

Appendix 4.3 Report for Benthic Grab Sampling Survey in Aberdeen Channel near Ap Lei Chau Bridge – Wet and Dry Seasons

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1 Introduction

Grab sampling surveys were performed in Aberdeen Channel near the Ap Lei Chau Bridge in wet and dry seasons to collect data and assess the conditions of the benthic communities. This paper reported the methodology and the results of the surveys.

2 Methodology

The grab sampling was conducted on 20 January 2009 for dry season and on 12 April 2009 for wet season. The three sampling locations as specified in the specifications (shown in **Table 1** below) were identified on site by hand-held GPS.

Table 1: Coordinates of the sampling locations

Sampling Locations	Easting	Northing
M1	834470.6656	811938.6817
M2	834551.8954	811883.1503
M3	834642.0562	811767.3422

At each site, three replicates of 0.05m² sediment were collected using a modified van Veen Grab. The collected samples were stored in labeled plastic zip bags, and then transported to the laboratory for sieving and sorting. The samples were sieved by 0.5mm mesh-sized sieve and then preserved in 5% formalin with Rose Bengal. Organisms in the preserved sediment samples were sorted and transferred into 70% alcohol for storage. Benthic organisms were identified to the lowest practicable taxonomic level by two marine benthic specialists as follows:

3 Results

The benthic organisms in the collected samples were of very low abundance and diversity. Only 7 individuals from 5 species were found in the 9 samples (3 replicate samples from each of the three sampling locations) during the dry season survey, and only 13 individual from 7 species were recorded during the wet season. The species recorded were shown in **Table 2** below. No species of conservation importance was recorded in the survey.

The samples contained a large amount of leaf litter fragments and plastic bags, possibly brought by the discharge from the nearby drainage channel. The sediment collected was of black colour and with odour, which indicated a high organic content in the sediment and polluted condition.

Table 2: List of recorded benthos in the survey

Phylum	Class/Order	Species	Dry season	Wet season
Nemertean	-	-		✓
ANNELIDA	Polychaeta	<i>Cirratulus filiformis</i>	✓	
		<i>Eunice indica</i>		✓
		<i>Glycinde</i> sp.		✓
		<i>Nectoneanthes multignatha</i>	✓	✓
		<i>Sigambra hanaokai</i>		✓
		<i>Tharyx marioni</i>		✓
ARTHROPODA	Decapoda	<i>Alpheus lobidens</i>	✓	✓
		<i>Neoxenophtalamus obscurus</i>		✓
		<i>Thalamita sima</i>	✓	
CHRODATA	Pisces	<i>Cryptocentrus filifer</i>	✓	

The abundance and biomass of the benthic organisms from the three sampling locations (i.e. M1, M2 and M3) during the wet and dry seasons were shown in **Tables A1 – A12** in **Appendix A**. During the dry season, there was no benthic organism found in all the three replicates from Station M2, while there were only three and four individuals were recorded in the samples from Station M1 and M3 respectively. During the wet season, Station M2 still had a lower abundance and diversity than Station M1 and M3. The Abundance/Biomass Comparison (ABC) plots for Station M1, M2, and M3 were shown in **Chart 1** to **Chart 5** in **Appendix A** (no ABC plot for Station M2 in dry season).

4 Conclusions

Species richness, diversity and evenness indices are inter-related. A diversity index integrates two components: the total number of species (d) and the distribution of individuals among species, into a single number (H'). H' is usually high (e.g. >3 or 4) in environmentally undisturbed benthic communities, and low (e.g. <1) in highly disturbed communities. Values for richness, diversity, and evenness would be high, with d>10, H'>3 and J (evenness) >0.8 for a diverse community structure. In benthic habitats where organic matter is concentrated or dissolved oxygen is low, such values are low, with d<5, H'<2, and J<0.5.

