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Benthic Ecology Subprogram

Marine Biodiversity of the South East NRM Region

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Prepared for the Department for Environment and Heritage

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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EXECUTIVE SUMMARY

1. Marine biodiversity studies were conducted to identify and assess spatial variability in the distribution of key flora and fauna within the South East Natural Resource Management (NRM) region. Habitats targeted included soft sediments, rocky reef and seagrass communities at 12 sites (4 locations and 3 depths). These surveys provide detailed quantitative information on the abundance and composition of species at each site and will form a benchmark for future monitoring programs across the region.

2. The field component of the survey included video assessment of the benthos, water quality sampling and sediment characterisation at all sites. Infauna was sampled by benthic grab, and sled shots were used to sample the epibiota at all 12 sites. A beam trawl shot was conducted at one site. Fish assemblages were sampled by trapping at all 12 sites and baited remote underwater video (BRUVS) at 11 sites.

3. A total of 900 individuals from 66 species were recorded during the infaunal grab survey. The sled survey collected a total of 169.9 kg of biomass representing 170 species, and a further 286 individuals from 51 species were collected from the beam trawl shot. The trapping survey collected 22 fish and macroinvertebrates representing 8 species, while 373 fish representing 32 species were recorded during the BRUVS survey.

4. The infauna species composition varied in relation to the presence of sediment (as opposed to hard substrate), sediment size and sorting, however, no clear geographical patterns were evident in either overall abundance or species richness. Crustaceans and polychaetes dominated most assemblages, while nematodes characterised the Lacepede Bay site, which contained seagrass.

5. The sled survey clearly demonstrated a north-south gradient in epibiota assemblages. Notably, biomass and species richness was much higher at the northern than the southern sites. The single beam trawl site (on seagrass in Lacepede Bay) had a similar species composition to the sled that was deployed in the same area.

6. Fish community structure differed markedly between sites in the survey area. Both traps and video deployed on seagrass at Lacepede Bay showed a different assemblage to those at the deeper sites or more turbid inshore sites. Schooling species dominated abundances at the deeper sites, particularly in respect of the

BRUVS technique. Poor visibility limited the BRUVS survey at some of the shallow sites.

7. A total of 293 taxa were identified using the five sampling techniques employed in this study. Many of these species are widespread and found throughout much of southern Australia. Unfortunately we cannot comment on the relative rarity and distributions of a large proportion (47%) of taxa collected, because their identification to species level requires more detailed taxonomic examination.

8. Syngnathids were the only organisms encountered that are currently listed under the EPBC Act as “protected”. All four species collected, the pugnose pipefish (*Pugnaso curtiorstris*), mother-of-pearl pipefish (*Vanacampus margaritifer*), spotted pipefish (*Stigmatopora argus*) and common seadragon (*Phyllopteryx taeniolatus*) are understood to have ranges extending beyond the south east region, but the regional significance of their populations is unknown.

9. Like many coastal waters with urbanised or agricultural catchments, the waters of the south east are increasingly subject to growing levels of pollution from a variety of sources. Although pollution effects on the biodiversity of the south east are difficult to assess, the results of this study provide a comprehensive basis for gauging any future degradation of the region’s marine environment. Regular monitoring of the same sites using at least a subset of the key techniques employed in this study should ensure that important changes to biodiversity are identified quickly.

1. INTRODUCTION

Recent developments in Natural Resource Management (NRM) in South Australia have seen the formation of a central NRM Council and regional NRM boards to oversee the implementation of the newly created State NRM Plan. The regional NRM boards' responsibilities involve funding projects related to their region including baseline biodiversity studies, the development of monitoring programs to evaluate changes in the environment, and the delivery of information back to the stakeholders within the region and the rest of the state. One of the key areas identified for successful NRM management is sustaining marine biological health within the various coastal regions of the state.

We report here the results of baseline marine biodiversity studies within the South East NRM region (Figure 1). The marine component of the South East NRM region extends to state water limits (generally 3 nautical miles from the coast), and incorporates a wide variety of open coastal and sheltered habitats spanning a range of depths (intertidal to 50 m). The region supports extensive reef systems but also a variety of other habitat types including seagrass beds and unvegetated soft-sediment areas, all of which are economically important as they support fisheries and tourism and provide a range of other ecosystem services (Bryars 2003; Edyvane 1999).

Figure 1. Map of the south east indicating biounits (solid lines) and the extent of the South East NRM region (dotted line).

Estimates for the areas of habitat in the south east are given in Table 1. Four biounits have been previously recognised in and adjacent to the South East NRM region; Coorong, Canunda, Nene and Piccanninie (Figure 1). Edyvane (1999) defined the area for each habitat per biounit, with each biounit being defined by coastal features and distribution of habitats. Some fine-scale habitat information is available for the southern end of the Coorong biounit, with extensive seagrass beds inshore and diverse algal assemblages offshore (Sinclair Knight Merz 2001). Updated habitat mapping for this area will be presented in a companion report to this publication prepared by the Department for Environment and Heritage (Miller *et al.* 2009).

Table 1. Areas of key habitat in the survey area (source Edyvane 1999). Note the sum of the habitat areas in each biounit do not always agree with the total area due to limitations in the resolution of the aerial photography. [1] within SA Coastal Water limits

Biounit	Sand (ha)	Reef (ha)	Seagrass (ha)	Total (ha)[1]
Coorong	75497	70376	25062	178575
Canunda	5333	50552	2	84833
Nene	234	9981	0	19061
Piccanninie	2798	675	44	16746

The study area supports a number of marine species that are of importance to commercial and recreational fisheries including abalone (*Haliotis* spp.) and southern rock lobster (*Jasus edwardsii*). Mulloway (*Argyrosomus hololepidotus*), snapper (*Chrysophrys auratus*), southern calamary (*Sepioteuthis australis*), Australian salmon (*Arripis truttacea*) and school shark (*Galeorhinus galeus*) are other significant species of importance to commercial and recreational fishers (Bryars 2003; Edyvane 1999). The Protected Matters search tool (DEWHA 2009) was used to identify threatened, endangered or protected species that are likely to occur in the region. A number of species of syngnathids (pipefish, seahorses and sea dragons) and marine mammals (including whales and pinnipeds) were listed.

Despite the apparent wealth of biologically, economically and environmentally significant marine species in the region, few biodiversity studies have been conducted south of Cape Jaffa other than qualitative surveys (Edyvane 1999). Large knowledge gaps exist within the marine waters of this area, making meaningful decisions about the effective conservation, monitoring and long-term management of the marine environment difficult.

The present biodiversity study was conducted to address the paucity of information available on the composition and spatial variability of flora and fauna within the South East NRM region. Assemblages targeted included fish and invertebrates, soft-bottom fauna, rocky reef and seagrass communities. The aim of the biological surveys was to provide detailed information on the abundance of species within each study site and to develop a framework for future marine monitoring programs.

2. METHODS

2.1 Study Sites

Initially we planned to sample eight roughly equi-distant locations along the coast, but the exposed nature of the south east coast meant it was difficult to sample at intermediate sites between the more protected bays. A total of four transect locations were surveyed during this study (Figure 2). All sampling was depth stratified and took place at the 10 m, 20 m and 30 m depth contours within these four locations to integrate any depth related patterns. The survey was carried out on the SARDI research vessel *RV Ngerin*, between the 3rd and 9th April 2009 and a smaller vessel (*Odyssey*) from the 1st to 4th June 2009.

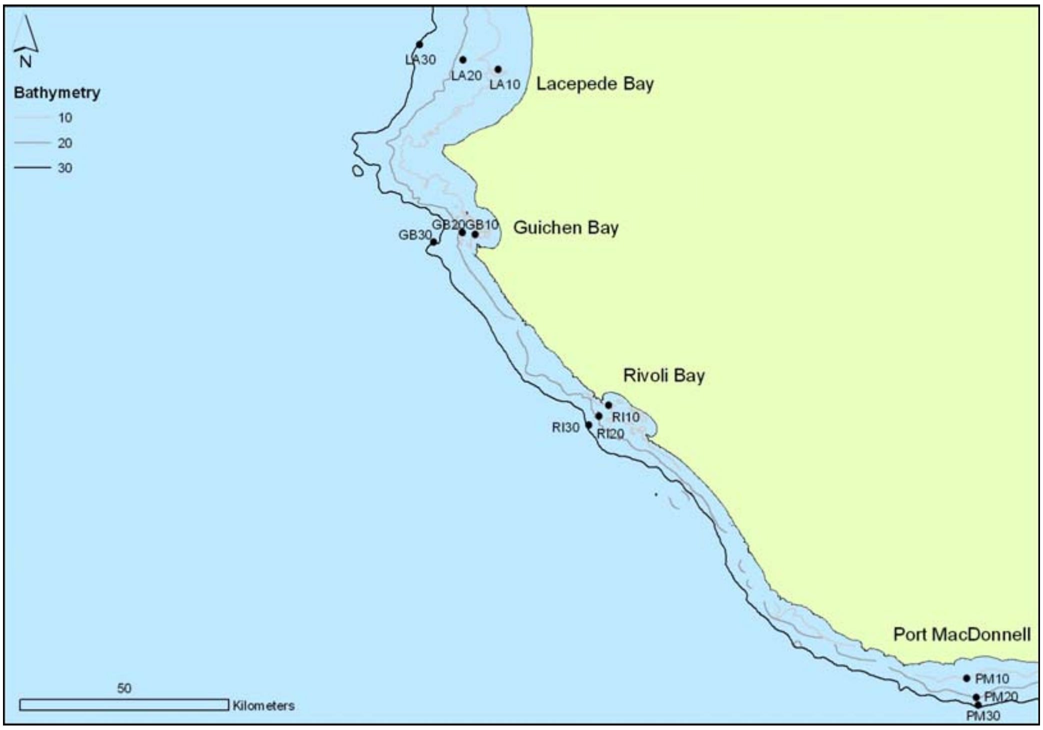

Figure 2. Map of the south east showing survey sites (with accompanying names). Solid black circles signify the depth-stratified survey design with sites at 10 m 20 m and 30 m offshore at each site.

2.2 Infauna

Samples of infauna were collected from all 12 sites using a 0.1 m^2 Smith-McIntyre grab. If no soft sediment was present, any sample of the benthos that was detached by the grab was retained. All grabs collected were sieved through a 1 mm mesh screen and the fauna retained was preserved in 5% formaldehyde solution. Data recorded at each site included date, time, location (latitude and longitude) and depth (Appendix 1). This fauna was later sorted in the laboratory to the lowest taxonomic level possible before being counted. Voucher specimens were photographed and stored in 75% ethanol for future reference.

2.3 Sediment

Where possible a single sediment sub-sample (70 ml) was retained from each grab prior to sieving. This fraction was collected from the surface layer by scraping an open vial across the top of each sample. These samples were snap frozen and stored at -20ºC, before being thawed immediately prior to examination for size structure and composition.

Samples containing particulate matter (sand, rubble or shell grit), as opposed to large pieces of hard substrate, were gently homogenised and a 50 g subsample of each was weighed into a dish. The subsample was then dry sieved through 2 mm and 1 mm sieves to obtain the % weight for the coarse fractions and determine the total proportion (by weight) of material < 1 mm. The finer fraction (< 1 mm) was kept for further analysis using laser diffraction on a Mastersizer 2000 Particle Size Analyser.

The percentage of the finer (<1 mm) fraction falling into each of five size classes (<63 µm, 63-125 µm, 125-250 µm, 250-500 µm, 500-1000 µm) was corrected for each sample by multiplying by the proportion (<1 mm) for that sample. Grain size distribution parameters were determined using the software package GRADISTAT (Blott and Pye 2001) and included mean grain size and sediment sorting (the spread of sizes around the mean).

Samples containing primarily large pieces of hard substrate, rather than particulate matter, were weighed, and the proportion of material between 1 and 2 mm and <1mm determined where present. For these samples the small quantity or lack of material <1 mm did not allow further analysis, and they were subsequently classified as rock.

2.4 Water Chemistry

Measures of water temperature and salinity were collected using a Sea-Bird SBE19 SEACAT conductivity-temperature-depth (CTD) profiler at all sample sites. Data recorded at each site included date, time, location and depth (Appendix 1). The CTD was preset to acquire data at 1-second intervals, and was lowered to within 1 m of the seafloor at each site. As water quality data adjacent to the seafloor was considered most biologically relevant to this study, all analyses use data extracted from the deepest part of each vertical profile.

2.5 Habitat Mapping

At each site, an underwater video camera (Morphcam) was lowered to within 1 m of the seabed and the vessel was allowed to drift or slowly motor for 5 minutes. Transects were approximately 100-200 m in length, depending on the prevailing sea conditions. Camera footage was recorded on a Sony digital video recorder together with time-stamped positional data from a Garmin GPS encoded as audio.

Habitat data were extracted from video tapes using a Visual Basic program designed in-house at SARDI. The user viewed the videotape on a TV monitor and was able to select from a list of predetermined habitat categories (Table 2), assigning one of the categories whenever a habitat transition occurred. The Visual Basic program combines each selected habitat category with position information that is simultaneously downloaded from the audio track of the tape during viewing, into a text file that can be imported into a Microsoft Access database for processing. Accurate positional data makes it possible to calculate the length of each section of homogeneous habitat. The percent coverage of different habitat groups was subsequently mapped using the GIS software package ArcGIS (Ver 9.2).

Table 2. Video habitat categories and their assigned habitat group used for describing the benthos of the south east.

Habitat Category	Details	Habitat Group
Amphibolis antartica - Dense	Contiguous seagrass	Seagrass
A. antartica - patchy	Patches isolated from each other	Seagrass
DDD	Missing - not recordable	Excluded
Halophila	Any level of cover	Bare
Macroalgae - dense	Can see little substrate between macroalgae	Macroalgae
Macroalgae - patchy	Patches isolated from each other	Macroalgae
Macroalgae - sparse	Continuous but not dense	Macroalgae
Mixed *Posidonia / Amphibolis* - dense	Can see little substrate between seagrass	Seagrass
Mixed *Posidonia / Amphibolis* - patchy	Patches isolated from each other	Seagrass
Posidonia - dense	Can see little substrate between seagrass	Seagrass
Posidonia - patchy	Patches isolated from each other	Seagrass
Posidonia - sparse	Continuous but not dense	Seagrass
Rock	100% reef	Bare
Rubble	100% Rubble cover	Bare
Sand	100% soft sediment cover	Bare
Unknown	Unidentified - not recordable	Excluded
Zosteraceae - patchy	Patches isolated from each other	Seagrass
Zosteraceae - sparse	Continuous but not dense	Seagrass

2.6 Epibiota

2.6.1 Sled

Samples of epifauna and flora were collected at all 12 sites using one of either of two benthic sleds. Both sleds are designed to target large sedentary and slow-moving organisms living on or near the seafloor, with the main difference being their weight. Deployed off the RV *Ngerin* the CSIRO-SEBS sled is 1 m wide by 0.6 m high and fitted with a 10 mm mesh bag (Lewis 1999). Deployed off the RV *Odyssey* was the SARDI sled, which weighs substantially less, is 1m wide by 0.3 m high and was also fitted with a 10 mm mesh bag. The large mesh-size employed in both sleds meant that most small organisms encountered (< 10 mm length) passed through the mesh and were not collected in this study. Each sled was towed across the seafloor for 100 m, with the start and end points of each tow defined using a Garmin GPS. The contents of each sled shot were bagged and frozen aboard the research vessel. Data recorded at each site included date, time, location and depth (Appendix 1).

Sled samples were later sorted and identified to species or putative taxon. A rapid assessment approach was undertaken with specimens less than 10 mm long not considered. All dead seagrass, broken shells and rocks were discarded. The remaining biological material was weighed and unitary animals were counted. For each species a reference sample was photographed and preserved in 75% ethanol.

2.6.2 Beam Trawl

To target small fish and motile invertebrates on flat soft sediment and seagrass, a beam trawl (4 m width by 0.5 m high) with a 25 mm stretch mesh codend was used. Because of the rugose seafloor at most sites only one site (LA10, Figure 2) was sampled using this technique. The trawl was towed for 500 m with the start and end point of the tow defined using a Garmin GPS. Data recorded included date, time, location and depth (Appendix 1). The entire contents of the codend was bagged and frozen on the research vessel. The trawl sample was later sorted and identified to species or putative taxon. For each species a reference sample was photographed and preserved in 75% ethanol.

2.7 Fish

2.7.1 Trapping

A set of three baited traps were deployed on the sea floor in the evening, and retrieved in the morning at all 12 sites. The set included 1) a snapper trap (1.2 m high by 1.2 m diameter with a 0.2 m wide slot for fish entry baited with 1.5 kg of crushed pilchards) for targeting large fish and motile invertebrates; 2) an opera trap (0.5 m long by 0.3 m wide by 150 mm high with a 100 mm diameter opening baited with 50 g of pilchards) for targeting small fish and crustaceans; 3) a PVC trap (0.5 m long by 0.1 m diameter with a 50 mm diameter opening baited with 25 g pilchards) for targeting cryptic fish, small molluscs and crustaceans. Upon retrieval the traps were emptied, the species present were identified, weighed and counted and returned alive to the water. The data from all three traps at each site was pooled prior to analysis.

2.7.2 Baited remote underwater video system (BRUVS)

Three BRUVS deployments were undertaken at 11 sites. One site (PM10) was not sampled because of the dangerous sea conditions at the time of sampling. For each deployment, a pair of digital video cameras (either high definition Canon HV30 or standard definition Sony DCR-HC52E; both fitted with Raynox 0.5x wide angle lens converters) were mounted horizontally on a frame 0.7 m above the substrate, with approximately 800g of fresh crushed pilchards in a bait bag ~1.5 m from the lens. The cameras were set to record in wide-screen 16:9 format, with focus set at infinity, and lowered over the side of the boat to the seafloor for a minimum of 45 minutes. Data recorded at each site included date, time, location and depth (Appendix 1).

The stereo video equipment was calibrated and imagery analysed using *Cal* software (Ver 2.03) (http://www.seagis.com.au/bundle.html) following the procedures outlined in Harvey *et al.* (2002) and Harvey and Shortis (1998). All video footage was captured using Adobe Premiere Pro 2 in an AVI (Audio Video Interleaved) format. The AVI file was imported into *EventMeasure* (Ver 2.03) (http://www.seagis.com.au/event.html), which was used to determine the relative abundance of the fish seen on the video tape. The maximum number of each species seen in a single frame during each deployment (*MaxN*) was recorded. A reference collection of photographs and video clips were also captured using *EventMeasure*.

2.8 Data Analysis

Site-related differences in community structure were examined using Bray-Curtis dissimilarity measures (Bray and Curtis 1957). This dissimilarity measure was chosen because it is not affected by joint absences, and has consistently performed well in preserving 'ecological distance' in a variety of simulations on different types of data (Faith *et al.* 1987; Field *et al.* 1982). Single square-root transformations were applied to the data before calculating the Bray-Curtis dissimilarity measures. These transformations were made to prevent abundant species from influencing the Bray-Curtis dissimilarity measures excessively (Clarke 1993; Clarke and Green 1988). Spatial patterns in dissimilarity were examined using a combination of hierarchical agglomerative clustering (with group average linking) and non-metric multidimensional scaling (MDS). The SIMPER routine of PRIMER was subsequently used to identify those species contributing most to observed differences, and the BEST:BioEnv routine was used to determine the best match between biological and environmental data (Clarke and Gorley 2001).

3. RESULTS

3.1 Physical Characteristics

3.1.1 Water Quality

Water quality parameters were consistent throughout the study area. Sea-bed salinity levels ranged from a high of >35.6 psu at Lacepede Bay to a low of <35.2 psu at Rivoli Bay (Figure 3). Within locations there was little variation between depths. Apart from the drop in temperature between April and June, temperature levels remained constant through sites and depths (Figure 3). The only variation was the lower temperature inshore at Lacepede Bay (~16.3°C). The decline in temperature from April to June is consistent with the seasonal changes that occur in the region (Edyvane 1999).

