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Survey of intertidal sediment biotopes in estuaries in Ireland

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Survey of intertidal sediment biotopes in estuaries in Ireland

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INTRODUCTION

The aim of this survey was to identify the species composition of selected intertidal mud and sand flat areas so as to describe their community composition and facilitate the assessment of their nature conservation importance. The occurrence of rare and large numbers of species was thus of interest. In addition, this contributed to the development of the marine biotopes classification by the Marine Nature Conservation Review (MNCR) of the Joint Nature Conservation Committee as part of the BioMar project.

A biotope is the physical habitat with its biological community, a combination of the physical environment and its distinctive assemblage of conspicuous species. The MNCR - BioMar biotope classification system is based primarily on the physical features and conditions pertaining at site level and the physical and biological factors at the habitat or station level (Connor *et al.* 1996). Using data from field surveys of habitats and communities which occur around the coast of Britain, the MNCR described 22 different littoral sediment biotope types. These range from barren shingle or gravel shores on exposed coasts to reduced salinity, muddy shores in very sheltered bays and estuaries. The primary classification was on the basis of the substratum with characteristic species from the biological community used as the secondary classification. The primary classifications for the sediment are, littoral mud (LMU), littoral muddy sand (LMS) and littoral gravels and sands (LGS). The present study applied the 1996 biotope classification, provided comments to MNCR on its applicability in Ireland, and suggested new biotopes for consideration.

Following the classification of each of the stations surveyed into a specific biotope, each site (collection of stations) was assessed as to its' conservation importance. To do this sites were scored according to:

- Species richness
- Species rarity
- Biotope richness
- Biotope rarity

The presence of intertidal shellfish farms and proximity to urban areas was noted.

METHODS

Site selection

Sites were selected to reflect the habitats and communities likely to occur in areas already noted for their bird populations. Survey areas were selected by NPWS to cover large sand and mudflats where insufficient infauna data existed, and to sample the inner and outer parts of the larger bays and estuaries (Figure 1, Table 1). Specific sampling sites were selected by the surveyors. Inspection of Admiralty charts and Ordnance Survey maps indicated the topography, range of wave exposures and tidal currents in the various areas. Each bay or mudflat was initially observed in the field to see what areas provide the best sampling opportunities before individual sampling sites were selected. In many cases ease of access to the shore was an important factor.

Field sampling

The macrofauna and sediments in representative sites in each survey area were observed and sampled. The physical characteristics of each sampling area in terms of degree of wave exposure were based on topography, sediment observation, and granulometric analysis. The macro-infauna at each sampling station was determined through sampling and analysis of dig and core material.

Sampling was carried out from June - September 1996 during the 4 - 5 days of the spring tide period. At each sampling location a transect was established between the last high water mark and the low water mark of the tide being worked. These were determined by taking a known starting point and by proceeding to a landmark or by following a set compass bearing. Distance along the transect was measured by calibrated pacing. Site location was recorded by giving the OS grid reference for the centre of the site. Sampling location was recorded as distance along the transect. As the shallow slope of many mudflats prevents accurate levelling the tidal height of stations was not recorded.

The sampling was based on methods described in Hiscock (1996) and was similar to that employed for beaches and exposed sandy shores as part of the BioMar project in Ireland. Sampling was essential to describe communities present within sediments. Habitats were selected from the main biological zones and range of substrata present. In effect this meant sampling along the shore at the upper, mid and lower shores plus sampling of the strandline talitrid biotope (Figure 2). For each site,

and habitats within each site, a description was made of the main physical (e.g. sand ripples, pools) and biological (e.g. worm tubes) features. Where it was considered that additional biotopes and species may be present further digs were taken elsewhere on the shore. At the upper shore, the land above the sediment area was described in general terms (e.g. rocky shore, marsh, etc.) but was not surveyed. Photographs were taken to illustrate the range of habitats present and to describe the general site topography. A selection of these are included in this report.

Sampling followed the tide down the shore. At each sampling point an area of 1 m^2 was dug as 4 x 0.25 m^2 areas, to a depth of 20 cm. Sediment from these digs was passed over a coarse (1 cm) square mesh sieve to determine the presence and abundance of large burrowing animals which were counted in situ. Smaller animals noticed passing through this sieve were also noted and collected. Smaller fauna were quantitatively sampled by collecting 4 x 0.01 m^2 cores. These cores were taken approximately 1 m apart in a square configuration and to a depth of 20 cm. Combined core samples were washed with fresh water over a 1 mm square mesh sieve before fixation in ethanol, sorting, identification and counting. A voucher collection of each animal identified was established by storing animals in labelled jars of 70% ethanol. The relative abundance of all conspicuous species present was recorded and categorised as rare, occasional, frequent, common, abundant or super abundant using the scales in Hiscock (1996).

Following the completion of sampling at each site the appropriate MNCR site and habitat forms were completed. All data collected during the survey was entered into the MNCR database at Trinity College, Dublin. The two initial survey sites Dorrins Strand and Cumeen Strand, both in Sligo Harbour, were sampled differently (more stations and less effort per station) and the entry of data from these sites was correspondingly adjusted for the purposes of comparison.

Sediment analysis

The proportion of sediment which was sand and mud was recorded in the field. Sediment samples were also taken in a 5 x 15 cm core (one each per sampling location) for more accurate granulometric analysis. Sediment samples collected were dried at 40°C. A subsample of each sample was forwarded to Aqua-Fact International Ltd for granulometric analysis. Only the total sediment fraction (< 1 mm) was analysed in this manner. The percentage content of mud (< 63 μm), very fine sand,

fine sand, medium sand and coarse sand in each sample was determined as well as median grain size (measured in phi Ø units i.e. - $\log_2$ mm). The sediment was categorised, as sand mud, muddy sand, etc., following Buchanan (1984). Granulometric data from 5 cores was excluded from analysis because of insufficient data or having become lost during analysis. Organic content (%) was determined by subjecting a further subsample to Loss on Ignition (LOI) analysis by the authors. Prior to LOI analysis sediment samples were redried at 100°C for at least 24 hours.

Abundance scale

The MNCR SACFOR abundance scale (Hiscock, 1996) was used for recording the abundance of flora and fauna. In this scale each species (rather than individuals) is allocated a size, and an abundance rating is given based on that size and the density at which it occurs on the shore. A large species at a low density could have the same abundance rating as a smaller species which occurred at a higher density. The MNCR database has a default size scale for each of the species in its species directory. Prior to this survey, data from the BioMar sediment habitats was entered into the database using these default sizes. Therefore in the interest of continuity, comparability and compatibility, the MNCR default size was used throughout this survey as agreed with NPWS. The actual number of individuals of each species found in each dig and core have been included on the station data sheets. It was found in this study, that in many cases, the default size (used to reflect true relative abundance between smaller and larger species) allotted to species in the MNCR database did not necessarily reflect the average size of the species found on the shore. Consequently when using the default size, some species which occurred in low numbers could have been given more importance in terms of characterising a shore than other species of similar size or larger which occurred at higher densities. This tended to influence the biotope classification designation. For example the bivalve *Scrobicularia plana* had a default size of 3-15 cm while *Macoma balthica* had a default size of <1cm. If only one small *Scrobicularia plana* was found in a 1 m^2 dig then it would be classed as common in that dig. However, at least 100 *Macoma balthica* would need to be present in the dig before they could be said to be common. Therefore when distinguishing between the MNCR biotopes LMU.HedScr and LMU.HedMac, the SACFOR scale favours the selection of the *Scrobicularia* variation. If the selection was based on numbers present or were biomass to be

calculated the dominant or characterising species might be *Macoma*. However, these factors did not affect the correct allocation of biotopes because the TWINSPAN analysis options used account for variation in abundance scales by grouping adjacent abundance's as the same. Furthermore, the species and habitat features at each station were manually compared with the biotope descriptions to check they were applicable.

Data analysis

The collated species and granulometry data was entered into the MNCR database. Initially the species data from all the surveyed stations was analysed using the TWINSPAN (Hill, 1979) multivariate analysis programme incorporated into the MNCR database. This analysis clustered stations on the basis of the composition and abundance of species present at each station. Data from the core samples and from the digs and observations made during the survey were used. The database transformed both quantitative and semi-quantitative data to a $\log_{10}$ abundance scale. This allowed data from all 142 of the survey stations to be included in the analysis. Only 97 out of the 142 stations surveyed would have been analysed if only the core data was included.

TWINSPAN analysis used the species lists for the stations surveyed. The analysis provided groups of stations which broadly corresponded to biotopes. The low number of species at each station limited the TWINSPAN analysis. Consequently both the physical and biological characteristics of each station were examined and compared with characteristics in the MNCR biotope descriptions (Connor *et al.*, 1996). The substratum type was of primary importance when assessing the physical characteristics of the site, reflecting both the degree of exposure of the shore and tidal stream strength. The species list for each sampling station (from both cores and digs) and their relative abundance using the MNCR abundance scale (Hiscock, 1996) was used in the biological assessment of each station for biotope allocation.

Table 1. The database report number, field numbers (year-month-day), name, and grid references for the sites sampled.

Report No.	Number of sampling stations	Site Field No. and date sampled	Site name	Grid reference at site centre
1	5	960913	Rosslare Point, Wexford Harbour	T 093 183
2	5	960912	The Burrow, Wexford Harbour	T 090 168
3	4	960915	Bannow Bay, inner	S 845 115
4	5	960914	Bannow Bay outer	S 825 075
5	2	960916	Newtown Head, Waterford Harbour	S 705 070
6	4	960831	Passage East, Waterford Harbour	S 705 096
7	4	960827	Back of Tramore Strand, Waterford Harbour	S 605 015
8	3	960828	Whitehouse Bank, Dungarvan Harbour	X 280 910
9	5	960829	Inner Dungarvan Harbour,	X 265 915
10	4	960830	Kinsalebeg, Youghal Harbour	X 120 795
11	4	960816	Ballymacoda, inner	W 061 725
12	5	960815	Ballymacoda, outer	X 070 717
13	5	960814	Clonakilty Harbour, outer	W 401 398
14	5	960927	Ballycarbery, Valentia Harbour	V 446 795
15	4	960802	Callinafercy, Castlemaine Harbour	Q 765 105
16	4	960803	Back Inch strand, Castlemaine Harbour	Q 670 100
17	4	960804	Back of Derrymore Island, Tralee Bay	Q 795 129
18	4	960801	The Spa, Tralee Bay	Q 788 146
19	4	960926	Barrow Harbour, Tralee Bay	Q 740 175
20	5	960928	Poulnasherry Bay	Q 942 577
21	4	961015	White Strand, Clew Bay	L 910 835
22	4	961014	Carraholly, Clew Bay	L 948 856
23	4	961013	Claggan Cove, Clew Bay	L 949 899
24	4	960705	Ballysadare Bay	G 635 305
25	3	960704	Dorrin's Strand, Sligo Harbour	G 635 379
26	3	960703	Cummeen Strand, Sligo Harbour	G 666 375
27	5	960718	Inner Drumcliff Bay	G 656 415
28	4	960715	Ballygilgan Strand, Drumcliff Bay	G 645 432
29	4	961026	Milk Harbour, Sligo	G 645 505
30	5	960717	Back of Murvagh, Donegal Bay	G 903 742
31	4	960716	Muckros Strand, Donegal Bay	G 917 768
32	5	961029	Owentocker Estuary	G 713 925
33	4	961027	Gweebarra Estuary, inner	G 784 994
34	4	961028	Gweebarra Estuary, outer	G 766 005

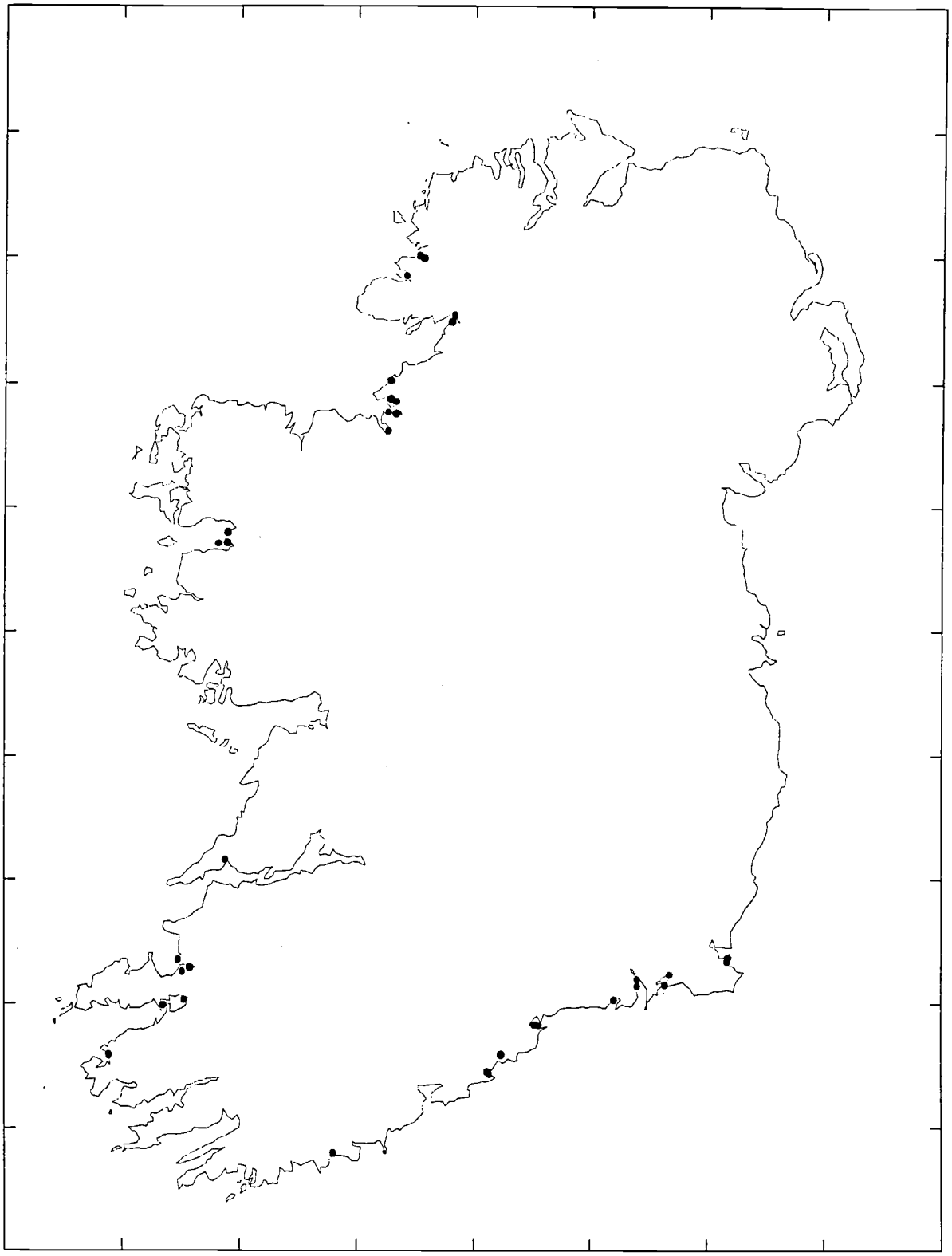


Figure 1. Map of Ireland showing distribution of the 34 survey sites.

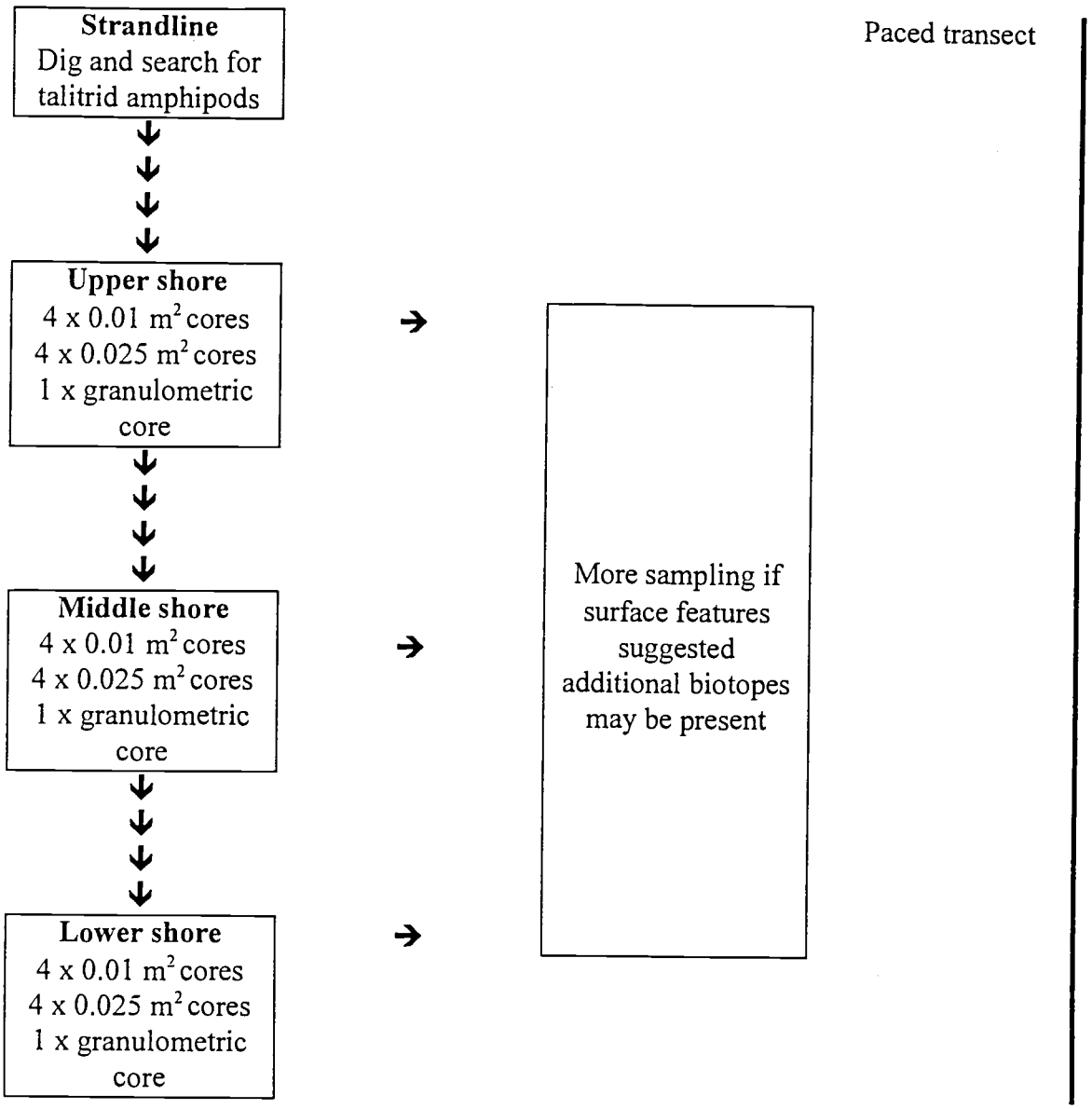


Figure 2. At each site, the strandline, and at least three stations were sampled.

RESULTS

Species

At least 76 species, plus some taxa not identified to species level, were recorded during the survey (Table 2). If the data from the semi-quantitative digs had not been included, only half as many species would have been recorded (Table 2). The authors are confident that the majority of macro fauna present at the various stations at the time of the survey were recovered.

Fourteen species occurred in at least 10 % of the sampling stations and 22 in more than 5 % (Figure 3). The most common polychaetes were *Arenicola marina*, *Nepthys hombergii*, *Scoloplos armiger* and *Hediste diversicolor;* the most common bivalves were *Cerastoderma edule*, *Angulus tenuis*, *Macoma balthica* and *Scrobicularia plana;* and the most common crustaceans *Crangon crangon* and *Carcinus maenas* (Figure 3, Appendix 1). Cluster analysis grouped species according to whether they were most often associated with the lower, mid or upper shore sediment, or amongst algae at the upper shore line (Figure 4).

Biotopes

In allocating biotopes to the stations both physical and biological data was used in order to derive the most appropriate biotope designation. A total of 19 biotope were allocated, 12 of these being MNCR - BioMar (Connor *et al.*, 1996) biotopes and the remaining 7 being new biotope types derived by the authors (Table 3, Appendix 2). Of those derived by the authors some are variations of MNCR biotopes. For example, the biotope 'LGS.Lan.Nhom' usually represents a transition area between *Nepthys hombergii* and *Lanice* in the mid shore and a *Lanice* dominated lower shore. The TWINSPAN analysis provided 10 distinct clusters, with some closely related biotopes clustered together (Figure 5). The most frequently found biotopes were the muddy sand polychaete - cockle (*Cerastoderma edule*) (LMS.PCer), reduced salinity mud with ragworm (*Hediste diversicolor*) and furrow shell (*Scrobicularia plana*) (LMU.Hed.Scr), and a mixed substratum with bladder wrack (*Fucus vesiculosus*) (SLR.FvesX) (Figure 6).

Table 2. The full list of species and other taxa recorded during this study.

* indicates taxa recorded in cores.

POLYCHAETA	CRUSTACEA	MOLLUSCA
Polychaeta indet. *	*Balanus* sp.	*Patella vulgata* *
Etone longa *	Mysidae indet. *	*Littorina littorea*
Sigalion mathildae	*Neomysis integer*	*Littorina neritoides*
Anaitides maculata	*Praunus flexuosus*	*Littorina obtusata*
Phyllodoce sp. *	Amphipoda indet. *	*Littorina saxatilis*
Phyllodoce laminosa *	*Hyale nilssoni* *	*Nucula sulcata*
Glycera gigantea	*Talitrus saltator*	*Hydrobia ulvae* *
Glycera tridactyla *	*Dexamine spinosa* *	*Mytilus edulis* *
Hediste diversicolor *	*Apherusa jurinei*	*Cerastoderma edule* *
Neanthes virens	*Ampelisca brevicornis* *	*Angulus tenuis* *
Nephtys cirrosa *	*Ampelisca tenuicornis* *	*Macoma balthica* *
Nephtys hombergii *	*Bathyporeia* sp. *	*Scrobicularia plana* *
Marphysa bellii	*Bathyporeia guilliamsoniana**	*Pharus legumen*
Orbinidae indet.	*Bathyporeia pelagica* *	*Mya arenaria* *
Orbinia latreillii *	*Haustorius arenarius* *	
Scoloplos armiger *	*Echinogammarus marinus* *	
Spionidae indet.	*Echinogammarus pirloti*	RHODOPHYCOTA
Magelona sp.	*Echinogammarus stoerensis*	Filamentous red algae
Cirratulus cirratus	*Gammarus locusta*	
Heteromastus filiformis *	*Gammarus* sp.	
Scolelpis foliosa	*Corophium volutator* *	CHROMOPHYCOTA
Capitomastus minimus *	*Corophium arenarium* *	*Ascophyllum nodosum*
Arenicola marina *	*Cyathura carinata* *	*Fucus ceranoides*
Maldanidae indet. *	*Eurydice pulchra*	*Fucus serratus*
Clymenura clypeata *	*Crangon crangon* *	*Fucus vesiculosus*
Euclymene oerstedii *	*Pagurus bernhardus*	*Pelvetia canaliculata*
Euclymene indet. *	*Carcinus maenas*	Filamentous brown algae
Notomastus latericeus		
Scalibregma inflatum *		
Owenia fusiformis *		CHLOROPHYCOTA
Terebellidae indet. *	SIPUNCULA	*Enteromorpha*
Lanice conchilega *	*Golfingiidae* indet.	*Ulva*
Scolelepis foliosa	*Golfingia vulgaris*	Filamentous green algae
PLATYHELMINTHES	TUNICATA	ANGIOSPERMAE
Platyhelminthes indet.	Tunicata indet.	*Zostera noltii*

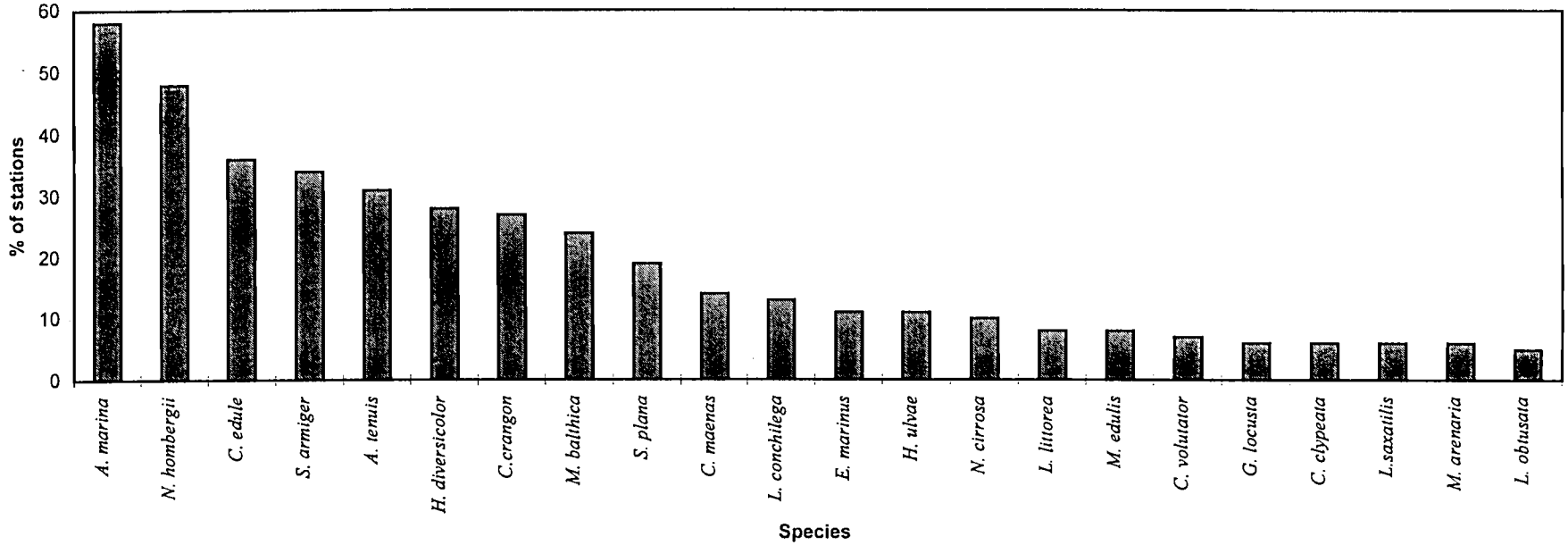
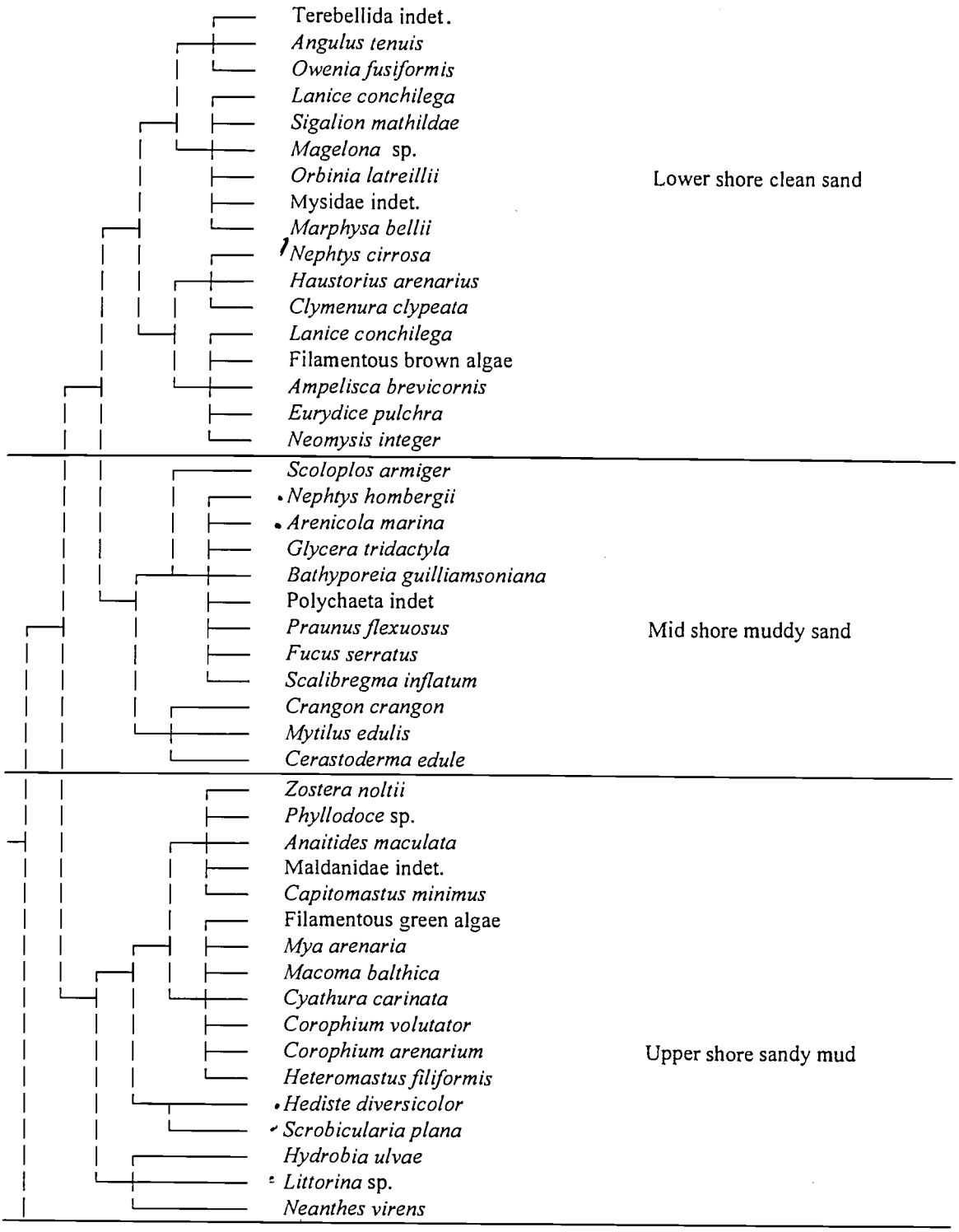


Figure 3. Frequency of occurrence (% of all stations) of those fauna which occur in 5% or more of the 142 stations. Details for all species in Appendix 1.

Figure 4. Division of species into clusters on the basis of their co-occurrence by TWINSPAN with general height on the shore and substratum type indicated.



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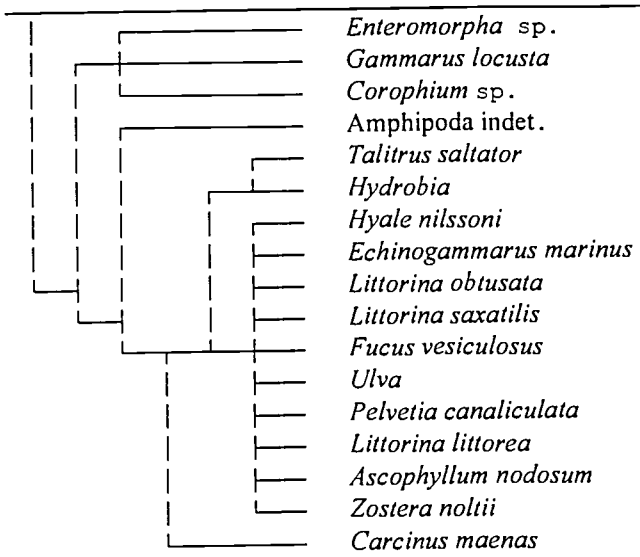
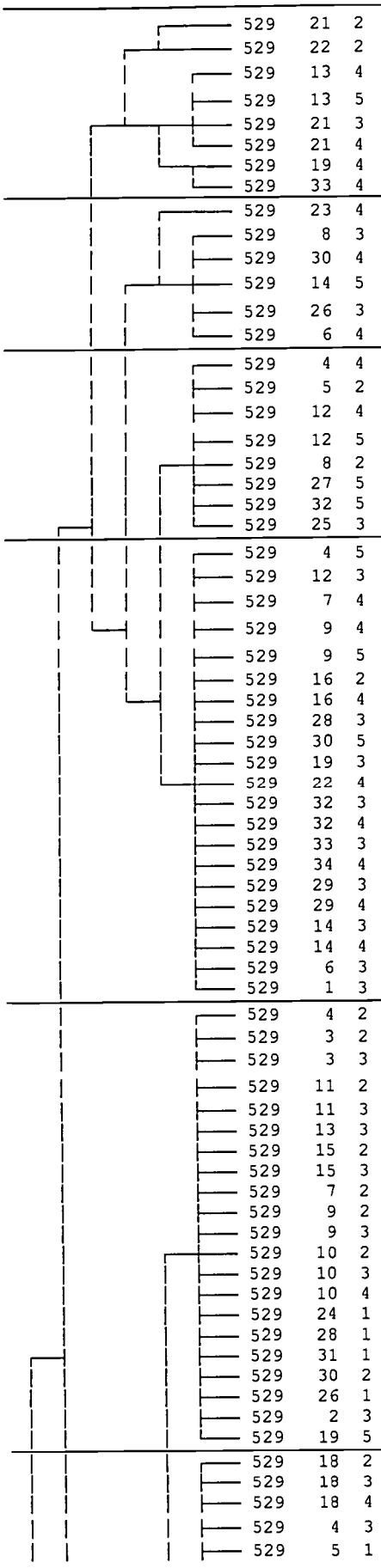

Enteromorpha sp.
Gammarus locusta
Corophium sp.
Amphipoda indet.
Talitrus saltator
Hydrobia
Hyale nilssoni
Echinogammarus marinus
Littorina obtusata
Littorina saxatilis
Fucus vesiculosus
Ulva
Pelvetia canaliculata
Littorina littorea
Ascophyllum nodosum
Zostera noltii
Carcinus maenas
Top of shore weedline

Table 3. Titles and codes for each of the 19 biotopes used to describe stations surveyed. Full descriptions of biotopes are given in Appendix 2. An asterix (*) indicates a non - MNCR biotope described by the authors.

Biotope title	Biotope Code
Fucus vesiculosus on mid eulittoral mixed substrata.	SLR.FvesX.
Ascophyllum nodosum on mid eulittoral mixed substrata.	SLR.AscX
Fucus serratus on lower eulittoral mixed substrata	SLR.FserX
Hediste diversicolor and *Scrobicularia plana* in reduced salinity muddy shores.	LMU.HedScr
Mytilus edulis banks on muddy sand shores.	LMU.Myt*
Neanthes virens in sandy mud shores.	LMU.Nea*
Hediste diversicolor and *Macoma balthica* in sandy mud shores.	LMU.Hed.Mac
Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores.	LMU.HedMac.Nhom
Barren muddy shores.	LMU.Bar*
Arenicola marina and bivalves in mid to lower shore muddy sand.	LMS.AreBv
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores.	LMS.PCer.
Zostera noltii beds in upper to mid shore muddy sand.	LMS.PCer.Znol
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores	LMS.Are.Nhom*
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand.	LGS.AP.Ang.
Nepthys hombergii, *Angulus tenuis* and *Arenicola marina* in sandy shores.	LGS.Nhom.Ang*
Mixed polychaete communities characterised by *Clymenura clypeata* in fine to medium sand on sheltered shores.	LGS.Cly*
Dense *Lanice conchilega* in tide - scoured lower shore sand.	LGS.Lan.
Lanice conchilega and *Nephtys hombergii* on moderately exposed sandy shores	LGS.Lan.Nhom *
Talitrid amphipods in decomposing seaweed on the strandline.	LGS.Tal.

Figure 5. The division of stations into clusters on the basis of species present by TWINSPAN. The biotope codes (Table 3) are indicated. Only dominant biotopes only given.



LGS.Ap.Ang, LGS.Cly*

Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand.

LGS.Lan

Dense *Lanice conchilega* in tide scoured lower shore sand.

LGS.Lan, LGS.Lan.Nhom*

Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores.

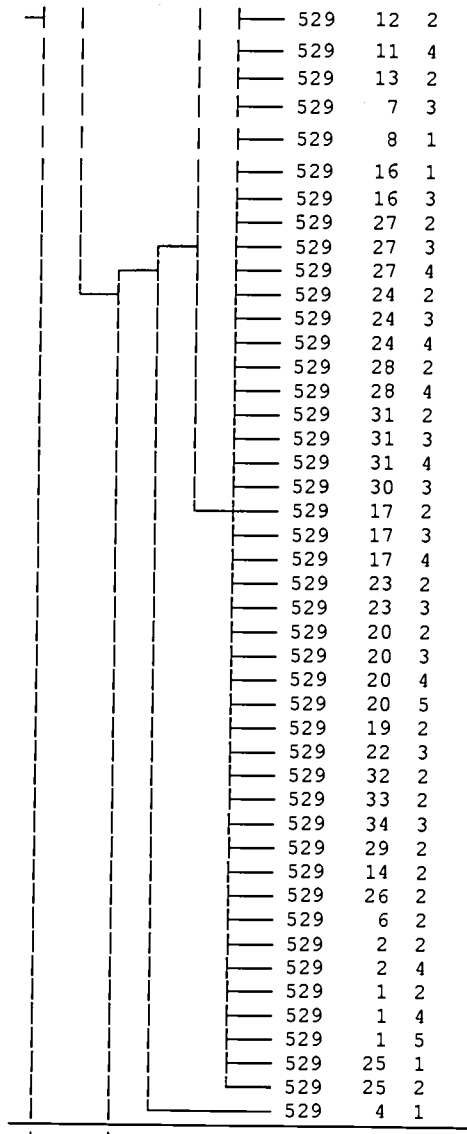
LMS.PCer, LMS.Are.Bv, LGS.Nhom.Ang*

Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores. *Arenicola marina* and bivalves in mid to lower shore muddy sand.

LMU.HedScr

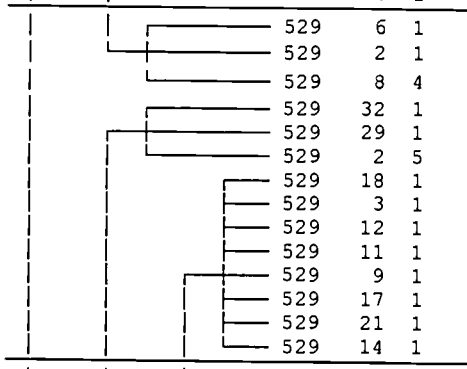
Hediste diversicolor and *Scrobicularia plana* in reduced salinity muddy shores.

LMS.PCER (mostly), LMS.PCerZnol, LMS.Are.Nhom*



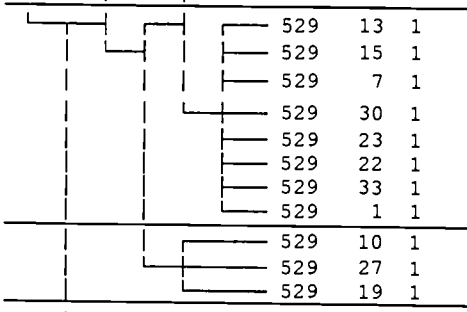
Zostera noltii beds in upper to mid shore muddy sand.

Many of the non *Zostera* communties here are characterised by the presence of *Arenicola marina* and could also be LMS.AreBv.



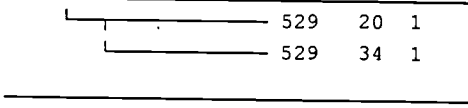
SLR.FvesX

Fusus vesiculosus on mid eulittoral mixed substrata.



SLR.AscX

Ascophyllum nodosum and *Fucus vesiculosus* on variable salinity mid eulittoral rock.



