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Littoral survey of Portland Harbour (Small Mouth Spit Area) 1994

A.J. Downie
Maritime Team
English Nature

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Distribution List

English Nature

Maritime NSST report collection	x2
Library	x5
Dorset LAT	x4
Roger Mitchell	

JNCC
Library
Keith Hiscock
MNCR Report Collection

SNH
Library
John Baxter

CCW
Library
Mandy Richards

DoE NI
Library
Bob Bleakley

Clive Askew, Shellfish Association of Great Britain
Rupert Best, Portland Port Limited
Don Moxton, Warden, Chesil & Fleet Nature Reserve
Dennis Seaward, Fleet Study Group
Peter Tinsley, Warden, Purbeck Marine Wildlife Reserve
Mark Whitley, Southern Sea Fisheries Committee

Introduction

In 1994 English Nature's Dorset LAT were asked by the Crown Estate Commission for comment on a consultation for a new shellfish farm site in Portland Harbour to grow Pacific Oysters. EN objected to the proposal because Portland is regarded as being of high scientific interest for its marine communities and species which are at least of National importance (Hiscock 1989). This has been further recognised by the Harbour's inclusion in the Portland & the Fleet Sensitive Marine Area (SMA) described by EN in 1993 (English Nature 1994). Also the Harbour shore as far down as MLW is designated as a Site of Special Scientific Interest (SSSI), mainly on the grounds of its geological interest (Appendix 1 - SSSI Citation).

English Nature initially objected to the proposal but later withdrew its objection following discussions with the applicant where a number of conditions were met and it was agreed that a baseline survey of the site would be undertaken to help resolve some of the issues.

English Nature agreed to undertake a modest baseline littoral survey of the proposed site.

Aims and Methods

The aim of the baseline survey was to describe the marine biological importance of the proposed shellfish farm site in Portland Harbour. Following discussions with a number of parties it was decided to undertake a transect of the site collecting cores for species i.d. and granulometric analysis. In addition it was agreed to take some general samples from the area.

The area covered was surveyed on 7th October 1994. The sampling was undertaken following standard MNCR methods (Hiscock 1990) and the information recorded onto MNCR recording forms. The single site was described on a 'Littoral site record' form which included details of the main physical features, a site profile and any conservation interest. Within each site, detailed biological records were collected from different habitats.

Infaunal species were sampled by taking four 0.01 m^2 core samples to a depth of 20 cm and washing the samples in a 0.5 mm sieve. Material retained on the sieve from all four cores was combined and preserved in formalin for subsequent identification. A smaller core sample was also collected for granulometric analysis.

Position information was gathered using a compass following the breakdown of the hand-held GPS. Unfortunately the camera also malfunctioned and no photographic record is available of this survey.

Laboratory and data analysis

Specimens collected during the survey were identified in the laboratory and the results added to the recording forms. Identification of sediment infauna was undertaken by Dr Peter Garwood (Identichaet, Newcastle) under contract to EN and the molluscan interest by Dennis Seaward. Animals were identified to species where possible, otherwise to genera or group. The number of infauna animals were recorded from the sediment samples as opposed to the semi-quantitative abundance data as recorded for the epifauna.

Sediment particle size distribution was determined to a standard granulometric scale (Wentworth 1922). A known weight of sample was puddled to remove the silt/clay fraction. All the sediment retained on the sieve was re-dried, sieved through a standard Wentworth series of sieves and each fraction weighed. The percentage of the total weight was calculated for each sediment fraction to provide grain size analysis to accompany the infaunal species data.

All site and habitat data were transferred to the MNCR computer database (Mills 1991).

Results

Site Information

A total of 16 habitat records were described from one transect consisting of 13 stations plus 3 additional stations. A list of the position information is given in Appendix 2.
Survey personnel are listed on page 6.

A total of 159 species and higher taxa groups were recorded. The species and higher taxa groups are listed in Table 1 (Appendix 3), which also shows the abundance of each per habitat.

End products

The following end-products were produced by the present survey:

- Survey report (entered onto MNCR d'base, published as an ENRR No. 146)
- Completed field data sheets (entered onto MNCR d'base and master copies held by EN's Maritime Team)
- Field, granulometric and infaunal sample data (entered onto MNCR d'base and master copies held by EN's Maritime Team)

0 Voucher specimens of animal species identified (held by EN's Dorset LAT, except for those of *A. cirrhosa* which are held by the Maritime Team)

Core sample results

A total of 112 species were identified from the 16 cores and a detailed breakdown of the number of species per core are listed in Table 2 (Appendix 4). The main area of interest derives from the Annelida.

The Annelida in the samples was represented by 61 species of Polychaeta and 3 of Oligochaeta. Of the oligochaete species, *Tubificoides benedenii* and *Tubificoides pseudogaster* are typical of areas of reduced salinity, and are common and widespread in such habitats. The *Grania* species is more typical of intertidal marine beaches. The number of polychaete species in the samples is impressive, although only about 15 species could be regarded as being abundant in any of the samples.

The numerically dominant species can be separated according to feeding types:

- sub-surface deposit feeders such as *Scoloplos armiger*, *Capitella capitata*, *Notomastus latericeus* and *Euclymene oerstedii*
- surface deposit feeders such as the *Spio* spp., *Pygospio elegans* and *Polydora quadrilobata*
- diatom feeders such as *Streptosyllis websteri* and *Exogone hebes*
- carnivores such as *Glycera tridactyla*
- species associated with algae such as *Platynereis dumerilii* and *Typosyllis* sp.

Of particular interest is the presence of small numbers of the Lagoon Sand Worm, *Armandia cirrhosa*. 7 specimens in total were recorded spread across the site (see Table 2, Appendix 4).

Additional information has been supplied by P. Garwood on the taxa found in the core samples (see Appendix 7).

Mollusc identification from transect survey sites

A total of 67 species were identified from the in-situ surveys of the 16 stations. Detailed breakdown of the number of species per station are listed in Appendix 4. A total of 32 species of mollusc, plus one unidentified gastropod, have been identified from this survey. Also notes of previous mollusc sampling on Sandsfoot Spit by Dennis Seaward have been provided for background information (Appendix 5).

Leptochiton asellus, is normally sublittoral, although also occurring in Fleet/Chesil Beach 'spring' seepages. The other chiton and most of the gastropods are restricted to the hard surfaces of stones, shells and remains of the pier, and to algae. Of these, *Rissoa lilacina* is western and local; *Calyptraea* is a Channel and S Wales native, probably introduced accidentally with oysters elsewhere; for *Epitonium clathrus*, this is only the second post 1950 record for the whole Portland S16 sea area of this normally sublittoral species. *Littorina*

littorea and both *Hinia* species, particularly *H. reticulata*, feed mainly in the surface layer of soft sediments; thus *H. reticulata* occurred in 14 of the 16 EN stations. All the other species in this group were encountered at 5 or fewer stations.