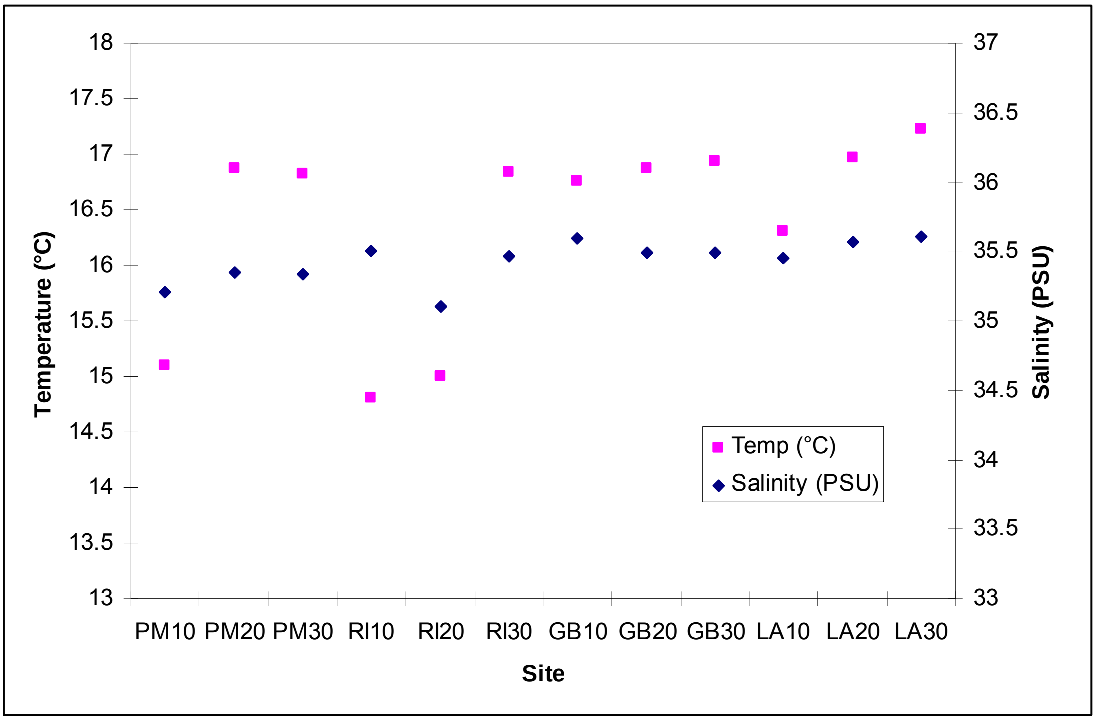

Figure 3. Seabed salinity and temperature measurements extracted from CTD casts in June (PM10, RI10, RI20) and April (all other readings) off the south east coast.

3.1.2 Sediment Characteristics

Where sediments could be sampled off the south east they tended to be coarse in structure, ranging from medium sand (250-500 μm) at the 20 m site off Lacepede Bay (LA20) to very coarse sand (>1000 μm) at Guichen Bay, Rivoli Bay and Port MacDonnell (Figure 4). Contiguous reef was extensive at all the 30 m sites apart from Lacepede Bay, which had coarse sand amongst the reef and macroalgae. Samples from 30 m at Port MacDonnell and Guichen Bay, and at both 20 and 30 m at Rivoli Bay consisted entirely of rock pieces. Lacepede Bay was the only location at which sediment could be sampled at all three depths, and the only location with no very coarse sand. Sediment sorting ranged from poor at Port MacDonnell (PM10), to moderate (Guichen Bay) and very well sorted (Rivoli Bay). The sediment at all depths in Lacepede Bay was moderately sorted.

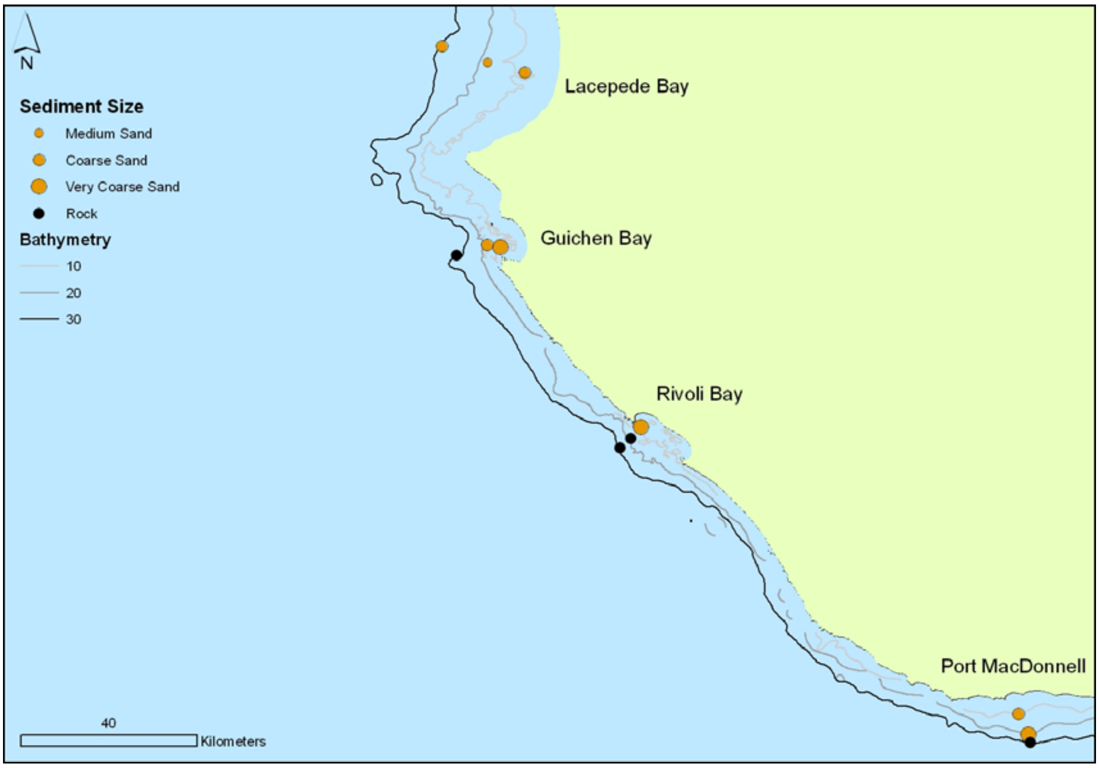

Figure 4. Map of the south east showing classification of mean grain size of sediment taken from Smith-McIntyre grab samples. Samples where little or no sediment were taken are indicated by solid black circles.

3.1.3 Habitat Classification

Observations taken from the video habitat mapping are summarised in Figure 5. Analysis of the video drops indicated that the south east benthos is dominated by macroalgae covered reef, with all depths at Port MacDonnell having 100 % cover.

Macroalgae also dominated the Rivoli Bay site with > 90 % cover at all three depths. Both the 10 m and 30 m sites at Rivoli Bay had < 10 % bare substrate between the macroalgae covered emergent reefs.

The 10 m and 20 m sites at Guichen Bay showed similar characteristics to the above, with ~90 % macroalgae and ~10 % bare substrate. The 30 m site at Guichen Bay had ~ 35 % macroalgae with the remainder (~ 65 %) being bare. While macroalgae was still present (~10 %), bare substrate was dominant (~ 90 %) at the 30 m site in Lacepede Bay, with macroalgae (~80 %) and bare (~20 %) characterising the 20 m site. Contiguous seagrass was observed in 10 m at Lacepede Bay (~95 % cover) with the remaining 5 % being bare.

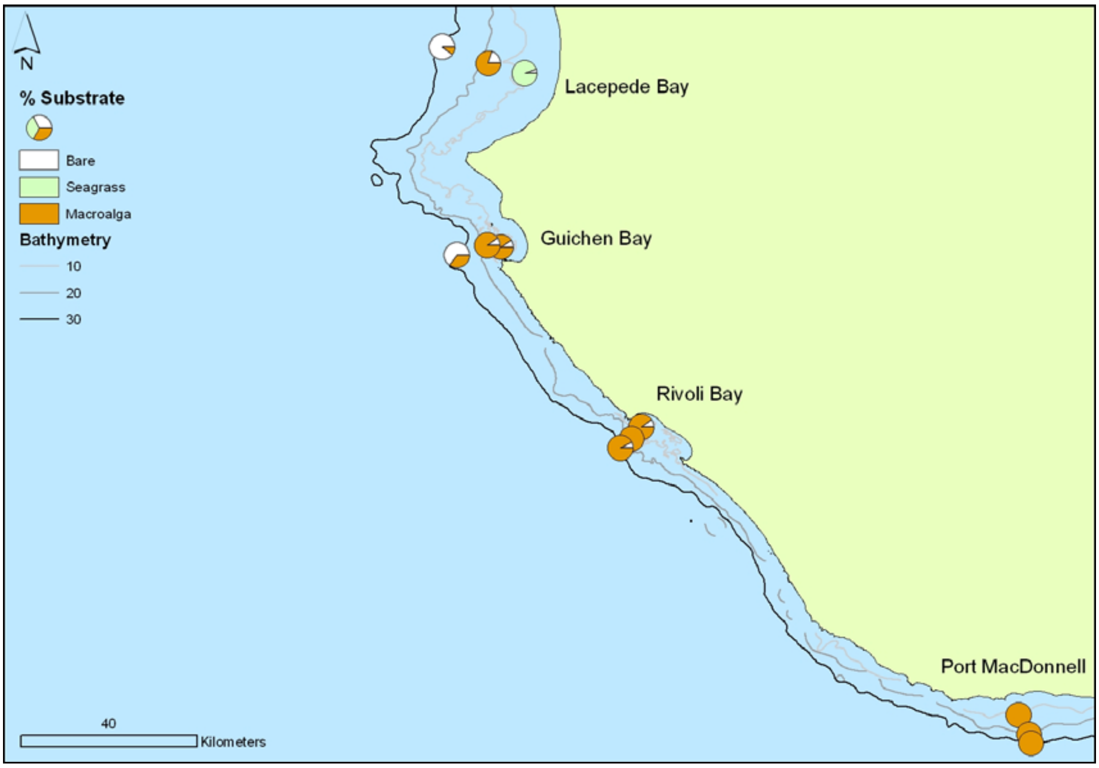

Figure 5. Map of the south east showing the percent cover of key substrate types (bare, seagrass, macroalgae) determined from 12 video drops.

3.2 Infauna

In total, 900 individuals from 66 taxa representing 8 phyla were collected from the 12 grab samples (Figure 6). The number of individuals at each site ranged from a high of 294 in 10 m depth at Lacepede Bay (LA10) to a low of 12 in 30 m at Rivoli Bay (RI30). The 30 m site at Lacepede Bay (LA30) had 93 individuals while the 30 m site at Guichen Bay (GB30) had 91. Crustaceans and annelids together accounted for more than 93% of the individuals collected. The most abundant annelids were from the polychaete family Syllidae (294 individuals). The most abundant crustaceans belonged to the gammarid amphipod families Lysianassidae (61 individuals) and Melitidae (60 individuals).

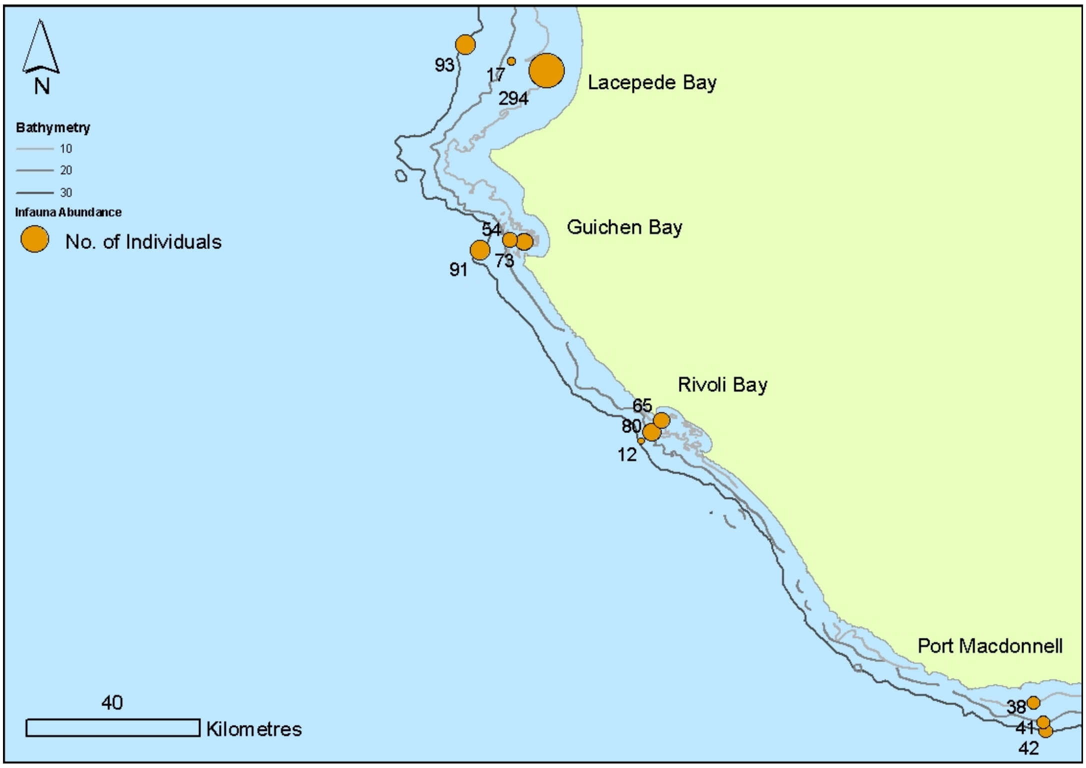

Figure 6. Bubble plot showing the total abundance of infauna found in 12 grab samples (0.1 m^2) off the south east. Numerals next to each bubble represent total numbers of individuals.

Patterns in infaunal species richness broadly followed the patterns in abundance, with the exception of the site with highest abundance (LA10), which had a lower species diversity than several sites (Figure 7). In addition to supporting the highest infaunal densities, the 30 m sites at Guichen Bay (GB30) and Lacepede Bay (LA30) also had the greatest number of species (20 each). The lowest number of species (6) occurred at the site with the lowest abundance (RI30). As well as dominating abundance, annelids and crustaceans were also the most widely distributed of all taxa (both were found at all sites). Another taxon (Echinodermata) was found at 6 of the sites. The most widespread families include the crustaceans Lysianassidae, Melitidae, Phoxocephalidae, and Dexaminidae, and the polychaete Syllidae, which were each found at over 50% of the sites.

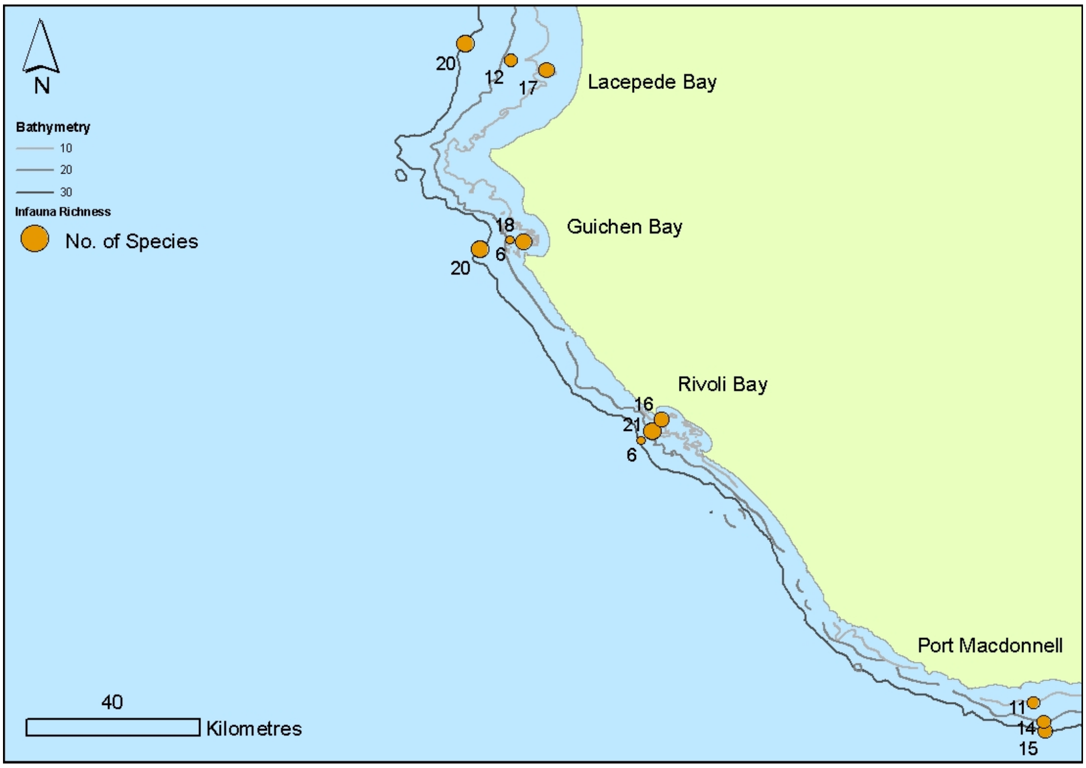

Figure 7. Bubble plot showing the total number of infauna species found in 12 grab samples (0.1 m^2) off the south east. Numerals next to each bubble represent total species number**.**

Patterns in infaunal species composition were investigated using cluster analysis (Figure 8) and non-metric multidimensional scaling (MDS) (Figure 9). Four discrete groupings were separated at the 24% Bray-Curtis dissimilarity level on the cluster analysis, and were separated on the ordination. The groups recognised are characterised by their sediment and/or benthic characteristics and are; (i) coarse sediment that is poorly sorted, (ii) coarse sediment under seagrass, (iii) rock or very coarse sediment with very poor sorting and (iv) medium sediment with poor sorting.

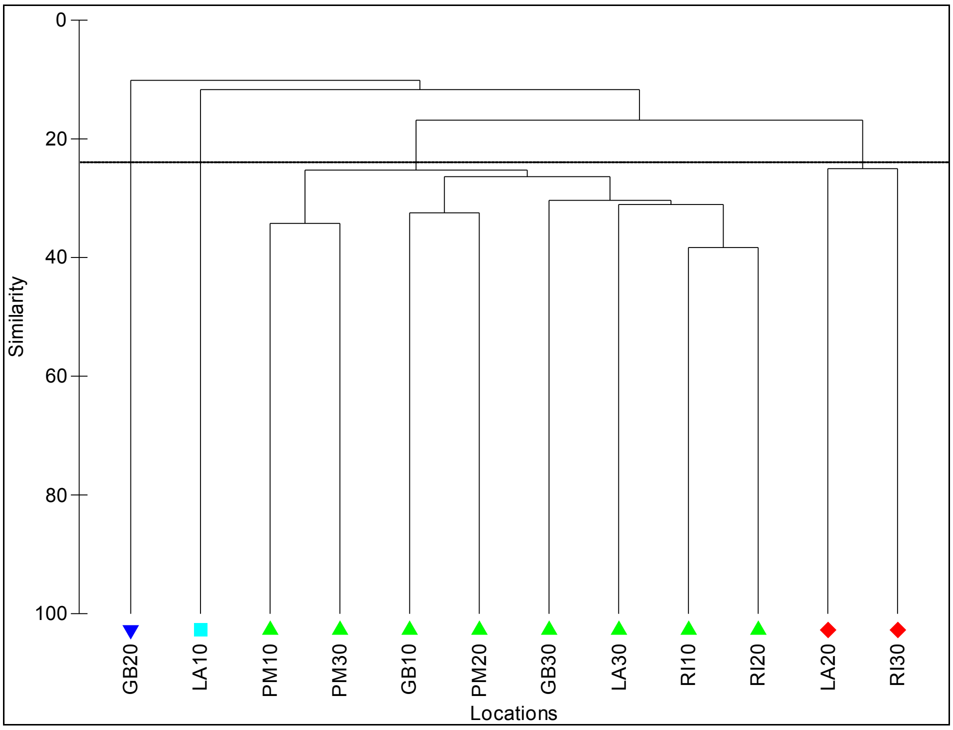

Figure 8. Cluster analysis of community structure in 12 grab samples taken off the south east. Four groups are identified at a Bray-Curtis dissimilarity level of 24 percent; coarse sediment under seagrass (blue square), rock or sediment with extremely poor sorting (green triangles), coarse sediment that is poorly sorted (blue triangle) and medium sediment with poor sorting (red diamonds).