SLR.FvesX

LGS.Tal

Talitrid amphipods in decomposing seaweed on the strand line

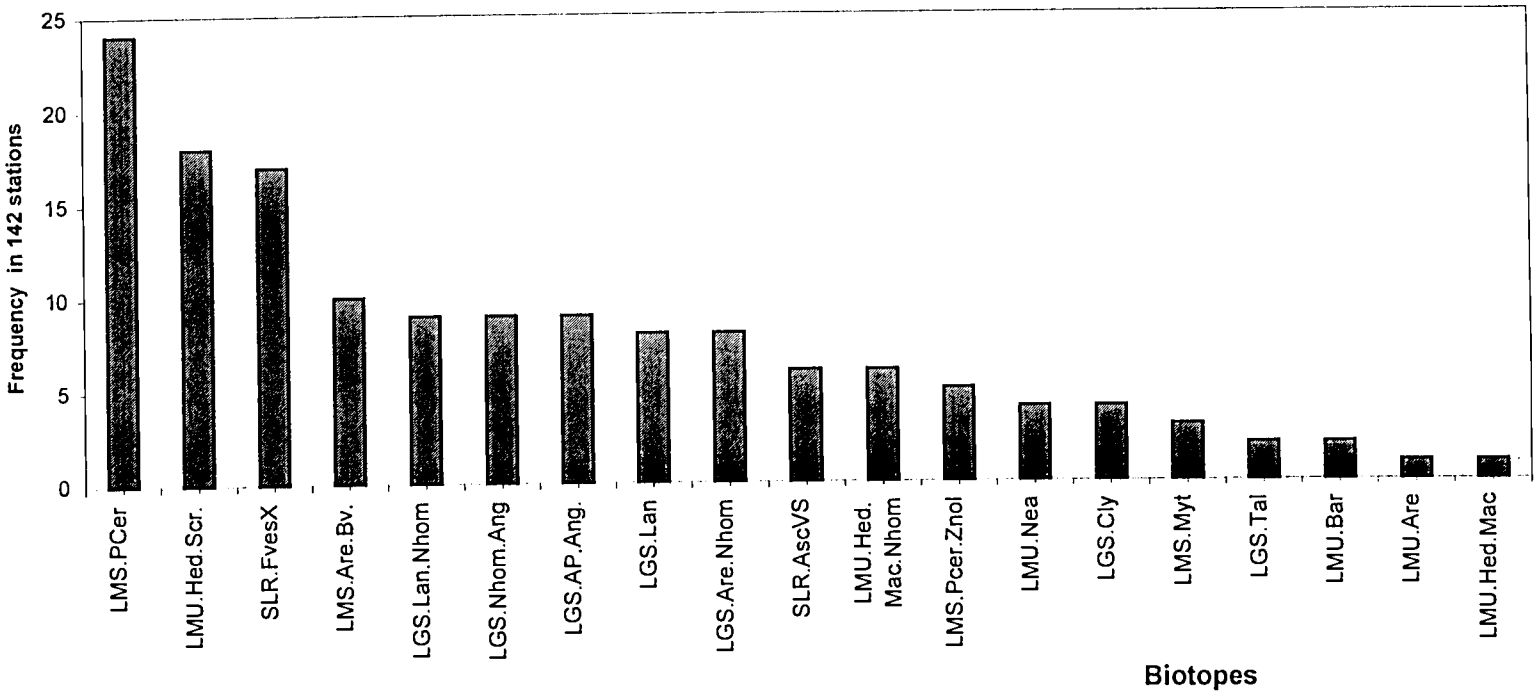


Figure 6. The frequency of occurrence of the biotopes in survey.

Granulometry

The mean mud content of the biotopes varied from 2.3 % for the relatively exposed amphipod and *Angulus tenuis* biotope (LGS.AP.Ang) to 49.0 % (maximum) for the more sheltered and muddier *Neanthes virens* biotope respectively (Table 4). There was a close positive relationship between the mud and organic carbon (as LOI) contents of the sediments for the biotopes (Figure 7).

Table 4. Granulometric data on the sediment (<1mm) for each biotope type. Data includes minimum and maximum grain size (in phi Ø units i.e. - $\log_2$mm) and the minimum, maximum and mean percentage mud and organic (as Loss on Ignition) contents for each sediment core.

Biotope	Number of		Median Ø		% Mud			%LOI		
	Stns.	Cores	min	max	min	mean	max	min	mean	max
LGS.AP.Ang.	8	6	0.18	0.25	0.1	2.3	3.2	0.6	1.2	1.8
LGS.Cly*	4	3	0.20	0.30	1.6	2.7	4.3	0.8	1.0	1.2
LGS.Nhom.Ang*	9	6	0.18	0.30	1.6	2.7	4.9	0.7	1.3	1.4
LMS.Myt*	3	1	0.22	0.22	3.4	3.4	3.4	0.6	0.6	0.6
LGS.Lan	8	8	0.15	0.36	2.0	4.3	6.4	1.1	1.3	1.6
LGS.Lan.Nhom*	9	6	0.16	0.30	2.6	7.0	11.7	0.7	1.1	1.6
LMU.Hed.Mac	1	1	0.15	0.15	7.8	7.8	7.8	1.0	1.0	1.0
LMS.Pcer.Znol	5	3	0.14	0.23	2.8	8.7	18.1	1.1	2.0	1.7
LMS.Are.Bv.	8	7	0.15	0.24	2.6	9.2	17.8	0.8	1.6	3.6
LMS.PCer	25	21	0.09	0.30	2.6	13.3	73.1	0.8	1.7	4.1
LMS.Bar*	2	2	0.14	0.16	8.7	17.8	26.8	2.2	2.9	3.6
LMS.Nhom*	6	5	0.14	0.20	7.0	21.3	32.1	1.0	1.9	3.1
LMU.Are	2	2	0.12	0.15	7.5	24.3	41.2	1.6	2.3	3.0
LMU.Hed.Mac.Nhom	6	5	0.09	0.26	5.4	35.8	51.5	1.9	3.0	5.9
LMU.Hed.Scr.	18	14	0.06	0.23	5.2	38.4	77.1	1.3	2.9	4.1
LMU.Nea*	4	3	0.04	0.18	21.8	49.0	83.5	1.3	3.6	5.5

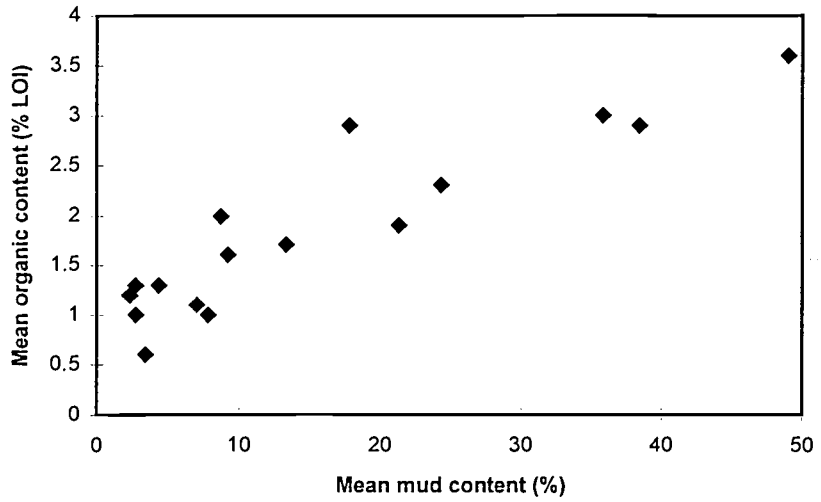


Figure 7. Relationship between mean mud content (%) and mean organic content (as % loss on ignition) of sediment samples for each biotope (Table 4).

CONSERVATION ASSESSMENT

Conservation parameters

The four criteria, species richness, species rarity, biotope richness, and biotope rarity were used for conservation assessment. Other possible criteria considered were unsuitable either due to a lack of data (e.g. productivity had not been measured) or due to potentially subjective interpretations (e.g. aesthetics). An average species richness per site was calculated by summing the number of species at each station and dividing by the number of stations per site. Species rarity was scored by counting the number of rare species at a given site with species classed as rare if they occurred at three sites or fewer in the survey. This is not a reflection of how rare the species are in Ireland. Similarly, biotope rarity was scored by counting the number of rare biotopes per site. Rare biotopes were taken to be those allocated to five or less survey stations. A detailed description of each site and station is in Appendix 3.

Notable sites

The most species rich sites were Whitehouse Bank (outer Dungarvan Harbour) with 7 species, and Inner Dungarvan Harbour, the back of Inch Strand, Derrymore Island, Ballygilgan Strand and Inner Drumcliff Bay each with a species count of 6 (Table 5). The high figure for Dorrins Strand reflects the amalgamation of a number of stations. Rare species occurred most frequently at Poulnasherry in the Shannon estuary and Carraholly in Clew Bay with 5 being recorded at each. In terms of biotope richness, the highest number of biotopes per site was 5 and this number of biotopes was recorded at Rosslare Point, Outer Ballymacoda, Outer Clonakilty, Poulnasherry and Muckros Strand (Inner Donegal Bay) (Table 5). The highest number of rare biotopes at a site was 2 and this number occurred at Poulnasherry and the Back of Inch Strand. Note that the biotope describing barren muddy shores was excluded from the rare biotopes as by definition it lacked species.

Human activities

The sites in the present survey could be regarded as either: (a) unaffected by obvious external activity; (b) generally unaffected by obvious external activity but subject to some possibly degrading or polluting influence. Usually this was its proximity to an urban area but it may also reflect 'ribbon development' of domestic dwelling houses adjacent to the shoreline; (c) subject to aquaculture activity, sites that appear unpolluted but are being used for aquaculture. Aquaculture consisted of intertidal Pacific Oyster and clam farming. Where (b) and (c) are relevant they are indicated as 'urban', or 'oyster' or 'clam' aquaculture respectively in Table 5.

Table 5. Conservation assessment scores including number and rarity of species and biotopes, and notes on associated urban and aquaculture activity. 'Oyster' and 'Clam' indicates aquaculture on site or nearby.

Site no.	Site name	Species no.	Species rarity	Biotope no.	Biotope rarity		Notes
1	Rosslare Point	6	2	5	1	Urban	Rich species and biotopes, raised *Mytilus* beds
2	The Burrow	5	1	2	1	Urban	*Neanthes virens*
3	Inner Bannow	4	1	3	0	-	Good eexample of LMU.HedScr biotope
4	Outer Bannow	6	2	4	0	Oyster	Species rich
5	Newtown Head	5	0	2	0	Oyster	*Lanice*
6	Passage East	4	0	3	0	Urban	Good example of *Lanice* shore
7	Back of Tramore Strand	5	1	4	0	Urban	Landfill site adjacent to shore
8	Whitehouse Bank	7	3	4	0	Oyster	Species rich, *Angulus*
9	Inner Dungarvan	6	1	4	1	Urban	Species rich
10	Kinsalebeg	4	0	2	0	-	Large *Nereis* population
11	Inner Ballymacoda	4	1	4	0	-	Large *Corophium* population
12	Outer Ballymacoda	3	1	5	0	-	Biotope rich, large *Angulus* population
13	Outer Clonakilty	4	0	5	1	Urban	Biotope rich
14	Ballycarbery, Valentia Hbr.	5	2	4	0	Oyster	*Lanice*
15	Callinafercy	3	0	4	0	Urban	*Zostera,* large *Nereis* population
16	Back of Inch	6	0	3	2	-	*Zostera,* species rich raised *Mytilus* beds
17	Back of Derrymore	6	0	4	1	-	Species rich, *Zostera*
18	The Spa	4	0	4	1	Urban	*Zostera,* close to sewage works
19	Barrow harbour	4	2	4	1	Urban	*Zostera*
20	Poulnasherry	5	5	5	2	Oyster	*Zostera.* Rare species, biotope rich
21	WhiteStrand	4	0	3	1	Oyster	
22	Carraholly	5	5	3	1	-	Rare species
23	Claggan Cove	5	3	4	1	-	
24	Ballysadare bay	3	0	3	0	Urban	
25	Dorrins Strand	4	2	3	0	Urban	Large *Lanice* population on lower shore
26	Cumeen Strand	3	2	4	0	Urban, Clam	Large cockle population
27	Inner Drumcliff bay	6	0	4	1	-	*Zostera*
28	Ballygilgan strand	6	1	4	0	Oyster	Species rich
29	Milk Harbour	4	1	4	0	-	
30	Back of Murvagh	5	4	4	0	-	Biotope rich, rare species, seal haul out nearby
31	Muckros Strand	5	0	5	0	Urban	Biotope rich
32	Owentocker	4	0	5	0	Urban	Large cockle & *Angulus* population
33	Inner Gweebarra	4	0	3	1	-	
34	Outer Gweebarra	4	1	2	1	-	Large cockle & *Angulus* population

DISCUSSION

Sampling limitations

The limitations of methods for surveying shore infauna have been discussed in general by James and Fairweather (1996), and those used by BioMar by Hunt (1995). In addition to sampling at upper, mid and lower shores, sampling was also done on an *ad hoc* basis, at least to dig level, where observations of habitat features suggested a different biotopes or species composition may be present. The results thus provide an good indication of the range of biotopes at a site, even if the species list would be extended by increased sampling effort.

The present biotope list may contain biotopes which could be combined as some of the biotopes used may be variations of each other. Future examination of the present data with data for other localities will aid improved definition of biotopes.

The methods were standardised and conducted by the same personnel at all sites, so the results are as comparable as possible between stations and sites. At the larger sites, such as the back of Tramore Strand, further sampling effort in the form of more than one transect would have been preferable to the present method had the resources been available. Should any of the sites be designated for nature conservation on the basis of invertebrate fauna or flora, more extensive surveys which map the biotopes present and identify seasonal variation in biotopes would be necessary to develop monitoring programmes.

Conservation assessment

This is the first survey of this type to be done on the intertidal areas surveyed for this report. While the scope of the survey was in some respects limited (one transect on one day at each site) it was at least as intensive as the BioMar-MNCR surveys. The biotopes derived are suitable for use in site description and conservation assessment. The conservation assessment was given on a site by site basis as this is the most suitable for management purposes.

Poulnasherry (Shannon Estuary) was noticeably rich in biotopes, and had a high number of rare biotopes and species. Rosslare Point (Wexford Harbour) and Outer Ballymacoda were also biotope rich. A number of sites were species rich including Carraholly (Clew Bay), the Whitehouse Bank (Outer Dungarvan Harbour), Inner Dungarvan Harbour, back of Inch Strand (Castlemaine harbour), Ballygilgan

Strand and Inner Drumcliff Bay. Carraholly, is a relatively small site in the Clew Bay survey area and although far smaller than the bulk of the other sites, it is important as along with Claggan Cove in the same survey area, it may be representative of a number of potentially similar sites in Clew Bay.

While the importance of rare species and rare biotopes is acknowledged the limitations of using these criteria in conservation assessment must be recognised. Many species were found on a few occasions or only on one occasion. This makes them rare in terms of the survey but not necessarily rare *per se*. Further study of these and other habitats is necessary to establish the true rarity of such species in these habitats and to assess their environmental sensitivity. A similar argument can be made for the rarity of biotopes.

In general, the sites which were species and biotope rich were those which were reasonably sheltered, with muddy, diverse and productive upper shores and with productive but slightly tide scoured, sandy mid and lower shores (e.g. Rosslare Point and Poulnasherry). However, different species and biotopes occurred in less muddy and more wave exposed sites and these deserve equal protection. Shores which were muddy throughout, such as Callinafercy on the eastern side of Castlemaine Harbour, tended to have a more limited number of biotopes and lower species diversity. Similarly the more exposed shores such as Woodstown Strand (Newtown Head, Waterford Harbour) also had limited species and biotopes and consequently did not rank as high as others in the survey. Species abundance (biomass) was not scored for conservation assessment as it would vary significantly with time of year, and spatially in the survey areas. Sites with abundant populations of polychaetes (Callinfercy) or bivalves (Cumeen Strand, Rosslare Point, Back of Inch) would have had their overall scores enhanced had this been the case. Such abundance's of fauna and flora may be very important for various species of birds.

Although difficult to quantify there are other aspects that may be considered in relation to conservation assessment. Sites containing non-natural features, including artificial substrata, polluted or disturbed habitats may need to be considered in a different light to those that are not. The presence of aquaculture or an industrial operation on or adjacent to a site could be considered to be a non-natural feature and a potential source of non native species. At many of the sites visited the presence of an aquaculture operation did not significantly impact on the aesthetic value of the site although they did cause a certain amount of disturbance. Similarly, the effects of

urban impacts such as the various discharges to the main river channel (for example at Tralee Bay) or landfill sites such as that at Tramore are beyond the scope of this report but worthy of consideration in terms of overall conservation assessment.

Zostera species have a high conservation importance as these plants are known to be an important food source for waders and wildfowl, particularly Brent geese (*Branta bernicla hrota*) and wigeon (*Anas penelope*) (Mather and Montgomery, 1996). The biotope of *Zostera noltii* beds in upper to mid shore muddy sand (LMS.PCer.Znol) was a rare biotope. It occurred at five sites, in Castlemaine Harbour at the back of Inch Strand, in Tralee Bay at Derrymore Island, The Spa and Barrow Harbour, and at Inner Drumcliff Bay in Sligo. Although not conforming to this biotope, *Zostera* also occurred at Poulnasherry in the Shannon Estuary and elsewhere in Castlemaine Harbour at Callinafercy.

All the sites visited are to some extent of conservation importance, and different sites are important for different reasons. The limitations of the selection of sites and transect lines in what were often very extensive survey areas should be recognised in conservation assessment, and particularly in developing management plans. Additional information, particularly in relation to bird conservation, and the practicality of managing the areas, will also need to be considered in selecting areas of nature conservation importance.

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REFERENCES

Connor, D.W., Brazier, D.P., Hill, T.O., Holt, R.H.F., Northen, K.O. and Sanderson, W.G. 1996. *Marine Nature Conservation Review: marine biotopes. A working classification for the British Isles 96.7* Peterborough, Joint Nature Conservation Committee.

Hill, M.O. 1979. *TWINSPAN - a FORTRAN program for arranging multivariate data in an ordered two-way table by classification of the individuals and attributes.* Ithaca, New York, Cornell University.

Hiscock, K., *ed.* 1996. *Marine Nature Conservation Review: Rationale and methods.* Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom).

Buchanan, J.B. 1984. Sediment analysis. In: eds. Holme, N.A. and McIntyre A.D. *Methods for the study of marine benthos*. Blackwell Scientific, London.

Hunt, J. 1995. *Sandy beach fauna and sampling methods.* M.Sc. thesis, Environmental Sciences Unit, Trinity College, Dublin.

James, R.J. and Fairweather, P.G. 1996. Spatial variation of intertidal macrofauna on a sandy ocean beach in Australia. *Estuarine Coastal and Shelf Science* **43**, 81 - 107.

Mathers, R.G. and Montgomery, W.I. Behaviour of brent geese *Branta bernicla hrota* and wigeon *Anas penelope* feeding on intertidal *Zostera* spp. *Biology and Environment, Proceedings of the Royal Irish Academy* 96B, 159 - 167.

APPENDIX 1

The frequency of occurrence and median abundance of the taxa in the (a) 142 sampling stations and (b) the sediment cores.

(a)

Species name	Frequency of occurrence		Abundance		
	No. records	%	Minimum	Maximum	Median
Arenicola marina	83	58	P	S	C
Nephtys hombergii	68	48	P	A	F
Cerastoderma edule	52	36	P	A	F
Scoloplos armiger	49	34	P	S	C
Angulus tenuis	44	31	P	A	F
Hediste diversicolor	40	28	P	A	F
Crangon crangon	39	27	P	C	F
Macoma balthica	35	24	P	C	O
Fucus vesiculosus	29	20	P	C	P
Scrobicularia plana	27	19	P	S	C
Carcinus maenas	20	14	P	C	P
Enteromorpha sp.	20	14	P	C	P
Echinogammarus marinus	16	11	O	C	F
Lanice conchilega	15	10	P	A	F
Ulva sp.	14	10	P	F	P
Nephtys cirrosa	14	10	P	A	F
Mytilus edulis	12	8	P	A	R
Littorina littorea	12	8	P	F	P
Ascophyllum nodosum	12	8	P	C	P
Filamentous green algae	12	8	P	A	P
POLYCHAETA indet.	12	8	P	F	F
Corophium volutator	10	7	P	C	O
Gammarus locusta	9	6	O	F	O
Zostera marina	9	6	P	A	F
Littorina saxatilis	8	6	P	F	P
Clymenura clypeata	8	6	P	C	F
Hydrobia ulvae	8	6	P	C	C
Mya arenaria	8	6	P	C	C
Hydrobia sp.	7	5	P	A	R
Littorina obtusata	7	5	P	F	P
Filamentous brown algae	7	5	P	S	P
AMPHIPODA indet.	6	4	P	C	O
Neanthes virens	6	4	C	A	C
Pelvetia canaliculata	5	3	P	P	P
Mysidae indet.	5	3	P	F	O
Ampelisca brevicornis	5	3	P	O	O
Lanice sp.	4	3	P	C	P
Heteromastus filiformis	4	3	P	C	O
Hyale nilssoni	4	3	P	O	O
Corophium sp.	4	3	P	O	O
Orbinia latreillii	4	3	F	F	F
Maldanidae indet.	4	3	F	C	F
Littorina sp.	3	2	P	C	P
Fucus serratus	3	2	P	P	P
Bathyporeia guilliamsoniana	3	2	O	O	O

Anaitides maculata	3	2	P	F	F
Glycera tridactyla	3	2	P	F	F
Nephtys sp.	2	1	P	F	P
Scalibregma inflatum	2	1	P	F	P
Praunus flexuosus	2	1	O	F	O
Talitrus saltator	2	1	O	O	O
Haustorius arenarius	2	1	O	C	O
Sigalion mathildae	2	1	F	F	F
Marphysa bellii	2	1	F	F	F
Leptomysis gracilis	2	1	F	F	F
Corophium arenarium	2	1	A	A	A
Arenicola sp.	1	1	P	P	P
Euclymene oerstedii	1	1	P	P	P
OPHELIIDA indet.	1	1	P	P	P
Opheliidae indet.	1	1	P	P	P
Balanus sp.	1	1	P	P	P
Dexamine spinosa	1	1	P	P	P
Ampelisca tenuicornis	1	1	P	P	P
Bathyporeia sp.	1	1	P	P	P
Bathyporeia pelagica	1	1	P	P	P
Pagurus bernhardus	1	1	P	P	P
Patella vulgata	1	1	P	P	P
Littorina neritoides	1	1	P	P	P
Filamentous red algae	1	1	P	P	P
Magelona sp.	1	1	O	O	O
Capitella capitata	1	1	O	O	O
Echinogammarus pirloti	1	1	O	O	O
Echinogammarus stoerensis	1	1	O	O	O
Gammarus sp.	1	1	O	O	O
Golfingiidae indet.	1	1	F	F	F
Golfingia vulgaris	1	1	F	F	F
Phyllodoce laminosa	1	1	F	F	F
Glycera gigantea	1	1	F	F	F
ORBINIIDA indet.	1	1	F	F	F
Orbiniidae indet.	1	1	F	F	F
Spionidae indet.	1	1	F	F	F
Cirratulus cirratus	1	1	F	F	F
Heteroclymene robusta	1	1	F	F	F
Owenia fusiformis	1	1	F	F	F
Gammarus finmarchicus	1	1	F	F	F
Crangon sp.	1	1	F	F	F
Pharus legumen	1	1	F	F	F
TEREBELLIDA indet.	1	1	C	C	C
TUNICATA indet.	1	1	C	C	C
Fucus ceranoides	1	1	C	C	C
Phyllodoce sp.	1	1	A	A	A
Zostera sp.	1	1	A	A	A

(b)

Species name	Frequency of occurrence		Abundance	
	No. of records	%	Range	median
Angulus tenuis	30	21	P - A	P
Arenicola marina	29	20	P - S	P
Nephtys hombergii	26	18	P - A	P
Macoma balthica	23	16	P - C	P
Cerastoderma edule	19	13	P - A	A
Hediste diversicolor	17	12	P - A	P
Scoloplos armiger	14	10	P - S	P
Crangon crangon	14	10	P - C	P
Scrobicularia plana	14	10	P - S	P
Nephtys cirrosa	7	5	P - A	P
Lanice conchilega	7	5	P - A	P
Glycera tridactyla	3	2	P - P	P
Terebellidae indet.	3	2	P - C	P
Hydrobia ulvae	3	2	P - C	C
Polychaeta indet.	2	1	P - P	P
Heteromastus filiformis	2	1	P - C	P
Clymenura clypeata	2	1	P - P	P
Ampelisca brevicornis	2	1	P - C	P
Corophium arenarium	2	1	A - A	A
Corophium volutator	2	1	P - P	P
Mya arenaria	2	1	P - P	P
Phyllodoce laminosa	2	1	P - P	P
Capitomastus minimus	1	1	P - P	P
Etone longa	1	1	P - P	P
Phyllodoce sp.	1	1	A - A	A
Nephtys sp.	1	1	P - P	P
Orbinia latreillii	1	1	P - P	P
Arenicola sp.	1	1	P - P	P
Euclymene oerstedii	1	1	P - P	P
Opheliidae indet.	1	1	P - P	P
Scalibregma inflatum	1	1	P - P	P
Owenia fusiformis	1	1	P - P	P
Mysidae indet.	1	1	P - P	P
Amphipoda indet.	1	1	P - P	P
Hyale nilssoni	1	1	P - P	P
Dexamine spinosa	1	1	P - P	P
Ampelisca tenuicornis	1	1	P - P	P
Bathyporeia sp..	1	1	P - P	P
Bathyporeia guilliamsoniana	1	1	P - P	P
Bathyporeia pelagica	1	1	P - P	P
Haustorius arenarius	1	1	C - C	C
Echinogammarus marinus	1	1	C - C	C
Cyathura carinata	1	1	F - F	F
Patella vulgata	1	1	P - P	P
Hydrobia sp.	1	1	P - P	P
Mytilus edulis	1	1	A - A	A
Maldanidae indet.	1	1	O - O	P
Euclymene indet.	1	1	O - O	P

LMU.Bar Barren muddy shores

Habitat Classification

Salinity:	Variable
Wave exposure:	Sheltered, very sheltered
Substratum:	Sandy mud to mud
Zone:	Eulittoral
Height/depth band:	Lower shore
Other features:	Occurs at the edge of channels

Biotope descriptions

Areas near the edge of some steep sided channels at the low water edge of shores with a muddy substratum appear not to support macro fauna. This is possible due to instability due to current flow. Often these channel edges have a coarser substratum than that of the main shore area.

Frequency

Uncommon

Characterising species

None

LMS.Are.Nhom — ***Arenicola marina* and *Nepthys hombergii* in mid to lower muddy sand shores**

Habitat Classification

Salinity:	Full, variable
Wave exposure:	Very sheltered, sheltered, moderately exposed
Substratum:	Fine sand
Zone:	Eulittoral
Height/depth band:	Mid to Lower Shore
Other features:	

Biotope descriptions

Muddy sand, mid to lower shores in sheltered to moderately exposed estuaries. The biotope is distinguished by a relatively dense polychaete community composed chiefly of *Arenicola marina* at levels of common and above and *Nephtys hombergii* at levels of frequent and above. Other polychaetes such as *Scoloplos armiger* (at levels of common to super abundant) and *Hediste diversicolor* (rare) may also be present. Bivalves such as *Angulus tenuis* (in particular), *Cerastoderma edule* and *Macoma balthica* may be present at frequencies of present to common. The isopod *Eurydice pulchra* may be present.

Frequency

Common

Characterising species

	Typical abundance
Arenicola marina	Common
Nephtys hombergii	Frequent
Scoloplos armiger	Frequent
Angulus tenuis	Occasional / Common
Cerastoderma edule	Present / Common
Macoma balthica	Present

LMS.Myt *Mytilus edulis* banks on muddy sand shores

Habitat Classification

Salinity:	Full, variable
Wave exposure:	Sheltered
Substratum:	Muddy sand, sand
Zone:	Eulittoral
Height/depth band:	Mid shore
Other features:	Occur as extensive banks or raised areas

Biotope descriptions

Mid to lower shore muddy sand or sand forming banks beneath large dense populations of *Mytilus edulis*. Polychaetes present typically include *Nephtys hombergii* and may include *Neanthes diversicolor*, *Neanthes virens* and *Scoloplos armiger*. Other bivalves present may include *Angulus tenuis* (in sandier substratum) and *Cerastoderma edule*. On muddier shores the mussel banks can be covered by *Enteromorpha* and also have patchy areas of *Fucus vesiculosus* whereas on more exposed sandy shores there appears to be less weed cover.

Frequency

Rare

Characterising species

	Typical abundance
Mytilus edulis	Abundant
Nephtys hombergii	Frequent
Scoloplos armiger	Common
Neanthes virens	Occasional
Cerastoderma edule	Frequent
Angulus tenuis	Occasional

LGS.Nhom.Ang — ***Nephtys hombergii, Angulus tenuis* and *Arenicola marina* in sandy shores**

Habitat Classification

Salinity:	Variable, full
Wave exposure:	Very sheltered to moderately exposed
Substratum:	Very fine sand, fine sand, medium sand
Zone:	Eulittoral
Height/depth band:	Mid shore to low shore
Other features:	

Biotope descriptions

Lower and mid shores of medium to fine sand. This biotope occurs usually in moderately exposed areas but occasionally on more sheltered shores and is dominated by the bivalve *Angulus tenuis* at frequencies of frequent or above. Other bivalves are infrequent although *Cerasroderma edule* and or *Macoma balthica* may also be present (occasional). The polychaete infauna is composed of *Arenicola marina* which is usually present at a frequency of common and *Nephtys hombergii* which occurs as frequent. *Scoloplos armiger* may also be present at levels of common or above.

Frequency

Common

Characterising species

	Typical abundance
Angulus tenuis	Common
Cerastoderma edule	Common
Macoma balthica	Occasional
Nephtys hombergii	Frequent
Arenicola marina	Common
Scoloplos armiger	Common

LGS.Lan.Nhom — ***Lanice conchilega* and *Nephtys hombergii* on moderately exposed sandy shores**

Habitat Classification

Salinity:	Full, variable
Wave exposure:	Sheltered, exposed, moderately exposed.
Substratum:	Fine sand, medium sand
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope descriptions

Medium to fine sandy with occasionally some sandy mud on upper shores with a mixed polychaete and bivalve community with *Lanice conchilega* occurring at frequencies of common or above usually along with *Nephtys hombergii*. This biotope may occur at the lower shore or in the mid to upper shore where the MNCR biotope LGS.Lan occurs at the lower shore. LGS.Lan.Nhom differs from LGS.Lan in that it is more 'mixed'. As well as *Lanice* and *Arenicola marina*, *Scoloplos armiger* may also be present. *Angulus tenuis* may be present at frequencies of common to abundant and *Cerastoderma* edule may be present at frequent to common. The common shrimp, *Crangon crangon*, is often found in pools on the shore.

Frequency

Common

Characterising species

	Typical abundance
Lanice conchilega	Frequent
Nephtys hombergii	Frequent
Arenicola marina	Present to common
Angulus tenuis	Common to abundant
Cerastoderma edule	Occasional to frequent
Scrobicularia plana	Occasional
Crangon crangon	Frequent

SLR.FvesX *Fucus vesiculosus* on mid eulittoral mixed substrata

Habitat classification

Salinity:	Full, variable
Wave exposure:	Very sheltered, extremely sheltered
Tidal streams:	Weak, very weak
Substratum:	Pebbles & cobbles on sand/mud
Zone:	Eulittoral
Height/depth band:	
Other features:	Silted &/or variable salinity

Biotope description

Sheltered and very sheltered mid eulittoral pebbles and cobbles lying on sediment are typically characterised by *Fucus vesiculosus*. FvesX is usually subject to some variability in salinity from riverine input or, in more marine conditions, the habitat consists predominantly of smaller stones which are too unstable for *Ascophyllum nodosum* to colonise to any great extent (compare with AscX). This biotope typically differs from Fves in having a less dense canopy and reduced richness of epifaunal species, presumably as a result of the increased siltation, variable salinity and lack of stable substrata. In addition, the sediment between patches of hard substrata often contains the lugworm *Arenicola marina*, cockles *Cerastoderma edule* or the ragworm *Hediste diversicolor*. Littorinids, particularly *Littorina littorea*, commonly graze on the algae. Ephemeral algae such as *Enteromorpha* spp. are often present, especially on any more mobile pebbles during the summer. Limpets are less common than in AscX, because of the limited availability of larger rocks.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Common

Characterising species

	Typical abundance
Hediste diversicolor	Occasional
Arenicola marina	Occasional
Semibalanus balanoides	Occasional
Elminius modestus	Occasional
Gammaridae	Occasional
Carcinus maenas	Occasional
Patella vulgata	Occasional
Littorina littorea	Occasional
Littorina saxatilis	Occasional
Littorina obtusata/mariae	Occasional
Mytilus edulis	Occasional
Cerastoderma edule	Occasional
Mastocarpus stellatus	Occasional
Ascophyllum nodosum	Occasional
Fucus vesiculosus	Frequent
Enteromorpha	Occasional

SLR.AscX *Ascophyllum nodosum* on mid eulittoral mixed substrata

Habitat classification

Salinity:	Full
Wave exposure:	Very sheltered, extremely sheltered
Tidal streams:	Very weak
Substratum:	Mixed cobbles, boulders and pebbles on sediment
Zone:	Eulittoral - mid
Height/depth band:	

Biotope description

Very sheltered mixed substrata (cobbles, boulders and pebbles) in fully / near fully marine conditions may be characterised by an *Ascophyllum nodosum* canopy. Like the *Ascophyllum* community that occurs on bedrock (Asc), *Fucus vesiculosus* may be co-dominant. In addition, however, this community also contains a selection of infaunal species, such as *Arenicola marina*, which occur in the sediment between the cobbles. Large mussels *Mytilus edulis* commonly occur in clumps, and provide further suitable substrata for the attachment of fucoids. *Littorina littorea* is the most commonly occurring littorinid, and at some sites it may reach high densities. The spaces between cobbles and boulders provide a refuge for crustaceans, especially *Carcinus maenas*. On shores with a smaller proportion of cobbles and boulders, the large *Ascophyllum nodosum* plants become uncommon (presumably since they lack a suitable substrata for attachment) and *Fucus vesiculosus* dominates the canopy (FvesX). *F. vesiculosus* also tends to replace *Ascophyllum* in areas with greater freshwater influence.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Uncommon

Characterising species

	Typical abundance
Dynamena pumila	Occasional
Actinia equina	Occasional
Arenicola marina	Occasional
Semibalanus balanoides	Frequent
Gammaridae	Frequent
Carcinus maenas	Occasional
Patella vulgata	Occasional
Littorina littorea	Frequent
Littorina obtusata/mariae	Occasional
Nucella lapillus	Occasional
Mytilus edulis	Occasional
Hildenbrandia	Occasional
Corallinaceae	Occasional
Mastocarpus stellatus	Occasional
Chondrus crispus	Occasional
Polysiphonia lanosa	Frequent
Ascophyllum nodosum	Common
Fucus serratus	Occasional
Fucus vesiculosus	Common
Enteromorpha	Occasional

SLR.FserX *Fucus serratus* on lower eulittoral mixed substrata

Habitat classification

Salinity:	Full
Wave exposure:	Very sheltered, extremely sheltered
Tidal streams:	Very weak
Substratum:	Mixed cobbles, boulders and pebbles on sediment
Zone:	Eulittoral - mid
Height/depth band:	
Other features:	

Biotope description

Sheltered eulittoral mixed substrata with *Fucus serratus*. Two variants have been described. These are: *F. serratus* with *Mytilus edulis* (FserX.Myt) and tide-swept *F. serratus* (FserX.T).

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Common

Characterising species

	Typical abundance
Fucus serratus	

LMU.HedScr *Hediste diversicolor* and *Scrobicularia plana* in reduced salinity muddy shores

Habitat classification

Salinity:	Reduced / low
Wave exposure:	Very sheltered, extremely sheltered
Tidal streams:	
Substratum:	Mud
Zone:	Eulittoral
Height/depth band:	Upper shore, mid shore
Other features:	

Biotope description

This community generally occurs on the mid and upper shore of intertidal estuarine mud. Typically the bivalve *Scrobicularia plana* is common or abundant as well as other bivalves such as *Macoma balthica* or *Cerastoderma edule*. The mud snail *Hydrobia ulvae* is usually common, and the amphipod *Corophium volutator* may occur in high density. A wide range of polychaetes, including *Nepthys hombergii*, *Pygospio elegans*, *Eteone longa*, *Caulleriella killariensis* and the widespread *Hediste diversicolor*, are typically present. The green alga *Ulva lactuca* may colonize the surface of the mud in the summer months or it may be covered by a mat of filamentous algae such as *Enteromorpha* spp.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Uncommon

Characterising species

	Typical abundance
Eteone longa	Abundant
Hediste diversicolor	Abundant
Pygospio elegans	Common
Caulleriella killariensis	Common
Oligochaeta	Common
Corophium volutator	Common
Hydrobia ulvae	Common
Cerastoderma edule	Common
Macoma balthica	Common
Scrobicularia plana	Abundant

LMU.Are *Arenicola marina* in full salinity muddy shores

Habitat classification

Salinity:	Full
Wave exposure:	Sheltered, very sheltered, extremely sheltered
Tidal streams:	
Substratum:	Sandy mud to mud
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope description

Mid to lower shore fine sandy mud or soft mud in fully marine conditions. This community has been recorded from sealochs and may also occur in rias and other fully marine inlets. It is typified by *Arenicola marina* at abundances of frequent and above. The muds may have a black anoxic layer close to the surface. Other polychaetes, such as *Eteone longa*, *Scoloplos armiger*, *Pygospio elegans* and *Tharyx marioni*, may occur but at lower abundances than *Arenicola marina*. Bivalves and burrowing amphipods are generally absent.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Other	Sealochs	Howson, Connor & Holt 1994	SL29

Frequency
Scarce

Characterising species

	Typical abundance
Eteone longa	Occasional
Scoloplos armiger	Occasional
Pygospio elegans	Occasional
Tharyx marioni	Occasional
Arenicola marina	Common

LMU.HedMac *Hediste diversicolor* and *Macoma balthica* in sandy mud shores

Habitat classification

Salinity:	Full, variable
Wave exposure:	Sheltered, very sheltered, extremely sheltered
Tidal streams:	
Substratum:	Sandy mud to mud
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope description

Littoral sandy mud and mud in sheltered, often estuarine, conditions with a community of polychaetes together with the bivalve *Macoma balthica*. The most abundant polychaete is typically *Hediste diversicolor*, which can readily be seen when digging over the sediment. Other smaller polychaetes include *Tharyx marioni*, *Pygospio elegans*, *Caulleriella killariensis*, *Streblospio shrubsolii* and *Manayunkia aestuarina*. Oligochaete worms (e.g. *Tubificoides benedii*, *T. pseudogaster* and enchytraeids) are common or abundant and the amphipod *Corophium volutator* may be abundant. The mud snail *Hydrobia ulvae* is often common, with individuals or their fine tracks visible on the mud surface. The bivalve *Macoma balthica* may be accompanied by *Cerastoderma edule*, *Abra tenuis* and, in muddier sediments, *Scrobicularia plana*. The surface of the mud is often covered with green algae such as *Enteromorpha* spp. or *Ulva lactuca*. There is usually a black anoxic layer close to the sediment surface. Three variations of this biotope are recognised: HedMac.Cer, HedMac.Man and HedMac.Nhom.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Common

Characterising species

	Typical abundance
Eteone longa	Frequent
Hediste diversicolor	Abundant
Pygospio elegans	Common
Tharyx marioni	Common
Manayunkia aestuarina	Common
Oligochaeta	Frequent
Tubificoides	Frequent
Corophium volutator	Abundant
Hydrobia ulvae	Common
Cerastoderma edule	Occasional
Abra tenuis	Occasional

LMU.HedMac.Nhom *Hediste diversicolor* and *Macoma balthica* with *Nephtys hombergii* in variable salinity sandy mud shores

Habitat classification

Salinity:	Variable, 18-30%. [lower estuary], 8-18%. [middle estuary]
Wave exposure:	Sheltered, very sheltered
Tidal streams:	
Substratum:	Mud
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope description

This is a variant of the *Hediste-Macoma* community found on the mid and lower shore of estuaries, typically lower on the shore than the low salinity mid shore '*Hediste-Macoma* with *Manayunkia aestuarina*' or '*Hediste* with *Scrobicularia plana*' communities. *Nephtys hombergii* and other polychaetes such as *Caulleriella killariensis* are common whereas the bivalve component is restricted with only *Macoma balthica* common. *Corophium volutator* and other burrowing crustaceans are typically absent. This community may not occur in all estuaries and the above mentioned communities may extend further down the shore. This community differs from the low salinity mid shore '*Hediste-Macoma* with *Manayunkia aestuarina*' community in that *Nephtys hombergii* and/or *Caulleriella killariensis* are common or abundant. [Further consideration of this biotope required]

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Uncommon

Characterising species

	Typical abundance
Eteone longa	Present/Not known
Hediste diversicolor	Abundant
Nephtys hombergii	Abundant
Pygospio elegans	Common
Streblospio shrubsolii	Common
Arenicola marina	Frequent
Manayunkia aestuarina	Common
Hydrobia ulvae	Common
Macoma balthica	Common

LMS.PCer Polychaetes and *Cerastoderma edule* in medium to fine sandy shores

Habitat classification

Salinity:	Full
Wave exposure:	Moderately exposed
Tidal streams:	
Substratum:	Medium to fine sand
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope description

Medium to fine sand on moderately exposed shores, where the sediment is sufficiently stable to accommodate populations of *Cerastoderma edule* (at least occasional) and other bivalves not usually found on more exposed shores. *Angulus tenuis* may be present in high densities. The community is found mainly on the mid and lower shore where the sediment is saturated most of the time. The more muddy conditions are reflected in a much reduced amphipod component and a wider range of polychaetes than the Amphipod-polychaete with *Angulus* community (AP.Ang). The polychaetes often include *Scoloplos armiger*, *Nephtys hombergii*, *Pygospio elegans*, *Spio filicornis* and *Chaetozone setosa*.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Common

Characterising species

	Typical abundance
Nephtys hombergii	Present/Not known
Scoloplos armiger	Abundant
Paraonis fulgens	Abundant
Pygospio elegans	Common
Spio filicornis	Frequent
Chaetozone setosa	Abundant
Capitellida	Common
Oligochaeta	Common
Bathyporeia guilliamsoniana	Present/Not known
Cerastoderma edule	Frequent
Angulus tenuis	Abundant

LMS.PCer.Znol *Zostera noltii* beds in upper to mid shore muddy sand

Habitat classification

Salinity:	Variable, 18-30%. [lower estuary], 8-18%. [middle estuary]
Wave exposure:	Sheltered, very sheltered, extremely sheltered
Tidal streams:	
Substratum:	Sandy mud to mud
Zone:	Eulittoral
Height/depth band:	Upper shore, mid shore
Other features:	

Biotope description

Mid and upper shore estuarine sandy mud with *Zostera noltii* at an abundance of frequent or above. This can be considered a variant of the '*Cerastoderma edule*' community since it is most frequently found on estuarine muds with a similar infauna. Exactly what is determining the distribution of *Zostera noltii* is however not entirely clear. *Zostera noltii* is often found in small lagoons and pools, remaining permanently submerged, whilst when on sediment exposed to the air, the mudiness of the sediment retains water and stops the roots from drying out.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Scarce

Characterising species

	Typical abundance
Eteone longa	Common
Scoloplos armiger	Abundant
Pygospio elegans	Frequent
Caulleriella killariensis	Common
Arenicola marina	Frequent
Tubificoides	Common
Corophium volutator	Frequent
Hydrobia ulvae	Abundant
Cerastoderma edule	Common
Macoma balthica	Frequent
Scrobicularia plana	Abundant
Zostera noltii	Common

LGS.AP.Ang Burrowing amphipods, *Angulus tenuis* and *Nephtys cirrosa* in lower shore clean stable sand

Habitat classification

Salinity:	Full
Wave exposure:	Moderately exposed, sheltered
Tidal streams:	
Substratum:	Medium to fine sand
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	Extends into the shallow sublittoral

Biotope description

Clean medium to fine sand on the lower shore, but sometimes also on the mid shore . The habitat differs from that of the Amphipods and *Scolelepis* biotope (AP.Sco) in that the conditions are a little more sheltered. The finer sediment and less mobile nature of the shores enable colonization by more adaptable species of bivalve. This community consists of burrowing amphipods (particularly *Bathyporeia elegens*, *B. guilliamsonia*, *B. pelagica*, *B. pilosa*, *B.sarsi*, *Pontocrates altamarinus*, *P. arenarius* and *Haustorius arenarius*), the isopod *Eurydice pulchra*, a range of polychaetes such as *Nepthys cirrosa* and *Paraonis fulgens* and bivalves. The bivalves are those which are more tolerant of wave exposure, principally *Angulus tenuis*, but also *Donax vittatus*, *Fabulina fabula* and *Mactra stultorum* in some locations. This community differs from the other Amphipod -polychaete communities (AP.Sco, AP.Are) in the presence of these bivalves at densities of frequent or greater in the majority of samples. It differs from other communities with bivalves in that the range of bivalve species is restricted to those mentioned. *Cerastoderma edule* and *Macoma balthica* are only rarely present.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Common

Characterising species

	Typical abundance
Nephtys cirrosa	Abundant
Paraonis fulgens	Abundant
Scolelepis squamata	Common
Spio filicornis	Common
Spiophanes bombyx	Common
Arenicola marina	Occasional
Pontocrates altamarinus	Common
Pontocrates arenarius	Frequent
Bathyporeia elegans	Common
Bathyporeia guilliamsoniana	Common
Bathyporeia pelagica	Common
Bathyporeia pilosa	Common
Bathyporeia sarsi	Common
Haustorius arenarius	Common
Eurydice pulchra	Frequent
Mactra stultorum	Rare
Angulus tenuis	Abundant

LGS.Lan Dense *Lanice conchilega* in tide-scoured lower shore sand

Habitat classification

Salinity:	Full
Wave exposure:	Moderately exposed, sheltered
Tidal streams:	Strong, moderately strong
Substratum:	Medium to fine sand
Zone:	Eulittoral
Height/depth band:	Lower shore
Other features:	Extends into the shallow sublittoral

Biotope description

Medium to fine sand, usually on the lower shore. The sand is usually clean but may contain some fines and typically occurs under tide-swept conditions or on shores moderately exposed to wave action . May be found in sheltered straits, sounds and fully marine sealochs, where tidal currents are strong. The biotope is distinguished from others in sandy beaches by the presence of *Lanice conchilega* at levels of common and above . A wide range of polychaetes may also be found with *Lanice conchilega* but generally at low levels of abundance. The crustacean and bivalve component is very restricted with species such as *Cerastoderma edule* and *Macoma balthica* when present, typically less than occasional.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Uncommon

Characterising species

	Typical abundance
Scoloplos armiger	Common
Pygospio elegans	Frequent
Lanice conchilega	Abundant
Enchytraeidae	Present/Not known
Cerastoderma edule	Rare
Macoma balthica	Present/Not known

LGS.Tal Talitrid amphipods in decomposing seaweed on the strand-line

Habitat classification

Salinity:	Full
Wave exposure:	Exposed, moderately exposed, sheltered
Tidal streams:	Very weak
Substratum:	Decomposing seaweed on shingle, mixed substrata, sand
Zone:	Supralittoral
Height/depth band:	Strandline
Other features:	Decomposing seaweed

Biotope description

This strand-line community may occur on any shore where decomposing seaweed accumulate on the extreme upper shore strand-line. This community occurs on a wide variety of substrata from shingle and mixed substrata through to fine sands. The shores are usually depositional in nature but the community may also occur on mixed and rocky shores in some circumstances. The decaying seaweeds provide cover and humidity for *Talitrus saltator* and other components of the community. The amphipods *Orchestia* spp. may also be present, as well as enchytraeid oligochaetes if there is some freshwater influence. *Talitrus saltator* may occur further down the shore, almost invariably accompanied by burrowing amphipods *Bathyporeia* spp. (AEur).

