GUNNS LTD PULP MILL OUTFALL

MARINE ECOLOGICAL MONITORING PROGRAM

Second Pre-operational Survey, Spring 2005

Prepared by

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For

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EXECUTIVE SUMMARY

The second pre-operational marine ecological monitoring survey at the proposed Gunns pulp mill outfall site at Five Mile Bluff was performed during spring 2005. The survey design replicated that applied during the first pre-operational survey in autumn 2005 and was based on the requirements of the MBACI approach. There were various ‘unknowns’ at the time of the survey, including the exact composition and toxicity of the proposed effluent stream, the anticipated direction, spatial extent and magnitude of effluent dispersion, the regulatory ‘effect’ size, and natural temporal variances in marine ecological community variables. The survey design should therefore be considered provisional until the above information gaps are filled.

The variables analysed were identical to those investigated during the autumn survey and included the abundance and diversity of benthic infauna and fish communities and the percentage cover of epi-benthic algae. Comparisons of these variables were performed among impact locations, to determine if there is any pre-operational variation at the outfall site, between impact and inner control locations and between impact and outer control locations. Previous autumn analyses were limited to assessments of spatial variation in biological variables, while completion of the current spring survey allowed additional assessments of temporal variation. This is in fact a more critical aspect of the analysis, since the MBACI design detects impact by comparing temporal variation between impact and control locations.

The benthic infauna survey revealed a diverse assemblage typical of environmentally healthy conditions, although there was a reduction in abundance, family richness and species richness compared with the autumn 2005 survey. Patterns of faunal similarity suggested that changes along the coast are more important than changes over the small depth difference (~ 3 m) separating ‘nearshore’ and ‘offshore’ sets of locations. Multi-dimensional Scaling (MDS) analysis of autumn and spring data revealed separate groupings for the two survey periods, suggesting that seasonal shifts in benthic communities exceeded spatial variation.

Epi-benthic quadrat photographs revealed a 16% increase in sand cover at impact locations compared with the autumn survey, reflecting the mobile nature of sands in this part of Bass Strait. The increase in sand cover resulted in decreases in cover of both bare reef and algal communities. Sand cover was more temporally consistent at control locations, however bare reef cover increased at the latter locations due to a reduction in algal density. A reduction in algal cover was therefore experienced across the entire study area, and may reflect seasonal declines over winter that had not yet been replenished by new growth initiated in spring.

A total of 11 fish species was recorded during the baited video survey program, compared with 16 during the autumn survey. However, species recorded in autumn and not spring were recorded in very low numbers, and mean species richness per location was in fact identical for the two surveys. Species richness per impact, inner control and outer control subsets of locations increased in spring. Fish abundance more than doubled between autumn and spring, mostly due to a large increase in total numbers of Degen’s leatherjacket.

Analyses of variance (ANOVAs) revealed that spatial variation among impact locations and between impact and control locations was non-significant for algal cover variables, benthic infaunal abundance and fish species richness. Benthic infaunal species and family richness varied significantly among the impact locations, while family richness also differed between inner control and impact locations. Fish abundance varied significantly between the impact locations, due to elevated numbers at one location, but not between impact and control

locations. Given that most variables displayed no significant spatial variation in autumn, it is unclear whether the variation observed here is seasonally based, that is, being detectable primarily during spring, or is caused by changes over a non-seasonal temporal scale. Data from autumn and spring surveys in 2006 will help to address this question, and will be used to determine implications of spatial differences for post-operational analyses.

Repeated measures ANOVAs comparing autumn and spring data among impact locations detected declines in cover of red foliose algae, but no significant temporal variation in total algal cover, benthic infaunal variables or fish variables. Analyses comparing impact and control locations revealed significant temporal shifts in all biological variables assessed, reflecting declines in algal cover, benthic infaunal abundance and species/family richness and increases in fish abundance and species richness. However, in all analyses, temporal variation did not differ significantly between impact and control locations, suggesting that pre-operational data will provide a useful baseline against which post-operational effluent impacts may be assessed.

