

LONG TERM EFFECTS OF HUMAN ACTIVITY ON BENTHIC
MACROFAUNA ADJACENT TO MCMURDO STATION, ANTARCTICA

By

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Abstract

Sediments in McMurdo Sound, Antarctica have been altered through contamination derived from McMurdo Station. Long-term monitoring of benthic communities provides a basis for assessment of impacts located near known sources of historic pollution. The objectives of the present study are to determine if any changes in benthic community abundance, biomass, and diversity occurred over time and if the change was due to contamination effects by comparing benthic communities between polluted and reference stations. Benthic cores were collected from either three or four transects at depths of 12, 24, and 36 meters during the austral summers of 2000 and 2003 to 2012. Transects included: Winter Quarters Bay and the Sewage Outfall, located near known sources of historic pollution; and Intake Jetty and Cape Armitage that are non-polluted, reference transects. Macrofauna metrics and a Benthic Index of Biological Integrity (BIBI) were used to test for spatial and temporal changes in macrofaunal communities. Disturbance-related spatial differences were detected using BIBI-ranks at Winter Quarters Bay indicating pollution effects in benthic communities at that location. Benthic community composition changed among all stations, disturbed and reference, over time. Therefore, the observed shifts in macrofaunal communities can primarily be attributed to natural processes rather than changes from contamination effects.

Key words: contamination, benthic, human impacts, environmental monitoring

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1. Introduction

Exploration of the Antarctic continent over the past fifty years has caused increased human development, which includes the establishment of permanent field stations that are manned year-round (Tin *et al.* 2009). McMurdo Station was first established as the Naval Air Facility McMurdo in 1951, and renamed McMurdo Station in 1961. Since the International Geophysical Years in 1957/58 McMurdo Station has been a central science and operations facility for the United States Antarctic Program (USAP) (Figure 1) (Klein *et al.* 2008). At the station, the total number of visiting scientists and support personnel increase during the austral summer when human activity is highest (Negri *et al.* 2006, Kennicutt *et al.* 2010).

The near shore area in McMurdo Sound adjacent to McMurdo Station was most heavily impacted by historic chemical waste pollutants such as polychlorinated biphenyls (PCBs) and petroleum hydrocarbons (Risebrough *et al.* 1990, Barnes & Conlan 2007, Morehead *et al.* 2008). The Protocol on Environmental Protection to the Antarctic Treaty enacted in 1991 was established to control sources of human pollution from McMurdo Station, which was described to have one of the highest concentrations of toxic pollutants compared with other water bodies on Earth (Hughes 2004, Bargagli 2008, Connor 2008, Aronson *et al.* 2011). Wastewater treatment was also introduced in 2003 to reduce high concentrations of pollutants (primarily organic waste) before being discharged back into the environment (Dayton & Robilliard 1971, Aronson *et al.*

2011). Despite these efforts, historic contaminants that accumulated remained in the sediment and members of the Antarctic Treaty became concerned with the environmental quality and overall health of the continent. This, in part, was the motivation for a long-term monitoring program to observe human disturbances on macrofauna communities (Kennicutt *et al.* 2010).

Macrofauna communities are good ecological indicators of environmental change, because they are relatively long-lived, feed in the water column by filter feeding and on settling particles in sediments by deposit feeding, and live in sediments that may include contaminants (Dauer 1993, Montagna *et al.* 2013). Surface deposit feeders and subsurface deposit-feeders share similar feeding structures and ingest organic matter from the sediment where contaminants are found (Fauchald & Jumars 1979, Kennicutt *et al.* 2010). The Antarctic benthos is composed of a diverse community of organisms with limited mobility, slow growth, and long lifespans (Morehead *et al.* 2008). These characteristics can also be used as biological indicators of human-induced change over time (Conlan 2010). Typically, macrofaunal diversity has a negative relationship with the presence of human-contributed contaminants (Conlan *et al.* 2010, Kennicutt *et al.* 2010).

Benthic community abundance, biomass, and diversity were used to determine if a temporal change occurred between disturbed and reference stations. In addition, a Benthic Index of Biological Integrity (BIBI) was used to compare levels of disturbance. The BIBI has been previously used in other pollution studies (Karr 1991, Kerans & Karr 1994, Deshon 1995, Morehead *et al.* 2008).

Weisberg et al. (1999) modified the BIBI from other studies using a two step procedure: 1) the community measurements were based on opportunistic or equilibrium life-history characteristics, and 2) comparisons of abundance of each taxon between reference sites and sites from a calibration data-set with known pollution stress. The BIBI approach of Weisberg et al. (1999) as modified by Morehead et al. (2008) is used in the present study.

The modified McMurdo-specific BIBI metric contains ten different community measurements, abundance, biomass, diversity, percent of disturbance-sensitive polychaetes, percent of carnivore or omnivore polychaetes, percent of sub-surface deposit feeding polychaetes, percent of annelids, and percent of crustaceans, which were converted into a ranking system used to assess environmental quality (Morehead *et al.* 2008). Disturbance-sensitive polychaete families include Syllidae, Polynoidae, and some species from Spionidae; carnivore/omnivore species include *Ophryotrocha claparedii* and Hesionidae; sub-surface deposit feeding polychaetes include *Leitoscoloplos kergulensis*, and surface deposit feeding polychaetes include *Aphelochaeta*, *Spiophanes tcherniai*, and *Capitella perarmata* (Fauchald & Jumars 1979) (Appendex 3). Polychaete families Syllidae, Polynoidae and Spionidae are categorized as disturbance sensitive because of their reproductive life history traits. The spionids and polynoids have planktonic larvae and syllids use direct development brooding (Wilson 1991).

Monitoring of macroinfaunal benthos for the present project at McMurdo Station began in 2000 (Morehead *et al.* 2008, Kennicutt *et al.* 2010). The present

project was performed to determine if changes are occurring over the 12-year sampling period to 2012. The outcome of this project will be useful to determine trends in the benthos over time in the McMurdo Sound region adjacent to McMurdo Station, and the role that human activities have in these trends.

2. Materials and Methods

2.1 Macrofaunal Sample Collection

The monitoring sampling design is based on historical information about station operations, previous studies of disturbances in the area, and a two-year pilot project that tested the monitoring design components (Morehead *et al.* 2008, Kennicutt *et al.* 2010). The benthos have been sampled in 2000 and annually from 2003 to 2013 from depths of 12, 24, and 36 meters along three or four transects (Table 1; Figure 1). Transects were named by Morehead *et al.* (2008) and Kennicutt *et al.* (2010), and by convention, these same transect names are used here. Transect A (Winter Quarters Bay) was exposed to known sources of pollution associated with seasonal use of the shipping terminal for fuel transfer, and transect D (Sewage Outfall) is positioned near the discharge of effluent from McMurdo Station sewage treatment facility (Lenihan *et al.* 1990, Klein *et al.* 2008). This included the discharge of food waste, laboratory chemicals, and sewage until 1980 when regulations were enforced (Aronson *et al.* 2011). Transect E (Intake Jetty) and transect F (Cape Armitage) are non-polluted reference sites (Figure 1). Sampling at transect F was discontinued in 2009 because it was determined that sponge spicules in the samples were a confounding

factor for a reference site. Transect E replaced Transect F in 2009, although simultaneous sampling of transects E and F occurred in 2000 and 2008. Samples were collected using hand-driven 6.7-cm diameter corers by divers during the austral summer (usually November-December). The sediment samples were divided into two vertical sections (0-3 cm and 3-10 cm) and preserved in 10 % formalin (Kennicutt *et al.* 2010). Macrofauna were extracted from the sediments by washing sediments through a 0.5 mm sieve, and examining the material retained under a dissecting microscope. All organisms were identified to the lowest possible taxon and enumerated. Biomass was measured for taxonomic groups as wet weight in early years (2000-2005, 2007), and more recently as dry weights (2004 to 2013). For the present analysis, all wet weights were converted to dry weight using taxa-specific allometric relationships developed when both dry- and wet-weight biomass were measured.

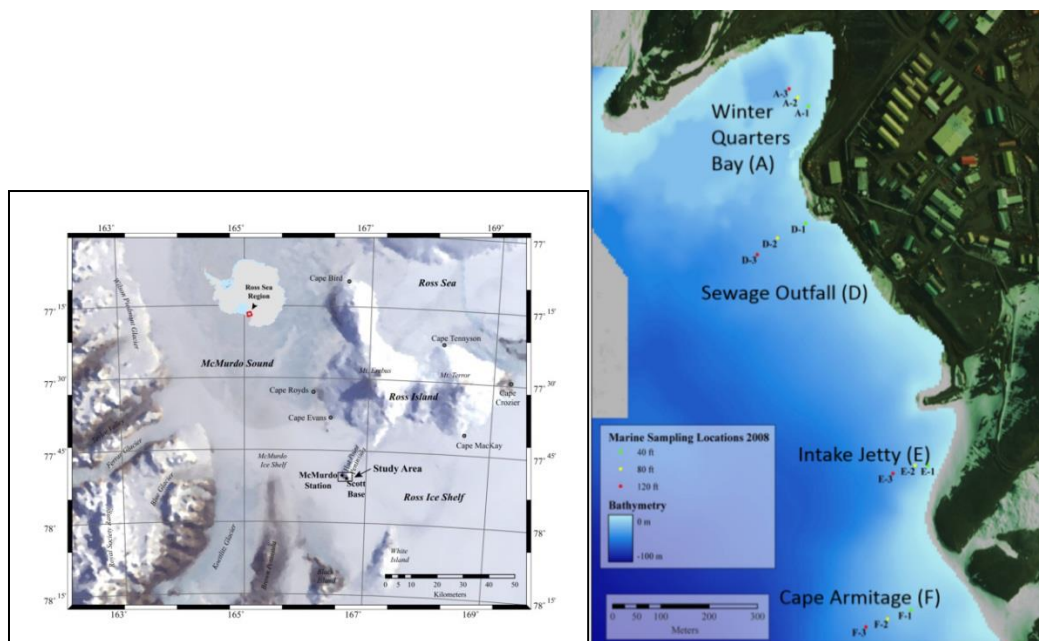
2.2 Sediment Chemistry

The sediment chemistry data was collected and measured as described in Kennicutt *et al.* (2010). Three replicate sediment cores were collected simultaneously with the macrofaunal benthic cores and placed in clean glass jars. Prior to the analysis, samples were stored at -20 °C and processed accordingly by standards of the National Oceanic and Atmospheric Administration 'Status and Trends Program' at the Geochemical and Environmental Research Group located at Texas A&M University, College Station (Morehead *et al.* 2008). Sediment

grain size samples were collected and stored at 4 °C until analysis using the method of Folk (1974).

Table 1. Long-term monitoring project sampling stations.

Transect	Station	Latitude	Longitude	Depth (m)	Quality of location
Winter Quarters Bay (A)	A-1	-77.814827	166.651307	12	Polluted
	A-2	-77.814637	166.650093	24	
	A-3	-77.814466	166.648838	36	
Sewage Outfall (D)	D-1	-77.816924	166.651247	12	Polluted
	D-2	-77.817127	166.650297	24	
	D-3	-77.817357	166.649351	36	
Intake Jetty (E)	E-1	-77.820967	166.663043	12	Reference Sampled 2000, 2008-2013
	E-2	-77.820986	166.661389	24	
	E-3	-77.820991	166.660455	36	
Cape Armitage (F)	F-1	-77.823655	166.661535	12	Reference Sampled 2000- 2008
	F-2	-77.823912	166.658978	24	
	F-3	-77.824029	166.657337	36	

**Figure 1.** Map of study area.

Left: McMurdo Sound, Antarctica. Right: Transect and station locations, which include two transects at known polluted locations - Winter Quarters Bay (A) and Sewage Outfall (D), and two non-polluted locations - Intake Jetty (E) and Cape Armitage (F). (From Andrew Klein and Terry Palmer)

2.3 Statistical Analysis

Abundance, dry weight biomass, Shannon diversity index (H'), and BIBI for each station were compared to determine spatiotemporal changes among macrofaunal communities. A 3-way Analysis of Variance (ANOVA) was run (using PROC GLM) where year, transect, and depth were the three main independent effects. Differences were tested for the four dependent variables abundance, biomass, diversity (H'), and BIBI rank among years, stations, depth, and their interactions. When significant interactions nullified the main effects tests, the design devolved to a 2-way ANOVA where year and station were the main effects because station replaced transect and depth. When significant interactions nullified the 2-way test, the design devolved to a simple main effects test that is a 1-way ANOVA where the station-year cell is the main effect. Tukey's Standardized Range Test was used as a post-hoc analysis for the interaction of stations and years to determine the relationship among stations and years for each variable. The Tukey Test did not provide adequate interpretive results, so linear contrasts were run to test specific a priori null hypotheses about patterns in the treatment means. A coefficient matrix was created using coefficient values equal to the number of treatments for each planned comparison of interest. Transect A (Winter Quarters Bay) and transect D (Sewage Outfall), against transect F (Cape Armitage) as the control. Another contrast tested transect A and D, against transect E (Intake Jetty) as the control. Transect E and F were contrasted to determine any differences amongst all sample years. Finally, transect E and F were contrasted to determine any differences between the

simultaneous sample years, 2000 and 2008. Multiple comparison tests based on the linear contrasts were used to determine differences amongst years. Tests are based on log transformed means, but detransformed means are presented for abundance and biomass. PROC UNIVARIATE was used to analyze the distribution and normality of the residuals for abundance, biomass, diversity, and BIBI rank data. Abundance and biomass were log-transformed ($\log_e [x+1]$) prior to these calculations, but the raw data was used for calculations involving diversity and BIBI rank. Univariate statistical analyses were performed with SAS software version 9.3 (SAS Institute Inc. 2013).

Non-metric multi-dimensional scaling (nMDS) was used to visualize similarities and differences in community structure. The abundance data for each species were log-transformed ($\log_e [x+1]$) using the before calculating the Bray-Curtis similarity matrix using Primer software (Clarke & Gorley 2006). Cluster analysis was also used to identify groups of similar macrofauna communities. A Similarity percent (SIMPER) analysis, computed in Primer, was run to determine differences in species abundance for stations A1 and E3. Included in the SIMPER analysis is a Similarity Profile Analysis (SIMPROF) to test the significance of the similarity between stations. Finally, the top three dominant species with the highest abundance for each station and year were calculated in order to identify which species were primarily present in the sample groupings within the cluster analysis (Clarke & Warwick 2001).

Sediment chemistry and grain size data was analyzed using Principal Component Analysis (PCA) to characterize spatiotemporal changes among

stations and years. The sediment chemical contaminant data were log-transformed and normalized prior to the PCA so there were comparable scales (Clark & Warwick 2001). Spearman correlations tested for sediment contamination indicators that best explained macrofaunal community structure at each station over time (Appendix 4).

3. Results

3.1 Chemical Contamination

The sediment chemistry data set was analyzed using a Principle Component Analysis (PCA) (Figure 2). Principle Components 1 and 2 (PC1 and PC2) explained 51.68 % and 15.35 % of variation (Figure 2A). Chemicals including polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs), dichlorodiphenyltrichloroethane (DDT), copper vanadium, and barium were highly loaded and correlated with positive PC1 scores and negatively loaded for total inorganic carbon (TIC). The second principal component was positively loaded for total organic carbon (TOC) and sediment classification, mud. The trace metal contaminants correlated with negative PC2 scores. There is a clear separation of disturbed and reference station - year loading scores along the PC1 axis (Figure 2B). This shows that chemicals with high PC scores are good indicators for contamination. Disturbed transects, Winter Quarters Bay and Sewage Outfall (stations A1-D3), had high concentrations of trace metals and other contaminants such as PAH and PCBs

along reference transects, the Intake Jetty and Cape Armitage had low concentrations of the same chemicals.

Total PAH and TPH were two contaminant variables that significantly decreased in concentration level at some disturbed stations. TPH, found at all stations, decreased at mid (A2) and deep (A3) Winter Quarters Bay stations and also Sewage Outfall station D3. Total PAH concentrations decreased over time for all Winter Quarters Bay stations shallow, mid, and deep (A1 - A3) (Appendix 4).

TPH and PAH concentrations are higher at the disturbed stations A1-D3 in comparison to reference stations E1-F3. At disturbed stations, Winter Quarters Bay and Sewage Outfall, concentration levels of TPH and PAH at shallow (A1 and D1) and mid (A2 and D2) stations that are closer to shore were higher than the deep (A3 and D3) stations farthest from shore (Figure 3 A,B). There is a large amount of variability in TPH concentration levels among averaged years at stations A1, A2, and D1 (Figure 3A). The majority of TPH contaminants in the disturbed area range from 100 to 500 ppm. All reference stations have contaminant concentrations below 100 ppm. Station D1 contained PCB concentrations between 1000 to 1500 ppm with variability among years above and below the median (Figure 3B).

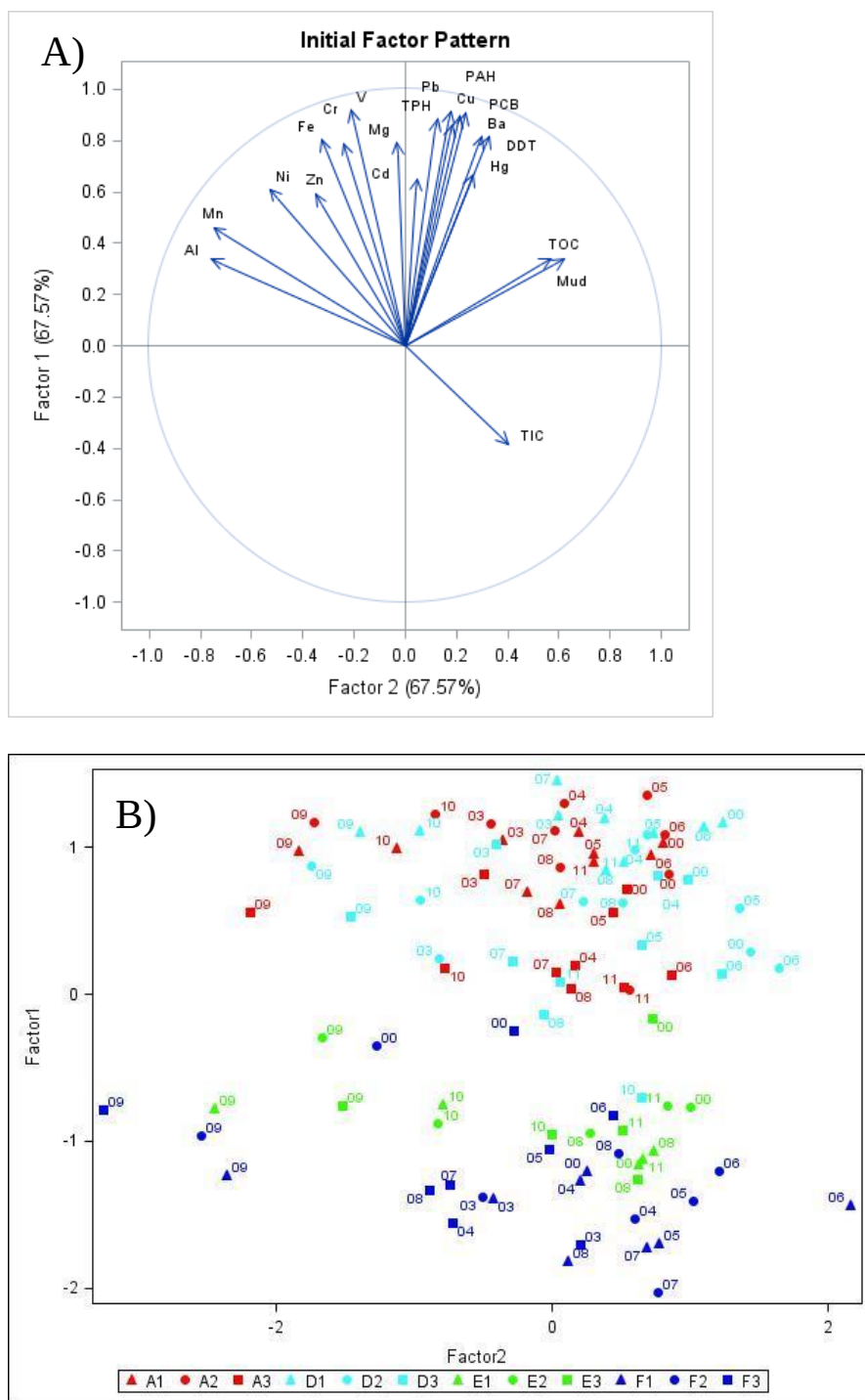


Figure 2. Principal Component Analysis (PCA) plot of A) sediment chemistry variable loads and B) station-year scores. Stations are shown as symbols and the two digit numbers labeled above each symbol are the last two digits of the year.

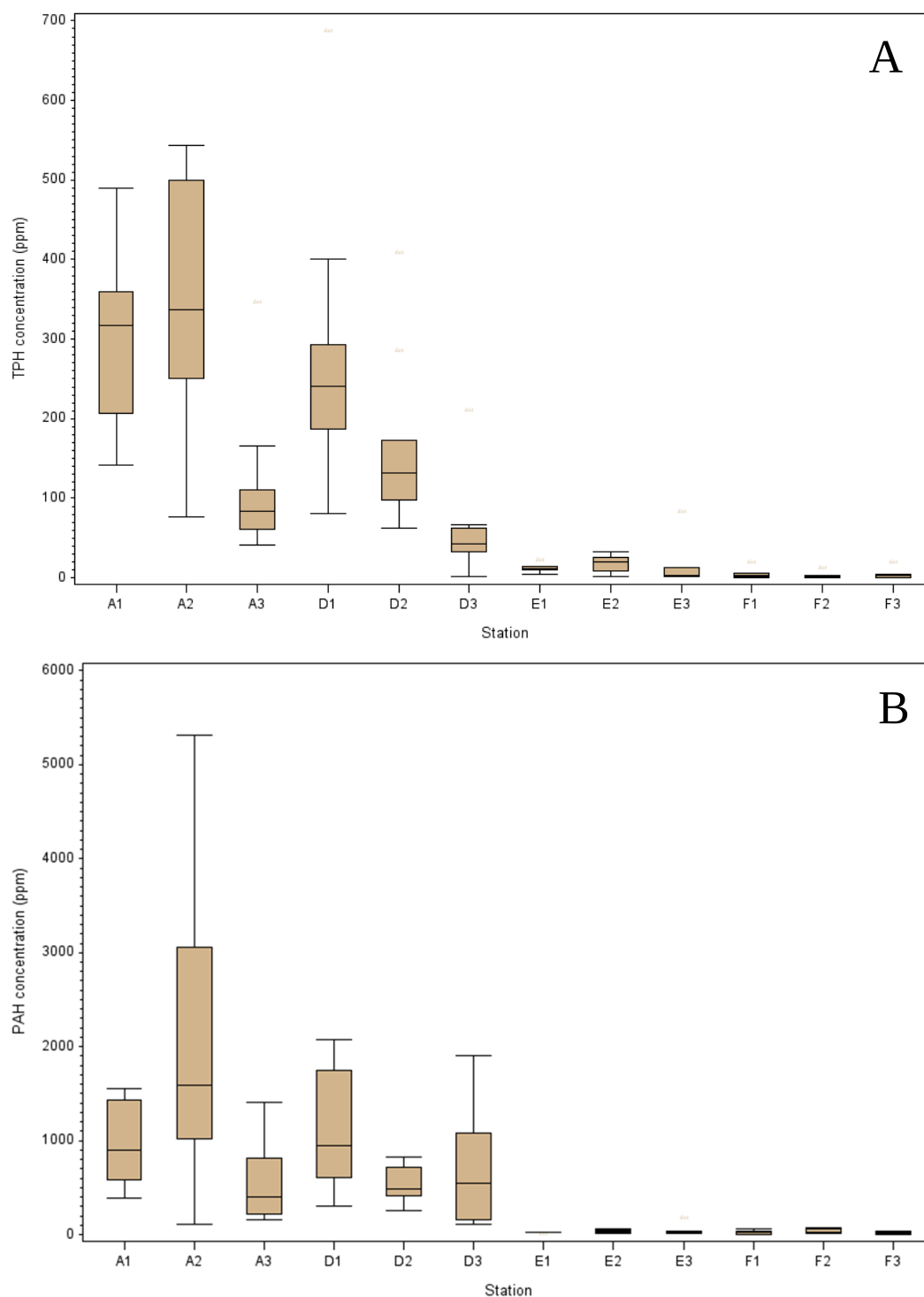


Figure 3. A) Total Petroleum Hydrocarbon and B) Polycyclic Aromatic Hydrocarbon concentrations at each station averaged for all years.

3.2 Biological Response

The 3-way ANOVA resulted in significant interactions among years, transects, and depth for abundance, biomass, diversity, and BIBI rank (Table 2). Because all of the interactions were significant, the main effects tests were nullified. Therefore, the design was reduced to a 2-way ANOVA where the main effects were year and station, where station replaces transect and depth. However, every station-year interaction had a P-value of < 0.0001 , which again nullified the main effects tests. Therefore, a 1-way ANOVA, simple main effects test, was used to further analyze differences between years and stations together (Table 3). The simple main effects test resulted in significant p-values (< 0.001) between the station*year independent variable and each dependent variable: abundance, biomass, diversity, and BIBI rank. Tukey's Standardized Range post-hoc test was run on the station*year means, but was inadequate for interpretation and linear contrasts were computed (Table 4).