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Very common

Characterising species

	Typical abundance
Enchytraeidae	Abundant
Orchestia	Common
Talitrus saltator	Abundant
Insecta indet.	Occasional

LGS.AP.Are Burrowing amphipods, *Arenicola marina* and *Nephtys cirrosa* in clean sandy shores

Habitat classification

Salinity:	Full
Wave exposure:	Moderately exposed, sheltered
Tidal streams:	
Substratum:	Medium to fine sand
Zone:	Eulittoral
Height/depth band:	Mid shore, lower shore
Other features:	

Biotope description

Clean medium to fine sand on exposed beaches with dense populations (at least Frequent) of lugworm *Arenicola marina*. The distribution of this community is influenced by local topography which affects drainage. On beaches with a steep slope it may be restricted to the lower shore but on wide flat beaches it may extend across the full width of the beach. The habitat is substantially the same as for the Amphipod-*Scolelepis* biotope (AP.Sco) and the community contains many of the same species. It typically includes the burrowing amphipods *Bathyporeia* spp., *Pontocrates* spp. and *Haustorius* spp., the isopod *Eurydice pulchra* and other polychaetes such as *Scolelepis squamata* and *Nepthys cirrosa*. The *Arenicola* populations are temporary; high numbers of *Arenicola* on clean sands may reflect local recruitment success. Also the surface casts of *Arenicola* may be swept away each tide. The community differs from the Amphipods with *Eurydice* community (AEur), and the Amphipod-polychaete with *Scolelepis* community (AP.Sco), in the abundance of *Arenicola marina* over other polychaete species. *Arenicola* perhaps excludes other polychaete species such as *Paraonis fulgens*. It differs from the Amphipod-polychaete with *Angulus* community (AP.Ang) in the paucity of bivalves. If bivalves occur at an abundance of frequent or above, in the majority of the samples, these should be considered AP.Ang. It should not be confused with the more muddy sand biotope AreBv.

Regional variation

Similar biotopes

Features of conservation interest

Distribution

Frequency
Uncommon

Characterising species

	Typical abundance
Nephtys cirrosa	Occasional
Scolelepis squamata	Frequent
Capitella capitata	Common
Arenicola marina	Common
Bathyporeia pelagica	Present/Not known
Bathyporeia pilosa	Present/Not known
Bathyporeia sarsi	Common
Eurydice pulchra	Frequent

APPENDIX 3

SITE INFORMATION

Survey areas

Site information is given by survey areas. A map of the survey area showing the location of the sites precedes each site report. The scale of these maps is 1:50,000 unless otherwise stated.

Site information

A full description for each site surveyed is provided. These descriptions describe the location of the site, dominant features and species and indicate the layout of the stations surveyed. Additional information included for each site is its (a) Field code number, (b) MNCR database site and report numbers, and (c) transect details including, transect length, grid reference of start point, magnetic bearing. The Field code number is the date sampled as year-month-day. All site descriptions are as entered into the MNCR database and are given by survey area. In the database, all sites and station numbers are prefixed by the survey code 529 which facilitates their rapid identification.

Station information

For each of the 142 stations sampled the site, station, habitat, fauna abundance, and biotope information is given.

1. Site and station

The site name, station number and location, MNCR habitat number, database number for the survey, site, and station. Stations were numbered from the upper to lower shore in most instances.

2. Habitat

The habitat is described according to height on the shore, wave exposure, and substratum. If taken, granulometry and organic content (% LOI) results are also given. Where no granulometry results are given then no sample was taken and substratum information is based on field observations.

3. Fauna abundance.

The fauna at each station are listed with their:

- the relative abundance (using MNCR scale) of fauna observed *in situ* on the surface. Note these data are shown in the column marked 'obs.';
- the number observed in each (1 m^2) dig ('dig');
- the number found in each set (4 x 0.01m^2) of cores ('core');
- the abundance for each species using all the above information ('abundance').

The occurrence of flora is indicated in the station description. Where no relevant samples were taken that abundance column is omitted. Thus top of shore stations do not have core or granulometry data presented.

4. Station description.

A general station description (as in database) is given which describes what was observed at the station in terms of general location (distance from top of the shore, national grid reference), topography, sediment type and any evidence of infauna observed on the surface. This is derived from the field observations such that (a) all infauna evident may not have been captured in digs or cores, and (b) the description of the substratum may differ from the actual granulometry results.

5. Biotope designation.

Each station is designated a biotope. Non MNCR standard biotopes, i.e. those that have been established by the authors in this study, are marked with an asterisk. Full descriptions of biotopes are given in Appendix 2.

SURVEY AREA	**WEXFORD HARBOUR**
Site No. 1	Rosslare Point
Site No. 2	The Burrow

Site Location Map

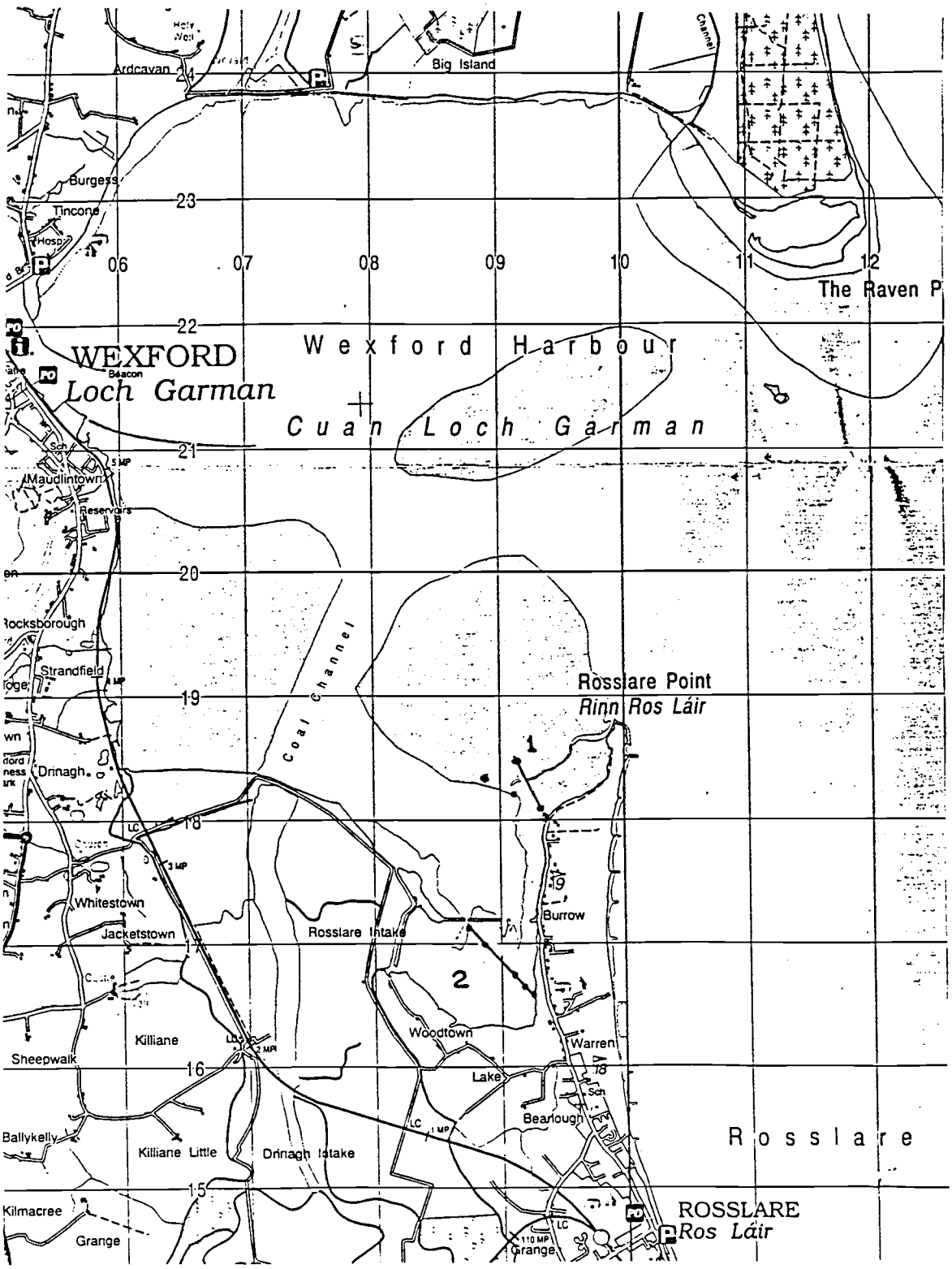


Plate 2. Extensive raised mussel bed (biotope type LMS.Myt*) at Rosslare Point, Wexford Harbour.

Site No. 1 Rosslare Point

Field No. and Date **960913** MNCR database site no. **10072**

Transect length: 600 m Magnetic bearing: 338° Grid Ref. start point: T 193 180

Site description

The site was located on the sheltered side and at the end of a dune peninsula which protects the mouth of a large, east facing bay (Wexford Harbour) on the south-east coast of Ireland. The harbour is an Area of Scientific Interest and a proposed SPA and NHA because of its' importance as a bird habitat. The area surveyed consisted of extensive tidal sand and mud flats broken by several channels with a variety of habitat types represented. A transect was walked from the west side of the peninsula (T 093 180), at a magnetic bearing of 338 degrees, across this inter-tidal flat for a distance of 540 m, crossing two channels. A narrow band of salt marsh led onto an upper shore of soft anoxic mud with some sand. The mid and lower shores were composed of rippled, muddy sand with a large *Mytilus* bed extending eastward on the lower mid shore. Stations 1 to 3 were located along the transect, station 4 at the edge of the mussel bed approximately 200 m south-west of station 3 and station 5 at the edge of the channel, approximately 200 m south of station 3. Species recorded at the site included, *Neanthes virens*, *Cerastoderma edule*, *Nepthys hombergii*, *Littorina* sp. and *Corophium volutator*.

Rosslare Point

Station 1, Top of shore
MNCR habitat no. 21655 (529,1.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Mud

Number fauna taxa: 0

Station description

Distance from shoreline: 0 m Grid Ref: T 093 180

At the edge of the narrow strip of saltmarsh backing the shore. Small clumps of *Fucus vesiculosus* present on soft mud. No animals observed.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Rosslare Point

Station 2, Upper shore
MNCR habitat no. 21656 (529,1.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Muddy sand
Organic content: 3.1%

Granulometry

Component	%
mud	34.9
very fine sand	19.5
fine sand	35.1
medium sand	10.1
coarse sand	0.1

Fauna list	Obs.	Dig	Core	Abundance
Glycera tridactyla	-	-	1	P
Hediste diversicolor	-	21	-	F
Scoloplos armiger	-	-	4	S
Arenicola marina	C	-	-	C
Crangon crangon	-	3	-	F
Cerastoderma edule	-	8	1	F
Scrobicularia plana	-	3	-	C

Number fauna taxa: 7

Station description

Distance from shoreline: 85 m

The upper shore was initially firm, sandy mud becoming progressively softer and muddier as it sloped to a shallow drainage channel. On the far side of the channel there was a slightly raised bank of soft, anoxic mud and pools of standing water. There was a high percentage of plant detritus in the top 10 cm of sediment with compacted clayey mud beneath this. The anoxic zone was 1 mm below the surface. *Arenicola* casts were common to abundant on the surface, in the standing water. *Hediste diversicolor*, *Cerastoderma edule* and *Scrobicularia plana* were also common in this area.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.Hed.Scr.)

Rosslare Point

Station 3, Mid shore
MNCR habitat no. 21657 (529,1.3)

Habitat classification
Height on shore: Mid Shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 0.83%

Granulometry

Component	%
mud	3.7
very fine sand	48.4
fine sand	44.6
medium sand	3.3
coarse sand	0.0

Fauna	Obs.	Core	Dig	Abundance
Nephtys hombergii	-	6	14	A
Scoloplos armiger	-	3	4	A
Arenicola marina	C	-	-	C
Corophium volutator	-	-	3	O
Cerastoderma edule	-	-	3	F
Angulus tenuis	-	-	1	F
Terebellida indet.	-	2	-	P

Number fauna taxa: 7

Station description

Distance from shoreline: 540 m Grid Ref: T 091 184

The mid shore area was dominated by extensive raised banks of firm, medium, rippled sand, broken by channels. There was a fine layer of silt over black anoxic sand. The surface was uneven with occasional pools of standing water and *Arenicola* casts common. *Nephtys hombergii*, *Corophium volutator*, *Scoloplos armiger*, *Angulus tenuis* and *Cerastoderma edule* were present in the area.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Rosslare Point

Station 4, Mid shore, mussel Bank
MNCR habitat no. 21658 (529,1.4)

Habitat classification
Height on shore: Mid shore, mussel bank
Wave exposure: Moderately exposed
Substratum: Sandy mud

Fauna list	Obs.	Dig	Abundance
Neanthes virens	-	9	C
Nephtys hombergii	-	1	F
Littorina sp.	C	-	C
Mytilus edulis	A	-	A

Number fauna taxa: 4

Station description

Distance from shoreline: 800m Grid ref: T 091 183

An extensive raised mussel (*Mytilus edulis*) bed dominated much of the mid and lower shore area. The surface of the bed was very uneven and was formed into banks and dunes about 0.75 m high. The sediment consisted of black mud which smelt strongly of hydrogen sulphide. The upper part of the dunes were covered in filamentous green algae. A number of birds were seen feeding on the bed and people were observed picking *Littorina* sp. which were present in clumps of *Fucus vesiculosus*.

Biotope designation
Mytilus edulis banks on muddy sand shores (LMU.Myt*)

Rosslare Point

Station 5, Lower shore
MNCR habitat no. 21659 (529,1.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Moderately exposed
Substratum: Muddy sand
Organic content: 1.29%

Granulometry

Component	%
mud	11.4
very fine sand	37.0
fine sand	44.4
medium sand	7.0
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	P	-	1	P
Neanthes virens	C	2	-	C
Nephtys hombergii	A	7	5	A
Scoloplos armiger	C	7	-	C
Arenicola marina	C	1	-	C

Number fauna taxa: 5

Station description

Distance from shoreline: 350m Grid ref: T 091 182

Edge of low water. Firm, even, rippled sand with an anaerobic zone 2 mm below the surface.

Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

Site No. 2 The Burrow

Field No. and Date: **960912** MNCR database site no. **10071**

Transect length: 850 m Magnetic bearing: 323° Grid ref. start point: T 092 165.

Site description

The site was located in a small, sheltered north facing inlet on the south side of a large, east facing bay (Wexford Harbour) on the south-east coast of Ireland. Wexford Harbour is an Area of Scientific Interest and a proposed SPA and NHA because of its importance to water fowl. The site was situated between a dune peninsula to the east, which protected the southern side of the inlet from the open sea, and an old breakwater which further enclosed an area of approximately 1 km^2 in a small bay. Shallow channels ran through two openings in the breakwater with the main channel being the more westerly of the two. A transect was taken from the west side of the dune peninsula, at a magnetic bearing of 323 degrees, across a slightly undulating mud flat to the edge of the west channel where it breached the breakwater. The upper shore was fringed by a ribbon of saltmarsh and grassland which separated the shore from a road verge. The sediment on the upper shore was generally soft mud with a subsurface layer of peat and occasional pockets of coarse sand. The surface sloped slightly to the east channel then rose again to slightly dryer sandy mud between the two channels before gradually descending to the west channel with soft clayey mud and a small percentage of broken shell at the channel edge. *Arenicola marina* casts were common to abundant on the upper shore but were only occasional to frequent on the mid and lower shore. *Neanthes virens* was dominant on the lower shore while *Nepthys hombergii* and the bivalves *Cerastoderma edule* and *Macoma balthica* were also present at the site.

The Burrow

Station 1, Top of shore
MNCR habitat no. 21650 (529,2.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Sandy mud

Fauna	Obs.	Abundance
Gammarus locusta	O	O
Hydrobia sp.	F	F

Number fauna taxa: 2

Station description

Distance from the shoreline 0m Grid ref. T 092 165

The top of the shore was fringed by eroding grassland and saltmarsh which separated the shore from the road way. Filamentous green algae, *Enteromorpha* sp. and *Ulva* sp. were present.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

The Burrow

Station 2, Upper shore
MNCR habitat no. 21651 (529,2.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Muddy sand
Organic content: 4.1(%)

Granulometry

Component	%
mud	45.2
very fine sand	15.5
fine sand	29.8
medium sand	9.5
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	-	1	P
Neanthes virens	-	10	-	A
Nephtys hombergii	-	1	-	F
Scoloplos armiger	-	1	-	C
Arenicola marina	C	-	1	C
Mya arenaria	-	-	1	P
Heteromastus filiformis	-	1	-	F

Number fauna taxa: 7

Station description

Distance from shoreline: 85 m

The sediment on the upper shore was gradually sloping soft mud becoming progressively softer near the east channel. The anaerobic zone was 4 mm below the surface. The surface of the sediment was covered by a fine layer of silt. There were occasional pockets of clean coarse sand through the mud with a layer of peat and plant detritus at 10 cm. There were occasional pools of standing water. Species present included *Neanthes virens*, and *Arenicola* at 1-9 m^{-2}.

Biotope designation
Neanthes virens in sandy mud shores (LMU.Nea*).

The Burrow

Station 3, Mid shore
MNCR habitat no. 21652 (529,2.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Muddy sand

Fauna	Obs.	Dig	Abundance
Neanthes virens	A	>50	A
Nephtys hombergii	-	1	F
Scrobicularia plana	P	1	C

Number fauna taxa: 3

Station description

Distance from shoreline: 250 m

Gradually sloping soft mud with layers of fine silt or black mud, slightly firmer than on the upper shore. Anaerobic zone at 1 mm depth. Paired *Scrobicularia plana* shells present. Course layer of small stones at 30 cm below the surface. *Neanthes virens* abundant in the sediment. No *Arenicola* casts present in this area.

Biotope designation
Neanthes virens in sandy mud shores (LMU.Nea*).

The Burrow

Station 4, Mid shore
MNCR habitat no. 21653 (529,2.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	21.8
very fine sand	19.5
fine sand	52.7
medium sand	6.0
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Neanthes virens	-	15	-	A
Hediste diversicolor	-		3	F
Nephtys hombergii	-	1	--	F
Arenicola marina	C	1	-	C
Cerastoderma edule	-	1	-	F
Macoma balthica	-	1	-	O
Mya arenaria	-	-	1	C

Number fauna taxa: 7

Station description

Distance from shoreline: 600 m

Approximately half way between the two channels, on a slightly raised bank of firm, even, sandy mud. Anaerobic zone 2 mm below the surface with a coarse layer at 15 cm. *Neanthes* sp. were common with *Cerastoderma edule* and *Macoma balthica* also present.

Biotope designation
Neanthes virens in sandy mud shores (LMU.Nea*)

The Burrow

Station 5, Lower shore
MNCR habitat no. 21654, (529,2.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Mud
Organic content: 5.5%

Granulometry

Component	%
mud	83.5
very fine sand	7.8
fine sand	5.9
medium sand	2.8
coarse sand	0.0

Fauna	Obs	Dig	Core	Abundance
Neanthes virens	P	7	0	C
Hediste diversicolor	-	-	1	P
Hyale nilssoni	-	-	1	P
Echinogammarus marinus	-	-	3	C
Cerastoderma edule	-	1	-	F

Number fauna taxa: 5

Station description

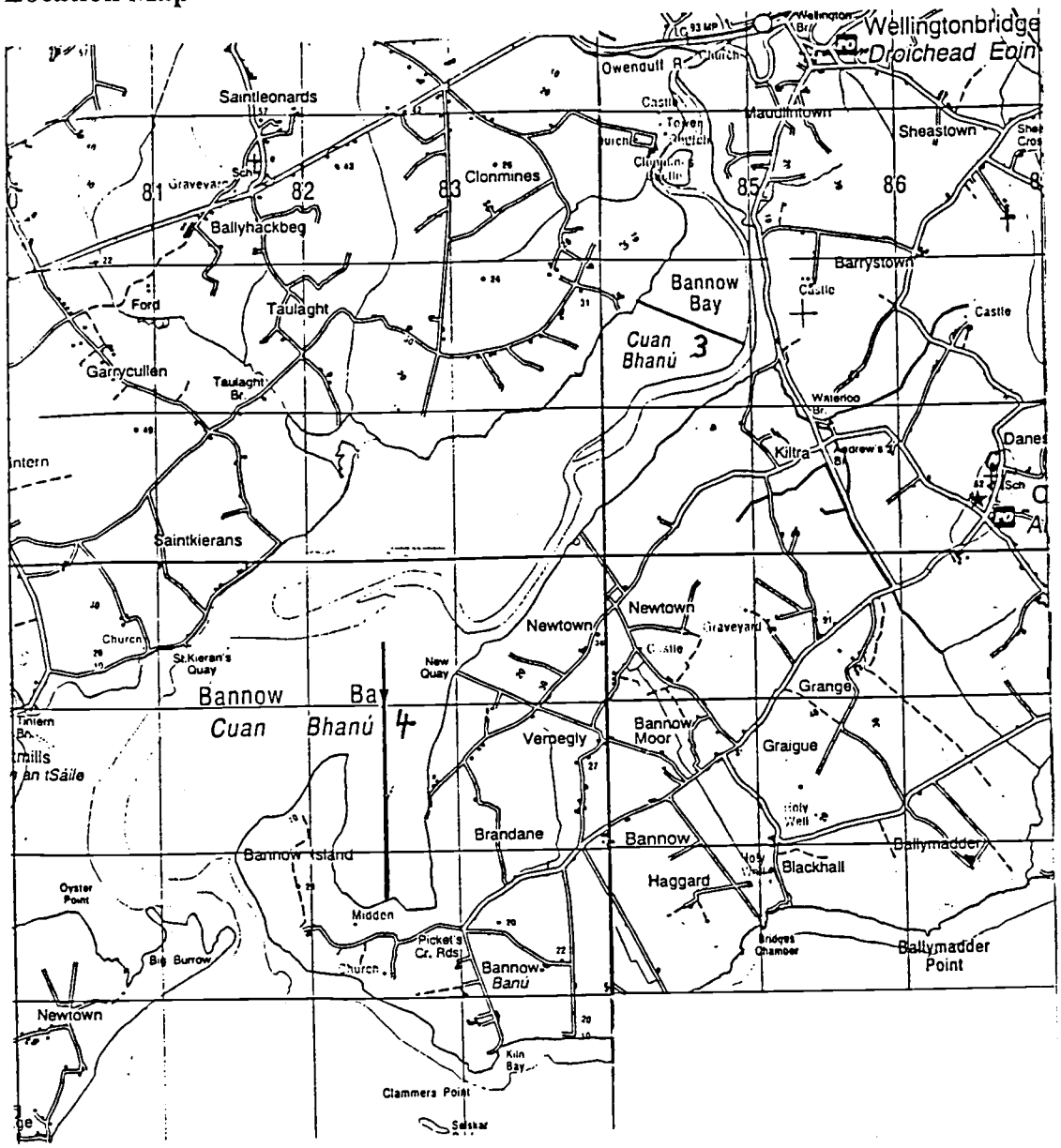
Distance from shoreline: 850 m Grid Ref. T 087 171

At the edge of the main channel, close to the breakwater. Heavy clayey mud with 5% broken shell content and a coarse layer of empty *Hydrobia* shells, 5 cm thick, just below the surface. The surface was covered by a layer of sandy silt and a lot of old scattered shells. The sediment became softer and water logged at the very edge of the channel. *Neanthes* sp. were present.

Biotope designation
Neanthes virens in sandy mud shores (LMU.Nea*)

SURVEY AREA	**BANNOW BAY**
Site No. 3	Bannow Bay - Inner
Site No. 4	Bannow Bay - Outer

Site Location Map



Site No. 3: Bannow Bay - Inner

Field No. and Date: **960915** MNCR database site no. **10027**

Transect length:600 m Magnetic bearing: 338° Grid ref. start point: S 841 115

Site description

The site was located on the west side of the inner estuary of the Owenduff and Corock rivers which flow into a partially enclosed south facing bay (Bannow Bay) on the south coast of Ireland. At the site, the estuary was approx. 1.4 km wide, and backed by a low (3 m) cliff and a short (9 m wide) sloping (1 m fall) shingle beach. A flat muddy area extended 1 km to the main channel of the estuary, running adjacent to the east shore. A steep muddy bank descended more than 1m to the channel. Generally the ground sloped very gradually towards the sea to the south-east. A film of water covered the site with a band of shallow (5 cm) standing water adjacent to the shingle beach. Clumps of green filamentous algae covered 10 to 20% of the site from the beach out to 900m. A narrow band of small worm (*Arenicola*) casts extended from the beach out to 150 m (density 10 m^{-2}) with very occasional larger worm casts extending to 400m out. Sediments were generally a black anoxic mud with some fine sand and broken shell. *Scrobicularia plana*, *Neanthes* sp., *Nephtys* sp., fine tube worms and amphipods were present. The muddy sand channel edge was barren.

Plate 3. Extensive upper shore mudflat (MNCR biotope LMU.HedScr) at Inner Bannow Bay, Co. Wexford.

Bannow Bay - Inner

Station 1, Top of shore
MNCR habitat no. 21412 (529,3.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Cobbles over muddy sand

Fauna	Obs.	Abundance
Hediste diversicolor	P	P
Echinogammarus marinus	A	A
Carcinus maenas	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 0 m Grid ref: S841 115

At the bottom of a sloping shingle beach (falls 1 m over 9 m) of large stones and cobbles. *Pelvetia canaliculata*, *Fucus vesiculosus* and some *Enteromorpha* sp. covering on the stones. Gammarids and shore crabs abundant. *Hediste diversicolor* present.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Bannow Bay - Inner

Station 2, Upper shore
MNCR no. 21414, (529,3.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Muddy sand
Organic content: 4.1%

Granulometry

Component	%
mud	47.6
very fine sand	37.7
fine sand	13.9
medium sand	0.8
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	40	7	A
Arenicola marina	C	3	2	C
Macoma balthica	-	-	1	P
Scrobicularia plana	-	9	11	S
Mya arenaria	-	-	3	C
Gammarus locusta	-	4	-	O

Number fauna taxa: 6

Station description

Distance from shoreline: 90 m

Flat area with occasional clumps of filamentous green algae on small mounds, and about 5 cm of standing water. Dunlin were observed feeding on the algae covered area. Sediments were composed of black anoxic mud with some fine sand and a thin (2 mm) layer of silt on the surface. There were dead *Scrobicularia plana* shells in the sediment with a hard layer at 20 cm, and worm casts (*Arenicola*) 9 m^{-2} on the surface. *Hediste diversicolor* were abundant, fine worm tubes common, *S. plana* frequent, *Arenicola* sp. and amphipods occasional, and small *Mya* present. Gammarids were frequent in clumps of algae.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.)
Conforms very well to this biotope type.

Bannow Bay - Inner

Station 3, Mid shore
MNCR habitat no. 21416 (529,3.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sandy mud

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	14	1	C
Nephtys hombergii	-	2	-	F
Macoma balthica	-	-	1	P
Scrobicularia plana	-	5	9	S
Cyathura carinata	-	6	3	F

Number fauna taxa: 5

Station description

Distance from shoreline: 675 m

In a flat area with fine black anoxic mud with some sand and *Scrobicularia plana* shells. Fine layer (2 mm) of silt on surface with a thin film of water over. Clumps of green filamentous algae covering 20% of the surface. Surface somewhat soft and broken. In dig were *Hediste diversicolor* (15 m^{-2}), *Nephtys hombergii* (3 m^{-2})) and abundance of fine worm tubes. Amphipoda were frequent to abundant (15 m^{-2}), and *S. plana* common.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.)

Bannow Bay - Inner

Station 4, Lower shore
MNCR habitat no.21418 (529,3.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Mud

Number fauna taxa: 0

Station description

Distance from shoreline: 925 m

At the edge of the main channel, on a steep muddy bank, with 4 mm of silt over a black anoxic mud with some fine sand and a small amount of plant detritus. No fauna present in the cores or digs.

Biotope designation
Barren sandy mud shores (LMU.Bar*)

Site No. 4 Bannow Bay - Outer

Field No. and Date: **960914** MNCR database site no.**10018**

Transect length: 1660 m Magnetic bearing: 13° Grid ref. start point: S 825 073

Site description

The site was located in a small, U-shaped sheltered inlet at the southern end, and east side, of a large partially enclosed, south facing bay (Bannow Bay) on the south-east coast of Ireland. The inlet is enclosed by grassland to the west and east and sand dunes to the south, with the mouth of the bay to the north, opening into Bannow Bay. A small stream drains into the middle of the top of the bay and a narrow band of saltmarsh fringes the top of the shore. The ground slopes very gradually northward to the mouth of the bay and gradually to a side channel which protrudes three-quarters of the way into the bay on its east side. A transect was taken from the top of the bay, near the stream, at a magnetic bearing of 13 degrees, down the centre of the bay to its mouth, a distance of 1.4 km. The bay was approximately 1 km wide. Sediments in the upper and upper mid shore (0 to 700m) areas were soft anoxic black muds with a small amount of sand. With the exception of a narrow strip (100m) at the edge of the saltmarsh which was characterised by abundant small *Arenicola* casts, this area was covered (40 to 95%) by a mat of green filamentous algae. Where the mud surface was free from algae, small worm casts were present at densities of between 70 and 99 m^{-2}. The size of the casts increased with distance from the shore but the density decreased. The area was generally covered in standing water. Beyond the algae mat, the sediments were sandy, graduating from fine sand on the mid shore region to coarser sand near the edge of the side channel. The area was generally flat rippled sand with small or no standing water and occasionally broken by shallow channels. Worm casts (*Arenicola*) were present at densities of 1 to 10 m^{-2}.

Bannow Bay - Outer

Station 1, Top of shore
MNCR habitat no. 21399 (529,4.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud
Other features Edge of salt marsh

Fauna	Obs.	Abundance
Hydrobia ulvae	C	C

Number fauna taxa: 1

Station description

Distance from shoreline: 0 m Grid Ref: S825 073

At the edge of a salt marsh. Gradually sloping black mud with a thin layer of silt on the surface. *Hydrobia* sp. in clumps at base of marsh reeds. Probably intermediate between salt marsh and mudflat.

Biotope designation

Unclassified

Bannow Bay - Outer

Station 2, Upper shore
MNCR habitat no. 21400 (529,4.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Mud

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	15	-	A
Nephtys hombergii	-	-	4	A
Arenicola marina	C	-	1	C
Hydrobia ulvae	-	-	-	C
Mytilus edulis	-	4	-	A
Scrobicularia plana	-	2	1	C

Number fauna taxa: 6

Station description

Distance from shoreline: 15 m

Gradually sloping black anoxic mud with a 1- 5 mm layer of silt on the surface. The sediment was firm at the edge of the saltmarsh but quickly became soft. Scattered clumps of green filamentous algae gradually increased to 40% cover at 100m out. Small worm casts were at a density of 70 to 99 m^{-2} from 10m out, and they decreased as alga cover increased. *Hediste diversicolor*, small *Arenicola* sp. and *Scrobicularia plana* present.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.)

Bannow Bay - Outer

Station 3, Mid shore, upper
MNCR habitat no. 21403 (529,4.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sandy mud
Organic content: 3.7%

Granulometry

Component	%
mud	65.0
very fine sand	17.7
fine sand	13.8
medium sand	3.5
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Glycera tridactyla	-	2	-	F
Nephtys hombergii	-	3	1	F
Scoloplos armiger	-	-	1	P
Arenicola marina	-	2	0	C
Scolelpis foliosus	-	1	0	F
Hydrobia ulvae	-	-	6	C
Cerastoderma edule	-	6	7	A
Scrobicularia plana	-	-	12	S
Mya arenaria	-	1	-	C

Number fauna taxa: 9

Station description
Distance from shoreline: 500 m

Flat anoxic muddy sediment with some sand. A filamentous green alga mat covered 80% of the surface. There was a silt layer 2 mm deep on the remaining area. The sampling station was situated beside a small channel carrying brackish water. Alga cover began to decrease from this point outward, and the alga mat ended at 700m from shore. A number of polychaetes and bivalves were present in the dig including *Cerastoderma edule, Nephtys hombergii, Scoloplos armiger, Scrobicularia plana,* and *Arenicola.*

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Bannow Bay - Outer

Station 4, Mid shore
MNCR habitat no. 21404 (529,4.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 2.9%

Granulometry

Component	%
mud	3.0
very fine sand	24.6
fine sand	56.8
medium sand	7.5
coarse sand	8..1

Fauna	Obs.	Dig	Abundance
Nephtys cirrosa	-	3	F
Scoloplos armiger	-	25	A
Arenicola marina	C	-	C
Crangon crangon	-	1	F
Cerastoderma edule	-	6	F
Terebellida indet.	-	1	F

Number fauna taxa: 6

Station description

Distance from shoreline: 1260 m

A medium, well compacted, rippled sand with small pools of water in the ripples. The anoxic zone was 1 to 3 cm below the surface. Worm casts (*Arenicola*) were at a density of 9 m^{-2}. *Nephtys cirrosa* sp. and *Scoloplos armiger* and *Cerastoderma edule* were present in the dig. The northern tip of Bannow Island was 1350 m from shore to the west. The sand extended approximately 1000 m into the main bay beyond this point. The sand flat was occasionally crossed by small channels.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Bannow Bay - Outer

Station 5, Lower shore

MNCR habitat no. 21405 (529,4.5)

Habitat classification

Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	2.1
very fine sand	17.9
fine sand	61.2
medium sand	17.9
coarse sand	1.4

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	-	F
Scoloplos armiger	-	14	2	A
Arenicola marina	C	4	1	C
Cerastoderma edule	-	7	-	F
Angulus tenuis	-	6	1	F
Crangon crangon	-	3	-	F
Haustorius arenarius	-	1	-	O

Number fauna taxa: 7

Station description

Distance from shoreline: 1260 m

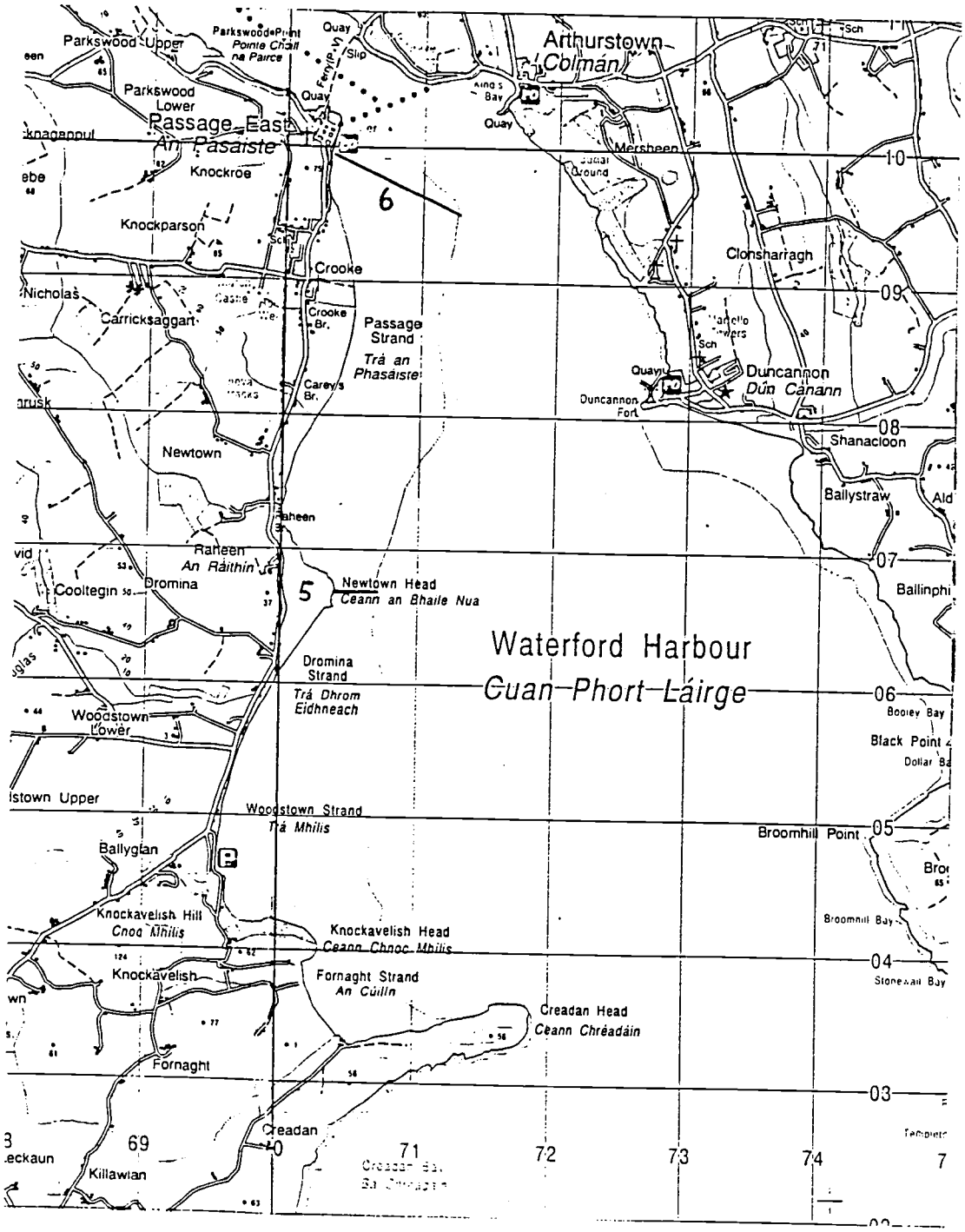
Approximately 400m east of the last station and 1260 m out from the transect origin. The station was at the edge of a side channel running adjacent to the east shore, 250 m north of the end of a road. Another small braided channel was at right angles to the side channel south of the station. The sand was firm, rippled, coarse, and well aerated; it was 15 to 20 cm to the anaerobic zone. Birds were feeding at the channel edge. *Angulus tenuis*, *Nephtys hombergii*, and *Arenicola* present.