Power analyses performed using mean 2005 values derived from autumn and spring datasets found that the current design would be inadequate to detect a 100% change in benthic infaunal abundance in comparisons of impact and inner control locations. Similarly, changes of 100% in algal cover may not be detected as a significant impact in comparisons of impact and outer control locations. In these cases, the current survey design appears to provide inadequate sampling intensity and increased sample numbers are required to improve the statistical power of analyses. For other biological variables, detectable changes were relatively homogenous in comparisons of impact and inner control locations, ranging from 48.8% to 66.0% compared with mean 2005 baseline values. Greater variation was recorded in the impact versus outer control comparisons, with detectable changes ranging from 21.8% to 40.4% for benthic infaunal variables and 50.8% to 76.2% for fish variables. The question as to the adequacy of power for these variables remains unresolved until a regulatory ‘effect size’ is determined. However, initial assessments indicate that benthic infaunal species and family richness provide the most power for impact assessment. The next most powerful variables relate to fish metrics, while lowest power was recorded on average for algal variables and benthic infauna abundance. Assessments of variance distributions indicated that power would best be increased by sampling a larger number of sites or replicates for algal and fish variables, and either a larger number of locations or sites/replicates for benthic infauna variables.

The implications of the power analyses results for survey design adequacy should be assessed in light of the temporal scale of sampling to date. Temporal variation has only been assessed at one temporal scale in one year and may or may not be indicative of variation experienced at the temporal scale of the monitoring program. We recommend that more temporal data be collected prior to confirming the effect size and other power parameters with regulatory authorities and hence prior to determining if, and how many, additional samples may be required to achieve the prescribed effect size and power. For example, same-season annual variation could be less than seasonal variation, in which case comparisons at this scale will require less samples to achieve adequate statistical power. In the longer term, a more appropriate and cost-effective design could therefore be achieved by having a greater understanding of patterns of temporal variation. It is recommended that annual versus seasonal temporal comparisons be made following the collection of autumn and spring 2006 data. The urgency of confirming the final design depends on the anticipated date for commissioning of the outfall. RPDC (2004) recommend 2.5 years of pre-operational monitoring, and it is important that the design applied during that time is the final design to also be applied during post-operational monitoring.

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1 INTRODUCTION AND PROJECT BRIEF

The proposed Gunns Ltd Bleached Eucalyptus Kraft (BEK) pulp mill includes an effluent outfall that discharges 3 km offshore from Five Mile Bluff, to the east of Low Head on the Tasmanian north coast. The proposed trajectory of the effluent pipeline and location of the outfall diffuser, based on geographical coordinates provided by GHD, are illustrated in Figure 1 below.