The overall linear contrast for simple main effects model for three variables had a significant p-value (< 0.0001), BIBI rank data was not used for this analysis because it does not have any replicates. For diversity, the test that contrasted transect A and D, against transect F as the control was significant (< 0.0001) (Table 4). Significance occurred for the test that contrasted transect E as the control with disturbed transects A and D for diversity (0.0086) and abundance ($< .0001$). Transects F and E were contrasted for differences amongst all years; biomass (0.0007) and abundance ($< .0001$) p-values were significantly different. Simultaneous sample years, 2000 and 2008, were contrasted for transect F and E

and all variables were not significant (Table 4). The multiple comparisons tested for differences amongst years in correspondence with the planned linear contrasts. The year 2000 had the highest mean detransformed abundance (56,056) and biomass (42.4) and was significantly different from all other years (Table 5). For diversity, years 2005, 2007, and 2008 had significantly higher detransformed means from all other years and year 2000 (2.19) had the highest mean (Table 5).

Table 2. 3-Way ANOVA results for abundance, biomass, diversity, and BIBI Rank.

ANOVA tested for significant differences among years, stations, depth, and their interactions. Abbreviations: Df= degrees of freedom, SS= sums of squares MS= Mean Square.

Variable	Source	Df	SS	MS	F Value	Pr > F
Abundance (n/m²)	Year	10	14.69	1.47	8.20	<.0001
	Trans	3	14.38	4.79	26.75	<.0001
	Year*Trans	21	8.20	0.39	2.18	0.0010
	Depth	2	13.98	6.99	39.01	<.0001
	Year*Depth	20	10.92	0.55	3.05	<.0001
	Trans*Depth	6	10.80	1.80	10.04	<.0001
	Year*Trans*Depth	42	21.32	0.51	2.83	<.0001
	Error	210	37.63	0.18		
Biomass (g/m²)	Year	10	148.16	14.82	10.48	<.0001
	Trans	3	43.36	14.45	10.23	<.0001
	Year*Trans	21	74.76	3.56	2.52	0.0010
	Depth	2	16.84	8.42	5.96	0.0030
	Year*Depth	20	51.64	2.58	1.83	0.0200
	Trans*Depth	6	33.97	5.66	4.01	0.0010
	Year*Trans*Depth	42	160.05	3.81	2.70	<.0001
	Error	210	296.83	1.41		
Shannon diversity (H')	Year	10	154.78	15.48	22.11	<.0001
	Trans	3	23.42	7.81	11.15	<.0001
	Year*Trans	21	89.88	4.28	6.11	<.0001
	Depth	2	16.34	8.17	11.67	<.0001
	Year*Depth	20	29.75	1.49	2.12	0.0010
	Trans*Depth	6	25.97	4.33	6.18	<.0001
	Year*Trans*Depth	42	84.88	2.02	2.89	<.0001
	Error	210	147.00	0.70		
BIBI Rank	Year	10	57.61	5.76	12.26	<.0001
	trans	3	144.57	48.19	102.58	<.0001
	Year*Trans	21	23.08	1.10	2.34	0.0010
	Depth	2	30.18	15.09	32.12	<.0001
	Year*Depth	20	15.74	0.79	1.68	0.0393
	Trans*Depth	6.00	14.52	2.42	5.15	<.0001
	Year*Trans*Depth	42.00	38.76	0.92	1.96	0.0010
	Error	210	11.08	0.05		

Table 3. 1-Way ANOVA, main effects model, results for abundance, biomass, diversity, and BIBI Rank.

ANOVA tested for significant differences among the station-year interaction. Abbreviations: Df= degrees of freedom, SS= sums of squares MS= Mean Square.

Variables	Source	Df	SS	MS	F Value	Pr > F
Abundance (n/m²)	Station*Year	104	426.36	4.10	5.86	<.0001
	Error	210	147.00	0.70		
Biomass (g/m²)	Station*Year	104	546.42	5.25	3.72	<.0001
	Error	210	296.83	1.41		
Diversity (H')	Station*Year	104	94.48	0.91	5.07	<.0001
	Error	210	37.63	0.18		
BIBI Rank	Station*Year	104	336.70	3.24	6.89	<.0001
	Error	210	98.65	0.47		

Table 4. Main effects model linear contrasts, results for abundance, biomass, and diversity

Significant differences were tested for several station and year contrasts. Abbreviations: Df= degrees of freedom, SS= sums of squares MS= Mean Square, 00= 2000, 08= 2008.

Variables	Contrast	Df	SS	MS	F Value	Pr > F
Abundance	Trans A & D vs F	1	0.02	0.02	0.03	0.8545
	Trans A & D vs E	1	16.17	16.17	23.1	<.0001
	Trans E vs F	1	15.23	15.23	21.76	<.0001
	Trans E vs F 00,08	1	0.15	0.15	0.22	0.6385
	Error	210	147.00	0.70		
Biomass	Trans A & D vs F	1	0.01	0.01	0	0.9453
	Trans A & D vs E	1	4.23	4.23	2.99	0.085
	Trans E vs F	1	16.56	16.56	11.72	0.0007
	Trans E vs F 00,08	1	0.80	0.80	0.57	0.4523
	Error	210	296.83	1.41		
Diversity (H')	Trans A&D vs F	1	10.03	10.03	55.99	<.0001
	Trans A&D vs E	1	1.26	1.26	7.04	0.0086
	Trans E vs F	1	0.00	0.00	0.01	0.9378
	Trans E vs F 00,08	1	0.02	0.02	0.09	0.7625
	Error	210	37.63	0.18		

Table 5. Multiple comparison tests to determine differences amongst years based on linear contrasts for the simple main effects (1-way ANOVA) model. Underlined means are not different at the 0.05 level. Variable means for each year are detransformed values.

Year	2008	2007	2005	2006	2009	2010	2012	2004	2003	2011	2000
n/m²	4,320	5,137	7,138	10,956	11,434	13,285	15,592	16,704	16,966	19,011	56,056
Year	2007	2006	2005	2009	2008	2004	2011	2003	2010	2012	2000
g/m²	2.0	3.4	3.5	5.2	5.5	6.9	7.5	7.9	10.0	14.9	42.4
Year	2005	2007	2008	2004	2006	2012	2009	2011	2003	2010	2000
H'	1.55	1.56	1.59	1.84	1.90	1.90	1.91	1.91	1.94	2.13	2.19

3.3 Macrofaunal Community Structure

The MDS temporally plotted each station to visualize the similarity patterns in benthic community structure (Figure 4). There was a temporal shift that occurred for both reference and disturbed stations, which would suggest a change in benthic community structure for all stations over time. There are also two distinct macrofaunal community groupings, which contain communities that are at least 28 % similar. Stations A1 from year 2007 and E1 from 2010 are outside of the 28 % similarity bounds, making them dissimilar from all other macrofaunal community groupings. Stations in MDS group 1 were at least 28 % similar and primarily consisted of reference stations E1 through F3, but also station D3, for all years, while MDS group 2 contained only stations A1 through D2 and had at least a 28 % similar macrofaunal community for all years. A

second multidimensional scaling (MDS) plot tested temporal macrofaunal community similarity with a 51 % and 55 % similarity cluster and temporal trajectory (Table 5). There are three distinct groupings with 55 % community similarity, years 2000, 2003 and 2004, years 2005–2008, and years 2009–2012. The trajectory shifted indicating macrofaunal community composition changed over time.

Species were ranked by the top three dominant species using total abundance at each station and included *Aphelocheata* sp. from the class Polychaeta, which was primarily found at station A1-D3, and *Nototanaeis dimorphus* from the order Tanaidacea, which was mostly found near station D3, E2-F2 (Table 6). Other species include; *Philomedes* sp., from the class Ostracoda and found at station D3 (10.67 %) and F3 (18.58 %), *Leitoscoloplos kergulensis*, from the class Polychaete (family Orbiniidae) and found at station A1 (10.85 %), A2 (9.26 %), and D2 (5.99 %), unidentified species from the class Oligochaeta and found at stations D3, E1, and E3 (Table 6). Reference stations have higher total abundance of species than disturbed stations. Station A1, located closest to known sources of pollution, had an abundance of approximately 10,600 n/m² top 3 most dominant and remaining species. Station F3, located farthest away from known sources of pollution, had an abundance of approximately 46,000 n/m² top dominant and remaining species. The top three species were also calculated among years (Table 7). *Nototanaeis dimorphus*, from the order Tanaidacea, was in the top three dominant species in all years except 2005 and 2007. *Aphelocheata* sp. (Polychaeta) was also one of the top three dominant species for years 2003,

2005 through 2011 and was the most abundant species for the years 2007, 2008, and 2010.

Stations E3 from the year 2010 and A1 from the year 2007 are outside of the 28 % similarity cluster. There were differences in the type of species found between MDS group 1 and station E3 and MDS group 2 and station A1. A SIMPER analysis was run to determine differences in species abundance for station E3 in comparison to group 1, reference stations, and A1 to group 2, disturbed stations. A SIMPROF test was run and was significant at $p < 0.001$. There were fewer species found at stations E3 and A1 than MDS groups 1 and 2. Comparing station E3 to other reference stations in MDS group 1, there was 89.49 % dissimilarity among species community composition, which include the most abundant species *Nototanaeis dimorphus*, *Spiophanes tcherniai*, and *Oligochaeta*. Station E3 had fewer species and a low total abundance of approximately 4,000 n/m². Comparing station A1 to other disturbed stations in MDS group 2, there was 65.81 % dissimilarity among species community composition, which included the most abundance species *Aphelochaeta* sp., *Heterophoxus videns*, and *Leitoscoloplos kergulensis*. Station A1 contained only 3 species and had a low total abundance of approximately 3,400 n/m².

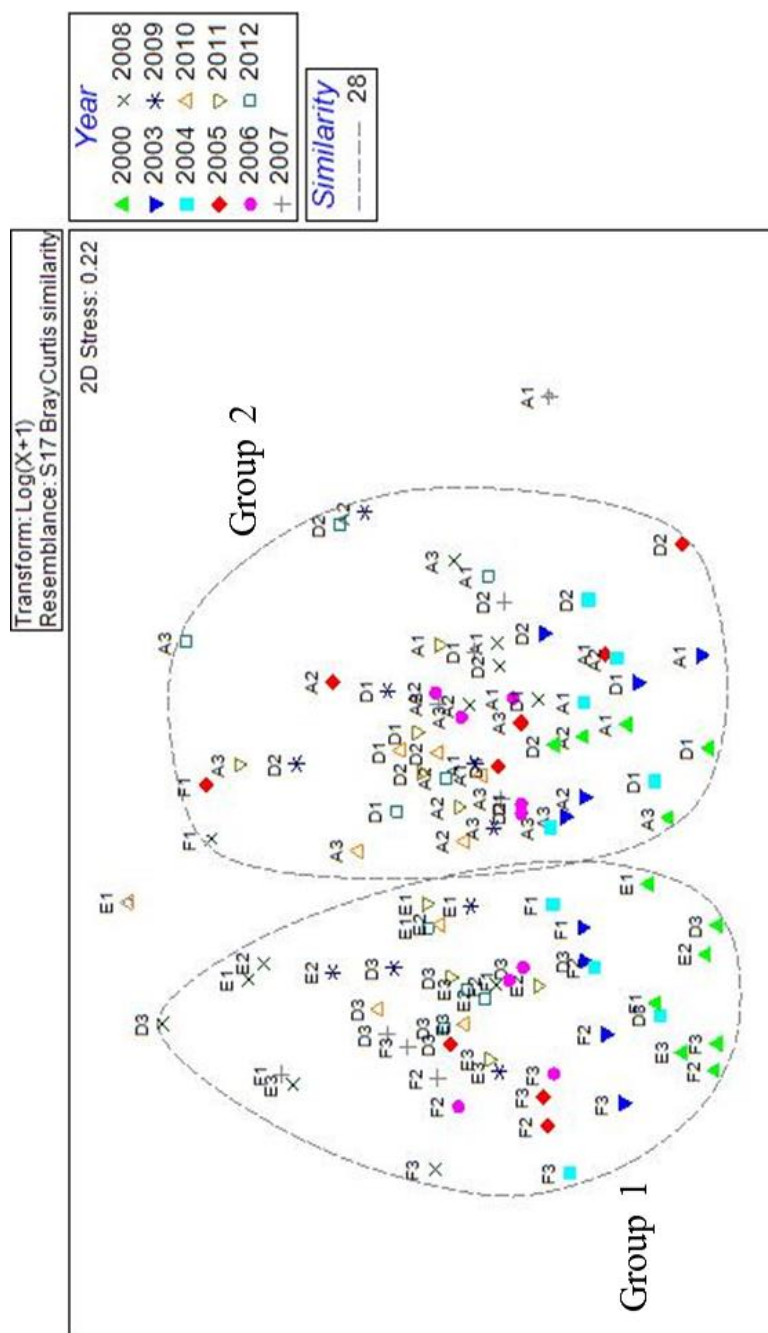


Figure 4 Multidimensional scaling (MDS) plot for macrofauna community similarity overlaid with a 28 % similarity cluster. Years are displayed by symbols and station names by labels

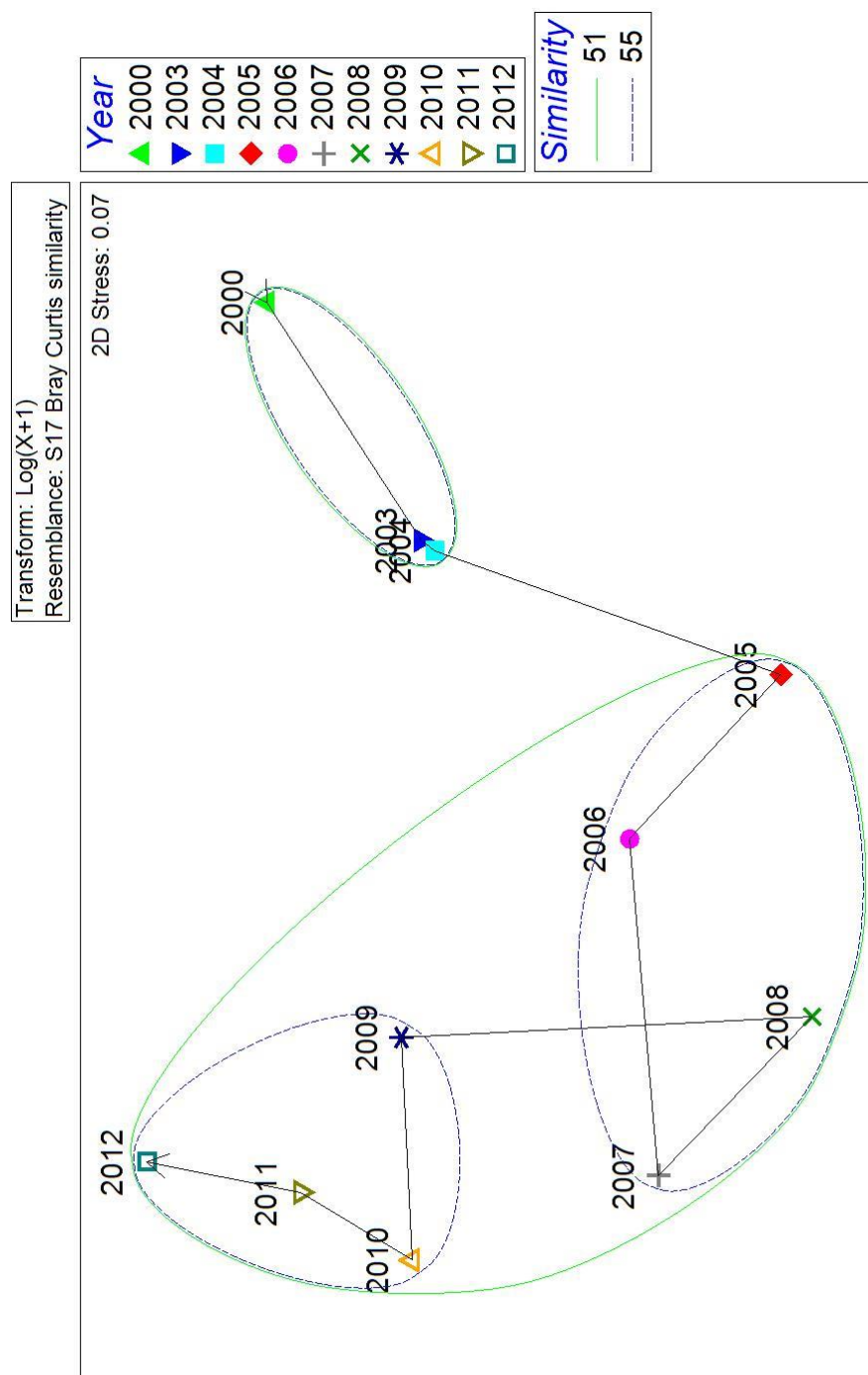


Figure 5 Multidimensional scaling (MDS) plot of temporal macrofaunal community similarity.
Years are overlaid with a 51 % and 55 % similarity cluster and a temporal trajectory.

Table 6. Top 3 dominant species for each station.

Remaining column is the number of remaining individual species, abundance, & percent abundance for each station. See appendix 3 for life history characteristics.

Station	1 st dominant	2nd Dominant	3rd Dominant	Remaining
A1	<i>Aphelochaeta</i> 5,329 n/m ² 49.84%	<i>Leitoscoloplos kergulensis</i> 1,160 n/m ² 10.85%	<i>Heterophoxus videns</i> 550 n/m ² 5.14%	55 3,653 n/m ² 34.16%
A2	<i>Aphelochaeta</i> 6,102 n/m ² 35.75%	<i>Leitoscoloplos kergulensis</i> 1,581 n/m ² 9.26%	Halacaridae (unidentified) 1,178 n/m ² 6.90%	73 8,208 n/m ² 48.09%
A3	<i>Aphelochaeta</i> 1,925 n/m ² 17.14%	Halacaridae (unidentified) 1,246 n/m ² 11.09%	Hesionidae (unidentified) 1,066 n/m ² 9.49%	59 6,996 n/m ² 62.28%
D1	<i>Aphelochaeta</i> 4,658 n/m ² 30.95%	<i>Heterophoxus videns</i> 2,484 n/m ² 16.50%	Actiniaria (unidentified) 1,753 n/m ² 11.65%	64 6,154 n/m ² 40.89%
D2	<i>Ophryotrocha clapedii</i> 8,130 n/m ² 34.36%	<i>Capitella perarmata</i> 7,374 n/m ² 31.17%	<i>Leitoscoloplos kergulensis</i> 1,418 n/m ² 5.99%	50 6,738 n/m ² 28.48%
D3	<i>Nototanaïs dimorphus</i> 5,225 n/m ² 15.70%	Oligochaeta (unidentified) 4,289 n/m ² 12.89%	<i>Philomedes</i> sp. 3,549 n/m ² 10.67%	142 20,215 n/m ² 60.74%
E1	<i>Spiophanes tcherniai</i> 6,098 n/m ² 25.28%	<i>Nototanaïs dimorphus</i> 3,577 n/m ² 14.83%	Oligochaeta (unidentified) 2,458 n/m ² 10.19%	57 11,991 n/m ² 49.71%
E2	<i>Nototanaïs dimorphus</i> 18,578 n/m ² 28.07%	<i>Spiophanes tcherniai</i> 8,793 n/m ² 13.29%	<i>Edwardsia meridionalis</i> 6,287 n/m ² 9.50%	86 32,523 n/m ² 49.14%
E3	<i>Nototanaïs dimorphus</i> 5,956 n/m ² 17.67%	Oligochaeta (unidentified) 3,845 n/m ² 11.40%	Porifera (unidentified) 3,672 n/m ² 10.89%	106 20,239 n/m ² 60.04%
F1	<i>Nototanaïs dimorphus</i> 6,077 n/m ² 17.12%	Gastropoda (unidentified) 5,146 n/m ² 14.50%	<i>Spiophanes bombyx</i> 4,295 n/m ² 12.10%	68 19,974 n/m ² 56.28%
F2	<i>Nototanaïs dimorphus</i> 11,263 n/m ² 19.75%	<i>Philomedes</i> sp. 10,210 n/m ² 17.90%	Podocopida (unidentified) 5,321 n/m ² 9.33%	102 30,238 n/m ² 53.02%
F3	<i>Philomedes</i> sp. 8,630 n/m ² 18.58%	Podocopida (unidentified) 7,927 n/m ² 17.06%	<i>Nototanaïs dimorphus</i> 6,577 n/m ² 14.16%	100 23,323 n/m ² 50.20%

Table 7. Top 3 dominant species for each year.

Remaining column is the number of remaining individual species, abundance, & percent abundance for each station. See appendix 3 for life history characteristics.

Year	1st dominant	2nd Dominant	3rd Dominant	Remaining
2000	<i>Nototanaïs dimorphus</i> 18,174 n/m ² 20.36%	<i>Philomedes</i> sp. 9,422 n/m ² 10.56%	<i>Podocopida (unidentified)</i> 8,784 n/m ² 9.84%	89 52,868 n/m ² 59.24%
2003	<i>Nototanaïs dimorphus</i> 2,973 n/m ² 13.37%	<i>Philomedes</i> sp. 2,594 n/m ² 11.67%	<i>Aphelochaeta</i> 1,891 n/m ² 8.50%	76 14,779 n/m ² 66.46%
2004	<i>Philomedes</i> sp. 3,781 n/m ² 13.21%	<i>Nototanaïs dimorphus</i> 2,952 n/m ² 10.31%	<i>Ophryotrocha claparedii</i> 2,668 n/m ² 9.32%	66 19,222 n/m ² 67.16%
2005	<i>Ophryotrocha claparedii</i> 5,200 n/m ² 26.80%	<i>Capitella perarmata</i> 5,085 n/m ² 26.20%	<i>Aphelochaeta</i> 1,765 n/m ² 9.10%	74 7,354 n/m ² 37.90%
2006	<i>Gastropoda (unidentified)</i> 4,412 n/m ² 22.69%	<i>Aphelochaeta</i> 1,565 n/m ² 8.05%	<i>Nototanaïs dimorphus</i> 1,345 n/m ² 6.92%	72 12,123 n/m ² 62.34%
2007	<i>Aphelochaeta</i> 1,691 n/m ² 19.95%	<i>Porifera (unidentified)</i> 1,271 n/m ² 14.99%	<i>Oligochaeta (unidentified)</i> 578 n/m ² 6.82%	67 4,938 n/m ² 58.24%
2008	<i>Aphelochaeta</i> 1,324 n/m ² 17.34%	<i>Myriochele</i> sp. 709 n/m ² 9.29%	<i>Nototanaïs dimorphus</i> 615 n/m ² 8.05%	67 4,987 n/m ² 65.33%
2009	<i>Nototanaïs dimorphus</i> 2,364 n/m ² 12.36%	<i>Aphelochaeta</i> 2,185 n/m ² 11.43%	<i>Spiophanes tcherniai</i> 1,586 n/m ² 8.30%	88 12,985 n/m ² 67.91%
2010	<i>Aphelochaeta</i> 2,815 n/m ² 14.61%	<i>Nototanaïs dimorphus</i> 1,565 n/m ² 8.12%	<i>Oligochaeta (unidentified)</i> 1,481 n/m ² 7.69%	84 13,410 n/m ² 69.58%
2011	<i>Nototanaïs dimorphus</i> 4,433 n/m ² 15.92%	<i>Spiophanes tcherniai</i> 4,192 n/m ² 15.05%	<i>Aphelochaeta</i> 3,131 n/m ² 11.24%	91 16,094 n/m ² 57.79%
2012	<i>Nototanaïs dimorphus</i> 6,765 n/m ² 20.61%	<i>Spiophanes tcherniai</i> 5,127 n/m ² 15.62%	<i>Oligochaeta (unidentified)</i> 2,805 n/m ² 8.55%	77 18,122 n/m ² 55.22%

4. Discussion

The main purpose of the present study was to determine if there is change in the benthic macrofaunal communities and sediment chemistry over time; and assess potential links in the change to known sources of contamination. Previous studies have already demonstrated spatial change with respect to spatial gradients of pollution and distance from shore (Lenihan *et al.* 1995, Conlan *et al.* 2004, Morehead *et al.* 2008, Kennicutt *et al.* 2010). Anthropogenic chemical contaminants are present in some marine sediments inhabited by macrofaunal communities that are adjacent to McMurdo Station. Community structures and chemical contamination of the sediment were compared among stations over time.

4.1 Changes in Chemical Contamination over Time

Petroleum hydrocarbon contaminants, from fuel, were used in large volumes at Antarctica scientific stations (Barnes & Conlan 2007, Morehead *et al.* 2008). Lenihan *et al.* (1992) described Winter Quarter's Bay to have a 0.5 km² area of high contamination. The total distance between polluted stations, Winter Quarter's Bay, and farthest away from Winter Quarter's Bay reference stations, Cape Armitage, is approximately one kilometer (Lenihan *et al.* 1992). Kennicutt *et al.* (2010) suggested the contaminants will remain within several hundred meters of the known pollution sources. The disturbed stations had higher concentration levels of pollutants at shallow (A1 and D1) and mid (A2 and D2) stations that are closer to shore than the deep (A3 and D3) stations farthest from shore (Figure 3A,B). TPH concentrations decreased over time at station D3 of the

Sewage Outfall and PAH concentrations decreased for stations A1-A3 of Winter Quarters Bay (Appendix 4).

4.2 Changes in Macrofaunal Communities over Time

Macrofaunal communities are characterized by functional groups that include the feeding patterns of species; specifically polychaete worms that account for a high percentage of total biomass (Fauchald & Jumars 1979, Morehead *et al.* 2008). Functional groups within a macrofaunal community are importantly associated with environmental quality. The BIBI combines several biological measurements, including feeding guilds that define functional groups within a benthic community into a single value creating a ranking index (Morehead *et al.* 2008). Relative measures of abundance, biomass, and diversity between taxonomic groups of marine benthos can be useful in the assessment of suspected environmental disturbance. For example, a high percentage of crustaceans relative to annelids would indicate a healthy undisturbed community adjacent to McMurdo Station, whereas the converse would imply a disturbed area. This is explained by the fact that crustaceans are more sensitive to localized contaminants relative to annelids (Peterson *et al.* 1996, Morehead *et al.* 2008). Some polychaete species have high colonizing abilities and a shorter generation time, making them more resilient to disturbances (Conlan *et al.* 2004). Lenihan *et al.* (1995) tested a field transplant experiment by taking sediment from the Intake Jetty community and transplanting it to Winter Quarters Bay. The experiment resulted in the loss of the majority of crustaceans from the jetty community, due

to emigration or death. The crustacean species were replaced by opportunistic polychaetes, such as *Ophryotrocha claparedii*.