Of the bivalves, only *Mytilus* is from the hard areas, requiring anchorage for its byssus threads. All the others burrow to a greater or lesser extent (though sometimes only just covered) in soft sediments. Of the 16 EN stations, *Loripes* was found in all, *Lucinoma* in 12, and *Cerastoderma* in 14, the rest being found in 4 or fewer stations.

Granulometric analysis

The results of the analysis are listed in Table 3 (Appendix 6).

Biotope descriptions

No attempt has been made to try to provide detailed biotope descriptions as only one site was sampled and there was little difference across it, mainly a sandy substrate which was rippled in places with a covering of filamentous brown algae varying between < 20% - > 50%. However, shallow standing water was present throughout the site at the time of sampling but afterwards almost the whole area dried out. This effect of the 'double low tide' of Weymouth Bay upon the marine ecology has not been studied, but must be included as another factor in the interest and importance of the Portland Harbour soft sediment shores. A follow-up survey for this area is proposed for autumn 1995 which should add to the interest of this site.

Discussion

The presence of this variety of feeding types amongst the polychaetes in the beach indicates its heterogeneous nature, providing the habitats necessary for the different species. The sub-surface deposit feeders, which are generally fairly well distributed across the study area, rely on suitable organic material in the sediment, whilst the surface deposit feeders require suitable local hydrographic conditions to ensure a supply of food material. The diatom feeding syllid species are typical of rather stable, relatively clean sand, whilst the species associated with algae depend on suitable attachment sites for those algae.

The richness of the polychaete fauna depends in part on the presence of species which are at their northern limit on southern and western coasts of Britain - *Syllidia armata, Micronereis variegata, Nematonereis unicornis, Spio mecznikowianus, Euclymene oerstedii, Armandia cirrhosa* and *Oriopsis armandi*. The remaining species are essentially widespread around British coasts in suitable habitats.

Of particular interest is the presence of the Lagoon Sand Worm, *Armandia cirrhosa*. Little is known of the biology of this species and prior to this survey it was only known from a single site in the UK, Eight-Acre Pond, on the Hampshire coast. It was first recorded there in 1984

but has not been found there since the last record in 1990 (Fowler & Sheader 1992). It was believed to be extinct in Britain (Barnes 1994) until now. In addition to being located in Portland Harbour during this survey a single species has recently been found in the Fleet by another group of workers (Smith 1995). The occurrence of *Armandia* here in Portland Harbour and in the Fleet merits further investigation for both these areas and for a reappraisal of its original location of Eight-Acre Pond

The EN survey found 32 mollusc species. Earlier work listed in Appendix 5 adds a further 6 species recorded on the southern end of the Spit. Several of these, together with a few more from the Smallmouth spit to the south (e.g. *Pandora*, *Antalis* and two *Mangelia* species), are normally found sublittorally. Soft sediment bivalves account for 11 from the EN survey, previous work adding a further 5, making 16 bivalves known from the one site.

These two factors of 'sublittoralness' and extremely high bivalve diversity - albeit, or perhaps for related reasons, at generally low density - make it of considerable interest and confirm the conservation status of the site.

The particular exceptions to the low density are *Loripes* as elaborated earlier, and *Lucinoma*. The ecological importance of these species is indicated further by experiments showing that 'The activity of the symbiosis oxidises the sulphide in the sediment, which turns from black through grey and then becomes yellow as the iron in it becomes fully oxidised' (Southward & Southward 1992).

Southward and others of the Plymouth Marine Laboratory have included the Portland Harbour population of *Loripes* in their study of chemo-autotrophic symbiotic bacteria in bivalves where '...core sampling showed a high density of the bivalve *Loripes lucinalis*, which averaged 233 per square metre. Comparison with the rest of the infauna, mostly polychaete worms, showed that the bivalve could constitute as much as 43% of the biomass...', and the work has '...confirmed the hypothesis that particulate iron sulphide is the source of the energy used by the bacterial symbionts in this type of habitat. In both 1989 and 1990 the bivalves were more numerous in patches of sand where there were black accumulations of iron sulphide...' (Southward & Southward 1991).

General

Previous work has discussed the conservation status of this site (Howard et al 1988; Hiscock 1989; English Nature 1994) and this survey confirms this. For example the species list from this survey compares favourably well with previous records for this area namely for the Fleet Entrance site from the HRE Survey of Portland and Weymouth Harbours (Howard *et al.* 1988), Table 4 (Appendix 8).

Acknowledgements

Special acknowledgement goes to Dennis Seaward for providing information from his earlier work and his interpretation of the molluscan. Also thanks to Peter Garwood for his interpretation of the annelid data.

Thanks to Peter Tinsley (Purbeck Marine Wildlife Reserve) and Don Moxon (Chesil and Fleet Reserve) for their participation in the survey work.

Survey team for the 1994 survey

Alexander Downie	EN, Maritime NSST, Peterborough
Paul Knapman	EN, Maritime NSST, Peterborough
Victoria Copley	EN, Dorset LAT, Slepe Farm, Arne
Jonathon Cox	EN, Dorset LAT, Slepe Farm, Arne
Dennis Seaward	Fleet Study Group
Peter Tinsley	Warden, Purbeck Marine Wildlife Reserve
Don Moxon	Warden, Chesil & Fleet Nature Reserve