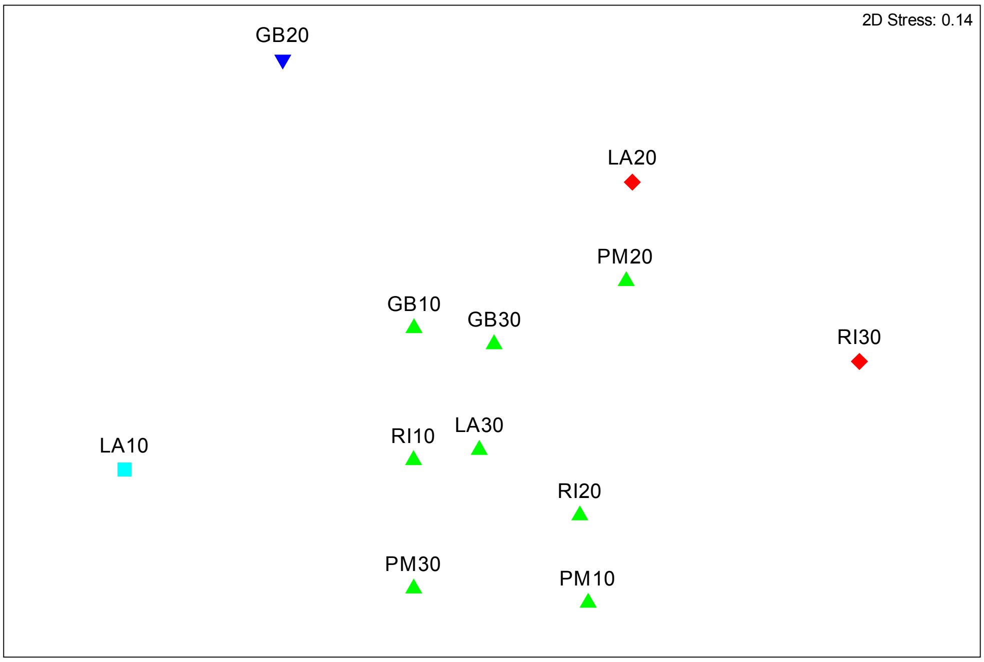

Figure 9. Non-metric MDS plot of community structure in 12 grab samples taken off the south east. Four groups are identified at a Bray-Curtis dissimilarity level of 24 percent; coarse sediment under seagrass (blue square), rock or sediment with extremely poor sorting (green triangles), coarse sediment that is poorly sorted (blue triangle) and medium sediment with poor sorting (red diamonds).

SIMPER analysis was undertaken to determine which species contributed most to similarities within and differences between the three site groupings. Abundances of the 13 taxa contributing ≥ 5% to within-group similarity or between-group dissimilarity for at least one of the four groupings are given in Table 3. Results from the SIMPER analysis indicate that group (iii), which comprised 8 of the 12 sites, is characterised by high numbers of the crustacean taxa Ceradocus and Dexaminidae. Group (iv) is characterised by the echinoderm order Ophiuroidea and the crustacean Lysianassidae. The seagrass group (ii) is characterised by high numbers of the polychaete Syllidae, crustacean Phoxocephalidae and Nematoda, while the final group (i) consisted of one site with high numbers of the crustaceans Cyathura and Gammeridea.

Table 3. Mean abundance of (n per 0.1 m^2) infauna collected from 12 grab samples off the south east. Species listed were identified from SIMPER analysis as contributing ≥ 5% to the similarity within and/or dissimilarity between groupings. Species indicative of each sediment characteristic (contributing ≥ 10% to the total similarity within an assemblage type) are highlighted in bold except for when n=1.

Phylum	Genus/Family	Group			
		(i) n=1 Coarse/Poor	(ii) n=1 Coarse/Seagrass	(iii) n= 8 Rock/Very Poor	(iv) n=2 Medium/Poor
Annelida	Syllidae		235	1.875	
Crustacea	Phoxocephalidae	5	22	0.75	1
Crustacea	Cyathura	10	1		
Crustacea	Lysianassidae			6.5	**4.5**
Crustacea	Gammeridea	8		1.5	0.5
Nemata	Nematoda		8		
Crustacea	Ceradocus			**7.375**	0.5
Echinodermata	Ophiuroidea			4.125	**1**
Crustacea	Eusiridae	3		1.75	
Crustacea	Ampithoinae			4.375	
Annelida	Nereididae		1	3.375	
Crustacea	Cymodoce		2	1.875	
Crustacea	Dexaminidae			**3.75**	

The PRIMER routine BEST:BioEnv was used to assess the correspondence and significance of environmental data to the four sediment type groupings. The best fit was with a combination of depth, sediment sorting and % cover of seagrass (Spearman Rank Correlation ρ=0.288).

3.3 Epibiota

3.3.1 Sled

A total of 169.9 kg of benthic flora and fauna was collected from the 12 sites during the sled surveys (Figure 10). The highest biomass recorded was 61 kg from the 30 m site at Guichen Bay (GB30), with the majority consisting of >15 kg of the sponge (*Spheciospongia papillose*), the brown alga *Carpoglossum confluens* (>12 kg) and the sponges Chondropsis sp2 (>8 kg) and Haplosclerid sp1 (>6 kg). Over 30 kg was also collected in 30 m at Lacepede Bay (LA30), with >33% of this consisting of compound sand ascidians (~11.3 kg). The 10 m site at Lacepede Bay (LA10) had ~25 kg of biomass, with >50% of this consisting of seagrass *Posidonia angustifolia*. The 20 m sites at Lacepede Bay (LA20) and Guichen Bay (GB20) had ~17 kg and >10 kg biomass respectively. The 10 m site at Rivoli Bay (RI10) had the lowest biomass with ~0.7 kg of epibenthos. Low levels of biomass (<1.53 kg) were also recorded in the 10 m site at Port MacDonnell (PM10) and the 30 m sites at the two southern locations (PM30, RI30). In addition to the high biomass of the species above, there were significant amounts of the brown algae *Ecklonia radiata* (~12.65 kg) and *Cystophora confluens* (9.46 kg) collected across the 12 sites.

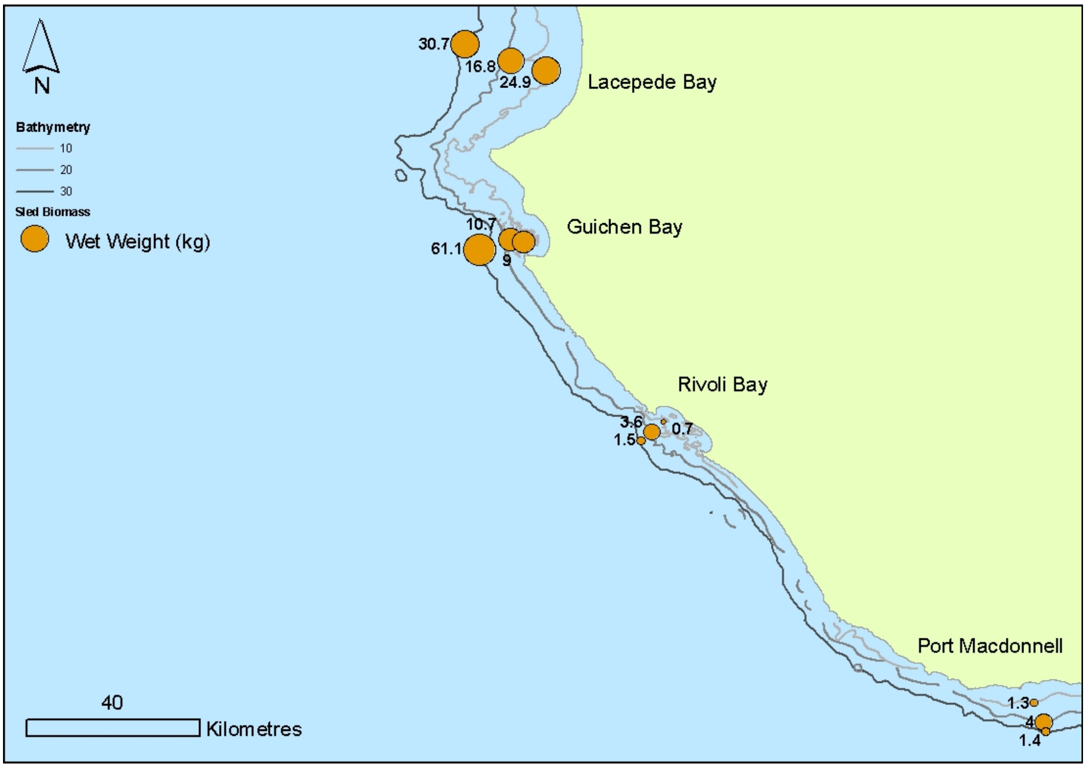

Figure 10. Bubble plot showing the total biomass of live epibenthos collected at 12 sled shots (100 m length) off the south east. Numerals next to each bubble represent total wet weight of sample (kg).

A total of 170 species were identified from the 12 sites surveyed using the sled (Figure 11). The highest number of species recorded at a site was 46 in 30 m at Lacepede Bay (LA30), followed by 42 species in 20 m at Lacepede Bay (LA20) and Guichen Bay (GB20). The shallow sites of the northern locations had lower species richness then the deeper sites. Few species were collected in the six southern sites at Rivoli Bay (RI10, RI20 and RI30) and Port MacDonnell (PM10, PM20 and PM30) with a low of 11 species sampled at RI20 and PM30. The most widespread species collected were algae, including the brown alga *Ecklonia radiata,* and the red algae *Peyssonnelia novaehollandiae, Hymenena curdieana, Nizymenia australis, Callophyllis lambertii* and *Plocamium patagiatum.* All were found at over 50% of the sampling sites.

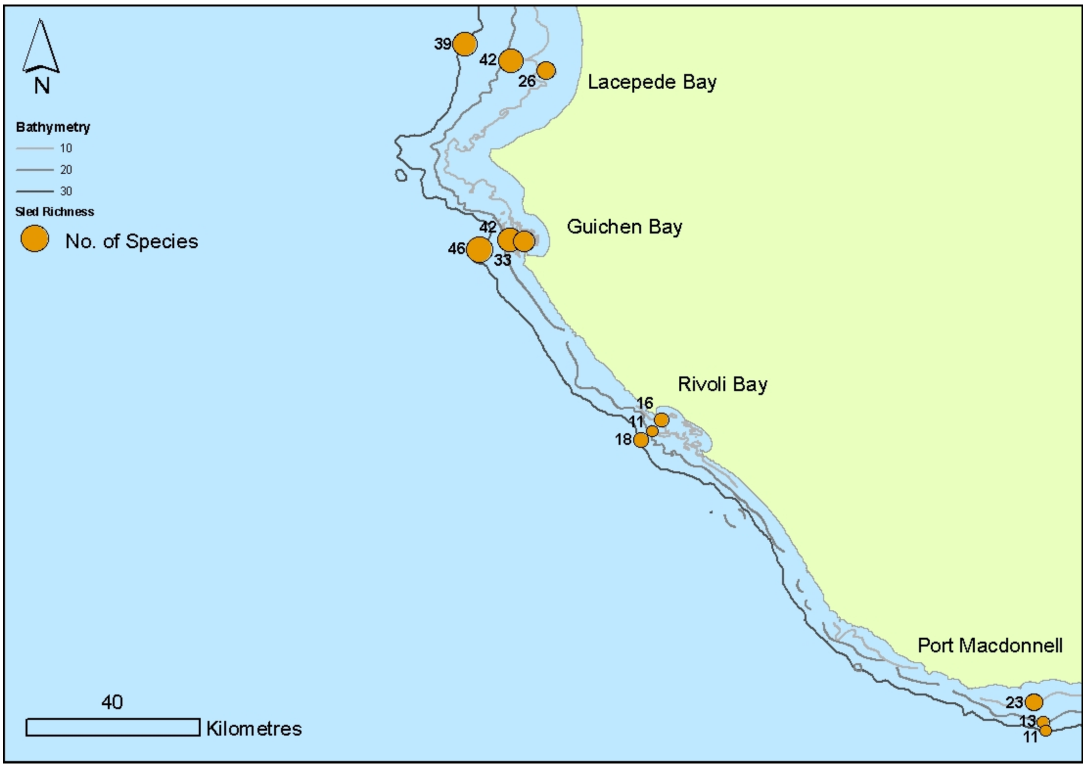

Figure 11. Bubble plot showing the total number of epibiota species found in 12 sled shots (100 m length) off the south east. Numerals next to each bubble represent total species number.

Patterns in species composition were compared using cluster analysis (Figure 12) and MDS analysis (Figure 13). Four assemblage types are identified at a Bray-Curtis dissimilarity level of 17 percent; the southern sites, northern deep sites, shallow sites in Lacepede Bay and the 10 m site in Guichen Bay.

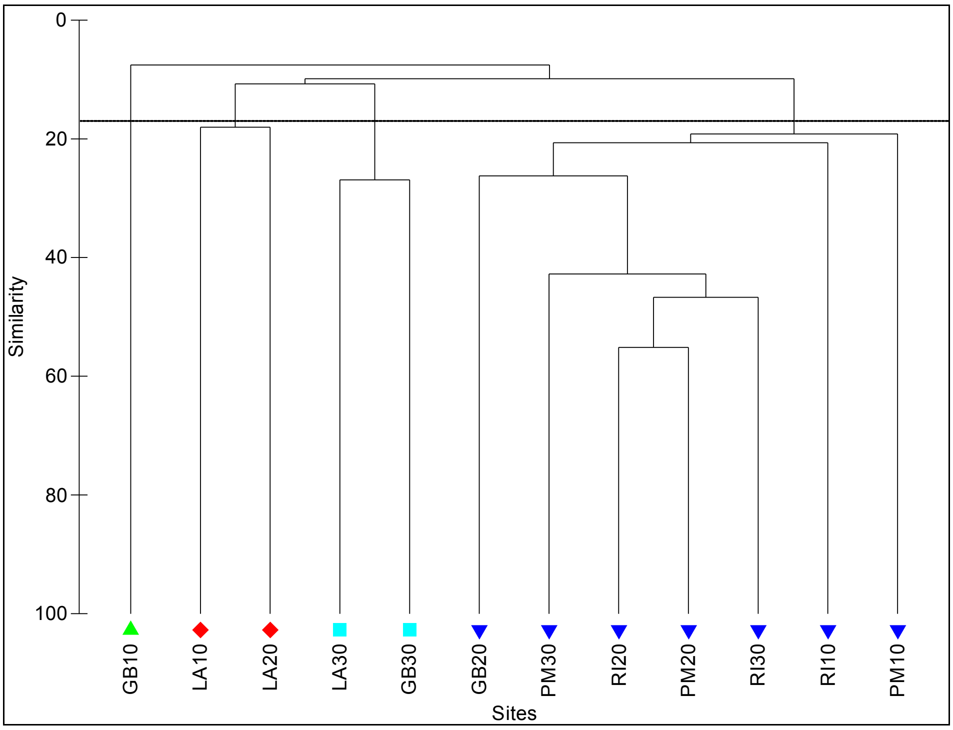

Figure 12. Cluster analysis of community structure from 12 sled shots off the south east. Four assemblage types are identified at a Bray-Curtis dissimilarity level of 17 percent; southern sites (blue triangles), northern deep sites (blue squares), Lacepede shallow (red diamonds) and Guichen Shallow (green triangle).

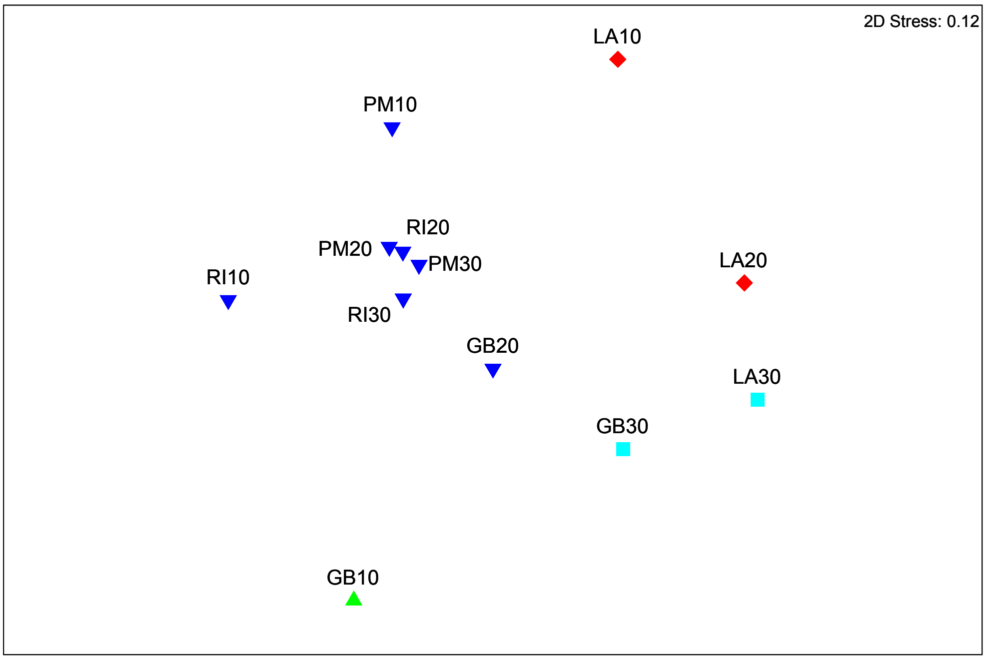

Figure 13. Non-metric MDS plot of community structure from 12 sled shots off the south east. Four assemblage types are identified at a Bray-Curtis dissimilarity level of 17 percent; southern sites (blue triangles), northern deep sites (blue squares), Lacepede shallow (red diamonds) and Guichen Shallow (green triangle).

Similarity percentage (SIMPER) analyses were employed to identify those species that contributed most to similarities within and differences between the four assemblage types. Abundances of the 15 species contributing ≥ 5% to within group similarity or between group dissimilarity for the four assemblage types are given in Table 4. The northern deep (LA30, GB30) assemblages are influenced by the high biomass of the two sponges (*Spheciospongia papillosa* and Chondropsis sp.2), the colonial sand Ascidian sp.6 and the brown alga *Carpoglossum confluens.* The two Lacepede Bay shallow sites were characterised by a high biomass of the brown alga *Cystophora confluens.* The majority of the sites were contained in the southern group, and were characterised by consistent biomass of two types of alga, the brown *Ecklonia radiata* and the red *Hymenena curdieana.* The site GB10 had a high biomass of the brown alga *Acrocarpia paniculata*.

Table 4. Mean biomass (kg per 100 m^2) of epibenthos species collected from 12 sled shots taken off the south east. Species listed were identified from SIMPER analysis as contributing ≥ 5% to the similarity within and/or dissimilarity between groupings. Species indicative of each assemblage type (contributing ≥ 10% to the total similarity within an assemblage type) are highlighted in bold except for when n=1.

