THE IMPOVERISHED FAUNA OF THE DEEP WATER CHANNEL AND MARGINAL AREAS BETWEEN FLATHOLM ISLAND AND KING ROAD, SEVERN ESTUARY.

R. WARWICK¹, P.A. HENDERSON², J.M. FLEMING² AND J.R. SOMES²

AUGUST 2001

¹PLYMOUTH MARINE LABORATORY PROSPECT PLACE WEST HOE PLYMOUTH PL1 3DH

RMW@PML.AC.UK PHONE 44(0)1752 633428 Fax 44(0)1752 633101

²Pisces Conservation Ltd IRC House The Square Pennington Lymington SO41 8GN England

 Pisces@irchouse.demon.co.uk

 www.irchouse.demon.co.uk

 Phone
 44 (0) 1590 676622

 Fax
 44 (0) 1590 675599

SUMMARY

The results of a survey of the benthic fauna of the deep-water channel of the Severn Estuary between Flatholm Island and King Road are presented. Quantitative samples were collected with a grab and the abundance of all animals retained by a 0.5 mm sieve was estimated. Using these data in conjunction with previous studies listed in the text the following conclusions were reached.

- The deep channel of the Severn Estuary has an extraordinarily impoverished fauna and 22 of the 62 grab samples taken held no animals. The sandy substrata were particularly impoverished. The total number of infaunal species at 13 stations with a sand substrate was only 5, which between them only comprised 18 individuals. At any one station with a sand substrate, the maximum number of infaunal species was 2 (**Figure 1**) represented by 4 individuals.
- The worm *Sabellaria alveolata* was the most abundant benthic animal in the survey area. This species was found in 17 grab samples taken from hard bottom areas in and immediately adjacent to the deep channel between the Bristol Deep and the Holm Islands. *Sabellaria* was found in varying abundance, ranging from individual worms in single or multiple tubes encrusting on the surface of pebbles to a maximum of 45 worms within a clump of *Sabellaria* reef. Ten further samples contained encrusting tubes or small fragments of reef, but with no evidence of live worms.
- There are two patches of *Sabellaria* reef in the study area (**Figure 2**). Compared with *Sabellaria* reefs situated further to seaward in the Bristol Channel and in other parts of the British Isles the fauna of these reefs is extremely impoverished. The maximum number of species recorded at a station supporting *Sabellaria* reef in the present study was only 16 (**Figure 1**). Compared with *Sabellaria* reefs situated further to seaward in the Bristol Channel and in other parts of the British Isles the fauna of these reefs is extremely impoverished. For example, littoral reef at Duckpool, North Cornwall, was found to hold 45 species. Published accounts of sub-littoral *Sabellaria* reef in the Wash and Bristol Channel record the presence of 87 and 100 species, respectively.
- The area does not support populations of animals with special adaptations for the conditions in the Severn Estuary. The fauna only comprises widely distributed marine forms that are abundant elsewhere in a variety of habitats. The study area does not hold an estuarine community.

INTRODUCTION

As part of an investigation into the ecology of the subtidal region of the Severn Estuary between King Road and the Island of Flatholm, the Bristol Port Company commissioned a grab survey to be undertaken in May 2001. The primary objective of this survey was to quantify the species richness and abundance of the benthic community within the deep water channel and the adjacent habitat. A particular aim of the study was to acquire further knowledge on the abundance and distribution of *Sabellaria* reef and its associated biota. The survey was planned to include areas covered by previous surveys to both check that the ecology has not greatly changed and to extend our knowledge of the region.

METHODS

Grab sampling was undertaken between the 14th and 16th of May 2001 in the Severn Estuary in the region between King Road and Flatholm Island (**Figure 1**). Sampling transects of 3, 4 or 5 stations were set at 5km intervals along the deep water channel. Further individual sample stations were chosen at 1km intervals between the main transects. In addition to the channel surveys, a small number of samples were collected at stations outside the main channel. Bad weather prevented the collection of these extra samples from the full length of the channel; however, it was possible to sample a number of sites on the Welsh (northwestern) side of the channel. Station position fixing was by GPS. A map of the region showing the position of the sampling stations is shown in **Figure 1** and the co-ordinates of the sampling stations are listed in **Table 1**.

Samples were collected using a 0.1m^2 Day grab, which takes a semi-cylindrical bite from the seabed with an area of 300 by 330 mm. The penetration, and hence the volume of the sample, varies according to the composition and compactness of the substrate. Two grab samples were collected from each station. On being brought aboard, the grab was checked to ensure that it had deployed correctly; if this was not the case the sample was repeated. In instances where a stone had prevented the jaws of the grab from closing properly, grabbing was repeated until a valid sample was obtained. At certain stations, particularly at the western end of the channel, the grab repeatedly came up completely empty, when this occurred it was assumed that the substrate was bare rock.

Samples were inspected visually, and then emptied in to a plastic tray, a photograph was taken and general features of the composition including the presence of mud, shell debris, organic matter or pieces of *Sabellaria* reef were noted. Any *Sabellaria* present was removed and preserved separately, as were any large stones. The presence of any encrusting organisms was recorded. The remaining sample was then washed through a 0.5mm sieve and the retained material preserved by the addition of 40% formaldehyde solution with 1% Rose Bengal. Generally, the sand fraction of the sample would pass easily through the 0.5mm sieve. However, towards the eastern end of the channel, the grain size was larger. This occasionally resulted in a sample not

being sieved completely before the collection of the next sample was due. In these instances, the entire bulk of the sample was preserved for processing later.

The samples were quantitatively sorted, and all organisms extracted and preserved in formaldehyde. Any *Sabellaria* reef was dabbed dry and weighed, to provide an estimate of the quantity present. The animals in the samples were identified to species and counted. Where possible, actual numbers per sample were obtained, but it is not possible to quantify colonial epifaunal organisms such as hydroids and bryozoans, and so they were recorded as present or absent. It was also found impossible to identify to species the encrusting sponge (only one species found) or the anemones (2 species found) from preserved samples. The number of *Sabellaria* individuals in the samples could not be fully quantified when large chunks of reef were present in the grab samples. However, the relative amount of *Sabellaria* reef present could be inferred from the weight of reef in each sample.

No comparative data were available from the intertidal *S. alveolata* reefs, and so samples were collected from the 'classic' site at Duckpool on the North Cornish coast (Wilson, 1971) on 24 June 2001 (see **Plate 4**). Fragments of reef were removed from the rock surface at low tide with a hammer and chisel, sufficient to loosely fill four 1-litre containers. The four samples were all taken in the same location, spaced haphazardly about 10m apart. A few large conspicuous animals (e.g. anemones, limpets) were also collected by hand from the same location. The samples were preserved in 10% formalin and subsequently treated in the laboratory in the same way as the subtidal Severn Estuary samples (see above).

RESULTS

From inspection of the grab samples there are 2 main substrates along the deep channel, and the transition between the two occurs around the 'elbow' in the channel roughly north of Weston-Super-Mare (**Figure 1**). To the east of this point, there is a predominantly sand substrate, occasionally overlaid by mud, with shingle, coal particles and shell fragments in places. There appears to be a gradient in the size of sand grains along this section of the channel, with the coarser sand occurring at the eastern end. South-west of the 'elbow' in the channel, the substrate becomes predominantly bedrock, with cobbles and pebbles. **Plates 1-3** show photographs of the contents of selected examples of the contents of the grabs.

The species and the number of individuals recorded from each grab are presented in **Table 2**. The two grab samples at each station are labelled a and b. The two samples from each station showed a high level of consistency in species richness and animal abundance, which demonstrates a high level of sampling precision and suggests that the samples reliably reflected the benthic community of the stations. The maximum of 13 benthic species per 0.1 m^2 sample was found. The maximum number of individuals was only 51 per 0.1 m^2 . A total of 22 of the 62 samples taken were found to hold no benthic animals large enough to be retained by a 0.5 mm sieve. *Sabellaria alveolata* was the commonest benthic animal and was most prevalent in the western section of the channel (**Figure 2**).