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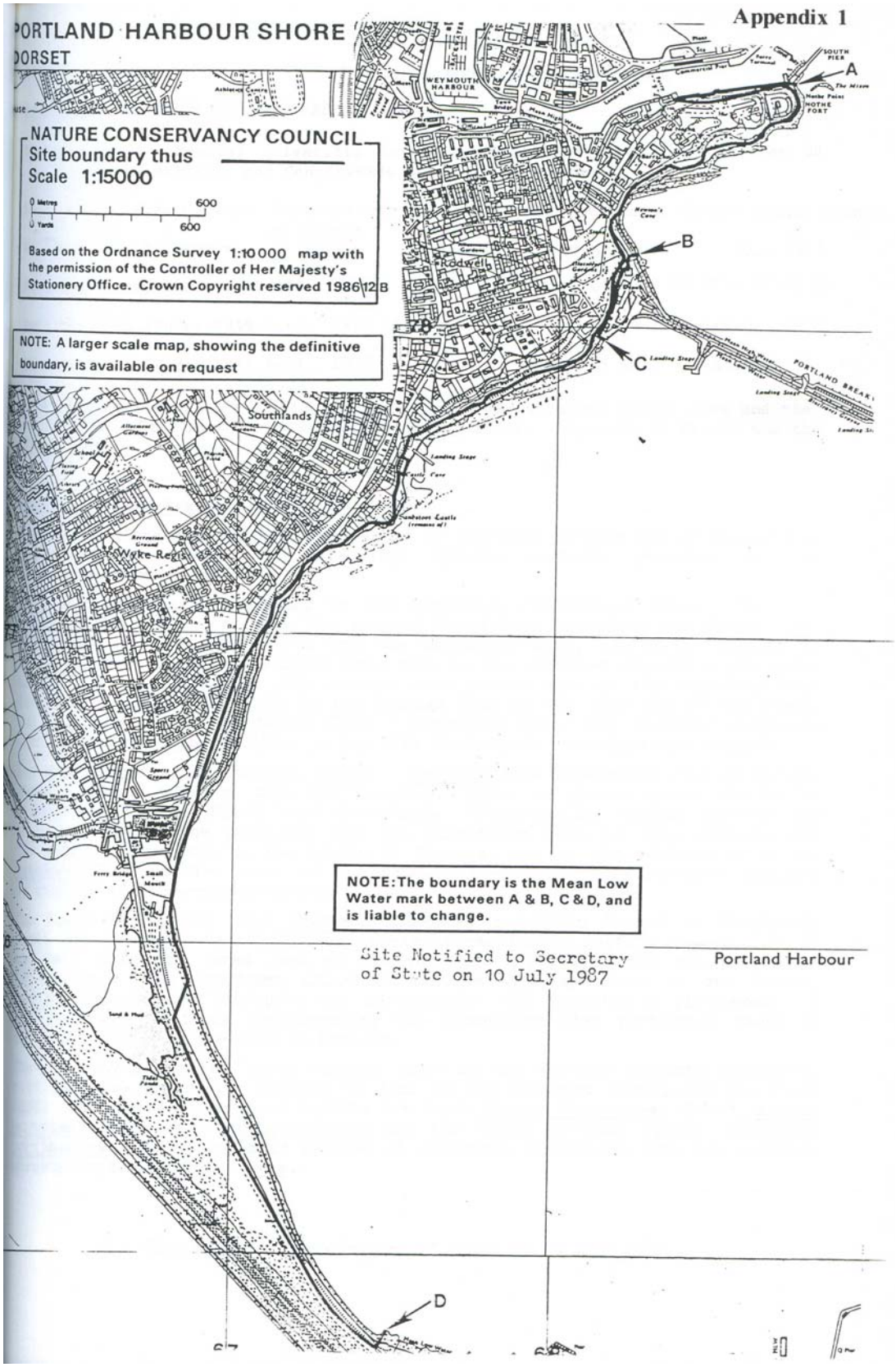
Appendix 1


PORTLAND HARBOUR SHORE
DORSET
NATURE CONSERVANCY COUNCIL
Site boundary thus
Scale 1:15000
0 Metres 600
0 Yards 600
Based on the Ordnance Survey 1:10000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1986
NOTE: A larger scale map, showing the definitive boundary, is available on request
WEYMOUTH HARBOUR
SOUTH PIER
Nothe Point
NOTHE FORT
Radwell
Southlands
Wyke Regis
PORTLAND BREAK
A
B
C
D
NOTE: The boundary is the Mean Low Water mark between A & B, C & D, and is liable to change.
Site Notified to Secretary of State on 10 July 1987
Portland Harbour

CITATION SHEET

COUNTY: DORSET SITE NAME: PORTLAND HARBOUR SHORE

DISTRICT: WEYMOUTH AND PORTLAND

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981(as amended)

Local Planning Authority: Weymouth and Portland Borough Council, Dorset County Counci

National Grid Reference: SY 675747 SY 683787 Area: 29.5 (ha) 72.9 (ac)

Ordnance Survey Sheet 1:50,000: 194 1:10,000: SY 67 NE & SY 67 SE

Date Notified (Under 1949 Act): 1972 (in part) Date of Last Revision: 1977

Date Notified (Under 1981 Act): 1987 Date of Last Revision:

Other Information: Part of site formerly known as Sandsfoot Castle Cove and the Nothe SSSI. Site amended by extension and deletion. Adjacent to Chesil and the Fleet SSSI.

Description and Reasons for Notification:

The cliffs along the north-western shore of Portland Harbour are of outstanding geological importance. The site also includes maritime grassland and the intertidal shore itself.

There are outstanding sections in the Corallian (Oxfordian) rocks. The site includes the type localities for several formations including the Nothe Clay, and Nothe Grit, Bencliff Grit and the Sandsfoot Clay, and Grit: several of which are more thickly developed here than in the standard section a few miles to the east at Osmington. The section here covers much of the Oxfordian time interval from the Nothe Grit to the Passage Beds at the very top of the stage, and exposure of the Sandsfoot Clay - Ringstead Coral Bed interval surpasses even that of the type section. A key site in Jurassic stratigraphic studies.

The site contains the thickest baylei - cymodoce Zone Kimmeridge Clay in Dorset. Above a clear junction with the Corallian Beds, an eleven metre section is visible up to the Black Head Siltstone. Historically, Waagen defined the boundary between the Corallian and the Kimmeridge Beds in this section, and the site is important as the source of Rasenia, and in the subdivision of the cymodoce Zone on the basis of its faunal assemblages. An historic locality in studies of Kimmeridgian strata.

The Lower Kimmeridge Clay (baylei, cymodoce, mutabilis Zones) of Smallmouth Sands has yielded one of the most varied Kimmeridgian reptile faunas. It is the best site for forms such as the turtles (4 species) and the pterosaurs (3 species). The specimens collected include type specimens of one turtle, two pterosaurs, one sauropod, one ichthyosaur, and possibly a plesiosaur. A key site with a fauna complementing the Kimmeridge Clay vertebrate fauna of the type section in the Isle of Purbeck.

The causeway along the south western shore of the Harbour supports extensive, rich maritime grassland, similar to that in the adjacent Chesil and the Fleet SSSI. Characteristic species include Sea Couch Elymus pycnanthus, Thrift Armeria maritima, Sand Sedge Carex arenaria and the local Portland Spurge Euphorbia portlandica. There are also patches of saltmarsh vegetation with the uncommon Shrubby Seablite Suaeda vera.