Table 3: Summaries of Statistics for the three stations – dry season

	Station M1	Station M2	Station M3	Total
Species richness	3	0	3	5
No. of individuals	3	0	4	7
Biomass (g)	18.51	0	11.51	30.02
	Station M1	Station M2	Station M3	Average
Density of individuals	20 individual/ m ²	0 individual/ m ²	26.67 individual/ m ²	15.56 individual/ m ²
Density of biomass	123.4 g/ m ²	0 g/ m ²	76.73 g/ m ²	66.71 g/ m ²
H'	1.10	\	1.04	\
J	1.0	\	0.94	\

* There is no species of conservation interest found in the samples.

Table 4: Summaries of Statistics for the three stations – wet season

	Station M1	Station M2	Station M3	Total
Species richness	3	2	5	7
No. of individuals	5	2	6	13
Biomass (g)	0.04	0.51	0.97	1.52

	Station M1	Station M2	Station M3	Average
Density of individuals	33.3 individual/ m ²	13.3 individual/ m ²	40 individual/ m ²	28.9 individual/ m ²
Density of biomass	0.27 g/ m ²	3.40 g/ m ²	6.47 g/ m ²	3.38 g/ m ²
H'	0.95	0.69	1.56	\
J	0.86	1.0	0.97	\

* There is no species of conservation interest found in the samples.

During the dry season, the Shannon-Wiener Diversity index for both M1 and M3 (see **Table 3**) were below 2 and the total number of species was below 5. The results showed that these stations were of low species richness and diversity, and high evenness.

During the wet season, the Shannon-Wiener Diversity index for M1, M2 and M3 (see **Table 4**) were still below 2 and the total number of species was only 7. The results also showed that these stations were of low species richness and diversity, and high evenness.

Given the low diversity community structure and no species of conservation importance present, this area is therefore not of special conservation importance in terms of benthic communities, and is of low ecological value (see **Table 5**).

Table 5: Evaluation of ecological importance of marine benthic habitat

Criteria	Remarks
Subtidal habitats in Aberdeen Channel	
Naturalness	Originally natural, but highly disturbed by organics matter input from the vessels inside the typhoon shelter and the freshwater discharge from the nearby drainage channel.
Size	N/A
Diversity	Low
Rarity	Common habitat in Hong Kong coastal waters. No species of conservation importance was recorded.
Re-creatability	Not re-creatable.
Fragmentation	Unfragmented.
Ecological linkage	Generally, it is linked with open sea. But not functionally linked to any highly valued habitat in close proximity.
Potential value	Low, if the typhoon shelter still in use
Nursery/breeding ground	Low potential as breeding/nursery ground for marine species due to the polluted conditions.
Age	N/A
Abundance/Richness of wildlife	Low
Overall Ecological value	Low

Appendix A. Results of the Benthic Sampling during Wet and Dry Season

Table A-1 Abundance of specimens in Station M1 – Dry season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M1	Percentage
			M1-1	M1-2	M1-3		
1	Polychaeta	<i>Cirratulus filiformis</i>	1			1	33.3%
2	Crustacea	<i>Alpheus lobidens</i>		1		1	33.3%
3	Crustacea	<i>Thalamita sima</i>	1			1	33.3%
Total abundance			2	1	0	3	100%

Table A-2 Biomass of specimens in Station M1– Dry season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M1	Percentage
			M1-1	M1-2	M1-3		
1	Polychaeta	<i>Cirratulus filiformis</i>	0.01			0.01	0.05%
2	Crustacea	<i>Alpheus lobidens</i>		3.5		3.5	18.91%
3	Crustacea	<i>Thalamita sima</i>	15.0			15.0	81.04%
Total biomass (g)			15.01	3.5	0	18.51	100%