Biotope designation

Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

SURVEY AREA	**WATERFORD HARBOUR**
Site No. 5	Newtown Head
Site No. 6	Passage East

Site Location Map



Site No. 5 Newtown Head and Woodstown Strand

Field No. and Date: **960916** MNCR database site no.**10028**

Transect length: 315 m Magnetic bearing: 88° Grid ref. start point: S 704 065

Site description

The site was located at Newtown Head, on the west side of Waterford Harbour, a long, narrow, south facing estuary on the south coast of Ireland. Newtown Head is approximately half way between Passage East and Creadan Head. Access to the site was from Woodstown strand. The site was backed by a rocky headland (3 m cliff) and gradually sloping sandy beach with rock outcrops which were covered with mussels and *Enteromorpha* sp. at their base and with barnacles higher up. A flat expanse of rippled sand extended approximately 600 m into Waterford Harbour. A transect was taken, on a magnetic bearing of 88°, from the southern tip of Newtown Head to the ruined tower on the high ground on the opposite side of the harbour. At the bottom of the sandy beach the sediment was a firm muddy sand which quickly turns to soft muddy sand at 5 m out. A shallow channel, 30 m wide ran adjacent to the beach 21m from the transect origin. On the seaward side of the channel the sediment was firm, well aerated, fine sand with patches of standing water. *Lanice* tubes were present in densities of 20 m^{-2} near the channel, increasing to 30 m^{-2} further out. Worm casts were present at 1 to 2 m^{-2} throughout the shore. Farmed oyster (*Crassostrea gigas*) trestles were present from 350m out to the low water mark. *Angulus tenuis* were abundant on the middle shore with *Arenicola marina* and *Nephtys* sp. occasionally present.

Plate 4. Moderately exposed sandy beach at Woodstown Strand, Waterford Harbour. Note extensive oyster trestles on lower shore.

Newtown Head / Woodstown Strand

Station 1, Upper shore
MNCR habitat no. 21428 (529,5.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Moderately exposed
Substratum: Muddy sand
Organic content: 3.1%

Granulometry

Component	%
mud	30.5
very fine sand	39.2
fine sand	26.9
medium sand	3.2
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	-	3	C
Scoloplos armiger	-	1	-	C
Arenicola marina	C	3	2	C
Macoma balthica	-	1	2	O

Number fauna taxa: 4

Station description

Distance from shoreline: 10 m

The station was 10 m out from the bottom of a short shallow sandy beach. It was on muddy sand, sloping very gradually to an auxiliary channel at 21 m out from the beach. There was 4 mm of silty sand over patchy, horizontally banded, well aerated sand 20 cm below the surface. Occasional *Arenicola* casts were on the surface. Occasional *Arenicola* sp., *Nephtys* sp. and *Angulus tenuis* in dig.

Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

Newtown Head / Woodstown Strand

Station 2, Mid shore
MNCR habitat no. 21430 (529,5.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.7%

Granulometry

Component	%
mud	21.6
very fine sand	66.5
fine sand	11.2
medium sand	0.6
coarse sand	0.1

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	2	1	F
Arenicola marina	C	1	-	C
Lanice conchilega	-	4	1	F
Crangon crangon	-	-	1	P
Cerastoderma edule	-	3	-	F
Angulus tenuis	-	10	13	A

Number fauna taxa: 6

Station description

Distance from shoreline: 350 m

On a flat, well aerated, medium, fine, rippled sand, 350 m out from the strandline. The anaerobic zone was more than 20 cm below surface. The station was adjacent to the start of oyster trestling. *Angulus tenuis* was abundant, *Lanice* common to abundant and *Nephtys hombergii* present.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Site No. 6 Passage East

Field No. and date: **960831** MNCR database site no. **10070**

Transect length: 1325m Magnetic bearing: 123° Grid ref. start point: S 704 100

Site description

The site was situated on the western side of a sheltered, south facing bay and river estuary on the south coast of Ireland. The area is known to be of ornithological interest. The site was located at the northern end of the outer estuary at the northern end of a large mud and sand flat that ran along the western side of the bay. The sand flat was somewhat protected by a peninsula to the south which partially enclosed the bay. The shore at the north side was backed by 'coastal protection' in front of a small village. A transect was taken from the western end of the coastal protection, at a magnetic bearing of 123 degrees, across the sand flat to the edge of the main channel. A bank of pebbles on firm sand dropped steeply to flat soft muddy sediment for approximately 100 m and thereafter was composed of firm, rippled, well aerated, medium to coarse sand. Generally faunal densities were greatest on the upper and mid shore. Species present included *Crangon crangon*, *Macoma balthica*, *Scoloplos armiger*, *Angulus tenuis* and *Nephtys*. The sandmason, *Lanice conchilega* was present in bands from the mid shore to the lower shore. The shore width was approximately 1.1 km.

Passage East

Station 1, Top of shore
MNCR habitat no. 21635 (529,6.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Muddy sand

Fauna	Obs.	Abundance
Gammarus locusta	F	F
Littorina littorea	P	P

Number fauna taxa: 2

Station description

Distance from shoreline: 0 m Grid Ref: S 704 100

The upper shore was bounded by a steep sandy beach with pebbles which gave way to soft muddy sand. There were occasional clumps of *Fucus vesiculosus* on which *Littorina littorea* were observed. Amphipods were collected from the weed and sand.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Passage East
Station 3, Mid shore
MNCR habitat no. 21637 (529,6.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.7%

Granulometry

Component	%
mud	16.3
very fine sand	47.5
fine sand	19.9
medium sand	8.6
coarse sand	7.7

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	1	F
Scoloplos armiger	-	10	1	A
Lanice conchilega	C	10	-	C
Angulus tenuis	-	2	-	F
Arenicola marina	C	-	-	F

Number fauna taxa: 5

Station description

Distance from shoreline: 810 m

The mid shore was flat and even with a sediment of well aerated, rippled, coarse sand and an anaerobic zone 10 cm below the surface. The sediment contained large amounts of broken shell with a hard shell layer 10 cm below the surface. *Lanice conchilega* was frequent and *Arenicola* were present. *Scoloplos armiger* were common with *Nepthys* sp. and *Angulus tenuis* occasional to frequent. *Lanice conchilega* were the most predominant species.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

Passage East

Station 4, Lower shore
MNCR habitat no. 21638 (529,6.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Exposed
Substratum: Sand
Organic content: 1.9%

Granulometry

Component	%
mud	13.9
very fine sand	59.9
fine sand	23.6
medium sand	2.6
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys cirrosa	-	1	1	F
Lanice conchilega	F	-	-	F
Angulus tenuis	-	3	-	F

Number fauna taxa: 3

Station description

Distance from shoreline: 1325 m

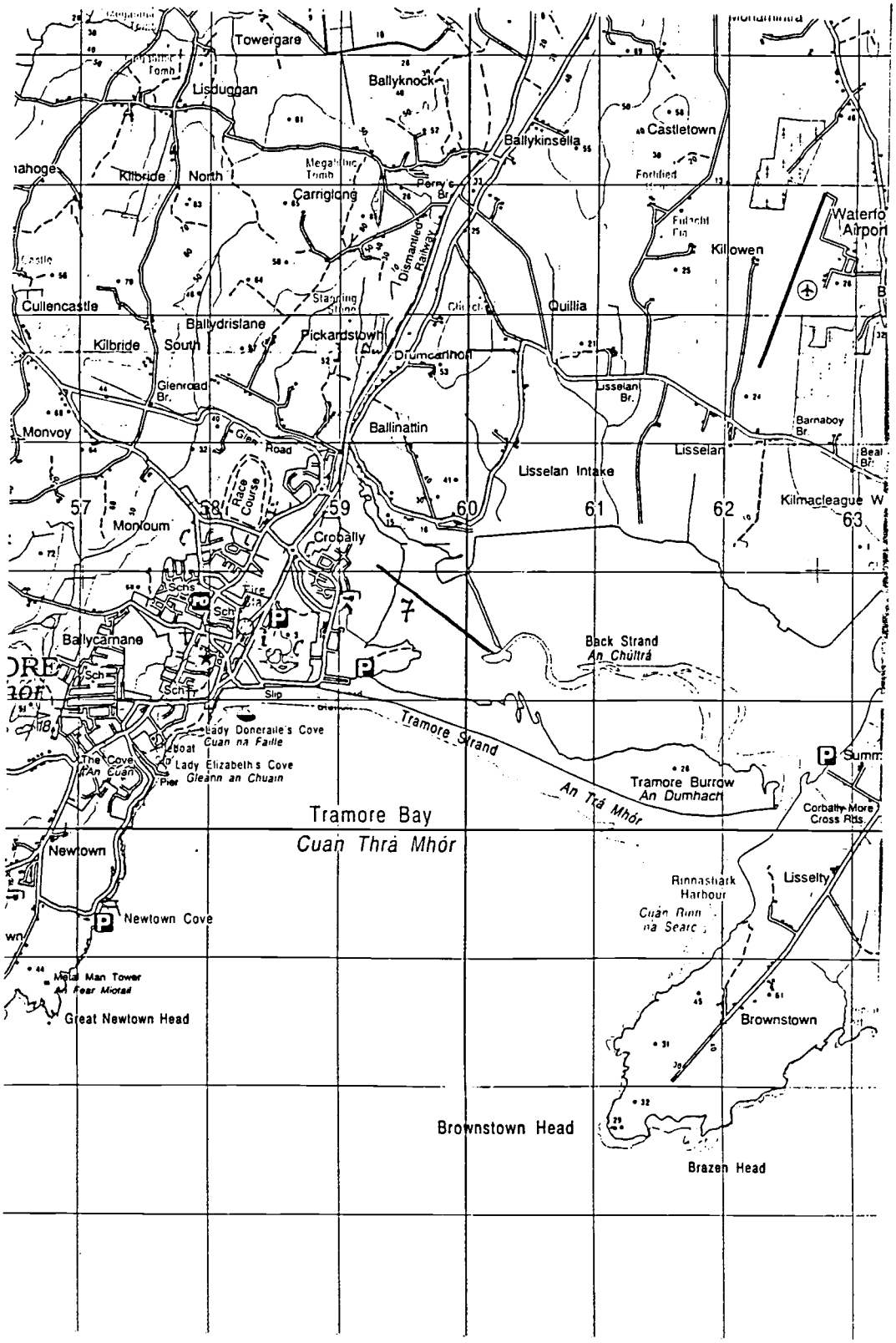
The lower shore consisted of even sediment with coarse well aerated sand, and an anaerobic layer at 20 cm below the surface. Faunal densities were low with small amounts of *Nephtys cirrosa* and *Angulus tenuis*. The low faunal densities may be explained by the increasing lack of stability close to the river channel coupled with the banded nature of the *Lanice conchilega*.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

SURVEY AREA **TRAMORE BAY**

Site No. 7 Back of Tramore Strand

Site Location Map



Site No. 7 Back of Tramore Strand

Field No. and date: **960827** MNCR database site no.**10054**

Transect length: 1100 m Magnetic bearing: 133° Grid ref. start point: S 601 015

Site description

The site was located in the inner part of a large enclosed bay on the south coast of Ireland at the back of a popular resort beach (Tramore). The area is known to be of ornithological interest. The area surveyed was bound on the north side by a large coastal protection wall, and by the Tramore peninsula on the south side where a municipal dump is situated. The peninsula and protection wall enclosed a small bay which opened into the larger bay to the east. A transect was taken from the top of the shore, across a sand and mud flat to the mouth of this small bay. The site was backed, for the most part, by grassland which initially gave way to a low marsh, reed area, to soft mud and then to a firmer rippled, muddy sand substratum on the mid shore and firm rippled sand on the lower shore. Large patches of *Mytilus edulis* and *Littorina littorea* were found on the upper shore. On the mid shore *Arenicola marina* casts were common.

Back of Tramore Strand

Station 1, Top of shore
MNCR habitat no. 21498 (529,7.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud and shale

Fauna	Obs.	Abundance
Echinogammarus marinus	O	O

Number fauna taxa: 1

Station description

Distance from shoreline: 1100 m

Just above tide line on rocks and large boulders at seaward end of the breakwater. *Fucus vesiculosus* occasional.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Back of Tramore Strand

Station 2, Upper shore
MNCR habitat no. 21500 (529,7.2)

Habitat classification
Height on shore: Upper shore
Substratum: Mud
Wave exposure: Very sheltered
Organic content: 4.1%

Granulometry

Component	%
mud	76.8
very fine sand	17.9
fine sand	5.0
medium sand	0.3
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	25	3	C
Arenicola marina	-	10	-	A
Littorina littorea	F	-	-	F
Mytilus edulis	F	-	-	F
Scrobicularia plana	-	12	-	A
Cerastoderma edule	-	-	1	-
Crangon crangon	-	-	1	F
Macoma balthica	-	-	1	P

Number fauna taxa: 8

Station description

Distance from shoreline: 225 m

The sediment was a firm mud and clay, and anoxic below 3 mm. There was a channel nearby with soft muddy banks. *Cerastoderma edule* was frequent, and large patches or clumps of *Mytilus edulis* and *Littorina littorea* nearby.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Back of Tramore Strand

Station 3, Mid shore
MNCR habitat no. 21502 (529,7.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 3.6%

Granulometry

Component	%
mud	14.2
very fine sand	45.0
fine sand	37.7
medium sand	3.0
coarse sand	0.1

Fauna	Obs.	Dig	Core	Abundance
Etone longa	-	-	2	F
Hediste diversicolor	-	1	-	F
Nephtys hombergii	-	6	-	F
Scoloplos armiger	-	8	-	C
Arenicola marina	C	3	1	C
Macoma balthica	-	-	3	F

Number fauna taxa: 6

Station description

Distance from shoreline: 675 m

The sediment was a thin layer of mud over fine sand, with further mud at 20 cm below the surface, and an anoxic layer at 2-3 mm below the surface. The sediment surface was rippled with some standing water. *Arenicola* were common ($9m^{-2}$) but patchy in the immediate area.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Back of Tramore Strand

Station 4, Lower shore
MNCR habitat no. 21504 (529,7.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.4%

Granulometry

Component	%
mud	1.6
very fine sand	15.0
fine sand	54.6
medium sand	27.6
coarse sand	1.4

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	8	-	F
Scoloplos armiger	-	6	-	C
Arenicola marina	C	4	-	C
Angulus tenuis	-	3	1	F

Number fauna taxa: 4

Station description

Distance from shoreline: 1100 m

Situated at the edge of the main channel, near seaward the end of the breakwater. The sediment was firm medium to coarse sand, anoxic below 2 to 3 cm depth. *Arenicola* casts were common and *Nephtys hombergii* frequent.

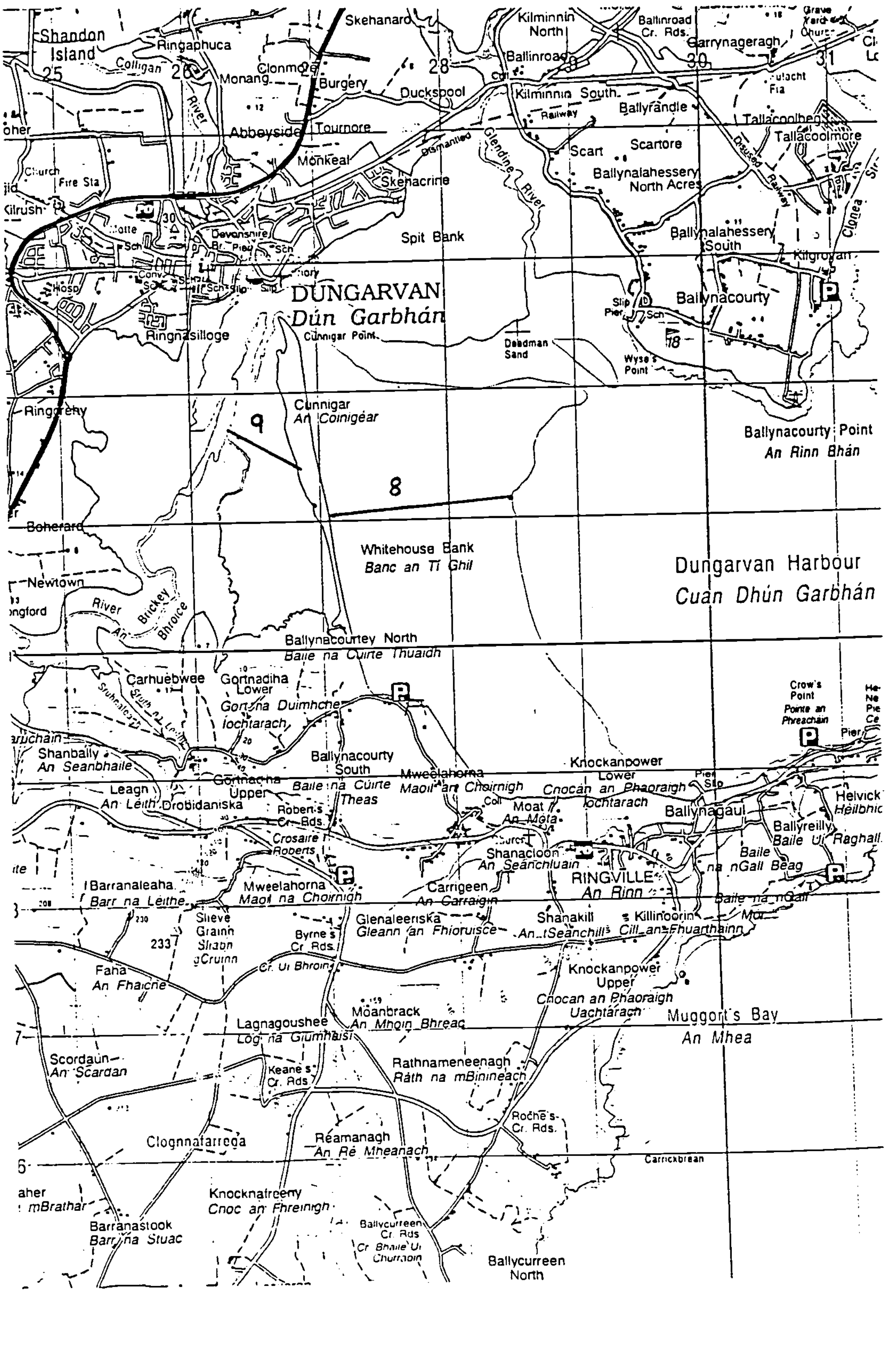
Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

SURVEY AREA **DUNGARVAN HARBOUR**

Site No. 8 Outer Dungarvan - Whitehouse Bank

Site No. 9 Inner Dungarvan

Site Location Map



Site No. 8 Outer Dungarvan Harbour - Whitehouse Bank

Field No. and Date: **960828** MNCR database site no. **10055**

Transect length: 490 m Magnetic bearing: 88° Grid ref. start point: X 270 910

Site description

The site was located in the outer part of a large east facing bay on the south coast of Ireland. The bay is split transversely by a narrow peninsula (An Cunigear), mainly of sand with coastal protection. This peninsula is used for recreational activities including walking and horse riding. A transect was taken from a point approximately one third of the way along the dune bank, at a magnetic bearing of 88 degrees, across sand flats in the outer bay. After a short steep sandy bank, the upper shore was a firm well aerated sand with occasional large pools of standing water. *Crangon crangon* were observed in these pools. *Cerastoderma edule* were found on the upper shore with *Arenicola marina* casts common out to 900 m. The amphipod community found on the mid shore was more varied (it included *Bathyporeia pelagica* and *Ampelisca brevicornis*) than other sandy sites in the survey and this may reflect the degree to which this site was more exposed than others in the survey. From the upper shore (250 m from the shore) seawards there was an increasing frequency of *Lanice* tubes which reached a maximum density of 50 m^{-2} at 1250 m from the shoreline. The lower shore was dominated by extensive trestling used in the cultivation of the Pacific oyster, *Crassostrea gigas.*

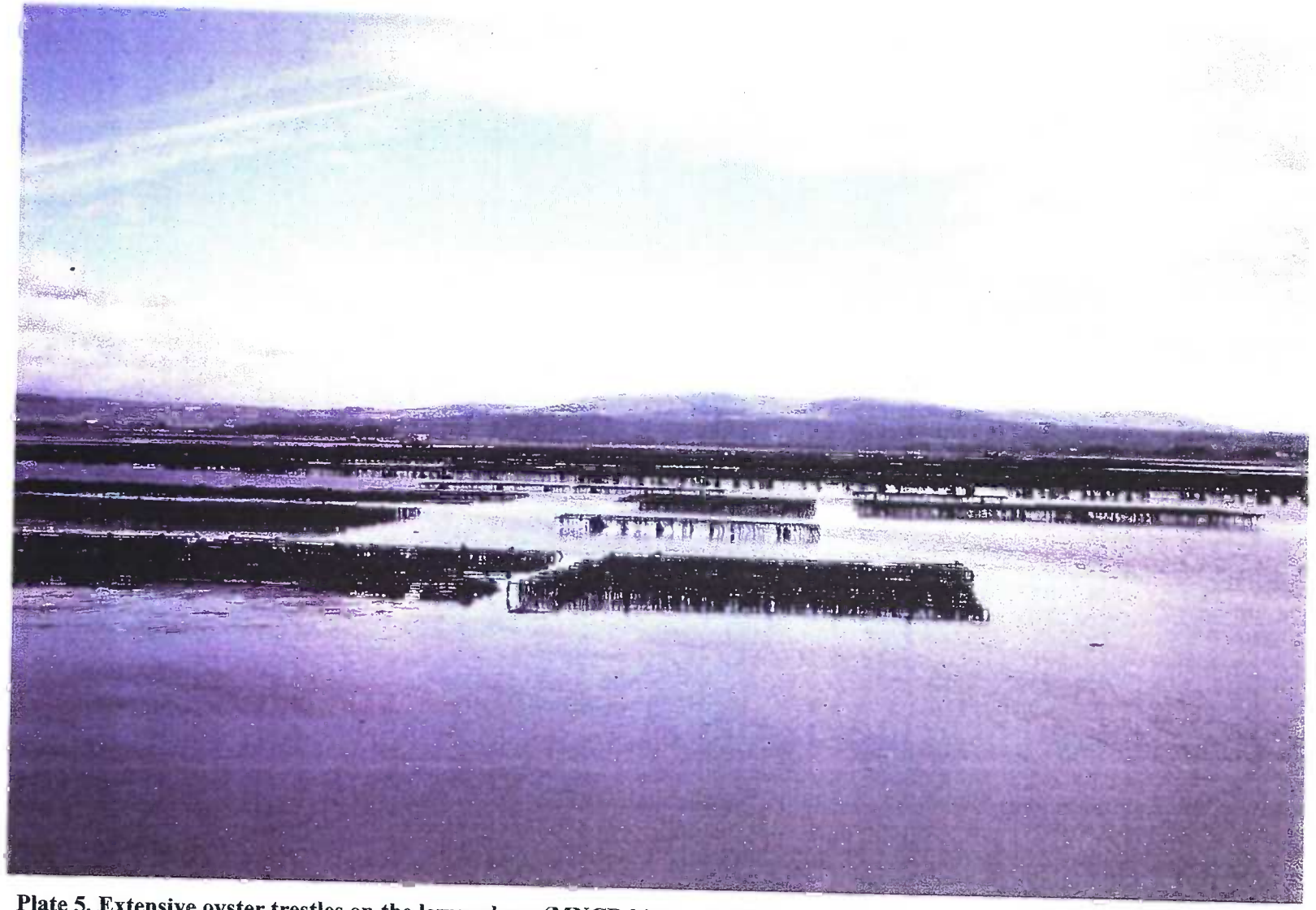


Plate 5. Extensive oyster trestles on the lower shore (MNCR biotope LGS.Lan) of the Whitehouse Bank, Dungarvan Harbour.

Outer Dungarvan

Station 4, Top of shore
MNCR habitat no. 21711 (529,8.4)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Hyale nilssoni	O	O
Gammarus locusta	F	F
Cerastoderma edule	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 15 m

The station was situated at the bottom of a short sandy slope, at the top of the shore, on firm even sand. Small clumps of *Ulva*, *Fucus serratus* and filamentous brown algae, were present. Amphipods were 'occasional to frequent' in and under algae.

Biotope designation
Fucus serratus on lower eulittoral mixed substrata (SLR.FserX).

Outer Dungarvan

Station 1, Upper shore

MNCR habitat no. 21506 (529,8.1)

Habitat classification

Height on shore: Upper shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.6%

Granulometry

Component	%
mud	4.4
very fine sand	23.0
fine sand	45.0
medium sand	13.0
coarse sand	13.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	12	2	C
Scoloplos armiger	2	24	1	S
Arenicola marina	C	1	1	C
Crangon crangon	F	4	-	F
Cerastoderma edule	1	8	-	F
Angulus tenuis	C	47	3	C
Macoma balthica	C	1	4	C

Number fauna taxa: 7

Station description

Distance from shoreline: 70 m

Situated on flat, even, medium to coarse sand, with a coarse layer of broken shell at 7 cm and anaerobic layer at 5 cm. The large pools nearby contained *Crangon crangon. Cerastoderma edulis* was frequent in a dig (10 m^{-2}), and *Arenicola* were common on the shore (1 m^{-2}).

Biotope designation

Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Outer Dungarvan

Station 2, Mid shore
MNCR habitat no. 21507 (529,8.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	4.3
very fine sand	47.5
fine sand	41.9
medium sand	5.9
coarse sand	0.4

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	2	-	F
Nephtys cirrosa	-	6	-	F
Nephtys hombergii	-	4	3	C
Scoloplos armiger	-	5	1	S
Arenicola marina	C	1	-	C
Clymenura clypeata	-	4	-	O
Lanice conchilega	F	-	1	P
Dexamine spinosa	-	-	1	P
Ampelisca brevicornis	-	-	1	P
Bathyporeia pelagica	-	-	1	P
Angulus tenuis	-	4	9	A

Number fauna taxa: 11

Station description

Distance from shoreline: 720 m

Firm, medium to coarse sand with a coarse layer of broken shell at 15 cm, and anoxic below 10 to 12 cm. *Lanice* sp. tubes were frequent ($9m^{-2}$). There were small clumps of filamentous brown algae with some *Ulva* sp. attached.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang). Conforms very well to this biotope.

Outer Dungarvan

Station 3, Lower shore
MNCR habitat no.21508 (529,8.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Exposed
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	3.7
very fine sand	55.5
fine sand	38.6
medium sand	2.2
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Golfingiidae	-	1	1	F
Sigalion mathildae	-	1	-	F
Nephtys hombergii	-	1	2	F
Magelona sp.	-	-	1	O
Lanice conchilega	F-C	10	8	A
Carcinus maenas	P	-	-	P
Angulus tenuis	-	-	1	P

Number fauna taxa: 7

Station description

Distance from shoreline: 1490 m

At the edge of the tide, level with the outermost line of oyster trestles. Firm rippled, well aerated medium sand. *Lanice* tubes were frequent to common. *Carcinus maenas* present.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

Site No. 9 Inner Dungarvan Harbour

Field No. and Date: **960829** MNCR database site no. **10056**

Transect length: 850m Magnetic bearing: 332° Grid ref.start point: X268 915

Site description

The site was located in the inner part of a large east facing bay on the south coast of Ireland. The inner part of the bay is enclosed by a peninsula of sand dunes (An Cunnigar) which runs in a north-south direction across the bay from its south side, leaving only a narrow channel to the inner bay at the northern end. A transect was taken from approximately mid-way along the peninsula at a magnetic bearing of 332 degrees across mud and sand flats, to the main channel to the north. The shore length covered by the transect was approximately 750 m. The upper shore was firm dry muddy sand, but the sediment to the west of the transect was softer and muddier. *Arenicola marina* was common on the upper and mid shores. *Corophium volutator* were occasionally abundant on the upper shore with *Nepthys* sp. frequent on the mid and lower shores. Sediment on the lower shore was firm clean sand with a coarse layer of broken shells at 6 cm below the surface. *Lanice conchilega* were abundant on the lower shore.

Plate 1. Inner Dungarvan Harbour, Co. Waterford (Site 9).

Inner Dungarvan Harbour

Station 1, Top of shore

MNCR habitat no. 21511 (529,9.1)

Habitat classification

Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud

Fauna	Obs.	Abundance
Gammarus finmarchicus	F	F
Littorina littorea	P	P
Littorina obtusata	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 0m Grid Ref: X 268 915

Short shingle bank backed by grassland and sand dunes giving way to small stones and gravel over mud. *Fucus vesiculosus*, *Enteromorpha* sp. and *Ulva* sp. occasional to frequent. This weed band was approximately 20 m in width.

Biotope designation

Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Inner Dungarvan Harbour

Station 2, Upper shore
MNCR habitat no. 21512 (529,9.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 5.9%

Granulometry

Component	%
mud	5.4
very fine sand	12
fine sand	69
medium sand	13
coarse sand	0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	-	1	F
Nephtys hombergii	-	1	-	F
Scoloplos armiger	-	20	1	A
Arenicola marina	C	2	-	C
Corophium volutator	-	2	-	C
Crangon crangon	-	1	1	F
Macoma balthica	-	4	2	O
Scrobicularia plana	-	1	-	F

Number fauna taxa: 8

Station description

Distance from shoreline: 90 m

Firm, even, muddy sand with an anoxic layer 5 mm below the surface, and occasional standing water. *Arenicola marina* casts abundant (20 m^{-2}).

Biotope designation
Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores (LMU.HedMac.Nhom).

Inner Dungarvan Harbour

Station 3, mid shore
MNCR habitat no. 21516 (529,9.4)

Habitat classification

Height band	Mid shore
Wave exposure	Very sheltered
Substratum	Sand
Organic content	1.47%

Granulometry

Component	%
mud	6.0
very fine sand	34.7
fine sand	47.9
medium sand	11.4
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	6	2	F
Scoloplos armiger	-	2	-	C
Arenicola marina	C-A	16	3	A
Lanice conchilega	P	-	-	P
Crangon crangon	-	1	-	F
Cerastoderma edule	P	-	-	P
Angulus tenuis	P	3	-	F
Scrobicularia plana	P	-	-	P

Number fauna taxa: 8

Station description

Distance from shore: 540 m

Medium, firm, rippled sand sloping very gently to a side channel, at 100 m to south west. Anaerobic layer at 1 to 3 cm below the surface. *Arenicola marina* common to abundant. *Cerastoderma edule, Scrobicularia plana,* and *Lanice conchilega* present.

Biotope Designation
Arenicola marina and bivalves in mid to lower shore sand (LGS. AreBv).

Inner Dungarvan Harbour

Station 4/5, Lower shore
MNCR habitat no. 21517 (529,9.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	6.2
very fine sand	32.4
fine sand	46.5
medium sand	14.3
coarse sand	0.6

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	7	2	F
Scoloplos armiger	-	4	-	C
Arenicola marina	C	3	-	C
Lanice conchilega	F	7	-	F
Angulus tenuis	-	2	-	F

Number fauna taxa: 5

Station description

Distance from shoreline: 850 m

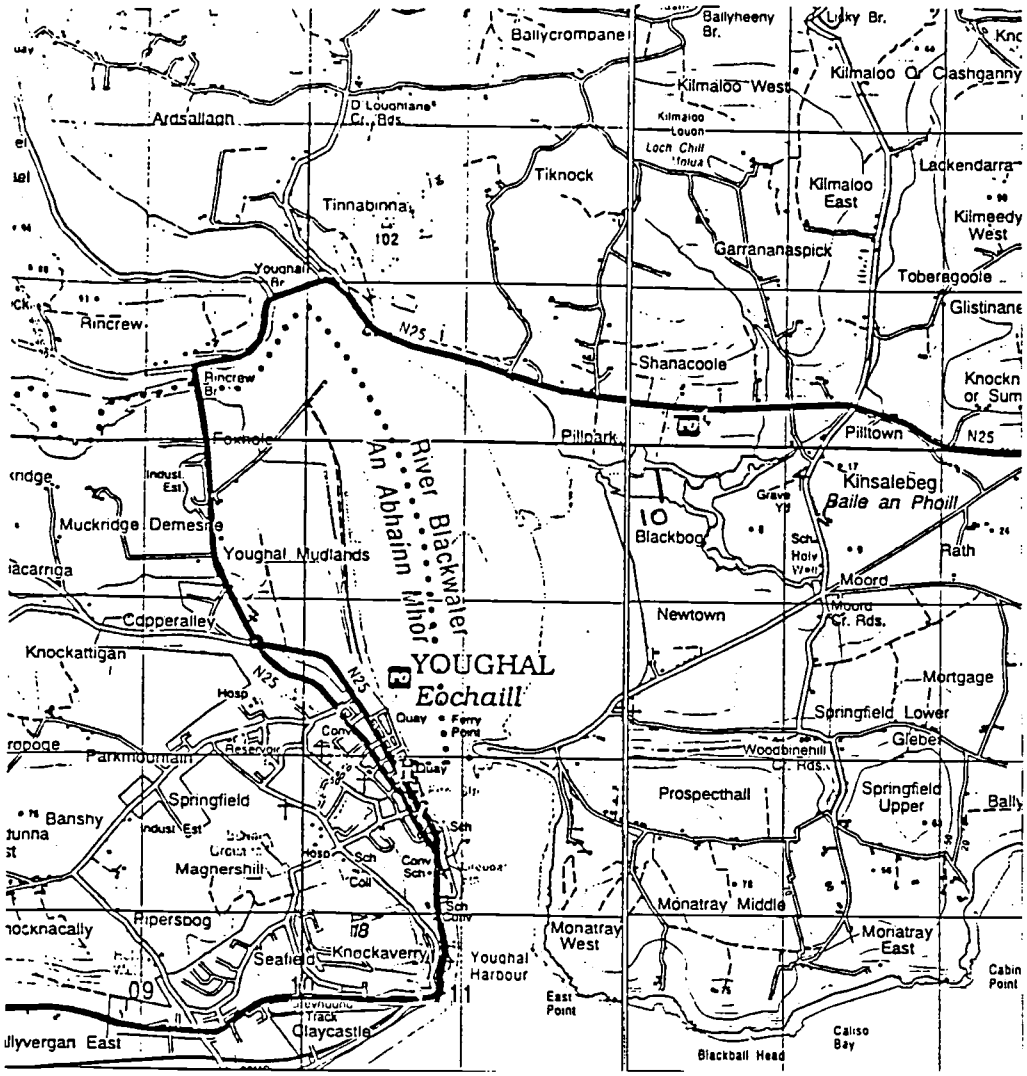
A firm, medium sand, at the edge of the main channel, with an anaerobic layer at 3 to 5 cm below the surface, and a layer of broken shell and stones at 6 cm below the surface. *Lanice conchilega* tubes abundant on surface. *Nephtys hombergii* were frequent in the dig.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

SURVEY AREA **YOUGHAL HARBOUR**

Site No. 10 Kinsalebeg

Site location map



Site No. 10 Kinsalebeg

Field No. and Date: **960830** MNCR database site no. **10057**

Transect length: 225m Magnetic bearing: 360° Grid ref.start point: X 120 796

Site description

The site was located on the south side of a small inlet known to be of ornithological interest on the east side of a large sheltered south facing estuary (Youghal Harbour) on the south coast of Ireland. The inlet is surrounded by grassland and trees. The site was located on the lower and broadest part of the smaller estuary, between its narrow mouth to the west and the confluence of two channels upstream to the east. A transect was taken from the south bank, due north to an old mill on the north bank. The distance to the channel, which ran adjacent to the north bank at this point, was approximately 210 m. There was a drop of approximately 1 m from the grassland onto soft mud which sloped gradually for 150 m and then levelled out for 60 m, before falling steeply (approximately 1.5 m) to the main river channel. There was a peat layer underlying the mud on the upper shore. *Hediste diversicolor*, *Scrobicularia plana*, *Arenicola marina*, and *Nepthys* sp. were the dominant species found. Note the entire transect lies in the upper eulittoral or upper shore region relative to the main estuary, Youghal Harbour.