The amount of *Sabellaria* tube in the grab samples varied from lumps of reef (maximum of 2338 g) towards the north-east end of the study area (Stations 9, 32 and 33) to fragments and encrustations on pebbles further south-west towards the islands of Flatholm and Steepholm. *Sabellaria* reef was also encountered at 2 stations (21 and 22) in the eastern section of the channel, but was otherwise absent from that section of the study area. The quantity of *Sabellaria* tubes obtained in each sample is given in **Table 3**. The most animal rich samples were collected from stations 21, 22 and 32, 33, in regions of well-developed *Sabellaria* reef (**Figure 2**).

There is some evidence that *Sabellaria alveolata* tube concretions provide a habitat for other species. The polychaete *Eulalia tripuctata* was found living inside unoccupied *Sabellaria* tubes. The small sipunculan *Nephasoma minutum* (formerly *Golfingia minuta*) was also found buried in the tube matrix. Sponges, hydroids and bryozoans were also found attached to the matrix, as well as on stones.

The animals sampled mostly comprised small juveniles, but there was some evidence of breeding in a few species. The adults of the ascidian *Dendrodoa grossularia* frequently contained tadpole larvae and a female with ripe eggs of the scaleworm *Harmothoe impar* was found at station 9a. Although no specimens of *Sabellaria alveolata* contained eggs or sperm, some grew to a large size (up to 3.1 cm) and relatively large numbers of very small juveniles were found in some samples, suggesting *in situ* reproduction. Single brooding females were observed for the isopod *Eurydice pulchra* (1 specimen in sample 19b) and the amphipod *Haustorius arenarius* (sample 29a).

The intertidal *S. alveolata* reefs at Duckpool on the North Cornish coast were well developed and show the sort of reef that can form given suitable environmental conditions (see **Plate 4**). A total of 45 species was found at this single location and a preliminary species list is presented in **Table 4**. A freshwater stream flows into the sea at this location and the consequent reduced salinity influences the biota: the dominant fucoid alga was the typically estuarine *Fucus ceranoides*, and no echinoderms were present in the samples as might have been expected from a fully marine location.

DISCUSSION

The results of this survey confirm earlier observations that:

- 1. The fauna of the sand and *Sabellaria* reef habitats is extremely impoverished compared with similar habitats further seaward in the Bristol Channel and elsewhere in the British Isles.
- 2. The species living in these habitats have no special adaptations to the extreme physical conditions of the estuary that might confer conservation interest, but rather they are all common and abundant species with a widespread distribution throughout Britain.

3. The species present in this part of the estuary are fully marine rather than brackish water specialists, so that this region cannot be regarded as estuarine in biological terms.

These three points are discussed in more detail below.

The Sabellaria reef habitat

In the Severn Estuary the total number of species found at stations representing the *Sabellaria* reef habitat (6,9,21,22,32,33) was 26. The highest number of species at any one station with *Sabellaria* reef was 16 (station 22). These represent the highest diversity found to date in this habitatin the estuary, because of the very careful analysis of even the smallest specimens retained on a 0.5mm sieve, and the inclusion of sessile epifaunal species such as hydroids and bryozoans attached to the *Sabellaria* tube fragments and to stones. Despite this, the diversity compares very unfavourably both with the intertidal *Sabellaria alveolata* and subtidal *Sabellaria spinulosa* habitats further seaward (George and Warwick, 1985).

While the species diversity in the intertidal *S. alveolata* reefs at Duckpool is much higher than the subtidal Severn Estuary (45 as compared to 25 species). The littoral location and reduced salinity result in a lower diversity than subtidal fully marine locations. George and Warwick (1985), for example, list 100 species from a single *Sabellaria spinulosa* station in the Bristol Channel at a depth of 41m off the North Devon coast. This work lists motile species only and the sessile epifauna was not recorded (as it was in the Severn Estuary), so the contrast is even greater. Such high diversity is not atypical of subtidal *Sabellaria spinulosa* station at 32m depth in the Wash, although comprehensive species inventories for such habitats are generally lacking.

All species found as adults in association with the *Sabellaria* reef in the Severn Estuary are common with a widespread distribution round the British coast, and so they cannot be regarded as specially adapted to the extreme hydrodynamic regime of the estuary. The species are typically marine and not brackish-water, so that biologically this area should not be regarded as an estuary. The exception is *Gammarus salinus*, which is a brackish species but found in more saline parts of estuaries. The list of species recorded as adults from *Sabellaria* reef in **Table 5** is derived from Mettam *et al.* (1994) plus the present survey of the deep channel. Distributional data are from P.J. Hayward and J.S. Ryland 'The Marine Fauna of the British Isles and North-West Europe (2 volumes) unless otherwise stated.

The subtidal sand habitat

Thirteen of the stations sampled fall loosely into this category (1, 13, 16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 29). Of the 26 samples (2 grabs at each station), 14 contained no fauna at all. In the remaining 12 samples a total of 9 species were recorded, four of which were epifaunal on stones and only five were typically infaunal. Only 18 individuals of the five infaunal species (*Ampharete baltica*, *Capitella capitata*, *Amphilochus manudens*, *Eurydice pulchra*, and *Haustorius arenarius*) were found in these 12 samples.

The greatest number of species recorded at any one station was two and the maximum number of individual animals recorded was three. The extremely impoverished nature of this fauna is clear from this and previous studies. For example, Mettam *et al.* (1994) also found that a high proportion of sand samples contained no fauna at all. Comparison with other subtidal sandy habitats illustrates the extreme species poverty of this habitat in the Severn Estuary; as an example Warwick *et al.* (1978) list 57 species from a single station further seaward in Carmarthen Bay.

As with the *Sabellaria* reef habitat, all species found as adults associated with the subtidal sand habitat in the Severn Estuary are common with a widespread distribution round the British coast, and so they cannot be regarded as specially adapted to the extreme hydrodynamic regime of the estuary. Likewise, the species are typically marine and not brackish-water, the exception again being *Gammarus salinus*. The list of species recorded as adults and the distributional data derived from the same sources as for the *Sabellaria* reef habitat is given in **Table 6**.

The above evidence fully supports the general conclusion of Hiscock and Cartlidge (1980) that "Communities in the Estuary are highly impoverished and this reduces their scientific and conservation interest".

REFERENCES

- George, C.L. and Warwick, R.M. 1985. Annual macrofauna production in a hardbottom reef community. J. mar. biol. Ass. U.K., 65: 713-735.
- Hiscock, K. and Cartlidge, D. 1980. Severn Tidal Power: Environmental implications in nearshore sublittoral areas. Report, Contract No. E/5A/CON/4007/51/060, UK Department of Energy.
- Mettam, C., Conneely, M.E. and White, S.J. 1994. Benthic macrofauna and sediments in the Severn Estuary. Biol. J. Linn. Soc., 51: 71-81.
- Warwick, R.M., George, C.L. and Davies, J.R. 1978. Annual macrofauna production in a *Venus* community. Est. cstl. mar. Sci., 7: 215-241.
- Watson, P.G., Widdicombe, S. and Frickers, P.E. 1995. Heterogeneity in macrobenthic activity. Final Report, Contract No. 7/7/423, UK Department of the Environment (Water Directorate).
- Wilson, D.P. 1971. *Sabellaria* colonies at Duckpool, North Cornwall, 1961-1970. J. mar. biol. Ass. U.K., 51: 509-580.

Figure 1 Map of the study area showing the position of the sampling stations. The total number of species recorded from each station from the two 0.1 m^2 grab samples is given as the bold red number in a blue box.





