Our ref: V-KAY-104

Jon Dean
Kaymac Marine & Civil Engineering
Osprey Business Park, Byng Street,
Landore, West Glamorgan.
Swansea.
SA1 2NR

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Dear Jon,

Invertebrate assessment of jetty pilings, Milford Haven.

Please find below Thomson Unicomarine's methodology and results for the benthic invertebrate analysis from Milford Haven Jetty piles.

Sampling

Qualitative sampling was carried out by Kaymac Civil and Marine Engineering. A total of 5 scrape samples were taken from jetty piles. Each sample was a 10 cm x 10 cm square of the jetty piling scraped into a bag and sealed. A bed sample was also taken at the foot of Pile U41. Samples were packed into a coolbox and delivered to the Thomson Unicomarine laboratory in Guildford.

Sample Analysis

On arrival in Thomson Unicomarine's laboratory, each sample was fixed using a 4% formaldehyde solution. A list of the samples is given in Table 1. After several days in preservative the samples were sieved over a stack of certified (ISO3310 – BS410) standard mesh sieves (4 mm, 2 mm, 1 mm and 0.5 mm) in our ventilated washroom. Taxa were extracted from each fraction. Larger fractions were analysed in trays in the washroom, whilst smaller fractions were analysed under a stereo microscope. Once all taxa had been extracted, the samples were checked by a second analyst to ensure organisms were not missed. Following this internal quality control, samples were passed to an experienced biologist for taxonomic identification using stereo and compound microscopes and standard literature. Due to the high numbers of certain species in each sample, they were subsampled for these particular species. The method for subsampling is given in Appendix 2.

Table 1. Sample list

Sample
Pile A41
Pile B08

Pile C33
Pile D26
Pile U41
Pile R41 bed sample

Results

The full results of this analysis are given in Appendix 1 as a matrix of species per station. The number of individuals and taxa in each sample are shown as well as notes on the subsampled species. All values given have been multiplied by the subsample factor. Colonial taxa, such as algae, bryozoans and hydroids were excluded from the total number of individuals but included when calculating the total number of taxa.

In the scrape samples the number of taxa varied from 23 to 34 and the number of individuals varied from 2863 to 8995. The bed sample had 808 individuals from 22 taxa. The scrape samples were dominated by the black lined periwinkle (*Littorina saxatilis*) and the Australasian barnacle (*Austrominius modestus*). The bed sample was dominated by nematodes and the cirratulid polychaete of the genus *Monticellina.*

Discussion

The scrape samples are moderately rich in fauna and there do not seem to be notable differences between piles at different locations on the jetty. No British Red Data Book (Bratton, 1991) or species listed as nationally rare or scarce (Sanderson, 1996) were found in the survey. Two non-native species (Eno *et al.*, 1997) were recorded; namely the barnacle *Austrominius modestus* and the amphipod crustacean *Monocorophium sextonae*. Both of these species are widespread throughout the UK.

Removing the bracing and deck from the existing piles and replacing it with new bracing and deck may disturb the existing fauna on or around the piles, but as this would be a short term disturbance it is likely that all habitats would return to their original state soon after construction ends. Therefore long-term impact to the integrity of the habitats would be avoided. As no protected species were found in the samples, there should be no legal or planning policy issues with respect to protected species at this site. The lack of evidence of protected or rare species at this site also means that removing the existing bracing from the water column should not be significantly detrimental to the ecology or diversity of the local habitat.