Kinsalebeg

Station 1, Top of shore
MNCR habitat no. 21519 (529,10.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Extremely sheltered
Substratum: Mud

Fauna	Obs.	Abundance
Carcinus maenas	F	F
Littorina saxatilis	F	F

Number fauna taxa: 2

Station description

Distance from shoreline: 0m Grid ref.: X120 796

There was a 1 m drop off from a grass bank to firm stony mud. Occasional *Fucus vesiculosus*, *Ulva* and *Enteromorpha* sp. made up a 5 m wide band of weed. *Carcinus maenas* and *Littorina* sp. were frequent among the algae but amphipods were not observed.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Kinsalebeg

Station 2, Upper shore
MNCR habitat no. 21521 (529,10.2)

Habitat classification
Height on shore: Upper shore
Wave Exposure Extremely sheltered
Substratum: Sandy mud
Organic content: 4.13%

Granulometry

Component	%
mud	70.4
very fine sand	17.8
fine sand	8.9
medium sand	3.0
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	A	34	8	A
Nephtys hombergii	-	1	1	F
Arenicola marina	C	8	1	C
Macoma balthica	-	1	-	O
Scrobicularia plana	F	14	1	A

Number fauna taxa: 5

Station description

Distance from shoreline: 90 m

Gradually sloping very soft mud, anaerobic layer at 2mm, and a peat and clay layer at 10 cm, below the surface. *Scrobicularia plana* and *Cerastoderma edule* shells were on the surface. *Hediste diversicolor* was abundant (50 m^{-2}) and *Scrobiculaira plana* were frequent and *Arenicola* common.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Kinsalebeg

Station 3, Mid shore, upper
MNCR habitat no. 21524 (529,10.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Extremely sheltered
Substratum: Sandy mud

Fauna	Obs	Dig	Abundance
Hediste diversicolor	C	17	C
Nephtys hombergii	-	4	F
Arenicola marine	P	-	P
Macoma balthica	-	1	O
Scrobicularia plana	-	1	C
Mya arenaria	-	1	C

Number fauna taxa: 6

Station description

Distance from shoreline: 120 m

Gradually sloping to flat, very soft mud, with an anaerobic layer at 2 mm below the surface. There was a clay and peat layer but not as pronounced as at the previous station. *Hediste diversicolor* common.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Kinsalebeg

Station 4, Lower shore
MNCR habitat no. 21526 (529,10.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Extremely sheltered
Substratum: Muddy sand
Organic content: 3.4%

Granulometry

Component	%
mud	43.5
very fine sand	33.4
fine sand	18.6
medium sand	4.4
coarse sand	0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	18	10	A
Nephtys hombergii	-	3	-	F
Arenicola marina	C	14	2	A
Scrobicularia plana	-	-	1	C

Number fauna taxa: 4

Station description

Distance from shoreline: 225 m

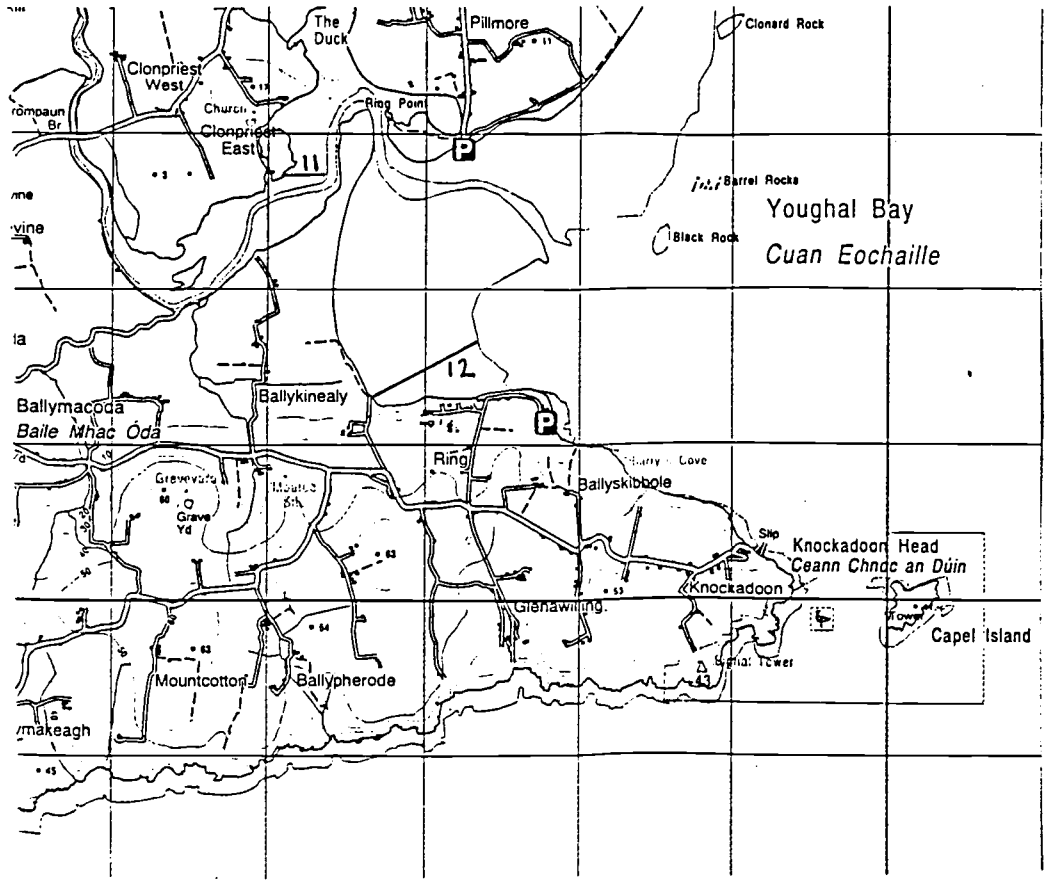
Very soft, steep (1.5 m) mud bank to channel edge. Plant detritus (branches etc.) and broken shells immediately adjacent to the channel edge. Anaerobic layer at 2-3 mm below the surface. In a dig, *Arenicola marina* and *Hediste diversicolor* were common, and *Nephtys* sp. were frequent on the channel bank but fewer animals present at the channel edge.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

SURVEY AREA	**BALLYMACODA BAY (YOUGHAL BAY)**
Site No. 11	Inner Ballymacoda - Womanagh River
Site No. 12	Outer Ballymacoda - Knockadoon Head

Site Location Map



Site No. 11 Inner Ballymacoda - Womanagh River

Field No. and date: **960816** MNCR database site no. **10043**

Transect length: 280m Magnetic bearing: 198° GR start point: X 061 728

Site description

The site was located on the eastern side of a small south facing estuary on the south coast of Ireland. The site, located in the inner estuary was very sheltered. It is known to be an important feeding and resting area for birds. A transect was taken from a small island in the estuary (X 061 728), at a magnetic bearing of 198 degrees, to the main river channel at a distance of approximately 200 m. This island was covered in coarse grasses and low salt tolerant plants. The upper shore was poorly aerated soft mud underlain by peat. The narrow shore sloped gradually to the edge of the main channel where the substratum was firm, well aerated medium sand. *Corophium volutator* was the most abundant species on the mid and lower shores. Large numbers of gulls and oyster catchers were observed resting in the area.

Inner Ballymacoda

Station 1, Top of shore
MNCR habitat no. 21483 (529,11.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F
Corophium volutator	O	O
Carcinus maenas	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 0 m Grid ref.: X 061 728

A grassy bank descended 0.5 m to gravel and small stones with patches of *Enteromorpha* sp., *Fucus vesiculosus* and *Ulva*. Gammarids were frequent. *Littorina* sp. were not found among the algae. There was soft mud at 5 m out from the bank. The small abundant holes in this mud were probably *Corophium* burrows. *Arenicola* casts present at 1 m^{-2}.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Inner Ballymacoda

Station 2, mid shore, upper
MNCR habitat no. 21484 (529,11.2)

Habitat classification
Height on shore: Mid shore
Substratum: Mud
Wave exposure: Very sheltered
Organic content: 3.9%

Granulometry

Component	%
mud	77.1
very fine sand	17.6
fine sand	2.8
medium sand	00.4
coarse sand	2.1

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	16	-	C
Arenicola marina	C	3	-	C
Corophium volutator	-	99	46	A
Crangon crangon	-	1	-	F

Number fauna taxa: 4

Station description

Distance from shoreline: 110 m

Soft mud over peat (at 5 to 15 cm below surface). Old *Mya, Scrobicularia plana* and cockle shells in sediment. Anoxic layer 1 to 5 cm below the surface but top 50 mm was well aerated because of the presence of abundant *Corophium* burrows. There was also some plant detritus in the cores. *Arenicola* casts were present on the surface at 1 m^{-2}.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Inner Ballymacoda

Station 3, Lower shore, 50 m south of the transect
MNCR habitat no. 21485 (529,11.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sandy mud
Organic content: 3.6%

Granulometry

Component	%
mud	62.5
very fine sand	27.4
fine sand	8.8
medium sand	1.3
coarse sand	0.0

Fauna	Obs	Dig	Core	Abundance
Hediste diversicolor	-	20	1	C
Corophium volutator	A	99	42	A
Macoma balthica	-	1	-	O
Scrobicularia plana	-	9	4	S

Number fauna taxa: 4

Station description

Distance from shoreline: 190 m

At the edge of the channel. A firm, well aerated, sandy sediment with plant detritus and *Scrobicularia plana* and *Macoma balthica* shells. *Corophium volutator* was abundant, 500m $^{-2}$.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Inner Ballymacoda

Station 4, Lower shore, 90m south of the transect
MNCR habitat no. 21486 (529,11.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs	Dig	Abundance
Hediste diversicolor	-	4	F
Nephtys hombergii	O	2	F
Scoloplos armiger	-	2	C
Bathyporeia guilliamsoniana	-	1	O
Corophium volutator	-	5	O
Macoma balthica	-	1	O

Number fauna taxa: 6

Station description

Distance from shoreline: 190 m

At the edge of the channel, off the south end of the island. Firm to soft, but water logged, medium to coarse sand. Gulls and oyster catchers seen congregating in this area.

Biotope designation

Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores (LMU.HedMac.Nhom).

Site No. 12 Outer Ballymacoda - Knockadoon Head

Field No. and date: **960815** MNCR database site no. **10042**

Transect length: 1200 m Magnetic bearing: 60° Grid ref. start point: X 068 711

Site description

The site was located in a small south-east facing bay on the south coast of Ireland. The area is known to be of ornithological interest. The shore width is approx. 1 km. A transect was walked from the sea wall at the end of a road on the west side of the bay (X 068 711), to low water, at a magnetic bearing of 60 degrees. The upper shore was a shingle ridge with boulders giving way to gravel and muddy sand. *Enteromorpha* sp., *Ulva* sp. and *Fucus vesiculosus* were present on the gravel, stones and muddy sand. From approximately 100 m down the shore to the edge of the sea (at low water) the sediment was generally firm rippled sand with occasional pools of standing water. *Arenicola marina* casts were present on the upper shore. *Cerastoderma edule* and *Angulus tenuis* were present (the latter in large numbers) on the upper to middle shore. *Lanice* were occasional at mid shore increasing to abundant on the lower shore.

Outer Ballymacoda

Station 1, Top of shore
MNCR habitat no. 21444 (529,12.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Mud and gravel

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F
Gammarus locusta	F	F
Littorina littorea	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 20 m

The shore was backed by a sea wall with a shingle and cobble ridge 17 m wide, sloping 1.5 m down to a coarse sandy beach with cobbles and boulders followed by soft mud and gravel. *Enteromorpha* sp., *Ulva* sp. and *Fucus vesiculosus* present.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Outer Ballymacoda

Station 2, Upper shore
MNCR habitat no. 21445 (529,12.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Muddy sand
Organic content: 2.0%

Granulometry

Component	%
mud	39.2
very fine sand	21.8
fine sand	28.1
medium sand	10.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	2	-	F
Nephtys hombergii	-	8	2	F
Scoloplos armiger	-	12	1	A
Arenicola marina	C	-	1	C
Crangon crangon	-	1	-	F
Cerastoderma edule	-	1	2	F
Macoma balthica	-	1	5	C
Angulus tenuis	-	2	-	P

Number fauna taxa: 8

Station description

Distance from shoreline: 60 m

The station was 60 m out from the shore line (i.e. sea wall), on soft sandy mud. The anoxic zone was 1 to 2 cm below the surface with a clay layer at 15 cm and small stones at 20 cm. There was standing water over much of the substratum at this point. *Arenicola* casts were present on the surface.

Biotope designation
Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores (LMU.HedMac.Nhom). Conforms very well to this biotope.

Outer Ballymacoda

Station 3, Upper shore
MNCR habitat no. 21446 (529,12.3)

Habitat classification
Height on shore: Upper shore
Wave exposure: Moderately exposed
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	5	F
Scoloplos armiger	-	17	A
Arenicola marina	P	-	P
Crangon crangon	-	1	F
Cerastoderma edule	-	1	F
Angulus tenuis	-	23	C

Number fauna taxa: 6

Station description

Distance from shoreline: 175 m

The station was 175 m out from a sea wall, on firm, rippled, medium sand. The sand was well aerated, with an anoxic zone 10 cm below surface and 15 cm to layer of small stones. *Arenicola marina* casts present at 1 to 9 m^{-2}.

Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

Outer Ballymacoda

Station 4, Mid shore
MNCR habitat no. 21447 (529,12.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.6%

Granulometry

Component	%
mud	11.7
very fine sand	57.9
fine sand	27.5
medium sand	2.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	3	2	F
Arenicola marina	C	1	-	C
Terebellida indet.	-	3	-	C
Lanice conchilega	-	1	-	F
Crangon crangon	-	-	1	P
Cerastoderma edule	-	1	-	F
Angulus tenuis	-	5	5	A

Number fauna taxa: 7

Station description

Distance from shoreline: 700 m

Firm, well aerated, medium, rippled sand, with an anoxic zone 10 cm below the surface. *Arenicola marina* casts present at 1 to 9 m^{-2}. Occasional *Lanice* tubes present.

Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

Site No. 13 Clonakilty Harbour - Outer

Field No. and Date: **960814** MNCR database site no. **10045**

Transect length: 900 m Magnetic bearing: 60° Grid ref. start point: W 398 395

Site description

The site was located in the outer part of a sheltered south facing estuary on the south coast of Ireland. The bay is known to be an important bird feeding area. A transect was taken from the south end of the sea wall (causeway) (W 398 395), on the west side of the estuary, across a mud and sand flat, at a magnetic bearing of 60 degrees to the main (river) channel on the east side of the bay. The width of the intertidal shore (east - west) was approximately 1 km at this point. The shore was composed of a number of habitats ranging from poorly aerated soft mud at the top of the shore to well aerated medium sand on the mid and lower shores. The surface tended to be even on the upper shore but uneven on the lower shore where it was punctuated by a number of sand banks and channels. The upper shore was covered (up to 80%) by a green filamentous algae. *Arenicola marina* casts were common to abundant. *Scrobicularia plana* were also common on the upper shore. *Nephtys* were frequent on the lower shore. Shrimp, *Crangon crangon*, and grey mullet (*Chelon labrosus*) were observed in the side channels.

Outer Ballymacoda

Station 5, Lower shore

MNCR habitat no. 214478 (529,12.5)

Habitat classification

Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	6.4
very fine sand	75.7
fine sand	17.5
medium sand	0.4
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Sigalion mathildae	-	1	-	F
Nephtys cirrosa	-	1	-	F
Arenicola marina	C	1	-	C
Clymenura clypeata	-	-	1	P
Lanice conchilega	-	4	2	F
Crangon crangon	-	6	-	F
Cerastoderma edule	-	1	-	F
Angulus tenuis	-	1	1	F

Number fauna taxa: 8

Station description

Distance from shoreline: 1200 m

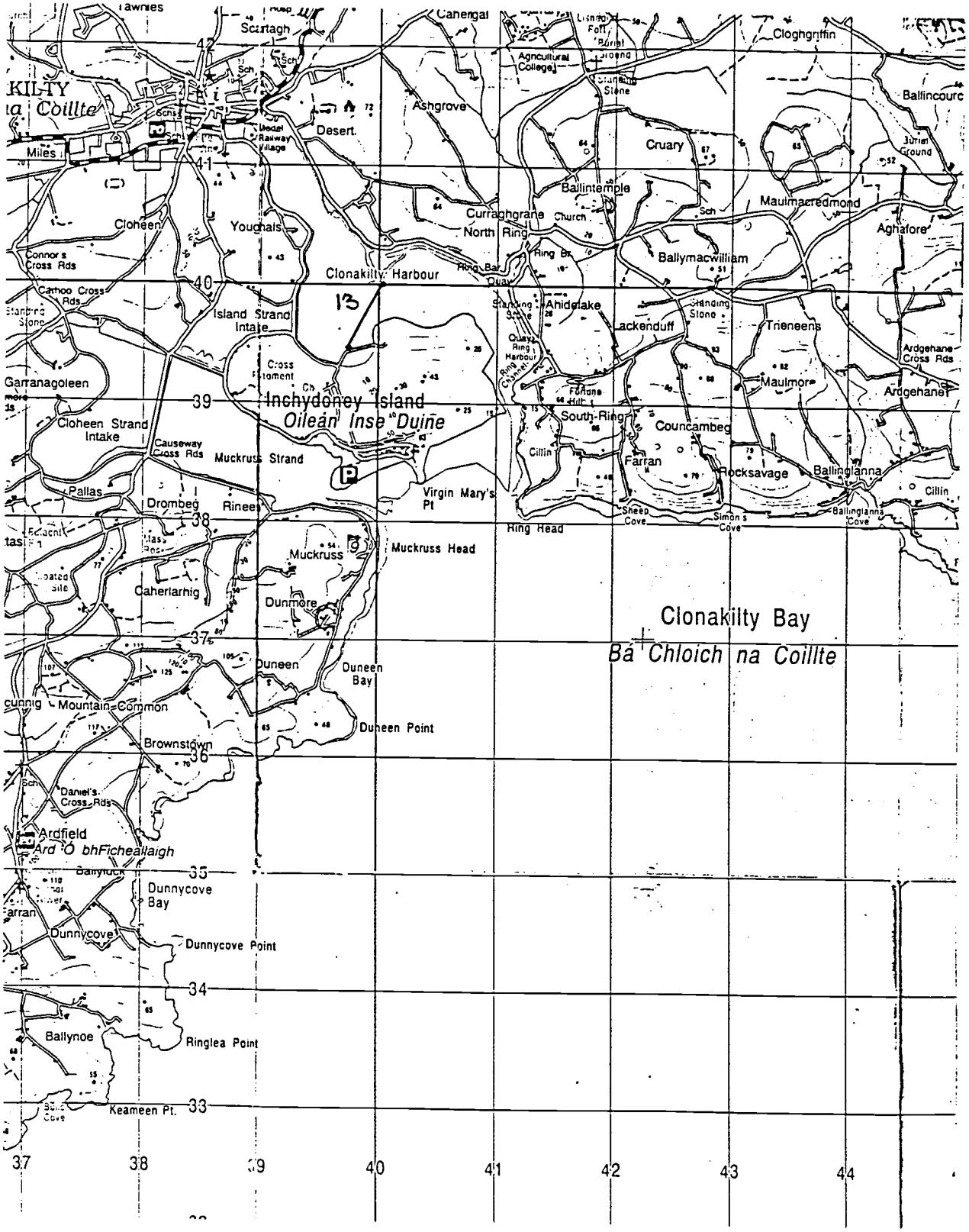
At the edge of the tide, 1200 m from the transect origin. Firm rippled sand, with an anoxic layer at 15 cm below the surface and some standing water over the sand. *Lanice* tubes present at 1 to 30 m^{-2}. Gulls, oyster catchers and herons feeding nearby. Some disused oyster trestles on the shore.

Biotope designation

Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

SURVEY AREA	**CLONAKILTY HARBOUR**
Site No. 13	Clonakilty Harbour - Outer

Site location map



Clonakilty - Outer

Station 2, Upper shore
MNCR habitat no. 21488 (529,13.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Muddy sand
Organic content: 2.9%

Granulometry

Component	%
mud	41.2
very fine sand	34.2
fine sand	22.2
medium sand	2.3
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Phyllodoce indet.	-	1	3	A
Scoloplos armiger	-	3		C
Arenicola marina	C	20		A
Scrobicularia plana	-	8	1	C
Terebellida indet.	-	-	2	F

Number fauna taxa: 5

Station description

Distance from shoreline: 175 m

Patches of filamentous green algae (50% cover) on even, soft mud. The anaerobic layer was at 1 to 5 mm depth. *Scrobicularia plana* and *Macoma balthica* shells in sediment. *Arenicola* casts were abundant (10 to 50 m^{-2}), and polychaetes were frequent in the dig.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Clonakility - Outer

Station 1, Top of shore
MNCR habitat no. 21487 (529,13.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F
Littorina obtusata	P	P
Littorina saxatilis	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 175 m

At the edge of a side channel to the west of the transect, opposite habitat 2. The seabed consists of cobbles and boulders, changing to soft mud over gravel lower on the shore. *Ascophyllum nodosum*, *Fucus vesiculosus* and *Enteromorpha* sp. were frequent on boulders. *Littorina* sp. frequent to common and *Echinogammarus* frequent in this area.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Clonakilty - Outer

Station 4, Mid shore
MNCR habitat no. 21490 (529,13.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Scoloplos armiger	-	4	C
Arenicola marina	C	-	P
Cerastoderma edule	-	2	F

Total species 3

Station description

Distance from shoreline: 700 m

On a flat sand bank. Firm, rippled, well aerated, medium, damp sand. Anoxic layer more than 20cm below sediment surface. *Arenicola* casts common, and cockle shells occasional on surface.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Clonakilty - Outer

Station 3, Mid shore
MNCR habitat no. 21489 (529,13.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Muddy sand
Organic content: 2.9%

Granulometry

Component	%
mud	26.5
very fine sand	35.7
fine sand	34.0
medium sand	3.8
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	3	-	F
Nephtys hombergii	-	4	-	F
Arenicola marina	C	5	-	C
Crangon crangon	-	7	-	F
Cerastoderma edule	-	1	-	F
Scrobicularia plana	-	4	3	A

Number fauna taxa: 6

Station description

Distance from shoreline: 550 m

Near a side channel on muddy sand, with 40 % cover of filamentous green algae, and anaerobic layer at 5 to 10 mm depth in sediment. Sediment deeply rippled and compact. *Arenicola* casts frequent to common and cockle shells occasional to frequent on the surface. Shrimp (*Crangon crangon*) from nearby channel included in dig sample.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.)

SURVEY AREA **VALENTIA HARBOUR**

Site No. 14 Ballycarbery - Valentia Harbour

Site Location Map

Clonakilty - Outer

Station 5, Lower shore
MNCR habitat no. 21490 (529,13.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand

Granulometry

Component	%
mud	1.3
very fine sand	32.8
fine sand	50.9
medium sand	13.4
coarse sand	1.6

Fauna	Obs	Dig	Core	Abundance
Nephtys cirrosa	P	9	3	F
Angulus tenuis	-	-	1	P

Number fauna taxa: 2

Station description

Distance from shoreline: 900 m

A sand bank descending 1 m to the main channel. Clean, medium to coarse rippled sand. No standing water but water logged due to proximity to channel. Anaerobic layer more than 20 cm below surface.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Site No. 14 Ballycarbery - Valentia Harbour

Field No. and Date: 960927 MNCR database site no. 10069

Transect length:810 m Magnetic bearing: 172° Grid ref. start point: V 448 795

Site description

The site was located in a small V shaped bay, on the north side of a south-westerly facing estuary (Valentia Harbour) on the south west coast of Ireland. The bay is drained by a channel which runs down the centre of the upper bay, and follows the eastern side of the bay in the middle and lower bay. A transect was taken, at a magnetic bearing of 172 degrees (from V 448 795), down the centre of the bay to the estuary channel, a distance of approximately 810 m. A low cliff topped by grass, backed a short, gradually sloping shingle beach with a narrow band of algae (*Fucus vesiculosus*, *Enteromorpha*, and *Ulva*) at its base. The transect crossed a humped and hollowed area of soft sand with pools of standing water in the hollows, characterised by *Hediste diversicolor* and *Arenicola marina*, which sloped gradually towards the centre of the bay. The ground then rose slightly to an area of firm, dry, smooth sand, characterised by *Nephtys* sp. and *Arenicola*, before falling again to a shallow depression of humped and hollowed sand with standing water in the hollows and a layer of silt on the surface. The ground then sloped very gradually to the main estuary channel. This outer area of the bay was characterised by firm, rippled sand with abundant *Lanice*. Oyster trestles (*Crassostrea gigas*) were present on the lower 200 metres of the shore.

Plate 6. Tide scoured channel (MNCR biotope type LGS.Lan) at Ballycarbery, Valentia Harbour, Co. Kerry.

Valentia Harbour

Station 1, Top of shore
MNCR habitat no. 21612 (529,14.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very Sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F
Carcinus maenas	P	P
Littorina obtusata	P	P
Hediste diversicolor	C	C

Number fauna taxa: 4

Station description

Distance from shoreline: 16 m

At the bottom of a gradually sloping shingle beach, in a narrow band of *Fucus vesiculosus*, *Ascophyllum. nodosum* and *Enteromorpha* sp. Amphipods were frequent under the algae, with small shore crabs and *Littorina littorea* common. *Hediste diversicolor* was common in the medium to coarse sandy sediment at the bottom of the shingle. The sediment was aerated to 5 cm below the surface with a hard layer at 10 cm.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Valentia Harbour

Station 2, Upper shore
MNCR habitat no. 21613 (529,14.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.6%

Granulometry

Component	%
mud	13.2
very fine sand	26.6
fine sand	42.0
medium sand	15.3
coarse sand	2.9

Fauna	Obs.	Dig	Core	Abundance
Glycera tridactyla	-	1	1	F
Hediste diversicolor	-	6	2	F
Scoloplos armiger	-	-	2	C
Arenicola marina	C	6	1	C
Crangon crangon	C	-	1	P
Cerastoderma edule	-	-	1	P
Scrobicularia plana	-	4	2	C

Number fauna taxa: 7

Station description

Distance from shoreline: 45 m

On very gradually sloping, slightly muddy but firm, uneven sand with 2 mm of silt over black coarse to medium sand with 10 % fine sand or mud. *Arenicola* casts common on the surface (1-9 m^{-2}). *Hediste diversicolor* frequent, and *Scrobicularia plana, Arenicola* and *Scoloplos armiger* common in the dig.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Valentia Harbour

Station 3, Mid shore, upper
MNCR habitat no. 21614 (529,14.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	4.6
very fine sand	17.6
fine sand	47.2
medium sand	27.1
coarse sand	3.5

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	1	F
Scoloplos armiger	-	15	2	A
Arenicola marina	C	2	-	C
Lanice conchilega	F	1	-	F
Angulus tenuis	-	5	3	C

Number fauna taxa: 5

Station description

Distance from shoreline: 225 m

On a slightly raised area of firm, medium, well aerated sand, with the anaerobic zone more than 20 cm below the surface. *Arenicola* casts 1-5 m^{-2} on the surface. *Nephtys hombergii* frequent, *Angulus tenuis* and *Arenicola* common, and *Scoloplos armiger* abundant in the dig.

Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).
Conforms very well to this biotope type.

Valentia Harbour

Station 4, Mid shore, lower
MNCR habitat no. 21615 (529,14.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	4	F
Scoloplos armiger	-	9	C
Arenicola marina	C	3	C
Lanice conchilega	-	5	F
Angulus tenuis	2	-	F

Number fauna taxa: 5

Station description

Distance from shoreline: 350 m

In a shallow depression, with slightly soft, medium to coarse sand, with silt on the surface. Surface humped and hollowed with water in the hollows. Anaerobic layer 2 cm deep, with a slight hydrogen sulphide smell. *Arenicola* casts common on the surface. *Lanice* sp. frequent and *Scoloplos armiger* common.

Biotope designation
LGS.LanNhom*
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

Valentia Harbour

Station 5, Lower shore
MNCR habitat no. 21616 (529,14.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.6%

Granulometry

Component	%
mud	2.4
very fine sand	9.4
fine sand	44.3
medium sand	41.2
coarse sand	2.7

Fauna	Obs.	Dig	Core	Abundance
Glycera gigantea	-	-	1	F
Lanice conchilega	A	7	6	A
Amphipod indet.	P	-	1	P

Total species 3

Station description

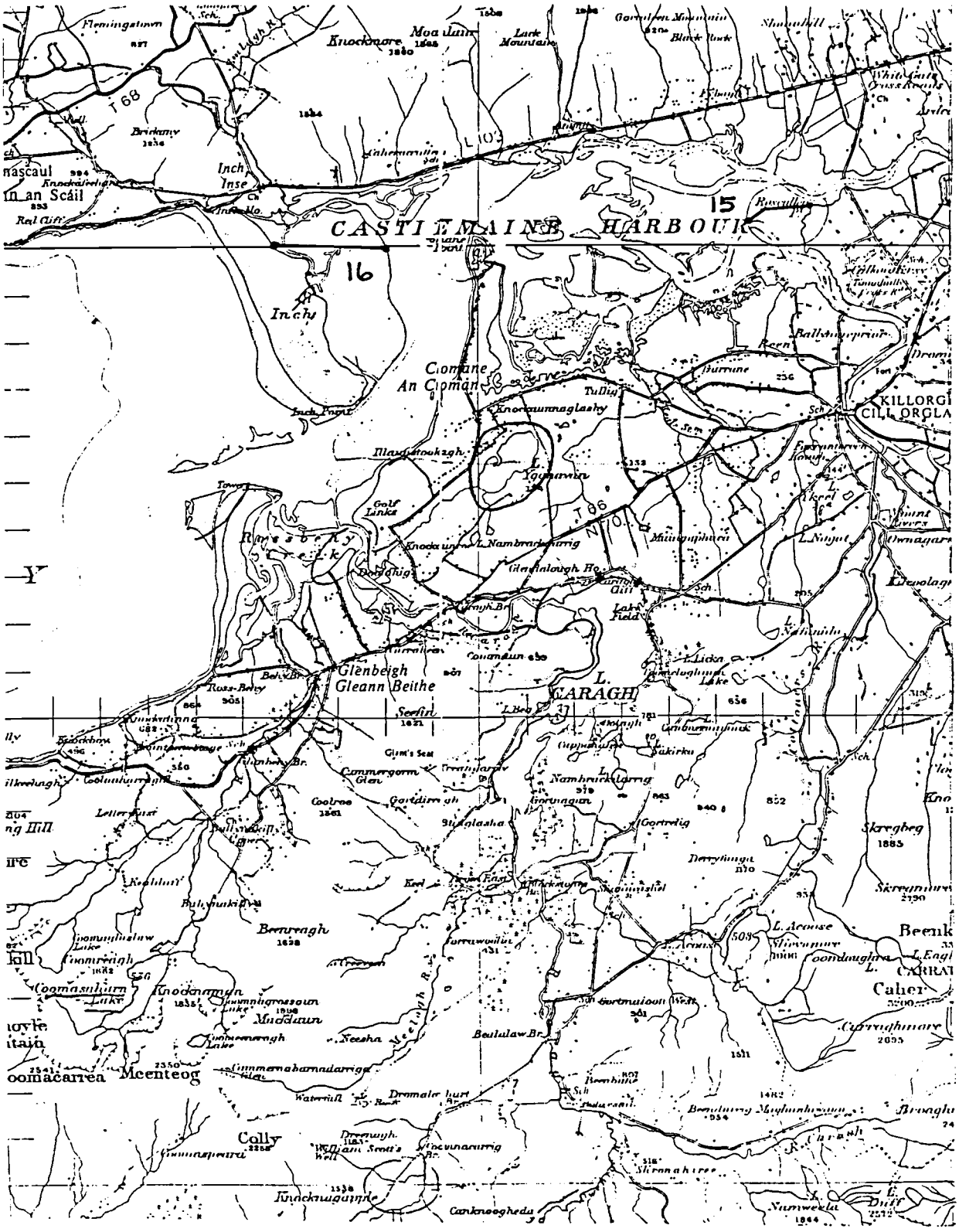
Distance from shoreline: 810 m

Edge of estuary channel. Firm coarse, rippled sand with an anaerobic zone 20 cm below the surface. *Lanice* abundant. Oyster trestles to the west of the station and small island to the east.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

SURVEY AREA	**CASTLEMAINE HARBOUR**
Site No. 15	Callinafercy - inner Castlemaine Harbour
Site No. 16	Back of Inch Strand - outer Castlemaine Harbour

Site location map



Site No. 15 Callinafercy - Inner Castlemaine Harbour

Field No. and Date: **960802** MNCR database site no. **10046**

Transect length: 1250m Magnetic bearing: 270° Grid ref.start point: Q 771 007

Site description

The site was located on the eastern side of Castlemaine Harbour, a large enclosed bay in the south west of Ireland, on the south side of the Dingle peninsula. The mouth of the bay is protected by the Inch peninsula on its north side and by the Rossbeigh peninsula on the south side. The site was located between the lower estuaries of the Maine and Laune rivers. The area is subject to agricultural runoff as well as municipal and industrial wastes. The shore is backed by grassland, reed marsh and extensive coastal protection works. A transect was taken from Rosscullen or Callinafercy Point (Q 771 007) to the Laune river channel, to the south-west, at a magnetic bearing of 270 degrees for 630m and then altering course to 243 degrees. The transect was 1250 m long. The level of the shore rose gradually (approximately 1 m) to a high point between the two river channels. *Fucus vesiculosus* and *Ascophyllum nodosum* were frequent to common on the gravel and boulder peninsula at the top of the transect, with gammarids and *Carcinus maenas* also present. The sediment over the entire transect was soft, fine, muddy sand with scattered broken shells on the surface (*Mya*, *Macoma balthica*, *Scrobicularia plana*) on the upper and middle shores. *Hediste diversicolor* were abundant (>500 m^{-2}) on the upper and middle shores. Few animals were found on the lower shore close to the main river channel. A number of different bird species including oystercatchers were feeding in the area.

Castlemaine Harbour

Station 1, Top of shore
MNCR habitat no. 21492 (529,15.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Gravel on sand and mud

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F
Carcinus maenas	C	C

Number fauna taxa: 2

Station description

Distance from shoreline: 0m Grid ref.: Q 771 007

At seaward side and base of a rock peninsula extending from Rosscullen Point into the Maine river estuary. Rocks, boulders and gravel sloped gradually to soft stony mud with *Ascophyllum nodosum*, *Fucus vesiculosus* and *Ulva* sp. frequent to common. Gammarids frequent and *Carcinus maenas* common in the algae.

Biotope designation
Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX)

Castlemaine Harbour

Station 2, Upper shore
MNCR habitat no. 21493 (529,15.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	7.8
very fine sand	68.8
fine sand	23.0
medium sand	0.4
coarse sand	0.0

Fauna	Obs.	dig	core	Abundance
Hediste diversicolor	-	7	5	A
Arenicola marina	P	-	2	P
Macoma balthica	-	3	3	O

Number fauna taxa: 3

Station description

Distance from shoreline: 80 m

On soft mud and fine sand but still easy to walk on. Scattered dead *Mya*, *Macoma* and *Scrobicularia plana* shells common on surface. Anaerobic layer at 5 mm depth. *Hediste diversicolor* abundant in dig (100 - 500 m^{-2}).

Biotope designation
Hediste diversicolor and *Macoma balthica* in sandy mud shores (LMU.Hed.Mac).
Conforms well to this biotope type.

Castlemaine Harbour

Station 3, Mid shore
MNCR habitat no. 21492 (529,15.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 2.0%

Granulometry

Component	%
mud	23.9
very fine sand	49.9
fine sand	24.5
medium sand	1.7
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	5	3	A
Cerastoderma edule	-	1	-	F
Macoma balthica	-	-	4	C
Scrobicularia plana	-	4	2	C

Number fauna taxa: 4

Station description

Distance from shoreline: 720 m

Soft, sandy mud, with anaerobic layer at 5 mm depth., and some pools of water. Large patches of filamentous brown algae, *Enteromorpha* sp. and *Zostera* common in the vicinity. *Scrobicularia plana* common and *Hediste diversicolor* abundant (500 to 1000 m^{-2}).

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Castlemaine Harbour

Station 4, Lower shore
MNCR habitat no. 21495 (529,15.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Muddy sand
Organic content: 2.2%

Granulometry

Component	%
mud	26.8
very fine sand	44.0
fine sand	25.0
medium sand	4.2
coarse sand	0

Number fauna taxa: 0

Station description

Distance from shoreline: 1250 m

At the edge of the Laune River channel. Descending slightly to channel. Sand firmer but still soft, rippled, and 5 mm to anoxic layer of black smelly mud. Small clumps of filamentous brown algae at edge. *Mya arenaria* shells abundant at channel edge. Evidence of sewage discharge to the Laune. Oyster catchers, gulls and other birds feeding nearby.

Biotope designation
Barren muddy shore (LMU.Bar*).

Site No. 16 Back of Inch Strand

Field No. and Date: **960803** MNCR database site no. **10058**

Transect length: 2250 m Magnetic bearing: 96° Grid ref.start point: Q 665 993

Site description

The site was located on the eastern shore of the Inch Strand peninsula. The Inch peninsula extends southward from the Dingle peninsula into Dingle Bay, across the mouth of the large west facing bay, Castlemaine Harbour, in the south-west of Ireland. Inch strand, on the west side of the peninsula, is a popular tourist beach. The site was backed by sand dunes and grassland which gave way to reed beds, saltmarsh and to sediment. A transect was taken from position Q 665 993 at a magnetic bearing 96 degrees at the edge of the main channel. The shore width was approximately 2 km at the transect. The upper shore was composed of sandy muddy sediment with *Zostera* (> 75% cover) and clumps of *Cerastoderma edule* and *Mytilus edulis* with a shallow layer of standing water. The middle shore consisted of extensive beds of *Mytilus edulis* (part of the Cromane mussel fishery) over soft muddy sand. *Littorina* sp. were being collected in this area. The lower shore was composed of firm, compacted rippled sand.

Plate 7. Upper shore (MNCR biotope type PCer.Znol) at the back of Inch Strand, Castlemaine Harbour, Co. Kerry.

Back of Inch Strand

Station 1, Upper shore
MNCR habitat no. 21529 (529,16.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 0.6%

Granulometry

Component	%
mud	4.2
very fine sand	34.3
fine sand	57.1
medium sand	4.4
coarse sand	0

Fauna	Obs,	Dig	Core	Abundance
Nephtys hombergii	-	2	-	F
Scoloplos armiger	-	6	-	C
Arenicola marina	C	1	1	P
Praunus flexuosus	-	2	-	O
Hyale nilssoni	-	1	-	O
Gammarus locusta	-	1	-	O
Crangon crangon	-	4	-	C
Mytilus edulis	P	-	-	P
Cerastoderma edule	-	3	-	F
Hydrobia ulvae	O	-	-	O

Number fauna taxa: 10

Station description

Distance from shoreline: 860 m

Very sheltered. Reed and salt marsh giving way to firm, fine sand and mud. Generally firm with clumps of *Cerastoderma edule* and *Mytilus edulis* shells with *Fucus vesiculosus* and *F. serratus* attached. Dense covering of *Zostera* (> 75% cover) from 200 m out. Pools of water present, and anaerobic layer at 1 cm below the surface. *Arenicola* casts common to abundant (1 to 20 m^{-2}). Amphipods, shrimps and *Hydrobia* occasional. Polychaetes frequent in dig.

Biotope designation
Zostera noltii beds in upper to mid shore muddy sand (LMS.PCer.Znol).

Back of Inch Strand

Station 2, Mid shore
MNCR habitat no. 21530 (529,16.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 0.6%

Granulometry

Component	%
mud	3.4
very fine sand	27.4
fine sand	61.3
medium sand	7.7
coarse sand	0.0

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	7	F
Scoloplos armiger	-	8	C
Mytilus edulis	A	-	A
Angulus tenuis	-	1	O

Number fauna taxa: 4

Station description

Distance from shoreline: 1760 m

Area dominated by large banks of mussel beds in uneven low dune like formations approximately 600 m in width, over soft mud and sand. Anaerobic layer at 1 to 4 cm depth. Polychaetes frequent in dig. Dense reed bank to the right (south) of transect with people gathering *Littorina* sp..

Biotope designation
Mytilus edulis banks on muddy sand shores (LMU.Myt*)

Back of Inch Strand

Station 4, Mid shore, lower, mussel bank.
MNCR habitat no. 21532 (529,16.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	5	F
Scoloplos armiger	-	4	C
Mytilus edulis	A	-	A
Cerastoderma edule	F	-	F
Angulus tenuis	-	5	O

Number fauna taxa: 5

Station description

Distance from shoreline: 2050 m

Only dig sample taken. On top of a large mussel bank before edge of channel. Soft, uneven sand. Polychaetes and *Cerastoderma edule* in dig.

Biotope designation
Mytilus edulis banks on muddy sand shores (LMU.Myt*). Conforms very well to this biotope type.

Back of Inch Strand

Station 3, Lower shore (dig only)
MNCR habitat no. 21531 (529,16.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 0.7%

Granulometry

Component	%
mud	4.6
very fine sand	39.2
fine sand	48.9
medium sand	3.8
coarse sand	3.5

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	5	-	F
Nephtys hombergii	-	-	1	P
Arenicola marina	C	-	-	C
Lanice sp.	F	-	-	F
Crangon crangon	P	1	1	P
Cerastoderma edule	F	-	-	F

Number fauna taxa: 6

Station description

Distance from shoreline: 2250 m

By main channel, opposite Cromane peninsula. Firm rippled clean sand, with anaerobic layer at 2 to 5 cm depth. *Arenicola* casts present in patches, 1 to 5 m^{-2}. *Lanice* present in clumps. *Cerastoderma edule* frequent.

Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

SURVEY AREA	**TRALEE BAY**
Site No. 17	Back of Derrymore Island
Site No. 18	The Spa
Site No. 19	Barrow Bay

Site location map

Site No. 17 Back of Derrymore Island

Field No. and Date: **960804** MNCR database site no. **10065**

Transect length: 360 m Magnetic bearing: 113° Grid ref. start point: Q 656 993

Site description

The site was located on the eastern side, and towards the tip of a large peninsula (Derrymore Island) that protects the inner part of a large west facing bay (Tralee Bay) on the south-west coast of Ireland. The mudflats in the vicinity of the peninsula are known to be important for birds and the whole area is a proposed National Heritage Area. A transect was taken from the peninsula (Q 758 130) at a magnetic bearing of 113 degrees to the northern channel (Bealathaleen Creek) draining the inlet, the distance being approximately 360 m. The top shore was composed of a steep gravel and shingle bank backed by grazed grassland and marshland. The sediment on the upper shore was muddy sand with up to 75% cover of *Zostera* sp. The middle shore was composed of soft muddy sand with standing water and abundant *Cerastoderma edule*. On the lower shore, close to the channel, the substratum was firm rippled sand, this sandy habitat widened to the east of the transect. *Arenicola marina* was common on the upper and middle shore and abundant on the lower shore.