Figure 2 Map of the study area showing the position of the stations where evidence of *Sabellaria* reef, fragments of reef and tubes were found.

Table 1: Site observations.

Sample	E	Ν	Date	Time	Sample contents
1a	322788	165267	15.5	11.30	Sand/mudballs/coal
1b	322786	165280	15.5		Small sample; sand/mudballs/coal
2a	322807	164255	15.5		Small Sabellaria fragments
2b	322813	16428/	15.5		Small Sabellaria fragments
3a 2h	322806	163586	15.5		Small Sabellaria fragments, barnacie snells
30	322/91	162040	15.5		Small Sabellaria Tragments
4a 4b	322798	162940	15.5		Empty
40 5a	322743	162927	15.5		1 stone with encrusted Sabellaria
5h	322788	162079	15.5	12.15	Sabellaria reef fragments
5b	322788	162079	15.5	12.15	Sabellaria fragments
6a	324509	164617	15.5	12.10	Sabellaria fragments
6b	324569	164583	15.5		Lumps of Sabellaria reef
7a	325732	166215	16.5	10.20	Sabellaria tube fragments
7b	325835	166360	16.5	10.29	1 cobble with Sabellaria, hydroids & 2 barnacles
8a	327002	167647	16.5	10.48	1 clean stone - nothing found
8b	326933	167595	16.5	10.55	1 cobble with encrusted Sabellaria
9a	328625	168970	16.5	11.52	Small Sabellaria fragments & mud
9b	328602	168993	16.5	11.59	Large Sabellaria lumps & mud
10a	327933	171239	14.5	15.20	Empty
10b	327961	171256	14.5	15.25	Empty
11a	3287?0	170803	16.5	12.28	Sabellaria reef fragments
11b	328733	170775	16.5	12.35	2 large pebbles, 1 with Sabellaria tube & barnacle
12a	329109	1/04/2	16.5	12.13	2 large pebbles
120	329102	1/04/3	16.5	12.19	l large peoble
138	329598	169900	14.5	15.50	Clean sand mud veneer
130	329009	169/00	14.5	15.55	Small Sahallaria, tube fragments
14a 14b	330079	169538	14.5	16.10	Small Sabellaria, tube fragments
15a	329820	172049	14.5	16.10	Cobbles/shingle/liquid mud
15b	329812	172012	14.5	16.40	Liquid mud - nothing found
16a	331374	173205	14.5	14.55	Sand, slight mud
16b	331367	173214	14.5	15.00	Muddy sand, mud veneer
17a	333142	173615	14.5		Sand, slight mud
17b	333093	173553	14.5	17.15	Sand, mud veneer
18a	335019	173932	14.5	17.30	Sand, mud veneer
18b	334986	173920	14.5	17.40	Sand, slight mud
19a	336765	174585	14.5	13.00	Clean sand
19b	336786	174657	14.5	13.50	Clean sand
20a	336741	174001	14.5		Sand/mudballs
20b	336783	173949	14.5	18.20	Sand
21a	336/96	1/353/	14.5	10.00	Sabellaria reef + sand
210	330/90	1/3524	14.5	18.00	Sand/mud/Sabellaria Muddy cond + Sabellaria 200/ roof
22a 22b	336701	173050	14.5	14.15	Sabellaria 90% reef+ muddy sand
220	336608	17/330	14.5		Liquid mud/sand
23h	338600	174373	14.5	18 40	Liquid mud/sand
238 24a	340244	175263	14.5	10.10	Sand, mud veneer
24b	340261	175246	14.5	18.55	Sand, mud veneer
25a	341785	176294	14.5		Coarse sand
25b	341800	176299	14.5	19.30	Sand/mud/1 Cobble
26a	343399	177194	14.5		Sand/mudballs
26b	343433	177221	14.5		Sand/gravel/shell/mudballs
27a	345066	178428	14.5		Sand/gravel
27b	345089	178426	14.5		Sand/gravel/dark grey clay
28a	345083	177792	14.5		Sand
28b	345111	177802	14.5		Sand
29a	345058	177179	14.5		Sand
29b	345052	177202	14.5		Sand
30a	Site not visited				
300	Site not visited				
31a 21b	Site not visited				
310	225650	160007	16.5	11 11	Saballaria reaf fragmente arevel/shell/myd
32a 32b	323030	169175	10.5	11.11	Shingle with Sahellaria & hydroids
339	323033	160173	16.5	11.10	Large Sabellaria reef lumps
33h	3260/4	169020	16.5	11.27	Large Sabellaria reef lumps
550	520900	102002	10.5	11.33	Europe subservarian recer tunips

						~ - ••					•		•	- 5 -		·P					
	1:	1 1b) 2	a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8 a	8b	9a	9b	10a	10b
Porifera	Encrusting sponge					Р	Р					Р									
Cnidaria	Abietinaria abietina																				
	Anthozoan (large)																2				
	Anthozoan (small)																	4	1		
	<i>Tubulariidae</i> (1 hydranth)																				
	Obelia dichotoma						Р														
Sipuncula	Nephasoma minutum						1					2						4			
Annelida	Ampharete baltica																				
	Aphelochaeta marioni					2															
	Autolytus langerhansi						2														
	Capitella capitata					1															
	Eulalia tripunctata												4					4			
	Harmothoe impar					1												1			
	Melinna elisabethae												1								
	Nereis zonata																				
	Proceraea sp.							1													
	Sabellaria alveolata		1	0								1	16		1		1	10	19		
	Scoloplos armiger																		1		
	Spio martinensis																				
	Syllis armillaris					2															
	Tubificoides benedii																				
Crustacea	Amphilochus manudens																				
	Cyathura carinata																				
	Dexamine sp.																				
	Elminius modestus					1															
	Eurydice pulchra																				
	Gammarus salinus																				
	Harpinia pectinata																				
	Haustorius arenarius																				
	Janira maculosa																				
	Melita palmata																				
	Semibalanus balanoides														2						
Mollusca	Lutraria sp. (juv)						1			1											
	Mytilus edulis (juv)					1	1										2				
Bryozoa	Cribrilina punctata							Р							Р						
	Electra pilosa					Р	Р	Р				Р	Р		Р						
Echinodermata	Ophiura sp. (v. small)																				
Tunicata	Dendrodoa grossularia							16		4	1		8		11						
	Total species 0	0		1	0	8	7	4	0	2	1	4	5	0	5	0	3	5	3	0	0
	Total no. of organisms 0	0	1	0	0	8+2	5+3	17+2	0	5	1	3+2	29+2	0	14+2	0	5	23	21	0	0

Table 2: Benthic invertebrates recorded from the 0.1 m² grab samples.

	1 1	A
101		(aanti

		11a	11b	12a/b	13a	13b	14a	14b	15a	15b	16a	16b	17a	17b	18a	18b	19a	19b	20a	20b
Porifera	Encrusting sponge							Р												
Cnidaria	Abietinaria abietina																			
	Anthozoan (large)																			
	Anthozoan (small)																			
	Tubulariidae (1 hydranth)		1	1																
	Obelia dichotoma		Р	Р	Р															
Sipuncula	Nephasoma minutum						1													
Annelida	Ampharete baltica										1									
	Aphelochaeta marioni																			
	Autolytus langerhansi																			
	Capitella capitata																			
	Eulalia tripunctata	1																		
	Harmothoe impar																			
	Melinna elisabethae																			
	Nereis zonata																			
	Proceraea sp.																			
	Sabellaria alveolata	3																	1	
	Scoloplos armiger																			
	Spio martinensis																			
	Syllis armillaris																			
	Tubificoides benedii																			
Crustacea	Amphilochus manudens																	1		
	Cyathura carinata																			
	Dexamine sp.																			
	Elminius modestus																			
	Eurydice pulchra														1	1		3		2
	Gammarus salinus																			
	Harpinia pectinata																			
	Haustorius arenarius													1	1					
	Janira maculosa																			
	Melita palmata																			
	Semibalanus balanoides				1															
Mollusca	Lutraria sp. (juv)																			
	Mytilus edulis (juv)																			
Bryozoa	Cribrilina punctata																			
	Electra pilosa		Р	Р				Р			Р									
Echinodermata	Ophiura sp. (v. small)																			
Tunicata	Dendrodoa grossularia							1												
	Total species	2	3	3	2	0	1	3	0	0	2	0	0	1	2	1	0	2	1	1
	Total no. of organisms	4	1+2	1+2	1+1	0	1	1+2	0	0	1+1	0	0	1	2	1	0	4	1	2