Phylum	Species	Assemblage			
		Guichen Shallow (n=1)	Southern (n=7)	Northern Deep (n=2)	Lacepede Shallow (n=2)
Porifera	*Spheciospongia papillosa*			**10.1**	2.06
Ascidiacea	Ascidian sp.6			**8.47**	
Magnoliophyta	*Posidonia angustifolia*				6.73
Phaeophyta	*Carpoglossum confluens*			**6.17**	
Phaeophyta	*Acrocarpia paniculata*	5.31	0.006		
Porifera	Chondropsis sp.2			**5.08**	
Phaeophyta	*Cystophora confluens*		0.11	0.008	**4.35**
Phaeophyta	*Ecklonia radiata*		**1.37**	0.73	0.82
Phaeophyta	*Perithalia caudata*	0.8			
Rhodophyta	*Plocamium patagiatum*	0.63	0.01	0.08	
Magnoliophyta	*Amphibolis antartica*				0.62
Rhodophyta	*Hymenena curdieana*	0.1	**0.17**	0.2	0.12
Rhodophyta	*Erythroclonium sonderi*				0.24
Rhodophyta	Plocamium sp.2		0.15		
Rhodophyta	*Peyssonnelia novaehollandiae*	0.002	0.08	0.02	0.04

The relationship between epibenthic community structure and the physical characteristics of the sites were analysed using the BEST:BioEnv function in PRIMER. The results of this analysis indicated that a combination of latitude and depth best match the patterns of the sled assemblage (Spearman Rank Correlation ρ=0.574).

3.3.2 Beam Trawl

A total of 8.97 kg of living benthos totalling 286 individuals and representing 51 species was collected from a single beam trawl at 10 m in Lacepede Bay (LA10). The most abundant species collected were the rough leatherjacket *Scobinichthys granulatus* (53 individuals), longray rock whiting *Siphonognathus radiatus* (37 individuals), the sea tulip *Pyura australis* (26 individuals) and the blackspotted wrasse *Austrolabrus maculatus* (23 individuals). The highest biomass collected was the rough leatherjacket *Scobinichthys granulatus* (1.61 kg) followed by two giant cuttlefish *Sepia apama* (1.09 kg) and the longray rock whiting *Siphonognathus radiatus* (0.94 kg). Over 0.5 kg of the seagrass *Posidonia angustifolia* was also collected.

3.4 Fish

3.4.1 Traps

A total of 22 fish and motile invertebrates were recorded from the 12 sites surveyed (Figure 14). The sites with the highest abundance were at Port MacDonnell (PM20, 5 individuals; PM30, 4 individuals) and the 10 m site at Lacepede Bay (LA10, 4 individuals). Two sites at Guichen Bay had three individuals in the traps with three other sites having just one individual. Four other sites (LA20, LA30, RI10, PM10) had no fauna recorded.

The most common and most widespread species collected was the bearded rock cod *Pseudophycis barbata* with 9 individuals at 6 sites. Two commercially important species, snapper *Chrysophrys auratus* (Lacepede Bay (LA20), 2 individuals) and southern rock lobster *Jasus edwardsii* (Port MacDonnell (PM30), 1 individual), were also captured in the traps.

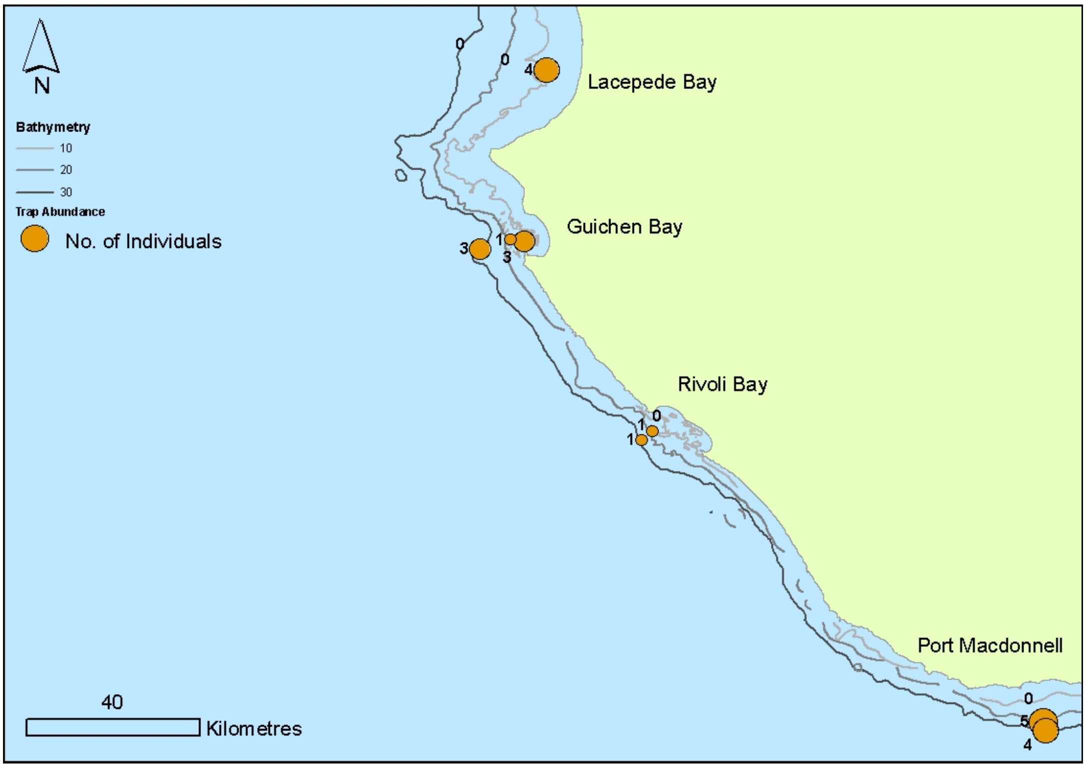

Figure 14. Bubble plot showing the total abundance of fish and motile invertebrates found in 12 sets of traps deployed off the south east. Numerals next to each bubble represent total numbers of individuals.

A total of 8 species were recorded from the 12 sites surveyed (Figure 15). As well as having a higher number of individuals, the 20 m and 30 m sites at Port MacDonnell and the 10 m site at Lacepede Bay also had more species. The trap set in 30 m at Guichen Bay collected two species, with the four other sites collecting a single species.

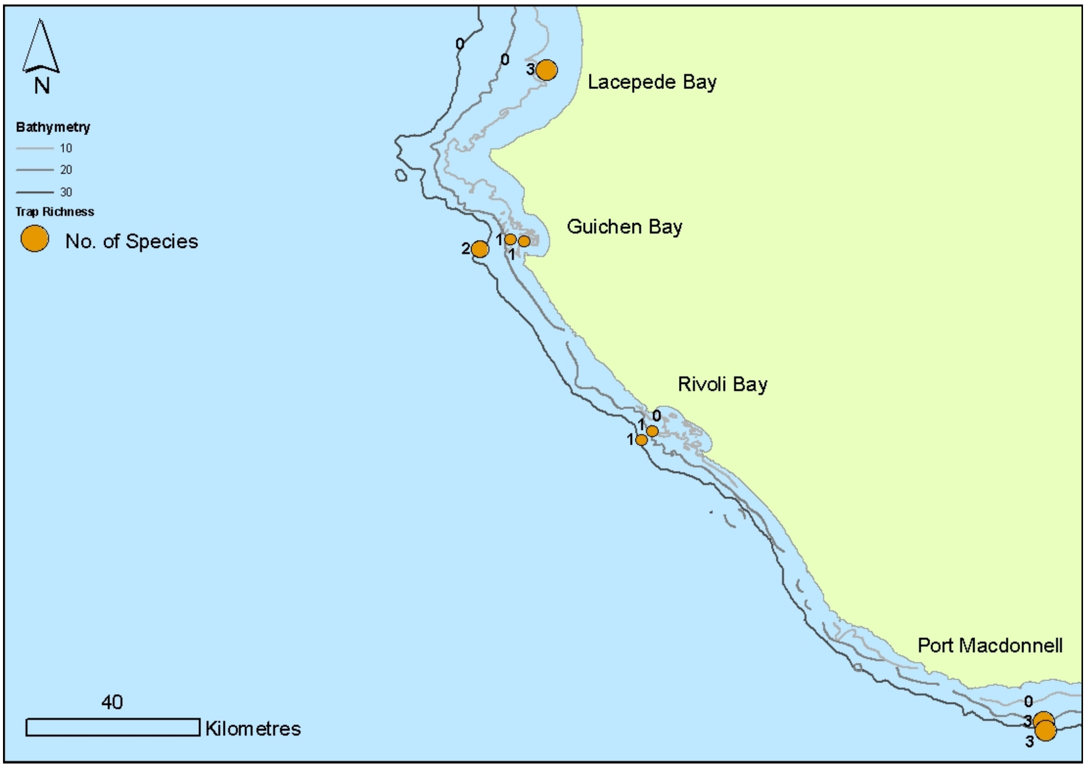

Figure 15. Bubble plot showing the total number of fish and motile invertebrate species found in 12 sets of traps deployed off the south east. Numerals next to each bubble represent total species number**.**

Cluster (Figure 16) and non-metric MDS analysis (Figure 17) showed that, at a Bray-Curtis dissimilarity level of 40 percent, four groups are identified: a seagrass site, macroalgae sites, Guichen Bay shallow, and Rivoli Bay deep.

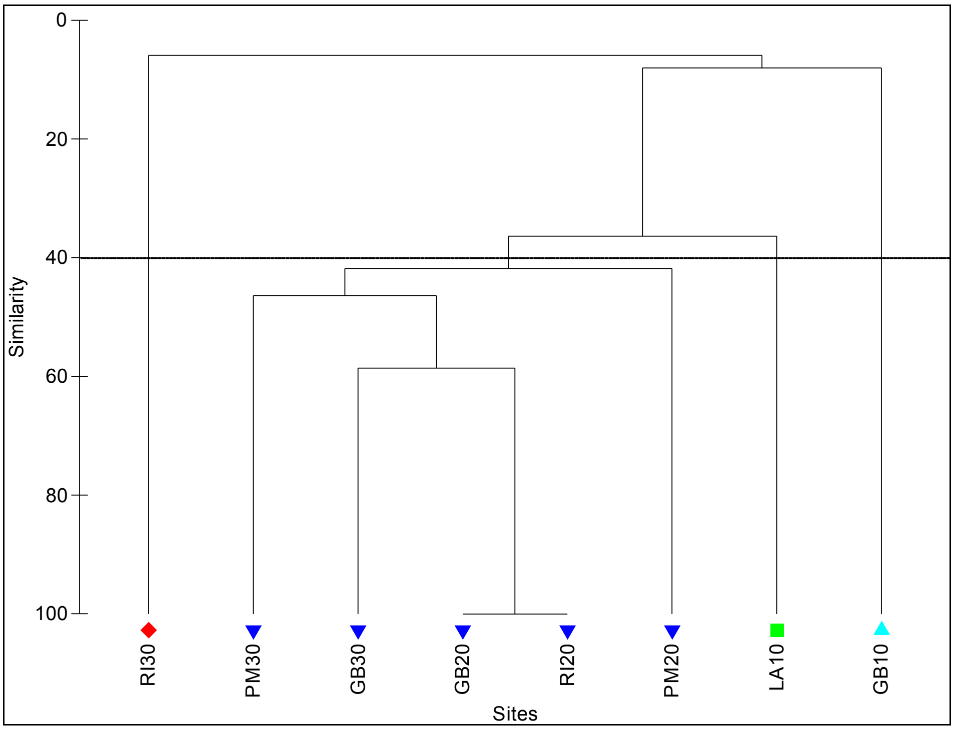

Figure 16. Cluster analysis of community structure from 8 trap sets deployed off the south east. Empty traps were excluded from the analysis. Four groups are identified at a Bray-Curtis dissimilarity level of 40 percent; a seagrass site (green square), deep sites (dark blue triangles), Guichen shallow (Light blue triangle), and Rivoli Deep (Red diamond).

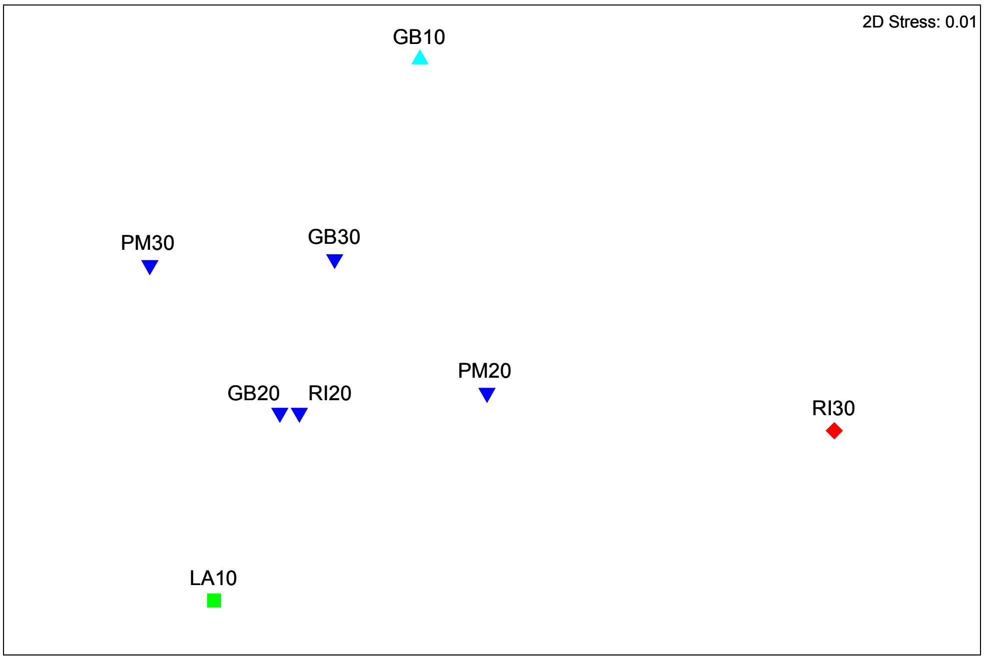

Figure 17. Non-metric MDS plot of community structure from 8 trap sets deployed off the south east. Empty traps were excluded from the analysis. Four groups are identified at a Bray-Curtis dissimilarity level of 40 percent; a seagrass site (green square), deep sites (dark blue triangles), Guichen Bay shallow (Light blue triangle), and Rivoli Bay Deep (Red diamond).

SIMPER analyses were employed to identify those species that contributed to similarities within, or differences between, the four groups. Abundances of the five species contributing ≥ 5% to within group similarity or between group dissimilarity for the three assemblage types are given in Table 5. Two species, Degens leatherjacket *Thamnaconus degeni* and snapper *Chrysophrys auratus,* were only trapped at the seagrass site while the rough rock crab *Nectocarcinus integrifrons* occurred in higher numbers at the shallow site at Guichen Bay. Blue throated wrasse *Notolabrus tetricus* characterised the 30 m site at Rivoli Bay while the other deep sites were characterised by higher catches of the bearded rock cod *Pseudophycis barbata.*

Table 5. Mean abundance of fish and motile invertebrate species collected from 12 trap sets off the south east. Species listed were identified from SIMPER analysis as contributing ≥ 5% to the similarity within and/or dissimilarity between groupings. Species indicative of each assemblage type (contributing ≥ 10% to the total similarity within an assemblage type) are highlighted in bold except when n=1.

Phylum	Species	Groups			
		Seagrass (n=1)	Deep (n=5)	RI30 (n=1)	GB10 (n=1)
Crustacea	*Nectocarcinus integrifrons*		0.2		3
Chordata	*Notolabrus tetricus*		0.4	1	
Chordata	*Pseudophycis barbata*	1	**1.6**		
Chordata	*Chrysophrys auratus*	2			
Chordata	*Thamnaconus degeni*	1			

The BEST:BioEnv function in PRIMER indicated that a combination of depth and % cover of seagrass best matched the patterns in trap species assemblages (Spearman Rank Correlation ρ=0.164).

3.4.2 BRUVS

A total of 373 individuals from 32 fish species were identified from the 11 sites surveyed (Figure 18). The highest numbers of individuals recorded occurred at the 30 m depth sites at Guichen Bay (GB30; 130 individuals) and Rivoli Bay (RI30; 60 individuals). The most common species observed was the yellowtail mackerel *Trachurus novaezelandiae* with 137 individuals. Other common species included the butterfly perch *Caesioperca lepidoptera* (57 individuals), blue throated wrasse *Notolabrus tetricus* (29 individuals), snapper *Chrysophrys auratus* (24 individuals) and the silverbelly *Parequula melbournensis* (22 individuals).

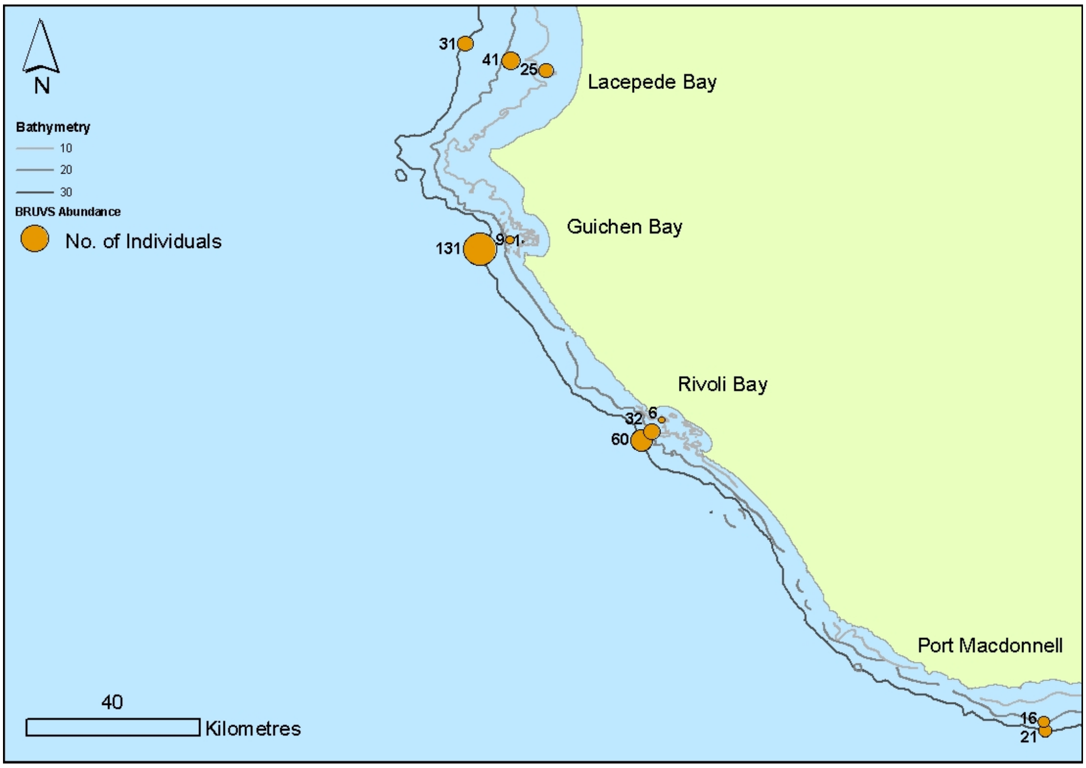

Figure 18. Bubble plot showing the total abundance of fish found in 11 sets of three BRUVS deployed off the south east. Numerals next to each bubble represent total numbers of individuals.

A total of 32 species were recorded from the 11 sites surveyed (Figure 19). Lacepede Bay had the site with the highest species richness (LA20; 14 species). The 30 m sites at Guichen Bay (GB30), Rivoli Bay (RI30) and Lacepede Bay (LA30) had 12, 12 and 10 species respectively. The 10 m site at Rivoli Bay (RI10) had only one individual observed, possible due to the low visibility. The most widespread species included the blue throated wrasse *Notolabrus tetricus* which was recorded at 9 of the sites, followed by the snapper *Chrysophrys auratus* and senator wrasse *Pictilabrus laticlavius* (7 sites each).

