 | 67 | O - C | O |
| *Sertularella gayi* | 2 | 67 | O - F | O |
| *Sertularella polyzonias* | 2 | 67 | O - O | O |
| *Alcyonium digitatum* | 3 | 100 | R - F | O |
| *Urticina felina* | 2 | 67 | O - F | O |
| *Chaetopterus variopedatus* | 2 | 67 | O - F | O |
| *Pomatoceros triqueter* | 2 | 67 | F - C | F |
| *Pagurus prideaux* | 2 | 67 | O - O | O |
| *Inachus phalangium* | 2 | 67 | O - F | O |
| *Calliostoma zizyphinum* | 3 | 100 | O - O | O |
| *Tritonia hombergii* | 2 | 67 | R - O | R |
| *Parasmittina trispinosa* | 2 | 67 | F - F | F |
| *Antedon bifida* | 2 | 67 | O - F | O |
| *Luidia ciliaris* | 3 | 100 | R - F | O |
| *Henricia oculata* | 3 | 100 | R - O | R |
| *Asterias rubens* | 3 | 100 | O - F | F |
| *Ophiothrix fragilis* | 3 | 100 | F - S | C |
| *Ophiocomina nigra* | 3 | 100 | F - C | C |
| *Ophiura albida* | 2 | 67 | C - A | C |

| | | | | |
|---|---|---|---|---|
| *Echinus esculentus* | 3 | 100 | F - F | F |
| *Trisopterus minutus* | 2 | 67 | F - C | F |

**BIOTOPE YB 8** Lower circalittoral rock with *Abietinaria abietina*, bryozoans and echinoderms

**HABITAT** Lower circalittoral rock

**Classification**

| | |
|---|---|
| Situation: | Open coast |
| Salinity: | Normal |
| Wave exposure: | Moderately exposed to exposed |
| Geology: | Hard; limestone and sandstone |
| Tidal streams: | Very weak |
| Zone/range: | Lower circalittoral; 22 to 28 m BCD |
| Substratum: | Bedrock, boulders, cobbles and pebbles |

**Distribution**

1(2), 11(1), 18(1)

**Extent**

Likely to occur along much of the survey area where hard substrata occurs in deeper water (greater than 20 m BCD)

**Description**

Deeper circalittoral rock supported a wide variety of organisms characterised by the hydroid *Abietinaria abietina* which was common on exposed rock ridges. Echinoderms, *Marthasterias glacialis* and *Echinus esculentus* occurred on the open rock faces with patches of dense *Antedon bifida* on protruding rocky ridges. The encrusting bryozoan *Parasmittina trispinosa* was frequent at all of the sites. At site 18, offshore from Ballycotton Island, the sponge *Axinella infundibuliformis* and the erect bryozoan *Porella compressa* were present. Both species are considered typical of a deeper circalittoral community.

**Species composition**

| Species name | Frequency of occurrence | | Abundance | |
|---|---|---|---|---|
| | No. of records (Total 3) | % | Range | Median |
| *Tubularia indivisa* | 2 | 67 | O - O | O |
| *Abietinaria abietina* | 3 | 100 | F - A | C |
| *Caryophyllia smithii* | 2 | 67 | C - C | C |
| *Pomatoceros triqueter* | 2 | 67 | F - F | F |
| *Balanus balanus* | 2 | 67 | O - F | O |
| *Munida rugosa* | 2 | 67 | O - F | O |
| *Pentapora foliacea* | 2 | 67 | R - R | R |
| *Parasmittina trispinosa* | 3 | 100 | F - F | F |
| *Antedon bifida* | 2 | 67 | C - A | C |
| *Luidia ciliaris* | 2 | 67 | R - O | R |
| *Henricia oculata* | 2 | 67 | R - O | R |
| *Asterias rubens* | 2 | 67 | O - F | O |
| *Marthasterias glacialis* | 3 | 100 | O - O | O |
| *Echinus esculentus* | 3 | 100 | O - C | F |
| *Labrus mixtus* | 2 | 67 | R - O | R |
| Corallinaceae indet. | 2 | 67 | C - C | C |

## Appendix 3 List of taxa recorded during the present survey

The sites at which each species was recorded are given. Taxa are listed according to Howson (1987) except for *Esperiopsis fucorum* (previously *Amphilectus fucorum*).