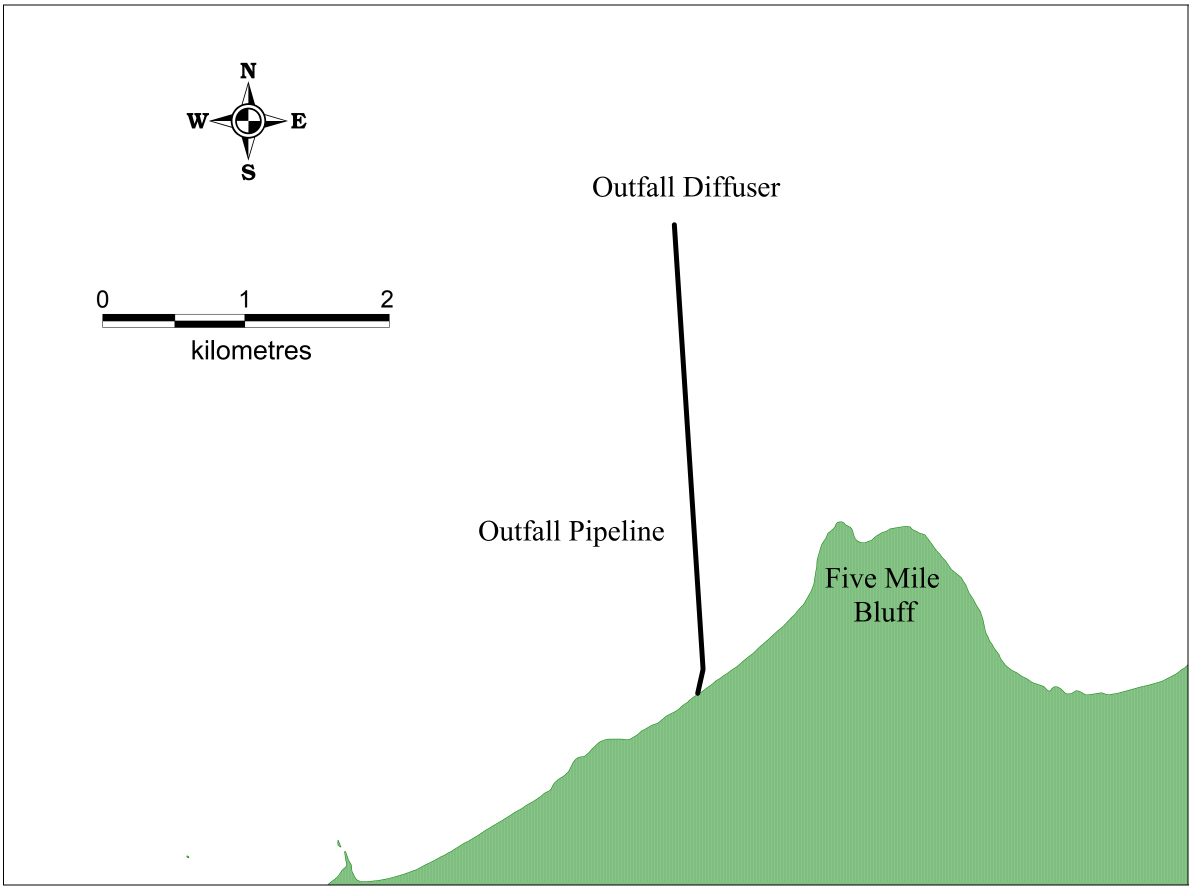

Figure 1 Map of the proposed outfall pipeline and diffuser site.

In accordance with the '*Recommended Environmental Emission Limit Guidelines For Any New Bleached Eucalyptus Kraft Pulp Mill In Tasmania*' (RPDC 2004), a marine ecological monitoring program is required to monitor the effect of BEK mill effluent on the marine environment. RPDC (2004) recommends that the methodology for the monitoring program should follow that described in the National Pulp Mills Research Program Technical report '*Protocols for designing marine ecological monitoring programs associated with BEK mills*' (Keough and Mapstone 1995) and should be based on a design agreed between regulatory authorities and the proponent.

Aquenal was commissioned by GHD to design and implement a pre-operational marine ecological monitoring program for the proposed Gunns Ltd effluent outfall in accordance with the recommendations of RPDC (2004). The survey design for the monitoring program was developed by Aquenal on the basis of RPDC (2004) and the recommendations of Keough and

Mapstone (1995). However, at the time of designing and conducting the current survey, there were some limitations and unknowns which were documented by Aquenal in their proposal prepared for GHD and Gunns Ltd and subsequently discussed with staff from the Department of Primary Industries, Water and Environment (DPIWE). These included the following:

- The effluent outfall location had been proposed, as mapped in the current document. However the suitability of this location had not been confirmed and therefore may be subject to review. If the proposed outfall location is deemed unsuitable and hence relocated, marine ecological survey sites will similarly need to be relocated.
- Keough and Mapstone (1995) recommended a pilot study prior to monitoring to determine the extent of natural variances and hence how many locations, sites and replicates are required to achieve the desired level of statistical power. However, timeframes dictated to Aquenal did not allow for a pilot survey. Therefore, the selected numbers of survey locations, sites and replicates were chosen on the basis of providing a level of replication considered likely to be appropriate for the scale of the project and on the basis of achieving a design that could be implemented within a realistic timeframe and budget. It currently remains unclear whether the 2005 surveys will ultimately form a component of the 2.5 years of monitoring required immediately prior to commissioning (as prescribed by RPDC 2004). If timeframes extend the commissioning date to beyond spring 2007, then the 2005 surveys or a component of them may effectively constitute pilot surveys. The availability of temporal pilot data is ideally required to confirm the appropriate intensity and distribution of sampling effort, since the statistical design of the monitoring program (see below) is based on detecting impact through comparisons of temporal variation between impact and control locations. Therefore the power of temporal comparisons, at temporal scales relevant to the longer term monitoring program and determined ultimately by regulatory authorities, is of primary importance in finalising the survey design. Note that for the purpose of the current report, the 2005 surveys will be referred to as ‘pre-operational surveys’, regardless of whether they form a component of the 2.5 years of monitoring immediately prior to commissioning.
- At the time of designing and conducting the current survey, the exact composition of the proposed effluent stream and the toxicity of effluent components had not been conveyed. Detailed modeling had not been conducted, such that the anticipated direction, spatial extent and magnitude of effluent dispersion and associated impact were also unknown. Similarly, no data was available on responses of different types of marine organisms to BEK mill effluent in this region; moreover, few data were available on natural variance in population density and composition for communities inhabiting this depth zone in Bass Strait. While the previous autumn 2005 survey provided information on spatial variance, no data were available on temporal variance, the key consideration for impact detection using the design recommended by Keough and Mapstone (1995). Given these limitations, the locations and distances from the outfall of impact and control sites were selected on the basis of generalised expectations for effluent dispersal, and will need to be reviewed once effluent composition is known and detailed modelling has been conducted.
- RPDC (2004) recommended that discussions be held with regulatory authorities to confirm the appropriate level of statistical power; this information is required to determine the relevant ‘effect size’ – ie what level of change is considered to represent an unacceptable impact. While a discussion was held with DPIWE regarding the marine ecological survey design, no decision had been made about effect size, or associated probability values for Type I and II errors and hence power, at the time of conducting the current survey. Similarly, the ‘mixing zone’ for marine ecological variables – the maximum distance from the outfall at which the above effect size would be considered acceptable – had not been