Site Notified to Secretary of State on 10 July 1987

Appendix 2

Date of survey	07/10/94
Time at start	13.00
Duration of survey	5 hrs 30 mins
Centre of site	050° 35' 10 N 002° 28' W

Position information for each station sampled -

Habitat no. 1	200° Castle 088° Breakwater
Habitat no. 2	180° Castle 094° Breakwater
Habitat no. 3	185° Castle 080° Breakwater
Habitat no. 4	192° Castle 085° Breakwater
Habitat no. 5	196° Castle 082° Breakwater
Habitat no. 6	194° Castle 084° Breakwater
Habitat no. 7	198° Castle 082° Breakwater
Habitat no. 8	196° Castle 082° Breakwater
Habitat no. 9	199° Castle 078° Breakwater
Habitat no. 10	203° Castle 072° Breakwater
Habitat no. 11	206° Castle 062° Breakwater
Habitat no. 12	204° Castle 070° Breakwater
Habitat no. 13	207° Castle 054° Breakwater
Habitat no. 14	205° Castle 066° Breakwater
Habitat no. 15	208° Castle 048° Breakwater
Habitat no. 16	210° Castle 036° Breakwater

Appendix 3 Table 1: Combined species list for the Portland Harbour Survey

	Habitat Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ACTINIARIA	-	P	-	-	-	P	-	-	-	-	-	-	C	A	S	S
Anemonia viridis	C	F	O	F	C	F	F	F	O	F	O	F	O	O	-	-
Cereus pedunculatus	-	-	-	-	-	-	-	-	-	-	-	F	F	F	C	A
NEMERTEA	P	P	-	P	C	-	A	-	P	C	P	P	P	P	P	P
Tubulanus polymorphus	P	-	-	P	-	-	A	P	-	-	-	-	-	-	-	-
Tetrastemma	-	C	-	-	-	-	F	-	-	-	-	-	-	-	-	-
Golfingiidae	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-
Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
Eteone flava	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
Eteone longa	-	-	-	-	P	-	-	-	-	-	-	-	-	-	P	-
Mysta picta	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anaitides groenlandica	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anaitides mucosa	P	C	P	-	P	-	P	-	P	A	P	-	-	P	P	-
Eumida bahusiensis	-	-	-	-	-	P	-	-	P	-	P	-	-	-	-	-
Glycera	-	-	-	P	-	-	P	P	-	-	P	-	-	-	-	P
Glycera tridactyla	P	A	A	-	A	A	A	A	A	A	P	A	P	-	P	-
Syllidia armata	P	F	-	-	-	P	-	P	-	-	-	-	-	-	-	-
Microphthalmus sczelkowii	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-
Typosyllis	P	-	-	-	P	-	P	C	C	C	C	C	C	-	-	-
Odontosyllis ctenostoma	C	-	-	P	-	P	P	-	-	-	-	-	-	-	-	-
Streptosyllis websteri	P	-	P	C	-	P	C	C	P	C	P	A	P	-	C	P
Exogoninae	C	P	-	C	P	P	-	-	P	C	P	F	-	-	-	-
Brania pusilla	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
Exogone hebes	A	C	F	C	C	C	C	C	C	C	C	C	C	A	C	A
Exogone naidina	P	C	-	-	P	P	P	-	-	-	-	P	-	-	-	-
Sphaerosyllis	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-
Micronereis variegata	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Platynereis dumerilii	A	A	-	A	-	P	-	P	P	-	-	-	-	P	-	C
Nephtys	-	-	-	-	-	P	-	P	-	-	P	-	-	-	-	-
Nephtys caeca	-	-	-	-	-	-	-	-	-	-	-	P	P	-	P	-
Nephtys cirrosa	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Nephtys hombergii	-	-	-	-	-	P	-	-	P	-	-	P	-	-	-	P
Nematonereis unicornis	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
Parougia	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
Scoloplos armiger	P	-	P	A	P	-	-	-	P	-	-	P	S	S	S	S
Paradoneis lyra	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spionidae	-	P	-	-	-	-	-	-	-	-	-	F	-	-	-	P
Aonides oxycephala	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malacoceros fuliginosus	-	-	-	P	-	-	-	-	-	-	-	-	P	P	-	-
Polydora quadrilobata	A	P	-	A	A	A	A	-	P	P	P	P	A	A	A	A
Prionospio malmgreni	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-
Pseudopolydora pulchra	P	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-
Pygospio elegans	C	-	-	C	C	C	C	P	F	C	C	C	C	P	C	P

Spio	A	C	C	P	C	C	C	A	A	A	A	A	A	A	A	A
Spio martinensis	-	-	C	P	-	P	F	-	P	-	-	F	C	F	-	P
Spio mecznikowianus	-	C	-	C	F	C	P	-	-	-	P	-	-	P	-	-
Spiophanes bombyx	-	-	-	-	-	-	-	P	-	-	P	P	P	-	-	-
Magelona filiformis	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-
Cirratulidae	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-
Caulleriella alata	P	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Chaetozone	-	-	-	P	-	-	P	P	P	-	-	P	P	-	-	-
Cirriformia tentaculata	P	A	-	A	-	-	-	-	-	-	-	-	-	-	-	-
Capitella capitata	A	C	P	C	C	A	C	C	P	C	C	C	C	C	A	A
Heteromastus filiformis	P	-	-	F	-	P	P	-	A	-	-	-	-	P	-	-
Notomastus latericeus	C	C	C	C	C	C	A	A	-	C	A	A	A	A	C	A
Arenicola marina	-	-	-	-	-	-	-	-	R	O	-	O	O	F	O	F
Maldanidae	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
Clymenella	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Clymenura	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	P
Euclymene oerstedii	A	A	A	A	A	A	A	A	P	P	P	A	A	A	A	A
Praxillella affinis	-	-	P	P	P	-	P	P	P	P	P	-	-	P	-	P
Armandia cirrhosa	-	F	-	-	-	P	-	P	-	-	-	-	-	-	-	P
Polyophthalmus pictus	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabellaria alveolata	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-
Lanice conchilega	F	-	F	-	C	C	O	P	C	F	O	F	F	F	O	R
Polycirrus	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
Oriopsis armandi	P	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabella pavonina	-	-	-	P	-	-	R	-	R	O	-	O	O	O	-	-
Pomatoceros lamarcki	-	-	-	-	F	-	-	-	-	-	-	-	O	-	-	-
Pomatoceros triqueter	-	P	-	C	-	-	-	P	-	-	-	-	-	-	O	-
Spirorbidae	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tubificoides benedii	C	C	-	C	-	P	-	-	-	P	-	-	-	-	-	-
Tubificoides pseudogaster	P	P	-	F	-	-	-	-	-	P	-	-	-	P	P	-
Grania	A	-	-	A	A	A	P	C	P	A	P	P	-	A	P	P
Chthamalus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-
OSTRACODA	-	P	-	C	-	-	-	F	C	C	-	C	-	F	-	-
GAMMARIDEA	C	A	-	A	P	P	-	-	P	P	P	P	-	P	-	C
Perioculodes longimanus	C	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-
Leucothoe incisa	-	-	-	P	-	-	P	-	C	P	C	F	-	-	-	P
Stenothoe monoculoides	C	C	-	C	-	-	-	-	-	-	P	-	P	P	-	P
Urothoe brevicornis	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Dexamine spinosa	P	P	P	P	P	-	-	-	-	-	P	-	-	-	P	-
Ampelisca brevicornis	-	-	-	-	-	-	-	-	P	-	-	P	-	P	-	-
Bathyporeia pelagica	-	-	P	-	-	-	-	-	-	C	C	P	-	P	-	-
Gammarella fucicola	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Melita hergensis	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ampithoe (Pleonexes) helleri	C	C	P	C	-	-	P	-	-	F	P	P	-	-	-	-
Microprotopus maculatus	C	F	P	C	F	C	C	C	C	C	C	P	C	C	C	C
Ericthonius punctatus	C	C	P	P	-	P	-	-	C	P	-	-	-	P	P	P
Microdeutopus anomalus	C	C	-	C	-	F	-	-	-	-	-	-	-	P	-	P
Corophium crassicorne	P	-	P	-	-	-	P	C	C	C	C	C	C	F	-	-
AMPHIPODA	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-