The dominant species consistently found in areas closely associated with known sources of contaminants in Winters Quarters Bay and the Sewage Outfall was the polychaete *Aphelochaeta* sp. In contrast, the dominant species found at reference stations near Cape Armitage was the tanaid *Nototanaeis dimorphus*. These findings indicated that Antarctic macrofaunal communities from the disturbed stations are associated with high abundances of specific polychaete species and thus are unhealthy (Dean 2008, Morehead *et al.* 2008). Macrofaunal communities from the reference stations have higher abundances of crustaceans.

A consistent shift in benthic community composition occurred over time for all sampling stations (polluted and reference). The common transition among stations (Figure 4) indicates that environmental disturbances had no effect over time, which was also found by Kennicutt *et al.* 2012. Between 2000 and 2012 macrofaunal community species dominance shifted in 2003 from *Nototanaeis dimorphus* (Tanaidacea), to *Aphelochaeta* sp in 2007 and 2008. In subsequent years (2009 - 2012) species dominance reverted to *N. dimorphus* for remaining years except 2010 (Table 7). Small changes in species dominance or other components of community structure may be attributed to natural year-to-year variability rather than changes in human activities. This is indicated by a shift in community structure observed for all stations during the present study (Figure 4).

There is 28 % similarity within communities in nMDS group 1, which contains two non-polluted stations (E1-F3) and one polluted station (D3) (Figure

4). However, compared to other stations on the D transect; D3 should be more comparable to reference stations because its sediment contains sponge spicules. Top dominant species for D3 were related to the other reference stations that contained sponge spicules. Chemical contaminant concentrations were lower at the deep station (D3) when compared to shallow (D1) and mid (D2) stations, which are closer to shore. Species similarity to reference stations and distance from shore may be the reason station D3 is more similarly related to the reference stations.

The sampling associated with reference transects E and F is an incomplete design. Linear contrasts tested the patterns in treatment means for simultaneous sampling that occurred for these transects in 2000 and 2008 for all four variables. The p-values associated with the contrasts were insignificant, which means transect E and F are not different. The replacement of Cape Armitage (F) to Intake Jetty (E) in 2009 is not significant and has no effect on the results.

4.3 Environmental Management Implications

Biological indicators can often detect temporal and spatial changes in environmental qualities. These changes determine the composition of the community and surrounding areas as a poor or healthy environment. Benthic communities are also indicative of water quality standards that are directly correlated to the condition of the community (Dauer *et al.* 1993). These environmental qualities provide measurements of health management progress for long-term studies and restoration efforts. An important and useful measurement

is the BIBI rank, which accounts for benthic functional groups within a community (Morehead *et al.* 2008). BIBI rank is a better indicator of spatial change for Antarctic macrofaunal communities for the present study in addition to abundance, biomass, and diversity.

Since the installation of the sewage treatment plant and enforcement of waste restrictions, Kennicutt *et al.* 2010 suggested benthic communities sampled closer to the outfall that started to differ in community structure, now resemble the surrounding benthic community again. The continuation of the long-term monitoring project will better quantify the temporal and spatial variation of benthic community structure. Rates of degradation in cold climates are slower than temperate climates, therefore contaminants persist for longer and continued monitoring is necessary (Kennicutt *et al.* 2010). Natural environmental variability occurs between functional groups within these benthic communities and works at different scales, including temporal change and life-history characteristics (Morehead *et al.* 2008, Smale 2008). To determine the effects of contaminants on benthic organisms in Antarctica rather than natural variability, such as life history characteristics, controlled environmental disturbance experiments would be required (Conlan *et al.* 2004). This will allow distinguishable differences between natural and anthropogenic variations in benthic community structure.

5. Summary

The present study provides potentially important environmental measurements for detecting altered macrofaunal community structure due to

pollution disturbances. The present research also describes the differences in macrofaunal communities between polluted and reference stations. By introducing a waste water treatment plant in 2003, there is evidence of a benthic community shift from highly resilient polychaete species to less contaminant tolerant species because of the reduced effluent from the McMurdo Station Sewage Outfall (Conlan *et al.* 2004). Higher abundances of polychaete species indicated an unhealthy environment and higher abundances of crustacean species indicated a healthy environment for this study (Morehead *et al.* 2008). This was consistent for the stations, polluted versus reference. There was a shift in macrofaunal community structure over time, but because there was a shift between polluted and reference stations, it was likely not due to contamination in the sediment. Kennicutt *et al* (2010) suggested the contaminants will remain within several hundred meters of the known pollution sources. Future long-term monitoring projects could then focus the disturbed sampling specifically within the area the contamination extends. The continuation of long-term monitoring for data and information on the Antarctic benthos will be useful for future environmental management decisions.

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Appendix 1 Species abundance per station

Table 1. 1. Overall species abundance (n/m²) and percent of the total abundance for each station.

Station	Species Name	n/m ²	Percent
A1	<i>Aphelochaeta</i>	5328.82	49.84%
A1	<i>Leitoscoloplos kergulensis</i>	1160.29	10.85%
A1	<i>Heterophoxus videns</i>	550.04	5.14%
A1	<i>Hesionidae (unidentified)</i>	532.84	4.98%
A1	<i>Ophryotrocha claparedii</i>	360.97	3.38%
A1	<i>Nototanaïs dimorphus</i>	360.95	3.38%
A1	<i>Austrosignum grande</i>	343.78	3.22%
A1	<i>Capitella perarmata</i>	257.85	2.41%
A1	<i>Halacaridae (unidentified)</i>	249.25	2.33%
A1	<i>Lysilla loveni macintoshi</i>	214.86	2.01%
A1	<i>Oligochaeta (unidentified)</i>	180.5	1.69%
A1	<i>Nemertea (unidentified)</i>	111.73	1.04%
A1	<i>Actiniaria (unidentified)</i>	111.72	1.04%
A1	<i>Paramunna glacialis</i>	77.36	0.72%
A1	<i>Leaena antarctica</i>	68.76	0.64%
A1	<i>Golfingia</i> sp.	60.17	0.56%
A1	<i>Neojaera furcata</i>	51.57	0.48%
A1	<i>Philomedes</i> sp.	34.38	0.32%
A1	<i>Sipunculidae (unidentified)</i>	34.38	0.32%
A1	<i>Barrukia cristata</i>	34.38	0.32%
A1	<i>Seba dubia</i>	34.38	0.32%
A1	<i>Apistobranchus glaciera</i>	25.79	0.24%
A1	<i>Bivalvia (unidentified)</i>	25.79	0.24%
A1	<i>Cirratulidae (unidentified)</i>	25.79	0.24%
A1	<i>Gnathia</i> sp.	25.79	0.24%
A1	<i>Laonice cirrata</i>	25.79	0.24%
A1	<i>Laternula elliptica</i>	25.79	0.24%
A1	<i>Lasaeidae A</i>	25.78	0.24%
A1	<i>Sabellidae A</i>	25.78	0.24%
A1	<i>Lumbrineris magalhaensis</i>	17.19	0.16%
A1	<i>Maldanidae (unidentified)</i>	17.19	0.16%
A1	<i>Munna</i> sp.	17.19	0.16%
A1	<i>Onoba turqueti</i>	17.19	0.16%
A1	<i>Ophelina breviata</i>	17.19	0.16%
A1	<i>Spiophanes bombyx</i>	17.19	0.16%
A1	<i>Podocopida (unidentified)</i>	17.19	0.16%
A1	<i>Aplysiidae (unidentified)</i>	17.19	0.16%
A1	<i>Hauchiella tribullata</i>	17.19	0.16%
A1	<i>Ampharete kerguelensis</i>	8.6	0.08%
A1	<i>Axiothella antarctica</i>	8.6	0.08%
A1	<i>Caecognathia calva</i>	8.6	0.08%
A1	<i>Gastropoda (unidentified)</i>	8.6	0.08%
A1	<i>Hippomedon kergueleni</i>	8.6	0.08%
A1	<i>Monoculodes curtipediculus</i>	8.6	0.08%
A1	<i>Ophiuroidea (unidentified)</i>	8.6	0.08%

A1	<i>Orseis mathai</i>	8.6	0.08%
A1	<i>Pista</i> sp.	8.6	0.08%
A1	<i>Spiophanes tcherniai</i>	8.6	0.08%
A1	<i>Syllis</i> sp.	8.6	0.08%
A1	<i>Astartidae</i> (unidentified)	8.59	0.08%
A1	<i>Axiokebuita</i> sp.	8.59	0.08%
A1	<i>Capitella</i> sp.	8.59	0.08%
A1	<i>Cirratulus</i> sp.	8.59	0.08%
A1	<i>Eudorella splendida</i>	8.59	0.08%
A1	<i>Hydroida</i> (polyp)	8.59	0.08%
A1	<i>Monoculodes</i> sp.	8.59	0.08%
A1	<i>Ophelina syringopyge</i>	8.59	0.08%
A1	<i>Pyramidellidae</i> (unidentified)	8.59	0.08%
		10691.9	100.00%
A2	<i>Aphelochaeta</i>	6102.36	35.75%
A2	<i>Leitoscoloplos kergulensis</i>	1581.46	9.26%
A2	<i>Halacaridae</i> (unidentified)	1177.53	6.90%
A2	<i>Oligochaeta</i> (unidentified)	971.25	5.69%
A2	<i>Hesionidae</i> (unidentified)	902.43	5.29%
A2	<i>Nototanais dimorphus</i>	679.01	3.98%
A2	<i>Austrosignum grande</i>	661.8	3.88%
A2	<i>Heterophoxus videns</i>	627.4	3.68%
A2	<i>Leaena antarctica</i>	550.09	3.22%
A2	<i>Paramunna glacialis</i>	507.11	2.97%
A2	<i>Capitella perarmata</i>	412.56	2.42%
A2	<i>Ophryotrocha claparedii</i>	326.6	1.91%
A2	<i>Nemertea</i> (unidentified)	283.64	1.66%
A2	<i>Gastropoda</i> (unidentified)	257.85	1.51%
A2	<i>Hydroida</i> (polyp)	197.66	1.16%
A2	<i>Neojaera furcata</i>	180.5	1.06%
A2	<i>Podocopida</i> (unidentified)	137.51	0.81%
A2	<i>Actiniaria</i> (unidentified)	128.91	0.76%
A2	<i>Lysilla loveni macintoshi</i>	103.14	0.60%
A2	<i>Bivalvia</i> (unidentified)	85.95	0.50%
A2	<i>Maldanidae</i> (unidentified)	77.36	0.45%
A2	<i>Philomedes</i> sp.	77.35	0.45%
A2	<i>Spiophanes tcherniai</i>	68.76	0.40%
A2	<i>Lumbrineris</i> sp.	51.57	0.30%
A2	<i>Monoculodes curtipediculus</i>	51.57	0.30%
A2	<i>Pyramidellidae</i> (unidentified)	51.56	0.30%
A2	<i>Onoba turqueti</i>	42.98	0.25%
A2	<i>Sipunculidae</i> (unidentified)	42.98	0.25%
A2	<i>Gnathia</i> sp.	42.97	0.25%
A2	<i>Spiophanes bombyx</i>	42.97	0.25%
A2	<i>Orseis mathai</i>	34.38	0.20%
A2	<i>Barrukia cristata</i>	34.38	0.20%
A2	<i>Caecognathia calva</i>	25.79	0.15%
A2	<i>Golfingia</i> sp.	25.79	0.15%
A2	<i>Laternula elliptica</i>	25.79	0.15%
A2	<i>Pista</i> sp.	25.79	0.15%
A2	<i>Neosabellides elongatus</i>	25.78	0.15%
A2	<i>Paramunna dentata</i>	25.78	0.15%
A2	<i>Ampharetidae</i> (unidentified)	17.19	0.10%

A2	<i>Laonice cirrata</i>	17.19	0.10%
A2	<i>Leodora</i> sp.	17.19	0.10%
A2	<i>Nephtys magellanica</i>	17.19	0.10%
A2	<i>Opheliidae</i> (unidentified)	17.19	0.10%
A2	<i>Polynoidae</i> (unidentified)	17.19	0.10%
A2	<i>Prionospio</i> sp.	17.19	0.10%
A2	<i>Sphaerosyllis perspicax</i>	17.19	0.10%
A2	<i>Syllis sensu lato</i>	17.19	0.10%
A2	<i>Cirratulus</i> sp.	17.19	0.10%
A2	<i>Sabellidae</i> A	17.19	0.10%
A2	<i>Ampharete kerguelensis</i>	8.6	0.05%
A2	<i>Ampharete</i> sp.	8.6	0.05%
A2	<i>Amphiglena mediterranea</i>	8.6	0.05%
A2	<i>Apistobranchus glaciera</i>	8.6	0.05%
A2	<i>Asteroidea</i> (unidentified)	8.6	0.05%
A2	<i>Eunoe anderssoni</i>	8.6	0.05%
A2	<i>Falsimargarita</i> sp.	8.6	0.05%
A2	<i>Golfingiidae</i> (unidentified)	8.6	0.05%
A2	<i>Harmothoe brevipalpa</i>	8.6	0.05%
A2	<i>Lumbrineris magalhaensis</i>	8.6	0.05%
A2	<i>Oenonidae</i> (unidentified)	8.6	0.05%
A2	<i>Orbiniidae</i> (unidentified)	8.6	0.05%
A2	<i>Parviturbo</i> sp.	8.6	0.05%
A2	<i>Scolecopsis</i> sp.	8.6	0.05%
A2	<i>Seriolis</i> sp.	8.6	0.05%
A2	<i>Sphaerosyllis kerguelensis</i>	8.6	0.05%
A2	<i>Spionidae</i> (unidentified)	8.6	0.05%
A2	<i>Syllides articulatus</i>	8.6	0.05%
A2	<i>Syllis</i> sp.	8.6	0.05%
A2	<i>Terebellidae</i> (unidentified)	8.6	0.05%
A2	<i>Typosyllis</i> sp.	8.6	0.05%
A2	<i>Aplysiidae</i> (unidentified)	8.59	0.05%
A2	<i>Brania rhopalophora</i>	8.59	0.05%
A2	<i>Hauchiella tribullata</i>	8.59	0.05%
A2	<i>Hydroida</i> (meduse)	8.59	0.05%
A2	<i>Nymphon</i> sp.	8.59	0.05%
A2	<i>Paramunna rostrata</i>	8.59	0.05%
		17069.54	100.00%
A3	<i>Aphelochaeta</i>	1925.21	17.14%
A3	<i>Halacaridae</i> (unidentified)	1246.28	11.09%
A3	<i>Hesionidae</i> (unidentified)	1065.66	9.49%
A3	<i>Capitella perarmata</i>	1014.12	9.03%
A3	<i>Paramunna glacialis</i>	636.04	5.66%
A3	<i>Heterophoxus videns</i>	524.26	4.67%
A3	<i>Ophryotrocha claparedii</i>	515.65	4.59%
A3	<i>Onoba turqueti</i>	429.76	3.83%
A3	<i>Leitoscoloplos kerguelensis</i>	352.38	3.14%
A3	<i>Seriolis</i> sp.	335.21	2.98%
A3	<i>Nototanaeus dimorphus</i>	318	2.83%
A3	<i>Hydroida</i> (polyp)	309.38	2.75%
A3	<i>Gastropoda</i> (unidentified)	266.45	2.37%
A3	<i>Neojaera furcata</i>	249.26	2.22%
A3	<i>Austrosignum grande</i>	232.05	2.07%

A3	<i>Nemertea (unidentified)</i>	189.09	1.68%
A3	<i>Gnathia sp.</i>	154.71	1.38%
A3	<i>Oligochaeta (unidentified)</i>	154.7	1.38%
A3	<i>Podocopida (unidentified)</i>	137.52	1.22%
A3	<i>Philomedes sp.</i>	103.14	0.92%
A3	<i>Actiniaria (unidentified)</i>	94.53	0.84%
A3	<i>Janaira sp.</i>	68.75	0.61%
A3	<i>Pyramidellidae (unidentified)</i>	68.75	0.61%
A3	<i>Bivalvia (unidentified)</i>	60.17	0.54%
A3	<i>Maldanidae (unidentified)</i>	60.17	0.54%
A3	<i>Heterophoxus sp.</i>	60.16	0.54%
A3	<i>Caecognathia calva</i>	51.57	0.46%
A3	<i>Serpulidae (unidentified)</i>	51.57	0.46%
A3	<i>Munna sp.</i>	51.57	0.46%
A3	<i>Barrukia cristata</i>	51.56	0.46%
A3	<i>Polychaeta (unidentified)</i>	42.98	0.38%
A3	<i>Brania rhopalophora</i>	34.38	0.31%
A3	<i>Lumbrineris magalhaensis</i>	25.79	0.23%
A3	<i>Orseis mathai</i>	25.79	0.23%
A3	<i>Paramunna dentata</i>	25.78	0.23%
A3	<i>Nymphon sp.</i>	17.19	0.15%
A3	<i>Polynoidae (unidentified)</i>	17.19	0.15%
A3	<i>Scolecopsis lefebvrei</i>	17.19	0.15%
A3	<i>Trochidae (unidentified)</i>	17.19	0.15%
A3	<i>Astartidae (unidentified)</i>	17.19	0.15%
A3	<i>Eudorella splendida</i>	17.19	0.15%
A3	<i>Golfingiidae (unidentified)</i>	17.19	0.15%
A3	<i>Mediomastus sp.</i>	17.19	0.15%
A3	<i>Brada sp.</i>	8.6	0.08%
A3	<i>Campylaspis sp.</i>	8.6	0.08%
A3	<i>Capitella sp.</i>	8.6	0.08%
A3	<i>Chaetozone sp.</i>	8.6	0.08%
A3	<i>Exogonella sp.</i>	8.6	0.08%
A3	<i>Laonice cirrata</i>	8.6	0.08%
A3	<i>Liljeborgia sp.</i>	8.6	0.08%
A3	<i>Muricidae (unidentified)</i>	8.6	0.08%
A3	<i>Ophelina syringopyge</i>	8.6	0.08%
A3	<i>Paramunna rostrata</i>	8.6	0.08%
A3	<i>Parviturbo sp.</i>	8.6	0.08%
A3	<i>Prionospio sp.</i>	8.6	0.08%
A3	<i>Sphaerosyllis c.f. hirsuta</i>	8.6	0.08%
A3	<i>Spionidae (unidentified)</i>	8.6	0.08%
A3	<i>Bathyarca sp.</i>	8.59	0.08%
A3	<i>Lumbrineris sp.</i>	8.59	0.08%
A3	<i>Monoculodes curtipediculus</i>	8.59	0.08%
A3	<i>Seba dubia</i>	8.59	0.08%
A3	<i>Tornidae (unidentified)</i>	8.59	0.08%
		11233.26	100.00%
D1	<i>Aphelochaeta</i>	4658.37	30.95%
D1	<i>Heterophoxus videns</i>	2483.83	16.50%
D1	<i>Actiniaria (unidentified)</i>	1753.19	11.65%
D1	<i>Austrosignum grande</i>	1658.78	11.02%
D1	<i>Nototanaeis dimorphus</i>	962.56	6.40%

D1	<i>Hesionidae (unidentified)</i>	567.25	3.77%
D1	<i>Leitoscoloplos kergulensis</i>	343.77	2.28%
D1	<i>Ophelina breviata</i>	249.26	1.66%
D1	<i>Onoba turqueti</i>	214.88	1.43%
D1	<i>Nemertea (unidentified)</i>	154.71	1.03%
D1	<i>Gastropoda (unidentified)</i>	137.52	0.91%
D1	<i>Monoculodes curtipediculus</i>	137.52	0.91%
D1	<i>Oligochaeta (unidentified)</i>	128.93	0.86%
D1	<i>Laternula elliptica</i>	111.73	0.74%
D1	<i>Philomedes sp.</i>	94.54	0.63%
D1	<i>Hydroida (meduse)</i>	94.53	0.63%
D1	<i>Bivalvia (unidentified)</i>	85.95	0.57%
D1	<i>Hydroida (polyp)</i>	85.94	0.57%
D1	<i>Halacaridae (unidentified)</i>	85.94	0.57%
D1	<i>Monoculodes sp.</i>	85.94	0.57%
D1	<i>Pyramidellidae (unidentified)</i>	77.35	0.51%
D1	<i>Capitella perarmata</i>	60.17	0.40%
D1	<i>Paramunna glacialis</i>	51.57	0.34%
D1	<i>Alcyonacea (unidentified)</i>	51.57	0.34%
D1	<i>Gnathia sp.</i>	51.57	0.34%
D1	<i>Spirorbis sp.</i>	34.38	0.23%
D1	<i>Barrukia cristata</i>	34.38	0.23%
D1	<i>Heterophoxus sp.</i>	34.38	0.23%
D1	<i>Ampharete kerguelensis</i>	25.79	0.17%
D1	<i>Axiothella antarctica</i>	25.79	0.17%
D1	<i>Helicosiphon biscoeensis</i>	25.79	0.17%
D1	<i>Lumbrineridae (unidentified)</i>	25.79	0.17%
D1	<i>Opheliidae (unidentified)</i>	25.79	0.17%
D1	<i>Ophelina syringopyge</i>	25.79	0.17%
D1	<i>Aplysiidae (unidentified)</i>	25.78	0.17%
D1	<i>Lumbrineris macquariensis</i>	25.78	0.17%
D1	<i>Orchomenella pinguis</i>	25.78	0.17%
D1	<i>Ammotrypane sp.</i>	17.19	0.11%
D1	<i>Apomatus sp.</i>	17.19	0.11%
D1	<i>Neojaera furcata</i>	17.19	0.11%
D1	<i>Nymphon sp.</i>	17.19	0.11%
D1	<i>Orseis mathai</i>	17.19	0.11%
D1	<i>Podocopida (unidentified)</i>	17.19	0.11%
D1	<i>Idunella sp.</i>	17.19	0.11%
D1	<i>Neosabellides elongatus</i>	17.19	0.11%
D1	<i>Chaetozone sp.</i>	8.6	0.06%
D1	<i>Eudorella splendida</i>	8.6	0.06%
D1	<i>Maldanidae (unidentified)</i>	8.6	0.06%
D1	<i>Ophelina gymnopyge</i>	8.6	0.06%
D1	<i>Ophelina sp.</i>	8.6	0.06%
D1	<i>Ophryotrocha claparedii</i>	8.6	0.06%
D1	<i>Orbiniidae (unidentified)</i>	8.6	0.06%
D1	<i>Paramunna dentata</i>	8.6	0.06%
D1	<i>Pettiboneia sp.</i>	8.6	0.06%
D1	<i>Polychaeta (unidentified)</i>	8.6	0.06%
D1	<i>Spiophanes bombyx</i>	8.6	0.06%
D1	<i>Syllis sensu lato</i>	8.6	0.06%
D1	<i>Terebellidae (unidentified)</i>	8.6	0.06%
D1	<i>Antias charcoti</i>	8.59	0.06%

D1	<i>Astartidae (unidentified)</i>	8.59	0.06%
D1	<i>Golfingiidae (unidentified)</i>	8.59	0.06%
D1	<i>Hauchiella tribullata</i>	8.59	0.06%
D1	<i>Janaira sp.</i>	8.59	0.06%
D1	<i>Lasaeidae A</i>	8.59	0.06%
D1	<i>Leptonidae (unidentified)</i>	8.59	0.06%
D1	<i>Lumbrineris magalhaensis</i>	8.59	0.06%
D1	<i>Sipunculidae (unidentified)</i>	8.59	0.06%
		15049.22	100.00%
D2	<i>Ophryotrocha claparedii</i>	8130.47	34.36%
D2	<i>Capitella perarmata</i>	7374.28	31.17%
D2	<i>Leitoscoloplos kergulensis</i>	1418.05	5.99%
D2	<i>Nototanais dimorphus</i>	1272.05	5.38%
D2	<i>Aphelochaeta</i>	1143.09	4.83%
D2	<i>Austrosignum grande</i>	885.21	3.74%
D2	<i>Heterophoxus videns</i>	653.22	2.76%
D2	<i>Hesionidae (unidentified)</i>	524.28	2.22%
D2	<i>Oligochaeta (unidentified)</i>	489.88	2.07%
D2	<i>Coralliotrocha composita</i>	403.97	1.71%
D2	<i>Gastropoda (unidentified)</i>	154.71	0.65%
D2	<i>Paramunna glacialis</i>	128.93	0.54%
D2	<i>Polychaeta (unidentified)</i>	103.14	0.44%
D2	<i>Actiniaria (unidentified)</i>	94.54	0.40%
D2	<i>Onoba turqueti</i>	68.76	0.29%
D2	<i>Axiothella antarctica</i>	60.17	0.25%
D2	<i>Philomedes sp.</i>	60.17	0.25%
D2	<i>Nemertea (unidentified)</i>	60.16	0.25%
D2	<i>Monoculodes curtipediculus</i>	51.57	0.22%
D2	<i>Munna sp.</i>	51.57	0.22%
D2	<i>Hydroida (polyp)</i>	42.97	0.18%
D2	<i>Laternula elliptica</i>	34.38	0.15%
D2	<i>Maldanidae (unidentified)</i>	34.38	0.15%
D2	<i>Podocopida (unidentified)</i>	25.79	0.11%
D2	<i>Gnathia sp.</i>	25.78	0.11%
D2	<i>Alcyonacea (unidentified)</i>	17.19	0.07%
D2	<i>Ampharete kerguelensis</i>	17.19	0.07%
D2	<i>Axiothella sp.</i>	17.19	0.07%
D2	<i>Dorvillea furcata</i>	17.19	0.07%
D2	<i>Golfingia sp.</i>	17.19	0.07%
D2	<i>Harmothoe brevipalpa</i>	17.19	0.07%
D2	<i>Lysilla loveni macintoshi</i>	17.19	0.07%
D2	<i>Monoculodes sp.</i>	17.19	0.07%
D2	<i>Ophelina breviata</i>	17.19	0.07%
D2	<i>Orchomenella sp.</i>	17.19	0.07%
D2	<i>Pista sp.</i>	17.19	0.07%
D2	<i>Sphaerosyllis c.f. hirsuta</i>	17.19	0.07%
D2	<i>Halacaridae (unidentified)</i>	17.19	0.07%
D2	<i>Astartidae (unidentified)</i>	17.19	0.07%
D2	<i>Pyramidellidae (unidentified)</i>	17.19	0.07%
D2	<i>Aglaophamus macroura</i>	8.6	0.04%
D2	<i>Ampharete sp.</i>	8.6	0.04%
D2	<i>Antinoella antarctica</i>	8.6	0.04%
D2	<i>Barrukia cristata</i>	8.6	0.04%