resolved. It has therefore been assumed that default probability values (i.e. conventional values adopted most frequently in the literature) will apply, and that the size of the mixing zone is 500 m. The impact detection sites have therefore been placed 500 m from the outfall. The design and statistical parameters may require future revision if further discussions with DPIWE or analyses of effluent composition and modelled dispersion do not support the above assumptions.

Given the above uncertainties, the locations of the marine ecological impact sites could only be positioned with relation to the anticipated outfall location, and distances between impact and control sites were based on unconfirmed assumptions regarding the spatial extent of the effluent impact. Due to the unknown extent of the mixing zone, natural variances and the other factors outlined above, Aquenal recommended that the distance of impact and control locations from the outfall, the span of sites within these locations, the span of replicates within sites and the numbers of control and impact locations, sites and replicates should be considered provisional. It was recommended that the survey design be re-assessed once power analysis had been performed on the pre-operational monitoring data, the effect size had been confirmed by regulatory authorities and information had become available on the anticipated direction, spatial extent and toxicity of effluent dispersed from the outfall.

The first pre-operational monitoring survey of the Gunns marine outfall site was conducted in autumn 2005. Survey data collected were analysed to assess spatial variation in marine biological variables and initial power analyses were performed to determine what level of spatial change could be detected by the survey design. However, the statistical design recommended by Keough and Mapstone (1995) and adopted for the Gunns outfall, the MBACI approach, assesses impact by comparing temporal variation between control and impact locations. The autumn 2005 survey report therefore emphasised that the full power analysis could not be conducted until temporal datasets were available.

The current survey, performed primarily in spring 2005, represents the second pre-operational monitoring survey. It was conducted six months following the first survey, in accordance with DPIWE's recommendations on survey frequency. These surveys form part of a longer term monitoring program, based on the recommendation of the RPDC (2004) that pre-operational data be collected over a period of at least 2.5 years. The current survey, combined with the autumn 2005 survey, provides a temporal dataset that allows a more detailed and relevant power analysis than previously performed using only autumn spatial data.

2 METHODS

2.1 Survey design

The marine ecological survey design implemented at the pulp mill outfall site is outlined schematically in Figure 2. The design was developed to meet the needs of the MBACI approach recommended by Keough and Mapstone (1995); further details of statistical procedures are outlined in Section 2.7. The design implemented in the current survey is identical to that applied during the autumn 2005 survey.

In each direction longshore from the outfall, two impact locations, each with a radius of ~ 100 m, were sampled at distances of 500 m from the outfall. An equal number of inner control locations (western inner controls – WIC1/2, eastern inner controls – EIC1/2), also with a radius of ~ 100 m each, were positioned 1.5 km from the outfall. Since the magnitude of impact was