Back of Derrymore Island

Station 1, Top of shore
MNCR habitat no. 21555 (529,17.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud and sand

Fauna	Obs.	Abundance
Littorina littorea	P	P
Mytilus edulis	P	P
Cerastoderma edule	P	P

Number fauna taxa: 3

Station description

Distance from shoreline: 30 m

From a grass bank the ground descended approximately 1.5 m over a cobble and shingle ridge to flat muddy sand with crushed shells and an anaerobic layer 3-4 mm below the surface. Occasional clumps of *Fucus vesiculosus* and *Enteromorpha* sp., and *Littorina* sp., *Mytilus edulis* and *Cerastoderma edule* were present. Paired *Macoma balthica* shells were also present. A dense (75% cover) band of *Zostera noltii* started about 3 m out from the foot of the shingle bank.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Back of Derrymore Island

Station 2, Upper shore
MNCR habitat no. 21556 (529,17.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	6	-	F
Arenicola marina	F	5	1	F
Crangon crangon	F	1	-	F
Mytilus edulis	F	-	-	F
Cerastoderma edule	C	-	13	A
Macoma balthica	-	2	2	O

Total number of infauna species 6

Station description

Distance from shoreline: 90 m

Very soft substratum with a 10 cm layer of coarse sand over mud and clay and an anaerobic layer 1 cm below the surface. There were pools of standing water on the surface and 60% *Zostera* cover. *Arenicola* casts were common with *Cerastoderma edule* abundant in the dig. *Fucus vesiculosus*, *Mytilus edulis* and *Cerastoderma edule* were in clumps on the surface.

Biotope designation
Zostera noltii beds in upper to mid shore muddy sand (LMS.PCer.Znol).
Conforms well to this biotope type.

Back of Derrymore Island

Station 3, Mid shore
MNCR habitat no. 21557 (529,17.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sandy mud
Organic content: 2.5%

Granulometry

Component	%
mud	50.7
very fine sand	39.9
fine sand	8.7
medium sand	0.7
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	1	-	F
Nephtys hombergii	-	13	4	A
Scoloplos armiger	-	2	-	C
Arenicola marina	C	2	2	C
Gammarus locusta	-	2	-	O
Crangon crangon	-	2	1	F
Cerastoderma edule	-	2	4	A
Macoma balthica	-	1	2	O

Number fauna taxa: 8

Station description

Distance from shoreline: 225 m

Thin layer of water over very soft mud, and anaerobic layer at 1 mm depth. Small drainage channels nearby. 60% cover of filamentous brown and green algae with 5% cover of *Zostera noltii*. *Arenicola* common and *Nephtys hombergii* and *Cerastoderma edule* abundant.

Biotope designation
Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores (LMU.HedMac.Nhom).

Back of Derrymore Island

Station 4, Lower shore
MNCR habitat no. 21558 (529,17.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.7%

Granulometry

Component	%
mud	19.5
very fine sand	58.0
fine sand	20.2
medium sand	2.3
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Cerasteroderma edule	P	-	-	P
Nephtys hombergii	-	-	9	A
Scoloplos armiger	-	1	-	C
Arenicola marina	C	1	-	C
Neomysis integer	-	2	-	F

Number fauna taxa: 4

Station description

Distance from shoreline: 360 m

At the edge of the channel. Firm, rippled, medium to fine sand with an anaerobic layer 1 to 2 cm below the surface. *Arenicola* casts abundant and *Cerastoderma edule* shells common. Paired cockle and *Macoma balthica* shells on the surface with occasional clumps of *Enteromorpha* sp. This biotope widened considerably to the east of the transect.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Site No. 18 The Spa

Field No. and Date: 960801 MNCR database site no. 9953

Transect length:860 m Magnetic bearing; 318° Grid ref. start point: Q 786 151

Site description

The site was located on the north side and inner part of a large west facing bay in south-west of Ireland (Tralee Bay). Inter-tidal mudflats in the vicinity are known to be important bird feeding areas. The site was situated close to a major oyster (*Ostrea edulis*) fishery and to the discharge point for the new Tralee sewage treatment works. The site was backed by a shingle ridge. The upper shore was soft mud with a narrow (30 m) band of *Mytilus*. Further down the shore sediment was a firmer rippled sand but this became softer on the lower shore and near side channels. *Arenicola marina* casts were common on the mid and lower shores. Shore width at the transect was approximately 1 km.

The Spa

Station 1, Top of shore
MNCR habitat no. 21333 (529,18.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Mud

Fauna	Obs.	Abundance
Hyale nilssoni	O	O
Echinogammarus marinus	F	F
Crangon crangon	P	P
Carcinus maenas	P	P
Littorina obtusata	P	P
Littorina saxatilis	P	P
Mytilus edulis	P	P

Number fauna taxa: 7

Station description

Distance from shoreline: 20 m

Steep shingle and stone bank with a drop of approximately 1.5 m to the shore. A 30 m wide bed of *Mytilus* sp. was present on soft mud. *Fucus vesiculosus*, some *Enteromorpha* sp. and sparse *Ulva*, and *Littorina* sp. were common on the algae. *Crangon crangon* present in standing water. Amphipods including *Echinogammarus* present under algae.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

The Spa

Station 2, Upper shore
MNCR habitat no. 21334 (529,18.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 2.0%

Granulometry

Component	%
mud	18.1
very fine sand	56.8
fine sand	23.4
medium sand	1.7
coarse sand	0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	8	-	F
Scoloplos armiger	-	1	-	C
Arenicola marina	C	-	-	C
Cerastoderma edule	P	3	5	A
Zostera noltii	C	-	-	C

Number fauna taxa: 4

Station description

Distance from shoreline: 90 m

Good *Zostera* cover at 50 - 100m out from top of shore. Sediment becoming firmer. *Arenicola* casts at 1 - 10 m^{-2}. Pools of water present and some *Cerastoderma edule* on surface. Paired *Scrobicularia plana* shells present. Some small polychaetes present in dig. Anoxic layer at 5 - 10mm below surface.

Biotope designation
Zostera noltii beds in upper to mid shore muddy sand (LMS.PCer.Znol).

The Spa

Station 3, Mid shore
MNCR habitat no. 21335 (529,18.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.4%

Granulometry

Component	%
mud	4.8
very fine sand	67.1
fine sand	27.3
medium sand	0.8
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	1	-	F
Nephtys hombergii	-	2	-	F
Spionidae indet.	-	2	-	F
Scoloplos armiger	-	6	-	C
Arenicola marina	C	-	2	C
Lanice conchilega	P	-	-	P
Cerastoderma edule	F	-	-	F

Number fauna taxa: 6

Station description

Distance from shoreline: 600 m

Firm rippled sand. *Arenicola* casts at approximately 10 m^{-2}. A 20 % cover of *Enteromorpha* sp. *Lanice* tubes present at the surface and in the dig. *Cerastoderma edule* present in dig (3 m^{-2}). Anoxic zone 2 cm below surface.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

The Spa

Station 4, Lower shore
MNCR habitat no. 21336 (529,18.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 1.6%

Granulometry

Component	%
mud	7.5
very fine sand	64.8
fine sand	26.0
medium sand	1.7
coarse sand	0

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	1	F
Arenicola marina	C	5	C

Number fauna taxa: 2

Station description

Distance from shoreline: 860 m

At the edge of the main channel. Rather soft just before the edge but firmerandcoarser sediment in channel. *Ulva* sp. present. *Arenicola* casts at a density of 1 - 9 m^{-2} (just before the edge of channel). Anaerobic zone at 1cm below the surface.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Site No. 19 Barrow Harbour

Field No. and Date: **960926** MNCR database site no. **10068**

Transect Length 780 m Magnetic bearing: 130° Grid ref.start point:

Site description

The site was located in an enclosed west facing bay on the north side of a large west facing bay (Tralee Bay) on the west coast of Ireland. The mouth of the bay is protected from the prevailing wind by a causeway and an island. A transect was taken from the south side of the bay, from the base of a sea wall (Q 743171) at 130°, across a sand flat to the main drainage channel on the north side of the bay. A gradually sloping shingle and stone beach, 30 m wide, with *Fucus vesiculosus*, *Ulva* and *Enteromorpha* at the bottom, led onto a flat area of soft muddy sand which was characterised by a sparse to dense covering of *Zostera*, *Cerastoderma edule* and *Arenicola marina* out to 440 m. Beyond this belt the substratum was composed of firm rippled, well aerated medium sand, sloping very gradually to the main channel. This area was characterised by *Arenicola marina* casts (5 m^{-2}). The edge of the channel at 780 m was characterised by *Lanice* tubes (10m^{-2}) and *Nephtys* sp. (1-9 m^{-2}).

Barrow Harbour

Station 1, Top of shore
MNCR habitat no. 21569 (529,19.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Gravel, mud and sand

Fauna	Obs.	Abundance
Amphipoda indet.	O	O
Carcinus maenas	F	F
Littorina sp.	F	F
Hediste diversicolor	F	F
Hydrobia sp.	F	F

Number fauna taxa: 5

Station description

Distance from shoreline: 30 m

At the bottom of a gradually sloping shingle and stone beach, occasional to frequent cover of *Ulva* sp., *Enteromorpha* sp. and *Fucus vesiculosus*. Amphipods (in the algae), littorinids, small *Carcinus maenas*, *Hydrobia* sp. and *Hediste diversicolor* were frequent to occasionally present.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Barrow Harbour

Station 2, Upper shore
MNCR habitat no.21570 (529,19.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.9%

Granulometry

Component	%
mud	2.8
very fine sand	30.0
fine sand	56.0
medium sand	11.1
coarse sand	0.1

Fauna	Obs.	Dig	Core	Abundance
Scoloplos armiger	-	3	-	C
Arenicola marina	-	4	-	C
Littorina saxatilis	F	2	-	F
Cerastoderma edule	-	9	5	A

Number fauna taxa: 4

Station description

Distance from shoreline: 180 m

100 m NE of the transect on relatively firm, medium, dry sand, slightly undulating, with a thin covering of *Zostera noltii*. There was 2 mm of aerated sand over a 150 mm layer of dark sand with a lighter layer below. Dense *Zostera* roots in the top 200 mm of sand. Slightly anoxic smell. *Arenicola* casts common (5 m^{-2}). *Cerastoderma edule* frequent (9 m^2) in the dig with *Scoloplos armiger* frequent.

Biotope designation
Zostera noltii beds in upper to mid shore muddy sand (LMS.PCer.Znol).

Barrow Harbour

Station 3, Mid shore
MNCR habitat no. 21571 (529,19.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.4%

Granulometry

Component	%
mud	2.1
very fine sand	31.3
fine sand	54.5
medium sand	11.5
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Scololepis foliosa	-	1	-	F
Nephtys sp.	-	1	-	F
Scoloplos armiger	-	15	5	S
Arenicola marina	C	1	-	C
Cerastoderma edule	-	4	2	F
Angulus tenuis	-	6	7	A

Number fauna taxa: 6

Station description

Distance from shoreline: 450 m

Beyond the *Zostera* belt on firm rippled, well aerated (to 10 cm below the surface), medium sand. Some broken shell in the sand. Scattered pools of shallow standing water. *Cerastoderma edule* frequent, *Arenicola* common, *Angulus tenuis* abundant, and *Scoloplos armiger* very abundant.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).
The station conformed very well to this biotope type.

Barrow Harbour

Station 4, Lower shore
MNCR habitat no. 21572 (529,19.4)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.8%

Granulometry

Component	%
mud	3.2
very fine sand	44.7
fine sand	46.0
medium sand	5.7
coarse sand	0.4

Fauna	Obs.	Dig	Core	Abundance
Nephtys cirrosa	-	6	1	F
Arenicola marina	C	-	-	C
Lanice conchilega	F	3	-	F
Bathyporeia guilliamsoniana	-	1	1	O
Angulus tenuis	-	-	6	A

Number fauna taxa: 5

Station description

Distance from shoreline: 780 m

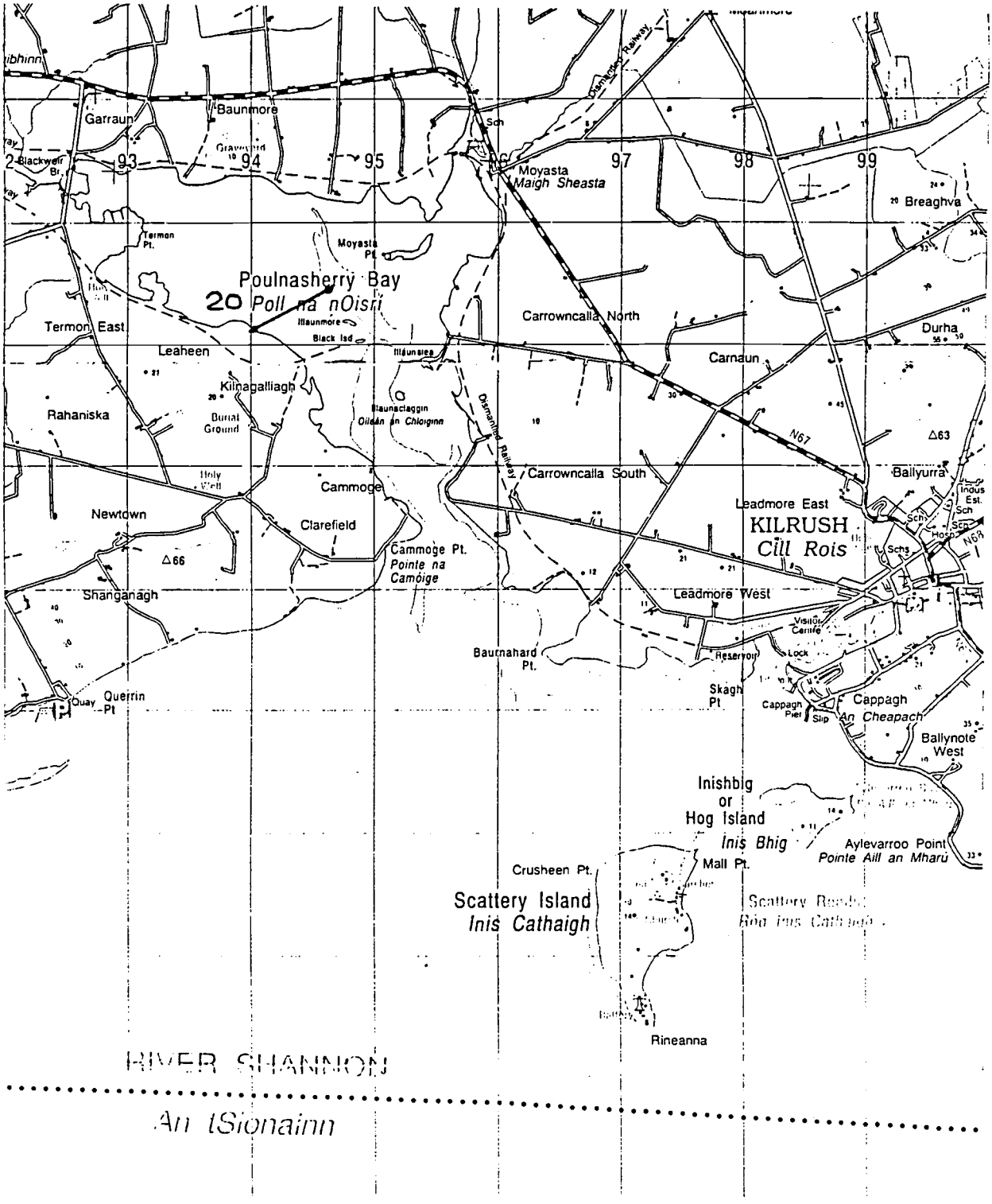
At the edge of the main drainage channel. Firm medium sand, well aerated to 10 cm below the surface. Water logged at side of channel. *Lanice* tubes common, *Nephtys cirrosa* frequent, *Angulus tenuis* abundant and amphipods occasional. *Arenicola* casts common on the surface.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

SURVEY AREA **SHANNON ESTUARY**

Site No. 20 Poulnasherry Bay

Site location map



Site No. 20 Poulnasherry Bay

Field No. and date: **960928** MNCR database site no. **10067**

Transect length: 750 m Magnetic bearing: 48° Grid ref.start point: Q 940 571

Site description

Poulnasherry Bay is an enclosed tidal bay on the north side of the Shannon estuary, a large estuary on the west coast of Ireland. The narrow mouth of the bay faces south into the estuary at Cammoge Point. A wide channel extends northward into the triangular shaped bay. An old railway causeway crosses the bay at mid point, affording protection to the inner bay though the embankment is breached in several places. A transect was taken from the west side of the inner bay, approximately 500 m north of the causeway (Q 940 571) at a magnetic bearing of 48° to the main drainage channel opposite a rocky outcrop in the centre of the bay (Moyasta Point). The site was backed by grassland with a steep cobble bank, with *Fucus vesiculosus* and *Ascophyllum nodosum* covering the cobbles on the lower section. A narrow band of reeds at the base of the bank gave way to very gradually sloping and slightly undulating mud (very soft) with a thin lay of standing water and up to 80 % cover of filamentous green algae on the upper 300 m. This area was crossed by occasional small drainage channels with small worm casts common to abundant on the bare mud. The algae thinned then disappeared at 315 m where a firm muddy sand bank lead down to a secondary drainage channel with its base about 1 m below its west bank. On the far side of this channel a flat rippled sandy area where *Arenicola* casts were common, extended for 10 m before the ground rose again gradually over the next 100 m to the top of a wide sandy bank which was higher than the ground to the west. A thin layer of filamentous green algae covered 20 % of the surface of this bank with abundant *Arenicola marina* casts and *Corophium* sp. burrows. The ground fell approximately 30 m over 300 m, eastwards to the edge of the main channel with a flat, 30 m wide area at the edge. The edge of the channel was characterised by *Cerastoderma edule* and *Nephtys* sp.

Poulnasherry

Station 1, Top of shore.
MNCR habitat no. 21564 (529,20.1)

Habitat classification
Height on shore: Top
Wave exposure: Very sheltered
Substratum: Gravel and sand

Fauna	Obs.	Abundance
Hyale nilssoni	O	O
Talitrus saltator	O	O

Number fauna taxa: 2

Station description

Distance from shoreline: 13 m

Towards the base of a steep cobble bank with *Fucus vesiculosus* and *Ascophyllum nodosum* covering 20 % of the cobbles. Amphipods were frequent under algae and cobbles. Narrow bank of reeds at the base of the slope in soft mud.

Biotope designation

Transition between biotopes (a) Talitrid amphipods in decomposing seaweed on the strandline (LGS.Tal) and (b) *Ascophyllum nodosum* on mid eulittoral mixed substrata (SLR.AscX).

Poulnasherry

Station 2, Upper shore.
MNCR habitat no. 21565 (529,20.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very Sheltered
Substratum: Sandy mud
Organic content: 4.1%

Granulometry

Component	%
mud	73.1
very fine sand	13.1
fine sand	3.3
medium sand	1.4
coarse sand	9.1

Fauna	Obs.	Dig	Abundance
Scoloplos armiger	-	1	C
Arenicola marina	C	-	C
Hydrobia ulvae	C	-	C
Cerastoderma edule	-	1	F

Number fauna taxa: 4

Station description

Distance from shoreline: 90 m

On flat to very gradually sloping, slightly undulating soft mud near a drainage channel. There was 4 mm of silt over black anoxic mud with a clay layer at 75 mm. There was a 70 % cover of green filamentous algae with occasional patches of *Zostera noltii* and a thin layer of standing water. Small *Arenicola* casts at densities of 30 m^{-2} in bare mud and 1-9 m^{-2} in algae, were common. *Hydrobia* sp. were common on bare mud.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Poulnasherry

Station 3, Mid shore, lower.
MNCR habitat no. 21566. (529,20.3)

Habitat classification
Height on shore: Lower mid shore
Substratum: Sand
Wave exposure: Sheltered

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	3	F
Arenicola marina	F	5	F
Crangon crangon	C	-	C

Number fauna taxa: 3

Station description

Distance from shoreline: 380 m

On the edge and east side of the secondary drainage channel, approximately 1 m below the surrounding area on a 10 m wide strip of firm rippled sand, with a layer of silty sand over dark muddy sand. Anaerobic layer 5 mm below the surface. *Nephtys hombergii* and *Arenicola* frequent with *Crangon crangon* common.

Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

Poulnasherry

Station 4, Upper mid shore.
MNCR habitat no. 21567 (529,20.4)

Habitat classification
Height on shore: Upper mid shore
Substratum: Sandy mud
Wave exposure: Very sheltered
Organic content: 2.6%

Granulometry

Component	%
mud	51.4
very fine sand	27.3
fine sand	8.6
medium sand	3.6
coarse sand	9.1

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	6	-	F
Nephtys hombergii	-	1	-	F
Scoloplos armiger	-	8	-	C
Arenicola marina	C	4	-	C
Ampelisca brevicornis	-	P	-	O
Apherusa jurinei	-	1	-	O
Corophium volutator	-	13	-	F
Macoma balthica	-	6	3	F
Scrobicularia plana	-	-	1	P

Number fauna taxa: 8

Station description

Distance from shoreline: 540 m

On top of the sand bank between the secondary and main channel, on firm, slightly undulating sand, aerated to 60 mm below the surface with abundant *Corophium* burrows. The sediment was a medium sand over muddy sand. There was a thin 15 to 20 % cover of filamentous green alga mat. *Arenicola* casts were abundant, *Scoloplos armiger* common, *Corophium* sp. abundant. There were reed covered islands 500 m to the north-west of the station.

Biotope designation
Hediste diversicolor and *Macoma balthica* with *Nepthys hombergii* in variable salinity sandy mud shores (LMU.HedMac.Nhom).

Poulnasherry

Station 5, Lower shore
MNCR habitat no. 21568 (529,20.5)

Habitat classification
Height on shore: Lower shore
Substratum: Sandy mud
Wave exposure: Very sheltered
Organic content: 3.2%
Other features Edge of channel

Granulometry

Component	%
mud	54.0
very fine sand	35.8
fine sand	9.5
medium sand	0.7
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	5	-	F
Scoloplos armiger	-	-	1	P
Arenicola marina	C	1	-	C
Scalibregma inflatum	-	3	-	F
Littorina littorea	F	1	-	F
Cerastoderma edule	C	-	3	C
Macoma balthica	-	2	2	O
Pharus legumen	-	-	-	F
Nucula sulcata	-	-	1	P

Number fauna taxa: 7

Station description

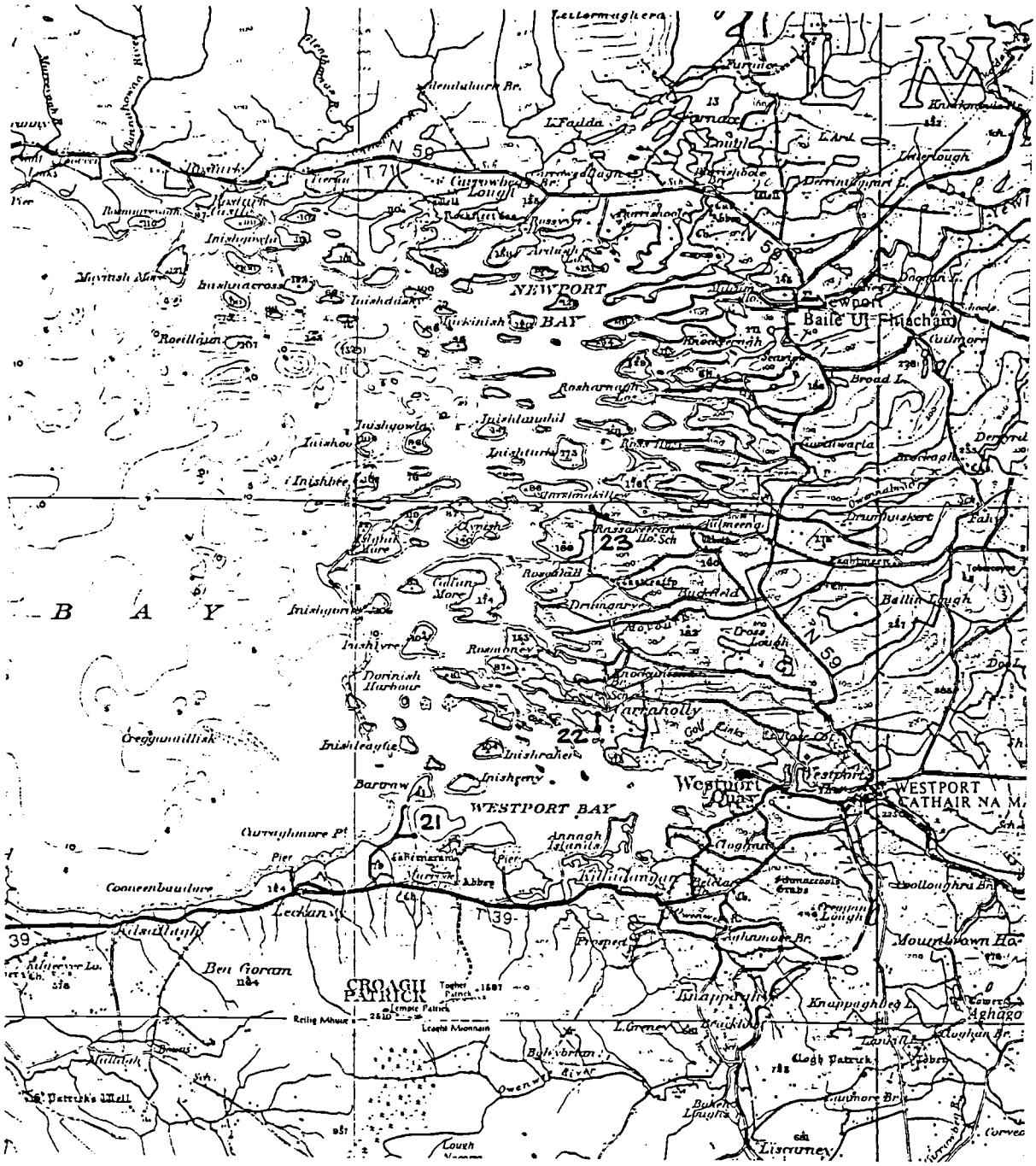
Distance from shoreline: 750 m

At the edge of the main channel, on level ground with humps and hollows on the surface. Slightly soft, sandy mud with some organic matter, shells and stones. Small clumps of algae floating in the channel. Pools of standing water present. *Cerastoderma edule* common with *Nephtys hombergii* and *Littorina* sp. frequent.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

SURVEY AREA	**CLEW BAY**
Site No. 21	White Strand
Site No. 22	Carraholly
Site No. 23	Claggan Cove

Site location map



Site No. 21 WHITE STRAND

Field No. and date: **961015** MNCR database site no. **10076**

Transect length: 495 m Magnetic bearing: 96° Grid ref.start point: L 908 835

Site description

The site was located in a north facing inlet, on the south side of a large west facing bay (Clew Bay) on the west coast of Ireland. A narrow sand dune peninsula formed the west side of the bay and protected it from the prevailing winds and from the open water of outer Clew Bay. A transect was taken from approximately half way along the peninsula, at a magnetic bearing of 96 degrees, across a sand flat, to the main drainage channel in the centre of the inlet. A relatively steep, cobbled covered slope gave way to flat firm even sand characterised by common to abundant worm tubes and occasional cockles. At the base of the cobble slope there was a narrow band of algae characterised by *Pelvetia canaliculata* and *Fucus vesiculosus*. At 315 m from the shoreline, the ground rose very slightly becoming dryer and the sand became rippled. A slight depression with soft sand, pools of standing water and a secondary channel, led onto a narrow band of firm sand at the edge of the channel 495 m out from the dunes. *Nephtys* sp. were common at the edge of the channel. There was extensive oyster trestling about 2 km to the North.

Whitestrand

Station 1, Top of shore.
MNCR habitat no. 21579 (529,21.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Cobbles and sand
Other features Bottom of cobble slope beneath sand dunes

Fauna	Obs.	Dig	Abundance
Phyllodoce maculata	-	1	P
Echinogammarus marinus	O	2	O
Crangon crangon	P	-	P
Littorina littorea	P	-	P
Littorina obtusata	P	-	P

Number fauna taxa: 6

Station description

Distance from shoreline: 27 m

At the bottom of a steep cobble covered slope. *Pelvetia canaliculata* above *Fucus vesiculosus* on the cobbles. Amphipods and *Littorina* sp. numerous under algae, and *Crangon crangon* occasional in the thin layer of standing water. Medium to coarse, well aerated, firm, even sand, with a coarse layer at 10 cm below the surface at the bottom of the slope.

Biotope designation

Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Whitestrand

Station 2, Upper shore.
MNCR habitat no. 21580 (529,21.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.17%

Granulometry

Component	%
mud	1.6
very fine sand	18.7
fine sand	60.2
medium sand	18.6
coarse sand	0.9

Fauna	Obs	Dig	Core	Abundance
Nephtys cirrosa	C	2	1	F
Clymenura clypeata	-	10	-	C

Number fauna taxa: 2

Station description

Distance from shoreline: 68 m

On flat, firm, well aerated, medium to coarse sand, 40 m out from the base of the cobble bank. Anaerobic layer 20 cm below the surface. A thin layer of standing water on the surface. Worm tubes, some with small mounds around them, common to abundant, although no live specimens collected. *Nephtys* sp. common in the dig.

Biotope designation
Mixed polychaete communities characterised by *Clymenura clypeata* in fine to coarse sand on sheltered shores (LGS.Cly*).

Whitestrand

Station 3, Mid shore
MNCR habitat no. 21581 (529,21.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	2.2
very fine sand	11.5
fine sand	57.7
medium sand	27.2
coarse sand	1.4

Fauna	Obs	Dig	Core	Abundance
Nephtys cirrosa	F	1	-	F
Clymenura clypeata	-	10	-	C
Cerastoderma edule	F	1	-	F
Angulus tenuis	-	3	1	F

Number fauna taxa: 4

Station description

Distance from shoreline: 270 m

On flat, firm even, well aerated, medium to coarse sand with a thin film of standing water. Fine worm tubes abundant (10-99 m^{-2}), *Nephtys* sp. frequent (1-9 m^{-2}). *Cerastoderma edule* frequent in the vicinity.

Biotope designation
Mixed polychaete communities characterised by *Clymenura clypeata* in fine to coarse sand on sheltered shores (LGS.Cly*).

Whitestrand

Station 4, Lower shore
MNCR habitat no. 21582 (529,21.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.5%

Granulometry

Component	%
mud	1.2
very fine sand	21.6
fine sand	60.3
medium sand	16.3
coarse sand	0.6

Fauna	Obs	Dig	Core	Abundance
Nephtys cirrosa	A	5	5	A
Scoloplos armiger	-	2	-	C
Angulus tenuis	A	2	4	A

Number fauna taxa: 3

Station description

Distance from shoreline: 495 m

At the edge of a 20 m wide channel draining the bay to the north, on a firm sand bank of well aerated medium to coarse sand with an anaerobic layer at 75 mm below the surface. *Nephtys* sp. and *Angulus tenuis* spat abundant.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Site No. 22 Carraholly

Field No. and Date: **961014** MNCR database site no. **10075**

Transect length: 210 m Magnetic bearing: 170° Grid ref. start point: L 948 860

Site description

The site was located in a small south-west facing cove (Carraholly Bay) on the inner shore of a very large west facing bay (Clew Bay) on the west coast of Ireland. Carraholly Bay is largely made up of algae covered cobbles and boulders with a narrow area of sand and mud extending from the back of the west side of the bay, eastward and then southward to its mouth. The site was in the vicinity of what appeared to be a fish packing factory which was located adjacent to the shore approximately 1 km away. A transect was taken from the top of a short relatively steep cobble bank, near the centre of the bay (L 948 860), at a magnetic bearing of 170 degrees, to the mouth of the bay. The lower quarter of the cobble bank was covered in a dense band of *Ascophyllum nodosum* and *Fucus vesiculosus*. The algae and rocks thinned gradually giving way to firm sand with a coarse layer of gravel at 40 mm. The shore sloped gradually southward to the centre of a sandy basin with common to abundant *Arenicola* casts, *Nephtys* sp. and small worm tubes. This sandy basin sloped very gradually east then south to the entrance of the bay, protected on each side by algae covered cobble and boulder arms. The *Arenicola* band gave way to smooth firm sand at the waters edge with *Lanice* like tubes common to abundant and smaller worm tubes common. The transect was approximately 400 m in length. Some of the species recorded here were rare in the survey including *Scalibregma inflatum, Notomastus latericeus* and *Clymenura clypeata*.

Plate 8. Midshore (Biotope type LMS.Are.Nhom*) at Carraholly, Clew Bay, Co. Mayo.

Carraholly

Station 1, Top of shore
MNCR habitat no. 21591 (529,22.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Cobbles and sand

Fauna	Obs.	Abundance
Echinogammarus marinus	O	O
Echinogammarus pirloti	O	O
Carcinus maenas	P	P
Littorina obtusata	F	F

Number fauna taxa: 3

Station description

Distance from shoreline: 20 m

Cobbles with a dense covering of *Ascophyllum nodosum* and *Fucus vesiculosus*. Amphipods 1-9 m^{-2} under boulders plus occasional polychaetes, *Littorina* 1 m^{-2}. *Nephtys* sp. frequent in coarse sand between cobbles, slightly lower down the shore beyond the area sampled.

Biotope designation
Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX).

Carraholly

Station 2, Upper shore
MNCR habitat no. 21592 (529, 22.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Cobbles and sand
Organic content: 0.8%

Granulometry

Component	%
mud	4.3
very fine sand	12.0
fine sand	59.0
medium sand	24.0
coarse sand	0.7

Fauna	Obs	Dig	Core	Abundance
Glycera tridactyla	-	1	-	F
Nephtys cirrosa	-	-	2	P
Nephtys hombergii	P	1	-	F
Scoloplos armiger	-	10	3	A
Cirratulus cirratus	-	5	-	F
Clymenura clypeata	-	7	-	F
Opheliidae indet.	-	-	1	P
Scalibregma inflatum	-	1	1	P
Nemertea indet.	-	-	-	P
Notomastus latericeus	-	1	-	P

Number fauna taxa: 10

Station description

Distance from shoreline: 70 m

At the bottom of the cobble and boulder slope, in well aerated sand with a coarse layer of gravel and shells at 75 mm below the surface. Patches of fine anaerobic sand with aerobic layer to 10 mm below the surface. Small worm tubes, more than 100 m^{-2}, and *Nephtys hombergii* 1-9 m^{-2}. *Nephtys* sp. and worm tubes increasing gradually towards mid shore.

Biotope designation
Mixed polychaete communities characterised by *Clymenura clypeata* in fine to coarse sand on sheltered shores (LGS.Cly). Conforms very well to this biotope type.

Carraholly

Station 3, Mid shore
MNCR habitat no. 21593 (529,22.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	15.5
very fine sand	35.3
fine sand	34.4
medium sand	9.3
coarse sand	5.5

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	8	2	F
Arenicola marina	C	1	-	C
Clymenura clypeata	-	2	-	C
Tunicata indet.	C	-	-	C

Number fauna taxa: 4

Station description

Distance from shoreline: 90 m

Middle of basin in the *Arenicola* belt. Undulating soft sand with algae and sea squirts (possibly *Dendrodoa grossularia*) in small pools of standing water. Large *Arenicola* casts in the area $10m^{-2}$. Surface layer of silt over medium to fine black sand with aerated sand at 150 mm below the surface in patches. Coarse layer of shells at 200 mm below the surface. *Nephtys* sp. 1-9 m^{-2}, large polychaete tubes 1-9 m^{-2} and small polychaete tubes 10 - $99m^{-2}$.

Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

Carraholly

Station 4, Lower shore
MNCR habitat no. 21594 (529,22.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand over coarse layer
Organic content: 0.7%

Granulometry

Component	%
mud	6.7
very fine sand	38.8
fine sand	42.4
medium sand	11.6
coarse sand	0.5

Fauna	Obs.	Dig	Core	Abundance
Marphysa bellii	-	-	2	F
Scoloplos armiger	-	3	-	C
Arenicola marina	O	1	-	C
Clymenura clypeata	-	7	-	F
Notomastus latericeus	-	1	-	P
Ampelisca tenuicornis	-	1	2	P
Angulus tenuis	-	-	1	F

Number fauna taxa: 6

Station description

Distance from shoreline: 210 m

At the edge of the water (low tide) near the mouth of the bay. Firm, even, medium sand, coarse layer at 200 mm below and anaerobic layer 100 mm below the surface. Large worm tubes 20 m^{-2}, with small tube tubes at 10-99 m^{-2}. *Arenicola* casts, polychaetes and bivalves frequent to common. Small clumps of red filamentous algae and *Ascophyllum nodosum* scattered on the beach.

Biotope designation
Mixed polychaete communities characterised by *Clymenura clypeata* in fine to coarse sand on sheltered shores (LGS.Cly).

Site No. 23 Claggan Cove

Field No. and Date: **961013** MNCR database site no. **10073**

Transect length: 170m Magnetic bearing: 313° Grid ref.start point: L 949 898

Site description

The site was located in a small, gradually sloping, muddy and sandy cove on the north side of a peninsula in inner Clew Bay, a large, west facing bay on the west coast of Ireland. The inner bay is scattered with numerous small islands, one of which (Inishnakillew) shelters the mouth of the cove to the north west. The cove is marked Claggan Quay on the 1:50,000 OS map. It is backed by steep grassland on three sides with a quay on the west side. The muddy, sandy floor of the cove is fringed by algae covered rocks which are typical of the surrounding coastline. A short shingle beach gives way to a narrow band of algae covered cobbles (*Ascophylum nodosum* and *Fucus vesiculosus*) followed by a band of small cobbles and gravel on firm muddy sand. A muddy, sandy basin with abundant *Arenicola* casts, slopes gradually towards the mouth of the cove where algae covered rocks encroach from both sides forming a narrow entrance. *Arenicola* casts disappear approximately 30 m before the cove mouth giving way to common to abundant *Nephtys* sp. and worm tubes. A transect was taken from the shoreline at a magnetic bearing of 313° along the centre of the cove.

Plate 9. Upper / mid shore (MNCR biotope LMU.Are) at Claggan Cove, Clew Bay, Co. Mayo.

Claggan

Station 1, Top of shore

MNCR habitat no 21560 (529,23.1)

Habitat classification

Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Cobbles and gravel

Fauna	Obs.	Abundance
Echinogammarus marinus	O	O
Corophium volutator	-	P
Carcinus maenas	P	P
Littorina saxatilis	P	P
Hydrobia ulvae	P	P

Number fauna taxa: 5

Station description

Distance from shoreline: 10 m

Gradually sloping cobbles pebbles and gravel with 75 % algal cover of *Ascophyllum nodosum* and *Fucus vesiculosus*. Amphipods (10-99 m^{-2}), *Littorina* sp. (1-9 m^{-2}), *C. maenas* (1-9 m^{-2}), *Hydrobia* sp. frequent (10-99 m^{-2}) and *Corophium* sp. were all present (1-9 m^{-2}).

Biotope designation

Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX).

Claggan

Station 2, Upper shore
MNCR habitat no. 21561 (529, 23.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	4.6
very fine sand	15.3
fine sand	41.5
medium sand	34.2
coarse sand	4.4

Fauna	Obs	Dig	Abundance
Scoloplos armiger	P	10	C
Corophium volutator	P	-	O

Number fauna taxa: 2

Station description

Distance from shoreline: 18 m

A narrow band (5 to 10 m wide) of gradually sloping ground between the algal zone above and the *Arenicola* belt below. Medium to coarse sand was patchy, some fine sand and mud with a layer of silt (2-3 mm thick) on top with an anaerobic layer immediately below this. There was a coarse layer at 20 cm below the surface. No fauna was found in the cores but worm tubes, mostly red, frequent (10-99 m^{-2}) were found in the dig. *Corophium* sp. were occasional in the dig (1-9 m^{-2}).

Biotope designation
Unclassified

Claggan

Station 3, Mid shore
MNCR habitat no. 21562 (529,23.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 0.9%

Granulometry

Component	%
mud	13.8
very fine sand	29.0
fine sand	39.2
medium sand	13.5
coarse sand	4.5

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	1	F
Arenicola marina	-	27	A
Mytilus edulis	R	-	R
Cerastoderma edul	R	-	R

Number fauna taxa: 4

Station Description
Distance from shoreline: 80 m

In the middle of a band of *Arenicola*, on very gradually sloping medium to fine sand with a small amount of mud, and 2 mm of aerated silt over an anaerobic layer. The sediment was uneven with occasional standing water. *Arenicola* casts were abundant on the surface. *Arenicola marina* was abundant in the dig ($27m^{-2}$) with *Nephtys* sp. frequent and *Cerastoderma edule* and *Mytilus edulis* rare in the vicinity. According to local information, cockles (*Cerastoderma edule*) were plentiful in the area up to 1995. The population may have been affected by high sea temperatures during the summer of that year.

Biotope designation
Arenicola marina and bivalves in full salinity muddy shores (LMS.Are).