Caprella acanthifera	C	C	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Phtisica marina	C	C	P	F	P	P	-	P	C	P	C	P	P	C	C	C	
Pseudoparatanais batei	C	P	-	P	-	-	-	-	-	P	-	-	-	-	-	-	
Apseudes latreillii	-	C	-	-	-	P	-	-	-	-	F	P	-	C	P	C	
Cumopsis goodsiri	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	
Bodotria arenosa arenosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	
CARIDEA	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Crangon	-	-	-	O	-	-	-	-	-	-	-	-	-	O	-	-	
Crangon crangon	-	-	-	-	P	C	P	-	P	-	O	-	P	-	P	O	
Pagurus bernhardus	-	-	-	-	P	O	P	F	P	F	O	O	O	-	O	-	
Porcellana platycheles	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Macropodia rostrata	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pisa tetraodon	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	
Cancer pagurus	P	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	
Carcinus maenas	P	P	P	-	P	O	P	O	C	-	-	F	O	-	R	-	
Leptochiton asellus	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lepidochitona cinereus	-	-	-	R	P	-	O	-	O	-	-	-	-	-	-	-	
GASTROPODA	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	
Gibbula cineraria	C	-	-	F	-	O	-	-	-	-	-	-	-	-	-	-	
Gibbula umbilicalis	-	-	-	F	C	O	-	-	-	-	-	-	R	-	-	-	
Tricolia pullus	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Littorina littorea	-	-	-	F	-	F	O	O	-	-	-	-	-	R	-	-	
Littorina obtusata	-	-	-	F	-	-	-	-	-	-	-	-	-	-	-	-	
Littorina saxatilis	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rissoa lilacina	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rissoa parva	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pusillina inconspicua	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	
Bittium reticulatum	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	
Epitonium clathrus	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	
Calyptraea chinensis	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	
Crepidula fornicata	O	-	-	O	O	-	-	-	R	-	-	-	-	-	-	-	
Ocenebra erinacea	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	
Hinia incrassata	-	-	-	-	O	-	-	-	-	-	-	-	-	O	-	-	
Hinia reticulata	P	P	P	O	F	-	F	O	O	O	O	O	O	O	O	-	
Aeolidiella alderi	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mytilus edulis	-	P	-	-	-	-	-	-	-	P	-	-	-	-	-	O	
Loripes lucinalis	C	C	F	C	C	C	C	R	R	R	P	C	C	C	C	A	
Lucinoma borealis	R	-	-	A	P	R	A	P	-	A	-	C	A	A	P	C	
Parvicardium exiguum	-	P	-	-	-	-	-	-	P	-	-	P	P	-	-	-	
Cerastoderma edule	-	-	O	O	O	P	O	O	O	C	F	O	O	R	O	P	
Ensis	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	
Tellinidae	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	
Angulus tenuis	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	
Moerella donacina	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	
Dosinia lupinus	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	
Tapes decussatus	-	-	-	-	-	-	-	R	-	O	-	-	-	R	P	-	
Venerupis senegalensis	-	-	-	P	-	-	P	-	-	-	-	-	P	-	-	-	
Chamelea gallina	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	
Phoronis muelleri	-	-	-	-	-	-	-	-	-	-	-	P	C	C	P	P	

Asterina gibbosa	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphipholis squamata	-	S	-	P	-	-	-	O	-	-	-	-	-	-	-	-
Ophiura	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Phallusia mammillata	-	-	-	-	-	-	-	O	P	-	-	-	-	-	-	-
Botrylloides leachi	P	-	P	-	-	O	-	-	-	-	-	-	-	-	-	-
Gobius paganellus	-	P	-	-	-	-	-	-	P	-	-	-	-	O	-	-
Mastocarpus stellatus	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-
Ceramium	-	-	-	-	-	-	-	-	-	-	-	C	-	F	-	F
Laurencia hybrida	F	F	-	O	-	O	-	F	-	-	-	-	-	O	-	-
Ralfsia verrucosa	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-
Leathesia difformis	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Cutleria multifida	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Cladostephus spongiosus	-	F	-	F	-	-	-	O	-	O	-	-	-	-	-	-
Chorda filum	-	C	O	O	P	O	P	O	P	O	O	-	O	R	O	-
Fucus serratus	-	O	-	C	O	O	-	-	-	-	-	-	-	-	-	-
Sargassum muticum	-	P	P	-	-	O	-	O	-	R	-	-	-	-	-	-
Filamentous brown algae	O	O	O	S	A	A	S	C	S	C	C	A	S	F	C	F
Codium	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-

Abundance Key:

S	**Super Abundant**
A	**Abundant**
C	**Common**
F	**Frequent**
O	**Occasional**
R	**Rare**
P	**Present**