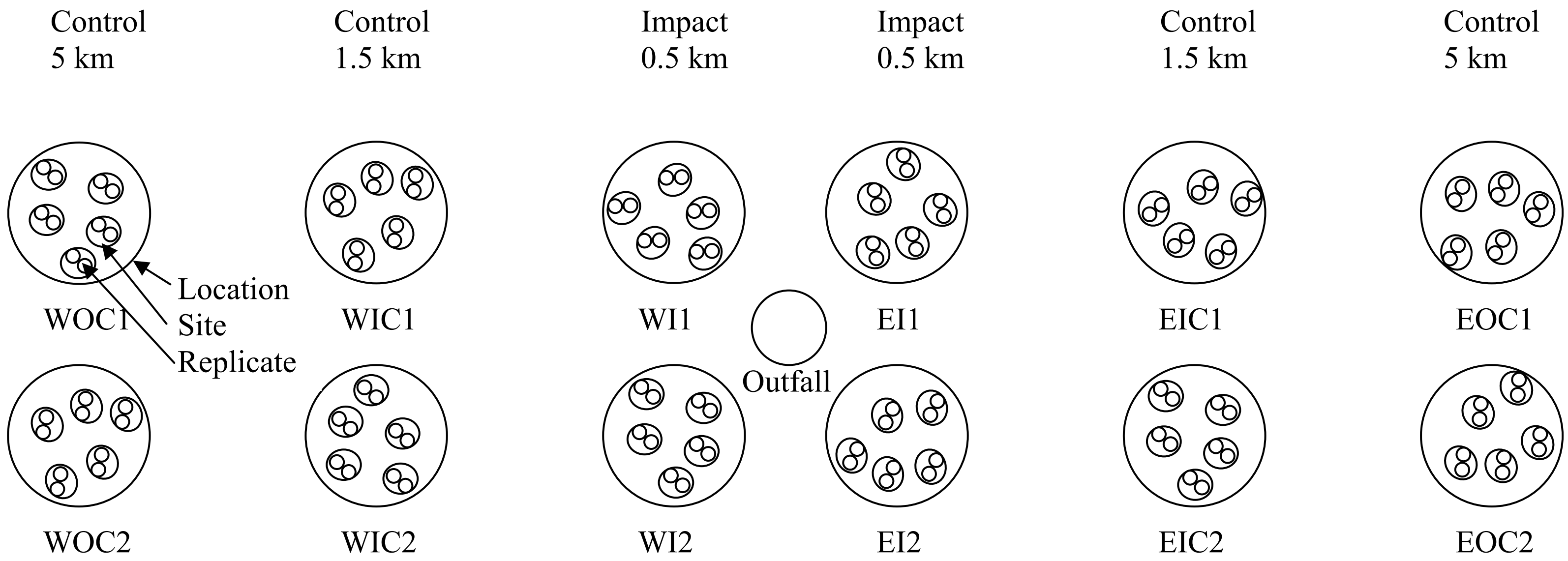

Figure 2 Schematic view of monitoring design. Approximate dimensions were 100 m radius for locations and 10-30 m radius for sites. Paired inner control and outer control locations, as well as paired impact locations, were located to the west and east of the outfall. All locations were distributed along the same approximate depth interval to minimise depth related effects and to account for the anticipated longshore dispersion of effluent.

unknown at the time of the survey, sampling was also performed at four outer control locations positioned 5 km from the outfall (western outer controls – WOC1/2, eastern outer controls – EOC1/2). These additional, more distant, control locations provide for the scenario that the inner control locations are subsumed within the impact zone during mill operation, since the biological ‘mixing zone’ remains unresolved at this stage. Within each impact and control location, five randomly positioned sites were sampled, each with two replicate samples located ~ 5 m apart for benthic infauna, 10 m for epi-benthic quadrat photographs and 30 m for baited fish video surveys. Locations were selected on the basis of minimising inter-location habitat heterogeneity, ensuring that the range of habitats present was represented at both the control and impact locations and including at least some areas of soft sediment, as the latter was a requirement for benthic infauna sampling (see below). The physical conditions of the impact and control locations were matched as closely as possible in accordance with the recommendations of Keough and Mapstone (1995). Control locations were placed at similar depths to the impact locations to minimise depth-related effects and to account for the anticipated longshore dispersion of effluent. Sites and replicates were positioned randomly within each location with the exception that benthic infauna samples had to be collected from areas of soft sediment.

On the basis of surveying two replicates per site and 5 sites per location at 12 locations, a total of 120 sampling points were surveyed.

The design described above allows for detection of impacts over two potential spatial scales: impacts over <1.5 km from the outfall, detected by comparisons between the impact and inner control locations; and >1.5 km but <5 km, detected by comparisons between the impact and outer control locations. If post-operational monitoring reveals the latter scenario, the inner controls would also effectively become impact locations. The inner controls have been included here because the control locations should be as proximate as possible to the impact locations to reduce geographical variation between the two and should also be as close as possible to the boundary of the biological mixing zone (as yet unspecified) defined by regulatory authorities. The design is capable of detecting impacts extending in a single direction from the outfall (e.g. where one or two impact locations are contrasted with the remaining impact and control locations), or impacts extending in both directions (e.g. where the four impact locations are compared with control locations).

Due to the unknown extent of the mixing zone and various other factors outlined in Section 1, the distance and direction of locations from the outfall are provisional and may require revision in light of new information on effluent dispersion and DPIWE requirements. Similarly, other aspects of the design may require modification on the basis of these factors or the results of statistical power analyses of marine ecological data. The latter analyses could not be completed prior to design of the current survey due to the absence of data on natural temporal variation in biological communities within the study area. The current study includes an assessment of statistical power using spatial and temporal data collected (as described in Section 2.7). The power estimates relating to temporal comparisons between impact and control locations are those most pertinent to the MBACI design.