D2	<i>Clymenella minor</i>	8.6	0.04%
D2	<i>Lumbrineris magalhaensis</i>	8.6	0.04%
D2	<i>Neosabellides elongatus</i>	8.6	0.04%
D2	<i>Orseis mathai</i>	8.6	0.04%
D2	<i>Pomatoceros</i> sp.	8.6	0.04%
D2	<i>Pseudoparatanaïs antarcticus</i>	8.6	0.04%
D2	<i>Lasaeidae A</i>	8.59	0.04%
D2	<i>Sipunculidae (unidentified)</i>	8.59	0.04%
D2	<i>Vitrinellidae (unidentified)</i>	8.59	0.04%
		23661.14	100.00%
D3	<i>Nototanaïs dimorphus</i>	5225.3	15.70%
D3	<i>Oligochaeta (unidentified)</i>	4288.8	12.89%
D3	<i>Philomedes</i> sp.	3549.37	10.67%
D3	<i>Spiophanes tcherniai</i>	1753.41	5.27%
D3	<i>Laonice cirrata</i>	1547.03	4.65%
D3	<i>Porifera (unidentified)</i>	1452.58	4.36%
D3	<i>Austrosignum grande</i>	1375.07	4.13%
D3	<i>Hesionidae (unidentified)</i>	911.01	2.74%
D3	<i>Paramunna glacialis</i>	842.26	2.53%
D3	<i>Nemertea (unidentified)</i>	747.78	2.25%
D3	<i>Heterophoxus videns</i>	661.76	1.99%
D3	<i>Podocopida (unidentified)</i>	498.47	1.50%
D3	<i>Pyramidellidae (unidentified)</i>	489.86	1.47%
D3	<i>Neojaera furcata</i>	472.68	1.42%
D3	<i>Munna</i> sp.	455.5	1.37%
D3	<i>Spiophanes bombyx</i>	421.14	1.27%
D3	<i>Nicomache lumbricalis</i>	421.13	1.27%
D3	<i>Paramunna rostrata</i>	360.96	1.08%
D3	<i>Orseis mathai</i>	318	0.96%
D3	<i>Axiothella antarctica</i>	318	0.96%
D3	<i>Golfingiidae (unidentified)</i>	309.4	0.93%
D3	<i>Pettiboneia</i> sp.	266.45	0.80%
D3	<i>Halacaridae (unidentified)</i>	257.84	0.77%
D3	<i>Brania rhopalophora</i>	257.83	0.77%
D3	<i>Golfingia</i> sp.	249.26	0.75%
D3	<i>Sphaerosyllis c.f. hirsuta</i>	240.66	0.72%
D3	<i>Exogone heterochacta</i>	240.65	0.72%
D3	<i>Bivalvia (unidentified)</i>	232.07	0.70%
D3	<i>Haplocheira plumosa</i>	232.06	0.70%
D3	<i>Gastropoda (unidentified)</i>	197.69	0.59%
D3	<i>Neosabellides elongatus</i>	197.66	0.59%
D3	<i>Actiniaria (unidentified)</i>	146.12	0.44%
D3	<i>Serpulidae (unidentified)</i>	137.51	0.41%
D3	<i>Apistobranchus glaciera</i>	128.93	0.39%
D3	<i>Ampharete kerguelensis</i>	120.33	0.36%
D3	<i>Syllis sensu lato</i>	120.32	0.36%
D3	<i>Sipunculidae (unidentified)</i>	120.32	0.36%
D3	<i>Leitoscoloplos kerguelensis</i>	111.73	0.34%
D3	<i>Nymphon</i> sp.	111.73	0.34%
D3	<i>Leucon</i> sp.	111.73	0.34%
D3	<i>Leptonidae (unidentified)</i>	111.72	0.34%
D3	<i>Ampharetidae (unidentified)</i>	103.14	0.31%
D3	<i>Ophelina syringopyge</i>	103.13	0.31%

D3	<i>Axiokebuita minuta</i>	94.55	0.28%
D3	<i>Caecognathia calva</i>	94.55	0.28%
D3	<i>Limatula hodgsoni</i>	94.54	0.28%
D3	<i>Cardiidae (unidentified)</i>	85.95	0.26%
D3	<i>Lumbrineris</i> sp.	85.95	0.26%
D3	<i>Gnathia</i> sp.	85.95	0.26%
D3	<i>Trochidae (unidentified)</i>	85.94	0.26%
D3	<i>Lucinidae (unidentified)</i>	85.94	0.26%
D3	<i>Octobranchus</i> sp.	77.36	0.23%
D3	<i>Periploma</i> sp.	77.36	0.23%
D3	<i>Edwardsia meridionalis</i>	68.76	0.21%
D3	<i>Notoproctus</i> sp.	68.76	0.21%
D3	<i>Aphelochaeta</i>	68.76	0.21%
D3	<i>Astartidae (unidentified)</i>	68.75	0.21%
D3	<i>Onoba turqueti</i>	60.17	0.18%
D3	<i>Sphaerosyllis perspicax</i>	60.16	0.18%
D3	<i>Sphaerosyllis</i> sp.	51.57	0.15%
D3	<i>Lasaeidae (unidentified)</i>	51.57	0.15%
D3	<i>Lumbrineris magalhaensis</i>	51.57	0.15%
D3	<i>Axiothella</i> sp.	51.57	0.15%
D3	<i>Monoculodes</i> sp.	51.56	0.15%
D3	<i>Isopoda (unidentified)</i>	51.56	0.15%
D3	<i>Paramunna dentata</i>	51.56	0.15%
D3	<i>Maldanidae (unidentified)</i>	42.98	0.13%
D3	<i>Spio obtusa</i>	42.98	0.13%
D3	<i>Terebellidae (unidentified)</i>	42.98	0.13%
D3	<i>Cirratulidae (unidentified)</i>	42.98	0.13%
D3	<i>Ophryotrocha claparedii</i>	42.98	0.13%
D3	<i>Pseudocythere</i> sp.	42.98	0.13%
D3	<i>Ectias</i> sp.	42.97	0.13%
D3	<i>Monoculodes curtipedculus</i>	42.97	0.13%
D3	<i>Capitella perarmata</i>	42.97	0.13%
D3	<i>Galathowenia scotiae</i>	34.38	0.10%
D3	<i>Lysilla loveni macintoshi</i>	34.38	0.10%
D3	<i>Thraciidae (unidentified)</i>	34.38	0.10%
D3	<i>Laternula elliptica</i>	34.38	0.10%
D3	<i>Barrukia cristata</i>	34.38	0.10%
D3	<i>Syllidae (unidentified)</i>	34.38	0.10%
D3	<i>Chaetozone</i> sp.	25.79	0.08%
D3	<i>Exogonella</i> sp.	25.79	0.08%
D3	<i>Ophelina breviata</i>	25.79	0.08%
D3	<i>Ophiuroidea (unidentified)</i>	25.79	0.08%
D3	<i>Prionospio</i> sp.	25.79	0.08%
D3	<i>Eunoe anderssoni</i>	25.78	0.08%
D3	<i>Aglaophamus macroura</i>	17.19	0.05%
D3	<i>Caulleriella</i> sp.	17.19	0.05%
D3	<i>Exogone</i> sp.	17.19	0.05%
D3	<i>Lacydonia</i> sp.	17.19	0.05%
D3	<i>Leaena antarctica</i>	17.19	0.05%
D3	<i>Leucon rossi</i>	17.19	0.05%
D3	<i>Maldane sarsi Antqrcicus</i>	17.19	0.05%
D3	<i>Myidae (unidentified)</i>	17.19	0.05%
D3	<i>Oculatus Antarticus</i>	17.19	0.05%
D3	<i>Pseudokellya cardiformis</i>	17.19	0.05%

D3	<i>Spiophanes soderstroemi</i>	17.19	0.05%
D3	<i>Terebellides stroemi</i>	17.19	0.05%
D3	<i>Typosyllis</i> sp.	17.19	0.05%
D3	<i>Axiokebuita</i> sp.	17.19	0.05%
D3	<i>Capitella</i> sp.	17.19	0.05%
D3	<i>Hauchiella tribullata</i>	17.19	0.05%
D3	<i>Hydroida</i> (polyp)	17.19	0.05%
D3	<i>Leucon sagittae</i>	17.19	0.05%
D3	<i>Phascolosomatidae</i> (unidentified)	17.19	0.05%
D3	<i>Sabellidae A</i>	17.19	0.05%
D3	<i>Syllis</i> sp.	17.19	0.05%
D3	<i>Thelepus cincinnatus</i>	17.19	0.05%
D3	<i>Acrocirrid</i> sp.	8.6	0.03%
D3	<i>Ampharete</i> sp.	8.6	0.03%
D3	<i>Arcturus</i> sp.	8.6	0.03%
D3	<i>Aricidea trilobata</i>	8.6	0.03%
D3	<i>Caulleriella antarctica</i>	8.6	0.03%
D3	<i>Ceriantharia</i> (unidentified)	8.6	0.03%
D3	<i>Cucumaria</i> sp.	8.6	0.03%
D3	<i>Eteone</i> sp.	8.6	0.03%
D3	<i>Harmothoe brevipalpa</i>	8.6	0.03%
D3	<i>Harmothoe</i> sp.	8.6	0.03%
D3	<i>Helicosiphon biscoeensis</i>	8.6	0.03%
D3	<i>Lasaeidae A</i>	8.6	0.03%
D3	<i>Lumbrineridae</i> (unidentified)	8.6	0.03%
D3	<i>Oriopsis limbata</i>	8.6	0.03%
D3	<i>Pherusa kerguelarum</i>	8.6	0.03%
D3	<i>Polychaeta</i> (unidentified)	8.6	0.03%
D3	<i>Pomatoceros</i> sp.	8.6	0.03%
D3	<i>Scolecopsis lefebvrei</i>	8.6	0.03%
D3	<i>Seba dubia</i>	8.6	0.03%
D3	<i>Simrothiellidae</i> unidentified	8.6	0.03%
D3	<i>Sphaerosyllis kerguelensis</i>	8.6	0.03%
D3	<i>Spionidae</i> (unidentified)	8.6	0.03%
D3	<i>Spirorbis</i> sp.	8.6	0.03%
D3	<i>Syllides articulatus</i>	8.6	0.03%
D3	<i>Thaumatelson herdmani</i>	8.6	0.03%
D3	<i>Aplysiidae</i> (unidentified)	8.59	0.03%
D3	<i>Austrodecus</i> sp.	8.59	0.03%
D3	<i>Eudorella splendida</i>	8.59	0.03%
D3	<i>Heterophoxus</i> sp.	8.59	0.03%
D3	<i>Janaira</i> sp.	8.59	0.03%
D3	<i>Leucothoe spinicarpa</i>	8.59	0.03%
D3	<i>Littorinidae</i> (unidentified)	8.59	0.03%
D3	<i>Lumbrineris macquariensis</i>	8.59	0.03%
D3	<i>Nuculidae</i> (unidentified)	8.59	0.03%
D3	<i>Paramunna</i> sp.	8.59	0.03%
D3	<i>Tharyx</i> sp.	8.59	0.03%
		33278.27	100.00%
E1	<i>Spiophanes tcherniai</i>	6098.26	25.28%
E1	<i>Nototanaeis dimorphus</i>	3576.79	14.83%
E1	<i>Oligochaeta</i> (unidentified)	2457.98	10.19%

E1	<i>Spiophanes bombyx</i>	1859.22	7.71%
E1	<i>Austrosignum grande</i>	1512.58	6.27%
E1	<i>Edwardsia meridionalis</i>	1355.17	5.62%
E1	<i>Paramunna glacialis</i>	787.89	3.27%
E1	<i>Axiothella antarctica</i>	630.31	2.61%
E1	<i>Eudorella splendida</i>	598.75	2.48%
E1	<i>Podocopida (unidentified)</i>	393.9	1.63%
E1	<i>Nemertea (unidentified)</i>	362.42	1.50%
E1	<i>Axiothella sp.</i>	346.64	1.44%
E1	<i>Philomedes sp.</i>	330.91	1.37%
E1	<i>Heterophoxus videns</i>	330.9	1.37%
E1	<i>Leitoscoloplos kergulensis</i>	315.14	1.31%
E1	<i>Laternula elliptica</i>	267.88	1.11%
E1	<i>Laonice cirrata</i>	252.12	1.05%
E1	<i>Hesionidae (unidentified)</i>	236.36	0.98%
E1	<i>Paramunna dentata</i>	204.84	0.85%
E1	<i>Hydroida (meduse)</i>	157.56	0.65%
E1	<i>Littorinidae (unidentified)</i>	141.8	0.59%
E1	<i>Onoba turqueti</i>	126.06	0.52%
E1	<i>Helicosiphon biscoeensis</i>	110.3	0.46%
E1	<i>Munna sp.</i>	110.3	0.46%
E1	<i>Neojaera furcata</i>	110.3	0.46%
E1	<i>Halacaridae (unidentified)</i>	94.55	0.39%
E1	<i>Ophelina breviata</i>	94.55	0.39%
E1	<i>Pyramidellidae (unidentified)</i>	94.53	0.39%
E1	<i>Gastropoda (unidentified)</i>	78.79	0.33%
E1	<i>Maldanidae (unidentified)</i>	78.79	0.33%
E1	<i>Lysilla loveni macintoshi</i>	78.79	0.33%
E1	<i>Ophelina syringopyge</i>	78.78	0.33%
E1	<i>Aphelochaeta</i>	78.78	0.33%
E1	<i>Trochidae (unidentified)</i>	78.78	0.33%
E1	<i>Haplocheira plumosa</i>	63.03	0.26%
E1	<i>Golfingia sp.</i>	47.27	0.20%
E1	<i>Monoculodes curtipedculus</i>	47.27	0.20%
E1	<i>Oriopsis limbata</i>	47.27	0.20%
E1	<i>Sphaerosyllis c.f. hirsuta</i>	47.27	0.20%
E1	<i>Astartidae (unidentified)</i>	47.27	0.20%
E1	<i>Bivalvia (unidentified)</i>	31.52	0.13%
E1	<i>Leucon sagittae</i>	31.52	0.13%
E1	<i>Monoculodes sp.</i>	31.52	0.13%
E1	<i>Porifera (unidentified)</i>	31.52	0.13%
E1	<i>Tornidae (unidentified)</i>	31.51	0.13%
E1	<i>Aglaophamus sp.</i>	15.76	0.07%
E1	<i>Apistobranchus glacierae</i>	15.76	0.07%
E1	<i>Caulleriella antarctica</i>	15.76	0.07%
E1	<i>Falsimargarita sp.</i>	15.76	0.07%
E1	<i>Hydroida (polyp)</i>	15.76	0.07%
E1	<i>Lasaeidae (unidentified)</i>	15.76	0.07%
E1	<i>Limatula hodgsoni</i>	15.76	0.07%
E1	<i>Nephtyidae (unidentified)</i>	15.76	0.07%
E1	<i>Ophryotrocha claparedii</i>	15.76	0.07%
E1	<i>Orbiniidae (unidentified)</i>	15.76	0.07%
E1	<i>Paramunna rostrata</i>	15.76	0.07%
E1	<i>Thaumatelson herdmani</i>	15.76	0.07%

E1	<i>Cirratulus</i> sp.	15.76	0.07%
E1	<i>Lucinidae</i> (unidentified)	15.76	0.07%
E1	<i>Turridae</i> (unidentified)	15.76	0.07%
		24124.09	100.00%
E2	<i>Nototanaïs dimorphus</i>	18577.78	28.07%
E2	<i>Spiophanes tcherniai</i>	8792.84	13.29%
E2	<i>Edwardsia meridionalis</i>	6287.35	9.50%
E2	<i>Austrosignum grande</i>	5672.47	8.57%
E2	<i>Galathowenia scotiae</i>	3860.66	5.83%
E2	<i>Eudorella splendida</i>	3844.63	5.81%
E2	<i>Spiophanes bombyx</i>	2678.44	4.05%
E2	<i>Oligochaeta</i> (unidentified)	1717.54	2.60%
E2	<i>Actiniaria</i> (unidentified)	1575.64	2.38%
E2	<i>Axiothella</i> sp.	1433.77	2.17%
E2	<i>Myriochele</i> sp.	1418.2	2.14%
E2	<i>Heterophoxus videns</i>	1276.32	1.93%
E2	<i>Philomedes</i> sp.	1213.33	1.83%
E2	<i>Paramunna glacialis</i>	724.86	1.10%
E2	<i>Haplocheira plumosa</i>	567.28	0.86%
E2	<i>Monoculodes curtipediculus</i>	504.25	0.76%
E2	<i>Orchomenella pinguis</i>	409.67	0.62%
E2	<i>Hippomedon kergueleni</i>	315.16	0.48%
E2	<i>Munna</i> sp.	315.15	0.48%
E2	<i>Bivalvia</i> (unidentified)	299.4	0.45%
E2	<i>Nemertea</i> (unidentified)	299.4	0.45%
E2	<i>Thaumatelson herdmani</i>	299.4	0.45%
E2	<i>Hesionidae</i> (unidentified)	299.38	0.45%
E2	<i>Porifera</i> (unidentified)	267.88	0.40%
E2	<i>Laonice cirrata</i>	267.88	0.40%
E2	<i>Podocopida</i> (unidentified)	267.85	0.40%
E2	<i>Aphelochaeta</i>	252.11	0.38%
E2	<i>Nicomache lumbricalis</i>	236.37	0.36%
E2	<i>Neojaera furcata</i>	220.61	0.33%
E2	<i>Axiothella antarctica</i>	141.82	0.21%
E2	<i>Hydroida</i> (meduse)	126.04	0.19%
E2	<i>Seba dubia</i>	110.29	0.17%
E2	<i>Golfingia</i> sp.	94.55	0.14%
E2	<i>Metopoides magellanica</i>	94.55	0.14%
E2	<i>Monoculodes</i> sp.	94.53	0.14%
E2	<i>Gastropoda</i> (unidentified)	78.79	0.12%
E2	<i>Ophelina syringopyge</i>	78.78	0.12%
E2	<i>Paramunna dentata</i>	78.78	0.12%
E2	<i>Trochidae</i> (unidentified)	78.78	0.12%
E2	<i>Halacaridae</i> (unidentified)	63.03	0.10%
E2	<i>Laternula elliptica</i>	63.03	0.10%
E2	<i>Leitoscoloplos kergulensis</i>	63.03	0.10%
E2	<i>Helicosiphon bischoeensis</i>	47.27	0.07%
E2	<i>Lysilla loveni macintoshi</i>	47.27	0.07%
E2	<i>Myriochele riojai</i>	47.27	0.07%
E2	<i>Ophelina breviata</i>	47.27	0.07%
E2	<i>Paramunna rostrata</i>	47.27	0.07%
E2	<i>Sphaerosyllis c.f. hirsuta</i>	47.27	0.07%
E2	<i>Pyramidellidae</i> (unidentified)	47.27	0.07%

E2	<i>Alcyonium antarcticum</i>	31.52	0.05%
E2	<i>Ascidacea (unidentified)</i>	31.52	0.05%
E2	<i>Barrukia cristata</i>	31.52	0.05%
E2	<i>Ceriantharia (unidentified)</i>	31.52	0.05%
E2	<i>Maldanidae (unidentified)</i>	31.52	0.05%
E2	<i>Nemocardium sp.</i>	31.52	0.05%
E2	<i>Terebellidae (unidentified)</i>	31.52	0.05%
E2	<i>Axiokebuita sp.</i>	31.51	0.05%
E2	<i>Neosabellides elongatus</i>	31.51	0.05%
E2	<i>Vitrinellidae (unidentified)</i>	31.51	0.05%
E2	<i>Abatus sp.</i>	15.76	0.02%
E2	<i>Aglaophamus macroura</i>	15.76	0.02%
E2	<i>Amage sp.</i>	15.76	0.02%
E2	<i>Ammotrypane sp.</i>	15.76	0.02%
E2	<i>Ampharete sp.</i>	15.76	0.02%
E2	<i>Apistobranchus glaciera</i>	15.76	0.02%
E2	<i>Cyamiocardia denticulatum</i>	15.76	0.02%
E2	<i>Euchone sp.</i>	15.76	0.02%
E2	<i>Falsimargarita sp.</i>	15.76	0.02%
E2	<i>Gnathia sp.</i>	15.76	0.02%
E2	<i>Harmothoe sp.</i>	15.76	0.02%
E2	<i>Idunella sp.</i>	15.76	0.02%
E2	<i>Lasaeidae (unidentified)</i>	15.76	0.02%
E2	<i>Leaena antarctica</i>	15.76	0.02%
E2	<i>Leodora sp.</i>	15.76	0.02%
E2	<i>Leucon rossi</i>	15.76	0.02%
E2	<i>Onoba turqueti</i>	15.76	0.02%
E2	<i>Opheliidae (unidentified)</i>	15.76	0.02%
E2	<i>Orchomenella sp.</i>	15.76	0.02%
E2	<i>Oriopsis limbata</i>	15.76	0.02%
E2	<i>Perkinsiana sp.</i>	15.76	0.02%
E2	<i>Pseudopolydora (unidentified)</i>	15.76	0.02%
E2	<i>Rissoidae (unidentified)</i>	15.76	0.02%
E2	<i>Sabellidae A</i>	15.76	0.02%
E2	<i>Scolecopsis lefebvrei</i>	15.76	0.02%
E2	<i>Syllidae (unidentified)</i>	15.76	0.02%
E2	<i>Astartidae (unidentified)</i>	15.76	0.02%
E2	<i>Cirratulus sp.</i>	15.76	0.02%
E2	<i>Lucinidae (unidentified)</i>	15.76	0.02%
E2	<i>Stenothoidae (unidentified)</i>	15.76	0.02%
		66180.48	100.00%
E3	<i>Nototanais dimorphus</i>	5955.92	17.67%
E3	<i>Oligochaeta (unidentified)</i>	3844.73	11.40%
E3	<i>Porifera (unidentified)</i>	3671.55	10.89%
E3	<i>Podocopida (unidentified)</i>	2284.62	6.78%
E3	<i>Philomedes sp.</i>	2205.85	6.54%
E3	<i>Paramunna dentata</i>	992.6	2.94%
E3	<i>Leucon sp.</i>	898.11	2.66%
E3	<i>Austrosignum grande</i>	724.8	2.15%
E3	<i>Hesionidae (unidentified)</i>	724.8	2.15%
E3	<i>Laonice cirrata</i>	646.06	1.92%
E3	<i>Halacaridae (unidentified)</i>	646.03	1.92%
E3	<i>Seba dubia</i>	614.55	1.82%

E3	<i>Nicomache lumbricalis</i>	535.76	1.59%
E3	<i>Spiophanes tcherniai</i>	535.76	1.59%
E3	<i>Nemertea (unidentified)</i>	504.25	1.50%
E3	<i>Munna</i> sp.	441.18	1.31%
E3	<i>Phascolosomatidae</i> (unidentified)	409.64	1.22%
E3	<i>Orseis mathai</i>	393.89	1.17%
E3	<i>Haplocheira plumosa</i>	362.41	1.08%
E3	<i>Limatula hodgsoni</i>	362.41	1.08%
E3	<i>Heterophoxus videns</i>	346.65	1.03%
E3	<i>Onoba turqueti</i>	330.91	0.98%
E3	<i>Axiothella</i> sp.	330.87	0.98%
E3	<i>Paramunna glacialis</i>	315.16	0.93%
E3	<i>Paramunna</i> sp.	315.11	0.93%
E3	<i>Sphaerosyllis</i> c.f. <i>hirsuta</i>	299.37	0.89%
E3	<i>Syllis</i> sp.	283.6	0.84%
E3	<i>Sphaerosyllis perspicax</i>	236.36	0.70%
E3	<i>Astartidae (unidentified)</i>	236.33	0.70%
E3	<i>Golfingia</i> sp.	204.85	0.61%
E3	<i>Seba saundersii</i>	204.85	0.61%
E3	<i>Brania rhopalophora</i>	189.07	0.56%
E3	<i>Exogone heterochacta</i>	157.56	0.47%
E3	<i>Eudorella splendida</i>	141.82	0.42%
E3	<i>Trochidae (unidentified)</i>	141.8	0.42%
E3	<i>Paramunna rostrata</i>	126.06	0.37%
E3	<i>Neojaera furcata</i>	126.06	0.37%
E3	<i>Gnathia</i> sp.	126.05	0.37%
E3	<i>Janaira</i> sp.	126.05	0.37%
E3	<i>Bivalvia (unidentified)</i>	110.3	0.33%
E3	<i>Pettiboneia</i> sp.	110.3	0.33%
E3	<i>Leitoscoloplos kergulensis</i>	110.3	0.33%
E3	<i>Naticidae (unidentified)</i>	94.55	0.28%
E3	<i>Axiokebuita</i> sp.	94.53	0.28%
E3	<i>Stenothoidae (unidentified)</i>	94.53	0.28%
E3	<i>Laternula elliptica</i>	78.79	0.23%
E3	<i>Leucon rossi</i>	78.79	0.23%
E3	<i>Ophiuroidea (unidentified)</i>	78.79	0.23%
E3	<i>Actiniaria (unidentified)</i>	78.78	0.23%
E3	<i>Thaumatelson herdmani</i>	78.78	0.23%
E3	<i>Tornidae (unidentified)</i>	78.78	0.23%
E3	<i>Ectias</i> sp.	63.02	0.19%
E3	<i>Axiothella antarctica</i>	47.27	0.14%
E3	<i>Brania</i> sp.	47.27	0.14%
E3	<i>Falsimargarita</i> sp.	47.27	0.14%
E3	<i>Ophelina breviata</i>	47.27	0.14%
E3	<i>Spirorbis</i> sp.	47.27	0.14%
E3	<i>Syllidae (unidentified)</i>	47.27	0.14%
E3	<i>Terebellidae (unidentified)</i>	47.27	0.14%
E3	<i>Exogone</i> sp.	47.27	0.14%
E3	<i>Ophryotrocha claparedii</i>	47.27	0.14%
E3	<i>Amphiodia</i> sp.	47.27	0.14%
E3	<i>Cirratulus</i> sp.	47.27	0.14%
E3	<i>Aphelochaeta</i>	31.52	0.09%
E3	<i>Axinopsis debilis</i>	31.52	0.09%