										1	an	U 4	(COII	y									
		21a	21b	22a	22b	23a	23b	24a	24b	25a	25b	26a	26b	27a	27b	28a	28b	29a	29b	32a	32b	33a	33b
Porifera	Encrusting sponge																						
Cnidaria	Abietinaria abietina																				Р	Р	
	Anthozoan (large)	1																					
	Anthozoan (small)	2			2																		1
	Tubulariidae (1 hydranth)			1																			
	Obelia dichotoma				Р		Р													Р	Р	Р	
Sipuncula	Nephasoma minutum																						
Annelida	Ampharete baltica			2	1															1			
	Aphelochaeta marioni																						
	Autolytus langerhansi				1																		
	Capitella capitata					4	2							1	2			2					
	Eulalia tripunctata	2			2															4			1
	Harmothoe impar			1	2																		1
	Melinna elisabethae																						
	Nereis zonata				3																	1	
	Proceraea sp.				-																	-	
	Sabellaria alveolata	45	24	11	15															13	6	6	7
	Scoloplos armiger	1	5																				
	Spio martinensis		-	1	2																		
	Syllis armillaris			-	_																		1
	Tubificoides benedii			3	10															2		2	1
Crustacea	Amphilochus manudens			-	2																	_	-
	Cyathura carinata			1																			
	Dexamine sp.			-			1																
	Elminius modestus						-																
	Eurodice nulchra															1							
	Gammarus salinus				1											-				2			
	Harninia pectinata				-															_			1
	Haustorius arenarius																	1					
	Janira maculosa																	-					1
	Melita palmata			1																			-
	Semibalanus balanoides			-																			
Mollusca	Lutraria sp. (iuv)																						
	Mytilus edulis (juy)																						
Brvozoa	Cribrilina punctata																						
J	Electra nilosa				Р																Р	Р	Р
Echinodermata	Ophiura sp. (v. small)				-		1														-	-	-
Tunicata	Dendrodoa grossularia																						
	Total species	5	2	8	13	1	4	0	0	0	0	0	0	1	1	1	0	2	0	6	4	6	9
	Total no. of organisms	51	29	21	41+2	4	4+1	Ũ	Õ	Ũ	Ũ	Õ	Ũ	1	2	1	Ũ	3	Ũ	22+1	6+3	<u>9+3</u>	14+1

Table 2 (cont)

Table 3: Weight of *Sabellaria* reef recorded in the grab samples. Samples not included in this table held zero or negligible quantities of tube.

Sampl	Е	Ν	Dat	Tim	Sample contents	Weight of Sabellaria tube g
e			e	e		
2a			15.5		Sabellaria fragments	15
5b			15.5	12.15	Sabellaria fragments	11
7b	325835	166360	16.5	10.29	1 cobble with Sabellaria, hydroids & 2 barnacles	10
8b	326933	167595	16.5	10.55	1 cobble with Sabellaria	98
9a	328625	168970	16.5	11.52	Sabellaria reef fragments & mud	465
9b	328602	168993	16.5	11.59	Large Sabellaria lumps & mud	2720
14a	330079	169490	14.5	16.05	Sabellaria reef fragments	20
14b	330077	169538	14.5	16.10	Sabellaria reef fragments	22
21a	336796	173537	14.5		Sabellaria reef + sand	2890
21b	336796	173524	14.5	18.00	sand/mud/Sabellaria reef	744
22a	336703	173050	14.5	14.15	Muddy sand + 30% Sabellaria reef	930
22b	336701	173061	14.5		90% Sabellaria reef+ muddy sand	2649
32a	325650	168237	16.5	11.11	Sabellaria fragments, gravel/shell/mud	660
33a	326874	169121	16.5	11.27	Large Sabellaria reef lumps	958
33b	326900	169089	16.5	11.33	Large Sabellaria reef lumps	2338

Table 4 Species list for the intertidal S. alveolata reefs at Duckpool on the North Cornish coast.

Group	Species
Algae	Ceramium rubrum
	Chaetomorpha sp.
	<i>Cladophora</i> sp.
	Corallina officinalis
	<i>Enteromorpha</i> sp.
	Ulva lactuca
	Fucus ceranoides
Cnidaria	Actinia equina
	Obelia dischotoma
	Actinia fragacea
Nemertea	Nemertea indet.
Nematoda	Thoracostoma coronatum
Annelida	Aonides oxycephala
	Aphroditidae indet.
	Eulalia viridis
	<i>Eumida</i> sp.
	Fabricia sabella
	Malacoceros fuliginosus
	Oligochaeta indet.
	Pomatoceros triqueter
	Sabellaria alveolata
	Sabellaria spinulosa
	Typosyllis armillaris
Chelicerata	Achelia sp.
	Nymphon gracile
	Pycnogonida indet.
Crustacea	Chthamalus montagui
	Dynamene bidentata
	<i>Hyale</i> sp.
	Idotea granulosa
	Idotea pelagica,
	Jaera albifrons
	Jassa falcata,
	Jassa oci
	Liocarcinus pusillus
	Tigriopus brevicornis
Insecta	Chironomid larva
Mollusca	Acanthochitona crinitus
	Gibbula umbilicalis
	Modiolus modiolus
	Mytilus edulis
	Nucella lapillus
	Patella depressa
	Patella vulgata
Bryozoa	Callophora lineata

Table 5 A list of adult species found in association with *Sabellaria* reefs in the Severn Estuary.