Due to a lack of knowledge of the exact makeup of the effluent stream, the toxicity of effluent components, and which organisms are most susceptible to effluent discharged, variables selected for monitoring included those shown in previous studies to be susceptible to anthropogenic impacts. The abundance and diversity of benthic infauna and fish communities and the percentage cover of benthic epi-flora and epi-fauna (e.g. algae, sessile invertebrates) were each surveyed using the above design. In accordance with Keough and Mapstone (1995), the relative importance of the various biological indicators selected for monitoring should be reviewed and their viability as decision variables assessed once patterns of natural spatial and temporal variation have been assessed and initial comparisons of pre-operational and operational data conducted.

2.2 Overview and study sites

A field survey of the marine ecological impact and control locations was conducted in spring 2005, although one component of the work extended into summer 2005/2006, as described in Section 2.6. A range of sampling techniques was used to survey marine communities, including:

- grab sampling for benthic infauna
- quadrat photographs for benthic epi-flora and epi-fauna
- baited video surveys for fish

Specific field methodologies are described in sections below.

The locations and sites surveyed for benthic infauna are indicated in Figure 3 while those surveyed for fish and benthic epi-flora and epi-fauna are illustrated in Figure 4. These sites are identical to those surveyed in autumn 2005 and were re-located to within ~2 m of accuracy during the current survey using geographical coordinates (projection WGS84) recorded during the autumn survey. A list of the sites sampled, including site labels (consistent with Figures 2-4), depths, survey types conducted and geographical coordinates is provided in Appendix 1.

As stated in Section 2.1, the positions of the survey locations selected in autumn 2005 depended on a number of variables, including depth, availability of soft sediment for benthic infauna sampling and inter-location habitat homogeneity and representation. For example, the western inner control locations (WIC1/2; see Figures 3 and 4) needed to be moved further offshore than the eastern inner control and impact locations in order to incorporate some sandy habitat and achieve depths comparable to those at other locations. Further inshore, depths were reduced and the seabed in this area consisted only of rocky substrata or very shallow sands that were unsuitable for grab sampling and contrasted with the sandier habitats east of the outfall. The relocation of the western inner control locations further offshore not only made benthic infauna surveying feasible, but also allowed the inclusion of habitats more comparable to those recorded at the impact and eastern inner control locations.

In the case of epi-benthic quadrats and baited fish video surveys, there was no specific substratum requirement, and survey locations each had a radius of ~ 100 m, as described in Section 2.1. However in the case of benthic infauna sampling, more extensive searches were required at some locations to identify soft sediments deep enough for grab sampling. At three locations, WIC1, WIC2 and WOC2, it was not possible to identify five suitable benthic infauna sampling sites within a 100 m radius circle, and the geographical scale of the locations was expanded (see Figure 3).

The geographical separation of 'offshore' and 'nearshore' locations, depicted by the numbers 1 and 2 respectively in the location abbreviations (see Figures 2-4), was determined with two aims in mind. These locations needed to be a sufficient distance apart to constitute independent