| | |
|---|---|
| **Porifera** | |
| *Leuconia nivea* | 4; 5; 12; 16; 17 |
| *Oscarella lobularis* | 2; 3; 4; 5; 6; 7; 12; 18 |
| *Dercitus bucklandi* | 16 |
| *Pachymatisma johnstonia* | 16 |
| *Thymosia guernei* | 14; 16 |
| *Tethya aurantium* | 4; 14; 16 |
| *Suberites carnosus* | 4; 10; 16; 17 |
| *Laxosuberites incrustans* | 16 |
| *Terpios fugax* | 14; 16 |
| *Polymastia boletiformis* | 1 |
| *Polymastia mamillaris* | 4; 16 |
| *Cliona celata* | 1; 2; 3; 4; 6; 14; 16; 17; 18 |
| *Axinella infundibuliformis* | 18 |
| *Stelligera rigida* | 2; 11; 12; 16 |
| *Stelligera stuposa* | 16; 18 |
| *Halichondria bowerbanki* | 16 |
| *Halichondria panicea* | 13; 14; 16 |
| *Mycale rotalis* | 10 |
| *Esperiopsis fucorum* | 13; 14; 16 |
| *Hemimycale columella* | 13; 14; 16 |
| *Ophlitaspongia seriata* | 16 |
| *Haliclona cinerea* | 14; 16 |
| *Haliclona fistulosa* | 14; 16 |
| *Haliclona simulans* | 2; 12; 14; 16 |
| *Haliclona viscosa* | 12; 16; 18 |
| *Dysidea fragilis* | 13; 14; 16; 18 |
| *Aplysilla sulfurea* | 2; 16 |
| *Halisarca dujardini* | 2; 13; 16; 17 |
| Porifera crusts indet. | 13; 16 |
| **Cnidaria** | |
| *Tubularia* sp. | 2; 12 |
| *Tubularia indivisa* | 1; 5; 6; 12; 17; 18 |
| *Halecium beanii* | 1 |
| *Halecium halecinum* | 1; 2; 4; 5; 6; 7; 10; 12; 17; 18 |
| *Aglaophenia pluma* | 2; 3; 6; 7; 13; 14; 16 |
| *Aglaophenia tubulifera* | 2; 6; 11; 17 |
| *Gymnangium montagui* | 6 |
| *Kirchenpaueria pinnata* | 10; 18 |
| *Nemertesia antennina* | 1; 2; 4; 6; 17 |
| *Nemertesia ramosa* | 1 |
| *Plumularia setacea* | 2; 7; 10 |
| *Abietinaria abietina* | 1; 2; 3; 4; 5; 6; 11; 18 |
| *Amphisbetia operculata* | 7 |
| *Hydrallmania falcata* | 1 |
| *Sertularella gayi* | 1; 10; 17 |
| *Sertularella polyzonias* | 1; 2; 4; 5; 11; 12; 16; 17 |
| *Sertularia argentea* | 3; 6; 7; 11; 12; 17 |
| *Obelia* sp. | 3 |
| *Obelia dichotoma* | 2; 7 |
| *Obelia geniculata* | 2; 7; 14; 16 |
| *Rhizocaulus verticillatus* | 1 |
| *Sarcodictyon roseum* | 1 |
| *Alcyonium digitatum* | 1; 2; 3; 4; 5; 6; 7; 10; 11; 12; 15; 17 |
| *Alcyonium glomeratum* | 11 |
| *Eunicella verrucosa* | 16 |
| *Epizoanthus couchii* | 11 |
| *Isozoanthus sulcatus* | 1; 4; 14; 16 |
| *Anemonia viridis* | 3; 4; 6; 12; 16; 17 |
| *Urticina felina* | 1; 2; 3; 4; 5; 6; 7; 12; 13; 14; 16; 17; 18 |
| *Urticina eques* | 2; 5; 12; 13 |
| *Metridium senile* | 1; 2; 3; 4; 5; 7; 17 |
| *Sagartia elegans* | 2; 3; 4; 5; 6; 13; 14; 16; 17; 18 |
| *Cereus pedunculatus* | 2; 4; 5 |
| *Actinothoe sphyrodeta* | 6; 7; 16; 17 |
| *Adamsia carciniopados* | 1; 17 |
| *Corynactis viridis* | 6; 7; 13; 18 |
| *Caryophyllia smithii* | 1; 2; 3; 4; 6; 11; 12; 13; 14; 15; 16; 17; 18 |
| **Nemertea** | |
| *Lineus longissimus* | 16 |
| **Annelida** | |
| Polychaeta indet. | 8; 9 |
| *Alentia gelatinosa* | 16; 17 |
| *Harmothoe* sp. | 17 |
| *Chaetopterus variopedatus* | 3; 5; 10; 12; 14; 16; 17 |
| *Arenicola marina* | 8 |
| *Owenia fusiformis* | 9 |
| *Pectinaria* sp. | 8; 9 |
| *Eupolymnia nebulosa* | 17 |
| *Lanice conchilega* | 9; 10 |
| *Sabella pavonina* | 17 |
| *Pomatoceros triqueter* | 2; 3; 4; 5; 6; 10; 11; 12; 13; 14; 16; 17; 18 |
| **Chelicerata** | |
| Pycnogonida indet. | 11 |
| **Crustacea (lower)** | |
| *Balanus* sp. | 2 |
| *Balanus balanus* | 11; 17; 18 |
| *Balanus crenatus* | 10; 17 |
| **Crustacea (higher)** | |
| Mysidae indet. | 16 |
| *Palaemon serratus* | 4; 16; 17 |
| *Pandalus montagui* | 2; 10; 12; 17 |
| *Nephrops norvegicus* | 1 |