Cnidaria Abietinaria abietina On stallies and stones: 10 m to offshore, effer found on strandline, all casss, common, arcic to Mediterranean. Sipuncula Obelia dichotoma On animal, plant and inert substrati, intertial to about 100 m, throughout British lass, rare cosmopolitan. Sipuncula Nephasoma misutum Very common in recky revices from mid-shore to 50 m dephs, witdespread round British and from morthern Norway to West Africa and Mediterranean. Annelida Ampharete baltica (as acutifrons) Al tow water, in maddy sand amongs see-grasses, and subititorally. Circum-Arctic, European coasts to Mediterranean. Including the Baltica Sci. Euclata tripuctata Not listed in Hayward and Ryland. Hormothoe inpar Al tow water, under stones or in kelp holdfasts; offshore amongs to del Sin Marchanean. Arabias Kelp. Hormothoe inpar Al tow water, under stones, annegst hells or it kelp in the species Directory of the Martine Fauna and Flora or the Ritish kelp. Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very common' in 'the species Directory of the Martine Fauna and Flora or the Ritish kelp. Anne-west Europen. Mediomast, see Singelis and Baltica allocary of the Martine Fauna and Flora or the Ritish kelp. Mediomastus fragilis On the shore and salibito salibitoral very or in shallow sublitoral very or in the anite fauna and Flora or the Ritish and fauna sublitoral very or in the hore and salibito salibitoral very sublicata aliveolata Sobellaria aliveolat	Group	Species	Distribution
Obelia dichotoma On animal, plant and inert substrate, intertual to about 100 m, througbout British Isies, marce cosmopolitan. Sipuncula Nephazona minutum Very common in rocky crevices from mid-shore to 30 m dephs, Stefand, Sweden, Fristan, Brittany. Golfingia vulgari In muddy sand or gravel from LW to 200m deph. Annelida Ampharete baltica (sa acuifrons) A low water, in muddy sand amongst sca-grasses, and subhitorally. Circum-Arctic, European coasts to Mediterranean, including the Baltic Sca. Eulata tripuctuta Not listed in Hayward and Ryland. Harmothoe impar Allow water, under stones or in kelp hulfiats; offshore amongst old shells. All around Britain and north-west Europe, Mediterranean. Harmothoe impar Allow water under stones, amongst shell propen coasts. Mediomastus fragilis Not listed in Hayward and Ryland, bul listed as 'very common' in 'The species Directory of the Muro Fusits Islas and Such Cord Line and Such Cord Line and Such Cord Line Fusits Islas and Such Cord Line and Such Cord Line Fusits Islas and Such Cord Line Fusits Islas and Such Cord Line Fusits Islas and Such Cord Line Allow Cord Line and Such Cord Line and Such Cord Line Allow C	Cnidaria	Abietinaria abietina	On shells and stones: 10 m to offshore, often found on strandline; all coasts, common; arctic to Mediterranean.
Sipuncula Nephasoma minutum Very common in rocky crevices from mid-shore to 50 m dept; Shelland, Sweden, Burlian, Britan, Deritan, Deri		Obelia dichotoma	On animal, plant and inert substrata; intertidal to about 100 m; throughout British Isles; near cosmopolitan.
Golfingia vulgari In "muddy sand or gravel from I.W to 2000 m depth, widespread round Britian and from northern Norway to West Africa and Mediterranean. Annelida Ampharete baltica (as acutifrons) At low water, in muddy sand amongst sce-grasses, and sublitorally. Circum-Arctic, European costs to Mediterranean, including the Baltic Sca. Evaluta argunetata Not listed in Hayward and Ryland Euroida sanguinea At low water under stones, amongst shells on it kelp holdfasts; oftshore to some depth. Northwestern European costss, Mediterranean: Arabian Gulf, Australasia. Harmothoe impar At low water under stones, amongst shells on it kelp holdfasts; oftshore to some depth. Northwestern European costss, Mediterranean: Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very common' in The species Directory of the Manne Zauna and Flora of the British liste and Surrounding Seas' (eds C.M. Howson & B.E. Picton). Melinna elisabethi (as cristata) On how shore and shallow sublitoral rocks adjacent to a sand table; southern species; both sides and Surrounding Seas' (eds C.M. Howson & Sear eds Shallow sublitoral rocks adjacent to a sand table; southern species; both sides and Surrounding Seas' (eds C.M. Howson & Sear eds Shallow sublitoral rocks adjacent to a sand table; southern species; both sides on it help holdfasts: Arctic, north Pacific, sub-Antarctic. Soloplos armiger At low water or in shallow sublitoral rocks adjacent to a sand table; southern species; both sides and surveys on the low shore and sublitoral in surveys. Anaretic to nonedistance offshore. Europe (recorded from dro H Srit	Sipuncula	Nephasoma minutum	Very common in rocky crevices from mid-shore to 50 m depth; Shetland, Sweden, Britain, Brittany.
widespread round Britain and from northern Norway to West Africa and Mediterranean. Annelida Ampharete baltica (as acutifrons) Al low water, in muddy snd amogst seargasses, and sublitationally. Circum-Arctic, Europen coasts to Mediterranean, including the Batic Sea. Euklika tripuctata Not listed in Hayward and Kyland. Lumida sanguinea Al low water, under stones or in kelp holdisats; offshore amongst od shells. All round Britain and north-west Europe, Mediterranean: Arabin Guit, Australasia. Harmothoe impar Al low water under stones, amongst shells or in kelp holdfasts; offshore to some depth. Northwestem European coasts, Mediterranean: Arabin Guit, Australasia. Mediomastus fragilis Not listed in Hayward and Ryland, Ut Australasia. Mediomastus fragilis On the shore and sublitorally on muddy bottoms, often amongst sea-grasses. Most onth-west European coasts, Mediterranean. Mediana elisabethi (as cristata) On the shore and sublitorally on muddy stond, often amongst sea-grasses. How sublitoral rocks adjacent to a stand table; southern specie; both sides of Britain as far as Firth of Clyde and Bervick; western Ireland; locally abundant. Scolaplos armiger At low water or in shallow sublitoral rocks adjacent to a sond table; southern specie; both sides adjacent to a starte of Rylae and Bervick; western Ireland; locally abundant. Scolaplos armiger At low water or in shallow sublitoral rocks adjacent to some and subletary on the Bervick; boy by sowastand enamonest seargasses. M		Golfingia vulgari	In muddy sand or gravel from LW to 2000 m depth,
Annelida Ampharete baltica (as acutifros) At low water, in muddy sud amongst se-grasses, and sublitationally. Circum-Arctic, European cousts to Mediterranean, including the Baltic Sea. Eulatita tripuctatia Not listed in Hayward and Ryland Eulatita tripuctatia Not listed in Hayward and Ryland Ilarmothoe impar At low water, under stones or in kelp holdfasts; offshore amongst od shells. All around Britan and north-west Ilarmothoe impar At low water under stones, amongst shells or in kelp holdfasts; offshore to some depth. Northwestern European coasts, Mediterranean. Mediomasnus fragilis Not listed in Hayward and Ryland, but listed as 'very common' in 'The species Directory of the Marine Fauna and Flora of the British Iss and Surrounding Seas; (eds C.M. Howson & B.E., Peton). Mediomasnus fragilis On the shore and shiltorally on muddy bottoms, often amongst sa-grasses. Most north-west European coasts, Acretic, north Acritic, sub-Antarctic. Sabellaria alveolata On lower shore and shiltorally on muddy bottoms, often amongst sa-grasses. West and north of Britin, a stra as Firth of Clyde and Bervick; western freland; locally abundant. Scoloplos armiger At low water or in shallow sublitoral rocks adjacent to a sard table; souther speces. West and north of Britin, Acretic, north-west Europe, Indian Ocean, Pacific, Antarctic. Tubificoides benedit Commony found with Cluebita covart, cosmog distance and sublitorally. In sedimetal, eoast, ordinadis and and anord british coast. cosmog distance offshore.			widespread round Britain and from northern Norway to West Africa and Mediterranean.
sublitionally. Circum-Arcic, European coasts to Mediterranean, including the Balits Sea. Eulalia tripuctata Not listed in Hayward and Ryland. European Construction of the Con	Annelida	Ampharete baltica (as acutifrons)	At low water, in muddy sand amongst sea-grasses, and
Endatia tripuctata Not listed in Hayward and Ryland. Eumida sanguinea At low water, under stones or in kelp holdists; offshore amongst old shells. All around Britain and north-west Europe, Mediterranean. Arabia Guil, Australasia. Harmothoe impar At low water under stones, amongst shells on in kelp holdists; offshore to some depth. Northwestern European coasts, Mediterranean. Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very common' in 'The species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas' (eds C.M. Howards & B.E. Pricton). Melinna elisabethi (as cristata) On the shore and sublitionally on muddy bottoms, often amongst sea grasses. Most north-west European coasts, Arcetic, north Areitis, asb-Antaretic. Sabellaria alveolata On lower shore and sublitionally on muddy bottoms, often amongst sea grasses. West and north of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scolaplos armitger At low water or in shallow sublitorally, under stones or in kelp holdists. Content species, but subliticonally in sediments, from estuaries to some distance of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scolaplos armitger At low water or in shallow sublitorally, under stones or in kelp holdists. Content species, but subst cost: cosmoplitan. Tubficoides benedii Commonly found with ClieBlio areanzias, on the lower shore and sublitorally in sediments. Janira maculosa Among spropegra, sacidints, h			sublittorally. Circum-Arctic, European coasts to
Emilial infjuicidia For instellin fragivation in a weak and the stones on in kelp holdfasts; offshore amongst old shells. All around Briain and north-west Europe, Mediterranean: Arabian Guif, Australasia. Harmothoe impar At low water under stones on in kelp holdfasts; offshore to some depth. Northwestern European coasts, Mediterranean. Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very common in 'The species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas' (eds C.M. Howson & B.F. Picton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottoms, often amongst see grasses. Mest north-west European coasts, Arctic, north Parific, sub-Antarctic. Sabellaria alveolata On they shore and sublitorally on muddy bottoms, often amongst see, grasses. Mest and the sublitoral recks adjacent to a sand table; southern species, but sides of Britain as far as Firth of Clyde and Barwick, western freand, liceally abundant. Scoloptos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst see, grasses. West and north of Britain, Arctic, north-west and sublituationally, under stones or in kelp holdfasts. Around must of the British coast: cosmopolitan. Tubificoides benedit Commody found with Cluella coast: cosmopolitan. Tubificoides benedit Commody found with Cluella and shallow sublittoral, anong sity, stony holds. All coasts. Melina alumata Anongst sponges, ascidians, hydroids, bryozoans and Laminara holdfastst. Hores and soust. Coast of France.		Fulalia tuinuotata	Mediterranean, including the Baltic Sea.
Image and a singlificat In room study, nucle steep isomatory, indicate an interpoly of the singlifies of the s		Eulalia Iripuciala Fumida sanguinea	At low water under stones or in keln holdfasts: offshore
Europe, Mediterranean: Arabias ia. Harmothoe impar At low water under stones, anongst shells or in kelp holdifasts; offshore to some depth. Northwestern European coasts, Mediterranean. Mediomastus fragilis Northwestern European coasts, Mediterranean. Mediomastus fragilis Northwestern European coasts, Mediterranean. Medionastus fragilis Northwest European or the British Isles and Surrounding Seas' (eds C.M. Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottoms, often amongst sea-grasses. Most north-west European coasts, Arctic: north Pacific, sub-Antarctic. Sabellaria alveolata On lower shore and shallow sublitoral, in fine muddy sand, often amongst sea-grasses. West and north of Britian, Arctic, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Arcund most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Cittelling enzarius; on the lower shore and sublitorally in sediments; more stuaries to some distance offshore. Europe (reoded from major estuaries all around Britian), north-east America. Crustacea Harpinia pectinata On moddy sand from 5 m downwards. All coasts. Melius palmata Anongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: Median da shallow sublitoral, among silvy, story holabiats. All coasts. Mollusca		Eumiaa sanguinea	amongst old shells. All around Britain and north-west