E3	<i>Capitella perarmata</i>	31.52	0.09%
E3	<i>Caulleriella antarctica</i>	31.52	0.09%
E3	<i>Caulleriella</i> sp.	31.52	0.09%
E3	<i>Chaetozone</i> sp.	31.52	0.09%
E3	<i>Haustoriidae</i> (unidentified)	31.52	0.09%
E3	<i>Lasaeidae</i> (unidentified)	31.52	0.09%
E3	<i>Lumbrineridae</i> (unidentified)	31.52	0.09%
E3	<i>Lumbrineris magalhaensis</i>	31.52	0.09%
E3	<i>Mytilidae</i> (unidentified)	31.52	0.09%
E3	<i>Periploma</i> sp.	31.52	0.09%
E3	<i>Perkinsiana</i> sp.	31.52	0.09%
E3	<i>Philobrya</i> sp.	31.52	0.09%
E3	<i>Phyllocomus crocea</i>	31.52	0.09%
E3	<i>Serpulidae</i> (unidentified)	31.52	0.09%
E3	<i>Syllides articulatus</i>	31.52	0.09%
E3	<i>Antias charcoti</i>	31.51	0.09%
E3	<i>Isopoda</i> (unidentified)	31.51	0.09%
E3	<i>Liljeborgia</i> sp.	31.51	0.09%
E3	<i>Spiophanes soderstroemi</i>	31.51	0.09%
E3	<i>Arcturus</i> sp.	15.76	0.05%
E3	<i>Cirratulidae</i> (unidentified)	15.76	0.05%
E3	<i>Edwardsia meridionalis</i>	15.76	0.05%
E3	<i>Gastropoda</i> (unidentified)	15.76	0.05%
E3	<i>Glycera kerguelensis</i>	15.76	0.05%
E3	<i>Lumbrineris</i> sp.	15.76	0.05%
E3	<i>Monoculodes</i> sp.	15.76	0.05%
E3	<i>Octobrachus</i> sp.	15.76	0.05%
E3	<i>Polychaeta</i> (unidentified)	15.76	0.05%
E3	<i>Pseudocythere</i> sp.	15.76	0.05%
E3	<i>Syllis sensu lato</i>	15.76	0.05%
E3	<i>Thelepus koehleri</i>	15.76	0.05%
E3	<i>Typhlotanaoides rostralis</i>	15.76	0.05%
E3	<i>Urothoe marionis</i>	15.76	0.05%
E3	<i>Vitrinellidae</i> (unidentified)	15.76	0.05%
E3	<i>Golfingiidae</i> (unidentified)	15.76	0.05%
E3	<i>Leptonidae</i> (unidentified)	15.76	0.05%
E3	<i>Littorinidae</i> (unidentified)	15.76	0.05%
E3	<i>Lucinidae</i> (unidentified)	15.76	0.05%
E3	<i>Lumbrineris macquariensis</i>	15.76	0.05%
E3	<i>Lysilla loveni macintoshi</i>	15.76	0.05%
E3	<i>Pyramidellidae</i> (unidentified)	15.76	0.05%
E3	<i>Sabellidae</i> A	15.76	0.05%
E3	<i>Spionidae</i> (unidentified)	15.76	0.05%
E3	<i>Terebellides stroemi</i>	7.88	0.02%
		33711.66	100.00%
F1	<i>Nototanaeis dimorphus</i>	6077.24	17.12%
F1	<i>Gastropoda</i> (unidentified)	5146.04	14.50%
F1	<i>Spiophanes bombyx</i>	4294.51	12.10%
F1	<i>Oligochaeta</i> (unidentified)	3767.89	10.62%
F1	<i>Podocopida</i> (unidentified)	2349.86	6.62%
F1	<i>Austrosignum grande</i>	2322.83	6.54%
F1	<i>Actiniaria</i> (unidentified)	1147.94	3.23%
F1	<i>Philomedes</i> sp.	1134.42	3.20%

F1	<i>Eudorella splendida</i>	1066.89	3.01%
F1	<i>Paramunna glacialis</i>	1053.5	2.97%
F1	<i>Halacaridae (unidentified)</i>	837.35	2.36%
F1	<i>Axiothella</i> sp.	607.71	1.71%
F1	<i>Paramunna dentata</i>	540.19	1.52%
F1	<i>Heterophoxus videns</i>	445.68	1.26%
F1	<i>Hesionidae (unidentified)</i>	432.16	1.22%
F1	<i>Seba dubia</i>	405.14	1.14%
F1	<i>Porifera (unidentified)</i>	337.66	0.95%
F1	<i>Neojaera furcata</i>	270.13	0.76%
F1	<i>Nemertea (unidentified)</i>	256.61	0.72%
F1	<i>Paramunna rostrata</i>	216.09	0.61%
F1	<i>Golfingiidae (unidentified)</i>	175.58	0.49%
F1	<i>Pyramidellidae (unidentified)</i>	175.56	0.49%
F1	<i>Haplocheira plumosa</i>	162.06	0.46%
F1	<i>Nicomache lumbricalis</i>	135.06	0.38%
F1	<i>Gnathia</i> sp.	135.06	0.38%
F1	<i>Janaira</i> sp.	135.05	0.38%
F1	<i>Spiophanes tcherniai</i>	121.56	0.34%
F1	<i>Onoba turqueti</i>	108.05	0.30%
F1	<i>Munna</i> sp.	108.05	0.30%
F1	<i>Limatula hodgsoni</i>	94.54	0.27%
F1	<i>Laonice cirrata</i>	94.54	0.27%
F1	<i>Leptonidae (unidentified)</i>	94.53	0.27%
F1	<i>Trochidae (unidentified)</i>	81.03	0.23%
F1	<i>Barrukia cristata</i>	67.53	0.19%
F1	<i>Brania rhopalophora</i>	67.52	0.19%
F1	<i>Paramunna</i> sp.	67.52	0.19%
F1	<i>Axiokebuita</i> sp.	54.02	0.15%
F1	<i>Capitella</i> sp.	54.02	0.15%
F1	<i>Leitoscoloplos kergulensis</i>	54.02	0.15%
F1	<i>Thaumatelson herdmani</i>	54.02	0.15%
F1	<i>Monoculodes curtipediculus</i>	54.02	0.15%
F1	<i>Bivalvia (unidentified)</i>	40.52	0.11%
F1	<i>Orseis mathai</i>	40.52	0.11%
F1	<i>Capitella perarmata</i>	40.52	0.11%
F1	<i>Exogone heterochacta</i>	40.52	0.11%
F1	<i>Astartidae (unidentified)</i>	40.51	0.11%
F1	<i>Cirratulus</i> sp.	40.51	0.11%
F1	<i>Heterophoxus</i> sp.	40.51	0.11%
F1	<i>Leucon</i> sp.	27.01	0.08%
F1	<i>Lysilla loveni macintoshi</i>	27.01	0.08%
F1	<i>Aphelochaeta</i>	27.01	0.08%
F1	<i>Ophelina syringopyge</i>	27.01	0.08%
F1	<i>Orchomenella pinguis</i>	27.01	0.08%
F1	<i>Phascolosomatidae (unidentified)</i>	27.01	0.08%
F1	<i>Sabellidae A</i>	27.01	0.08%
F1	<i>Ampharetidae (unidentified)</i>	13.51	0.04%
F1	<i>Amphiporeia</i> sp.	13.51	0.04%
F1	<i>Cardiidae (unidentified)</i>	13.51	0.04%
F1	<i>Harmothoe brevipalpa</i>	13.51	0.04%
F1	<i>Helicosiphon biscoeensis</i>	13.51	0.04%
F1	<i>Hydroida (polyp)</i>	13.51	0.04%

F1	<i>Maldanidae (unidentified)</i>	13.51	0.04%
F1	<i>Naticidae (unidentified)</i>	13.51	0.04%
F1	<i>Pettiboneia</i> sp.	13.51	0.04%
F1	<i>Seriolis</i> sp.	13.51	0.04%
F1	<i>Sphaerosyllis</i> sp.	13.51	0.04%
F1	<i>Aplysiidae (unidentified)</i>	13.5	0.04%
F1	<i>Insecta (unidentified)</i>	13.5	0.04%
F1	<i>Lasaeidae A</i>	13.5	0.04%
F1	<i>Syllis</i> sp.	13.5	0.04%
F1	<i>Turridae (unidentified)</i>	13.5	0.04%
		35491.97	100.00%
F2	<i>Nototanais dimorphus</i>	11263.11	19.75%
F2	<i>Philomedes</i> sp.	10209.76	17.90%
F2	<i>Podocopida (unidentified)</i>	5320.91	9.33%
F2	<i>Seba dubia</i>	2849.54	5.00%
F2	<i>Halacaridae (unidentified)</i>	2133.77	3.74%
F2	<i>Oligochaeta (unidentified)</i>	2120.32	3.72%
F2	<i>Paramunna</i> sp.	1728.61	3.03%
F2	<i>Leucon</i> sp.	1553.08	2.72%
F2	<i>Limatula hodgsoni</i>	1472.07	2.58%
F2	<i>Munna</i> sp.	1404.51	2.46%
F2	<i>Austrosignum grande</i>	1323.48	2.32%
F2	<i>Paramunna dentata</i>	1282.95	2.25%
F2	<i>Brania rhopalophora</i>	1039.87	1.82%
F2	<i>Porifera (unidentified)</i>	1026.49	1.80%
F2	<i>Hesionidae (unidentified)</i>	1012.88	1.78%
F2	<i>Actiniaria (unidentified)</i>	972.36	1.70%
F2	<i>Paramunna glacialis</i>	918.36	1.61%
F2	<i>Pyramidellidae (unidentified)</i>	783.28	1.37%
F2	<i>Eudorella splendida</i>	607.72	1.07%
F2	<i>Haplocheira plumosa</i>	567.22	0.99%
F2	<i>Spiophanes bombyx</i>	567.21	0.99%
F2	<i>Orseis mathai</i>	513.19	0.90%
F2	<i>Thaumatelson herdmani</i>	499.68	0.88%
F2	<i>Heterophoxus videns</i>	432.16	0.76%
F2	<i>Axiothella</i> sp.	378.13	0.66%
F2	<i>Nicomache lumbricalis</i>	351.13	0.62%
F2	<i>Nemertea (unidentified)</i>	297.12	0.52%
F2	<i>Janaira</i> sp.	256.59	0.45%
F2	<i>Onoba turqueti</i>	189.09	0.33%
F2	<i>Mytilidae (unidentified)</i>	189.07	0.33%
F2	<i>Exogone heterochacta</i>	175.56	0.31%
F2	<i>Phascolosomatidae (unidentified)</i>	162.06	0.28%
F2	<i>Isopoda (unidentified)</i>	162.06	0.28%
F2	<i>Haustoriidae (unidentified)</i>	148.56	0.26%
F2	<i>Aphelochaeta</i>	135.06	0.24%
F2	<i>Neojaera furcata</i>	135.06	0.24%
F2	<i>Bathyarca</i> sp.	135.05	0.24%
F2	<i>Trochidae (unidentified)</i>	135.05	0.24%
F2	<i>Sphaerosyllis c.f. hirsuta</i>	121.55	0.21%
F2	<i>Gnathia</i> sp.	121.55	0.21%
F2	<i>Antias charcoti</i>	121.54	0.21%

F2	<i>Astartidae (unidentified)</i>	108.04	0.19%
F2	<i>Golfingia</i> sp.	94.55	0.17%
F2	<i>Golfingiidae (unidentified)</i>	94.53	0.17%
F2	<i>Alcyonacea (unidentified)</i>	81.04	0.14%
F2	<i>Capitella perarmata</i>	81.03	0.14%
F2	<i>Sipunculidae (unidentified)</i>	81.03	0.14%
F2	<i>Lysilla loveni macintoshi</i>	67.53	0.12%
F2	<i>Lucinidae (unidentified)</i>	67.52	0.12%
F2	<i>Neosabellides elongatus</i>	67.52	0.12%
F2	<i>Syllis</i> sp.	67.52	0.12%
F2	<i>Paramunna rostrata</i>	67.52	0.12%
F2	<i>Gastropoda (unidentified)</i>	54.03	0.09%
F2	<i>Laonice cirrata</i>	54.03	0.09%
F2	<i>Orchomenella pinguis</i>	54.03	0.09%
F2	<i>Sphaerodoropsis parva</i>	54.03	0.09%
F2	<i>Heterophoxus</i> sp.	54.02	0.09%
F2	<i>Amphiodia</i> sp.	40.52	0.07%
F2	<i>Capitella</i> sp.	40.52	0.07%
F2	<i>Leitoscoloplos kergulensis</i>	40.52	0.07%
F2	<i>Barrukia cristata</i>	40.51	0.07%
F2	<i>Campylaspis</i> sp.	40.51	0.07%
F2	<i>Kinoryncha (unidentified)</i>	40.51	0.07%
F2	<i>Ophiuroidea (unidentified)</i>	40.51	0.07%
F2	<i>Syllis sensu lato</i>	40.51	0.07%
F2	<i>Serpulidae (unidentified)</i>	40.51	0.07%
F2	<i>Ampharete</i> sp.	27.01	0.05%
F2	<i>Arcturus</i> sp.	27.01	0.05%
F2	<i>Lumbrineris magalhaensis</i>	27.01	0.05%
F2	<i>Sphaerosyllis perspicax</i>	27.01	0.05%
F2	<i>Yoldia eightsi</i>	27.01	0.05%
F2	<i>Laternula elliptica</i>	27.01	0.05%
F2	<i>Spiophanes tcherniai</i>	27.01	0.05%
F2	<i>Amphiura</i> sp.	27.01	0.05%
F2	<i>Cirratulus</i> sp.	27.01	0.05%
F2	<i>Naticidae (unidentified)</i>	27.01	0.05%
F2	<i>Nudibranchia (unidentified)</i>	27.01	0.05%
F2	<i>Thelepus</i> sp.	27.01	0.05%
F2	<i>Tornidae (unidentified)</i>	27.01	0.05%
F2	<i>Anthuridae (unidentified)</i>	13.51	0.02%
F2	<i>Cardiidae (unidentified)</i>	13.51	0.02%
F2	<i>Chaetozone</i> sp.	13.51	0.02%
F2	<i>Eunoe iphionoides</i>	13.51	0.02%
F2	<i>Exogonella</i> sp.	13.51	0.02%
F2	<i>Hippomedon kergueleni</i>	13.51	0.02%
F2	<i>Idunella</i> sp.	13.51	0.02%
F2	<i>Notoproctus</i> sp.	13.51	0.02%
F2	<i>Parviturboides</i> sp.	13.51	0.02%
F2	<i>Periploma</i> sp.	13.51	0.02%
F2	<i>Pettiboneia</i> sp.	13.51	0.02%
F2	<i>Pomatoceros</i> sp.	13.51	0.02%
F2	<i>Prionospio lanceolata</i>	13.51	0.02%
F2	<i>Scoloplos</i> sp.	13.51	0.02%
F2	<i>Thraciidae (unidentified)</i>	13.51	0.02%
F2	<i>Axiokebuita</i> sp.	13.5	0.02%

F2	<i>Eunoe opalina</i>	13.5	0.02%
F2	<i>Exogone</i> sp.	13.5	0.02%
F2	<i>Fauveliopsis</i> sp.	13.5	0.02%
F2	<i>Leucothoe spinicarpa</i>	13.5	0.02%
F2	<i>Lumbrineris</i> sp.	13.5	0.02%
F2	<i>Monoculodes curtipediculus</i>	13.5	0.02%
F2	<i>Ophryotrocha claparedii</i>	13.5	0.02%
F2	<i>Orseis</i> sp.	13.5	0.02%
F2	<i>Spiophanes soderstroemi</i>	13.5	0.02%
F2	<i>Stenothoidae</i> (unidentified)	13.5	0.02%
		57031.63	100.00%
F3	<i>Philomedes</i> sp.	8629.67	18.58%
F3	<i>Podocopida</i> (unidentified)	7927.38	17.06%
F3	<i>Nototanais dimorphus</i>	6576.86	14.16%
F3	<i>Leucon</i> sp.	3065.59	6.60%
F3	<i>Porifera</i> (unidentified)	2282.62	4.91%
F3	<i>Paramunna dentata</i>	1796.13	3.87%
F3	<i>Halacaridae</i> (unidentified)	1485.56	3.20%
F3	<i>Munna</i> sp.	1485.53	3.20%
F3	<i>Brania rhopalophora</i>	1161.41	2.50%
F3	<i>Hesionidae</i> (unidentified)	783.28	1.69%
F3	<i>Haplocheira plumosa</i>	769.78	1.66%
F3	<i>Limatula hodgsoni</i>	756.3	1.63%
F3	<i>Seba dubia</i>	621.26	1.34%
F3	<i>Actiniaria</i> (unidentified)	607.72	1.31%
F3	<i>Orseis mathai</i>	567.21	1.22%
F3	<i>Oligochaeta</i> (unidentified)	540.21	1.16%
F3	<i>Pyramidellidae</i> (unidentified)	526.69	1.13%
F3	<i>Astartidae</i> (unidentified)	472.67	1.02%
F3	<i>Austrosignum grande</i>	459.17	0.99%
F3	<i>Thaumatelson herdmani</i>	405.16	0.87%
F3	<i>Axiothella</i> sp.	378.13	0.81%
F3	<i>Nemertea</i> (unidentified)	351.13	0.76%
F3	<i>Paramunna</i> sp.	337.62	0.73%
F3	<i>Heterophoxus videns</i>	310.62	0.67%
F3	<i>Onoba turqueti</i>	229.61	0.49%
F3	<i>Gnathia</i> sp.	216.08	0.47%
F3	<i>Stenothoidae</i> (unidentified)	216.08	0.47%
F3	<i>Bathyarca</i> sp.	202.58	0.44%
F3	<i>Trochidae</i> (unidentified)	189.07	0.41%
F3	<i>Paramunna rostrata</i>	175.57	0.38%
F3	<i>Sphaerosyllis</i> c.f. <i>hirsuta</i>	148.55	0.32%
F3	<i>Nicomache lumbricalis</i>	121.54	0.26%
F3	<i>Syllis sensu lato</i>	121.54	0.26%
F3	<i>Serpulidae</i> (unidentified)	121.54	0.26%
F3	<i>Gastropoda</i> (unidentified)	108.05	0.23%
F3	<i>Axiokebuita</i> sp.	108.04	0.23%
F3	<i>Bivalvia</i> (unidentified)	94.55	0.20%
F3	<i>Paramunna glacialis</i>	94.54	0.20%
F3	<i>Ophiuroidea</i> (unidentified)	94.54	0.20%
F3	<i>Neosabellides elongatus</i>	94.53	0.20%
F3	<i>Tornidae</i> (unidentified)	94.53	0.20%
F3	<i>Pettiboneia</i> sp.	81.04	0.17%

F3	<i>Ectias</i> sp.	81.03	0.17%
F3	<i>Isopoda</i> (unidentified)	81.03	0.17%
F3	<i>Hesiosyllis</i> sp.	67.53	0.15%
F3	<i>Exogone heterochacta</i>	67.53	0.15%
F3	<i>Janaira</i> sp.	67.52	0.15%
F3	<i>Sipunculidae</i> (unidentified)	67.52	0.15%
F3	<i>Pseudoparatanaïs antarcticus</i>	54.03	0.12%
F3	<i>Sphaerodoropsis parva</i>	54.02	0.12%
F3	<i>Periploma</i> sp.	40.52	0.09%
F3	<i>Axiokebuita minuta</i>	40.52	0.09%
F3	<i>Antias charcoti</i>	40.51	0.09%
F3	<i>Capitella</i> sp.	40.51	0.09%
F3	<i>Cirratulus</i> sp.	40.51	0.09%
F3	<i>Golfingiidae</i> (unidentified)	40.51	0.09%
F3	<i>Heterophoxus</i> sp.	40.51	0.09%
F3	<i>Mytilidae</i> (unidentified)	40.51	0.09%
F3	<i>Alcyonacea</i> (unidentified)	27.01	0.06%
F3	<i>Leucon sagittae</i>	27.01	0.06%
F3	<i>Sphaerosyllis</i> sp.	27.01	0.06%
F3	<i>Spirorbis</i> sp.	27.01	0.06%
F3	<i>Syllidae</i> (unidentified)	27.01	0.06%
F3	<i>Thelepus</i> sp.	27.01	0.06%
F3	<i>Aplacophora</i> (unidentified)	27.01	0.06%
F3	<i>Lysilla loveni macintoshi</i>	27.01	0.06%
F3	<i>Ophryotrocha claparedii</i>	27.01	0.06%
F3	<i>Liljeborgia</i> sp.	27.01	0.06%
F3	<i>Littorinidae</i> (unidentified)	27.01	0.06%
F3	<i>Monoculodes curtipediculus</i>	27.01	0.06%
F3	<i>Vitrinellidae</i> (unidentified)	27.01	0.06%
F3	<i>Antiplanes</i> sp.	13.51	0.03%
F3	<i>Haustoriidae</i> (unidentified)	13.51	0.03%
F3	<i>Lanicides bilobata</i>	13.51	0.03%
F3	<i>Lasaeidae</i> (unidentified)	13.51	0.03%
F3	<i>Leucothoe spinicarpa</i>	13.51	0.03%
F3	<i>Lumbrineris magalhaensis</i>	13.51	0.03%
F3	<i>Macrochaeta</i> sp.	13.51	0.03%
F3	<i>Notoproctus</i> sp.	13.51	0.03%
F3	<i>Nuculidae</i> (unidentified)	13.51	0.03%
F3	<i>Orchomenella pinguis</i>	13.51	0.03%
F3	<i>Parviturbo</i> sp.	13.51	0.03%
F3	<i>Polynoidae</i> (unidentified)	13.51	0.03%
F3	<i>Sphaerosyllis perspicax</i>	13.51	0.03%
F3	<i>Syllides articulatus</i>	13.51	0.03%
F3	<i>Thraciidae</i> (unidentified)	13.51	0.03%
F3	<i>Amphiodia</i> sp.	13.5	0.03%
F3	<i>Antarcturus</i> sp.	13.5	0.03%
F3	<i>Campylaspis</i> sp.	13.5	0.03%
F3	<i>Eudorella splendida</i>	13.5	0.03%
F3	<i>Exogone</i> sp.	13.5	0.03%
F3	<i>Fauveliopsis</i> sp.	13.5	0.03%
F3	<i>Herpyllobiidae</i> (unidentified)	13.5	0.03%
F3	<i>Holothuroidea</i> (unidentified)	13.5	0.03%
F3	<i>Hydroida</i> (meduse)	13.5	0.03%
F3	<i>Kinorhyncha</i> (unidentified)	13.5	0.03%

F3	<i>Lasaeidae A</i>	13.5	0.03%
F3	<i>Leitoscoloplos kergulensis</i>	13.5	0.03%
F3	<i>Leptonidae (unidentified)</i>	13.5	0.03%
F3	<i>Lucinidae (unidentified)</i>	13.5	0.03%
F3	<i>Naticidae (unidentified)</i>	13.5	0.03%
F3	<i>Neojaera furcata</i>	13.5	0.03%
F3	<i>Spiophanes tcherniai</i>	13.5	0.03%
		46457.27	100.00%

Appendix 2 Species abundance per year

Table 2. 1. Overall species abundance (n/m^2) and percent of the total abundance for each year.