| | |
|---|---|
| *Palinurus elephas* | 18 |
| *Pagurus bernhardus* | 4; 14; 17 |
| *Pagurus prideaux* | 1; 4; 8; 10; 17 |
| *Galathea squamifera* | 2; 4; 12; 14; 16; 17 |
| *Galathea strigosa* | 10; 16 |
| *Munida rugosa* | 1; 18 |
| *Pisidia longicornis* | 4; 12; 14; 16; 17 |
| *Porcellana platycheles* | 2; 11 |
| *Ebalia tuberosa* | 10 |
| *Inachus phalangium* | 1; 3; 4; 10; 17 |
| *Eurynome* sp. | 1 |
| *Cancer pagurus* | 3; 4; 6; 10; 16; 17; 18 |
| *Liocarcinus puber* | 2; 3; 4; 5; 6; 7; 12; 14; 16; 17; 18 |
| *Goneplax rhomboides* | 1 |
| *Pilumnus hirtellus* | 2 |
| *Xantho incisus* | 16 |
| *Xantho pilipes* | 14; 16 |
| **Mollusca** | |
| *Tectura virginea* | 3; 16 |
| *Helcion pellucidum* | 7; 14; 16 |
| *Gibbula magus* | 12 |
| *Gibbula tumida* | 10 |
| *Gibbula cineraria* | 2; 4; 5; 7; 12; 14; 16; 17 |
| *Calliostoma zizyphinum* | 1; 2; 3; 4; 5; 6; 7; 10; 12; 14; 16; 17 |
| *Simnia patula* | 1; 6 |
| *Trivia* sp. | 6 |
| *Trivia arctica* | 6; 14; 16; 17 |
| *Trivia monacha* | 11; 17 |
| *Ocenebra erinacea* | 1; 14 |
| *Buccinum undatum* | 17 |
| *Hinia incrassata* | 4; 10; 12; 13; 14; 16; 17 |
| *Hinia reticulata* | 17 |
| *Raphitoma linearis* | 1 |
| *Aplysia punctata* | 14 |
| *Tritonia hombergii* | 1; 5; 16 |
| *Tritonia plebeia* | 2; 7; 12 |
| *Ancula gibbosa* | 1 |
| *Onchidoris sparsa* | 16 |
| *Polycera faeroensis* | 1 |
| *Cadlina laevis* | 2; 3; 5; 6; 11; 17 |
| *Archidoris pseudoargus* | 12; 16; 17 |
| *Cuthona caerulea* | 10 |
| *Eubranchus farrani* | 7 |
| *Facelina coronata* | 6 |
| *Chlamys distorta* | 4 |
| *Chlamys varia* | 12; 17 |
| *Aequipecten opercularis* | 1 |
| *Pododesmus patelliformis* | 17 |
| *Mactra stultorum* | 9 |
| *Spisula* sp. | 9 |
| *Gastrochaena dubia* | 14; 16 |
| *Hiatella arctica* | 11 |
| *Eledone cirrhosa* | 5; 17 |
| **Bryozoa** | |
| Crisiidae indet. | 6 |
| *Crisia denticulata* | 7 |
| *Alcyonidium diaphanum* | 1; 2; 4; 6; 14; 16 |
| *Vesicularia spinosa* | 1 |
| *Amathia* sp. | 1 |
| *Pentapora foliacea* | 3; 11; 18 |
| *Parasmittina trispinosa* | 1; 2; 3; 5; 6; 7; 10; 11; 12; 13; 14; 16; 17; 18 |
| *Porella compressa* | 18 |
| *Schizomavella linearis* | 2; 12; 14; 16; 17 |
| *Cellepora pumicosa* | 2; 3; 5; 7; 14; 16; 17 |
| *Membranipora membranacea* | 3; 7; 14; 16 |
| *Electra pilosa* | 3; 7; 16 |
| *Cellaria sinuosa* | 1 |
| *Bicellariella ciliata* | 16 |
| *Bugula plumosa* | 6 |
| Bryozoa crusts indet. | 6; 11; 12; 13; 16; 17 |
| **Phoronida** | |
| *Phoronis hippocrepia* | 1; 4 |
| **Echinodermata** | |
| *Antedon bifida* | 1; 2; 4; 5; 6; 7; 10; 12; 17; 18 |
| *Luidia ciliaris* | 1; 2; 5; 10; 11; 16; 17; 18 |
| *Crossaster papposus* | 10 |
| *Henricia oculata* | 1; 2; 5; 6; 10; 11; 12; 14; 16; 17; 18 |
| *Asterias rubens* | 1; 2; 3; 4; 5; 6; 7; 10; 11; 12; 14; 16; 17; 18 |
| *Leptasterias muelleri* | 12 |
| *Marthasterias glacialis* | 1; 2; 3; 4; 5; 6; 7; 11; 12; 14; 16; 17; 18 |
| *Ophiothrix fragilis* | 1; 2; 5; 10; 12; 14; 15; 16; 17 |
| *Ophiocomina nigra* | 1; 5; 10; 17 |
| *Ophiactis balli* | 1; 14 |
| *Amphiura filiformis* | 1 |
| *Ophiura albida* | 1; 4; 10; 12; 17 |
| *Psammechinus miliaris* | 5; 7; 12 |
| *Echinus esculentus* | 1; 2; 3; 4; 5; 6; 7; 10; 11; 12; 14; 17; 18 |
| *Pawsonia saxicola* | 2; 3; 16; 17; 18 |
| *Aslia lefevrei* | 2; 3; 4; 12; 14; 16; 17; 18 |
| *Ocnus planci* | 2; 7; 12 |
| *Thyone roscovita* | 1; 2; 16; 17 |
| **Tunicata** | |
| *Aplidium proliferum* | 16 |
| *Aplidium punctum* | 6 |
| Didemnidae indet. | 14 |
| *Didemnum maculosum* | 14; 16 |
| *Diplosoma listerianum* | 14; 16 |
| *Corella parallelogramma* | 12; 17 |
| *Ascidiella aspersa* | 12 |
| *Ascidia mentula* | 14; 16; 17 |
| *Polycarpa pomaria* | 17 |
| *Polycarpa rustica* | 1; 4 |
| *Botryllus schlosseri* | 13; 14; 16 |