Chart 1 ABC plot for Station M1– Dry season

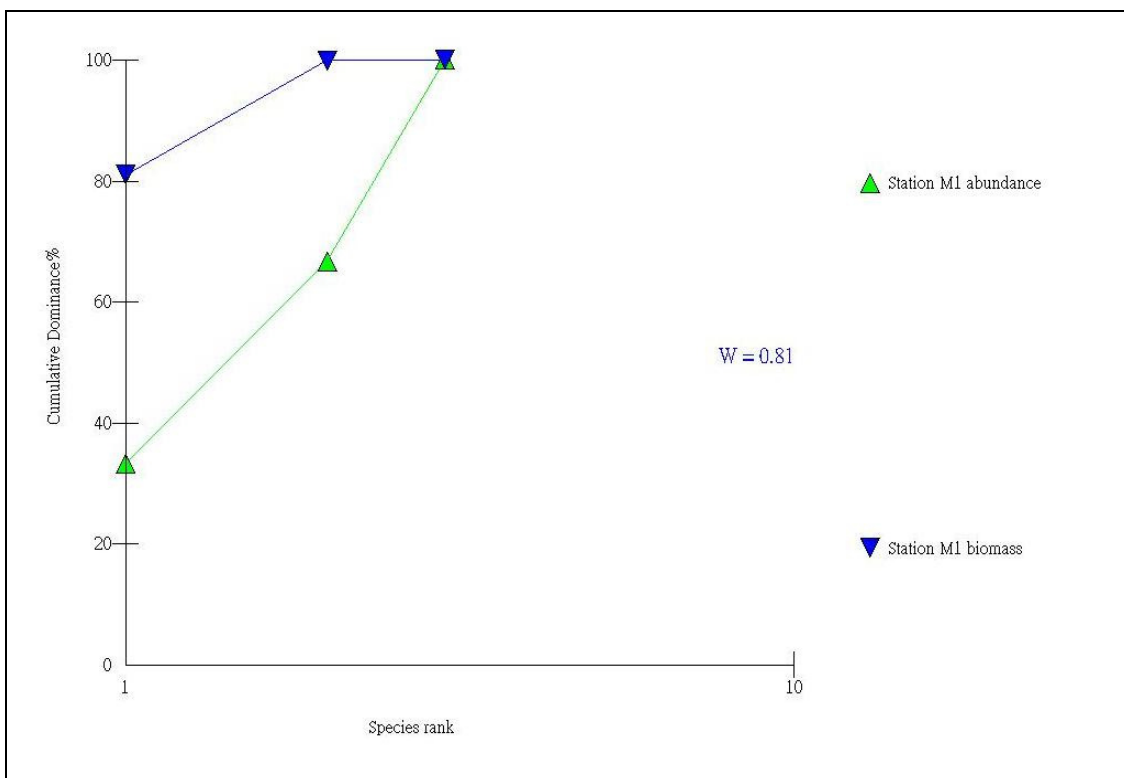


Table A-3 Abundance of specimens in Station M2– Dry season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M2	Percentage
			M2-1	M2-2	M2-3		
\	\	\	\	\	\	\	\
\	\	\	\	\	\	\	\
\	\	\	\	\	\	\	\
Total abundance			0	0	0	0	0%

Table A-4 Biomass of specimens in Station M2– Dry season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M2	Percentage
			M2-1	M2-2	M2-3		
\	\	\	\	\	\	\	\
\	\	\	\	\	\	\	\
\	\	\	\	\	\	\	\
Total biomass (g)			0	0	0	0	0%

Table A-5 Abundance of specimens in Station M3– Dry season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M3	Percentage
			M3-1	M3-2	M3-3		
1	Polychaeta	<i>Nectoneanthes multignatha</i>			1	1	25%
2	Crustacea	<i>Alpheus lobidens</i>	1		1	2	50%
3	Pisces	<i>Cryptocentrus filifer</i>		1		1	25%
Total abundance			1	1	2	4	100%

Table A-6 Biomass of specimens in Station M3– Dry season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M3	Percentage
			M3-1	M3-2	M3-3		
1	Polychaeta	<i>Nectoneanthes multignatha</i>			0.01	0.01	0.08%
2	Crustacea	<i>Alpheus lobidens</i>	0.9		1.1	2.0	16.94%
3	Pisces	<i>Cryptocentrus filifer</i>		9.8		9.8	82.98%
Total biomass (g)			0.9	9.8	1.11	11.81	100%