Appendix 4 Table 2: Core sample infauna results

MNCR Survey number 636

No.	MCS code	Species name	Habitat Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	D1131	Actinaria	0	2	0	0	0	1	0	0	0	0	0	0	3	26	42	69
2	D1158	Anemonia viridis	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
3	G0000	Nemertea	2	1	0	2	3	0	4	2	2	3	1	2	2	1	1	1
4	G0046	Tubulanus polymorphus	1	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0
5	G0154	Tetrastemma	0	6	0	0	0	0	3	0	0	0	0	0	0	0	0	0
6	N0006	Golfingiidae	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7	P0187	Sthenelais boa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	P0203	Eteone flava	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
9	P0205	Eteone longa	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
10	P0224	Mysta picta	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	P0253	Anaitides groenlandica	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	P0257	Anaitides mucosa	2	3	2	0	1	0	2	0	1	4	1	0	0	1	2	0
13	P0283	Eumida bahusiensis	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
14	P0471	Glycera	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	1
15	P0481	Glycera tridactyla	2	5	6	0	6	5	6	5	7	5	2	4	2	0	1	0
16	P0583	Syllidia armata	1	3	0	0	0	2	0	1	0	0	0	0	0	0	0	0
17	P0600	Microphthalmus sczelkowii	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
18	P0666	Typosyllis	1	0	0	0	1	0	1	5	4	22	30	6	7	0	0	0
19	P0698	Odontosyllis ctenostoma	7	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
20	P0723	Streptosyllis websteri	1	0	1	10	0	2	8	6	2	23	1	71	1	0	4	2
21	P0733	Exogoninae	14	2	0	4	1	1	0	0	1	4	2	3	0	0	0	0
22	P0737	Brania pusilla	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
23	P0744	Exogone hebes	48	5	3	15	35	21	25	14	15	12	5	13	23	43	31	53
24	P0745	Exogone naidina	2	4	0	0	1	2	1	0	0	0	0	1	0	0	0	0
25	P0750	Sphaerosyllis	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
26	P0820	Micronereis variegata	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
27	P0849	Platynereis dumerilii	8	16	0	5	0	2	0	1	2	0	0	0	0	1	0	3

28	P0867	Nephtys	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0
29	P0868	Nephtys caeca	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	0
30	P0870	Nephtys cirrosa	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
31	P0871	Nephtys hombergii	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1
32	P0991	Nematonereis unicornis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
33	P1096	Parougia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
34	P1152	Scoloplos armiger	2	0	1	3	2	0	0	0	1	0	0	1	4	7	4	10
35	P1183	Paradoneis lyra	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	P1225	Spionidae	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	1
37	P1227	Aonides oxycephala	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	P1257	Malacoceros fuliginosus	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0
39	P1287	Polydora quadrilobata	7	1	0	8	22	11	5	0	2	2	1	2	6	17	13	24
40	P1302	Prionospio malmgreni	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
41	P1312	Pseudopolydora pulchra	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
42	P1317	Pygospio elegans	5	0	0	6	10	10	29	2	3	14	17	8	5	2	4	1
43	P1333	Spio	116	6	13	2	36	18	11	66	47	53	63	65	135	149	132	93
44	P1337	Spio martinensis	0	0	4	1	0	2	3	0	1	0	0	3	21	3	0	1
45	P1338	Spio mecznikowianus	0	5	0	8	3	5	1	0	0	0	1	0	0	2	0	0
46	P1343	Spiophanes bombyx	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0
47	P1363	Magelona filiformis	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
48	P1392	Cirratulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
49	P1394	Caulleriella alata	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
50	P1402	Chaetozone	0	0	0	2	0	0	1	2	1	0	0	1	1	0	0	0
51	P1414	Cirriformia tentaculata	1	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0
52	P1531	Capitella capitata	130	22	2	28	5	48	28	4	2	4	6	20	10	19	75	47
53	P1553	Heteromastus filiformis	1	0	0	3	0	1	1	0	0	0	0	0	0	1	0	0
54	P1563	Notomastus latericeus	21	17	8	11	12	37	56	40	68	39	53	42	57	56	39	55
55	P1591	Maldanidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
56	P1617	Clymenella	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
57	P1623	Clymenura	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
58	P1633	Euclymene oerstedii	13	12	6	9	6	5	7	6	1	1	1	6	4	4	4	9
59	P1648	Praxillella affinis	0	0	1	1	2	0	2	1	1	1	2	0	0	1	0	2
60	P1712	Armandia cirrhosa	0	3	0	0	0	1	0	1	0	0	0	0	0	0	0	2

61	P1727	Polyophthalmus pictus	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
62	P2031	Lanice conchilega	1	0	0	0	0	0	2	2	0	1	0	0	0	0	1	0
63	P2117	Polycirrus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
64	P2233	Oriopsis armandi	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	P2261	Sabella pavonina	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
66	P2304	Pomatoceros triqueter	0	2	0	3	0	0	0	2	0	0	0	0	0	0	0	0
67	P2355	Spirorbidae	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	P2487	Tubificoides benedenii	13	14	0	31	0	1	0	0	0	2	0	0	0	0	0	0
69	P2489	Tubificoides pseudogaster	1	1	0	3	0	0	0	0	0	2	0	0	0	1	2	0
70	P2611	Grania	19	0	0	6	5	4	2	3	1	19	2	1	0	5	1	1
71	R3518	Ostracoda	0	1	0	6	0	0	0	3	10	9	0	4	0	3	0	0
72	S0167	Gammaridea	3	7	0	9	1	1	0	0	2	2	2	2	0	1	0	3
73	S0228	Perioculodes longimanus	6	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
74	S0313	Leucothoe incisa	0	0	0	2	0	0	1	0	4	2	4	3	0	0	0	1
75	S0371	Stenothoe monoculoides	4	5	0	5	0	0	0	0	0	0	1	0	2	2	0	1
76	S0428	Urothoe brevicornis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
77	S0690	Dexamine spinosa	1	1	1	1	1	0	0	0	0	0	1	0	0	0	1	0
78	S0710	Ampelisca brevicornis	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0
79	S0745	Bathyporeia pelagica	0	0	1	0	0	0	0	0	0	4	4	2	0	1	0	0
80	S0845	Gammarella fucicola	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	S0864	Melita hergensis	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	S0886	Ampithoe helleri	4	14	1	8	0	0	1	0	0	3	1	1	0	0	0	0
83	S0918	Microprotopus maculatus	7	3	1	10	3	5	4	6	6	6	12	2	5	13	18	13
84	S0944	Ericthonius punctatus	10	20	1	2	0	1	0	0	4	1	0	0	0	2	2	1
85	S0996	Microdeutopus anomalus	4	22	0	7	0	3	0	0	0	0	0	0	0	2	0	2
86	S1023	Corophium crassicorne	1	0	2	0	0	0	2	6	15	11	38	18	11	3	0	0
87	S1072	Caprella acanthifera	4	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0
88	S1096	Phtisica marina	11	8	1	3	2	1	0	2	8	1	9	2	2	11	7	7
89	S1921	Pseudoparatanais batei	4	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0
90	S1977	Apseudes latreillii	0	9	0	0	0	1	0	0	0	0	3	2	0	10	1	4
91	S1988	Cumopsis goodsiri	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
92	S2000	Bodotria arenosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
93	S2169	Caridea	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