| | |
|---|---|
| *Botrylloides leachi* | 14 |
| **Chondrichthyes** | |
| *Scyliorhinus canicula* | 1; 13; 14; 16 |
| **Osteichthyes** | |
| *Conger conger* | 16 |
| *Diplecogaster bimaculata* | 10 |
| *Pollachius pollachius* | 2; 3; 4; 7; 13; 16 |
| *Trisopterus minutus* | 2; 3; 4; 5; 10; 12; 17 |
| *Myoxocephalus scorpius* | 13; 17 |
| *Centrolabrus exoletus* | 16 |
| *Ctenolabrus rupestris* | 2; 4; 5; 11; 12; 16; 17 |
| *Labrus bergylta* | 3; 16 |
| *Labrus mixtus* | 11; 16; 18 |
| *Parablennius gattorugine* | 12 |
| *Chirolophis ascanii* | 17 |
| *Pholis gunnellus* | 3; 12 |
| *Callionymus lyra* | 2; 4; 12; 17 |
| *Callionymus reticulatus* | 3; 10; 12; 14; 17 |
| *Gobiusculus flavescens* | 4; 14; 16; 17 |
| *Pomatoschistus pictus* | 2; 7; 10; 12; 17 |
| *Thorogobius ephippiatus* | 2; 12; 18 |
| *Phrynorhombus norvegicus* | 17 |
| *Zeugopterus punctatus* | 2; 3; 12; 17 |
| *Microstomus kitt* | 5; 12 |
| **Rhodophycota** | |
| *Bonnemaisonia asparagoides* | 6; 14 |
| *Palmaria palmata* | 13 |
| *Dilsea carnosa* | 6; 13; 14; 16 |
| *Callophyllis laciniata* | 6; 12; 14; 16; 17 |
| *Kallymenia reniformis* | 14; 16 |
| *Meredithia microphylla* | 16 |
| Corallinaceae indet. | 2; 3; 10; 11; 12; 13; 14; 16; 17; 18 |
| *Corallina officinalis* | 13 |
| *Phyllophora* sp. | 6; 12 |
| *Phyllophora crispa* | 2; 4; 14; 16 |
| *Schottera nicaeensis* | 16 |
| *Chondrus crispus* | 14; 16 |
| *Plocamium cartilagineum* | 12; 13; 14; 16 |
| *Sphaerococcus coronopifolius* | 14 |
| *Furcellaria lumbricalis* | 13 |
| *Calliblepharis ciliata* | 2; 4; 14; 16 |
| *Rhodymenia holmesii* | 17 |
| *Rhodymenia ardissonei* | 11; 17 |
| *Lomentaria articulata* | 16 |
| *Sphondylothamnion multifidum* | 16 |
| *Acrosorium uncinatum* | 2; 3; 4; 6; 12; 13; 14; 16; 17 |
| *Cryptopleura ramosa* | 4; 6; 14; 16 |
| *Delesseria sanguinea* | 2; 3; 4; 6; 7; 12; 13; 14; 16 |
| *Membranoptera alata* | 14; 16 |
| *Phycodrys rubens* | 3; 4; 6; 7; 12; 13; 14; 16; 17 |
| *Polyneura laciniata* | 3; 4 |
| *Heterosiphonia plumosa* | 4; 12; 14; 16 |
| Rhodophycota indet.(non-calc. .crusts) | 12; 16 |
| **Chromophycota** | |
| *Ralfsia* sp. | 2 |
| *Halopteris filicina* | 16 |
| *Cladostephus spongiosus* | 13 |
| *Dictyopteris membranacea* | 2; 3; 4; 6; 7; 12; 16 |
| *Dictyota dichotoma* | 2; 3; 4; 6; 7; 12; 13 |
| *Desmarestia aculeata* | 3; 7 |
| *Laminaria digitata* | 13 |
| *Laminaria hyperborea* | 3; 6; 7; 12; 13; 14; 16 |
| *Laminaria saccharina* | 12 |
| *Saccorhiza polyschides* | 7; 13; 16 |
| *Alaria esculenta* | 13 |
| *Halidrys siliquosa* | 2; 3; 4; 13 |
| Chromophycota indet.(crusts) | 3; 12 |

