



Pre-Permitting Environmental / Socio-Economic Data Report Series

Report Series J- Marine Nearshore Fish and Benthic Invertebrates

Report J-2 Marine Benthic Macrofauna Data Tables 2004-2007

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The Pebble Partnership is providing environmental and socio-economic baseline data collected to inform the development of the Pebble Project to state and federal agencies, project stakeholders and the general public prior to project permitting as part of its commitment to full and open disclosure.

A comprehensive Environmental Baseline Document (EBD) will subsequently be prepared and appended to future project permit applications. The EBD will also be made publicly available when complete.

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Report J-2 Table 1
 Dominant Intertidal Macro-infaunal Taxa by Average Abundance^a

Station	2004		2005	
	Taxon ^b	No./m ²	Taxon ^b	No./m ²
MBB-Low	<i>Chaetozone sp.</i>	488	<i>Polydora sp.</i>	2,420
	<i>Pygospio elegans</i>	488	<i>Pygospio elegans</i>	821
	<i>Aricidea lopezi</i>	111	<i>Chaetozone sp.</i>	422
	<i>Nephtys ciliata</i>	67	<i>Capitella capitata</i>	266
	<i>Nephtys sp. (tied)</i>	67	<i>Nephtys ciliata</i>	111
	Caprellidea	67		
	<i>Lacuna sp.</i>	67		
MPS1A-Middle	<i>Cossura sp.</i>	67	<i>Spio filicornis</i>	67
	<i>Nephtys longosetosa</i>	44	<i>Balanus sp.</i>	44
	<i>Macoma sp.</i>	22	<i>Nephtys longosetosa</i>	22
	Rhynchocoela	22	<i>Littorina sitkana</i>	22
	<i>Prionospio sp.</i>	22	<i>Lacuna vincta</i>	22
MPS2-Low	<i>Nephtys cornuta</i>	200	<i>Nephtys ciliata</i>	67
	<i>Nephtys ciliata</i>	111	<i>Lacuna sp.</i>	22
	Caprellidea	44	<i>Macoma sp.</i>	22
	<i>Spio filicornis</i>	22	<i>Nephtys sp.</i>	22
MPS3-Low	<i>Nephtys cornuta</i>	155	<i>Polydora sp.</i>	710
	<i>Macoma sp.</i>	155	<i>Nephtys cornuta</i>	244
	<i>Nephtys ciliata</i>	133	<i>Spio filicornis</i>	200
	<i>Mya sp.</i>	44	<i>Nephtys ciliata</i>	200
	<i>Ampharete sp.</i>	44	<i>Lacuna sp.</i>	155
MPS3-Middle	<i>Scoloplos armiger</i>	111	Not sampled for infauna in 2005.	
	<i>Nephtys ciliata</i>	111		
	<i>Polydora sp.</i>	89		
	<i>Macoma baltica</i>	67		
	Orbiniidae	67		
MPS4-Middle	<i>Polydora sp.</i>	577	<i>Mysella planata</i>	511
	<i>Nephtys ciliata</i>	333	<i>Polydora sp.</i>	511
	<i>Nephtys sp.</i>	244	<i>Lacuna sp.</i>	244
	<i>Scoloplos armiger</i>	111	<i>Nephtys sp.</i>	67
	Capitellidae	89	<i>Eteone sp.</i>	67
			<i>Leitoscoloplos panamensis</i>	67
			<i>Nephtys ciliata</i>	67

Notes:

- Abundance values shown are the mean of all replicate samples for each station.
- Fragment categories and higher taxa categories containing other taxa categories (polychaeta, bivalvia, and gastropoda) are not included.

All n = 5.

No./m² = number of organisms per square meter.

Report J-2 Table 1
 Dominant Intertidal Macro-infaunal Taxa by Average Abundance^a

Station	2004		2005	
	Taxon ^b	No./m ²	Taxon ^b	No./m ²
MPSE-Middle	<i>Macoma baltica</i>	821	<i>Macoma sp.</i>	89
	<i>Mya sp.</i>	44	<i>Eteone sp.</i>	22
	Priapulidae	22		
	<i>Pygospio elegans</i>	22		
	<i>Eteone sp.</i>	22		
MBSA1-Middle	Not sampled for infauna in 2004.		<i>Pygospio elegans</i>	2,153
			<i>Macoma sp.</i>	111
			<i>Nephtys ciliata</i>	89
			<i>Macoma baltica</i>	89
			Orbiniidae	67

Notes:

- a. Abundance values shown are the mean of all replicate samples for each station.
- b. Fragment categories and higher taxa categories containing other taxa categories (polychaeta, bivalvia, and gastropoda) are not included.

All n = 5.

No./m² = number of organisms per square meter.