Year	Species Name	n/m^2	Percent
2000	<i>Nototanaeis dimorphus</i>	18174.03	20.36%
2000	<i>Philomedes</i> sp.	9421.82	10.56%
2000	<i>Podocopida</i> (unidentified)	8783.72	9.84%
2000	<i>Austrosignum grande</i>	5608.98	6.28%
2000	<i>Spiophanes bombyx</i>	4127.96	4.63%
2000	<i>Oligochaeta</i> (unidentified)	3537.12	3.96%
2000	<i>Hesionidae</i> (unidentified)	2891.14	3.24%
2000	<i>Paramunna dentata</i>	2765.1	3.10%
2000	<i>Leucon</i> sp.	2489.38	2.79%
2000	<i>Actiniaria</i> (unidentified)	2174.27	2.44%
2000	<i>Halacaridae</i> (unidentified)	2150.63	2.41%
2000	<i>Aphelochaeta</i>	2119.12	2.37%
2000	<i>Seba dubia</i>	1851.28	2.07%
2000	<i>Munna</i> sp.	1733.11	1.94%
2000	<i>Axiothella</i> sp.	1717.36	1.92%
2000	<i>Leitoscoloplos kergulensis</i>	1685.84	1.89%
2000	<i>Heterophoxus videns</i>	1591.31	1.78%
2000	<i>Eudorella splendida</i>	1496.78	1.68%
2000	<i>Paramunna</i> sp.	1410.12	1.58%
2000	<i>Brania rhopalophora</i>	1339.22	1.50%
2000	<i>Capitella perarmata</i>	1039.87	1.17%
2000	<i>Limatula hodgsoni</i>	968.97	1.09%
2000	<i>Ophryotrocha claparedii</i>	945.33	1.06%
2000	<i>Pyramidellidae</i> (unidentified)	764.14	0.86%
2000	<i>Orseis mathai</i>	661.73	0.74%
2000	<i>Haplocheira plumosa</i>	661.73	0.74%
2000	<i>Hydroida</i> (polyp)	575.08	0.64%
2000	<i>Astartidae</i> (unidentified)	496.3	0.56%
2000	<i>Thaumatelson herdmani</i>	449.03	0.50%
2000	<i>Trochidae</i> (unidentified)	409.64	0.46%
2000	<i>Janaira</i> sp.	338.74	0.38%
2000	<i>Phascolosomatidae</i> (unidentified)	330.87	0.37%
2000	<i>Laonice cirrata</i>	307.23	0.34%
2000	<i>Nemertea</i> (unidentified)	267.84	0.30%
2000	<i>Hydroida</i> (meduse)	236.33	0.26%
2000	<i>Syllis</i> sp.	204.82	0.23%
2000	<i>Stenothoidae</i> (unidentified)	189.07	0.21%
2000	<i>Gnathia</i> sp.	173.31	0.19%
2000	<i>Axiokebuita</i> sp.	165.43	0.19%
2000	<i>Lysilla loveni macintoshi</i>	165.43	0.19%
2000	<i>Monoculodes</i> sp.	165.43	0.19%
2000	<i>Isopoda</i> (unidentified)	157.56	0.18%
2000	<i>Orchomenella pinguis</i>	133.92	0.15%

2000	<i>Exogone heterochacta</i>	126.04	0.14%
2000	<i>Lucinidae (unidentified)</i>	126.04	0.14%
2000	<i>Sphaerosyllis c.f. hirsuta</i>	126.04	0.14%
2000	<i>Axiothella antarctica</i>	118.17	0.13%
2000	<i>Tornidae (unidentified)</i>	118.17	0.13%
2000	<i>Cirratulus sp.</i>	110.29	0.12%
2000	<i>Mytilidae (unidentified)</i>	110.29	0.12%
2000	<i>Littorinidae (unidentified)</i>	102.41	0.11%
2000	<i>Barrukia cristata</i>	94.53	0.11%
2000	<i>Antias charcoti</i>	86.66	0.10%
2000	<i>Leptonidae (unidentified)</i>	86.66	0.10%
2000	<i>Neosabellides elongatus</i>	86.66	0.10%
2000	<i>Porifera (unidentified)</i>	86.66	0.10%
2000	<i>Heterophoxus sp.</i>	70.9	0.08%
2000	<i>Amphiodia sp.</i>	55.15	0.06%
2000	<i>Ectias sp.</i>	55.14	0.06%
2000	<i>Ophelina syringopyge</i>	55.14	0.06%
2000	<i>Golfingiidae (unidentified)</i>	47.27	0.05%
2000	<i>Lasaeidae A</i>	47.27	0.05%
2000	<i>Sabellidae A</i>	47.27	0.05%
2000	<i>Aplysiidae (unidentified)</i>	39.39	0.04%
2000	<i>Lumbrineris macquariensis</i>	39.39	0.04%
2000	<i>Syllis sensu lato</i>	39.39	0.04%
2000	<i>Vitrinellidae (unidentified)</i>	39.39	0.04%
2000	<i>Laternula elliptica</i>	31.52	0.04%
2000	<i>Campylaspis sp.</i>	31.51	0.04%
2000	<i>Hauchiella tribullata</i>	31.51	0.04%
2000	<i>Liljeborgia sp.</i>	31.51	0.04%
2000	<i>Monoculodes curtipediculus</i>	31.51	0.04%
2000	<i>Spiophanes tcherniai</i>	31.51	0.04%
2000	<i>Neojaera furcata</i>	23.63	0.03%
2000	<i>Sphaerosyllis perspicax</i>	23.63	0.03%
2000	<i>Spiophanes soderstroemi</i>	23.63	0.03%
2000	<i>Amphiura sp.</i>	15.76	0.02%
2000	<i>Exogone sp.</i>	15.76	0.02%
2000	<i>Leucon sagittae</i>	15.76	0.02%
2000	<i>Mediomastus sp.</i>	15.76	0.02%
2000	<i>Naticidae (unidentified)</i>	15.76	0.02%
2000	<i>Nudibranchia (unidentified)</i>	15.76	0.02%
2000	<i>Nymphon sp.</i>	15.76	0.02%
2000	<i>Sphaerodoropsis parva</i>	15.76	0.02%
2000	<i>Turridae (unidentified)</i>	15.76	0.02%
2000	<i>Alcyonacea (unidentified)</i>	7.88	0.01%
2000	<i>Antarcturus sp.</i>	7.88	0.01%
2000	<i>Aplacophora (unidentified)</i>	7.88	0.01%
2000	<i>Axiokebuita minuta</i>	7.88	0.01%
2000	<i>Capitella sp.</i>	7.88	0.01%
2000	<i>Insecta (unidentified)</i>	7.88	0.01%
2000	<i>Spionidae (unidentified)</i>	7.88	0.01%
		89247.37	100.00%
2003	<i>Nototanais dimorphus</i>	2972.55	13.37%
2003	<i>Philomedes sp.</i>	2594.41	11.67%
2003	<i>Aphelochaeta</i>	1890.67	8.50%

2003	<i>Oligochaeta (unidentified)</i>	1712.1	7.70%
2003	<i>Ophryotrocha claparedii</i>	1617.57	7.27%
2003	<i>Podocopida (unidentified)</i>	1396.99	6.28%
2003	<i>Actiniaria (unidentified)</i>	1165.91	5.24%
2003	<i>Heterophoxus videns</i>	1018.86	4.58%
2003	<i>Austrosignum grande</i>	672.24	3.02%
2003	<i>Hesionidae (unidentified)</i>	609.21	2.74%
2003	<i>Halacaridae (unidentified)</i>	451.66	2.03%
2003	<i>Leucon sp.</i>	388.64	1.75%
2003	<i>Capitella perarmata</i>	367.63	1.65%
2003	<i>Orseis mathai</i>	283.6	1.28%
2003	<i>Laonice cirrata</i>	262.59	1.18%
2003	<i>Paramunna glacialis</i>	262.59	1.18%
2003	<i>Paramunna rostrata</i>	262.59	1.18%
2003	<i>Spiophanes bombyx</i>	252.09	1.13%
2003	<i>Leitoscoloplos kergulensis</i>	241.59	1.09%
2003	<i>Pyramidellidae (unidentified)</i>	210.07	0.94%
2003	<i>Sipunculidae (unidentified)</i>	199.57	0.90%
2003	<i>Nemertea (unidentified)</i>	189.07	0.85%
2003	<i>Batharca sp.</i>	178.56	0.80%
2003	<i>Seba dubia</i>	178.56	0.80%
2003	<i>Sphaerosyllis c.f. hirsuta</i>	168.06	0.76%
2003	<i>Brania rhopalophora</i>	157.56	0.71%
2003	<i>Exogone heterochacta</i>	157.56	0.71%
2003	<i>Haplocheira plumosa</i>	157.56	0.71%
2003	<i>Nicomache lumbricalis</i>	157.56	0.71%
2003	<i>Serpulidae (unidentified)</i>	147.05	0.66%
2003	<i>Gnathia sp.</i>	136.55	0.61%
2003	<i>Munna sp.</i>	126.04	0.57%
2003	<i>Limatula hodgsoni</i>	115.54	0.52%
2003	<i>Porifera (unidentified)</i>	94.54	0.43%
2003	<i>Heterophoxus sp.</i>	94.53	0.43%
2003	<i>Capitella sp.</i>	84.03	0.38%
2003	<i>Neosabellides elongatus</i>	84.03	0.38%
2003	<i>Ophiuroidea (unidentified)</i>	73.53	0.33%
2003	<i>Leptonidae (unidentified)</i>	73.53	0.33%
2003	<i>Barrukia cristata</i>	63.02	0.28%
2003	<i>Astartidae (unidentified)</i>	63.02	0.28%
2003	<i>Axiothella sp.</i>	63.02	0.28%
2003	<i>Eudorella splendida</i>	63.02	0.28%
2003	<i>Thaumatelson herdmani</i>	63.02	0.28%
2003	<i>Monoculodes curtapediculus</i>	52.52	0.24%
2003	<i>Ectias sp.</i>	42.01	0.19%
2003	<i>Kinorhyncha (unidentified)</i>	42.01	0.19%
2003	<i>Neojaera furcata</i>	42.01	0.19%
2003	<i>Axiokibbutia sp.</i>	31.51	0.14%
2003	<i>Lumbrineris magalhaensis</i>	31.51	0.14%
2003	<i>Mytilidae (unidentified)</i>	31.51	0.14%
2003	<i>Sabellidae A</i>	31.51	0.14%
2003	<i>Syllidae (unidentified)</i>	31.51	0.14%
2003	<i>Antias charcoti</i>	21.01	0.09%
2003	<i>Aplysiidae (unidentified)</i>	21.01	0.09%
2003	<i>Golfingiidae (unidentified)</i>	21.01	0.09%
2003	<i>Hauchiella tribullata</i>	21.01	0.09%

2003	<i>Idunella</i> sp.	21.01	0.09%
2003	<i>Ophelina syringopyge</i>	21.01	0.09%
2003	<i>Orchomenella pinguis</i>	21.01	0.09%
2003	<i>Syllis sensu lato</i>	21.01	0.09%
2003	<i>Thelepus cincinnatus</i>	21.01	0.09%
2003	<i>Tornidae (unidentified)</i>	21.01	0.09%
2003	<i>Axiokebuita minuta</i>	10.5	0.05%
2003	<i>Cirratulus</i> sp.	10.5	0.05%
2003	<i>Exogone</i> sp.	10.5	0.05%
2003	<i>Fauveliopsis</i> sp.	10.5	0.05%
2003	<i>Herpyllobiidae (unidentified)</i>	10.5	0.05%
2003	<i>Holothuroidea (unidentified)</i>	10.5	0.05%
2003	<i>Lasaeidae A</i>	10.5	0.05%
2003	<i>Laternula elliptica</i>	10.5	0.05%
2003	<i>Leucothoe spinicarpa</i>	10.5	0.05%
2003	<i>Lumbrineris</i> sp.	10.5	0.05%
2003	<i>Nymphon</i> sp.	10.5	0.05%
2003	<i>Orseis</i> sp.	10.5	0.05%
2003	<i>Sphaerodoropsis parva</i>	10.5	0.05%
2003	<i>Sphaerosyllis perspicax</i>	10.5	0.05%
2003	<i>Thelepus</i> sp.	10.5	0.05%
2003	<i>Trochidae (unidentified)</i>	10.5	0.05%
		22236.29	100.00%
2004	<i>Philomedes</i> sp.	3781.33	13.21%
2004	<i>Nototanaeis dimorphus</i>	2951.54	10.31%
2004	<i>Ophryotrocha claparedii</i>	2667.94	9.32%
2004	<i>Capitella perarmata</i>	2573.41	8.99%
2004	<i>Oligochaeta (unidentified)</i>	1901.17	6.64%
2004	<i>Aphelochaeta</i>	1880.16	6.57%
2004	<i>Heterophoxus videns</i>	1354.98	4.73%
2004	<i>Paramunna glacialis</i>	1008.36	3.52%
2004	<i>Spiophanes bombyx</i>	934.83	3.27%
2004	<i>Austrosignum grande</i>	913.82	3.19%
2004	<i>Actiniaria (unidentified)</i>	871.81	3.05%
2004	<i>Pyramidellidae (unidentified)</i>	840.3	2.94%
2004	<i>Eudorella splendida</i>	703.75	2.46%
2004	<i>Hesionidae (unidentified)</i>	703.75	2.46%
2004	<i>Nicomache lumbricalis</i>	462.16	1.61%
2004	<i>Neojaera furcata</i>	451.66	1.58%
2004	<i>Podocopida (unidentified)</i>	388.64	1.36%
2004	<i>Leitoscoloplos kergulensis</i>	315.11	1.10%
2004	<i>Golfingiidae (unidentified)</i>	304.61	1.06%
2004	<i>Munna</i> sp.	304.61	1.06%
2004	<i>Paramunna rostrata</i>	294.1	1.03%
2004	<i>Laonice cirrata</i>	262.59	0.92%
2004	<i>Halacaridae (unidentified)</i>	231.08	0.81%
2004	<i>Neosabellides elongatus</i>	220.58	0.77%
2004	<i>Syllis sensu lato</i>	168.06	0.59%
2004	<i>Brania rhopalophora</i>	157.56	0.55%
2004	<i>Leucon</i> sp.	157.56	0.55%
2004	<i>Gnathia</i> sp.	147.05	0.51%
2004	<i>Seba dubia</i>	105.04	0.37%
2004	<i>Serpulidae (unidentified)</i>	105.04	0.37%

2004	<i>Astartidae (unidentified)</i>	105.04	0.37%
2004	<i>Haplocheira plumosa</i>	105.04	0.37%
2004	<i>Sipunculidae (unidentified)</i>	94.53	0.33%
2004	<i>Haustoriidae (unidentified)</i>	73.53	0.26%
2004	<i>Laternula elliptica</i>	73.53	0.26%
2004	<i>Ophelina syringopyge</i>	73.53	0.26%
2004	<i>Limatula hodgsoni</i>	73.53	0.26%
2004	<i>Isopoda (unidentified)</i>	63.02	0.22%
2004	<i>Monoculodes curtipediculus</i>	63.02	0.22%
2004	<i>Trochidae (unidentified)</i>	63.02	0.22%
2004	<i>Janaira sp.</i>	52.52	0.18%
2004	<i>Lysilla loveni macintoshi</i>	52.52	0.18%
2004	<i>Exogone heterochacta</i>	52.52	0.18%
2004	<i>Heterophoxus sp.</i>	42.01	0.15%
2004	<i>Leptonidae (unidentified)</i>	42.01	0.15%
2004	<i>Barrukia cristata</i>	31.51	0.11%
2004	<i>Bathyarca sp.</i>	31.51	0.11%
2004	<i>Lucinidae (unidentified)</i>	31.51	0.11%
2004	<i>Nemertea (unidentified)</i>	31.51	0.11%
2004	<i>Nymphon sp.</i>	31.51	0.11%
2004	<i>Thaumatelson herdmani</i>	31.51	0.11%
2004	<i>Porifera (unidentified)</i>	31.51	0.11%
2004	<i>Capitella sp.</i>	21.01	0.07%
2004	<i>Eunoe anderssoni</i>	21.01	0.07%
2004	<i>Ophiuroidea (unidentified)</i>	21.01	0.07%
2004	<i>Antias charcoti</i>	10.5	0.04%
2004	<i>Austrodecus sp.</i>	10.5	0.04%
2004	<i>Eunoe opalina</i>	10.5	0.04%
2004	<i>Fauveliopsis sp.</i>	10.5	0.04%
2004	<i>Hydroida (meduse)</i>	10.5	0.04%
2004	<i>Leucothoe spinicarpa</i>	10.5	0.04%
2004	<i>Lumbrineris magalhaensis</i>	10.5	0.04%
2004	<i>Lumbrineris sp.</i>	10.5	0.04%
2004	<i>Naticidae (unidentified)</i>	10.5	0.04%
2004	<i>Nuculidae (unidentified)</i>	10.5	0.04%
2004	<i>Orchomenella pinguis</i>	10.5	0.04%
2004	<i>Syllidae (unidentified)</i>	10.5	0.04%
2004	<i>Tharyx sp.</i>	10.5	0.04%
2004	<i>Thelepus sp.</i>	10.5	0.04%
		28622.57	100.00%
2005	<i>Ophryotrocha claparedii</i>	5200.07	26.80%
2005	<i>Capitella perarmata</i>	5084.51	26.20%
2005	<i>Aphelochaeta</i>	1764.87	9.10%
2005	<i>Oligochaeta (unidentified)</i>	1019	5.25%
2005	<i>Porifera (unidentified)</i>	724.86	3.74%
2005	<i>Philomedes sp.</i>	588.29	3.03%
2005	<i>Hesionidae (unidentified)</i>	420.21	2.17%
2005	<i>Heterophoxus videns</i>	399.2	2.06%
2005	<i>Actiniaria (unidentified)</i>	346.67	1.79%
2005	<i>Podocopida (unidentified)</i>	346.67	1.79%
2005	<i>Halacaridae (unidentified)</i>	283.64	1.46%
2005	<i>Austrosignum grande</i>	262.63	1.35%
2005	<i>Nemertea (unidentified)</i>	252.12	1.30%

2005	<i>Nototanais dimorphus</i>	199.6	1.03%
2005	<i>Spiophanes bombyx</i>	168.08	0.87%
2005	<i>Bivalvia (unidentified)</i>	168.08	0.87%
2005	<i>Laonice cirrata</i>	147.07	0.76%
2005	<i>Leitoscoloplos kergulensis</i>	147.07	0.76%
2005	<i>Gnathia</i> sp.	126.06	0.65%
2005	<i>Limatula hodgsoni</i>	115.56	0.60%
2005	<i>Onoba turqueti</i>	94.55	0.49%
2005	<i>Seba dubia</i>	94.55	0.49%
2005	<i>Axiothella antarctica</i>	84.04	0.43%
2005	<i>Gastropoda (unidentified)</i>	73.54	0.38%
2005	<i>Haplocheira plumosa</i>	73.54	0.38%
2005	<i>Notoproctus</i> sp.	63.03	0.32%
2005	<i>Bathyarca</i> sp.	63.03	0.32%
2005	<i>Exogonella</i> sp.	52.53	0.27%
2005	<i>Paramunna glacialis</i>	52.53	0.27%
2005	<i>Pyramidellidae (unidentified)</i>	52.53	0.27%
2005	<i>Cirratulidae (unidentified)</i>	52.53	0.27%
2005	<i>Hesiosyllis</i> sp.	52.53	0.27%
2005	<i>Pettiboneia</i> sp.	52.53	0.27%
2005	<i>Barrukia cristata</i>	42.02	0.22%
2005	<i>Ampharetidae (unidentified)</i>	31.52	0.16%
2005	<i>Capitella</i> sp.	31.52	0.16%
2005	<i>Janaira</i> sp.	31.52	0.16%
2005	<i>Leucon</i> sp.	31.52	0.16%
2005	<i>Nymphon</i> sp.	31.52	0.16%
2005	<i>Sphaerodoropsis parva</i>	31.52	0.16%
2005	<i>Syllis sensu lato</i>	31.52	0.16%
2005	<i>Aglaophamus macroura</i>	21.01	0.11%
2005	<i>Laternula elliptica</i>	21.01	0.11%
2005	<i>Leucon sagittae</i>	21.01	0.11%
2005	<i>Lumbrineris</i> sp.	21.01	0.11%
2005	<i>Monoculodes</i> sp.	21.01	0.11%
2005	<i>Myidae (unidentified)</i>	21.01	0.11%
2005	<i>Neosabellides elongatus</i>	21.01	0.11%
2005	<i>Opheliidae (unidentified)</i>	21.01	0.11%
2005	<i>Ophelina syringopyge</i>	21.01	0.11%
2005	<i>Sphaerosyllis perspicax</i>	21.01	0.11%
2005	<i>Sphaerosyllis</i> sp.	21.01	0.11%
2005	<i>Syllidae (unidentified)</i>	21.01	0.11%
2005	<i>Thelepus</i> sp.	21.01	0.11%
2005	<i>Antiplanes</i> sp.	10.51	0.05%
2005	<i>Aricidea trilobata</i>	10.51	0.05%
2005	<i>Axiothella</i> sp.	10.51	0.05%
2005	<i>Caulleriella</i> sp.	10.51	0.05%
2005	<i>Chaetozone</i> sp.	10.51	0.05%
2005	<i>Eunoe anderssoni</i>	10.51	0.05%
2005	<i>Golfingia</i> sp.	10.51	0.05%
2005	<i>Golfingiidae (unidentified)</i>	10.51	0.05%
2005	<i>Lasaeidae (unidentified)</i>	10.51	0.05%
2005	<i>Lasaeidae A</i>	10.51	0.05%
2005	<i>Leucothoe spinicarpa</i>	10.51	0.05%
2005	<i>Lumbrineridae (unidentified)</i>	10.51	0.05%
2005	<i>Macrochaeta</i> sp.	10.51	0.05%

2005	<i>Maldanidae (unidentified)</i>	10.51	0.05%
2005	<i>Munna</i> sp.	10.51	0.05%
2005	<i>Neojaera furcata</i>	10.51	0.05%
2005	<i>Ophiuroidea (unidentified)</i>	10.51	0.05%
2005	<i>Paramunna rostrata</i>	10.51	0.05%
2005	<i>Parviturbo</i> sp.	10.51	0.05%
2005	<i>Parviturboidea</i> sp.	10.51	0.05%
2005	<i>Periploma</i> sp.	10.51	0.05%
2005	<i>Polynoidae (unidentified)</i>	10.51	0.05%
2005	<i>Spionidae (unidentified)</i>	10.51	0.05%
		19403.24	100.00%
2006	<i>Gastropoda (unidentified)</i>	4412.18	22.69%
2006	<i>Aphelochaeta</i>	1565.27	8.05%
2006	<i>Nototanais dimorphus</i>	1344.66	6.92%
2006	<i>Philomedes</i> sp.	1029.51	5.29%
2006	<i>Porifera (unidentified)</i>	1019	5.24%
2006	<i>Oligochaeta (unidentified)</i>	987.49	5.08%
2006	<i>Paramunna glacialis</i>	892.94	4.59%
2006	<i>Capitella perarmata</i>	724.86	3.73%
2006	<i>Halacaridae (unidentified)</i>	640.82	3.30%
2006	<i>Heterophoxus videns</i>	630.31	3.24%
2006	<i>Hesionidae (unidentified)</i>	535.76	2.76%
2006	<i>Podocopida (unidentified)</i>	493.74	2.54%
2006	<i>Coralliotrocha composita</i>	493.74	2.54%
2006	<i>Nemertea (unidentified)</i>	388.69	2.00%
2006	<i>Leitoscoloplos kergulensis</i>	346.67	1.78%
2006	<i>Austrosignum grande</i>	325.66	1.67%
2006	<i>Neojaera furcata</i>	325.66	1.67%
2006	<i>Golfingiidae (unidentified)</i>	273.13	1.40%
2006	<i>Orseis mathai</i>	241.62	1.24%
2006	<i>Paramunna rostrata</i>	189.09	0.97%
2006	<i>Actiniaria (unidentified)</i>	178.59	0.92%
2006	<i>Munna</i> sp.	178.59	0.92%
2006	<i>Laonice cirrata</i>	168.08	0.86%
2006	<i>Limatula hodgsoni</i>	168.08	0.86%
2006	<i>Onoba turqueti</i>	168.08	0.86%
2006	<i>Leucon</i> sp.	147.07	0.76%
2006	<i>Nicomache lumbricalis</i>	115.56	0.59%
2006	<i>Gnathia</i> sp.	105.05	0.54%
2006	<i>Pettiboneia</i> sp.	105.05	0.54%
2006	<i>Thaumatelson herdmani</i>	105.05	0.54%
2006	<i>Seba dubia</i>	94.55	0.49%
2006	<i>Ampharetidae (unidentified)</i>	84.04	0.43%
2006	<i>Sphaerosyllis</i> sp.	73.54	0.38%
2006	<i>Periploma</i> sp.	63.03	0.32%
2006	<i>Haplocheira plumosa</i>	52.53	0.27%
2006	<i>Harmothoe brevipalpa</i>	52.53	0.27%
2006	<i>Eudorella splendida</i>	52.53	0.27%
2006	<i>Lumbrineris</i> sp.	42.02	0.22%
2006	<i>Pseudoparatanaeis antarcticus</i>	42.02	0.22%
2006	<i>Axiothella</i> sp.	31.52	0.16%
2006	<i>Exogone heterochacta</i>	31.52	0.16%
2006	<i>Pomatoceros</i> sp.	31.52	0.16%