## Appendix 4 List of sites from previous studies

1-10 Guiry (1977), 11-26 Egan (1983); Site type L-littoral, S-sublittoral

| Site no. | Site name | Grid ref. | Site type |
|---|---|---|---|
| 1 | Ballinacoutry Point | X 320 942 | L |
| 2 | Spit Bank | X 270 927 | L |
| 3 | Cunnigar | X 268 903 | L |
| 4 | Helvick Head | X 318 890 | L |
| 5 | Paulsworth | X 213 803 | L |
| 6 | Black Rock, Curragh | X 202 788 | L |
| 7 | Ardmore Head | X 201 770 | L |
| 8 | Whiting Bay | X 161 770 | L |
| 9 | Calliso Bay | X 138 766 | L |
| 10 | Mangan's Bay | X 117 765 | L |
| 11 | - | X 088 703 | L |
| 12 | - | X 038 684 | L |
| 13 | - | W 992 660 | L |
| 14 | - | W 987 652 | L |
| 15 | - | W 994651 | S |
| 16 | - | W 988 641 | L |
| 17 | - | W 995 638 | L |
| 18 | - | W 998 640 | S |
| 19 | - | W 998 636 | L |
| 20 | - | X 003 636 | L |
| 21 | - | X 005 635 | S |
| 22 | - | X 000 633 | S |
| 23 | - | W 993 631 | S |
| 24 | - | W 674 627 | L |
| 25 | - | W 668 626 | L |
| 26 | - | W 967 623 | S |