Report J-2 Table 2

Dominant Intertidal Macroinfaunal Taxa by Average Wet-weight Biomass^a

Station	2004		2005	
	Taxon	Biomass (g/m ²)	Taxon	Biomass (g/m ²)
MBB-Low	<i>Nephtys ciliata</i>	8.969	<i>Nephtys ciliata</i>	5.483
	<i>Nephtys caeca</i>	4.085	<i>Polydora sp.</i>	3.263
	Maldanidae	0.488	<i>Notoproctus pacificus</i>	1.709
	<i>Lacuna sp.</i>	0.466	<i>Mysella planata</i>	1.510
	<i>Chaetozone sp.</i>	0.344	Maldanidae	0.688
	<i>Pygospio elegans</i>	0.344		
MPS1A-Middle	<i>Nephtys longosetosa</i>	0.311	<i>Littorina sitkana</i>	0.822
	<i>Macoma sp.</i>	0.133	<i>Nephtys longosetosa</i>	0.622
	<i>Cossura sp.</i>	0.022	<i>Spio filicornis</i>	0.133
	Rhynchocoela	0.011	<i>Balanus sp.</i>	0.111
	<i>Prionospio sp.</i>	0.011	<i>Lacuna vincta</i>	0.044
MPS2-Low	<i>Nephtys ciliata</i>	6.394	<i>Nephtys ciliata</i>	7.792
	<i>Nephtys cornuta</i>	0.289	<i>Macoma sp.</i>	2.153
	Caprellidea	0.011	<i>Nephtys sp.</i>	0.533
	<i>Spio filicornis</i>	0.011	<i>Lacuna sp.</i>	0.044
MPS3-Low	<i>Macoma sp.</i>	9.946	<i>Nephtys ciliata</i>	15.251
	<i>Nephtys ciliata</i>	7.814	<i>Macoma sp.</i>	4.706
	<i>Clinocardium nuttallii</i>	1.132	<i>Mysella planata</i>	1.754
	<i>Nephtys cornuta</i>	0.244	<i>Harmothoe imbricata</i>	0.910
	<i>Ampharete sp.</i>	0.178	<i>Polydora sp.</i>	0.855
MPS3-Middle	<i>Macoma baltica</i>	36.386	Not sampled for	
	<i>Echiurus echiurus</i>	5.794	infauna in 2005.	
	<i>Macoma sp.</i>	4.307		
	<i>Scoloplos armiger</i>	3.552		
MPS4-Middle	<i>Nephtys ciliata</i>	2.575		
	<i>Cistenides granulata</i>	4.373	<i>Mysella planata</i>	6.349
	<i>Macoma sp.</i>	3.552	<i>Leitoscoloplos panamensis</i>	2.597
	<i>Nephtys ciliata</i>	2.109	<i>Nephtys ciliata</i>	2.531
	<i>Ampharete sp.</i>	1.532	<i>Nephtys sp.</i>	0.599
	<i>Scoloplos armiger</i>	0.955	<i>Polydora sp.</i>	0.544

Notes:

a. Biomass values shown are the mean of all replicate samples for each station.

All n = 5.

g/m² = grams per square meter.

Report J-2 Table 2

Dominant Intertidal Macroinfaunal Taxa by Average Wet-weight Biomass^a

Station	2004		2005	
	Taxon	Biomass (g/m ²)	Taxon	Biomass (g/m ²)
MPSE-Middle	<i>Macoma baltica</i>	89.888	<i>Macoma sp.</i>	6.882
	<i>Priapulidae</i>	1.021	<i>Eteone sp.</i>	0.044
	<i>Eteone sp.</i>	0.355		
	<i>Mya sp.</i>	0.222		
	<i>Pygospio elegans</i>	0.011		
MBSA1-Middle	Not sampled for infauna in 2004.		<i>Macoma golikovi</i>	34.343
			<i>Macoma baltica</i>	32.834
			<i>Macoma sp.</i>	14.896
			<i>Nephtys ciliata</i>	3.086
			<i>Pygospio elegans</i>	0.955

Notes:

a. Biomass values shown are the mean of all replicate samples for each station.

All n = 5.

g/m² = grams per square meter.