Claggan

Station 4, Lower shore
MNCR habitat no. 21563 (529,23.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	18.9
very fine sand	26.3
fine sand	32.5
medium sand	20.3
coarse sand	2.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	4	-	F
Marphysa sp.	-	1	-	F
Clymenura clypeata	-	1	-	F
Polychaete indet.*	-	2	-	F
Lanice conchilega	F	1	-	F
Aricia latreilli	-	9	-	C
Mysidae indet	P	-	1	P
Crangon crangon	P	-	1	P
Pagurus bernhardus	P	-	-	P
Patella vulgata	P	-	1	P
Littorina littorea	F	-	-	F

Number fauna taxa: 8

Station description

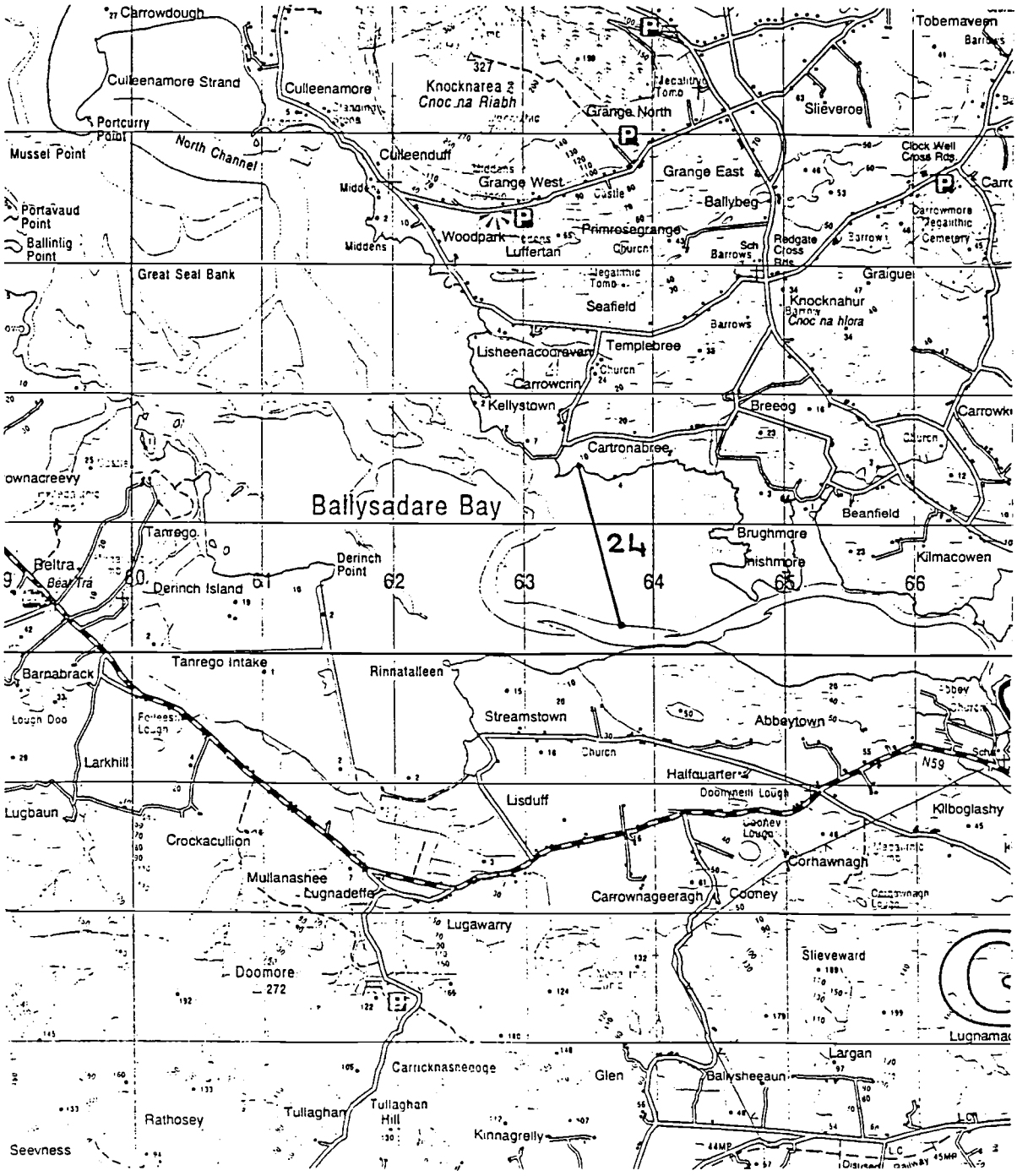
Distance from shoreline: 170 m

Sampled at the edge of a low tide. Flat, even surface on sand with pebbles and broken shell, coarse layer at 20 cm below the surface and an anaerobic layer 5 mm below the surface. Occasional rocks covered in *Ascophyllum nodosum* and *Fucus serratus*. Brown filamentous algae covered 80 % of the surface. Small and large worm tubes frequent and abundant (10-99 m^{-2}) in dig, and hermit crabs common (1-9 m^{-2}). *Crangon crangon* from channel also included in the dig sample.

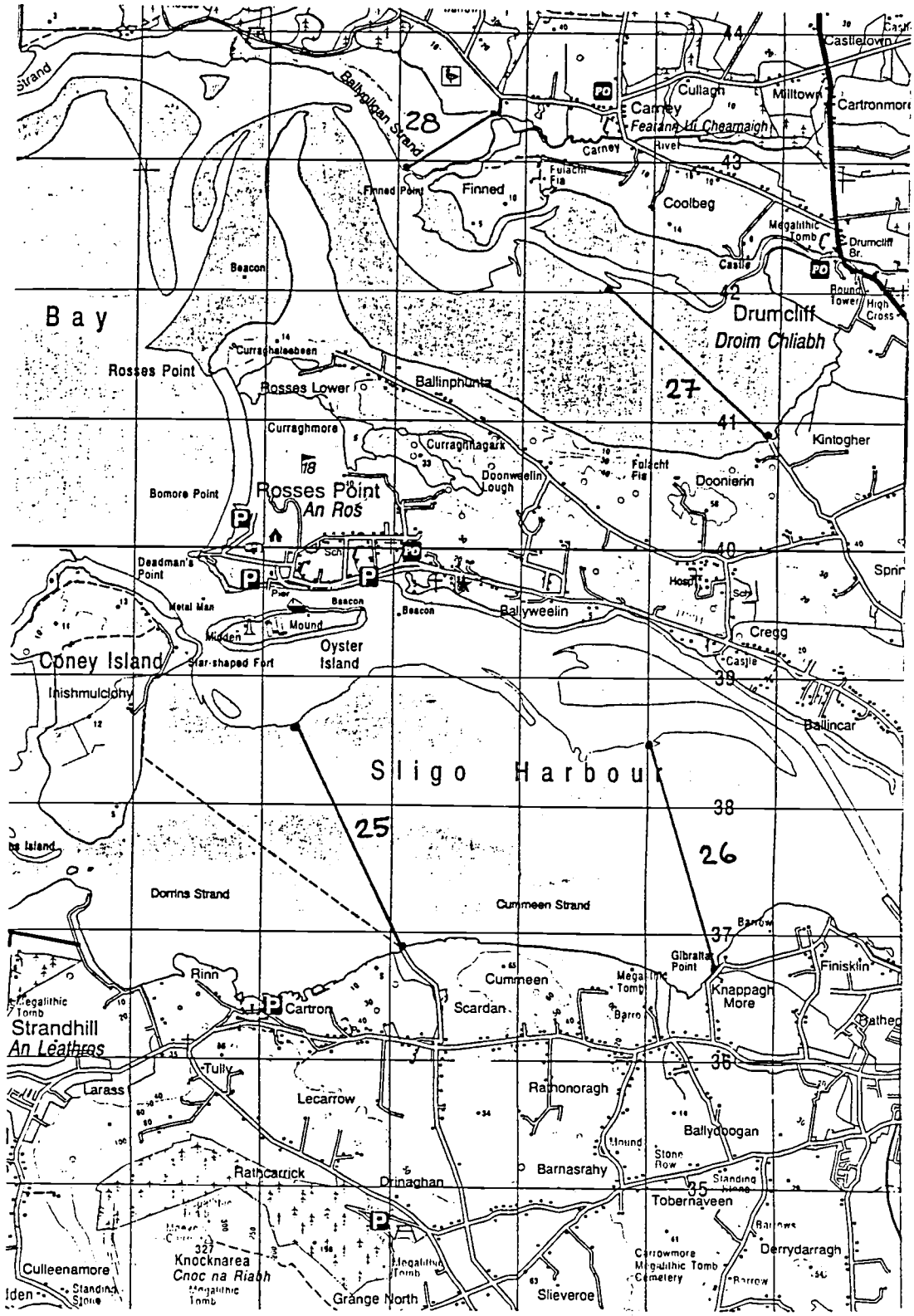
Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

SURVEY AREA	**SLIGO BAY**
Site No. 24	Cartonabree - Ballysadare Bay
Site No. 25	Dorrin's Strand - Sligo Harbour
Site No. 26	Cumeen Strand - Sligo Harbour
Site No. 27	Inner Drumcliff Bay
Site No 28	Ballygillan Strand - Drumcliff Bay

Site location map



Site location map



Site No. 24 Cartonabree - Ballysadare Bay

Field No. and Date: **960705** MNCR database site no. **10062**

Transect length: 1160 m Magnetic bearing: 174° Grid ref.Start Point G 634 314

Site description

The site was located on the northern side of the inner, and sheltered part, of a north-west facing bay on the north-west coast of Ireland. The shore was backed by grassland and a band of small, algae covered rocks and boulders lined the top of the shore. A transect was taken from the centre of a small shallow bay (G 634 314), at a magnetic bearing of 174 degrees, to the channel of the Ballysadare River on the south side of the bay. The shore width was approximately 1.15 km at this point and punctuated by a number of shallow side channels between slightly raised sand flats. The sediment was generally firm sand though slightly muddier on the upper shore, while plant detritus and some mud was found adjacent to the main river channel. The depth to the anoxic layer was typically 2 to 3 cm. The upper shore had bands of *Pelvetia canaliculata*, *Ascophyllum nodosum* (with the epiphyte *Polysiphonia lanosa*) and *Fucus vesiculosus* (5 to 19 % cover). Below the fucoids *Arenicola marina* were abundant for 200 m, and then common on the remainder of the shore. *Cerastoderma edule* and *Mya arenaria* were frequent to common on the mid shore with fine worm tubes frequent to common on the lower shore.

Ballysadare Bay

Station 1, Upper shore
MNCR habitat no. 21538 (529,24.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.4%

Granulometry

Component	%
mud	7.2
very fine sand	32.4
fine sand	52.2
medium sand	6.4
coarse sand	1.8

Fauna	Obs.	Dig	Abundance
Hediste diversicolor	-	1	F
Arenicola marina	C	2	C
Crangon crangon	C	1	C
Carcinus maenas	P	-	P
Scrobicularia plana	-	3	C

Number fauna taxa: 5

Station description

Distance from shoreline: 90 m

The upper shore was backed by grassland with a band of small rocks and boulders at the top of the shore giving way to uneven soft, muddy sand with small rock out crops and small pools of standing water. The anoxic layer was 2 cm below the surface with a layer of coarse broken shell 1.5 cm below. Clumps of *Fucus vesiculosus* frequent, *Enteromorpha* sp. and *Ulva* sp. occasional, were scattered on the rocks and sediment surface nearby. *Arenicola* casts and *Crangon crangon* were common.

Biotope designation

Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.Hed.Scr.).

Ballysadare Bay

Station 2, Mid shore
MNCR habitat no. 21539 (529,24.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	2.4
very fine sand	28.3
fine sand	63.2
medium sand	6.1
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Arenicola marina	C	1	1	C
Terebellidae indet.	-	1	-	-
Lanice conchilega	P	-	-	P

Number fauna taxa: 2

Station description

Distance from shoreline: 360 m

The sediment on the mid shore was generally firm, rippled, fine sand, interspersed with shallow channels where *Lanice* sp. were occasionally present. The ground sloped very gradually to the river channel and to the mouth of the bay. The anaerobic layer was 2 to 3 cm below the surface. *Arenicola* were common to abundant, with rare patches of *Enteromorpha* sp. and *Ulva* sp. in this area.

Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

Ballysadare Bay

Station 3, Mid shore dig
MNCR habitat no. 21540 (529,24.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Arenicola marina	C	1	C
Mya arenaria	-	1	C
Cerastoderma edule	-	-	P

Number fauna taxa: 3

Station description

Distance from shoreline: 720 m

Firm, rippled, fine sand with an anaerobic layer 2 cm below the surface and very shallow layer of standing water. Occasional empty *Mya arenaria* shells were found in the dig and one large (125 mm) live specimen was found. *Arenicola* casts were common with small fine worm tubes frequent near the surface.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Ballysadare Bay

Station 4, Lower shore
MNCR habitat no. 21541 (529,24.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Other features Edge of main channel
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	5.7
very fine sand	41.5
fine sand	47.0
medium sand	4.1
coarse sand	1.7

Fauna	Obs.	Dig	Abundance
Arenicola marina	C	-	C
Crangon crangon	C	-	C
Macoma balthica	-	2	O

Number fauna taxa: 3

Station description

Distance from shoreline: 1160 m

Located 80 m back from the river channel. Ground sloping very gradually towards the channel. Firm rippled sand, anaerobic layer at 2 cm below the surface. Small fine worm tubes frequent to common. No fauna in cores. Paired *Macoma balthica* shells on the surface. *Arenicola* present.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Site No. 25 Dorrin's Strand - Sligo Harbour

Field No. and Date: **960704** MNCR database site no.**10060**

Transect length: 1930 m Magnetic bearing: 334° Grid ref.start point: G 641 368

Site description

The site was located towards the outer part, and on the southern shore of a large narrow, north-west facing bay (Sligo Harbour) on the north-west coast of Ireland. The mouth of the bay is sheltered from the prevailing westerly winds by two islands (Coney Island and Oyster Island) with the main drainage channel running on the north side of the bay. A transect was taken from the southern end of the marked intertidal 'roadway' (G 641 368) shown on the OS map to Coney Island, at a magnetic bearing of 334 degrees, across a large sand flat to the edge of the main channel, to the south of Oyster Island, a distance of approximately 2 km. The shore was backed by grassland and a narrow strip of salt marsh giving way to fine rippled sand with a thin layer of standing water. A wide (100m) shallow channel (2-5 cm), split by a sandbar, was located approximately 100m from the shore. The bed of the channel was soft rippled sand with frequent cockles (*Cerastoderma edule*), *Arenicola* casts and frequent clumps of *Enteromorpha* sp. on the surface. To the north of this channel the sand was firm and, for the most part, covered with a layer of standing water and had an anaerobic layer 1-2 cm below the surface. *Arenicola* casts were visible on the surface at densities of 1-9 m^{-2} with *Cerastoderma edule* present in the top 10-15 cm of sediment at densities of 1-5 m^{-2}. Fine worm tubes were also common. The density of cockles increased 1.5 km out from the shore with 18 per 0.25 m^{-2} recorded. At 1.75 km out from the shoreline the surface rose gradually to the top of a large, sandbank running adjacent to the main channel. The sediment on the bank was coarse and dry with *Scoloplos armiger* abundant and *Lanice conchilega* tubes rare to occasional (1- 5 m^{-2}). The anoxic layer was greater than 25 cm below the surface. At 2 km from the shoreline, the sand bank sloped down to noticeably coarser substratum at the edge of the main channel with a dense band of *Lanice conchilega* and filamentous brown algae 50 m from the channel. *Ulva* sp. was also present attached to worm tubes. The anoxic layer was 10 cm below the surface in the coarse sand and broken shell at the channel edge.

Dorrins Strand

Station 1, Upper shore
MNCR habitat no. 21705 (529,25.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	1.4
very fine sand	17.6
fine sand	67.6
medium sand	13.2
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Arenicola marina	C	1	-	C
Euclymene oerstedii	-	1	-	P
Crangon crangon	F	1	1	F
Cerastoderma edule	F	-	-	F
Macoma balthica	-	1	1	O
Scrobicularia plana	P	-	-	P

Number fauna taxa: 5

Station description

Distance from shoreline: 135m

In a shallow channel, 2- 5 cm deep with some flow. The surface of the channel was slightly soft rippled sand with an anoxic layer 1 cm below the surface. Filamentous green algae was frequent on the surface of the sand. *Arenicola* casts were common with fine worm tubes also present. *Cerastoderma edule* and *Scrobicularia plana* present on the sediment surface.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Dorrins Strand

Station 2, Mid shore
MNCR habitat no. 21706 (529,25.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	2.5
very fine sand	34.2
fine sand	54.2
medium sand	8.3
coarse sand	0.8

Fauna	Obs.	Dig	Core	Abundance
Etone longa	-	-	1	P
Hediste diversicolor	-	2	-	F
Nephtys hombergii	-	1	-	F
Scoloplos armiger	-	-	2	P
Arenicola marina	C	1	2	C
Clymenura clypeata	-	1	-	P
Crangon crangon	P	-	6	P
Cerastoderma edule	C	7	-	C
Angulus tenuis	-	-	4	P
Macoma balthica	-	1	-	O

Total number of infauna species 10

Station description

Note this is an amalgamation of three stations and is the sum of six cores and three digs.

Distance from shoreline: 1350 m

On flat sand with swirls rather than ripples on the surface and anoxic layer 2 cm below the surface. Thin layer of standing water on the surface. *Arenicola* casts and *Cerastoderma edule* were common. Fine worm tubes and worms were also frequent in the sediment. Clumps of green filamentous algae were occasional on the surface.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Dorrins Strand

Station 3, Lower shore
MNCR habitat no. 21707 (529,25.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand and gravel
Organic content: 1.1%

Granulometry

Component	%
mud	2.0
very fine sand	16.9
fine sand	52.8
medium sand	21.8
coarse sand	6.5

Fauna	Obs.	Dig	Core	Abundance
Nephtys cirrosa	-	1	-	F
Nephtys hombergii	-	-	1	C
Orbiniidae indet.	-	2	2	F
Arenicola marina	C	-	-	C
Owenia fusiformis	-	-	1	F
Lanice conchilega	A	1	9	A
Carcinus maenas	C	-	-	C
Cerastoderma edule	P	-	-	P
Angulus tenuis	-	-	8	A

Total number of infauna species 9

Station description

Note this is an amalgamation of two lower shore sites and includes data for two digs and four cores.

Distance from shoreline: 1930 m

On a gradually sloping bank at the edge of the channel, on coarse sand with a high percentage of broken shell. There was a thin layer of standing water 0-2 cm deep on the surface with the anaerobic layer 10 cm below the surface. *Lanice conchilega* was abundant in a 50 m band at the channel edge with wisps of brown filamentous algae attached to their tubes. *Arenicola* casts were present at a density of 1-9 m^{-2} and *Cerastoderma edule* and *C. maenas* were present. The dense band of *Lanice* was not consistent along the channel though they were present in larger numbers to the east and west. To the west of the station there was a slightly raised area with green filamentous algae. Approximately 150 metres back from the edge of the channel, at the top of the bank, the anoxic layer was greater than 25 cm below the surface and the sediment was 95% medium sand with 5% coarse sand. *Lanice* tubes were present at 1-5 m^{-2}. Numerous small holes were observed in the surface of the sand which were possibly polychaete burrows.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan). Conforms well to this biotope type.

Site No. 26 Cumeen Strand - Sligo Harbour

Field No. and Date: **960703** MNCR database site no. **10060**

Transect length: 1870 m Magnetic bearing: 342° Grid ref.start point: G 665 366

Site description

The site was located towards the inner part of a large, sheltered bay (Sligo Harbour) in the north-west of Ireland with two narrow north-west facing entrances. A transect was taken from the sea wall west of Gibraltar Point, on the southern shore, at a magnetic bearing of 342 degrees, across a sand flat, to the main channel on the north side of the bay. The transect was approximately 2 km long and crossed a small shallow channel about 50 m from the sea wall. The beach started with an area of mud, gravel and stone sloping gradually to the shallow channel and was characterised by *Enteromorpha* sp., *Ulva* sp., *Fucus vesiculosus*, *Fucus ceranoides* and *Scrobicularia plana*. Beyond the channel the beach had a short steep upward slope characterised by small burrows with very small gastropods, 1-2 mm in the burrows. The beach appeared flat for 600 m and was characterised by *Arenicola marina* for the first 300 m and then by a mixture of *A. marina* and *Cerastoderma edule*. Between 600 and 700 m from the shoreline there was a dense mussel bed with mussel and dead cockle shells banded together on the landward side. Some *Fucus vesiculosus* and *Enteromorpha* sp. were present on the bed. Seaward of this the shore sloped very gradually to the channel and was covered with standing water, 1-5 cm deep, with cockles (*Cerastoderma edule*), in particular small cockles, present for the next 200 m. After this cockles were occasional as were *Arenicola* casts. The sand was very flat with small tubes present. Close to the channel the sand became rippled and algae, in particular *Polysiphonia* sp. or *Ceramium* sp. were attached to dead cockle shells. *Lanice conchilega* were frequent at the channel edge. Across most of the area *Enteromorpha* sp. was present attached to dead shells. The anoxic layer varied from 1 to 10 cm below the surface but was generally 1 to 5 cm beneath the surface. Clam cultivation (in beds) was taking place in the area and there were clam beds on the lower shore.

Cumeen Strand

Station 1, Upper shore
MNCR habitat no. 21559 (529,26.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 2.4%

Granulometry

Component	%
mud	3.0
very fine sand	30.3
fine sand	55.2
medium sand	7.6
coarse sand	3.9

Fauna	Obs.	Dig	Core	Abundance
Polychaeta indet.	-	2	-	F
Hediste diversicolor	-	1	3	A
Arenicola marina	-	-	1	C
Mytilus edulis	-	1	-	F
Cerastoderma edule	-	-	1	P
Macoma balthica	-	-	1	P
Scrobicularia plana	-	4	2	C

Number fauna taxa: 7

Station description

Note this is an amalgamation of two upper shore sites and includes data for two digs and two cores.

Distance from shoreline: 14 m

Near the top of the shore, beneath the sea wall, on cobbles and stones over mud, with empty shells and peat below this. The anaerobic zone was only 2 mm below the surface. *Fucus vesiculosus* and *F. ceranoides* were common on the cobbles with *Enteromorpha* sp. and *Ulva* sp. frequent. Amphipods were frequent in and under the algae. *Hediste diversicolor* was abundant as were *Arenicola* casts. The ground sloped gradually to a small channel 47 m from the sea wall.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.).

Cumeen Strand

Station 2, Mid shore
MNCR habitat no. 21632 (529,26.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	1.4
very fine sand	17.6
fine sand	67.6
medium sand	13.2
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	1	F
Arenicola marina	C	1	-	C
Cerastoderma edule	A	80	19	A
Angulus tenuis	-	1	1	F
Macoma balthica	-	1	1	O

Number fauna taxa: 5

Station description

Note this is an amalgamation of three mid shore sites and includes data for three digs and three cores.

Distance from shoreline: 800 m

Located on the seaward side and approximately 80 m from a large raised mussel bed which was a prominent feature in this area. The mussel bed was characterised by live and dead *Mytilus edulis*, mostly dead *Cerastoderma edule* and *Littorina littorea* shells with patches of *Fucus vesiculosus* and *Enteromorpha* sp. The firm, rippled, medium sand was covered by a layer of standing water. Old shell was abundant in the sediment and the anaerobic zone was 2 cm below the surface. Small *Cerastoderma edule* were abundant on the surface and in the sediment with *Arenicola* casts common on the surface. *Enteromorpha* sp. was present on occasional clumps of *Mytilus edulis*. *Arenicola* casts were abundant on the upper mid shore with *Corophium* sp. occasional in patches (but not found in dig and cores).

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Cumeen Strand

Station 3, Lower shore
MNCR habitat no. (529,26.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Fine sand
Organic content: 1.3%

Granulometry

Component	%
mud	1.6
very fine sand	35.0
fine sand	55.8
medium sand	7.4
coarse sand	0.2

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	-	F
Lanice conchilega	C	-	-	C
Ampelisca brevicornis	-	3	3	O
Crangon crangon	F	-	-	F
Carcinus maenas	C	-	-	C
Angulus tenuis	-	4	-	F
Platyhelminthes indet.	-	1	-	F

Number fauna taxa: 7

Station description

Note this is an amalgamation of three lower shore sites and includes data for one digs and three cores.

Distance from shoreline: 1870 m

Located 70 m from the edge of the main channel on firm, rippled, fine sand with a layer of standing water and an anaerobic zone 10 cm below the surface. Red algae, probably *Ceramium* or *Polysiphonia* was attached to occasional dead shells. Sand masons *Lanice conchilega* were common but were abundant further east of the transect. *Carcinus maenas* were common and shrimp *Crangon crangon* frequent on the surface.

Biotope designation
Lanice conchilega and *Nepthys hombergii* on moderately exposed sandy shores (LGS.Lan.Nhom*).

Site No. 27 Inner Drumcliff Bay

Field No. and Date: **960718** MNCR database site no. **10059**

Transect length: 1900 m Magnetic bearing: 318° Grid ref. start point: G 669 408.

Site description

The site was located in the inner part of a large sheltered west facing bay (Drumcliff Bay) on the north-west coast of Ireland. The mudflats in the bay are thought to be important feeding grounds for birds. A transect was taken on the south side of the inner bay (from the end of a boreen at G 669 408) at a magnetic bearing of 318°, to the channel of the Drumcliff river, across a very gradually sloping mud and sand flat which seemed typical of the area. The shore width was approximately 1.8 km at this point. A band of *Zostera*, approximately 100 m in width extended along the upper shore. *Arenicola marina* were common to abundant on the upper and mid shore. *Cerastoderma edule*, *Angulus tenuis*, *Macoma balthica*, and *Nephtys* sp. were also frequent to common on the mid shore.

Inner Drumcliff Bay

Station 1, Top of shore
MNCR habitat no. 21533 (529,27.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Sand and cobbles

Fauna	Obs.	Abundance
Carcinus maenas	C	C
Littorina littorea	F	F
Littorina saxatilis	F	F
Hydrobia sp.	C	C

Number fauna taxa: 4

Station description

Distance from shoreline: 0 m

The upper shore was backed by grassland with occasional stones and small boulders along the top of the shore. Clumps of *Fucus vesiculosus* covered the boulders with occasional *Enteromorpha* sp. and *Ulva* sp. *Littorina* spp. and *Carcinus maenas* were common among the boulders. No amphipods were found.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Inner Drumcliff Bay

Station 2, Upper shore
MNCR habitat no. 21534 (529,27.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	5.3
very fine sand	51.2
fine sand	41.6
medium sand	1.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Polychaeta indet.	-	1	-	F
Arenicola marina	C	2	1	C
Carcinus maenas	P	-	-	P
Hydrobia ulvae	C	-	-	C
Cerastoderma edule	-	25	5	A
Macoma balthica	-	6	2	O
Scrobicularia plana	C	-	-	C
Mya arenaria	C	-	-	C

Number fauna taxa: 8

Station description

Distance from shoreline: 80 m

There was a 65 to 70 % coverage of *Zostera noltii* over the top 100 m of the upper shore with *Enteromorpha* sp. occasional. The fine muddy, sandy sediment was firm with the anaerobic layer 5 mm below the surface and a layer of old cockle, *Macoma* and *Hydrobia* shells and other broken shells at 20 cm below the surface. *Arenicola* casts were common (30 m^{-2}) and *Hydrobia* sp. were common. *Carcinus maenas*, and *Scrobicularia plana* were common, and with small fine worm casts frequent. A shallow layer of standing water covered the shore at the station.

Biotope designation
Zostera noltii beds in upper to mid shore muddy sand (LMS.PCer.Znol).

Inner Drumcliff Bay

Station 3, Mid shore
MNCR habitat no. 21535 (529,27.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Scoloplos armiger	-	1	C
Heteromastus filiformis	-	2	O
Arenicola marina	A	-	A
Hydrobia ulvae	A	-	A
Cerastoderma edule	C	2	F
Macoma balthica	C	6	O
Scrobicularia plana	-	2	F
Mya arenaria	-	1	F

Number fauna taxa: 8

Station description

Distance from shoreline: 450 m

Muddy, sandy sediment with anaerobic layer at 5 mm below the surface and a coarse layer of shells at 30 cm below. Standing water with occasional clumps of *Enteromorpha* sp. present. Fine worm tubes abundant with small fine, green and red worms occasional to frequent. *Arenicola* casts were abundant (10 to 30 m^{-2}). *Macoma balthica* and *Cerastoderma edule* were common with small *Hydrobia* sp. abundant. Paired *Scrobicularia plana* shells on the surface.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Inner Drumcliff Bay

Station 4, Lower mid shore.
MNCR habitat no. 21536 (529,27,4.)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Medium to fine sand
Organic content: 1.0%

Granulometry

Component	%
mud	3.2
very fine sand	45.2
fine sand	47.8
medium sand	3.7
coarse sand	0.0

Species	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	2	-	F
Scoloplos armiger	-	1	-	C
Arenicola marina	C	-	-	C
Maldanidae indet.	-	1	-	F
Amphipoda indet.	-	1	-	O
Angulus tenuis	-	3	1	O
Cerasteroderma edule	C	-	-	C
Macoma balthica	-	1	1	O

Number fauna taxa: 8

Station description

Distance from shoreline: 1250 m

Firm, medium to fine sand with the anaerobic layer 3 mm below the surface. Some green filamentous algae nearby. *Arenicola* casts and live cockles common on the surface and in dig. *Macoma balthica* occasional in the dig. Amphipods occasional. Abundant fine worm tubes in dig.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Inner Drumcliff Bay

Station 5, Lower shore
MNCR habitat no. 21537 (529,27.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	2.7
very fine sand	42.4
fine sand	50.9
medium sand	3.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	-	F
Crangon crangon	C	1	-	C
Hydrobia ulvae	-	-	1	P
Angulus tenuis	-	2	1	F

Number fauna taxa: 4

Station description

Distance from shoreline: 1900 m

At the edge of main river channel approximately 1.9 km from the top of the shore. Deeply rippled soft medium sand with 10 % plant detritus and an anaerobic layer 1 to 4 cm below the surface. Having sloped gradually towards the channel from 1700 m, there was a more pronounced slope down the last 30 m to the channel. This slope or bank had occasional clumps of brown filamentous algae. *Crangon crangon* were common in the station.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Site No. 28 Ballygilgan Strand - Drumcliff Bay

Field No. and Date: **960715** MNCR database site no. **10063**

Transect length: 800 m Magnetic bearing: 250° Grid ref.start point: G 647 433

Site description

The site was located on the north side and inner part, of a large sheltered west facing bay (Drumcliff Bay) on the north-west coast of Ireland. A large dune and grassland peninsula extending northward into the bay from the southern shore, shelters the site on the seaward (west) side. A transect was taken from the end of a small road, at the eastern end of Ballygilgan Strand (G 647 433), at a magnetic bearing of 250 degrees, parallel to the Carney river estuary, to the main channel. The shore width was approximately 500 m at this point. Drumcliff Bay is known to be an important feeding area for birds and contains several Ramsar sites for geese. This site at Ballygilgan Strand is included in a proposed NHA. The upper part of the site was very sheltered and was fringed by grassland with some stones and boulders at the top of the shore. *Fucus vesiculosus*, *Pelvetia canaliculata* and *Ascophyllum nodosum* were occasional on the boulders. *Arenicola marina* casts were common to abundant on the upper shore where the sediment was dry firm, muddy sand. In the mid shore the sediment was sandier with small pools of standing water and occasional clumps of algae. *Cerasteroderma edule* and *Arenicola* were common with occasional small banks of *Mytilus edulis*. The lower shore had a firmer sand and shell substratum except at the edge of the side channel which was muddier. A large shellfish farm (clams and pacific oysters) dominated the lower shore area to the west of the transect. On the opposite side of the main channel approximately 40 seals were hauled out on a sand bank.

Ballygilgan Strand

Station 1, Upper shore
MNCR habitat no. 21542 (529,28.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	4.3
very fine sand	22.5
fine sand	57.9
medium sand	14.5
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	1	-	F
Heteromastus filiformis	-	-	5	O
Arenicola marina	C	5	4	S
Crangon crangon	C	2	-	C
Carcinus maenas	C	-	-	C
Cerastoderma edule	-	-	1	F
Macoma balthica	-	6	1	O
Scrobicularia plana	-	-	1	C

Number fauna taxa: 8

Station description

Distance from shoreline: 70 m

Located about 25 m west of transect. Flat, firm, dry, muddy sand with an anaerobic layer 5 to 7 mm below the surface. *Arenicola* casts abundant. Near a 15 m wide (river) channel containing many *Crangon crangon*.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).
Conforms very well to this biotope type.

Ballygilgan Strand

Station 2, Mid shore
MNCR habitat no. 21543 (529,28.2)

Habitat classification
Height on shore: Midshore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.2%

Granulometry

Component	%
mud	4.6
very fine sand	28.5
fine sand	49.4
medium sand	13.0
coarse sand	4.5

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	1	-	F
Clymenura clypeata	-	-	5	F
Praunus flexuosus	-	5	4	O
Corophium volutator	-	2	-	O
Crangon crangon	C	-	-	C
Mytilus edulis	-	-	1	P
Cerastoderma edule	C	6	1	F

Number fauna taxa: 7

Station description

Distance from shoreline: 450 m

Firm to slightly soft sandy sediment with some standing water. *Cerastoderma edule* common on the surface and in the dig. Small clumps of *Fucus vesiculosus* occasional on the surface and occasional raised banks of *Mytilus edulis* along the shore with patches of drier sand on these raised areas. A dig taken on one raised area revealed *Corophium* sp., *Nephtys hombergii* and mysids.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Ballygilgan Strand

Station 4, Mid shore, lower
MNCR habitat no. 21545 (529,28.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	4	F
Arenicola marina	C	-	C
Ampelisca brevicornis	-	1	O

Total number of infauna species 3

Station description

Distance from shoreline: 800 m

Start of shellfish trestles. Slightly dryer than surrounding area. Anoxic layer 5 mm below surface. *Arenicola marina* common.

Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

Ballygilgan Strand

Station 3, Lower shore
MNCR habitat no. 21544 (529,28.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand and shell
Organic content: 1.5%

Granulometry

Component	%
mud	5.0
very fine sand	25.9
fine sand	34.5
medium sand	8.3
coarse sand	26.3

Fauna	Obs.	Core	Dig	Abundance
Clymenura clypeata	-	-	3	F
Nephtys hombergii	-	4	7	F
Scoloplos armiger	-	-	7	C
Arenicola marina	C	-	-	C
Lanice conchilega	C	-	-	C
Crangon crangon	F	-	1	F
Ampelisca brevicornis	-	1	-	O
Glycera tridactyla	-	-	1	F

Number fauna taxa: 8

Station description

Distance from shoreline: 680 m

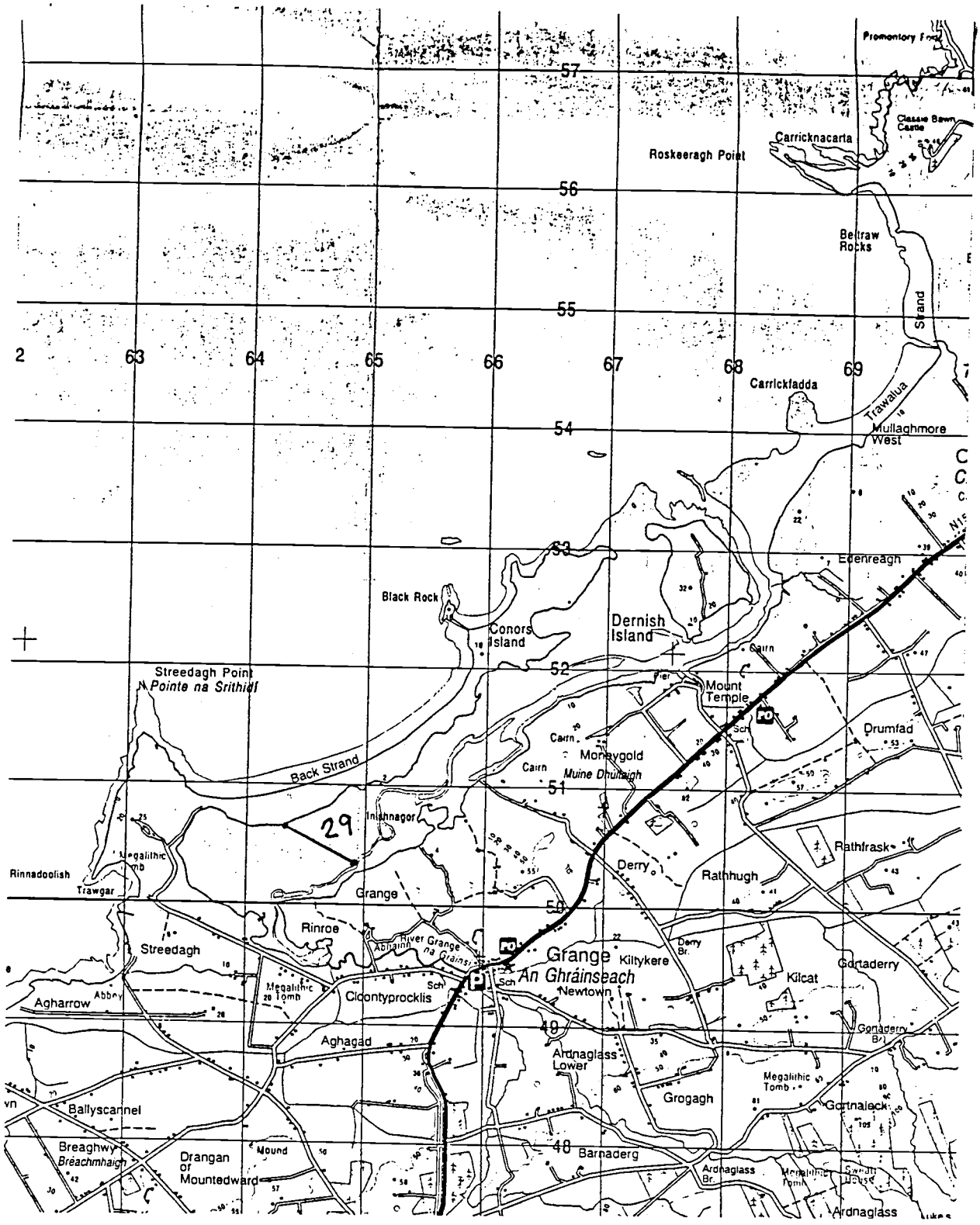
At the edge of main channel, 10 m west of transect. The sediment was firm with sand over broken shells and stone. *Arenicola marina* and *Lanice* sp. were common in this area. Shellfish trestles were present at channel edge. There was a seal haul out on the far bank of channel with approximately 40 seals present. Where the river channel met the main channel the ground was steeper with soft, muddy sediment on the channel sides and bed. Clumps of *Fucus vesiculosus* and *F. serratus* were frequent on the rocks at the far side of the river channel.

Biotope designation
Dense *Lanice conchilega* in tide - scoured lower shore sand (LGS.Lan).

SURVEY AREA **NORTH SLIGO**

Site No. 29 Milk Harbour - Streedagh

Site location map



Site No. 29 Milk Harbour - Streedagh

Field No. and Date: **961026** MNCR database site no. **10086**

Transect length: 750 m Magnetic bearing: 120° Grid ref. start point: G 643 506

Site description

The site was located in an enclosed bay, on the west coast of Ireland, between the mainland and a long (4 km) sand dune peninsula running north - south parallel to the mainland. The bay has a narrow mouth opening to the north and is protected from the prevailing westerly winds by the dune peninsula. A transect was taken from the peninsula on the west side of the bay (G 643 506), at a magnetic bearing of 120 degrees, across a firm sand flat to the main drainage channel on the east side of the bay, a distance of approximately 760 m. From the dunes a short level area of grassland gave way to flat, firm, slightly rippled sand with a thin film of standing water covering most of the transect. The ground rose slightly and dried, before a secondary channel at 680 m with flat rippled wet sand leading to the edge of the channel. Cobbles covered with *Fucus vesiculosus* and rare clumps of *Pelvetia canaliculata*, were occasional for the first 5 m on the top of the shore with amphipods in the algae. *Arenicola* casts were abundant on the surface out to mid shore and thereafter common to the edge of the channel, *Angulus tenuis* was common (10-99 m^{-2}) at the edge of the channel and frequent (1-9 m^{-2}) elsewhere. *Cerastoderma edule* were occasional throughout the transect while *Macoma* sp. were frequent (1-9 m^{-2}) on the upper shore.