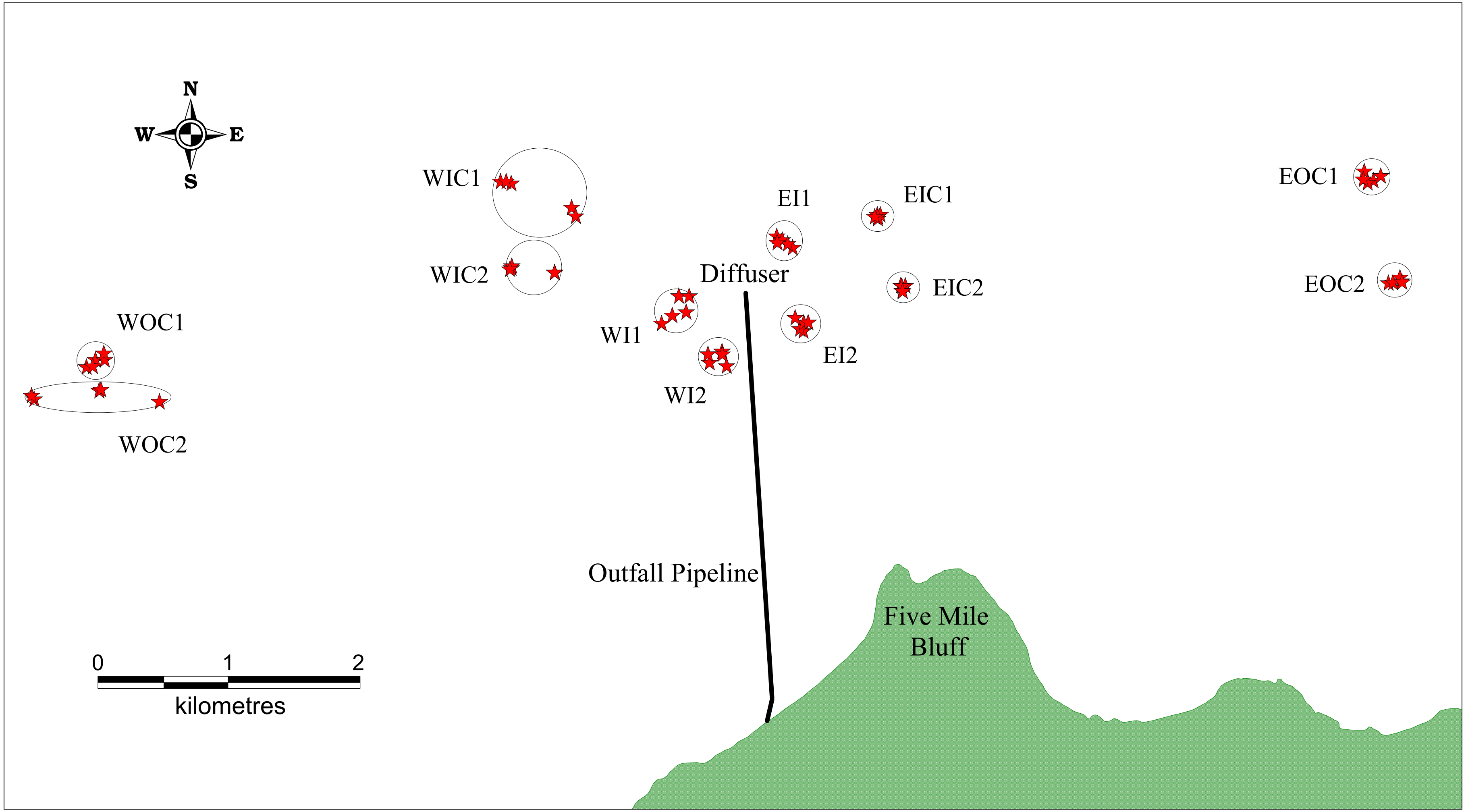

Figure 3 Map of sites (red stars) surveyed for benthic infauna at the impact and control locations (circled).