Report J-2 Table 3

Averages^a of Results for Various Intertidal Macro-infaunal Measures by Station and Year

Station	Abundance (No./m ² ; n = 5)				Biomass (g/m ² ; n = 5)				Number of Taxa			
	2004		2005		2004		2005		2004		2005	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MBB-Low	1643	946.0	4933	7990.2	19.5	10.7	16.7	17.6	6.6	2.30	7.6	5.13
MPS1A-Middle	222	272.0	178	126.7	0.6	0.7	1.7	1.9	1.6	1.7	6.4	1.34
MPS2-Low	422	345.7	156	60.9	8.4	6.2	15.4	11.4	1.8	1.10	1.4	0.55
MPS3-Low	577	287.3	4333	2615.2	19.5	15.3	28.2	20.3	3.4	1.34	10.2	2.59
MPS3-Middle	799	473.5	N/A	N/A	58.9	68.6	N/A	N/A	5.2	3.03	N/A	N/A
MPS4Middle	1998	977.2	1911	1384.2	15.6	10.6	14.9	9.0	7.4	2.30	7.0	2.12
MPSE-Middle	1043	126.6	733	1161.6	92.0	36.5	7.3	7.9	2.4	1.14	2.0	1.58
MBSA1-Middle	N/A	N/A	2867	2670.6	N/A	N/A	88.6	84.1	N/A	N/A	1.4	0.89

Station	Simpson's Dominance ^b				Shannon Diversity ^b			
	2004		2005		2004		2005	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MBB-Low	0.25	0.087	0.35	0.078	1.58	0.386	1.34	0.267
MPS1A-Middle	0.44	0.095	0.51	0.354	0.88	0.317	0.35	0.400
MPS2-Low	0.80	0.288	0.50	0.500	0.35	0.488	0.28	0.380
MPS3-Low	0.38	0.142	0.25	0.129	1.08	0.402	1.83	0.290
MPS3-Middle	0.37	0.358	N/A	N/A	1.35	0.823	N/A	N/A
MPS4-Middle	0.25	0.083	0.30	0.175	1.65	0.320	1.52	0.507
MPSE-Middle	0.69	0.226	0.50	0.386	0.53	0.411	0.24	0.233
MBSA1-Middle	N/A	N/A	0.48	0.177	N/A	N/A	1.15	0.356

Notes:

a. Values are means for all replicate samples at each station; samples with no infauna were given a count and weight of zero.

b. Diversity values were calculated using only results greater than zero.

N/A = not applicable (no samples collected).

Report J-2 Table 4

Average^a Abundance (No./m²) and Biomass (g/m²) for Intertidal Mega-infauna by Station and Major Taxa

Station	Number of Replicates	Annelida		Mollusca		Arthropoda		Miscellaneous		Total	
		No./m ²	g/m ²	No./m ²	g/m ²	No./m ²	g/m ²	No./m ²	g/m ²	No./m ²	g/m ²
MBSA1	2	16	0.4	16	0.2	8	0.1	2	0.1	42	0.9
MPS2	2	14	5.8	28	25.2	2	0.9	4	137.4	48	169.3
MPS3	1	164	74.3	420	2281.1	88	8.8	8	0.3	680	2364.5
Overall	5	194	80.5	464	2306.5	98	9.8	14	137.9	770	2534.7

Notes:

- a. Averages are the mean for all replicate samples for each station; values for MPS3 are total results, rather than means, because only one sample was collected at that station.

Report J-2 Table 5

Dominant Subtidal Macro-infaunal Taxa (Top 10 for each Station) by Average Abundance and Average Biomass^a

Year	Station	Abundance		Biomass	
		Taxon	No./m ²	Taxon	g/m ²
1976 ^b	54	<i>Lumbrineris zonata</i>	346	<i>Nephtys rickettsi</i>	8.194
		<i>Lumbrineris sp.</i>	184	<i>Praxillella gracilis</i>	4.267
		<i>Prionospio sp.</i>	94	<i>Macoma moesta alaskana</i>	2.951
		<i>Magelona japonica</i>	79	<i>Praxillella praetermissa</i>	1.843
		<i>Praxillella gracilis</i>	64	<i>Macoma calcarea</i>	1.607
		<i>Haploscoloplos elongatus</i>	60	<i>Lumbrineris zonata</i>	1.524
		<i>Praxillella affinis</i>	46	<i>Haploscoloplos elongatus</i>	1.250
		<i>Ennucula tenuis</i>	41	<i>Nephtys punctata</i>	1.183
		<i>Prionospio steenstrupi</i>	34	<i>Praxillella affinis</i>	1.163
		<i>Macoma moesta alaskana</i>	33	<i>Lumbrineris sp.</i>	0.984
2004	MOPP1	Terebellidae	2180	Terebellidae	4.290
		<i>Lumbrineris luti</i>	710	<i>Lumbrineris luti</i>	4.140
		<i>Ampharete sp.</i>	360	<i>Nephtys ciliata</i>	2.890
		<i>Spiophanes bombyx</i>	290	<i>Nephtys sp. A</i>	1.810
		<i>Ampharete acutifrons</i>	240	<i>Scoloplos armiger</i>	1.560
		Orbiniidae	170	<i>Ampharete acutifrons</i>	1.370
		<i>Spiophanes sp.</i>	140	<i>Spiophanes bombyx</i>	1.110
		<i>Scoloplos armiger</i>	120	<i>Mactromeris polynyma</i>	0.920
		<i>Aricidea lopezi</i>	110	<i>Leitoscoloplos panamensis</i>	0.450
		<i>Nephtys ciliata</i>	90	<i>Ennucula tenuis</i>	0.440
2004	MPS1	<i>Lumbrineris luti</i>	892	<i>Macoma calcarea</i>	104.856
		<i>Prionospio steenstrupi</i>	740	<i>Macoma brota</i>	99.540
		<i>Cossura sp.</i>	260	<i>Macoma sp.</i>	26.182
		<i>Ennucula tenuis</i>	256	<i>Nephtys ciliata</i>	13.150
		<i>Leitoscoloplos panamensis</i>	112	<i>Ennucula tenuis</i>	11.448
		<i>Magelona longicornis</i>	100	<i>Yoldia hyperborea</i>	10.838
		<i>Nephtys ciliata</i>	98	<i>Macoma moesta</i>	6.482
		<i>Pholoe minuta</i>	96	<i>Lumbrineris luti</i>	6.338
		<i>Nephtys cornuta</i>	80	<i>Lumbrineris cf lagunae</i>	2.308
		Terebellidae	80	Hydrozoa	1.551