Yours sincerely,

Daisy Chamberlain

Encl: Appendix 1. Species data matrix
Appendix 2. Subsampling methodology

Appendix 1: Species Data Matrix

SDC	TaxonName	Pile A41 a 64504	Pile B08 a 64505	Pile C33 a 64506	Pile D26 a 64507	Pile U41 a 64509	Pile R41 bed sample 64508
ZR0002	PHAEOPHYCEAE	P	-	-	P	P	-
ZS0002	CHLOROPHYCEAE	-	-	-	P	-	-
	ANIMALIA (eggs)	-	-	-	P	-	-
	Lagotia viridis	-	-	P	-	P	-
C0001	PORIFERA	-	-	P	P	P	-
C0152	DEMOSPONGIAE	P	P	P	P	P	-
D0447	Plumulariidae	-	-	-	P	-	-
D0413	Diphasia	P	-	-	-	-	-
D0491	Campanulariidae	-	-	-	P	-	-
D0662	ACTINIARIA	2	1	2	4	2	-
D0759	Edwardsiidae	-	-	-	-	-	2
HD0001	NEMATODA	-	-	-	-	-	583
K0015	Loxosomella	-	-	-	-	-	P
N0014	Golfingia elongata	-	-	1	-	-	-
P0091	Pholoe	-	1	-	-	-	-
	Pholoe assimilis	1	-	-	3	-	-
P0094	Pholoe inornata	-	-	1	-	6	1
P0118	Eteone cf. longa	-	-	-	-	-	2
P0451	Proceraea	-	1	-	-	-	-
P0371	Syllis variegata	-	1	-	-	-	-
P0458	Nereididae (juv.)	1	-	-	-	-	-
P0499	Nephtys hombergii	-	-	-	-	-	2
	Lumbrineris cf. cingulata (agg.)	-	-	-	-	-	3
P0776	Pygospio elegans	-	-	-	-	-	1
P0832	Chaetozone	-	-	-	-	-	1
P0843	Monticellina	-	-	-	-	-	149
P0868	Cossura	-	-	-	-	-	1
P0878	Diplocirrus glaucus	-	-	-	-	-	1
P1139	Ampharete lindstroemi (agg.)	-	-	-	-	-	1
P1124	Melinna palmata	-	-	-	-	-	2
P1117	Sabellaria spinulosa	-	-	-	-	1	-
P1257	Sabellidae	-	-	-	-	7	-
P1487	Tubificoides (Type 1)	-	-	-	-	-	6
P1490	Tubificoides benedii	-	-	-	1	-	17
P1498	Tubificoides pseudogaster (agg.)	-	-	-	-	-	14
Q0017	Achelia laevis	-	1	-	-	1	-
Q0038	Callipallene tiberi	1	-	-	-	-	-
Q0054	ACARINA	-	3	-	-	-	-
R0015	THORACICA	565	-	444	552	296	-
R0015	THORACICA (eggs)	-	P	-	-	P	-
R0068	Austrominius modestus	1553	6416	6224	6336	3728	-
R2413	MYODOCOPIDA	-	-	-	-	1	2
S0097	AMPHIPODA	1	-	-	-	1	-
S0180	Leucothoe spinicarpa	-	-	-	1	-	-
S0303	Lysianassa ceratina	5	2	4	4	8	-
S0604	Corophiidae	-	-	-	2	-	-
S0611	Crassicorophium crassicorne	2	-	-	-	-	-
S0606	Monocorophium acherusicum	-	2	-	-	-	-
S0615	Monocorophium sextonae	-	2	2	-	4	-
S0859_97	Campecopea hirsuta	-	-	-	2	1	-
S1056	Ligia oceanica	3	-	-	-	-	-
S1142	Tanaopsis graciloides	-	-	-	-	-	10
S1276	DECAPODA	-	1	-	-	-	-
S1360	Thoralus cranchii	1	-	-	-	-	-
S1482	Pisidia longicornis	-	-	2	-	5	-
S1518	Hyas araneus	-	-	-	-	1	-
S1529	Macropodia	1	-	-	-	-	-
S1615	Pilumnus hirtellus	1	1	-	4	-	-
	INSECTA	-	-	-	-	1	-
	INSECTA (larva)	-	-	-	3	-	-
	DIPTERA (larva)	-	-	-	-	2	-
W0305	Littorina saxatilis	716	839	948	2012	1126	-
W0309	Melarhaphe neritoides	-	25	-	2	-	-
W0461	Trivia monacha	-	-	1	-	-	-
W1159	Berthella plumula	-	-	-	-	1	-
W1563	Nuculidae	1	-	-	-	-	-
W1570	Nucula nucleus	-	-	-	-	-	1
W1691	Mytilidae (juv.)	-	-	-	-	1	-
W1805	Anomiidae	-	-	1	-	1	-
W1809	Heteranomia squamula	-	-	-	1	-	-
W1837	Thyasira flexuosa	-	-	-	-	-	3
W1880	Lasaea adansoni	-	3	1	41	18	-
W2059	Abra alba	-	-	-	-	-	6
W2166	Hiatella arctica	-	-	1	-	3	-
Y0013	Crisia	P	P	P	P	-	-
Y0039	Eurystrotos compacta	-	P	-	P	P	-
Y0165	Eucratea loricata	P	-	-	-	-	-
Y0187	Flustra foliacea	-	-	-	P	-	-
Y0256	Bicellariella ciliata	-	P	P	P	P	-
Y0240	Bugula	-	-	-	P	-	-
Y0274	Scrupocellaria	-	P	P	-	P	-
Y0279	Scrupocellaria scruposa	-	-	-	P	-	-
ZB0010	Antedon bifida	5	13	5	20	11	-
ZB0123	Ophiothrix (juv.)	1	-	-	-	-	-
ZB0128	Ophiocomina nigra	-	-	3	-	-	-
ZB0128	Ophiocomina nigra (juv.)	-	-	1	-	-	-
ZB0161	Amphipholis squamata	3	28	18	7	43	-
ZD0002	ASCIDIACEA	-	P	-	-	1	-
ZD0041	Didemnidae	-	P	-	-	P	-
ZF0001	ELASMOBRANCHII (eggs)	-	2	-	-	-	-
ZG0001	ACTINOPTERYGII (eggs)	-	3	-	-	-	-
	Notes	Littorinidae & Thoracica subsampled to 1/4	Littorinidae & Thoracica subsampled to 1/4	Littorinidae & Thoracica subsampled to 1/4	Littorinidae & Thoracica subsampled to 1/8	Littorinidae & Thoracica subsampled to 1/8	Nematoda subsampled to 1/4
	Number of individuals	*2863*	*7345*	*7659*	*8995*	*5270*	*808*
	Number of taxa	*23*	*27*	*23*	*30*	*34*	*22*