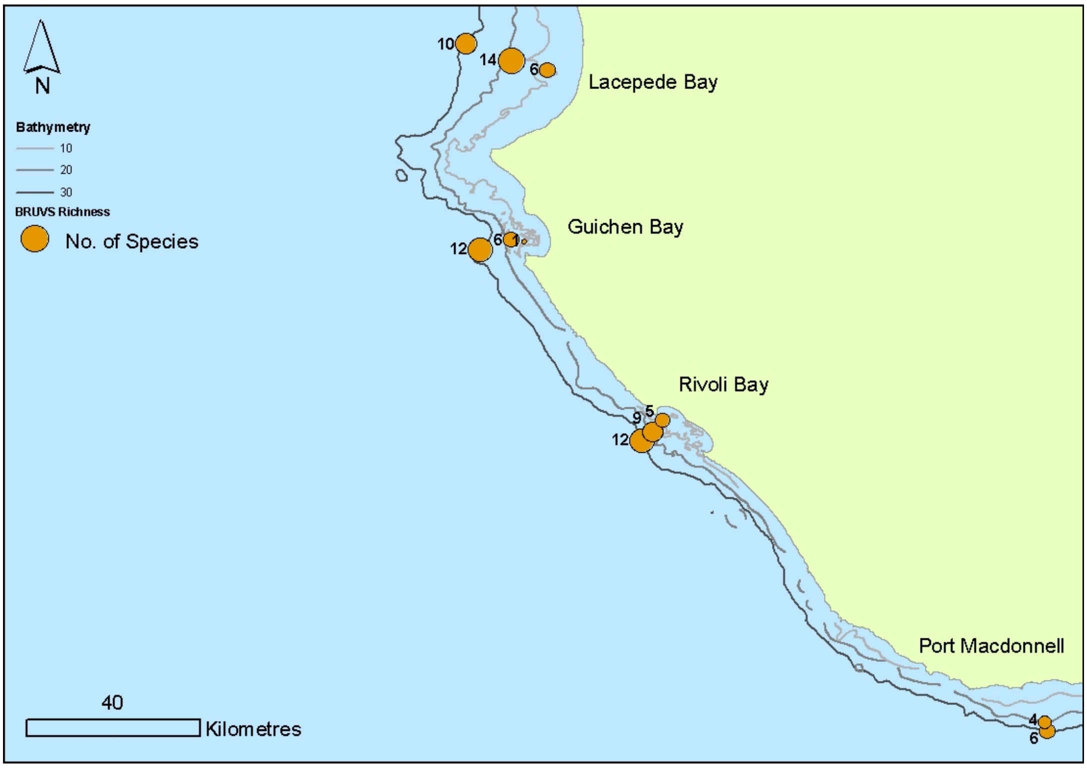

Figure 19. Bubble plot showing the total number of fish species found in 11 sets of three BRUVS deployed off the south east. Numerals next to each bubble represent total species number.

Cluster (Figure 20) and MDS analysis (Figure 21) showed three groups at a Bray-Curtis dissimilarity level of 30 percent; a seagrass site, deep sites and turbid inshore sites. The shallow site at Guichen Bay (GB10) was excluded from the analysis due to near zero visibility, with only a solitary fish observed.

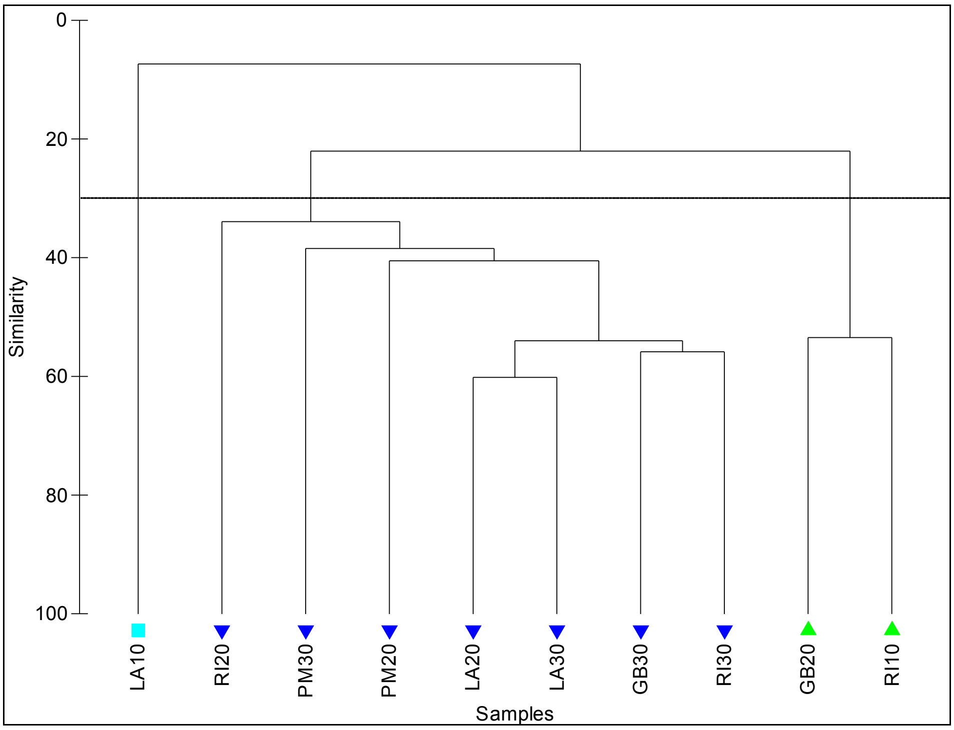

Figure 20. Cluster analysis of fish community structure at 10 sets of three BRUVS deployed off the south east. One site (GB10) was excluded from the analysis due to near zero visibility and a solitary fish observed. Three groups are identified at a Bray-Curtis dissimilarity level of 30 percent; a seagrass site (blue square), deep sites (blue triangles), and turbid inshore sites (green triangles).

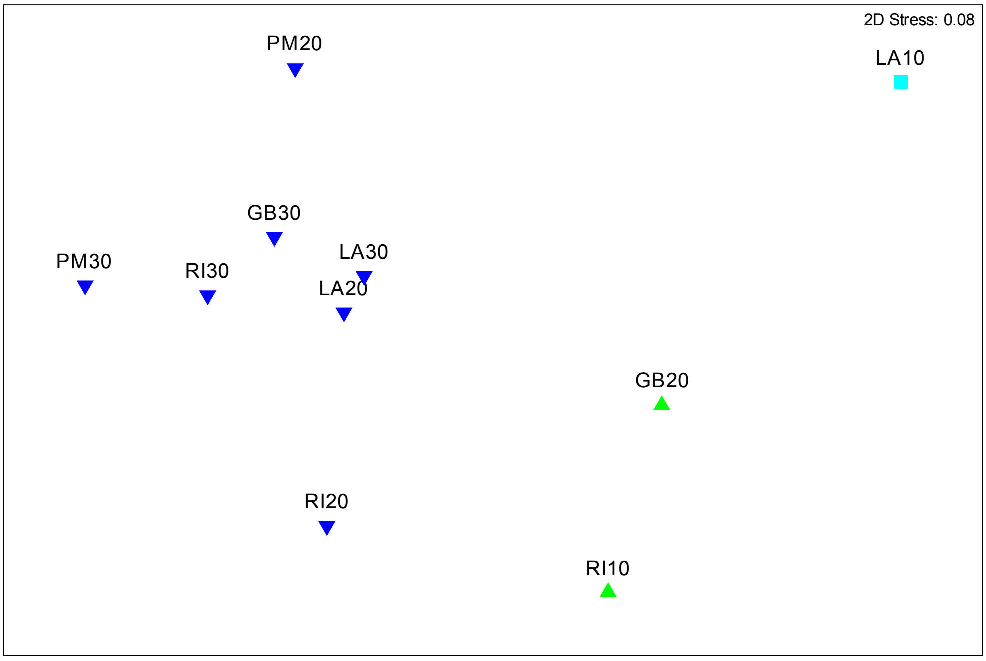

Figure 21. Non-metric MDS plot of fish community structure at 10 sets of three BRUVS deployed off the south east. One site (GB10) was excluded from the analysis due to near zero visibility and a solitary fish observed. Three groups are identified at a Bray-Curtis dissimilarity level of 30 percent; a seagrass site (blue square), deep sites (blue triangles), and turbid inshore sites (green triangles).

Abundances of the 17 species contributing ≥ 5% to within group similarity or between group dissimilarity for the three assemblage types were identified using SIMPER analysis and are given in Table 6. The deep group is characterised by high numbers of yellowtail mackerel *Trachurus novaezelandiae*, butterfly perch *Caesioperca lepidoptera*, blue throated wrasse *Notolabrus tetricus,* and senator wrasse *Pictilabrus laticlavius.* The blue throated wrasse is also important in the turbid inshore group along with the snapper *Chrysophrys auratus* and silverbelly *Parequula melbournensis.* The silverbelly was observed in high numbers in the seagrass site, along with the slender weed whiting *Siphonognathus attenuatus,* southern eagle ray *Myliobatis australis* and red mullet *Upeneichthys vlamingii.*

Table 6. Mean abundance of fish species observed in 10 sets of three BRUVS deployed off the south east. Species listed were identified from SIMPER analysis as contributing ≥ 5% to the similarity within and/or dissimilarity between groupings. Species indicative of each assemblage type (contributing ≥ 10% to the total similarity within an assemblage type) are highlighted in bold except when n=1.

Phylum	Species	Groups		
		Inshore (n=2)	Deep (n=8)	Seagrass (n=1)
Chordata	*Trachurus novaezelandiae*		**13.7**	
Chordata	*Parequula melbournensis*	**0.5**	1.1	10
Chordata	*Siphonognathus attenuatus*			6
Chordata	*Caesioperca lepidoptera*		**5.7**	
Chordata	*Notolabrus tetricus*	**2**	**2.5**	
Chordata	*Myliobatis australis*	1		3
Chordata	*Chrysophrys auratus*	**1**	2.2	
Chordata	*Upeneichthys vlamingii*		0.3	2
Chordata	*Pictilabrus laticlavius*		**1.4**	
Chordata	*Heterodontus portusjacksoni*	1	0.2	
Chordata	Labridae sp1	**1**		
Chordata	*Notorynchus cepedianus*			1
Chordata	*Pseudolabrus mortonii*		1	
Chordata	*Cheilodactylus nigripes*	0.5	0.1	
Chordata	Monacanthidae sp1		0.5	
Chordata	Parascyllium sp1	0.5		
Chordata	*Dasyatis brevicaudata*		0.4	

The BEST:BioEnv function in PRIMER indicated that a combination of depth and % cover of seagrass best match the patterns in BRUVS species assemblages (Spearman Rank Correlation ρ=0.347).

4. DISCUSSION

4.1 Infauna

Infaunal community structure was observed to vary in relation to benthic characteristics (eg. presence of seagrass, reef) at the site, and sediment grain size and sorting. Strong correlations between sediment grain size and biotic composition have been previously demonstrated in estuarine and shallow coastal environments (Snelgrove 1999). Other environmental factors considered in this study (including salinity and temperature) had no apparent direct influence on infaunal community structure in the south east.

In this study 66 infaunal taxa were found in a combined sampling area of 1.2 m^2. This number of species appears to be consistent with a similar study off Yorke Peninsula (169 per 2.3 m^2, Rowling *et al.* 2009), and a study in deeper waters off western South Australia (240 per 7.2 m^2, Currie *et al.* 2007), and slightly lower than shallow-water studies off the eastern Victorian coast (803 species per 10.3 m^2, Coleman *et al.* 1997). It is noteworthy that several samples in the current study contained holdfasts of alga, pieces of reef that are typically not taken in grabs. However it is unclear as to what influence this would have on the number of taxa.

It is difficult to assess the conservation status of marine infaunal species because only a small proportion of the global fauna has been described, and very little is known about their distributions. Less than 6 percent (4/66) of the taxa collected during this survey could be confidently identified to species level, and a large proportion of the south east infauna may be undescribed. Presently, no infaunal species are listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) as threatened, endangered or rare.

The infaunal taxa that could be reliably identified to species (and for which there were distributional data available) were found to be widespread in southern Australian waters. In fact, these species had ranges that extended at least from the southwest of Western Australia to Victoria (DEWR 2009).

4.2 Epibiota

Results from sled sampling reflect habitat (particularly the presence/absence of seagrass), depth and regional environmental gradients. The sled tows were standardised to 100 m in length, however the sampling efficiency of sleds is greatly influenced by the topography and composition of the seafloor (Currie and Parry 1999). It is unclear to what extent differing sampling efficiencies for the sled influenced the results.

Biomass and species richness were consistently higher in the northern transects (Lacepede Bay and Guichen Bay). Within these northern locations high biomass colonial species (sponges and ascidians) were more prevalent at the 30 m sites, possibly due to the patchiness of the macroalgae rich reefal systems and consequently higher amounts of suitable bare benthos for their settlement and growth. Sites with higher biomass also had higher species diversity, possibly reflecting the reliance of many species of fish and decapods on invertebrate assemblages and seagrass meadows for all or part of their life cycles (Bryars 2003; Edyvane 1999).

The southern transects at Rivoli Bay and Port MacDonnell are subject to higher energy levels and wave exposure and are dominated by kelp species like *Ecklonia* (Edyvane 1999, Edgar 1997). Although biomass and species diversity was lower in the southern locations, they contained a number of deep water brown and red algae which will significantly expand the collection at the South Australian Herbarium (B. Baldock pers. comm. July 2009). Many of the other species identified in this study are consistent with those listed in previous broad-scale studies of the area (Bryars 2003; Edyvane 1999).

The overall number of species identified using the sled (170) is similar to a study using identical methods conducted off Yorke Peninsula (125 species, Rowling *et al.* 2009), but low compared to a study carried out in deeper shelf-waters in western South Australia (720 species) (Currie *et al.* 2008). This relatively lower species richness is likely due to the reduced sampling effort, much shorter tow length (100 m c.f. 5 mins at 3.5 knots, ca 550-600 m) and a narrower geographical coverage. Many of the species collected in the single beam trawl were consistent with the species collected in the sled at the same site (Lacepede Bay, LA10), although there was a higher number of cryptic species such as syngnathids, *Siphonognathus* species and leatherjackets collected.

No epibenthic species collected in the sled and trawl shots are listed under the EPBC Act as threatened, endangered or rare. However four Syngnathidae species were collected, the pugnose pipefish (*Pugnaso curtiorstris*), mother-of-pearl pipefish (*Vanacampus margaritifer*), spotted pipefish (*Stigmatopora argus*) and common seadragon (*Phyllopteryx taeniolatus*); these are listed as protected under the EPBC Act. In terms of biodiversity and endemism, of the species that could be reliably identified (and which there is distribution data available for) most were found to be widespread in southern Australian waters (CAAB 2009; DEWR 2009; Last and Stevens 2009) and many of the species have been observed in previous broad-scale biodiversity studies of the region (Bryars 2003; Edyvane 1999).

4.3 Fish

Both the traps and the BRUVS target large mobile species by attraction using a bait plume. Although fish bait was used to attract predators and scavengers, a wide variety of fish were sampled, including herbivores and planktivores (Appendix 4). This agrees with other baited surveys, where fish are attracted to bait or commotion (Cappo *et al.* 2004; Malcolm *et al.* 2007). Despite an order of magnitude difference between abundances sampled using the two different techniques (trap, 22 individuals; BRUVS, 373 individuals) both the baited trapping and underwater video sampling off the south east indicated that fish assemblages vary according to habitat type and depth.

The effectiveness of traps is determined by the likelihood of three successive events; that a species will encounter, enter and remain in the trap (Hayes *et al.* 2005). Trap catch rates in the south east were low, particularly in relation to some key commercial species including the southern rock lobster (*Jasus edwardsii*) and snapper (*Chrysophrys auratus*). This may be due to the heavy sea conditions at the time of sampling, and/or the inability of the target species to enter the traps due to the high levels of macroalgae sweeping across the openings at most of the sites. Common reef dwelling species like the rock cod (*Pseudophycis barbata*) and the blue throated wrasse (*Notolabrus tetricus*) were caught more frequently and are commonly found in the area.

In contrast to low numbers in the traps, schooling species such as the yellowtail mackerel (*Trachurus novaezelandiae*) and the butterfly perch (*Caesioperca Lepidoptera*) were identified in high numbers in the deeper BRUVS deployments, with the silverbelly *Parequula melbournensis* common on the seagrass site.

Abundant schooling species are frequently recognised as important contributors to fish assemblages in BRUVS research (Cappo *et al.* 2004; Malcolm *et al.* 2007).

The use of *MaxN* to give a measure of abundance represents a potential bias that may have affected the results. Estimates of *MaxN* are considered conservative, particularly in areas where fish occur in high-densities, due to the ability to only count fish in the field of view and the tendency for fish to stay around the bait while entering and exiting the view (Cappo *et al.* 2004). In this study some of these deficiencies were partially overcome by using stereo-video camera systems, which allow for fish to be precisely measured for use in calculation of the *MaxN* value (Harvey *et al.* 2002). In this study 32 species were identified from the video taken at the 11 sites (33 drops). This is broadly comparable to the numbers observed in similar studies in South Australia (89 species, 72 drops, Rowling *et al.* 2009), Queensland (76 species, 95 drops, Cappo *et al.* 2004) and in temperate New South Wales (101 species, 96 drops, Malcolm *et al* 2007).

Limited image quality due to poor visibility or obscuring of the video cameras by biota at the site caused some variability in measurement and observations, and many Monacanthidae and Labridae species present in South Australia are morphologically similar with similar colour patterns. The use of standard definition cameras made differentiation of similar species difficult, and some fish could not be identified beyond family level. These families were included in the analysis, but may have resulted in some species being underestimated.

All species identified in the traps and BRUVS off the south east are common and occur widely throughout southern Australian waters (CAAB 2009; Edgar 1997; Gomon *et al.* 2008) and many of the species have been observed in previous broad-scale biodiversity studies of the region (Bryars 2003; Edyvane 1999).

4.4 Summary and Recommendations

Across all sampling techniques a total of 293 individual taxa were identified during this study. Most taxa that could be reliably identified to species (and for which there were distributional data available) were found to be widespread in southern Australian waters. Unfortunately we cannot comment on the relative rarity and distributions of a large proportion (47%) of the taxa collected, because their identification to species level requires more time and high levels of taxonomic expertise. Voucher material for each taxon collected during this study has been lodged with the South Australian Museum and State Herbarium of South Australia, and should prove useful in future bio-regionalisation assessments, especially once unknown species have been accurately identified.

The general lack of comparative benthic data available in South Australia limits our ability to evaluate the regional biodiversity of South East NRM region. Results from this study do however provide a solid quantitative basis to assess this question in the future as data for other regions become available. Like many areas with urbanised catchments the South East NRM region receives pollution from a wide range of sources including urban developments, commercial and recreational fishing and rural agriculture and the effects these threats on regional biodiversity are unclear.

This study provides us with a baseline of current community composition, and with regular ongoing monitoring provides us with a context for assessing changes in community structure, assessing the impact of threats and the effectiveness of conservation measures such as marine reserves and parks. By periodically re-sampling the same sites and comparing trends in their biotic assemblages over time, it should be possible to identify any future changes in the benthic environment. It is recommended that regular surveys of reef and seagrass communities continue in order to monitor marine biodiversity, preferably following the methods used in this survey.

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Appendix 1. Location, date and depth of all sampling undertaken during the biodiversity survey off the South East in 2009. Note that the WGS84 datum is employed for all position fixes.