Milk Harbour

Station 1, Top of shore
MNCR habitat no. 21608 (529,29.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Gammarus locusta	O	O
Cerastoderma edule	F	F

Number fauna taxa: 3

Station description

Distance from shoreline: 10 m

At the top of the shore, occasional cobbles covered with *Fucus vesiculosus* and occasional clumps of *Pelvetia canaliculata*. Amphipods were occasional under algae. *Cerastoderma edule* spat frequent in sand near cobbles.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Milk Harbour

Station 2, Upper shore
MNCR habitat no. 21609 (529,29.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	1.8
very fine sand	21.8
fine sand	62.1
medium sand	9.4
coarse sand	4.6

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	-	1	P
Arenicola marina	C	5	1	C
Corophium volutator	-	-	1	P
Cerastoderma edule	-	2	4	A
Macoma balthica	-	2	-	O

Number fauna taxa: 5

Station description

Distance from shoreline: 90 m

On firm, flat, even, medium sand with an anaerobic zone 5 to 10 cm below the surface, and broken cockle shells in sediment. Thin layer of standing water on surface. *Cerastoderma edule* and *Arenicola* casts abundant (30 m^{-2}) on the surface.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Milk Harbour

Station 3, Mid shore
MNCR habitat no. 21610 (529,29.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 0.9%

Granulometry

Component	%
mud	1.7
very fine sand	30.4
fine sand	59.8
medium sand	7.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Arenicola marina	C	1	-	C
Hydrobia ulvae	P	-	1	P
Cerastoderma edule	-	1	2	F
Angulus tenuis	-	3	3	C

Number fauna taxa: 4

Station description

Distance from shoreline: 500 m

On firm, medium sand with pools of standing water with rippled sand between dryer areas. Shrimp in the standing water. Empty cockle shells were present in the sediment and an anaerobic zone was present 2 to 4 cm below the surface. *Arenicola* casts and *Angulus tenuis* spat common on the surface. Fine worm casts (10-99 m^{-2}) on the surface.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Milk Harbour

Station 4, Lower shore
MNCR habitat no. 21611 (529,29.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	0.8
very fine sand	16.3
fine sand	69.8
medium sand	12.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Cerasteroderma edule	C	-	-	C
Scoloplos armiger	-	2	-	C
Arenicola marina	C	5	1	C
Mysidae	-	4	-	F
Neomysis integer	-	1	-	F
Angulus tenuis	-	11	3	C

Number fauna taxa: 5

Station description

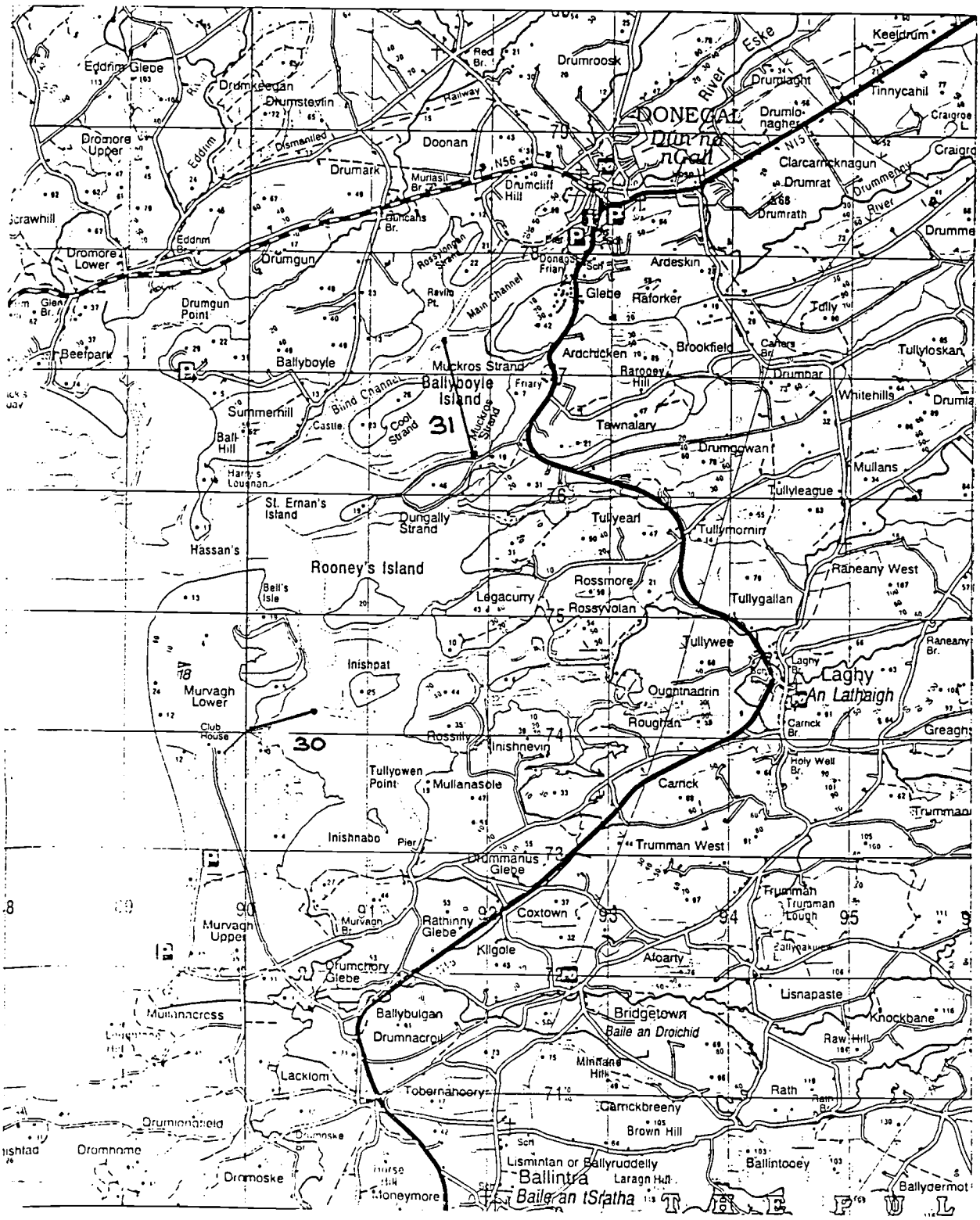
Distance from shoreline: 740 m

At the edge of the main channel, on firm, water logged, medium to coarse sand with an aerobic zone at more than 10 cm below the surface. *Arenicola marina*, *Angulus tenuis*, Sipunculidae in the dig, and *A. tenuis* and *Cerastoderma edule* spat in cores. Abundant *Crangon crangon* in the channel.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

SURVEY AREA	**DONEGAL BAY**
Site No. 30	Back of Murvagh - Inishpat Island
Site No. 31	Muckros Island

Site location map



Site No. 30 Back of Murvagh - Inishpat Island

Field No. and Date: 960717 MNCR database site no. 10066

Transect length: 510 m Magnetic bearing: 70° Grid ref. start point: G 900 740

Site description

The site was located at the back of a dune and grassland peninsula (Murvagh) in a north facing inlet on the south-west side of inner Donegal Bay, a south west facing bay on the north-west coast of Ireland. The site is known to be important to birds and is representative of a group of similar areas in the vicinity. It is an SPA and a proposed NHA. Shellfish aquaculture is carried out north of the site and the main channel, draining the Ballintra river is a popular boating and water skiing area. A transect was taken from the end of a drainage ditch, west of the golf course club house on the peninsula (G 900 740), at a magnetic bearing of 70° towards the western tip of Inishpat Island to the main channel. A small channel ran parallel to the transect on the upper shore. The shore was backed by grassland and forestry and was composed of firm peaty sand becoming muddier near the side channel. The mid shore was generally firm rippled sand with some standing water becoming soft near some small drainage channels flowing west to the side channel. *Arenicola* casts were abundant in this area. The shore rose slightly to a dry, well aerated, sandy bank for the last 100 m before descending steeply to the main channel. There was a seal haul out to the west on the opposite bank of the channel.

Back of Murvagh Peninsula

Station 1, Top of shore
MNCR habitat no. 21550 (529,30.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Mud

Fauna	Obs.	Abundance
Echinogammurus marinus	C	C
Hyalidae indet.	-	P
Carcinus maenas	P	P
Littorina obtusata	P	P

Number fauna taxa: 4

Station description

Distance from shoreline: 0 m

Grass bank giving way to clumps of algae over cobbles. *Ascophyllum nodosum* and *Fucus vesiculosus* occasional to frequent on cobbles. Firm, muddy sand with a mixture of aerobic and anaerobic layers. Large gammarids common.

Biotope designation
Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX).

Back of Murvagh Peninsula

Station 2, Upper shore
MNCR habitat no. 21551 (529,30.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.3%

Granulometry

Component	%
mud	5.2
very fine sand	56.4
fine sand	34.6
medium sand	1.8
coarse sand	2.0

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	22	2	C
Nephtys hombergii	-	1	-	F
Polychaete indet.	-	3	-	-
Arenicola marina	C	6	1	C
Macoma balthica	-	2	1	O
Scrobicularia plana	-	3	1	C

Number fauna taxa: 6

Station description

Distance from shoreline: 54 m

On a firm, dry, muddy sand bank to the west of a side drainage channel. Some plant detritus in sediment. Anoxic layer 5 mm below the surface, muddier closer to the channel. *Arenicola* casts common in and near the channel, *Hediste diversicolor* and *Scrobicularia plana* common in the dig. Paired *Macoma balthica* shells frequent.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr.)

Back of Murvagh Peninsula

Station 3, Mid shore
MNCR habitat no. 21552 (529,30.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.8%

Granulometry

Component	%
mud	17.8
very fine sand	50.0
fine sand	29.7
medium sand	2.4
coarse sand	0.1

Fauna	Obs.	Dig	Core	Abundance
Capitomastus minimus	-	-	1	C
Nephtys hombergii	-	2	1	C
Arenicola marina	C	5	3	A
Bathyporeia guilliamsoniana	-	2	-	O
Eurydice pulchra	-	2	-	O

Number fauna taxa: 5

Station description

Distance from shoreline: 270 m

At the edge of a small channel draining into the side channel. Muddy, uneven surface with pools of standing water and some patches of drier sediment. Anaerobic layer 3 mm below the surface. *Arenicola* casts abundant (30 m^{-2}). Small amphipods occasional in dig. Small fine worm tubes common to abundant in dig. Occasional clumps of *Fucus vesiculosus* nearby. Layer of empty shells (*Cerastoderma edule*, *Mya* and *Scrobicularia plana*) at 30 cm.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBV).

Back of Murvagh Peninsula

Station 4, Lower mid shore
MNCR habitat no.21553 (529,30.4)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Dig	Abundance
Orbinia latreilli	1	F
Bathyporeia sp.	1	O
Eurydice pulchra	3	O
Angulus tenuis	1	C

Number fauna taxa: 4

Station description

Distance from shoreline: 490 m

On a slightly raised bank of very well aerated, firm, dry sand with numerous small holes. Slightly rippled. Anaerobic layer 5 to 10 cm below the surface. Amphipods and isopods occasional to frequent with *Angulus tenuis* common.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Plate 10. Mid shore cockle bank (MNCR biotope LMS.PCer) at Cumeen Strand, Sligo Harbour.

Back of Murvagh Peninsula

Station 5, Lower shore
MNCR habitat no. 21554 (529,30.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Other features Edge of channel
Substratum: Sand
Organic content: 1.8%

Granulometry

Component	%
mud	3.1
very fine sand	63.1
fine sand	30.4
medium sand	1.7
coarse sand	1.7

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergi	-	3	-	F
Scoloplos armiger	-	1	-	C
Arenicola marina	C	3	-	C
Praunus flexuosus	-	7	-	F
Crangon crangon	F	F	-	F
Hydrobia sp.	R	2	-	R
Angulus tenuis	-	6	2	F

Number fauna taxa: 7
Note data includes animals from one extra dig

Station description

Distance from the shore: 510m

At the edge of the main channel. A short steep (1 m) slope of firm, medium sand to channel edge (station 1.4). Channel water peaty with *Crangon crangon* present. Seal haul out and grazing sheep observed on opposite bank. Further east along channel edge there was less of a slope to the channel (station 1.5). Sediment was firm, medium, rippled sand with some standing water. *Arenicola marina* was common in this latter area.

Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*)

Site No. 31 Muckros Strand

Field No. and Date: **960716** MNCR database site no. **10064**

Transect length: 825 m Magnetic bearing: 355° Grid ref. start point: G 918 764

Site description

The site was located in the inner part of Donegal Bay, a large south-west facing bay on the north-west coast of Ireland. The area is known to be an important to birds and is part of a proposed NHA. A transect was taken from the road junction (G 918 764) on the peninsula leading out to St. Ernan's Island, at a magnetic bearing of 355 degrees, across a slightly undulating mud and sand flat (Muckros Strand), passing to the east of Ballyboyle Island, to the main channel of the Esle river estuary. The upper shore, backed by grassland and trees, had a band of small stones giving way to a steeply sloping, 30 m wide bank of boulders with *Pelvetia canaliculata*, *Ascophyllum nodosum* and *Fucus vesiculosus*. A short steep soft muddy bank gave way to a 15 m wide channel with a soft muddy bottom. On the far side of the channel the ground rose steeply (1 m) to a large raised plateau of generally firm rippled sand with abundant *Arenicola* casts, approximately 800 m wide. The plateau was broken by a small side channel at 600 m after which the ground sloped gradually to the main channel with the last 30 m being noticeably steeper. The main channel was fringed by a 25 m band of *Enteromorpha* (30 % cover). The shrimp *Crangon crangon* and flounder *Platichthys flesus* were observed in the main channel.

Muckros Strand

Station 5, Top of shore
MNCR habitat no. (529,31.5)

Habitat classification
Height on shore: Upper shore
Wave exposure: Very Sheltered
Substratum: Muddy sand

Fauna	Obs.	Abundance
Echinogammarus marinus	2	O
Carcinus maenas	P	P
Littorina sp.	P	P

Total number of infauna species 4

Station description

Distance from the shore: 25m

Gammarids, littorinids, and *Carcinus maenas*, were numerous among the boulders and algae including *Fucus vesiculosus* which covered the muddy area 10 - 20 m from the top of the shore which was backed by a cobble ridge.

Biotope designation
Fucus vesiculosus on mid eulittoral mixed substrata (SLR.FvesX).

Muckros Strand

Station 1, Upper shore
MNCR habitat no. 21546 (529,31.1.)

Habitat classification
Height on shore: Upper Shore
Wave exposure: Very sheltered
Substratum: Muddy sand
Organic content: 2.5%

Granulometry

Component	%
mud	14.4
very fine sand	42.3
fine sand	25.8
medium sand	7.2
coarse sand	10.3

Fauna	Obs.	Core	Dig	Abundance
Hediste diversicolor	-	-	9	C
Heteromastus filiformis	-	1	-	P
Arenicola marina	P	1	-	P
Macoma balthica	-	1	-	P
Scrobicularia plana	-	1	1	C

Number fauna taxa: 5

Station description

Distance from shoreline: 30 m

At the edge of a channel, in soft mud at the bottom of a steep bank of boulders covered with *Fucus vesiculosus*. The anoxic layer was 2 mm below the surface. The substratum was composed of mud mixed with broken mussel shells and small stones.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Muckros Strand

Station 2, Mid shore
MNCR habitat no. 21547 (529,31.2)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 0.8%

Granulometry

Component	%
mud	2.6
very fine sand	67.3
fine sand	29.2
medium sand	0.9
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Orbiniida sp.	-	-	1	F
Heteromastus filiformis	-	1	7	C
Arenicola marina	C	2	1	C
Corophium volutator	O	4	-	O
Cerastoderma edule	-	2	-	F
Macoma balthica	C	6	-	F

Number fauna taxa: 5

Station description

Distance from shoreline: 450 m

On a flat, firm, rippled sandy plateau with standing water and an anoxic layer 1 cm below the surface. *Arenicola* casts were abundant (30 m^{-2}). There were abundant fine polychaete tubes. *Corophium* sp. were occasional with *Macoma balthica* spat frequent. Paired shells of *Cerastoderma edule* and *Mya arenaria* were occasional on the surface.

Biotope designation
Arenicola marina and bivalves in mid to lower shore muddy sand (LMS.AreBv).

Muckros Strand

Station 4, Mid shore, lower
MNCR habitat no. 21549 (529,31.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Orbinida indet.	-	1	F
Arenicola marina	C	1	C
Crangon crangon	F	-	F
Cerastoderma edule	-	1	F
Angulus tenuis	-	3	F
Macoma balthica	-	2	O

Number fauna taxa: 6

Station description

Distance from shoreline: 630m

Just north of a small side channel on the lower, middle shore on a sandy bank at the side of the channel. Plant detritus in dig. *Mya arenaria* shells on the surface with anaerobic layer 1 cm below. Shrimp (*Crangon crangon*) in channel.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Muckros Strand

Station 3, Lower shore
MNCR habitat no. 21548 (529,31.3)

Habitat classification
Height on shore: Lower shore
Wave exposure: Very sheltered
Other features Edge of river bank
Substratum: Sand
Organic content: 2.4%

Granulometry

Component	%
mud	5.6
very fine sand	59.5
fine sand	27.9
medium sand	2.6
coarse sand	4.4

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	-	2	P
Arenicola marina	C	1	2	C
Mysidae indet	-	1	-	O
Crangon crangon	F	2	-	F

Number fauna taxa: 4

Station description

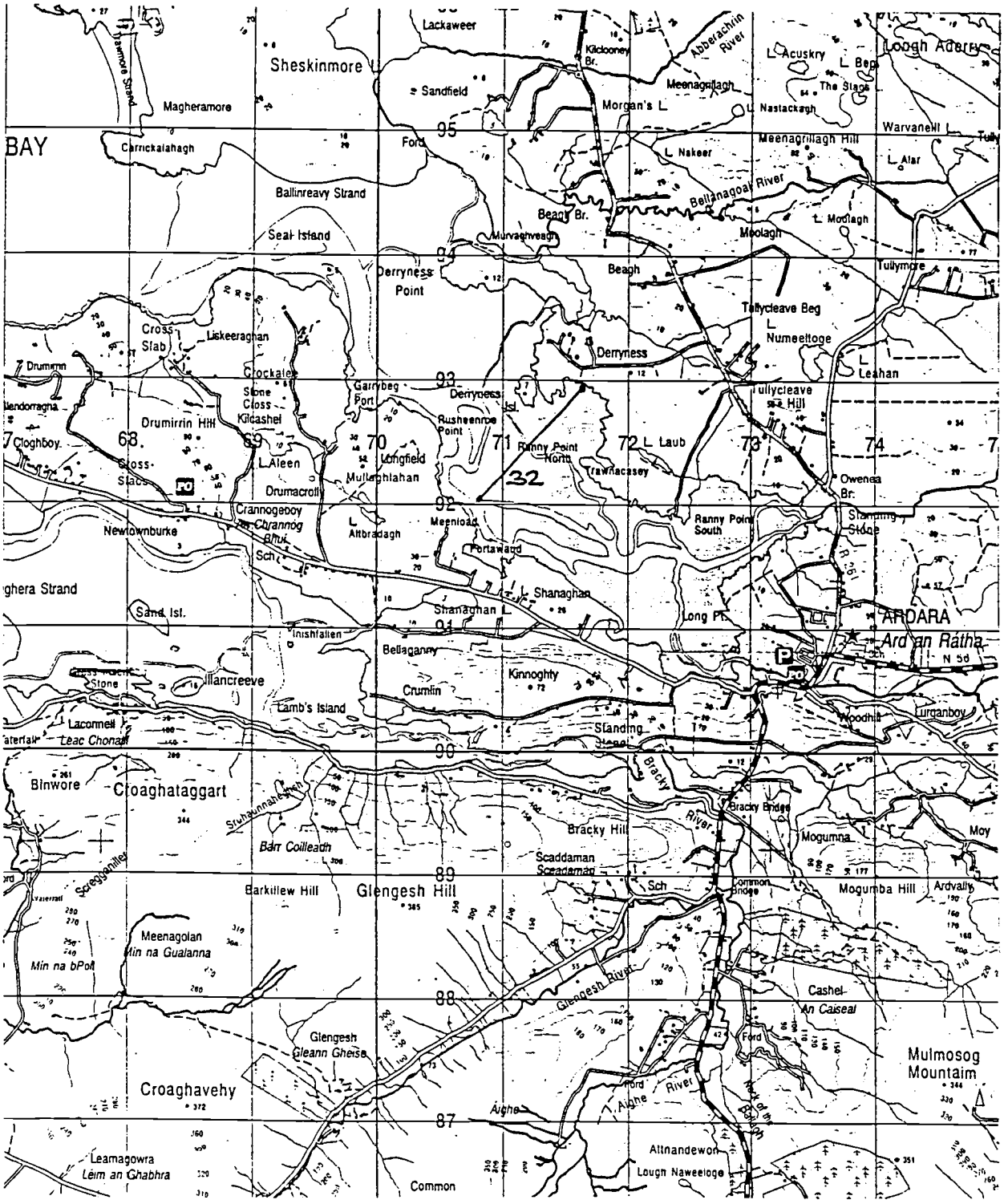
Distance from shoreline: 825m

Shore sloping quickly (dropped 1.5 m) over last 25 m to edge of main channel (river) approximately 200 m east of the east end of Ballyboyle Island. Sloping channel bank covered with *Enteromorpha.* Sediment firm, medium fine sand with anoxic layer at 1 cm. Clumps of *Fucus vesiculosus* in channel, and *Crangon crangon* and flounder. Not much evidence of sediment infauna at channel edge.

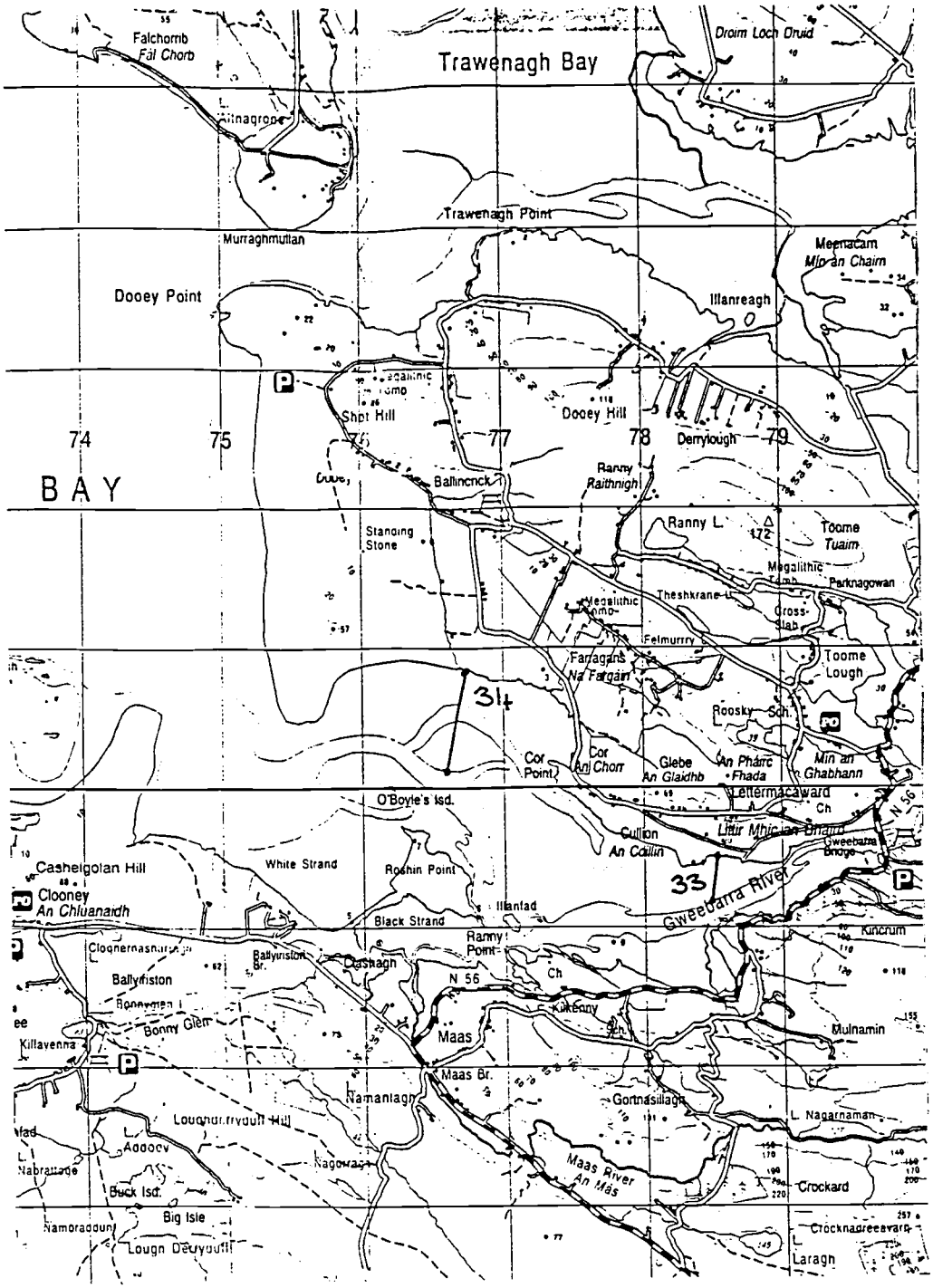
Biotope designation
Arenicola marina and *Nepthys hombergii* in mid to lower muddy sand shores (LMS.Are.Nhom*).

SURVEY AREA	**NORTH DONEGAL**
Site No. 32	Owentocker Estuary - Ardara
Site No. 33	Gweebarra Estuary - Inner
Site No. 34	Gweebarra Estuary - Outer

Site location map



Site location map



Site No. 32 Owentocker Estuary - Ardara

Field No. and Date: 961029 MNCR database site no. **10083**

Transect length: 1390 m Magnetic bearing: 230° Grid ref. start point: G 716 929

Site description

The site was located near the centre of the north-west facing estuary of the Owentocker and Owenea rivers on the north-west coast of Ireland. A transect was taken from a point on the northern shore of the estuary (G 716 929), at a magnetic bearing of 230°, extending out into the estuary over a sand flat to the main river channel on the far (south) side of the estuary, a distance of approximately 1.4 km. A narrow band of algae (*Fucus vesiculosus*, *Pelvetia canaliculata* and *Ascophyllum nodosum*) covered rocks and boulders at the top of the shore which was backed by grassland and a small copse. The firm, even, rippled, medium to coarse sand at the top of the shore was characterised by *Hediste diversicolor* and *Arenicola marina*. A narrow band of *A. nodosum* covered boulders was present at 225 m out from the strandline with the area 100 m either side of these rocks characterised by *Cerastoderma edule* (common to abundant) and abundant *Arenicola*. The transect crossed a shallow channel at 550 m with the firm rippled medium sand on the far (southern) side being characterised by *Arenicola* (common), *Nephtys* sp. (frequent) and *Angulus tenuis* (frequent). The transect crossed another shallow channel at 1 km after which the sand rose slightly to a flat plateau of well aerated, dry, rippled, coarse sand with occasional pools of shallow standing water. The plateau continued to the main channel and was characterised by occasional to frequent *Angulus tenuis* and *Nephtys* sp. and occasional *Arenicola* casts. A short bank fell approximately 0.75 m to a small, flat, rippled, water logged area at the edge of the main channel characterised by *Angulus tenuis*.

Owentocker

Station 6, Top of shore
MNCR habitat no. (529,32.6)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Sand, boulders, shingle.

Fauna	Obs.	Abundance
Echinogammarus marinus	F	F

Number fauna taxa: 1

Station description

Distance from the shoreline 0m and 200m

Amphipods in and under the algae *Pelvetia canaliculata*, *Fucus vesiculosus* and *Ascophyllum nodosum* on rocks at top of shore.

Biotope designation
Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX).

Owentocker

Station 1, Upper shore

MNCR habitat no. 21595 (529,32.1)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Hediste diversicolor	F	F
Scrobicularia plana	F	F
Arenicola marina	C	C
Hydrobia ulvae	F	F

Number fauna taxa: 4

Station description

Distance from the shore: 10m

Medium to coarse sand with a dark anaerobic layer at 1cm below surface. Layer of silt on surface. *Arenicola marina* common (10 - 99 m^{-2}). Small *Hydrobia* on surface in aerobic layer > 99 m^{-2}.

Biotope designation
Hediste diversicolor and *Scrobicularia plana* in reduced salinity sandy mud shores (LMU.HedScr).

Owentocker

Station 2, Mid shore, upper
MNCR habitat no. 21596 (529,32.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: San
Organic content: 1.0%

Granulometry

Component	%
mud	2.2
very fine sand	41.2
fine sand	50.2
medium sand	3.2
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	2	-	F
Arenicola marina	C	2	1	C
Echinogammarus marinus	F	-	-	F
Cerastoderma edule	-	35	8	A
Angulus tenuis	-	-	1	P
Mya arenaria	-	1	-	C

Number fauna taxa: 6

Station description

Distance from shoreline: 225 m

In the centre of a narrow band of rocks covered with *Ascophyllum nodosum*. Medium sand with a dark anaerobic zone 1 cm below the surface with a layer of silt on the surface. Occasional pools of standing water near the rocks. *Arenicola marina* casts (20 m^{-2}) common. *Cerastoderma edule*, mostly small, were abundant, with *Mya* sp., *Arenicola* and *Nephtys* sp. also present.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Owentocker

Station 3, Mid shore
MNCR habitat no.21597 (529,32.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Very sheltered
Substratum: Sand
Organic content: 1.1%

Granulometry

Component	%
mud	1.8
very fine sand	31.7
fine sand	59.0
medium sand	7.5
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	4	-	F
Nepthys cirrosa	-	2	1	F
Scoloplos armiger	-	3	-	C
Arenicola marina	C	1	-	C
Angulus tenuis	-	4	7	A

Total number of infauna species 5

Station description

Distance from the shore: 540m

Beside a shallow channel on firm, rippled, medium sand with an anaerobic zone 2 to 4 cm below the surface. A thin film of standing water covered the surface of the water logged sand. *Arenicola marina* casts were common on the surface.

Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

Owentocker

Station 4, Mid shore, lower
MNCR habitat no. 21598 (529,32.4)

Habitat classification
Height on shore: Lower mid shore
Wave exposure: Very sheltered
Substratum: Sand

Fauna	Obs.	Dig	Abundance
Nephtys hombergii	-	2	F
Arenicola marina	C	1	C
Angulus tenuis	-	3	F

Total number of infauna species 3

Station description

Distance from shoreline: 1100 m

On a slightly raised bank of dry, rippled, firm, coarse sand with an aerated layer extending of more than 20 cm below the surface. Occasional, shallow pools of standing water nearby. *Arenicola* casts were occasional on the surface with fine worm tubes in the ripples on the surface.

Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

Owentocker

Station 5, Lower shore
MNCR habitat no. 21599 (529,32.5)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Other features By channel (river) edge
Substratum: Sand
Organic content: 0.6%

Granulometry

Component	%
mud	0.1
very fine sand	29.4
fine sand	65.8
medium sand	4.7
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys cirrosa	-	2	1	F
Crangon crangon	F	-	-	F
Angulus tenuis	-	3	-	F
Bathyporeia sp.	-	-	1	P

Number fauna taxa: 4

Station description

Distance from shoreline: 1400 m

At the edge of the main channel, on a short, flat area of rippled, water logged, well aerated, coarse, darkish sand, approximately 0.75 m below the level of the sand plateau. The sand was aerated for more than 20 cm below the surface and there were occasional paired tellinid shells on the surface.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Site No. 33 Gweebarra Estuary, Inner

Field No. and Date: **961027** MNCR database site no. **10084**

Transect length: 270 m Magnetic bearing: 210° Grid ref. start point: B 777 995

Site description

The site was located in a shallow cove on the north shore of a narrow, west facing, estuary on the north-west coast of Ireland. The site was in the inner part of the estuary close to where the intertidal shore reduced considerably in area. A transect was taken from the top of the shore (B 777 995), at a magnetic bearing of 210 degrees across a very gradually sloping sand flat, which extended out to the edge of the main channel in the middle of the estuary. The cove was backed by grassland fringed by reeds. A band of large algae (*Fucus vesiculosus*, *Pelvetia canaliculata* and *Ascophyllum nodosum*) which covered boulders acting as coastal protection, gave way to a narrow band of cobbles and pebbles on firm, even, medium sand with occasional ripples. This area was characterised by abundant *Hediste diversicolor*, and *Arenicola marina* casts were common. The sediment was composed of medium fine sand with an anaerobic zone 5 mm below the surface. The mid shore was composed of medium sand with a 5 cm deep band of anaerobic sand 5 cm below the surface. The area was characterised by *Angulus tenuis* and *A. marina*. The lower shore was characterised by medium to coarse, well aerated sand with *A. tenuis* more common than on the mid shore. A thin film of standing water covered the whole site possibly due to the poor weather conditions on the day of surveying.

Inner Gweebarra

Station 1, Top of shore
MNCR habitat no. 21600 (529,33.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Very sheltered
Substratum: Boulders and cobbles

Fauna	Obs.	Abundance
Balanus sp	P	P
Echinogammarus stoerensis	C	C
Carcinus maenas	P	P
Littorina obtusata	P	P
Littorina saxatilis	P	P

Number fauna taxa: 5

Station description

Distance from shoreline: 0 m

The boulders at the top of the shore were covered in algae, *Pelvetia canaliculata*, *Fucus vesiculosus* and *Ascophyllum nodosum*. Amphipods were common, and *Littorina* species and *Carcinus maenas*, frequent under the algae and stones. *Balanus* sp. occasional on rocks.

Biotope designation
Ascophyllum nodosum on mid eulittoral mixed substrata (SLR.AscX).

Gweebarra Inner

Station 2, Upper shore
MNCR habitat no. 21601 (529,33.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Boulders, cobbles, gravel and sand

Fauna	Obs.	Dig	Abundance
Hediste diversicolor	-	5	F
Nephtys hombergii	-	2	F
Arenicola marina	C	3	C
Cerastoderma edule	-	1	F
Scrobicularia plana	-	1	P

Total number of infauna species 5

Station description

Distance from shoreline: 22 m

On a flat, occasionally rippled, firm, medium to fine sand with an anaerobic zone 5 mm below the surface. Dead *Scrobicularia plana* shells were frequent in the sediment. A thin film of standing water covered the surface. *Arenicola* casts were common (1-9 m^{-2}) and occasional paired valves of *Cerastoderma edule* were found on the surface. *Hediste diversicolor* were abundant (10-99 m^{-2}) in the dig with *Cerastoderma edule*, *Arenicola* and *Scrobicularia plana* present at densities of approximately 1- 5 m^{-2}.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Gweebarra Inner

Station 3, Mid shore
MNCR habitat no. 21602 (529,33.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 1.0%

Granulometry

Component	%
mud	4.9
very fine sand	52.9
fine sand	39.4
medium sand	2.8
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	P	3	-	F
Arenicola marina	C	-	-	C
Crangon crangon	-	-	1	P
Angulus tenuis	C	7	7	A

Number fauna taxa: 4

Station description

Distance from shoreline: 135 m

On firm, even, medium sand with a band of anaerobic sand 5 cm in depth, 5 cm below the surface. Occasional shallow pools of standing water with ripples on the bottom and occasional *Cerastoderma edule* shells on the surface. *Arenicola* casts common on the surface with fine worm tubes frequent in the sediment. *Angulus tenuis* abundant (20 m^{-2}) with *Nephtys* sp. present.

Biotope designation
Angulus tenuis, *Nepthys hombergii* and *Arenicola marina* in sandy shores (LGS.Nhom.Ang*).

Gweebarra Inner

Station 4, Lower shore
MNCR habitat no. 21603 (529,33.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Other features Edge of channel (river)
Substratum: Sand
Organic content: 0.9%

Granulometry

Component	%
mud	3.2
very fine sand	53.1
fine sand	40.0
medium sand	3.5
coarse sand	0.2

Fauna	Obs	Dig	Core	Abundance
Nephtys cirrosa	F	1	-	F
Haustorius arenarius	P	2	7	C
Angulus tenuis	A	18	11	A

Number fauna taxa: 3

Station description

Distance from shoreline: 270 m

At the edge of the channel at low tide, with brown river water in channel. Firm, rippled, medium to coarse, well aerated sand, 10 to 15 cm to the anaerobic zone. *Angulus tenuis* abundant ($40m^{-2}$) dig with *Nepthys* sp. and amphipods present at 1-5 m^{-2}.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).

Site No. 34 Outer Gweebarra Estuary

Field No. and Date: **961028** MNCR database site no. **10085**

Transect length: 770 m Magnetic bearing: 200° Grid ref. start point: G 767 008

Site description

The site was located in a shallow, south facing bay, in the outer part of a large, narrow north west facing estuary on the north-west coast of Ireland. The bay is backed by low grassland to the north, large sand dunes to the west (which protect the bay from the prevailing wind), and high ground with a rocky peninsula to the east. A transect was taken from the flat grassland at the top of the beach, at a magnetic bearing of 200°, across a sand flat, 770 m in width, to the main estuary channel. A short sandy beach at the top sloped gradually to rippled sand and an upper shore characterised by *Hediste diversicolor*. The transect crossed a shallow channel at mid shore and this area was characterised by *Arenicola*, *Cerastoderma edule* and *Angulus tenuis*. A thin film of standing water covered the upper and mid shores but the lower third of the shore was composed of well aerated, dry rippled sand with small or no infauna. A steep bank, approximately 1 m high, led down to the (river) channel. No infauna were found in the dark rippled sand at the edge of this channel.

Gweebarra Outer

Station 1, Top of shore
MNCR habitat no. 21604 (529,34.1)

Habitat classification
Height on shore: Top of shore
Wave exposure: Sheltered
Substratum: Sand

Fauna	Obs.	Abundance
Talitrus saltator	O	O

Number fauna taxa: 1

Station description

Distance from shoreline: 0 m

Talitrids under stranded *Fucus vesiculosus* on a gently sloping beach.

Biotope designation
Talitrid amphipods in decomposing seaweed on the strandline (LGS.Tal).

Gweebarra Outer

Station 2, Upper shore
MNCR habitat no. 21602 (529,34.2)

Habitat classification
Height on shore: Upper shore
Wave exposure: Sheltered
Substratum: Sand
Organic content: 0.8%

Granulometry

Component	%
mud	1.4
very fine sand	30.6
fine sand	47.3
medium sand	13.5
coarse sand	7.3

Fauna	Obs.	Dig	Core	Abundance
Hediste diversicolor	-	25	13	C
Corophium volutator	-	1	-	O
Arenicola marina	F	3	-	F
Scrobicularia. plana	F	-	-	F
Cerasteroderma edule	F	-	-	F
Crangon crangon	F	1	-	F

Number fauna taxa: 6

Station description

Distance from shoreline: 22 m

On flat, even, occasionally rippled, firm, medium to fine sand with an anaerobic zone 5 mm below the surface. Dead *Scrobicularia plana* shells were frequent in the sediment. A thin film of standing water covered the surface. *Arenicola* casts were common (1-9 m^{-2}) and occasional paired valves of *Cerastoderma edule* were found on the surface. *Hediste diversicolor* were common and *Cerastoderma edule*, *Arenicola* and *S. plana* present.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Gweebarra outer

Station 3, Mid shore
MNCR habitat no. 21606 (529,34.3)

Habitat classification
Height on shore: Mid shore
Wave exposure: Moderately exposed
Substratum: Sand
Organic content: 0.9%

Granulometry

Component	%
mud	2.6
very fine sand	57.7
fine sand	37.4
medium sand	2.3
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Nephtys hombergii	-	3	1	F
Arenicola marina	C	1	-	C
Crangon crangon	P	-	1	P
Hydrobia ulvae	C	-	6	C
Cerastoderma edule	-	40	6	A
Angulus tenuis	-	50	9	A
Macoma balthica	-	1	-	O

Number fauna taxa: 7

Station description

Distance from shoreline: 135 m

On firm, even, medium sand with a band of anaerobic sand 5 cm below the surface. Occasional shallow pools of standing water with ripples on the bottom and occasional *Cerastoderma edule* shells on the surface. *Arenicola* casts were common on the surface with fine worm tubes frequent in the sediment. *Angulus tenuis* common in the dig with *Nephtys hombergii* present.

Biotope designation
Polychaetes and *Cerasteroderma edule* in medium to fine sandy shores (LMS.PCer).

Gweebarra Outer

Station 4, Lower shore
MNCR habitat no. 21607 (529,34.4)

Habitat classification
Height on shore: Lower shore
Wave exposure: Sheltered
Substratum: Medium coarse sand
Organic content: 1.0%

Granulometry

Component	%
mud	2.4
very fine sand	49.9
fine sand	42.4
medium sand	5.0
coarse sand	0.0

Fauna	Obs.	Dig	Core	Abundance
Angulus tenuis	P	-	1	A
Amphipoda indet.	P	-	-	P
Nepthys indet.	P	-	1	F

Number fauna taxa: 3

Station description

Distance from shoreline: 270 m

At the edge of the channel at low tide, with brown river water in channel. Firm, rippled, well aerated sand, 10 to 15 cm to the anaerobic zone. *Angulus tenuis,* with *Nepthys* sp. and amphipods present.

Biotope designation
Burrowing amphipods, *Angulus tenuis* and *Nepthys cirrosa* in lower shore clean stable sand (LGS.AP.Ang).