Appendix 2: Subsampling methodology

2.1.1 Subsampling is not routine apart from where there are very large numbers (100+) of certain taxa within a sample or where the volume of light sediment ("float") is very high. Where the abundance of each taxon is low and diversity high it is not appropriate to use subsampling.

2.1.2 It is standard practice only to subsample down to 1/8 of the original sample. Where further subsampling is necessary this is only done after consultation with the client.

2.1.3 The decision as to whether to subsample and the fraction to be examined is made by the Project Manager after discussion with other project staff. The following are taken into account:

- Abundance of certain taxa
- Volume of "float"
- Diversity of taxa
- Sample size

In essence the key questions are whether use of subsampling could affect the quality of results obtained and whether it is possible to analyse the entire sample without subsampling.

Procedure

2.1.4 For samples where subsampling has been identified for specific taxa only, the entire sample is first sorted by the usual methods, extracting all fauna with the exception of those specific taxa. All of these animals are identified, enumerated and added to the data sheets in the normal way. Once this has been done, the method is dependent on the species to be subsampled.

2.1.5 Heavier species such as gastropods or barnacles are spread out evenly in a white tray marked into 4 or 8 sections using a marker. All specimens in one section are removed, identified and enumerated. This figure is recorded on the identification sheet and then multiplied by the subsampled factor *e.g.* 4 or 8 and recorded.

2.1.6 Where the species to be subsampled are found in the 'float' this is placed into a subsampling device ("quarteriser") following the initial extraction for all other taxa. The entire float (0.5 – 1 mm and / or 1 – 2 mm fraction) of the sample is washed into the "quarteriser" and water is added to approximately half the depth of the device. The bung is placed into the top of the device, which is then shaken to ensure equal division of the sediment between the four compartments. After shaking, any residue left on the bung and the sides of the "quarteriser" is rinsed into the device using a water bottle. The device is then left to stand undisturbed for several minutes, until all sediment in the sample has settled. At this point, the cap from one of the quarters in the bottom of the device is removed and the quarter left to drain out into a bucket or sieve. The liquid, with its quarter of sediment is drained out slowly to prevent disturbance to the partition, which would otherwise cause material to flow into the opened quarter from other compartments. The empty compartment is then carefully rinsed to add any animals left on the sides to the quarter. The quarter fraction is then picked under a stereomicroscope as per 4.3 and the extracted fauna identified and enumerated as detailed. The figures are then multiplied by four and added to the existing fully counted data to give an estimate of the total count for each sample.