94	S2331	Crangon crangon	0	0	0	0	1	3	0	0	0	0	1	0	1	0	1	0
95	S2690	Carcinus maenas	1	1	0	0	1	0	2	0	1	0	0	0	0	0	0	0
96	W0074	Lepidochitona cinereus	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
97	W0092	Gastropoda	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
98	W0726	Crepidula fornicata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	W0889	Hinia reticulata	1	1	0	0	0	0	2	1	2	0	0	1	0	0	0	0
100	W1650	Mytilus edulis	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0
101	W1834	Loripes lucinalis	9	5	3	10	5	7	8	0	2	2	1	8	12	9	16	23
102	W1842	Lucinoma borealis	2	0	0	5	1	2	7	1	0	5	0	3	5	8	1	3
103	W1975	Parvicardium exiguum	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0
104	W1991	Cerastoderma edule	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
105	W2022	Ensis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
106	W2046	Angulus tenuis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
107	W2164	Dosinia lupinus	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
108	W2171	Tapes decussatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
109	W2185	Venerupis senegalensis	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
110	ZA005	Phoronis muelleri	0	0	0	0	0	0	0	0	0	0	0	1	4	8	2	1
111	ZB300	Amphipholis squamata	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0
112	ZB311	Ophiura	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Appendix 5

Notes by Dennis Seaward of previous sampling on Sandsfoot Spit.

18 February 1984 D.R. Seaward

Transect of 7 stations along line of lower shore from NGR 671768 to near end of old pier at 674762, see air photograph 114 of 5/6/1993.

Hinia incrassata	1/7 stations
Loripes lucinalis	7/7
Ensis ensis	1/7

2 March 1987, D.R. Seaward and others

Transect of 13 stations along same line as last; 3 further stations from station 13 towards shore.

Hinia reticulata	4/16 stations
Loripes lucinalis	10/16, up to 18.5 mm
Cerastoderma edule	3/16
Fabulina fabula	1/16
Chamelea gallina	2/16

18 March 1988

Random trowel sampling over much of sand spit, showing *Loripes lucinalis* present in most.

9 August 1994, D.R. Seaward and Victoria Copley

On sandbank near ELWST just north of end of old pier (674762), random 'forkfulls' equivalent to total of c. 1 m x 1 m, sieved 10 mm.

Loripes lucinalis	12
Cerastoderma edule	4
Lutraria lutraria	1 (dug by bait digger - seldom found except by deep digging, although fresh shells occasional)
Angulus squalidus	1
Angulus tenuis	1
Chamelea gallina	2

Other species recorded on Sandsfoot Spit

(See Seaward, 1987, Mar Moll Portland Harbour, Dorset Procs, 108: 162-166)

Retusa truncatula
Venus verrucosa
Corbula gibba

Appendix 6 Table 3: Portland harbour granulometric results

		1.1	1.1(%)	1.2	1.2(%)	1.3	1.3(%)	1.4	1.4(%)	1.5	1.5(5)	1.6	1.6(%)
V. coarse sand	1-2mm	2.6851	5.41%	2.2650	4.53%	0.3254	0.65%	1.6490	3.30%	1.1597	2.32%	1.5377	3.08%
Coarse sand	0.5-1.0mm	1.9910	4.01%	1.8462	3.69%	0.5143	1.03%	1.7038	3.41%	1.4930	2.99%	1.9274	3.86%
Medium sand	0.25-0.5mm	12.1840	24.54%	17.6915	35.36%	15.5212	31.05%	15.7246	31.47%	15.7754	31.58%	13.4035	26.82%
Fine sand	0.125-0.25mm	32.1482	64.75%	26.5785	53.12%	33.1295	66.28%	30.1190	60.28%	30.7114	61.47%	32.0175	64.06%
V. fine sand	0.063-0.125mm	0.4724	0.95%	1.3676	2.73%	0.4303	0.86%	0.6364	1.27%	0.7084	1.42%	0.9950	1.99%
Silt & clay	<0.063mm	0.1670	0.34%	0.2887	0.58%	0.0616	0.12%	0.1354	0.27%	0.1124	0.22%	0.0981	0.20%
	TOTAL	49.6477	100.00%	50.0375	100.00%	49.9823	100.00%	49.9682	100.00%	49.9603	100.00%	49.9792	100.00%

		1.7	1.7(%)	1.8	1.8(%)	1.9	1.9(%)	1.10	1.10(%)	1.11	1..1(%)	1.12	1.12(%)
V. coarse sand	1-2mm	1.0235	2.05%	0.8143	1.63%	0.7636	1.53%	1.1461	2.29%	1.3717	2.74%	1.3448	2.69%
Coarse sand	0.5-1.0mm	1.3771	2.76%	1.4028	2.81%	1.0791	2.16%	1.5349	3.07%	2.0307	4.06%	2.0402	4.08%
Medium sand	0.25-0.5mm	13.4112	26.84%	12.2423	24.50%	9.0444	18.10%	14.7502	29.51%	15.7919	31.60%	13.4345	26.88%
Fine sand	0.125-0.25mm	33.1864	66.42%	34.7017	69.45%	38.3442	76.72%	31.8694	63.77%	30.1860	60.39%	32.4631	64.96%
V. fine sand	0.063-0.125mm	0.8167	1.63%	0.6913	1.38%	0.6461	1.29%	0.6031	1.21%	0.5375	1.08%	0.6220	1.24%
Silt & clay	<0.063mm	0.146	0.29%	0.1165	0.23%	0.0993	0.20%	0.0725	0.15%	0.0641	0.13%	0.0661	0.13%
	TOTAL	49.9609	100.00%	49.9689	100.00%	49.9767	100.00%	49.9762	100.00%	49.9819	100.00%	49.9707	100.00%

		1.13	1.13(%)	1.14	1.14(%)	1.15	1.15(%)	1.16	1.16(%)
V. coarse sand	1-2mm	1.068	2.14%	1.1081	2.22%	0.9294	1.86%	0.5358	1.07%
Coarse sand	0.5-1.0mm	1.2834	2.57%	1.5955	3.20%	1.6234	3.26%	1.0069	2.02%
Medium sand	0.25-0.5mm	11.5007	23.03%	12.7424	25.52%	13.462	26.99%	11.3954	22.82%
Fine sand	0.125-0.25mm	35.3317	70.76%	33.8145	67.72%	33.0241	66.22%	36.2176	72.51%
V. fine sand	0.063-0.125mm	0.6516	1.31%	0.5732	1.15%	0.7284	1.46%	0.6704	1.34%
Silt & clay	<0.063mm	0.0933	0.19%	0.0992	0.20%	0.1023	0.21%	0.1202	0.24%
	TOTAL	49.9287	100.00%	49.9329	100.00%	49.8696	100.00%	49.9463	100.00%

Appendix 7 Notes from P. Garwood on specimens recorded in core samples.