Chart 2 ABC plot for Station M3– Dry season

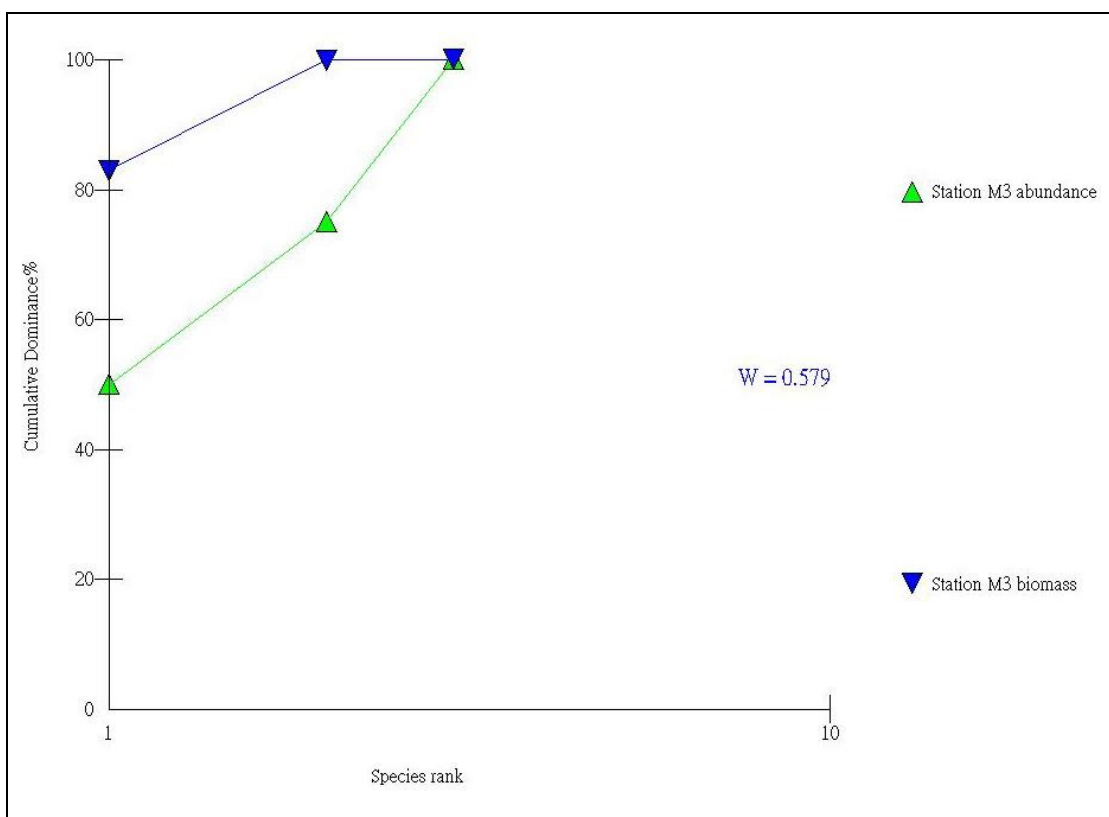


Table A-7 Abundance of specimens in Station M1 – wet season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M1	Percentage
			M1-1	M1-2	M1-3		
1	Nemertean	-	1			1	20%
2	Polychaeta	<i>Sigambra hanaokai</i>	1		2	3	60%
3	Polychaeta	<i>Tharyx marioni</i>		1		1	20%
Total abundance			2	1	2	5	100%

Table A-8 Biomass of specimens in Station M1 – wet season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M1	Percentage
			M1-1	M1-2	M1-3		
1	Nemertean	-	0.01			0.01	25%
2	Polychaeta	<i>Sigambra hanaokai</i>	0.01		0.01	0.02	50%
3	Polychaeta	<i>Tharyx marioni</i>		0.01		0.01	25%
Total biomass (g)			0.02	0.01	0.01	0.04	100%