Harmothoe impar At low water under stores, anongst shells or in kelp holdfast; offshore to some depth. Northwestern European coasts, Mediterranean. Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very commor in 'The species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas' (eds C.M. Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottons, often amongst sea grasses. Most north-west European coasts, Arctic; north Pacific, sub-Antarctic. Sabellaria alveolata On lower shore and sublitorally on suddy bottons, often amongst sea grasses. Most and north of Britain, Arctic, north-west European coasts, Arctic; north-west European coasts, Arctic; north-west European coasts, Arctic; north-west European coasts, Arctic; north-west European coasts, abundant. Scolopios armiger At low water or in shallow sublitoral norks adjacent to a sand table; southern species; both sides of Britain, Arctic, north-west Europe, Indian Ocean, Pacific, Antarctic, Typosyllts armillaris Tubificoides benedii On the lower show and wibit Chelloi arrenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain, north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts, ont uncommon. Distributed from Norway to Atlantic coast of France. Melita palmata Marine and brackish water; intertidal and shallow sublitoral, among sily, story habitas. All coasts, not uncommon. Distributed from Norway to Atlantic co			Europe, Mediterranean: Arabian Gulf, Australasia.
holdfasts; offshore to some depth. Northwestern European coasts. Mediterranean. Mediomastus fragilis Not listed in Hayward and Ryland, but listed as 'very common' in 'The species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas' (eds C.M. Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottoms, often amongst sea-grasses. Most north-west European coasts, Artei; north Pacific, sub-Antarctic. Sabellaria alveolata On lower shore and shallow sublittoral rocks adjacent to a sand table; southern species; both sides of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, arteit, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublittorally under stones or in kelp holdfasts. Around most of the British coast; cosmopolitan. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Mellua palmata Anongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublitorally not seast. Soft most British coasts; distributed southwards to the Mediterranean and north-west Africa. Mollusca Electra pilosa On rocky, stone		Harmothoe impar	At low water under stones, amongst shells or in kelp
Image: coasts, Mediterranean. Mediomastus fragilis Not liste in Hayward and Ryland, but listed as 'very common' in 'The species Directory of the Marine Fauna and Flora of the British Isles and Surrounding Seas' (eds C.M. Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottoms, often anongst sea-grasses. Most north-west European coasts, Articit, north Pacific, sub-Antarctic. Sabellaria alveolata On lower shore and shallow sublitoral rocks adjacent to a sand table; southern species; both sides of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublitoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arteite, north-west Europe, Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedli Commonly found with Clifelio aremuta; on the lower shore and sublitorally in adversame muddy sand from Sm downwards. All coasts. Grustacea Harpinia pectinata On muddy sand from Sm downwards. All coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches bay syssus, in holes and crevices or algal holdfasts, in shallow sublitoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Mollusca Sphenia binghami Atta			holdfasts; offshore to some depth. Northwestern European
Mealtomistics fragitis Not inside in Hayward by Kinki, but inside as very and Flora of the British Issed and Kydaid, but inside as very and Flora of the British Issed as Marrounding Seas' (eds C.M. Howson & B.E. Preton). Melinna elisabethi (as cristata) On the shore and sublitorally on muddy bottoms, often amongst sea-grasses. Most north-west European coasts, Arctic, north Pacific, sub-Antartic. Sabellaria alveolata On lower shore and sublitorally on muddy bottoms, often amongst sea-grasses. Most north-west European coasts, Arctic, north Pacific, sub-Antartic. Scoloplos armiger At low water or in shallow sublitoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic, north-west Europe. Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Citellio arenarius; on the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Mollusca Sphenia binghami Antongst sponges, ascidians, hydroids, bytozoans and Laminaria holdfasts. Tumora, and cholars. A southern species coasts. Mollusca Sphenia binghami Antaches by a bysus, in holes and revices or algal holdfasts, manog sity, stony habitast. All coasts. Mollusca Sphenia binghami At			coasts, Mediterranean.
Bernom the British Isles and Surrounding Seas' (eds C.M., Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and sublittorally on muddy bottoms, often amongst sea-grasses. Most north-west European coasts, Arctic; north-west European, Pacific, Antarctic. Image: Scoloplos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic; north-west Europe; Indian Ocean, Pacific, Antarctic. Image: Scoloplos armiger On the lower shore and sublittorally, under stones or in kelp holdfasts. Around most of the British coast; cosmopolitan. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Image: Argent and antice and brackish water; intertial and shallow sublittoral, among sitty, stony habitats. All coasts. Marine and brackish water; intertial and shallow sublittoral, among sitty, stony habitats. All coasts. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts; in shallow sublittorally to 35 m; intertidally most abundant on tuffed red algae such as Lonentaria, Louencia, and Chondrus. A southern specices extending from the West and south- west coasts of B		Mediomastus fragilis	Not listed in Hayward and Ryland, but listed as very common' in 'The species Directory of the Marine Fauna and
Howson & B.E. Picton). Howson & B.E. Picton). Melinna elisabethi (as cristata) On the shore and subliturally on muddy bottoms, often amongst sea-grasses. Most north-west Europen coasts, Arctic; north Pacific, sub-Antarctic. Sabellaria alveolata On lower shore and shallow sublitoral rocks adjacent to a sand table, southen species; both sides of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublitoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic, north-west Europen; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Citellito arenarius; on the lower shore and sublitorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Melita palmata Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below, most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Melita palmata Attaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublitoral, rare in the North. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts, in boles and crevices or algal			Flora of the British Isles and Surrounding Seas' (eds C.M.
Melinna elisabethi (as cristata)On the shore and sublitorally on muddy bottoms, often amogst ser-grasses. Most north-west European coasts, Arctic; north Pacific, sub-Antarctic.Sabellaria alveolataOn lower shore and sublitoral rocks adjacent to a sand table; souther species both sides of Britain as far as Firth of Clyde and Bervick; western Ireland; locally abundant.Scoloplos armigerAt low water or in shallow sublitoral, in fine muddy sand, often amogst sea-grasses. West and north of Britain, Arctic; north-west Europe; Indian Ocean, Pacific, Antarctic.Typosyllis armillarisOn the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan.IndifastsTubificoides benediiCommonly found with <i>Cluellio arenarius;</i> on the lower shore and sublitorally in sediments, from estuaries to some distace offshore. Europe (recorded form major estuaries all around Britain), north-east America.CrustaceaHarpinia pectinataOn muddy sand from Norway to Atlantic coast of France.MolluscaSphenia binghamiAttaches by a byssus, in holes and revices: or algal holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.MolluscaSphenia binghamiOn rocky shores and LW ediciterranee and aouthy sublitoral unterfed and shallow sublitorally most abundant on the Mediterranee and and ontro-west Africa.MolluscaDendrodoa grossulariaOn rocky shores near LWST and Sublitorally for 35 m; intertidally most shoutast, alt coasts; very common.MolluscaDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts; in aggregations; par			Howson & B.E. Picton).
amongst sea-grasses. Most north-west European coasts, Artcic; north Pacific, sub-Antarcic. Sabellaria alveolata On lower shore and shallow sublittoral rocks adjacent to a sand table; southern species; both sides of Britain as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Artcic, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Grustacea Harpinia pectinata Mollusca Amongst space, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a bysus, in holes and crevices or algal holdfasts; in shallow sublitoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Bryozoa Electra pilosa Dendrodoa grossularia On rock, stones, shells et. from the lower shore into deque avery spore water; all coasts; particularly in the south and west; locally common, North America, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain a		Melinna elisabethi (as cristata)	On the shore and sublittorally on muddy bottoms, often
Sabellaria alveolata On lower shore and shallow sublitoral rocks adjacent to a sand table; southern species; both sides of Britian as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublitoral, in fine muddy sand, often amongst sea-grasses. West and north of Britian, Arctic, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Clitellia arenarius; on the lower shore and sublitorally in sodiments, from estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some and sublitorally in sodiments, from estuaries to some all around Britain), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Melita palmata Marine and brackish water; intertidal and shallow sublittoral, more solitoral y in boldfasts: LWST and below; nost coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a byssus; in holes and crevices or algal holdfasts; instributed southwards to the Mediterranean and north-west Africa. Bryozoa Electra pilosa On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Larmencia, and Chondras. A southern species extending from the Mediterranean to the west and south-west Afr			amongst sea-grasses. Most north-west European coasts,
bubel and alreound Son toker shore shore and same same signed. The of Strian as far as Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublittorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Clitellio arenarize; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Mollusca Janira maculosa Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a bysus, in holes and crevices or algal holdfasts, in shallow sublitoral waters. Off most British coasts: coasts of straitica. Mollusca Dendrodoa grossularia On rocky shores and LWST and sublicrally to 35 m; intertially most abundant on tuffed red algae such as Lowertary. A southern species extending from the Mediterranean and north-west affrica. Mollusca Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and		Sabellaria alveolata	Arctic, north Pacific, sub-Antarctic.
Firth of Clyde and Berwick; western Ireland; locally abundant. Scoloplos armiger At low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic, north-west Europe, Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublittorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Clitellia arenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britian), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Melita palmata Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a bysus, in holes and revices or algal holdfasts, in shallow sublitoral wers. Off most British coasts: distributed southwards to the Mediterranean and north-west Africa. Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on the dediage such as Lomentaria, and Chondrus. A southem species extending from the Mediterranean to the west and south-west coasts, obstrine, various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; versions and Lamineria, rate in the North. Marine: various usbuttaria durates. Dendrodoa grossularia On rocky shores near LWST and		Suberiuriu uiveolulu	sand table: southern species: both sides of Britain as far as