Actinaria:
A species of anemone which attaches to stones, shells etc., but which has not been identified.

Nemertea:
More than one species of unidentified nemertean is included in this category.

Tetrastemma:
A species of this genus, with a small pigment patch between the 2 pairs of eyes. It may be *Tetrastemma coronatum* (Quatrefages, 1846), but it is difficult to be certain with preserved material.

Golfingiidae:
Two small specimens of a species of this family, which could not be further identified with any confidence.

Glycera:
Several incomplete and damaged specimens belonging to a distinct but unidentified species of this genus. The species is characterised by the presence of retractile gills on the anterior face of parapodia (only rarely extended), with a pair of pointed pre-chaetal lobes and a pair of more or less rounded post-chaetal lobes, of which the dorsal one is slightly longer.

Typosyllis:
This species is characterised by relatively long dorsal cirri with 15 or more articles, chaetae including both bidentate falcigers with short blades and long bladed compound chaetae with slightly knobbed tips, and distinctive acicula in post-proventricular segments. Due to the currently very confused state of the taxonomy of species of this genus (which should not be separated from the genus *Syllis*), it is not possible to give this taxon even a tentative name.

Exogoninae:
Parapionosyllis minuta (Pierantoni, 1903).

Sphaerosyllis:
Sphaerosyllis taylori Perkins, 1981.

Nephtys:
Small, and/or poorly preserved specimens, which can not be identified further.

Parougia:
A single incomplete specimen of this genus.

Spionidae:
Juveniles of species of this family.

Prionospio malmgreni:
This should more correctly be called *Prionospio fallax* Soderstrom, 1920 (see Sigvaldadottir & Mackie, 1993; Sarsi 78: 203-219.)

Spio:
This species is distinct from *Spio decorata, S. filicornis* and *S. martinensis*, but there remains some doubt as to wha its correct name should be. It may well be *Spio theeli* (Soderstrom, 1920).

Cirratulidae:
Unidentified members of this family.

Chaetozone:

A distinct species of this genus, to be described by Woodham & Chambers in the Proceedings of the International Polychaete Conference held in France two years ago.

Maldanidae:

Unidentified fragment not belonging to any of the other species encountered.

Clymenella:

Fragments of a species of this genus, without a head or pygidium.

Clymenura:

A species of this genus, with the characteristic ventricular glandular area on setiger 8, but lacking a cephalic plate.

Polycirrus:

An incomplete specimen, clearly belonging to this genus.

Spirorbidae:

Two specimens out of their tubes.

Grania:

All the specimens belong to a single un-named species of this genus.

Ostracoda:

All specimens belong to a single un-named species.

Gammaridea:

This category includes all specimens of gammaridean amphipods which were unidentifiable, generally due to being very small and/or incomplete.

Caridea:

A single unidentified specimen.

Gastropoda:

Small specimens lacking shells.

Ensis:

A single fragment of an unknown species.

Ophiura:

A single unidentified juvenile.

Appendix 8

Table 4: Species list from HRE survey of Portland and Weymouth Harbour 1988 site no. 10 - Fleet Entrance [SY 667 763].

PORIFERA	Leucosolenia botryoides
	Scypha ciliata
	Halichondria bowerbanki
	Halichondria panicea
	Esperiopsis fucorum
	Dysidea fragilis
CNIDARIA	Tubularia indivisa
	Tubularia larynx
	Plumularia setacea
	Sertularia argentea
	Sertularia cupressina
	Obelia longissima
	Obelia plicata
	Anemonia viridis
	Urticina felina
	Sagartia elegans
	Cereus pedunculatus
	Sagartiogeton laceratus
	Sagartiogeton undatus
	Hormathia coronata
ANNELIDA	Eupolymnia nebulosa
	Lanice conchilega
	Branchiomma bombyx
	Sabella pavonina
	Pomatoceros
CRUSTACEA	Cirripedia indet.
	Balanus crenatus
	Palaemon serratus
	Pagurus bernhardus
	Galathea squamifera
	Macropodia deflexa
	Liocarcinus depurator
	Carcinus maenas
MOLLUSCA	Calliostoma zizyphinum
	Crepidula fornicata
	Hinia reticulata
	Elysia viridis
	Onchidoris bilamellata
	Archidoris pseudoargus
	Aeolidia papillosa
BRYOZOA	Bugula plumosa
ECHINODERMATA	Asterina gibbosa
TUNICATA	Polyclinum aurantium

	Didemnidae
	Didemnum gelatinosum
	Didemnum maculosum
	Diplosoma listerianum
	Ciona intestinalis
	Ascidiella aspersa
	Ascidia mentula
	Phallusia mammillata
	Styela clava
	Dendrodoa grossularia
	Botryllus schlosseri
	Botrylloides leachi
OSTEICHTHYES	Callionymus lyra
	Gobius niger
	Gobiusculus flavescens
	Pleuronectes platessa
RHODOPHYCOTA	Scinaia forcellata
	Palmaria palmata
	Dumontia contorta
	Gracilaria verrucosa
	Calliblepharis ciliata
	Rhodophyllis divaricata
	Chylocladia verticillata
	Lomentaria clavellosa
	Antithamnion cruciatum
	Antithamnionella spirographidis
	Ceramium nodulosum
	Griffithsia corallinoides
	Griffithsia flosculosa
	Polysiphonia
	Polysiphonia fucoides
	Rhodomela confervoides
CHROMOPHYCOTA	Ectocarpaceae
	Cladostephus spongiosus
	Laminaria saccharina
	Sargassum muticum
	Cystoseira baccata
CHLOROPHYCOTA	Enteromorpha
	Cladophora pygmaea
	Codium