2006	<i>Spiophanes bombyx</i>	31.52	0.16%
2006	<i>Spirorbis</i> sp.	31.52	0.16%
2006	<i>Ampharete</i> sp.	21.01	0.11%
2006	<i>Bivalvia</i> (unidentified)	21.01	0.11%
2006	<i>Monoculodes</i> sp.	21.01	0.11%
2006	<i>Ophelina syringopyge</i>	21.01	0.11%
2006	<i>Ophryotrocha claparedii</i>	21.01	0.11%
2006	<i>Scolecopsis lefebvrei</i>	21.01	0.11%
2006	<i>Sphaerodoropsis parva</i>	21.01	0.11%
2006	<i>Sphaerosyllis perspicax</i>	21.01	0.11%
2006	<i>Thraciidae</i> (unidentified)	21.01	0.11%
2006	<i>Yoldia eightsi</i>	21.01	0.11%
2006	<i>Alcyonacea</i> (unidentified)	10.51	0.05%
2006	<i>Amphiporeia</i> sp.	10.51	0.05%
2006	<i>Arcturus</i> sp.	10.51	0.05%
2006	<i>Axiokebuita minuta</i>	10.51	0.05%
2006	<i>Barrukia cristata</i>	10.51	0.05%
2006	<i>Caulleriella</i> sp.	10.51	0.05%
2006	<i>Cirratulus</i> sp.	10.51	0.05%
2006	<i>Ectias</i> sp.	10.51	0.05%
2006	<i>Idunella</i> sp.	10.51	0.05%
2006	<i>Lysilla loveni macintoshi</i>	10.51	0.05%
2006	<i>Maldanidae</i> (unidentified)	10.51	0.05%
2006	<i>Monoculodes curtipediculus</i>	10.51	0.05%
2006	<i>Neosabellides elongatus</i>	10.51	0.05%
2006	<i>Nuculidae</i> (unidentified)	10.51	0.05%
2006	<i>Nymphon</i> sp.	10.51	0.05%
2006	<i>Orchomenella</i> sp.	10.51	0.05%
2006	<i>Paramunna dentata</i>	10.51	0.05%
2006	<i>Prionospio</i> sp.	10.51	0.05%
2006	<i>Seriolis</i> sp.	10.51	0.05%
2006	<i>Spionidae</i> (unidentified)	10.51	0.05%
2006	<i>Syllides articulatus</i>	10.51	0.05%
		19445.2	100.00%
2007	<i>Aphelochaeta</i>	1691.33	19.95%
2007	<i>Porifera</i> (unidentified)	1271.13	14.99%
2007	<i>Oligochaeta</i> (unidentified)	577.79	6.82%
2007	<i>Nototanais dimorphus</i>	472.73	5.58%
2007	<i>Heterophoxus videns</i>	420.21	4.96%
2007	<i>Paramunna glacialis</i>	336.17	3.97%
2007	<i>Hesionidae</i> (unidentified)	262.63	3.10%
2007	<i>Nemertea</i> (unidentified)	241.62	2.85%
2007	<i>Neojaera furcata</i>	199.6	2.35%
2007	<i>Philomedes</i> sp.	189.09	2.23%
2007	<i>Limatula hodgsoni</i>	178.59	2.11%
2007	<i>Onoba turqueti</i>	178.59	2.11%
2007	<i>Gastropoda</i> (unidentified)	136.57	1.61%
2007	<i>Seba dubia</i>	136.57	1.61%
2007	<i>Capitella perarmata</i>	126.06	1.49%
2007	<i>Polychaeta</i> (unidentified)	115.56	1.36%
2007	<i>Spiophanes tcherniai</i>	115.56	1.36%
2007	<i>Halacaridae</i> (unidentified)	115.56	1.36%
2007	<i>Laonice cirrata</i>	105.05	1.24%

2007	<i>Maldanidae (unidentified)</i>	105.05	1.24%
2007	<i>Munna</i> sp.	94.55	1.12%
2007	<i>Austrosignum grande</i>	94.55	1.12%
2007	<i>Leitoscoloplos kergulensis</i>	94.55	1.12%
2007	<i>Alcyonacea (unidentified)</i>	73.54	0.87%
2007	<i>Podocopida (unidentified)</i>	73.54	0.87%
2007	<i>Monoculodes curtipediculus</i>	63.03	0.74%
2007	<i>Bivalvia (unidentified)</i>	52.53	0.62%
2007	<i>Chaetozone</i> sp.	52.53	0.62%
2007	<i>Orchomenella pinguis</i>	52.53	0.62%
2007	<i>Actiniaria (unidentified)</i>	42.02	0.50%
2007	<i>Gnathia</i> sp.	42.02	0.50%
2007	<i>Notoproctus</i> sp.	42.02	0.50%
2007	<i>Prionospio</i> sp.	42.02	0.50%
2007	<i>Sphaerosyllis perspicax</i>	42.02	0.50%
2007	<i>Spio obtusa</i>	42.02	0.50%
2007	<i>Apistobranchus glaciera</i>	31.52	0.37%
2007	<i>Axiothella antarctica</i>	31.52	0.37%
2007	<i>Golfingia</i> sp.	31.52	0.37%
2007	<i>Leucon</i> sp.	31.52	0.37%
2007	<i>Nicomache lumbricalis</i>	31.52	0.37%
2007	<i>Paramunna rostrata</i>	31.52	0.37%
2007	<i>Periploma</i> sp.	31.52	0.37%
2007	<i>Cardiidae (unidentified)</i>	21.01	0.25%
2007	<i>Haplocheira plumosa</i>	21.01	0.25%
2007	<i>Haustoriidae (unidentified)</i>	21.01	0.25%
2007	<i>Lacydonia</i> sp.	21.01	0.25%
2007	<i>Lumbrineris</i> sp.	21.01	0.25%
2007	<i>Orseis mathai</i>	21.01	0.25%
2007	<i>Pettiboneia</i> sp.	21.01	0.25%
2007	<i>Spiophanes soderstroemi</i>	21.01	0.25%
2007	<i>Aglaophamus macroura</i>	10.51	0.12%
2007	<i>Ampharete</i> sp.	10.51	0.12%
2007	<i>Ampharetidae (unidentified)</i>	10.51	0.12%
2007	<i>Anthuridae (unidentified)</i>	10.51	0.12%
2007	<i>Aplacophora (unidentified)</i>	10.51	0.12%
2007	<i>Barrukia cristata</i>	10.51	0.12%
2007	<i>Brania rhopalophora</i>	10.51	0.12%
2007	<i>Ectias</i> sp.	10.51	0.12%
2007	<i>Hippomedon kergueleni</i>	10.51	0.12%
2007	<i>Hydroida (polyp)</i>	10.51	0.12%
2007	<i>Leptonidae (unidentified)</i>	10.51	0.12%
2007	<i>Lumbrineris magalhaensis</i>	10.51	0.12%
2007	<i>Naticidae (unidentified)</i>	10.51	0.12%
2007	<i>Oenonidae (unidentified)</i>	10.51	0.12%
2007	<i>Orbiniidae (unidentified)</i>	10.51	0.12%
2007	<i>Orchomenella</i> sp.	10.51	0.12%
2007	<i>Parviturbo</i> sp.	10.51	0.12%
2007	<i>Seriolis</i> sp.	10.51	0.12%
2007	<i>Sphaerosyllis kerguelensis</i>	10.51	0.12%
2007	<i>Thaumatelson herdmani</i>	10.51	0.12%
		8477.85	100.00%
2008	<i>Aphelochaeta</i>	1323.65	17.34%

2008	<i>Myriochele</i> sp.	709.1	9.29%
2008	<i>Nototanaïs dimorphus</i>	614.55	8.05%
2008	<i>Philomedes</i> sp.	449.1	5.88%
2008	<i>Oligochaeta</i> (unidentified)	393.94	5.16%
2008	<i>Spiophanes tcherniai</i>	393.94	5.16%
2008	<i>Actiniaria</i> (unidentified)	354.55	4.64%
2008	<i>Leitoscoloplos kergulensis</i>	346.67	4.54%
2008	<i>Nemertea</i> (unidentified)	236.37	3.10%
2008	<i>Spiophanes bombyx</i>	236.37	3.10%
2008	<i>Hesionidae</i> (unidentified)	220.61	2.89%
2008	<i>Eudorella splendida</i>	212.73	2.79%
2008	<i>Heterophoxus videns</i>	149.7	1.96%
2008	<i>Porifera</i> (unidentified)	133.94	1.75%
2008	<i>Austrosignum grande</i>	126.06	1.65%
2008	<i>Capitella perarmata</i>	126.06	1.65%
2008	<i>Axiothella</i> sp.	118.18	1.55%
2008	<i>Maldanidae</i> (unidentified)	110.3	1.44%
2008	<i>Onoba turqueti</i>	102.43	1.34%
2008	<i>Bivalvia</i> (unidentified)	94.55	1.24%
2008	<i>Paramunna glacialis</i>	94.55	1.24%
2008	<i>Golfingia</i> sp.	78.79	1.03%
2008	<i>Laonice cirrata</i>	70.91	0.93%
2008	<i>Ophryotrocha claparedii</i>	70.91	0.93%
2008	<i>Seba dubia</i>	70.91	0.93%
2008	<i>Laternula elliptica</i>	55.15	0.72%
2008	<i>Leucon</i> sp.	55.15	0.72%
2008	<i>Haplocheira plumosa</i>	47.27	0.62%
2008	<i>Lumbrineris magalhaensis</i>	39.39	0.52%
2008	<i>Neojaera furcata</i>	39.39	0.52%
2008	<i>Sphaerosyllis</i> c.f. <i>hirsuta</i>	39.39	0.52%
2008	<i>Thaumatelson herdmani</i>	39.39	0.52%
2008	<i>Halacaridae</i> (unidentified)	31.52	0.41%
2008	<i>Lumbrineris</i> sp.	31.52	0.41%
2008	<i>Nicomache lumbricalis</i>	31.52	0.41%
2008	<i>Ophelina breviata</i>	31.52	0.41%
2008	<i>Haustoriidae</i> (unidentified)	23.64	0.31%
2008	<i>Podocopida</i> (unidentified)	23.64	0.31%
2008	<i>Arcturus</i> sp.	15.76	0.21%
2008	<i>Caulleriella</i> sp.	15.76	0.21%
2008	<i>Cirratulidae</i> (unidentified)	15.76	0.21%
2008	<i>Gnathia</i> sp.	15.76	0.21%
2008	<i>Limatula hodgsoni</i>	15.76	0.21%
2008	<i>Lysilla loveni macintoshi</i>	15.76	0.21%
2008	<i>Nemocardium</i> sp.	15.76	0.21%
2008	<i>Aglaophamus macroura</i>	7.88	0.10%
2008	<i>Alcyonacea</i> (unidentified)	7.88	0.10%
2008	<i>Barrukia cristata</i>	7.88	0.10%
2008	<i>Cardiidae</i> (unidentified)	7.88	0.10%
2008	<i>Eunoe iphionoides</i>	7.88	0.10%
2008	<i>Exogone heterochacta</i>	7.88	0.10%
2008	<i>Exogone</i> sp.	7.88	0.10%
2008	<i>Gastropoda</i> (unidentified)	7.88	0.10%
2008	<i>Helicosiphon biscoeensis</i>	7.88	0.10%
2008	<i>Janaira</i> sp.	7.88	0.10%

2008	<i>Lanicides bilobata</i>	7.88	0.10%
2008	<i>Monoculodes curtipedculus</i>	7.88	0.10%
2008	<i>Ophiuroidea (unidentified)</i>	7.88	0.10%
2008	<i>Periploma</i> sp.	7.88	0.10%
2008	<i>Pettiboneia</i> sp.	7.88	0.10%
2008	<i>Polychaeta (unidentified)</i>	7.88	0.10%
2008	<i>Prionospio lanceolata</i>	7.88	0.10%
2008	<i>Pseudoparatanaeis antarcticus</i>	7.88	0.10%
2008	<i>Pyramidellidae (unidentified)</i>	7.88	0.10%
2008	<i>Rissoidae (unidentified)</i>	7.88	0.10%
2008	<i>Scolecopsis lefebvrei</i>	7.88	0.10%
2008	<i>Scoloplos</i> sp.	7.88	0.10%
2008	<i>Spionidae (unidentified)</i>	7.88	0.10%
2008	<i>Syllides articulatus</i>	7.88	0.10%
2008	<i>Vitrinellidae (unidentified)</i>	7.88	0.10%
		7634.68	100.00%
2009	<i>Nototanaeis dimorphus</i>	2363.67	12.36%
2009	<i>Aphelochaeta</i>	2185.08	11.43%
2009	<i>Spiophanes tcherniai</i>	1586.28	8.30%
2009	<i>Porifera (unidentified)</i>	1533.76	8.02%
2009	<i>Galathowenia scotiae</i>	1428.71	7.47%
2009	<i>Edwardsia meridionalis</i>	1281.63	6.70%
2009	<i>Heterophoxus videns</i>	829.91	4.34%
2009	<i>Paramunna glacialis</i>	724.86	3.79%
2009	<i>Austrosignum grande</i>	588.29	3.08%
2009	<i>Oligochaeta (unidentified)</i>	588.29	3.08%
2009	<i>Philomedes</i> sp.	399.2	2.09%
2009	<i>Seba dubia</i>	388.69	2.03%
2009	<i>Eudorella splendida</i>	378.19	1.98%
2009	<i>Leitoscoloplos kergulensis</i>	273.13	1.43%
2009	<i>Neojaera furcata</i>	262.63	1.37%
2009	<i>Hesionidae (unidentified)</i>	241.62	1.26%
2009	<i>Golfingia</i> sp.	231.11	1.21%
2009	<i>Laonice cirrata</i>	199.6	1.04%
2009	<i>Spiophanes bombyx</i>	199.6	1.04%
2009	<i>Munna</i> sp.	178.59	0.93%
2009	<i>Nicomache lumbricalis</i>	168.08	0.88%
2009	<i>Podocopida (unidentified)</i>	168.08	0.88%
2009	<i>Onoba turqueti</i>	157.58	0.82%
2009	<i>Gastropoda (unidentified)</i>	147.07	0.77%
2009	<i>Capitella perarmata</i>	147.07	0.77%
2009	<i>Limatula hodgsoni</i>	147.07	0.77%
2009	<i>Nemertea (unidentified)</i>	147.07	0.77%
2009	<i>Halacaridae (unidentified)</i>	136.57	0.71%
2009	<i>Leucon</i> sp.	105.05	0.55%
2009	<i>Paramunna dentata</i>	105.05	0.55%
2009	<i>Ampharete kerguelensis</i>	84.04	0.44%
2009	<i>Bivalvia (unidentified)</i>	84.04	0.44%
2009	<i>Apistobranchus glacerae</i>	73.54	0.38%
2009	<i>Gnathia</i> sp.	73.54	0.38%
2009	<i>Orchomenella pinguis</i>	73.54	0.38%
2009	<i>Haplocheira plumosa</i>	63.03	0.33%
2009	<i>Maldanidae (unidentified)</i>	63.03	0.33%

2009	<i>Ophelina breviata</i>	63.03	0.33%
2009	<i>Ophryotrocha claparedii</i>	63.03	0.33%
2009	<i>Brania rhopalophora</i>	52.53	0.27%
2009	<i>Helicosiphon biscoeensis</i>	52.53	0.27%
2009	<i>Lumbrineris magalhaensis</i>	52.53	0.27%
2009	<i>Monoculodes curtipediculus</i>	52.53	0.27%
2009	<i>Orseis mathai</i>	52.53	0.27%
2009	<i>Axiothella antarctica</i>	42.02	0.22%
2009	<i>Exogone heterochacta</i>	42.02	0.22%
2009	<i>Ophiuroidea (unidentified)</i>	42.02	0.22%
2009	<i>Paramunna rostrata</i>	42.02	0.22%
2009	<i>Polynoidae (unidentified)</i>	42.02	0.22%
2009	<i>Syllis sensu lato</i>	42.02	0.22%
2009	<i>Thraciidae (unidentified)</i>	42.02	0.22%
2009	<i>Actiniaria (unidentified)</i>	31.52	0.16%
2009	<i>Lysilla loveni macintoshi</i>	31.52	0.16%
2009	<i>Metopoides magellanica</i>	31.52	0.16%
2009	<i>Serpulidae (unidentified)</i>	31.52	0.16%
2009	<i>Spirorbis</i> sp.	31.52	0.16%
2009	<i>Apomatus</i> sp.	21.01	0.11%
2009	<i>Caulerella antarctica</i>	21.01	0.11%
2009	<i>Ceriantharia (unidentified)</i>	21.01	0.11%
2009	<i>Hippomedon kergueleni</i>	21.01	0.11%
2009	<i>Laternula elliptica</i>	21.01	0.11%
2009	<i>Leucon sagittae</i>	21.01	0.11%
2009	<i>Maldane sarsi Antarticus</i>	21.01	0.11%
2009	<i>Mytilidae (unidentified)</i>	21.01	0.11%
2009	<i>Oculatus Antarticus</i>	21.01	0.11%
2009	<i>Phyllocomus crocea</i>	21.01	0.11%
2009	<i>Amage</i> sp.	10.51	0.05%
2009	<i>Ammotrypane</i> sp.	10.51	0.05%
2009	<i>Arcturus</i> sp.	10.51	0.05%
2009	<i>Ascidacea (unidentified)</i>	10.51	0.05%
2009	<i>Barrukia cristata</i>	10.51	0.05%
2009	<i>Cardiidae (unidentified)</i>	10.51	0.05%
2009	<i>Cirratulidae (unidentified)</i>	10.51	0.05%
2009	<i>Clymenella minor</i>	10.51	0.05%
2009	<i>Harmothoe</i> sp.	10.51	0.05%
2009	<i>Idunella</i> sp.	10.51	0.05%
2009	<i>Liljeborgia</i> sp.	10.51	0.05%
2009	<i>Lumbrineridae (unidentified)</i>	10.51	0.05%
2009	<i>Lumbrineris</i> sp.	10.51	0.05%
2009	<i>Nymphon</i> sp.	10.51	0.05%
2009	<i>Opheliidae (unidentified)</i>	10.51	0.05%
2009	<i>Orbiniidae (unidentified)</i>	10.51	0.05%
2009	<i>Parviturbo</i> sp.	10.51	0.05%
2009	<i>Pettiboneia</i> sp.	10.51	0.05%
2009	<i>Pseudocythere</i> sp.	10.51	0.05%
2009	<i>Pseudopolydora (unidentified)</i>	10.51	0.05%
2009	<i>Sabellidae A</i>	10.51	0.05%
2009	<i>Seriolis</i> sp.	10.51	0.05%
2009	<i>Sphaerosyllis perspicax</i>	10.51	0.05%
2009	<i>Terebellidae (unidentified)</i>	10.51	0.05%
2009	<i>Thelepus koehleri</i>	10.51	0.05%

		19119.59	100.00%
2010	<i>Aphelochaeta</i>	2815.39	14.61%
2010	<i>Nototanaeis dimorphus</i>	1565.27	8.12%
2010	<i>Oligochaeta (unidentified)</i>	1481.23	7.69%
2010	<i>Halacaridae (unidentified)</i>	1113.55	5.78%
2010	<i>Spiophanes tcherniai</i>	1061.02	5.51%
2010	<i>Paramunna glacialis</i>	987.49	5.12%
2010	<i>Porifera (unidentified)</i>	987.49	5.12%
2010	<i>Leitoscoloplos kergulensis</i>	924.46	4.80%
2010	<i>Heterophoxus videns</i>	777.38	4.03%
2010	<i>Leaena antarctica</i>	766.88	3.98%
2010	<i>Austrosignum grande</i>	745.87	3.87%
2010	<i>Onoba turqueti</i>	567.28	2.94%
2010	<i>Nemertea (unidentified)</i>	420.21	2.18%
2010	<i>Laonice cirrata</i>	409.7	2.13%
2010	<i>Gastropoda (unidentified)</i>	346.67	1.80%
2010	<i>Neojaera furcata</i>	315.16	1.64%
2010	<i>Hesionidae (unidentified)</i>	283.64	1.47%
2010	<i>Capitella perarmata</i>	241.62	1.25%
2010	<i>Philomedes sp.</i>	220.61	1.14%
2010	<i>Axiothella antarctica</i>	210.1	1.09%
2010	<i>Bivalvia (unidentified)</i>	210.1	1.09%
2010	<i>Podocopida (unidentified)</i>	210.1	1.09%
2010	<i>Eudorella splendida</i>	178.59	0.93%
2010	<i>Monoculodes curtipediculus</i>	168.08	0.87%
2010	<i>Nicomache lumbricalis</i>	168.08	0.87%
2010	<i>Ophryotrocha claparedii</i>	105.05	0.55%
2010	<i>Lasaeidae (unidentified)</i>	105.05	0.55%
2010	<i>Helicosiphon biscoeensis</i>	94.55	0.49%
2010	<i>Seriolis sp.</i>	94.55	0.49%
2010	<i>Laternula elliptica</i>	84.04	0.44%
2010	<i>Sphaerosyllis perspicax</i>	84.04	0.44%
2010	<i>Golfingia sp.</i>	84.04	0.44%
2010	<i>Lysilla loveni macintoshi</i>	73.54	0.38%
2010	<i>Falsimargarita sp.</i>	63.03	0.33%
2010	<i>Haplocheira plumosa</i>	63.03	0.33%
2010	<i>Ophelina breviata</i>	63.03	0.33%
2010	<i>Serpulidae (unidentified)</i>	63.03	0.33%
2010	<i>Hydroidea (polyp)</i>	52.53	0.27%
2010	<i>Galathowenia scotiae</i>	52.53	0.27%
2010	<i>Actiniaria (unidentified)</i>	42.02	0.22%
2010	<i>Gnathia sp.</i>	42.02	0.22%
2010	<i>Leucon rossi</i>	42.02	0.22%
2010	<i>Paramunna rostrata</i>	42.02	0.22%
2010	<i>Spirorbis sp.</i>	42.02	0.22%
2010	<i>Edwardsia meridionalis</i>	31.52	0.16%
2010	<i>Leodora sp.</i>	31.52	0.16%
2010	<i>Lumbrineris sp.</i>	31.52	0.16%
2010	<i>Maldanidae (unidentified)</i>	31.52	0.16%
2010	<i>Monoculodes sp.</i>	31.52	0.16%
2010	<i>Munna sp.</i>	31.52	0.16%
2010	<i>Octobranchus sp.</i>	31.52	0.16%
2010	<i>Ophiuroidea (unidentified)</i>	31.52	0.16%

2010	<i>Orseis mathai</i>	31.52	0.16%
2010	<i>Pista</i> sp.	31.52	0.16%
2010	<i>Axinopsis debilis</i>	21.01	0.11%
2010	<i>Barrukia cristata</i>	21.01	0.11%
2010	<i>Dorvillea furcata</i>	21.01	0.11%
2010	<i>Exogone heterochacta</i>	21.01	0.11%
2010	<i>Exogone</i> sp.	21.01	0.11%
2010	<i>Haustoriidae</i> (unidentified)	21.01	0.11%
2010	<i>Nymphon</i> sp.	21.01	0.11%
2010	<i>Opheliidae</i> (unidentified)	21.01	0.11%
2010	<i>Pettiboneia</i> sp.	21.01	0.11%
2010	<i>Polychaeta</i> (unidentified)	21.01	0.11%
2010	<i>Pseudokellya cardiformis</i>	21.01	0.11%
2010	<i>Syllidae</i> (unidentified)	21.01	0.11%
2010	<i>Syllis</i> sp.	21.01	0.11%
2010	<i>Trochidae</i> (unidentified)	21.01	0.11%
2010	<i>Aglaophamus</i> sp.	10.51	0.05%
2010	<i>Alcyonium antarcticum</i>	10.51	0.05%
2010	<i>Ammotrypane</i> sp.	10.51	0.05%
2010	<i>Ampharete</i> sp.	10.51	0.05%
2010	<i>Amphiglena mediterranea</i>	10.51	0.05%
2010	<i>Apistobranchus glaciera</i>	10.51	0.05%
2010	<i>Brada</i> sp.	10.51	0.05%
2010	<i>Caecognathia calva</i>	10.51	0.05%
2010	<i>Cyamiocardia denticulatum</i>	10.51	0.05%
2010	<i>Eteone</i> sp.	10.51	0.05%
2010	<i>Euchone</i> sp.	10.51	0.05%
2010	<i>Leucon</i> sp.	10.51	0.05%
2010	<i>Lumbrineris magalhaensis</i>	10.51	0.05%
2010	<i>Muricidae</i> (unidentified)	10.51	0.05%
2010	<i>Naticidae</i> (unidentified)	10.51	0.05%
2010	<i>Orbiniidae</i> (unidentified)	10.51	0.05%
2010	<i>Sabellidae A</i>	10.51	0.05%
2010	<i>Sphaerosyllis kerguelensis</i>	10.51	0.05%
2010	<i>Terebellides stroemi</i>	5.25	0.03%
		19271.88	100.00%
2011	<i>Nototanaeis dimorphus</i>	4433.19	15.92%
2011	<i>Spiophanes tcherniai</i>	4191.57	15.05%
2011	<i>Aphelochaeta</i>	3130.55	11.24%
2011	<i>Edwardsia meridionalis</i>	2122.05	7.62%
2011	<i>Oligochaeta</i> (unidentified)	1628.3	5.85%
2011	<i>Halacaridae</i> (unidentified)	1428.71	5.13%
2011	<i>Austrosignum grande</i>	1313.15	4.72%
2011	<i>Porifera</i> (unidentified)	1029.51	3.70%
2011	<i>Paramunna glacialis</i>	745.87	2.68%
2011	<i>Heterophoxus videns</i>	567.28	2.04%
2011	<i>Leitoscoloplos kerguelensis</i>	409.7	1.47%
2011	<i>Eudorella splendida</i>	399.2	1.43%
2011	<i>Galathowenia scotiae</i>	378.19	1.36%
2011	<i>Hesionidae</i> (unidentified)	346.67	1.24%
2011	<i>Onoba turqueti</i>	325.66	1.17%
2011	<i>Nemertea</i> (unidentified)	315.16	1.13%
2011	<i>Philomedes</i> sp.	315.16	1.13%