abundant. Scoloplos armiger At low water or in shallow sublitoral, in fine muddy sand, offen amongst sea-grasses. West and north of Britain, Arctic, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublitorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Clitellio arenarius; on the lower shore and sublitorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britiah), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Janira maculosa Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Mollusca Sphenia binghami Attaches by a bysus, in holes and crevices or algal holdfasts; in shallow sublitoral vares. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on three dalgae such as Lomentaria, laruencia, and Choordrus. A southern species extending from the Mediterranean and other algae; lower shore shore into deep water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shell ec. from the lower shore into deep water; all coasts; very common.			Firth of Clyde and Berwick; western Ireland; locally
Scoloplos armigerAt low water or in shallow sublittoral, in fine muddy sand, often amongst sea-grasses. West and north of Britain, Arctic, north-west Europe; Indian Ocean, Pacific, Antarctic.Typosyllis armillarisOn the lower shore and sublittorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan.Tubificoides benediiCommonly found with Clitellio arenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America.CrustaceaHarpinia pectinataOn muddy sand from 5 m downwards. All coasts.Janira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.BryozoaElectra pilosaOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted real ages such as Lomentaria, Laureria, and Chodrus. A southem species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly <i>Fucus servatus</i> and other algae; lower shore and shallow water; all coasts; very common. North America, Arctic south to level so Silvand Brittany, ensineul (Glemar arethinedaeo) <th></th> <th></th> <th>abundant.</th>			abundant.
Artice, north-west Europe; Indian Ocean, Pacific, Antarctic. Typosyllis armillaris On the lower shore and sublittorally, under stones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Cittelliou arenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Janira maculosa Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Melita palmata Marine and brackish water; intertidal and shallow sublittoral among sity, stony habitats. All coasts. Mollusca Sphenia binghami Attaches by a bysus, in holes and crevices or algal holdfasts; in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Bryozoa Electra pilosa On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed real ages such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south-west coasts of Britian and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly freus servatus and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia		Scoloplos armiger	At low water or in shallow sublittoral, in fine muddy sand,
Typosyllis armillaris On the lower Shore and sublittorally, understones or in kelp holdfasts. Around most of the British coast: cosmopolitan. Tubificoides benedii Commonly found with Clitellia arenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from major estuaries to some distance offshore. Europe (recorded from Norway to Atlantic coast of France. Melita palmata Amonest barley in bottats. All coasts. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and			Arctic north west Europe: Indian Ocean Pacific Antarctic
OperationOperationTubificoidesFullificoidesTubificoidesSenediiCommonly found with Clitellio arenarius; on the lower shore and sublitorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America.CrustaceaHarpinia pectinataJanira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts; distributed southwards to the Mediterranean and north-west Africa.Tricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine, various substrata, particularly <i>Fucus servatus</i> and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to leles of Scill wan britava peninulu (Clanon architaria)		Typosyllis armillaris	On the lower shore and sublittorally under stones or in keln
Tubificoides benedii Commonly found with Clitellio arenarius; on the lower shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America. Crustacea Harpinia pectinata On muddy sand from 5 m downwards. All coasts. Janira maculosa Amongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France. Melita palmata Marine and brackish water; intertidal and shallow sublitoral, among silty, stony habitats. All coasts. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts; instributed form to the Mediterranean and north-west Africa. Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south-west coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine, various substrata, particularly Fucus servatus and other algae; lower shore and shallow water; all coasts; very common. Verticata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common, North America, Arctic south to Les of Scilly and Britary peninnula (Clanan extributed south and peninny peninnula) (Clanan extributed south and medis particulare peninnula) (Clanan extributed south and medis penind		Typosytus annual is	holdfasts. Around most of the British coast: cosmopolitan.
shore and sublittorally in sediments, from estuaries to some distance offshore. Europe (recorded from major estuaries all around Britain), north-east America.CrustaceaHarpinia pectinataOn muddy sand from 5 m downwards. All coasts.Janira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.MolluscaTricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common, North America, Arctic south to alkey of the archina and relay in diseas archinelano)		Tubificoides benedii	Commonly found with Clitellio arenarius; on the lower
CrustaceaHarpinia pectinataOn muddy sand from 5 m downwards. All coasts.Janira maculosaJanira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublitoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublitoral waters. Off most British coasts, distributed southwards to the Mediterranean and north-west Africa.Tricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to lose of Scilly and Brittany nenjousla (Chena archinelano)			shore and sublittorally in sediments, from estuaries to some
CrustaceaHarpinia pectinataOn muddy sand from 5 m downwards. All coasts.Janira maculosaJanira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts; in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.Tricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly <i>Fucus servatus</i> and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to lokes of Scilly and Brittany neminsula (Clenen archinelance)			distance offshore. Europe (recorded from major estuaries
Janira maculosaJanira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.MolluscaTricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly Fucus serratus and other algae; lower shore into deep water; all coasts; in aggregations; particularly in the south and west; locally common; North America, Arctic south to listes of Scilly and Brittary neninsula (Claman archinelaro)	Crustacea	Harpinia pectinata	On muddy sand from 5 m downwards All coasts
Janira maculosaAmongst sponges, ascidians, hydroids, bryozoans and Laminaria holdfasts: LWST and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.Tricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts; in aggregations; particularly in the south and west; locally common; North America, Arctic south to Isles of Scilly and Britian an archinealago)			on multipsand nom o m downwards. An cousts.
Laminaria noidrasts: LWS1 and below; most coasts, not uncommon. Distributed from Norway to Atlantic coast of France.Melita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.MolluscaTricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south and west; l		Janira maculosa	Amongst sponges, ascidians, hydroids, bryozoans and
MolluscaMelita palmataMarine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts.MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.MolluscaTricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; locally common; North America, Arctic south to Isles of Scilly and Brittany peningula (Glanea archinelago)			<i>Laminaria</i> noidiasis: LWS1 and below, most coasts, not uncommon Distributed from Norway to Atlantic coast of
Melita palmata Marine and brackish water; intertidal and shallow sublittoral, among silty, stony habitats. All coasts. Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as <i>Lomentaria, Laurencia,</i> and <i>Chondrus</i> . A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Isles of Scilly and Brittany peninsula (Clenan archipelago)			France.
MolluscaSphenia binghamiAttaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa.Tricolia pullusOn rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North.BryozoaElectra pilosaMarine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common.TunicataDendrodoa grossulariaOn rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Isles of Scilly and Brittany peninsula (Cleman archinelago))		Melita palmata	Marine and brackish water; intertidal and shallow
Mollusca Sphenia binghami Attaches by a byssus, in holes and crevices or algal holdfasts, in shallow sublittoral waters. Off most British coasts; distributed southwards to the Mediterranean and north-west Africa. Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tuffed red algae such as Lomentaria, Lawrencia, and Chondrus. A southern species extending from the Mediterranean to the west and southwest coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Cleman archinelago)			sublittoral, among silty, stony habitats. All coasts.
Bryozoa Electra pilosa Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts; na ggregations; particularly in the south and west; locally common; North America, Arctic south to Islee of Scilly common; North America, Arctic south to Islee of Scilly and Brittany peninsula (Clenan archinelago)	Mollusca	Sphenia binghami	Attaches by a byssus, in holes and crevices or algal
Bryozoa Electra pilosa On rocky stores, near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as <i>Lomentaria, Laurencia,</i> and <i>Chondrus.</i> A southern species extending from the Mediterranean to the west and south- west coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Glenan archinelago)			coasts: distributed southwards to the Mediterranean and
Tricolia pullus On rocky shores near LWST and sublitorally to 35 m; intertidally most abundant on tufted red algae such as Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and southwest coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Islee of Scilly and Brittany peninsula (Glenan archinelago)			north-west Africa.
Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Glenan archinelaga)		Tricolia pullus	On rocky shores near LWST and sublitorally to 35 m;
Bryozoa Electra pilosa Lomentaria, Laurencia, and Chondrus. A southern species extending from the Mediterranean to the west and southwest coasts of Britain and Ireland; rare in the North. Bryozoa Electra pilosa Marine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Cleman archinelago)			intertidally most abundant on tufted red algae such as
Bryozoa Electra pilosa Marine; various substrata, particularly <i>Fucus serratus</i> and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Clenan archinelago)			Lomentaria, Laurencia, and Chondrus. A southern species
Bryozoa Electra pilosa Marine; various substrata, particularly Fucus serratus and other algae; lower shore and shallow water; all coasts; very common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Usles of Scilly and Brittany peninsula (Clenan archinelago)			extending from the Mediterranean to the west and south-
Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common, North America, Arctic south to Islee of Scilly and Brittany pennsula (Clenan archinelago)	Bryozoa	Electra pilosa	Marine: various substrata, particularly <i>Fucus serratus</i> and
Common. Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Uslee of Scilly and Brittany peninsula (Glenan archinelago)			other algae; lower shore and shallow water; all coasts; very
Tunicata Dendrodoa grossularia On rock, stones, shells etc. from the lower shore into deep water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Isles of Scilly and Brittany pennsula (Glenan archinelago)			common.
water; all coasts, in aggregations; particularly in the south and west; locally common; North America, Arctic south to Isles of Scilly and Brittany peninsula (Clenan archinelago)	Tunicata	Dendrodoa grossularia	On rock, stones, shells etc. from the lower shore into deep
and west, locally common; North America, Aferic South to Isles of Scilly and Brittany peninsula (Clenan archinelago)			water; all coasts, in aggregations; particularly in the south
			Isles of Scilly and Brittany peninsula (Glenan archipelago)