Chart 3 ABC plot for Station M1 – wet season

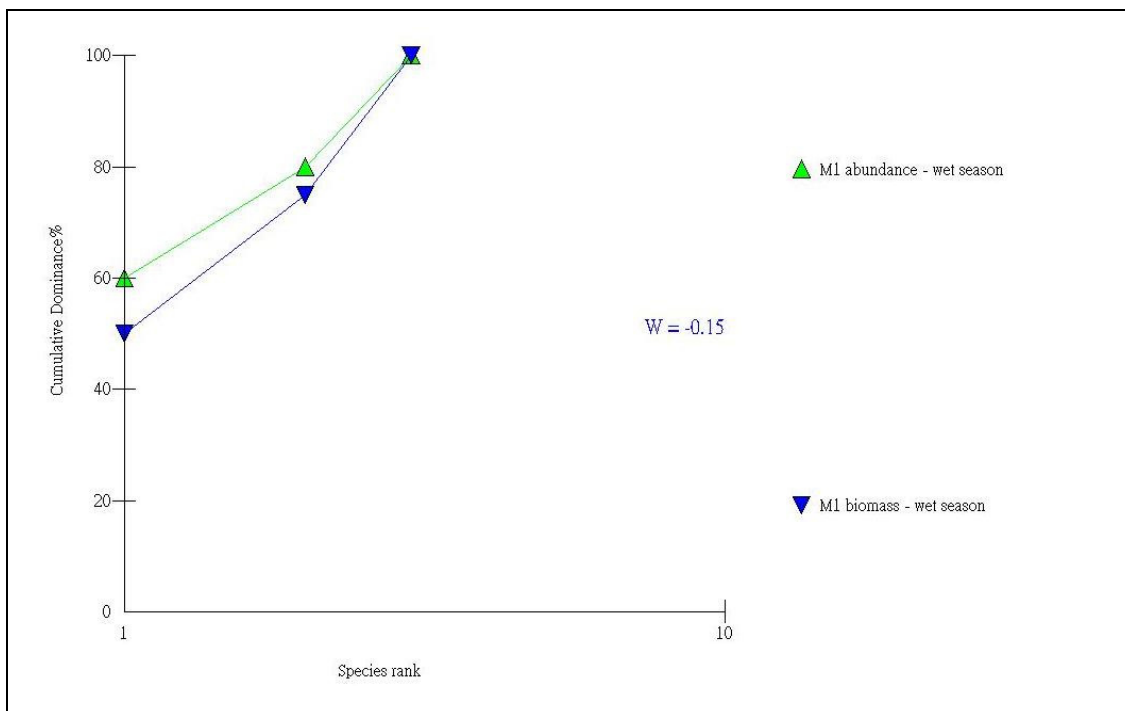


Table A-9 Abundance of specimens in Station M2 – wet season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M2	Percentage
			M2-1	M2-2	M2-3		
1	Nemertean	-	1			1	50%
2	Crustacean	<i>Neoxenophthalmus obscurus</i>		1		1	50%
Total abundance			1	1	0	2	100%

Table A-10 Biomass of specimens in Station M2 – wet season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M2	Percentage
			M2-1	M2-2	M2-3		
1	Nemertean	-	0.01			0.01	2%
2	Crustacean	<i>Neoxenophthalmus obscurus</i>		0.5		0.5	98%
Total biomass (g)			0.01	0.5	0	0.51	100%