2011	<i>Capitella perarmata</i>	294.14	1.06%
2011	<i>Laonice cirrata</i>	283.64	1.02%
2011	<i>Ophryotrocha claparedii</i>	273.13	0.98%
2011	<i>Gastropoda (unidentified)</i>	273.13	0.98%
2011	<i>Munna</i> sp.	220.61	0.79%
2011	<i>Seriolis</i> sp.	220.61	0.79%
2011	<i>Axiothella antarctica</i>	189.09	0.68%
2011	<i>Nicomache lumbricalis</i>	157.58	0.57%
2011	<i>Thaumatelson herdmani</i>	157.58	0.57%
2011	<i>Haplocheira plumosa</i>	147.07	0.53%
2011	<i>Seba saundersii</i>	136.57	0.49%
2011	<i>Golfingia</i> sp.	126.06	0.45%
2011	<i>Lysilla loveni macintoshii</i>	126.06	0.45%
2011	<i>Monoculodes curtipediculus</i>	126.06	0.45%
2011	<i>Pettiboneia</i> sp.	105.05	0.38%
2011	<i>Brania rhopalophora</i>	94.55	0.34%
2011	<i>Ophelina syringopyge</i>	94.55	0.34%
2011	<i>Neojaera furcata</i>	94.55	0.34%
2011	<i>Orseis mathai</i>	94.55	0.34%
2011	<i>Paramunna rostrata</i>	73.54	0.26%
2011	<i>Caecognathia calva</i>	73.54	0.26%
2011	<i>Octobranthus</i> sp.	73.54	0.26%
2011	<i>Podocopida (unidentified)</i>	63.03	0.23%
2011	<i>Sipunculidae (unidentified)</i>	63.03	0.23%
2011	<i>Sphaerosyllis perspicax</i>	63.03	0.23%
2011	<i>Apistobranthus glacerae</i>	52.53	0.19%
2011	<i>Laternula elliptica</i>	52.53	0.19%
2011	<i>Polychaeta (unidentified)</i>	52.53	0.19%
2011	<i>Naticidae (unidentified)</i>	52.53	0.19%
2011	<i>Exogone heterochacta</i>	42.02	0.15%
2011	<i>Ophelina breviata</i>	42.02	0.15%
2011	<i>Orchomenella pinguis</i>	42.02	0.15%
2011	<i>Periploma</i> sp.	42.02	0.15%
2011	<i>Terebellidae (unidentified)</i>	42.02	0.15%
2011	<i>Ampharetidae (unidentified)</i>	31.52	0.11%
2011	<i>Brania</i> sp.	31.52	0.11%
2011	<i>Leucon rossi</i>	31.52	0.11%
2011	<i>Leucon</i> sp.	31.52	0.11%
2011	<i>Lumbrineris magalhaensis</i>	31.52	0.11%
2011	<i>Myriochele riojai</i>	31.52	0.11%
2011	<i>Perkinsiana</i> sp.	31.52	0.11%
2011	<i>Pista</i> sp.	31.52	0.11%
2011	<i>Actiniaria (unidentified)</i>	21.01	0.08%
2011	<i>Barrukia cristata</i>	21.01	0.08%
2011	<i>Bivalvia (unidentified)</i>	21.01	0.08%
2011	<i>Chaetozone</i> sp.	21.01	0.08%
2011	<i>Limatula hodgsoni</i>	21.01	0.08%
2011	<i>Lumbrineridae (unidentified)</i>	21.01	0.08%
2011	<i>Philobrya</i> sp.	21.01	0.08%
2011	<i>Serpulidae (unidentified)</i>	21.01	0.08%
2011	<i>Sphaerosyllis c.f. hirsuta</i>	21.01	0.08%
2011	<i>Syllidae (unidentified)</i>	21.01	0.08%
2011	<i>Abatus</i> sp.	10.51	0.04%
2011	<i>Acrocirrid</i> sp.	10.51	0.04%

2011	<i>Alcyonium antarcticum</i>	10.51	0.04%
2011	<i>Ampharete kerguelensis</i>	10.51	0.04%
2011	<i>Ascidacea (unidentified)</i>	10.51	0.04%
2011	<i>Asteroidea (unidentified)</i>	10.51	0.04%
2011	<i>Campylaspis</i> sp.	10.51	0.04%
2011	<i>Cardiidae (unidentified)</i>	10.51	0.04%
2011	<i>Caulleriella antarctica</i>	10.51	0.04%
2011	<i>Cirratulidae (unidentified)</i>	10.51	0.04%
2011	<i>Cucumaria</i> sp.	10.51	0.04%
2011	<i>Eunoe anderssoni</i>	10.51	0.04%
2011	<i>Lumbrineris</i> sp.	10.51	0.04%
2011	<i>Maldanidae (unidentified)</i>	10.51	0.04%
2011	<i>Nephtyidae (unidentified)</i>	10.51	0.04%
2011	<i>Opheliidae (unidentified)</i>	10.51	0.04%
2011	<i>Ophelina gymnopyge</i>	10.51	0.04%
2011	<i>Ophelina</i> sp.	10.51	0.04%
2011	<i>Orchomenella</i> sp.	10.51	0.04%
2011	<i>Pherusa kerguelarum</i>	10.51	0.04%
2011	<i>Prionospio</i> sp.	10.51	0.04%
2011	<i>Syllides articulatus</i>	10.51	0.04%
2011	<i>Terebellides stroemi</i>	10.51	0.04%
2011	<i>Typosyllis</i> sp.	10.51	0.04%
2011	<i>Urothoe marionis</i>	10.51	0.04%
		27849.44	100.00%
2012	<i>Nototanais dimorphus</i>	6765.34	20.61%
2012	<i>Spiophanes tcherniai</i>	5126.53	15.62%
2012	<i>Oligochaeta (unidentified)</i>	2804.88	8.55%
2012	<i>Aphelochaeta</i>	2353.16	7.17%
2012	<i>Austrosignum grande</i>	2206.09	6.72%
2012	<i>Edwardsia meridionalis</i>	1754.37	5.35%
2012	<i>Leitoscoloplos kerguelensis</i>	1019	3.10%
2012	<i>Galathowenia scotiae</i>	756.37	2.30%
2012	<i>Nemertea (unidentified)</i>	714.35	2.18%
2012	<i>Heterophoxus videns</i>	630.31	1.92%
2012	<i>Philomedes</i> sp.	546.27	1.66%
2012	<i>Hesionidae (unidentified)</i>	525.26	1.60%
2012	<i>Laonice cirrata</i>	504.25	1.54%
2012	<i>Haplocheira plumosa</i>	483.24	1.47%
2012	<i>Paramunna glacialis</i>	430.71	1.31%
2012	<i>Halacaridae (unidentified)</i>	399.2	1.22%
2012	<i>Sphaerosyllis</i> c.f. <i>hirsuta</i>	388.69	1.18%
2012	<i>Eudorella splendida</i>	367.68	1.12%
2012	<i>Axiothella antarctica</i>	336.17	1.02%
2012	<i>Bivalvia (unidentified)</i>	315.16	0.96%
2012	<i>Ophelina breviata</i>	294.15	0.90%
2012	<i>Porifera (unidentified)</i>	273.13	0.83%
2012	<i>Ophryotrocha claparedii</i>	241.62	0.74%
2012	<i>Podocopida (unidentified)</i>	231.11	0.70%
2012	<i>Monoculodes curtipediculus</i>	220.61	0.67%
2012	<i>Capitella perarmata</i>	199.6	0.61%
2012	<i>Hippomedon kergueleni</i>	199.6	0.61%
2012	<i>Nicomache lumbricalis</i>	199.6	0.61%
2012	<i>Laternula elliptica</i>	199.6	0.61%

2012	<i>Pettiboneia</i> sp.	168.08	0.51%
2012	<i>Munna</i> sp.	157.58	0.48%
2012	<i>Golfingia</i> sp.	147.07	0.45%
2012	<i>Caecognathia calva</i>	136.57	0.42%
2012	<i>Ampharete kerguelensis</i>	126.06	0.38%
2012	<i>Axiokebuita minuta</i>	115.56	0.35%
2012	<i>Onoba turqueti</i>	115.56	0.35%
2012	<i>Lysilla loveni macintoshi</i>	105.05	0.32%
2012	<i>Exogone heterochacta</i>	94.55	0.29%
2012	<i>Gastropoda (unidentified)</i>	94.55	0.29%
2012	<i>Seriolis</i> sp.	84.04	0.26%
2012	<i>Cardiidae (unidentified)</i>	73.54	0.22%
2012	<i>Terebellidae (unidentified)</i>	73.54	0.22%
2012	<i>Alcyonacea (unidentified)</i>	63.03	0.19%
2012	<i>Apistobranchus glaciera</i>	52.53	0.16%
2012	<i>Leucon</i> sp.	52.53	0.16%
2012	<i>Nymphon</i> sp.	52.53	0.16%
2012	<i>Oriopsis limbata</i>	52.53	0.16%
2012	<i>Pseudocythere</i> sp.	52.53	0.16%
2012	<i>Limatula hodgsoni</i>	42.02	0.13%
2012	<i>Metopoides magellanica</i>	31.52	0.10%
2012	<i>Neojaera furcata</i>	31.52	0.10%
2012	<i>Orseis mathai</i>	31.52	0.10%
2012	<i>Ampharete</i> sp.	21.01	0.06%
2012	<i>Ectias</i> sp.	21.01	0.06%
2012	<i>Leaena antarctica</i>	21.01	0.06%
2012	<i>Lumbrineridae (unidentified)</i>	21.01	0.06%
2012	<i>Nephtys magellanica</i>	21.01	0.06%
2012	<i>Sipunculidae (unidentified)</i>	21.01	0.06%
2012	<i>Syllides articulatus</i>	21.01	0.06%
2012	<i>Typosyllis</i> sp.	21.01	0.06%
2012	<i>Ammotrypane</i> sp.	10.51	0.03%
2012	<i>Antias charcoti</i>	10.51	0.03%
2012	<i>Antinoella antarctica</i>	10.51	0.03%
2012	<i>Aplysiidae (unidentified)</i>	10.51	0.03%
2012	<i>Cauleriella antarctica</i>	10.51	0.03%
2012	<i>Ceriantharia (unidentified)</i>	10.51	0.03%
2012	<i>Exogone</i> sp.	10.51	0.03%
2012	<i>Glycera kerguelensis</i>	10.51	0.03%
2012	<i>Gnathia</i> sp.	10.51	0.03%
2012	<i>Harmothoe</i> sp.	10.51	0.03%
2012	<i>Leucon rossi</i>	10.51	0.03%
2012	<i>Ophiuroidea (unidentified)</i>	10.51	0.03%
2012	<i>Polychaeta (unidentified)</i>	10.51	0.03%
2012	<i>Scolecopsis lefebvrei</i>	10.51	0.03%
2012	<i>Scolecopsis</i> sp.	10.51	0.03%
2012	<i>Serpulidae (unidentified)</i>	10.51	0.03%
2012	<i>Simrothiellidae unidentified</i>	10.51	0.03%
2012	<i>Spio obtusa</i>	10.51	0.03%
2012	<i>Terebellides stroemi</i>	10.51	0.03%
2012	<i>Typhlotanaoides rostralis</i>	10.51	0.03%
		32818.34	100.00%

Appendix 3 Species life history characteristics

Table 3. 1. Macrofaunal species with the corresponding disturbance and feeding code.

Species	Sp Code	Dist.code	Feed.code
<i>Anaitides longipes</i>	608		CO
<i>Anaitides</i> sp.	204		CO
<i>Eteone</i> sp.	644		CO
<i>Phyllodoce</i> sp.	135	DS	CO
<i>Hesionidae</i> (unidentified)	320	DI	CO
<i>Hesiosyllis</i> sp.	165	DS	CO
<i>Orseis mathai</i>	94	DI	CO
<i>Orseis</i> sp.	118	DI	CO
<i>Kefersteinia fauveli</i>	174		CO
<i>Syllidia inermis</i>	77	DS	CO
<i>Syllidae</i> (unidentified)	73	DS	CO
<i>Brania</i> sp.	220		CO
<i>Brania rhopalophora</i>	75	DS	CO
<i>Exogone</i> sp.	87	DS	CO
<i>Exogone heterochacta</i>	85	DS	CO
<i>Exogonella</i> sp.	164	DS	CO
<i>Sphaerosyllis</i> sp.	175	DS	CO
<i>Sphaerosyllis</i> c.f. <i>hirsuta</i>	74	DS	CO
<i>Sphaerosyllis kerguelensis</i>	630	DS	CO
<i>Sphaerosyllis perspicax</i>	95	DS	CO
<i>Syllides articulatus</i>	72	DS	CO
<i>Syllis sensu lato</i>	76	DS	CO
<i>Syllis</i> sp.	445	DS	CO
<i>Typosyllis</i> sp.	218		CO
<i>Nephtyidae</i> (unidentified)	325		OV
<i>Aglaophamus</i> sp.	196		OV
<i>Aglaophamus macroura</i>	128	DS	CO
<i>Nephtys magellanica</i>	129	DS	CO
<i>Glycera kerguelensis</i>	181		CO
<i>Lumbrineridae</i> (unidentified)	331	DI	CO
<i>Lumbrineris</i> sp.	156	DI	CO
<i>Lumbrineris magalhaensis</i>	138	DI	CO
<i>Lumbrineris macquariensis</i>	70	DI	CO
<i>Oeonidae</i> (unidentified)	332		CO
<i>Notocirrus lorum</i>	89	DI	CO
<i>Coralliotrocha composita</i>	107	DI	CO
<i>Dorvillea furcata</i>	206		CO
<i>Ophryotrocha claparedii</i>	71	DI	CO
<i>Pettiboneia</i> sp.	173	DS	OV
<i>Lacydonia</i> sp.	629		OV
<i>Polynoidae</i> (unidentified)	314		CV
<i>Barrukia cristata</i>	78	DS	CO

<i>Eunoe anderssoni</i>	152	DS	CO
<i>Eunoe iphionoides</i>	179	DS	CO
<i>Eunoe opalina</i>	157	DS	CO
<i>Harmothoe brevipalpa</i>	54	DS	CO
<i>Harmothoe</i> sp.	639		CV
<i>Sphaerodoropsis parva</i>	102	DI	SD
<i>Apistobanchus glaciera</i>	632		SD
<i>Spionidae</i> (unidentified)	137	DS	SD
<i>Laonice cirrata</i>	62	DS	SD
<i>Prionospio lanceolata</i>	182	DS	SD
<i>Prionospio</i> sp.	90	DS	SD
<i>Scolecopsis lefebvrei</i>	91	DS	SD
<i>Spio obtusa</i>	631	DS	SD
<i>Spiophanes bombyx</i>	63	DS	SD
<i>Spiophanes soderstroemi</i>	64	DS	SD
<i>Spiophanes tcherniai</i>	97	DS	SD
<i>Pseudopolydora</i> (unidentified)	642		SU
<i>Acrocirrid</i> sp.	233		SD
<i>Cirratulidae</i> (unidentified)	154	DI	SD
<i>Caulleriella antarctica</i>	192		SD
<i>Caulleriella</i> sp.	162	DI	SD
<i>Chaetozone</i> sp.	163	DI	SD
<i>Cirratulus</i> sp.	88	DI	SD
<i>Cirriformia</i> sp.	120	DI	SD
<i>Macrochaeta</i> sp.	166	DS	SD
<i>Tharyx</i> sp.	581	DI	SD
<i>Aphelochaeta</i>	65	DI	SD
<i>Axiokebuita</i> sp.	86	DS	SSD
<i>Axiokebuita minuta</i>	101	DS	SSD
<i>Galathowenia longicollaris</i>	221		SSD
<i>Galathowenia scotiae</i>	194		SSD
<i>Myriochele</i> sp.	635		SSD
<i>Myriochele riojai</i>	222		SSD
<i>Brada</i> sp.	461		SD
<i>Pherusa kerguelarum</i>	223		SD
<i>Ampharetidae</i> (unidentified)	122	DI	SD
<i>Ampharete kerguelensis</i>	190		SSD
<i>Neosamytha gracilis</i>	648		SSD
<i>Ampharete</i> sp.	93	DI	SD
<i>Amage</i> sp.	646		SSD
<i>Neosabellides elongatus</i>	66	DI	SD
<i>Phyllocomus crocea</i>	186		SSD
<i>Terebellidae</i> (unidentified)	352		SD
<i>Hauchiella tribullata</i>	68	DI	SD
<i>Lanicides bilobata</i>	184		SD
<i>Leaena antarctica</i>	202		SD
<i>Lysilla loveni macintoshi</i>	69	DI	SD

<i>Pista</i> sp.	203		SD
<i>Terebellides stroemi</i>	577		SD
<i>Thelepus cincinnatus</i>	130	DI	SD
<i>Thelepus koehleri</i>	180		SD
<i>Thelepus</i> sp.	140	DI	SD
<i>Sabellidae</i> A	84	DI	F
<i>Sabellidae</i> (juvenile)	67	DI	F
<i>Sabellidae</i> (unidentified)	353		DS
<i>Amphiglena mediterranea</i>	200		SD
<i>Euchone</i> sp.	201		SU
<i>Perkinsiana</i> sp.	224		SU
<i>Serpulidae</i> B	141		F
<i>Serpulidae</i> (unidentified)	354		SU
<i>Apomatus</i> sp.	643		SU
<i>Helicosiphon biscoeensis</i>	185		F
<i>Leodora</i> sp.	199		F
<i>Pomatoceros</i> sp.	96		F
<i>Spirorbis</i> sp.	480		F
<i>Fauveliopsis</i> sp.	149	DS	SS
<i>Octobranhus</i> sp.	198		SD
<i>Terebellides stroemi</i>	226		SD
<i>Terebellides</i> sp.	225		SD
<i>Capitella perarmata</i>	79	DI	SD
<i>Capitella</i> sp.	80	DI	SD
<i>Mediomastus</i> sp.	81	DI	SSD
<i>Maldanidae</i> (unidentified)	125	DS	SSD
<i>Axiothella antarctica</i>	161	DS	SSD
<i>Axiothella</i> sp.	82	DS	SSD
<i>Clymenella minor</i>	189		SSD
<i>Maldane sarsi</i> Antqrcicus	195		SSD
<i>Nicomache lumbricalis</i>	139	DS	SSD
<i>Oculatus Antarticus</i>	210		SSD
<i>Notoproctus</i> sp.	168	DS	SSD
<i>Opheliidae</i> (unidentified)	342	DS	SSD
<i>Ammotrypane</i> sp.	191		SSD
<i>Ophelina breviata</i>	183		SS
<i>Ophelina gymnopyge</i>	229		SS
<i>Ophelina syringopyge</i>	61	DS	SSD
<i>Ophelina</i> ssp.p.	228		SS
<i>Orbiniidae</i> (unidentified)	339	DI	SSD
<i>Leitoscoloplos kergulens</i>	83	DI	SSD
<i>minutus</i>			
<i>Leitoscoloplos kergulensis</i>	92	DI	SSD
<i>Scoloplos</i> sp.	637	DI	SSD
<i>Aricidea trilobata</i>	160	DS	CO

Appendix 4 Chemical contaminant Spearman Correlations

Table 4. 1. Spearman correlations among sediment quality variables and time.
Contamination indicator refers to chemicals that have PC1 values above 0.5.

Variable		Winter Quarters Bay			Sewage Outfall			Intake Jetty			Cape Armitage		
		A1	A2	A3	D1	D2	D3	E1	E2	E3	F1	F2	F3
TOCP	r	-0.66	-0.89	-0.67	-0.73	-0.07	-0.73	0.60	0.00	0.00	-0.69	-0.19	-0.40
	p	0.04	0.00	0.03	0.02	0.85	0.02	0.28	1.00	1.00	0.06	0.65	0.32
TICP	r	0.28	0.48	0.67	0.40	0.39	0.71	0.70	0.50	0.20	0.76	-0.36	0.12
	p	0.43	0.16	0.03	0.25	0.26	0.02	0.19	0.39	0.75	0.03	0.39	0.78
TPH	r	-0.52	-0.66	-0.77	-0.88	-0.19	-0.78	-0.60	-0.30	-0.40	-0.52	-0.12	-0.05
	p	0.13	0.04	0.01	0.00	0.60	0.01	0.28	0.62	0.50	0.18	0.78	0.91
Al	r	0.04	-0.07	0.08	-0.22	0.09	-0.49	-0.40	-0.40	0.20	-0.45	0.02	-0.12
	p	0.91	0.85	0.83	0.53	0.80	0.15	0.50	0.50	0.75	0.26	0.96	0.78
Ba	r	-0.42	-0.31	-0.22	-0.58	-0.05	-0.67	0.30	0.30	-0.30	-0.31	-0.05	-0.10
	p	0.23	0.38	0.53	0.08	0.88	0.03	0.62	0.62	0.62	0.46	0.91	0.82
Cd	r	-0.28	-0.65	-0.25	-0.21	-0.03	-0.33	0.60	0.60	0.00	0.10	-0.40	-0.05
	p	0.43	0.04	0.49	0.56	0.93	0.35	0.28	0.28	1.00	0.82	0.32	0.91
Cu	r	-0.41	-0.20	-0.65	-0.59	0.07	-0.81	-0.10	-0.70	-0.60	-0.19	-0.05	-0.38
	p	0.24	0.58	0.04	0.07	0.85	0.00	0.87	0.19	0.28	0.65	0.91	0.35
Fe	r	-0.30	-0.19	-0.24	-0.44	-0.37	-0.67	0.10	0.30	-0.30	-0.40	-0.26	-0.55
	p	0.40	0.60	0.51	0.20	0.29	0.03	0.87	0.62	0.62	0.32	0.53	0.16
Mg	r	-0.31	0.09	0.19	-0.21	-0.27	-0.37	0.20	0.10	-0.60	0.50	-0.05	-0.38
	p	0.38	0.80	0.60	0.56	0.45	0.29	0.75	0.87	0.28	0.21	0.91	0.35
Mn	r	-0.56	-0.35	-0.38	-0.56	-0.58	-0.30	-0.60	-0.30	-0.60	-0.43	-0.07	-0.60
	p	0.09	0.33	0.28	0.09	0.08	0.40	0.28	0.62	0.28	0.29	0.87	0.12
Ni	r	-0.41	-0.24	-0.22	-0.38	-0.50	-0.35	-0.10	-0.40	-0.50	0.14	0.48	-0.48
	p	0.24	0.51	0.53	0.28	0.14	0.33	0.87	0.50	0.39	0.74	0.23	0.23

Variable		Winter Quarters Bay			Sewage Outfall			Intake Jetty			Cape Armitage		
V	r	-0.61	-0.58	-0.52	-0.53	-0.56	-0.65	-0.50	-0.30	-0.60	-0.24	0.07	-0.60
	p	0.06	0.08	0.13	0.12	0.09	0.04	0.39	0.62	0.28	0.57	0.87	0.12
Zn	r	0.09	-0.15	0.07	-0.15	0.12	-0.28	0.10	0.60	0.60	-0.90	-0.60	-0.76
	p	0.80	0.68	0.85	0.68	0.75	0.43	0.87	0.28	0.28	0.00	0.12	0.03
Pb	r	-0.39	-0.37	-0.55	0.15	0.24	-0.66	-0.50	-0.60	-0.90	-0.14	-0.05	-0.24
	p	0.26	0.29	0.10	0.68	0.51	0.04	0.39	0.28	0.04	0.74	0.91	0.57
Hg	r	-0.44	-0.58	-0.38	-0.37	0.22	-0.85	-0.20	-0.10	0.10	-0.68	-0.71	-0.71
	p	0.20	0.08	0.28	0.29	0.53	0.00	0.75	0.87	0.87	0.06	0.05	0.05
Cr	r	-0.50	-0.54	-0.36	-0.41	-0.33	-0.55	-0.60	-0.30	-0.60	-0.48	-0.40	-0.79
	p	0.14	0.11	0.31	0.24	0.35	0.10	0.28	0.62	0.28	0.23	0.32	0.02
TOTPCB	r	-0.70	-0.33	-0.77	-0.33	0.31	-0.73	0.10	0.30	-0.10	-0.60	-0.40	-0.71
	p	0.03	0.35	0.01	0.35	0.38	0.02	0.87	0.62	0.87	0.12	0.32	0.05
TOTDDT	r	-0.66	-0.35	-0.81	-0.62	-0.08	-0.76	-0.67	-0.89	-0.89	-0.55	-0.55	-0.30
	p	0.04	0.33	0.00	0.05	0.83	0.01	0.22	0.04	0.04	0.16	0.16	0.47
TOTPAH	r	-0.78	-0.70	-0.68	-0.60	0.13	-0.32	0.50	-0.40	-0.30	-0.62	-0.62	-0.55
	p	0.01	0.03	0.03	0.07	0.73	0.37	0.39	0.50	0.62	0.10	0.10	0.16
GravelP	r	-0.15	0.03	-0.22	-0.18	0.31	0.47	-0.70	0.10	-0.30	-0.29	0.64	0.31
	p	0.68	0.93	0.53	0.63	0.38	0.17	0.19	0.87	0.62	0.49	0.09	0.46
SandP	r	0.08	0.14	0.55	0.39	-0.56	-0.12	0.60	-0.30	0.20	0.05	-0.07	-0.24
	p	0.83	0.70	0.10	0.26	0.09	0.75	0.28	0.62	0.75	0.91	0.87	0.57
SiltP	r	-0.28	-0.53	-0.08	-0.42	0.22	0.26	0.90	0.50	-0.10	0.12	-0.29	0.21
	p	0.43	0.12	0.83	0.23	0.53	0.47	0.04	0.39	0.87	0.78	0.49	0.61
ClayP	r	-0.07	-0.26	0.13	0.76	0.50	-0.10	-0.50	-0.10	-1.00	0.31	-0.43	0.26
	p	0.85	0.47	0.73	0.01	0.14	0.78	0.39	0.87	<.0001	0.46	0.29	0.53
Mudp	r	-0.21	-0.49	-0.01	-0.01	0.39	0.07	0.50	0.80	-0.10	0.31	-0.60	0.24
	p	0.56	0.15	0.99	0.99	0.26	0.85	0.39	0.10	0.87	0.46	0.12	0.57