Table 6 A list of a	dult species	found in	subtidal	sand	habitat	in the S	Severn
Estuary.	_						

Group	Species	Distribution
Annelida	Capitella capitata:	At low water and offshore, in muddy sand or rich mud and under stones; often indicates polluted conditions. European coasts from Arctic to the Mediterranean, widespread elsewhere around Atlantic and Pacific coasts.
	Nephtys cirrosa:	Intertidal and at low water. All around Britain, Atlantic coast of Europe.
Crustacea	Eurydice pulchra:	Up to HWN in intertidal sand, swimming freely with the rising tide; all British coasts; common. Distributed from Norway to Morocco; absent from the Mediterranean.
	Gammarus salinus:	Brackish waters, usually in more saline conditions than <i>G. zaddachi</i> . All coasts.
	Haustorius arenarius	In clean, medium to coarse sands. Intertidal, generally close to the highest point of emergence of water table. All coasts, including sandy estuaries. Common.

Plate 1 – Sample substrates



Site 24b – clean sand



Site 19a – Clean sand



Site 26b – Sand, shell & mud

Plate 2 – Sample substrates



Site 27b – Sand, mud & stone



Site 21b – Sand & mud



Site 15a – Stone & mud

Plate 3 – Sample substrates



Site 4a - Stone



Site 21a – Sabellaria & muddy sand



Site 33b - Sabellaria

Plate 4 – *Sabellaria alveolata*, Duckpool, North Cornwall