Site	Date	Method	Depth	Start		Finish	
				Latitude	Longitude	Latitude	Longitude
GB10	7/04/2009	BRUV1	10	-37.13052	139.74574		
GB10	7/04/2009	BRUV2	10	-37.13192	139.74387		
GB10	7/04/2009	BRUV3	10	-37.13382	139.74253		
GB10	7/04/2009	CTD	10	-37.13414	139.74128		
GB10	6/04/2009	GRAB	10	-37.13542	139.73953		
GB10	7/04/2009	SLED	10	-37.13200	139.74212	-37.13130	139.74279
GB10	6/04/2009	TRAP	10	-37.13409	139.73945		
GB10	7/04/2009	VIDEO	10	-37.13467	139.74192	-37.13446	139.74149
GB20	7/04/2009	BRUV1	20	-37.13107	139.71568		
GB20	7/04/2009	BRUV2	20	-37.13170	139.71297		
GB20	7/04/2009	BRUV3	20	-37.13390	139.71255		
GB20	7/04/2009	CTD	20	-37.13088	139.71305		
GB20	6/04/2009	GRAB	20	-37.13615	139.70399		
GB20	7/04/2009	SLED	20	-37.13242	139.71484	-37.13177	139.71563
GB20	6/04/2009	TRAP	20	-37.13666	139.70445		
GB20	7/04/2009	VIDEO	20	-37.13126	139.71389	-37.13078	139.71321
GB30	7/04/2009	BRUV1	30	-37.14848	139.65361		
GB30	7/04/2009	BRUV2	30	-37.15056	139.65327		
GB30	7/04/2009	BRUV3	30	-37.15246	139.65242		
GB30	7/04/2009	CTD	30	-37.15089	139.65101		
GB30	6/04/2009	GRAB	30	-37.15052	139.64923		
GB30	7/04/2009	SLED	30	-37.15000	139.65041	-37.14909	139.65039
GB30	6/04/2009	TRAP	30	-37.14971	139.65010		
GB30	7/04/2009	VIDEO	30	-37.15113	139.65210	-37.15117	139.65121
LA10	8/04/2009	BRUV1	10	-36.78474	139.78961		
LA10	8/04/2009	BRUV2	10	-36.78255	139.78950		
LA10	8/04/2009	BRUV3	10	-36.78025	139.78940		
LA10	8/04/2009	CTD	10	-36.77976	139.78996		
LA10	7/04/2009	GRAB	10	-36.78131	139.78827		
LA10	8/04/2009	SLED	10	-36.78283	139.79070	-36.78192	139.79079
LA10	7/04/2009	TRAP	10	-36.78040	139.78952		
LA10	8/04/2009	TRAWL	10	-36.78398	139.79063	-36.77955	139.7899
LA10	8/04/2009	VIDEO	10	-36.77957	139.79011	-36.77967	139.78977
LA20	8/04/2009	BRUV1	20	-36.75592	139.71493		
LA20	8/04/2009	BRUV2	20	-36.75812	139.71498		
LA20	8/04/2009	BRUV3	20	-36.76024	139.71536		
LA20	8/04/2009	CTD	20	-36.75864	139.71571		
LA20	7/04/2009	GRAB	20	-36.75863	139.71654		
LA20	8/04/2009	SLED	20	-36.75814	139.71616	-36.75728	139.71651
LA20	7/04/2009	TRAP	20	-36.75840	139.71542		
LA20	8/04/2009	VIDEO	20	-36.75972	139.71559		
LA30	8/04/2009	BRUV1	30	-36.72124	139.62141		
LA30	8/04/2009	BRUV2	30	-36.72326	139.62095		
LA30	8/04/2009	BRUV3	30	-36.72519	139.62167		
LA30	8/04/2009	CTD	30	-36.72638	139.62219		

Site	Date	Method	Depth	Start		Finish	
				Latitude	Longitude	Latitude	Longitude
LA30	7/04/2009	GRAB	30	-36.72601	139.62126		
LA30	8/04/2009	SLED	30	-36.72404	139.62258	-36.72315	139.62255
LA30	7/04/2009	TRAP	30	-36.72539	139.62089		
LA30	8/04/2009	VIDEO	30	-36.72611	139.62164	-36.72640	139.62194
PM10	4/04/2009	GRAB	10	-38.09011	140.79785		
PM10	2/06/2009	SLED	10	-38.09103	140.79773	-38.09063	140.79836
PM10	4/04/2009	TRAP	10	-38.09061	140.79776		
PM10	2/06/2009	CTD	10	-38.09083	140.79774		
PM10	2/06/2009	VIDEO	10	-38.08995	140.79866	-38.08926	140.79714
PM20	5/04/2009	BRUV1	20	-38.12466	140.82226		
PM20	5/04/2009	BRUV2	20	-38.12614	140.82066		
PM20	5/04/2009	BRUV3	20	-38.12731	140.81882		
PM20	5/04/2009	CTD	20	-38.12842	140.81816		
PM20	4/04/2009	GRAB	20	-38.12723	140.81714		
PM20	3/06/2009	SLED	20	-38.12215	140.82052	-38.12183	140.82134
PM20	4/04/2009	TRAP	20	-38.12614	140.81672		
PM20	5/04/2009	VIDEO	20	-38.12852	140.81859		
PM30	5/04/2009	BRUV1	30	-38.14962	140.82763		
PM30	5/04/2009	BRUV2	30	-38.14926	140.82463		
PM30	5/04/2009	BRUV3	30	-38.14829	140.82122		
PM30	5/04/2009	CTD	30	-38.14633	140.82564		
PM30	4/04/2009	GRAB	30	-38.14822	140.81783		
PM30	3/06/2009	SLED	30	-38.14881	140.82889	-38.14943	140.82939
PM30	4/04/2009	TRAP	30	-38.14836	140.81803		
PM30	5/04/2009	VIDEO	30	-38.14680	140.82192	-38.14711	140.82499
RI10	6/04/2009	BRUV1	10	-37.50476	140.02614		
RI10	6/04/2009	BRUV2	10	-37.50288	140.02658		
RI10	6/04/2009	BRUV3	10	-37.50057	140.02735		
RI10	3/06/2009	CTD	10	-37.50231	140.02231		
RI10	6/04/2009	GRAB	10	-37.50291	140.02505		
RI10	3/06/2009	SLED	10	-37.50420	140.02760	-37.50492	140.02688
RI10	5/04/2009	TRAP	10	-37.50229	140.02683		
RI10	3/06/2009	VIDEO	10	-37.50330	140.02786	-37.50238	140.02831
RI20	6/04/2009	BRUV1	20	-37.52628	140.00291		
RI20	6/04/2009	BRUV2	20	-37.52838	140.00159		
RI20	6/04/2009	BRUV3	20	-37.53031	140.00012		
RI20	6/04/2009	CTD	20	-37.52610	140.00149		
RI20	6/04/2009	GRAB	20	-37.52774	140.00122		
RI20	3/06/2009	SLED	20	-37.52625	140.00218	-37.52549	140.00246
RI20	5/04/2009	TRAP	20	-37.52902	140.00125		
RI20	6/04/2009	VIDEO	20	-37.52724	140.00027	-37.52646	139.99984
RI30	6/04/2009	BRUV1	30	-37.54420	139.98984		
RI30	6/04/2009	BRUV2	30	-37.54620	139.98849		
RI30	6/04/2009	BRUV3	30	-37.54828	139.98720		
RI30	6/04/2009	CTD	30	-37.54354	139.98542		
RI30	6/04/2009	GRAB	30	-37.54597	139.98773		
RI30	3/06/2009	SLED	30	-37.54524	139.99089	-37.54663	139.99006
RI30	5/04/2009	TRAP	30	-37.54723	139.98809		
RI30	6/04/2009	VIDEO	30	-37.54457	139.98562	-37.54358	139.98486

Appendix 2. Taxonomic classification and abundances of 66 infaunal species collected from Smith-McIntyre grabs at 12 sites off the south east during 2009. A reference collection is maintained at SARDI Aquatic Sciences.

Phylum/Family	Species	Lacepede Bay (LA)			Guichen Bay (GB)			Port MacDonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Annelida		-	-	-	-	-	-	-	-	-	-	-	-
Ampharetidae	Ampharetidae	-	-	-	-	-	-	-	-	-	1	-	-
Amphinomidae	Amphinomidae	-	-	3	-	-	-	-	-	-	-	-	-
Capitellidae	Capitella	1	-	-	-	-	-	-	-	-	-	-	-
Cirratulidae	Cirratulidae	1	1	-	-	-	-	-	-	-	-	-	-
Eunicidae	Eunicidae	-	1	-	-	-	-	1	-	-	-	2	-
Nereididae	Nereididae	1	-	13	2	-	-	-	-	1	10	1	-
Oenonidae	Oenonidae	-	-	-	-	-	-	-	-	-	-	1	1
Onuphidae	Onuphidae	-	-	-	-	-	1	-	-	-	-	-	-
Orbiniidae	Orbiniidae	1	-	-	-	-	-	-	-	-	-	-	-
Phyllodocidae	Phyllodoce	-	-	1	-	-	-	-	-	-	1	3	-
Phyllodocidae	Phyllodoce sp2	4	-	-	-	-	8	-	-	-	-	-	-
Polynoidae	Polynoidae	-	-	1	3	-	1	-	1	1	-	-	-
Sabellariidae	*Idanthyrsus australiensis*	-	-	3	-	-	-	-	-	-	-	-	-
Sabellidae	Sabellidae	-	-	-	2	-	-	1	-	-	-	2	-
Scalibregmatidae	Scalibregmatidae	-	-	1	-	1	-	-	-	-	-	-	-
Sigalionidae	Sigalionidae	-	-	-	-	-	-	-	-	-	-	2	-
Syllidae	Syllidae	235	-	-	-	-	1	1	-	6	1	6	-
Syllidae	Syllinae	-	-	-	3	27	14	-	-	-	-	-	-
Syllidae	Trypanosyllis	-	-	-	-	-	1	-	-	-	-	-	-
Terebellidae	Terebellidae	-	-	-	-	-	-	-	-	-	-	1	-
Pycnogonida	Pycnogonida	1	2	-	1	-	1	-	-	-	1	-	-
Crustacea		-	-	-	-	-	-	-	-	-	-	-	-
Alpheidae	Alpheidae	-	-	-	2	-	-	-	1	-	-	-	-
Ampeliscidae	Ampeliscidae	-	2	-	-	-	-	-	2	-	-	-	-
Ampithoidae	Ampithoinae	-	-	-	9	-	-	-	17	1	8	-	-
Anthuridae	Cyathura	1	-	-	-	10	-	-	-	-	-	-	-
Aoridae	Aoridae	-	-	-	1	-	-	-	-	-	11	6	-
Apseudidae	Apseudidae	1	-	-	1	-	-	1	-	-	-	-	-
Asellota	Asellota	-	-	-	-	-	-	7	3	-	-	-	2
Caprellidae	Caprella	-	-	-	-	-	-	1	-	-	-	-	-
Cirolanidae	Cirolana	-	-	1	-	-	-	-	-	-	-	2	-
Corophiidae	Corophiidae	-	-	-	-	-	-	-	-	-	3	15	-
Cumacea	Cumacea	5	-	-	1	-	-	-	-	-	-	-	-
Dendrobranchiata	Dendrobranchiata	-	-	-	-	-	-	-	1	-	-	-	-
Dexaminidae	Dexaminidae	-	-	-	1	-	12	3	2	1	9	2	-
Eusiridae	Eusiridae	-	-	-	8	3	1	-	-	-	5	-	-
Galatheidae	Galatheidae	-	-	1	-	-	-	-	-	-	-	-	-
Gammaridea	Gammaridea	-	1	-	9	8	-	-	3	-	-	-	-
Gnathiidae	Elaphognathia	1	-	2	-	-	-	-	1	2	-	-	-
Gnathiidae	Gnathia	-	-	-	-	-	1	-	-	-	-	1	-
Janiridae	Janiridae	-	-	-	-	-	1	-	-	1	-	-	-
Leucothoidae	Leucothoidae	-	-	3	6	-	7	-	-	-	-	2	1
Lysianassidae	Lysianassidae	-	3	3	-	-	21	1	2	-	1	24	6
Melitidae	Ceradocus	-	1	14	14	-	-	12	-	12	3	4	-
Melitidae	Ceradocus sp2	-	-	-	-	-	-	-	-	-	7	-	-

Phylum/Family	Species	Lacepede Bay (LA)			Guichen Bay (GB)			Port MacDonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Melitidae	Melitidae	-	-	11	8	-	1	-	-	-	-	1	-
Mysidacea	Mysidacea	-	1	-	1	-	-	-	-	-	-	-	-
Nebaliidae	Nebalia	-	-	-	-	-	-	-	-	1	-	1	-
Oedicerotidae	Oedicerotidae	-	-	1	-	-	-	-	-	-	-	1	-
Phoxocephalidae	Phoxocephalidae	22	2	3	-	5	1	-	-	1	1	-	-
Platyischnopidae	Platyischnopidae	6	-	-	-	-	-	-	-	-	-	-	-
Podoceridae	Podoceridae	-	-	-	-	-	3	-	-	-	-	-	-
Pontogeneiidae	Pontogeneiidae	-	-	-	-	-	-	6	-	2	-	-	-
Serolidae	Serolidae	-	-	-	1	-	2	-	2	-	-	-	-
Serolidae	Serolina	-	-	-	-	-	-	-	-	10	-	-	1
Sphaeromatidae	Paracilicea	1	-	-	-	-	-	-	-	-	-	-	-
Sphraerpmatidae	Cymodoce	2	-	4	-	-	3	4	1	-	1	2	-
Stenothoidae	Stenothoidae	-	-	-	-	-	-	-	1	-	-	-	-
Tanaidae	*Tanais tenucornis*	-	-	2	-	-	-	-	-	-	2	-	-
Cylindroleberididae	Cylindroleberididae	3	-	-	-	-	-	-	-	1	-	-	-
Echinodermata		-	-	-	-	-	-	-	-	-	-	-	-
Holothuroidea	Holothuroidea	-	-	2	-	-	-	-	-	1	-	-	-
Ophiuroidea	Ophiuroidea	-	1	19	-	-	10	-	4	-	-	-	1
Mollusca		-	-	-	-	-	-	-	-	-	-	-	-
Pleurobranchidae	Pleurobranchidae	-	1	-	-	-	-	-	-	-	-	-	-
Chitonidae	Chitonidae	-	1	-	-	-	-	-	-	-	-	1	-
Nemata		-	-	-	-	-	-	-	-	-	-	-	-
Nemata	Nematoda	8	-	-	-	-	-	-	-	-	-	-	-
Nemertea		-	-	-	-	-	-	-	-	-	-	-	-
Nemertea	Nemertea	-	-	5	-	-	-	-	-	-	-	-	-
Platyhelminthes		-	-	-	-	-	-	-	-	-	-	-	-
Platyhelminthes	Platyhelminthes	-	-	-	-	-	1	-	-	1	-	-	-

Appendix 3. Taxonomic classification and biomass (g) of 125 epibiota species collected from 12 sled shots off the south east during 2009.