Chart 4 ABC plot for Station M2 – wet season

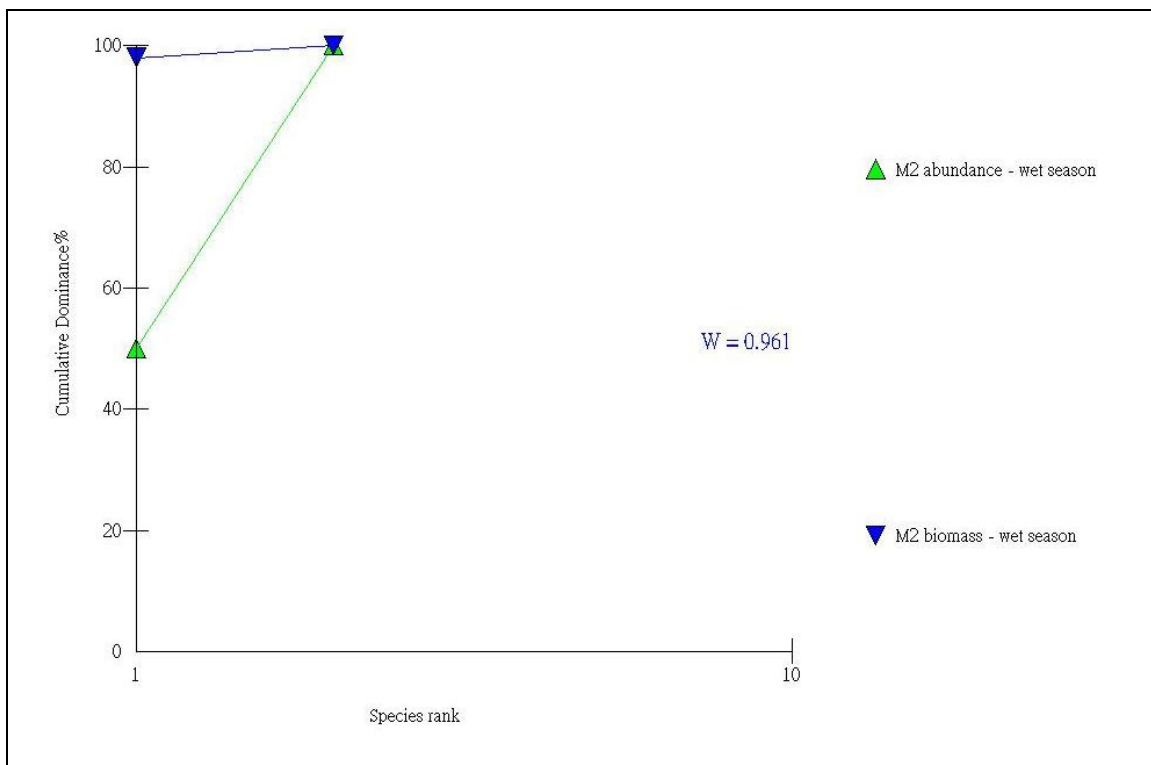


Table A-11 Abundance of specimens in Station M3 – wet season.

No.	Phylum/ Class/ Order	Species	Abundance in replicates			Abundance in Station M3	Percentage
			M3-1	M3-2	M3-3		
1	Polychaeta	<i>Eunice indica</i>	1			1	16.7%
2	Polychaeta	<i>Glycinde</i> sp.		1		1	16.7%
3	Polychaeta	<i>Nectoneanthes multignatha</i>			2	2	33.2%
4	Polychaeta	<i>Sigambra hanaokai</i>			1	1	16.7%
5	Crustacea	<i>Alpheus lobiden</i>		1		1	16.7%
Total abundance			1	2	3	6	100%

Table A-12 Biomass of specimens in Station M3 – wet season.

No.	Phylum/ Class/ Order	Species	Biomass (g) in replicates			Biomass (g) in Station M3	Percentage
			M3-1	M3-2	M3-3		
1	Polychaeta	<i>Eunice indica</i>	0.01			0.01	1%
2	Polychaeta	<i>Glycinde</i> sp.		0.01		0.01	1%
3	Polychaeta	<i>Nectoneanthes multignatha</i>			0.04	0.04	4%
4	Polychaeta	<i>Sigambra hanaokai</i>			0.01	0.01	1%
5	Crustacea	<i>Alpheus lobiden</i>		0.9		0.9	93%
Total biomass (g)			0.01	0.91	0.05	0.97	100%

Chart 5 ABC plot for Station M3 – wet season