Notes:

- Values for abundance and biomass are means for all replicate samples for each station.
- From Feder et al., 1980.

Report J-2 Table 5

Dominant Subtidal Macro-infaunal Taxa (Top 10 for each Station) by Average Abundance and Average Biomass^a

Year	Station	Abundance		Biomass	
		Taxon	No./m ²	Taxon	g/m ²
2004	MPS2	<i>Lumbrineris luti</i>	290	<i>Macoma calcarea</i>	53.690
		<i>Prionospio steenstrupi</i>	216	<i>Nephtys caeca</i>	11.098
		<i>Ennucula tenuis</i>	138	<i>Nephtys ciliate</i>	7.838
		<i>Nephtys ciliata</i>	110	<i>Ennucula tenuis</i>	7.084
		Terebellidae	102	Hydrozoa A	6.200
		<i>Nephtys sp.</i>	82	<i>Macoma sp.</i>	5.784
		<i>Autolytus sp.</i>	82	<i>Macoma baltica</i>	5.194
		<i>Macoma sp.</i>	62	<i>Yoldia myalis</i>	4.428
		<i>Pholoe minuta</i>	58	Hydrozoa B	2.758
		Orbiniidae	52	<i>Bryozoa</i>	2.312
2004	MPS4	<i>Prionospio steenstrupi</i>	314	<i>Nephtys caeca</i>	15.308
		<i>Lumbrineris luti</i>	238	<i>Nephtys ciliate</i>	8.030
		Terebellidae	236	<i>Yoldia hyperborea</i>	8.002
		Orbiniidae	138	<i>Macoma brota</i>	4.926
		<i>Nephtys sp.</i>	138	<i>Macoma calcarea</i>	4.750
		<i>Nephtys ciliata</i>	132	<i>Ennucula tenuis</i>	3.514
		Cirratulidae	82	<i>Lumbrineris luti</i>	1.380
		<i>Nephtys cornuta</i>	74	<i>Macoma sp.</i>	0.956
		<i>Magelona longicornis</i>	54	<i>Magelona longicornis</i>	0.918
		<i>Aricidea lopezi</i>	52	<i>Ampharete acutifrons</i>	0.742

Notes:

- a. Values for abundance and biomass are means for all replicate samples for each station.
- b. From Feder et al., 1980.

Report J-2 Table 6
Average^a Results for Various Subtidal Infaunal Measures by Station

Station	Number of Samples	Abundance (No/m ²)		Biomass (g/m ²)		Number of Taxa		Simpson Dominance		Shannon Diversity	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
54 ^b	7	1,367	620.9	37.2	20.6	26	3.7	0.18	0.04	2.38	0.22
MOPP1 ^c	1	5,090	N/A	25.3	N/A	31	N/A	0.22	N/A	2.24	N/A
MPS1	5	3,618	940.3	297.0	230.6	40	8.6	0.13	0.02	2.68	0.25
MPS2	5	1,894	988.7	117.8	110.2	35	10.7	0.10	0.03	2.86	0.31
MPS4	5	1,882	1024.6	53.9	53.1	25	6.8	0.13	0.07	2.51	0.37
Overall ^d	16	2,629	1368.3	148.0	172.7	33	10.2	0.12	0.05	2.66	0.33

Notes:

- a. Results shown are means for all replicate samples at each station.
 - b. From Feder et al., 1980.
 - c. Standard deviations cannot be calculated for sites with one replicate.
 - d. Excluding station 54, which was not part of the Pebble Project studies.
- N/A = not available.