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Annelida		-	-	-	-	-	-	-	-	-	-	-	-
Eunicidae	Eunice sp.	-	-	-	-	-	1.2	-	-	-	-	-	-
Bryozoa		-	-	-	-	-	-	-	-	-	-	-	-
Catenicellidae	Orthoscuticella sp.	-	53	-	-	12.7	22.1	-	-	-	-	-	14.2
Lepraliellidae	Celleporaria sp.	-	-	-	10.4	-	-	-	-	-	-	-	-
Phidoloporidae	*Triphyllozoon moniliferum*	-	-	-	-	-	4.5	-	-	-	-	-	-
Catenicellidae	*Orthoscuticella ventricosa*	-	-	-	-	-	32.1	-	-	-	-	-	-
Chlorophyta		-	-	-	-	-	-	-	-	-	-	-	-
Caulerpaceae	Caulerpa	-	-	-	3.3	-	-	5.5	-	-	-	-	-
Caulerpaceae	*Caulerpa cactoides*	-	275.6	498.3	-	-	-	-	-	-	-	-	-
Caulerpaceae	*Caulerpa longifolia*	-	-	-	-	129.5	32	-	-	-	-	-	-
Chlorophyta	Chlorophyta sp	-	-	-	-	2.2	-	-	-	-	-	-	-
Chordata		-	-	-	-	-	-	-	-	-	-	-	-
Clinidae	Heteroclinus sp.	-	-	-	18.8	-	-	-	-	-	-	-	-
Monacanthidae	*Acanthaluteres spilomelanurus*	195	-	-	-	-	-	-	-	-	-	-	-
Odacidae	*Heteroscarus acroptilus*	-	-	-	-	-	-	-	-	-	66.2	-	-
Syngnathidae	*Phyllopteryx taeniolatus*	-	1.7	-	-	-	-	-	-	-	-	-	-
Syngnathidae	*Pugnaso curtiorstris*	-	-	-	0.07	-	-	-	-	-	-	-	-
Cnidaria		-	-	-	-	-	-	-	-	-	-	-	-
Actiniidae	*Phlyctenactis tuberculosa*	-	-	-	-	53.6	-	-	-	-	-	-	-
Crustacea		-	-	-	-	-	-	-	-	-	-	-	-
Decapoda	Crab sp1	-	2.2	12.2	-	-	-	-	-	-	-	-	-
Decapoda	*Austrodromidia australis*	-	24.6	-	-	-	-	-	-	-	-	-	-
Majidae	*Naxia aurita*	2.1	-	-	-	-	-	-	-	-	-	-	-
Majidae	*Notomithrax ursus*	1.3	-	-	-	-	-	-	-	-	-	-	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Xanthidae	*Actaea calculosa*	-	-	-	-	-	0.7	-	-	-	-	-	-
Echinodermata		-	-	-	-	-	-	-	-	-	-	-	-
Holothuriidae	Holothuroidea sp.1	2.8	-	-	-	-	-	-	-	-	-	-	-
Holothuriidae	Holothuroidea sp.2	-	-	-	-	-	1.9	-	-	-	-	-	-
Ophiodermatidae	*Ophiopsammus assimilis*	4	-	-	-	-	-	-	-	-	-	-	-
Ophiodermatidae	Ophiuroid. sp.1	-	-	-	-	-	1.7	-	-	-	-	-	0.6
Ophiodermatidae	Ophiuroid. sp.2	-	-	-	-	-	6.4	-	-	-	-	-	-
Temnopleuridae	*Amblypneustes formosus*	24.2	-	-	-	-	-	-	-	-	-	-	-
Temnopleuridae	Echinoid. sp.3	-	-	-	42	-	-	-	-	-	-	-	-
Temnopleuridae	Echinoid. sp.4	-	-	-	-	56.4	-	-	110.5	-	71	-	-
Temnopleuridae	Echinoid. sp.7	-	-	-	100.2	-	-	-	-	-	-	-	-
Temnppleuridae	*Amblypneustes pallidus*	-	-	-	35.2	-	-	-	-	-	-	-	-
Magnoliophyta		-	-	-	-	-	-	-	-	-	-	-	-
Cymodoceaceae	*Amphibolis antartica*	391.7	86	-	-	-	-	-	-	-	-	-	-
Posidoniaceae	*Posidonia angustifolia*	4542	35	-	-	-	-	-	-	-	-	-	-
Mollusca		-	-	-	-	-	-	-	-	-	-	-	-
Mollusca	Barbatia sp.	-	-	3	-	3.3	-	-	-	-	-	-	-
Mollusca	*Prothalotia lehmani*	1.3	-	-	2.9	2.4	-	0.8	-	-	-	-	-
Arcidae	*Barbatia pistachia*	-	-	-	-	-	85	-	-	-	-	-	7.3
Calliostomatidae	*Calliostoma armillata*	1.9	5.2	-	-	-	-	-	-	-	-	-	-
Corbulidae	*Corbula stolata*	-	-	-	-	-	9.13	-	-	-	-	-	-
Phasianellidae	*Phasianella australis*	11.4	-	-	2.1	-	-	-	-	-	-	-	-
Trochidae	*Phasianotrochus apicinus*	-	-	-	0.8	3	-	3	-	-	-	-	-
Phaeophyta		-	-	-	-	-	-	-	-	-	-	-	-
Alariaceae	*Ecklonia radiata*	554.4	-	503.6	-	1091	390.8	197.2	2357	899.2	62	1184	576.6
Cladophoraceae	*Apjohnia laetevirens*	-	-	-	-	82.6	-	-	-	-	-	-	-
Cystoseiraceae	*Acrocarpia paniculata*	-	-	-	5310	-	-	23.4	-	-	-	-	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Cystoseiraceae	*Carpoglossum confluens*	-	-	-	-	-	5082	-	-	-	-	-	-
Cystoseiraceae	*Cystophora confluens*	1674	3757	15.5	-	470.1	-	-	-	-	-	-	-
Cystoseiraceae	*Cystophora monilifera*	-	-	-	-	-	-	28.8	-	-	-	-	-
Cystoseiraceae	*Cystophora moniliformis*	375.9	-	-	-	-	-	59.7	-	-	-	-	-
Cystoseiraceae	*Cystophora platylobium*	5.7	-	-	-	-	-	-	-	-	-	-	-
Cystoseiraceae	*Cystophora siliquosa*	494.5	-	-	-	-	-	-	-	-	-	-	-
Cystoseiraceae	Cystophora sp.	-	-	-	-	-	-	98.4	-	-	-	-	-
Cystoseiraceae	*Myriodesma quercifolium*	-	8	-	-	-	-	-	-	-	-	-	-
Dictyotaceae	*Glossophora nigricans*	-	-	-	33.5	2.2	-	-	-	-	-	-	-
Dictyotaceae	Zonaria sp.	-	-	-	-	16.5	-	-	-	-	-	-	-
Dictyotaceae	*Zonaria spiralis*	48.6	-	-	-	-	-	-	-	-	-	-	-
Sargassaceae	*Sargassum spinuligerum*	-	-	-	32.5	-	-	-	-	-	-	-	-
Sargassaceae	Sargassum sp. 1	14.5	15	-	-	-	-	23	-	-	-	-	-
Sargassaceae	Sargassum sp. 3	56.2	-	-	-	48	-	-	-	-	-	-	-
Seirococcaceae	*Scytothalia dorycarpa*	1.6	-	-	-	-	-	-	-	-	-	-	-
Sporochnaceae	*Perithalia caudata*	-	-	-	802.7	-	-	-	-	-	-	-	-
Porifera		-	-	-	-	-	-	-	-	-	-	-	-
Ancorinidae	Ecionemia sp.	-	-	-	-	-	-	-	-	-	-	-	41.3
Chondropsidae	Chondropsid sp.1	-	516.9	62	-	14	-	-	-	-	-	-	-
Chondropsidae	Chondropsis sp.2	-	-	1999	-	-	1446	-	-	-	-	-	-
Chondropsidae	Chondropsis sp.3	-	1081	166.9	-	-	-	-	-	-	-	-	-
Clionaidae	*Spheciospongia papillosa*	-	4120	4770	-	-	2728	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.11	-	-	-	-	-	-	-	-	-	-	-	63.9
Demospongiae (Class)	Demosponge sp.12	-	-	-	-	-	140	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.13	-	-	140	-	-	107.8	-	-	-	-	-	174.6
Demospongiae (Class)	Demosponge sp.14	-	-	-	-	-	63.3	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.15	-	-	1777	-	-	-	-	-	-	-	-	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Demospongiae (Class)	Demosponge sp.16	-	-	337.8	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.18	-	-	29.9	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.19	-	-	15.81	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.2	-	-	606.9	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.20	-	-	1251	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.22	-	-	554	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.3	-	-	1119	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.4	-	-	-	-	-	137.9	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.5	-	528	-	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.7	-	-	620	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.8	-	-	2861	-	-	-	-	-	-	-	-	-
Haplosclerida	Haplosclerid sp.1	-	-	-	-	-	1077	-	-	-	-	-	-
Microcionidae	Clathria sp.	-	10.1	25.5	-	-	-	-	-	-	-	-	-
Microcionidae	Holopsamma sp. Indet.	-	57	-	-	130	-	-	-	-	-	-	-
Raspailiidae	*Echinodictyum mesenterinum*	-	-	296	-	-	-	-	-	-	-	-	-
Spirophorida (Order)	Spirophorid sp.	-	-	-	-	-	329.1	-	-	-	-	-	-
Spongiidae	Spongiid sp.	-	-	1207	-	-	-	-	-	-	-	-	-
Demospongiae (Class)	Demosponge sp.1	-	-	365.6	-	-	-	-	-	-	-	-	-
Rhodophyta		-	-	-	-	-	-	-	-	-	-	-	-
Rhodophyta	*Anotrichium elongatum*	-	-	-	-	-	9.4	-	-	35.7	-	-	-
Rhodophyta	*Callophycus laxus*	-	-	-	-	1060	592.1	-	-	-	203.1	-	-
Rhodophyta	*Callophycus oppositifolius*	-	-	-	-	-	19.5	-	-	-	-	-	-
Rhodophyta	*Cladurus elatus*	-	537	-	69.5	-	-	-	-	-	-	-	-
Rhodophyta	*Hymenena curdieana*	-	249.6	-	99	326	166.2	-	109	33	-	136.4	179.7
Rhodophyta	Rhodophyta 1	-	-	0.5	-	-	-	3.9	-	-	-	-	-
Rhodophyta	Rhodophyta 10	-	-	-	-	6.4	-	-	-	-	35.1	-	-
Rhodophyta	Rhodophyta 11	-	-	-	-	50.3	-	-	-	-	-	-	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Rhodophyta	Rhodophyta 12	-	-	-	-	-	-	-	-	-	10	-	-
Rhodophyta	Rhodophyta 13	-	-	-	-	70.3	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 14	-	-	18.69	-	-	-	280.1	-	-	-	-	-
Rhodophyta	Rhodophyta 15	-	-	-	-	9.4	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 16	-	-	-	-	1.2	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 17	-	-	-	-	-	-	-	-	-	32	-	-
Rhodophyta	Rhodophyta 18	-	-	-	-	-	-	-	11.1	-	-	-	-
Rhodophyta	Rhodophyta 19	-	-	21.9	-	-	-	11.2	-	-	-	-	-
Rhodophyta	Rhodophyta 3	-	-	-	-	6.6	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 4	-	-	-	-	16	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 5	-	-	-	-	-	-	4.6	-	-	-	-	-
Rhodophyta	Rhodophyta 6	-	-	4.3	-	-	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 7	-	-	-	-	-	-	-	-	0.9	-	40.9	-
Rhodophyta	Rhodophyta 8	-	-	-	-	60	-	-	-	-	-	-	-
Rhodophyta	Rhodophyta 9	-	-	5	-	-	-	-	-	-	-	-	-
Areschougiaceae	*Erythroclonium muelleri*	-	238	-	-	-	10.96	-	-	-	-	-	-
Areschougiaceae	*Erythroclonium sonderi*	9.9	450	-	-	-	-	-	-	-	-	-	-
Areschougiaceae	*Rhabdonia verticillata*	-	-	-	300	-	-	-	-	-	-	-	-
Bonnemaisoniaceae	*Delisea pulchra*	-	-	-	302.1	426.9	-	-	0.5	80	-	-	8.1
Carallinaceae	*Metagoniolithin stelliferum*	-	21	-	-	-	-	1.6	-	-	-	-	-
Ceramiaceae	*Euptilocladia villosa*	-	-	-	10.8	-	-	-	-	-	-	-	-
Ceramiaceae	*Euptilocladia spongiosa*	-	7	-	-	-	-	-	-	-	-	-	-
Ceramiaceae	*Euptilota articulata*	-	-	-	-	58	41.7	-	-	-	-	-	-
Ceramiaceae	*Euptilota tomentosa*	-	37.9	-	-	-	-	6.2	-	-	-	-	-
Ceramiaceae	*Griffithsia monilis*	-	-	3.8	-	-	-	-	-	-	-	-	-
Ceramiaceae	*Haloplegma preissii*	-	62	6.4	-	-	-	-	-	-	-	24	-
Corallinaceae	*Arthrocardia wardi*	-	-	-	-	-	-	0.8	-	-	-	-	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Corallinaceae	*Haliptilon roseum*	2.6	-	-	-	-	-	-	-	-	-	-	-
Dasyaceae	*Thuretia quercifolia*	-	-	-	-	-	-	-	-	-	40	-	-
Delesseriaceae	*Heterodoxia denticulata*	-	-	6.1	33.3	38.9	-	-	10.8	-	42.1	-	25.5
Delesseriaceae	*Nitospinosa pristoidea*	-	-	-	469	-	-	-	-	-	-	-	-
Gracilariaceae	*Gracilaria flagelliformis*	10.4	-	-	-	-	-	-	-	-	-	-	-
Gracilariaceae	Chondria sp	8.4	7.6	-	4.6	17	0.5	-	-	-	-	-	-
Gracilariaceae	*Curdiea angustata*	-	-	-	-	581.2	21.8	-	-	59.3	-	-	-
Gracilariaceae	*Melanthalia obtusata*	-	-	-	-	-	-	-	0.7	-	-	-	-
Gracilariaceae	*Polysiphonia decipiens*	-	-	-	46.8	-	-	-	-	-	-	-	-
Halymeniaceae	*Carpopeltis phyllophora*	-	73	-	-	-	-	3.6	1.6	1.9	-	-	63.9
Liagoraceae	Ganonema	-	89	-	-	18.5	-	-	-	-	-	-	-
Peyssonneliaceae	*Peyssonnelia novaehollandiae*	-	79.6	-	2.5	268	14.3	5.6	22.9	-	27.2	22	29.8
Phacelocarpaceae	*Dictyomenia tridens*	2.1	974	108.2	108	86.7	4.2	-	-	-	6.7	-	-
Phacelocarpaceae	*Phacelocarpus peperocarpus*	-	-	-	-	-	666.4	-	-	-	-	193.7	241.7
Plocamiaceae	*Callophyllis lambertii*	-	-	33.3	-	139	52.2	-	1.7	4.2	-	42.5	9.3
Plocamiaceae	*Plocamium angustum*	-	-	-	-	-	4.4	-	-	-	-	-	-
Plocamiaceae	*Plocamium dilatatum*	-	-	-	-	13	13	-	-	-	-	-	-
Plocamiaceae	*Plocamium mertensii*	-	-	-	9.8	-	15.6	-	-	-	-	-	-
Plocamiaceae	*Plocamium patagiatum*	-	-	-	630	22	65.2	-	-	12.3	-	-	22.5
Plocamiaceae	Plocamium sp.1	-	16	-	-	66.8	8.1	1.2	133	-	2	-	-
Plocamiaceae	Plocamium sp.2	-	-	-	-	559	-	22.4	13.2	2.5	16.6	30.5	21
Rhodomelaceae	*Echinothamnion hystrix*	-	92	-	-	-	-	-	-	-	-	-	-
Rhodomelaceae	*Erythrostachys strobilifera*	-	156.8	-	-	-	-	-	-	-	-	-	-
Rhodomelaceae	*Gonatogenia subulata*	-	1129	-	-	-	-	-	-	-	-	-	-
Rhodomelaceae	*Haplodasya tomentosa*	-	-	-	15.9	-	-	-	-	-	-	-	-
Rhodomelaceae	*Heterocladia umbellifera*	-	-	-	94	-	-	-	-	-	-	-	-
Rhodomelaceae	*Lenormandia latifolia*	-	10.74	-	-	-	-	5.2	20.7	-	3.9	2.1	-

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)			Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m	10 m	20 m	30 m
Rhodomelaceae	*Lenormandia marginata*	-	-	-	-	-	4.8	3.6	-	-	-	-	-
Rhodomelaceae	*Lenormandia muelleri*	-	-	1.7	-	3.4	12.8	-	-	-	79.7	-	-
Rhodomelaceae	Lenormandia sp.	-	-	-	-	-	-	-	-	-	-	99	-
Rhodomelaceae	*Osmundaria prolifera*	-	17.7	-	-	-	-	-	-	-	-	-	-
Rhodomelaceae	*Vidalia spiralis*	-	165	-	-	-	-	-	-	-	-	-	-
Rhodophyceae (Class)	*Involucrana crassa*	-	-	-	302	-	-	-	-	-	-	-	-
Rhodophyceae (Class)	*Involucrana meredithiana*	-	-	-	127	577	39	-	-	-	20	15.9	24.8
Rhodophyceae (Class)	*Macrothamnion pellucidum*	-	92	-	-	-	-	-	-	-	-	-	-
Rhodophyceae (Class)	*Nizymenia australis*	-	70	13	3.8	166.7	459.6	-	-	29.8	-	-	23.7
Rhodymeniaceae	*Gloiosaccion brownii*	-	-	9.9	-	-	-	-	-	-	-	-	-
Sipuncula		-	-	-	-	-	-	-	-	-	-	-	-
Sipuncula	*Phascolosoma annulatum*	-	-	3.6	-	-	-	-	-	-	-	-	-
Urochordata		-	-	-	-	-	-	-	-	-	-	-	-
Ascidiaceae	Ascidian 3	-	1203	-	-	-	-	-	-	-	-	-	-
Ascidiaceae	Ascidian 6	-	-	11271	-	-	1004	-	-	-	-	-	-
Ascidiaceae	Ascidian 7	-	-	-	-	-	-	-	-	-	-	-	-
Didemnidae	Ascidian 5	-	-	-	-	-	119.7	-	-	-	-	-	-
Didemnidae	Didemnid sp.2	-	-	-	-	-	111.7	-	-	-	-	-	-
Pyuridae	*Herdmania momus*	-	-	-	-	-	56.3	-	-	-	-	-	-
Pyuridae	*Pyura australis*	2.3	-	-	-	-	-	-	-	-	-	-	-
Pyuridae	*Pyura gibbosa*	-	-	-	-	-	-	20.1	-	-	-	-	-
Riterellidae	*Riterella compacta*	-	442	-	-	-	-	-	-	-	-	-	-

Appendix 4. Taxonomic classification and abundance of 50 epibiota species collected from 1 trawl shot off the south east during 2009

Phylum/Family	Scientific Name	Common Name	Lacepede Bay (LA) 10 m
Bryozoa			
Adeonidae	*Adeona grisea*	Adeona	1
Chlorophyta			
Codiaceae	*Codium harveyi*	Harvey's Codium	1
Chordata			
Apogonidae	*Siphamia cephalotes*	Woods Siphonfish	5
Apogonidae	*Vincentia conspersa*	Southern Gobbleguts	8
Callionymidae	*Repomucenus calcaratus*	Spotted Stinkfish	1
Gerreidae	*Parequula melbournensis*	Silverbelly	10
Labridae	*Austrolabrus maculatus*	Blackspotted Wrasse	23
Monacanthidae	*Brachaluteres jacksonianus*	Sthn. Pygmy Leatherjacket	2
Monacanthidae	*Scobinichthys granulatus*	Rough Leatherjacket	53
Mullidae	*Upeneichthys vlamingii*	Red Mullet	7
Neosebastidae	*Maxillicosta meridianus*	Southern Gurnard Perch	1
Odacidae	*Haletta semifasciata*	Blue Weed Whiting	1
Odacidae	*Siphonognathus argyrophanes*	Tubemouth	1
Odacidae	*Siphonognathus attenuatus*	Slender Weed Whiting	1
Odacidae	*Siphonognathus radiatus*	Longray Rock Whiting	37
Ostraciidae	*Aracana aurita*	Shaws Cowfish	1
Syngnathidae	*Phyllopteryx taeniolatus*	Common Seadragon	3
Syngnathidae	*Stigmatopora argus*	Spotted Pipefish	15
Syngnathidae	*Vanacampus margaritifer*	Mother-of-Pearl Pipefish	1
Triglidae	*Lepidotrigla papilio*	Spiny Gurnard	1
Crustacea			
Decapoda	*Austrodromidia australis*	Sponge crab	1
Majidae	*Naxia aurita*	Smooth Seaweed Crab	4
Majidae	*Naxia spinosa*	Spider Crab	3
Echinodermata			
Asterinidae	*Meridiastra gunnii*	Sea Star	2
Temnopleuridae	*Amblypneustes formosus*	Sea Urchin	3
Temnopleuridae	Echinoid. sp.1	Urchin	20
Temnopleuridae	Echinoid. sp.2	Urchin	11
Magnoliophyta			
Cymodoceaceae	*Amphibolis antartica*	Amphibolis	2
Posidoniaceae	*Posidonia angustifolia*	Strap Weed	1
Mollusca			
Calliostomatidae	*Calliostoma armillata*	Topshell	2
Phasianellidae	*Phasianella australis*	Pheasant Shell	1
Sepiidae	*Sepia apama*	Giant Cuttlefish	2
Trochidae	*Thalotia conica*	Periwinkle	18
Phaeophyta			
Cystoseiraceae	*Cystophora confluens*	Cystophora	1
Sargassaceae	Sargassum sp. 1	Sargassum	1
Sargassaceae	Sargassum sp. 3	Sargassum	1
Sargassaceae	*Sargassum varians*	Sargassum	1
Porifera			
Chondropsidae	Chondropsis sp.3	Sponge	1

Phylum/Family	Scientific Name	Common Name	Lacepede Bay (LA) 10 m
Demospongiae (Class)	Demosponge sp.17	Sponge	1
Rhodophyta			
Areschougiaceae	*Erythroclonium sonderi*	Erythroclonium	1
Carallinaceae	*Metagoniolithin stelliferum*	Metagoniolithin	1
Corallinaceae	*Haliptilon roseum*	Rosey Coralline Algae	1
Gracilariaceae	*Gracilaria flagelliformis*	Gracilaria	1
Gracilariaceae	*Polysiphonia decipiens*	Polysiphonia	1
Phacelocarpaceae	*Dictyomenia tridens*	Phacelocarpus	1
Plocamiaceae	*Plocamium mertensii*	Merten's Plocamium	1
Rhodomelaceae	*Echinothamnion hystrix*	reassign number	1
Rhodophyceae (Class)	*Heterosiphonia muelleri*	Heterosiphonia	1
Rhodophyceae (Class)	*Laurencia calvata*	Club-branched Laurencia	1
Rhodophyceae (Class)	*Macrothamnion pellucidum*	Macrothamnion	1
Urochordata			
Pyuridae	*Pyura australis*	Sea Tulip	26

Appendix 5. Taxonomic classification and abundance of 8 fish and motile invertebrate species observed during trap deployment at 12 sites off the south east during 2009. Sites with no fauna observed are not included.

Phylum/Family	Scientific Name	Lacepede Bay (LA)	Guichen Bay (GB)			Port Macdonnell (PM)		Rivoli Bay (RI)	
		10 m	10 m	20 m	30 m	20 m	30 m	20 m	30 m
Chordata		-	-	-	-	-	-	-	-
Chironemidae	*Chironemus maculosus*	-	-	-	-	1	-	-	-
Labridae	*Notolabrus tetricus*	-	-	-	-	2	-	-	1
Monacanthidae	*Thamnaconus degeni*	1	-	-	-	-	-	-	-
Moridae	*Pseudophycis bachus*	-	-	-	-	-	1	-	-
Moridae	*Pseudophycis barbata*	1	-	1	2	2	2	1	-
Sparidae	*Pagrus auratus*	2	-	-	-	-	-	-	-
Crustacea		-	-	-	-	-	-	-	-
Palinuridae	*Jasus edwardsii*	-	-	-	-	-	1	-	-
Portunidae	*Nectocarcinus integrifrons*	-	3	-	1	-	-	-	-

Appendix 6. Taxonomic classification of 31 fish species observed during BRUVS deployment at 11 sites off the south east during 2009.

Phylum/Family	Scientific Name	Lacepede Bay (LA)			Guichen Bay (GB)			Port Macdonnell (PM)		Rivoli Bay (RI)		
		10 m	20 m	30 m	10 m	20 m	30 m	20 m	30 m	10 m	20 m	30 m
Chordata		-	-	-	-	-	-	-	-	-	-	-
Carangidae	*Trachurus novaezelandiae*	-	11	7	-	-	100	8	-	-	-	11
Cheilodactylidae	*Cheilodactylus nigripes*	-	-	1	-	1	-	-	-	-	-	-
Dasyatidae	*Dasyatis brevicaudata*	-	-	-	1	-	-	-	-	-	-	1
Dinolestidae	*Dinolestes lewini*	-	-	-	-	-	-	-	-	-	16	-
Gempylidae	*Thyrsites atun*	-	1	-	-	-	3	-	-	-	1	-
Gerreidae	*Parequula melbournensis*	10	5	3	-	1	3	-	-	-	-	-
Heterodontidae	*Heterodontus portusjacksoni*	-	1	-	-	-	-	-	-	2	1	-
Hexanchidae	*Notorynchus cepedianus*	1	-	-	-	-	-	-	-	-	-	-
Labridae	*Austrolabrus maculatus*	-	1	-	-	-	-	-	-	-	-	-
Labridae	*Notolabrus fucicola*	-	-	-	-	-	-	-	-	-	-	1
Labridae	*Notolabrus parilus*	-	-	-	-	-	-	-	-	-	-	1
Labridae	*Notolabrus tetricus*	-	1	3	-	3	2	5	4	1	4	6
Labridae	*Pictilabrus laticlavius*	-	3	2	-	-	2	2	2	-	1	2
Labridae	*Pseudolabrus mortonii*	-	-	-	-	-	3	-	3	-	1	3
Monacanthidae	*Acanthaluteres vittiger*	-	2	1	-	-	-	-	-	-	-	-
Monacanthidae	*Meuschenia australis*	-	-	2	-	-	1	-	-	-	1	1
Monacanthidae	*Thamnaconus degeni*	-	1	-	-	-	-	-	-	-	-	-
Mullidae	*Upeneichthys vlamingii*	2	-	2	-	-	1	-	-	-	-	-
Myliobatidae	*Myliobatis australis*	3	-	-	-	2	-	-	-	-	-	-
Myxinidae	*Eptatretus longipinnis*	-	-	-	-	-	-	-	1	-	-	-
Odacidae	*Siphonognathus attenuatus*	6	-	-	-	-	-	-	-	-	-	-
Parascylliidae	*Parascyllium ferrugineum*	-	-	-	-	-	1	-	-	-	1	2
Pempherididae	*Pempheris multiradiata*	-	1	-	-	-	-	-	2	-	-	3
Pristiophoridae	*Pristiophorus nudipinnis*	-	1	-	-	-	-	-	-	-	-	-
Rajidae	*Dipturus whitleyi*	-	-	-	-	-	-	1	-	-	-	-
Serranidae	*Caesioperca rasor*	-	5	6	-	-	9	-	9	-	-	28
Sillaginidae	*Sillaginodes punctata*	-	-	-	-	-	2	-	-	-	-	-
Sparidae	*Pagrus auratus*	-	7	4	-	1	4	-	-	1	6	1
Squalidae	*Squalus acanthias*	-	1	-	-	-	-	-	-	-	-	-

Appendix 7. Photographic plates depicting 66 infauna species collected in 12 benthic grab samples from off the south east. (GC=Crustaceans, GP=Polychaetes, GM= Mollusca, GE=Echinoderms, GF=Foraminiferans, GNE=Nemerteans, GS=Sipunculans, GBR=Bryozoans, GCE= Cephalochordata, GN=Nematods, GPO=Polyplacophora, GPY=Pycnogonida, GPL= Platyhelminthes)


GC01-*Gammaridea-1*


GC13-Aoridae


GC19-Lysianassidae


GC04-Phoxocephalidae


GC14-Dexaminidae


GC20-Pontogeneiidae


GC07-Apseudidae


GC15-Ampithoinae


GC21-Cylindroleberididae-1


GC09-Platyischnopidae


GC17-*Ceradocus*


GC22-Crab Megalopa sp2-dorsal


GC11-Cumacea


GC18-*Tanais tenucornis*


GC23-*Serolina*


GC24-Mysidacea


GC39-*Cymodoce*


GC55-Janiridae


GC25-Stenothoidae


GC42-*Cyathura*


GC56-Melitidae


GC26-Oedicerotidae


GC45-*Caprella*


GC58-*Asellota*

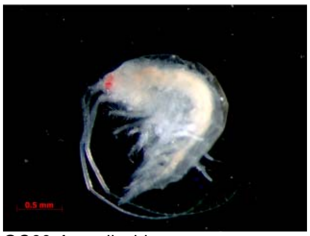

GC27-Cirolana


GC46-Leucothoidae


GC59-*Ceradocus sp2*


GC33-Alpheidae


GC53-*Nebalia*


GC60-Ampeliscidae

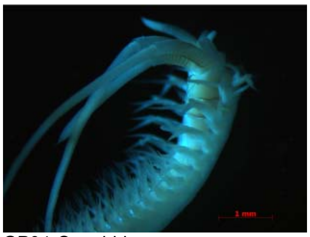

GC38-Corophiidae


GC54-Podoceridae


GC61-Eusiridae


GC62-Galatheidae


GE01-Holothuroidea


GP04-Onuphidae


GC63- Elaphognathia


GE02-Ophiuroidea


GP04-Onuphidae-Anterior


GC64-Serolidae


GM27-Pleurobranchidae

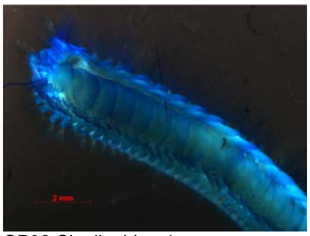

GP06-*Syllinae*


GC65-Gnathia


GN01-Nematoda

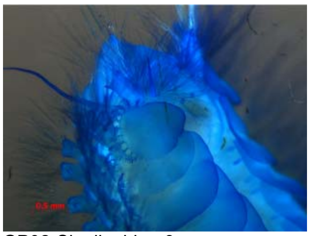

GP11-Terebellidae-dorsal


GC67-Dendrobranchiata


GP02-Sigalionidae-1


GP13-Orbiniidae

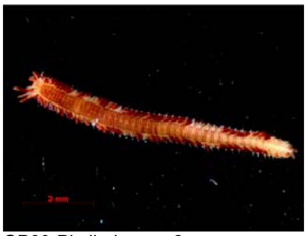

GC68-Paracilicea


GP02-Sigalionidae-3


GP25-Polynoidae


GP37-Syllidae


GP51-*Phillodoce*


GP69-Phyllodoce sp2


GP39-*Capitella*


GP61-Amphinomidae


GP70-Idanthyrsus australiensis


GP40-Oenonidae


GP62-Sabellidae


GPL01-Platyhelminthes


GP45-Scalibregmatidae


GP64-Cirratulidae


GPO03-Chitonidae


GP48-Ampharetidae


GP67-Eunicidae


GPY02-Pycnogonida


GP50-Nereididae


GP68-Trypanosyllis


GS01- Sipuncula

Appendix 8. Photographic plates depicting the 213 species collected in the trap, sled and beam trawl samples around the SE region. (F=fish, G=seagrass, I=invertebrates, X=algae)

F003 *Upeneichthys vlamingii*


F014 *Chrysophrys auratus*


F023 *Parequula melbournensis*

F006 *Thamnaconus degeni*


F017 *Phyllopteryx taeniolatus*


F025 *Austrolabrus maculates*


F012 *Notolabrus tetricus*


F021 *Maxillicosta meridianus*

F027 *Brachaluteres jacksonianus*


F013 *Pseudophycis barbata*


F022 *Lepidotrigla papilo*


F028 *Acanthaluteres spilomelanurus*


F029 *Haletta semifasciata*


F050 *Repomucenus calcaratus*


F062 *Heteroscarus acroptilus*


F031 *Siphongnathus attenuatus*


F055 *Siphamia cephalotes*


F066 *Aracana aurita*


F037 *Scobinichthys granulatus*

F056 *Stigmatapora argus*


F077 *Vincentia conspersa*


F042 *Siphonognathus argyrophanes*

F057 *Pugnaso curtiostris*


F080 *Chironemus maculosus*

F045 *Siphonognathus radiatus*


F058 Vanacampus margaritifer


F081 *Pseudophycis bachus*

F082 *Heteroclinus* sp.

I010 *Amblypneustes formosus*

I032 *Corbula stolata*

G001 *Amphibolis antarctica*

I011 *Phasianella australis*

I036 *Ampblypneustes pallidus*

G003 *Posidonia angustifolia*

I012 *Pyura australis*

I039 Holothuroidea sp. 1

I003 *Nectocarinus intergrifrons*

I015 *Naxia spinosa*

I040 Demosponge sp 1

I004 *Jasus edwardsii*

I020 *Chondropsis* sp.3

I042 *Clathria* sp.


I049 Demosponge sp. 2


I074 Demosponge sp. 19


I101 *Orthoscuticella ventricose*

I058 *Herdmania momus*


I087 *Triphyllozoon moniliferum*


I107 Spongiid. sp.


I059 Chondropsid. sp.1


I089 Demosponge sp. 5


I108 Ascidian sp. 3


I062 *Naxia aurita*


I090 *Holopsamma* sp. Indet.


I118 *Austrodromidia australis*


I065 *Thalotia conica*


I099 *Calliostoma armillata*


I121 *Actaea calculosa*


I128 *Notomithrax ursus*


I129 *Ophiopsammus assimilis?*


I130 *Prothalotia lehmani*


I132 Echinoid. sp. 1


I133 Echinoid. sp. 2

I134 *Sepia apama*


I135 *Meridiastra gunnii*


I136 *Adeona grisea*


I137 *Phlyctenactis tuberculosa*

I138 Demosponge sp.4


I139 *Petrocheles australiensis*

I140 *Orthoscuticella* sp.


I141 *Spheciospongia papillosa*

I142 *Chondropsis* sp.2


I143 Spirophorid. sp.


I144 Haplosclerid. sp. 1


I145 Didemnid sp. 2


I146 Ascidian sp.5


I147 Ascidian sp.6


I148 *Barbatia pistachio*


I149 Ophiuroid. sp.2


I150 Demosponge sp.12


I151 Demosponge sp.13


I152 Demosponge sp.14


I153 Ophiuroid sp.1


I154 Eunice sp.


I155 *Riterella compacta*


I156 Ascidian sp.7


I157 Decapod sp.1

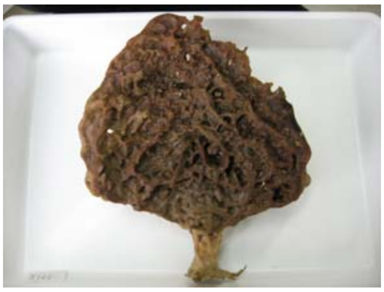

I158 *Celleporaria* sp.


I159 *Phasianotrochus apicinus*


I164 Demosponge sp.11


I169 Demosponge sp.16


I160 Echinoid. sp.7


I165 *Echinodictyum mesenterinum*


I170 Demosponge sp.2


I161 Echinoid. sp. 3

I166 Demosponge sp. 22


I171 Demosponge sp. 3


I162 Echinoid. sp. 4


I167 Demosponge sp.18


I172 Demosponge sp.15

I163 *Ecionemia* sp.


I168 Demosponge sp.7


I173 Demosponge sp.8


I174 Demsponge sp.20


I179 Chiton sp.2

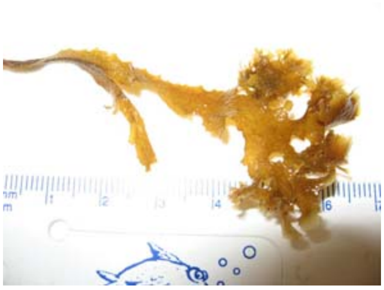

X020 *Laurencia clavata*


I175 Decapod sp.1


X003 *Osmundaria prolifera*


X021 *Cystophora monilifera*


I176 *Phascolosoma annulatum*

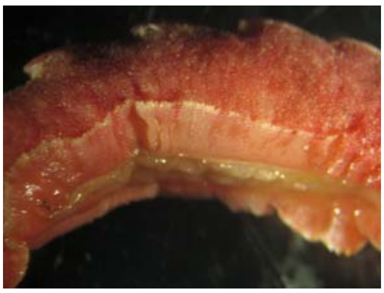

X005 *Zonaria spiralis*


X022 *Ecklonia radiata*


I177 *Barbatia* sp.


X009 *Haliptilon roseum*


X023 *Scythothalia dorycarpa*


I178 Chiton sp.1


X013 *Sargassum* sp. 1


X024 *Carpoglassum confluens*


X025 *Cystophora siliquosa*


X026 *Cystophora confluens*


X027 *Sargassum* sp.3


X028 *Cystophora moniliformis*


X029 *Erythroclonium sonderi*


X030 ?*Gracillaria flagelliformis*


X031 *Dictyomenia tridens*

X032 *Chondria* sp.


X033 *Cystophora platylobium*


X034 *Codium harveyi*


X035 *Sargassum varians*


X036 *Metagoniolithin stelliferum*


X037 *Echinothamnion hystrix*


X038 *Plocamium mertensii*


X039 *Heterosiphonia muelleri*

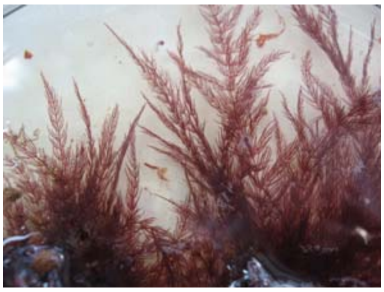

X041 *Polysiphonia decipiens*


X042 *Callophyllis lambertii*


X043 *Euptilota articulata*

X044 *Hymenena curdieana*


X045 *Phacelocarpus peperocarpus*


X046 *Involucrana meredithiana*


X047 *Callophycus laxus*


X048 *Nizymenia australis*


X049 *Peyssonnelia novaehollandiae*


X050 *Plocamium dilatatum*


X051 *Dictyomenia tridens*

X052 *Plocamium angustum*


X053 *Curdiea angustata*


X054 *Caulerpa longifolia*


X055 *Erythroclonium muelleri*


X056 *Plocamium patagiatum*


X057 *Lenormandia marginata*


X058 *Callophycus oppositifolius*


X059 *Plocamium* sp.1


X060 *Lenormandia muelleri*


X061 *Anotrichium ?elongatum*


X062 *Haloplegma preissii*


X063 *Carpopeltis phyllophora*


X064 *Gonatogenia subulata*


X065 *Cladurus elatus*


X066 *Caulerpa cactoides*


X067 *Euptilocladia spongiosa*


X068 *Ganonema* sp.


X069 *Erythrostachys stobilifera*


X070 *Vidalia spiralis*


X071 *Euptilota tomentosa*


X072 *Lenormandia latifolia*


X073 *Myriodesma quercifolium*


X074 *Acrocarpia paniculata*


X075 *Perithalia caudata*


X076 *Euptilocladia ?villosa*


X077 *Caulerpa* sp.1


X078 *Haplodasya tomentosa*

X079 *Polysiphonia decipiens*


X080 *Nitospinosa pristoidea*


X081 *Rhabdonia verticillata*

X082 *Involucrana crassa*


X083 *Heterodoxia denticulata*


X084 *Heterocladia umbellifera*


X085 *Sargassum spinuligerum*


X086 *Glossophora nigricans*


X087 *Delisea pulchra*


X088 *Delisea pulcra*


X089 *Plocamium* sp.2


X090 Rhodophyta sp.18


X091 *Melanthalia obtusata*


X092 Rhodophyta sp.7


X093 *Lenormandia* sp.

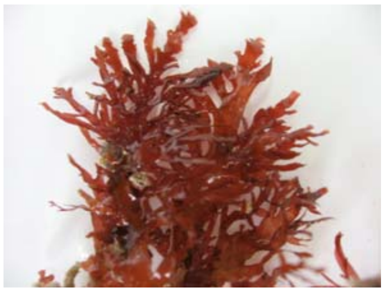

X094 *Thuretia quercifolia*


X095 Rhodophyta sp.17


X096 Rhodophyta sp.12


X097 Rhodophyta sp.10


X098 Rhodophyta sp.14


X099 Rhodophyta sp.1


X100 Rhodophyta sp.5

X101 *Griffithsia monilis*


X102 Rhodophyta sp.6


X103 Rhodophyta sp.9


X104 Chlorophyta sp.


X105 Rhodophyta sp.13


X106 *Zonaria* sp.


X107 Rhodophyta sp.16


X108 Rhodophyta sp.8


X109 Rhodophyta sp.11


X110 Rhodophyta sp.4


X111 Rhodophyta sp.3


X112 Rhodophyta sp.2


X113 Rhodophyta sp.15


X114 *Apjohnia laetevirens*


X115 *Cystophora* sp.

X116 Rhodophyta sp.19

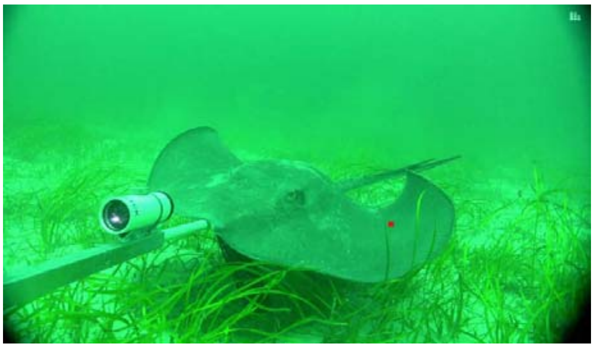
X117 *Arthrocardia wardi*

X118 Gloiosaccion brownii

Appendix 9. Still images of 13 fish species identified from BRUVS deployments at 11 sites off the south east. In the case of multiple fish in one image the species identified is indicated by a red dot.


Cheilodactylus nigripes

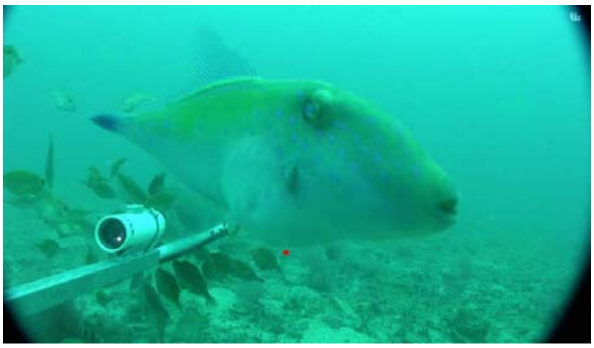

Sillaginodes punctata


Dasyatis brevicaudata


Chrysophrys auratus

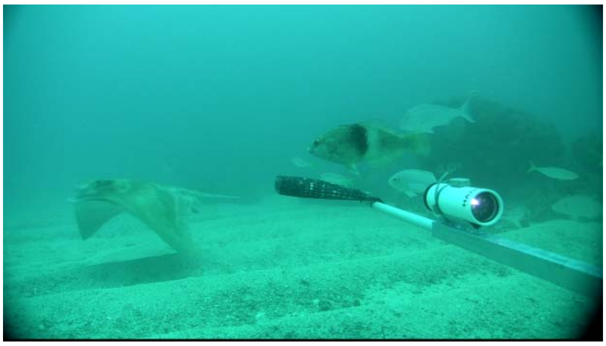

Paraquula melbournensis


Caesioperca razor

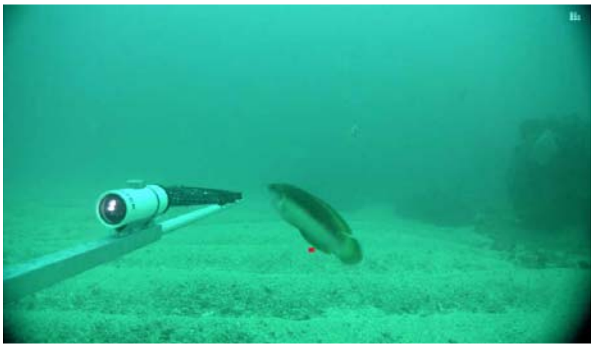

Thamnaconus degeni

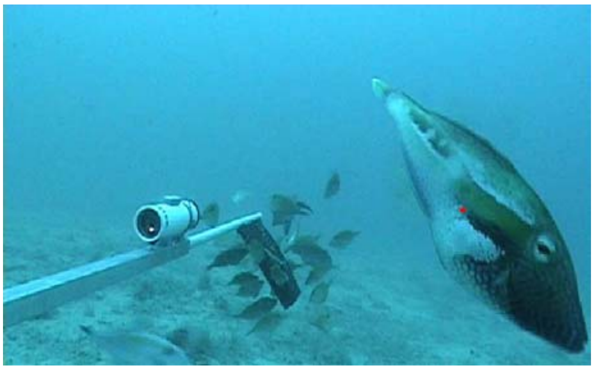

Notolabrus parilus


Notorynchus cepedianus


Notolabrus tetricus


Pictolabrus laticlavius


Austrolabrus maculatus


Acanthaluteres vittiger