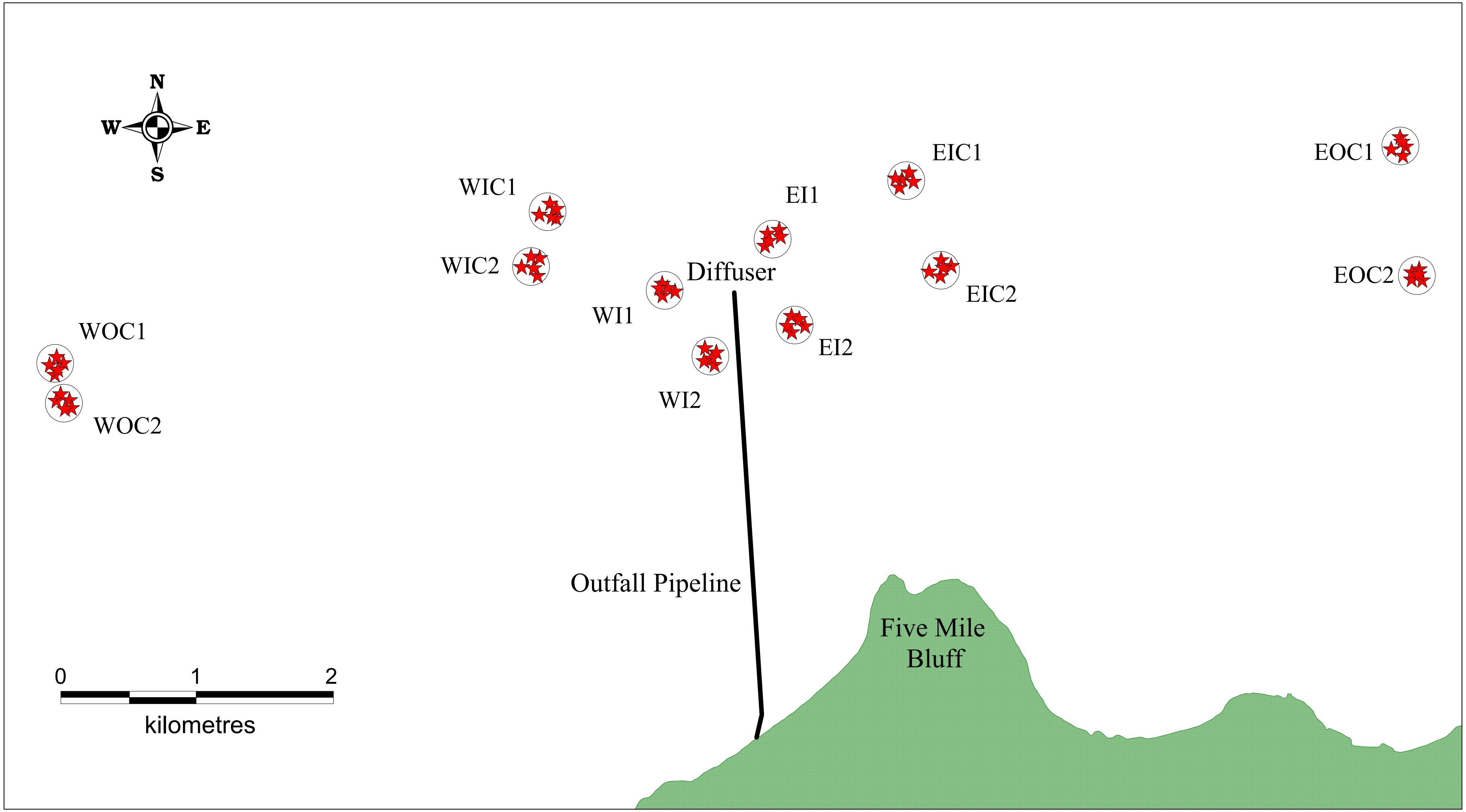

Figure 4 Map of sites (red stars) surveyed for fish and epi-benthic flora and fauna at the impact and control locations (circled).

sampling units, whilst being sufficiently proximate to avoid large variations in depth. It is not possible to completely avoid depth effects in this case, however the positioning of impact and control locations at similar depths standardises for the effects of this parameter. Depth ranges for sites selected were primarily 23 to 26 m at the nearshore locations and 27 to 29 m at the offshore locations (Appendix 1).

2.3 Benthic infauna

Benthic infauna sampling was performed during October-November 2005. Duplicate benthic infauna samples were collected at the sites illustrated in Figure 3 using a Van Veen grab, an apparatus that samples a 0.07 m^2 area of seabed during each deployment.

In areas dominated by low profile reef, remote sampling of soft sediments proved difficult without a method of being able to accurately detect small patches of soft sediment suitable for grab sampling. To overcome this, a remote video camera was attached to the grab line, positioned approximately 1 m above the grab itself. Output from the camera was transmitted by coaxial cable to a TV monitor on the boat. This enabled deployment of the grab apparatus, and hence collection of a seabed sample, when a sufficiently large area of soft sediment was revealed on the TV monitor.

The grab samples were washed through an aluminium funnel into polypropylene bags with a mesh size of 0.8 mm. The bagged samples were labelled and placed into a 20 L drum of 10% buffered formalin for a minimum of 3 days. In the laboratory, collected material was washed through a 1 mm sieve and the retained material was sorted under a dissecting microscope to separate animals from other material. The animals were subsequently counted and identified to the taxonomic level of family, with the exception of any introduced marine pests or threatened species (*Gazameda gunnii*), which were identified to species level. In addition, the number of species present per family was counted for each sample, without actually allocating names to the species. Whilst counts of species numbers for each sample were not included in the monitoring brief, this work was performed because it could be completed relatively quickly and provides an additional variable to be used in impact assessment. No cross checks were made between samples for this variable and hence data on number of species per family is only available at the level of sample, and not at site or location levels (the latter work would have been considerably more time consuming). Therefore, data generated for each sample included: a) number of families, b) abundance of each family and c) number of species present. All specimens were placed in labelled vials and preserved in 70% alcohol for longer term storage.

2.4 Sediment particle size

During grab sampling for benthic infauna (described in Section 2.3 above) sediment samples were also collected for particle size analysis, with one 77 ml jar of sediment collected per benthic infauna survey site (Figure 3). It is not proposed that particle size distributions be analysed using the MBACI design adopted for biological analyses. Instead, particle size distributions were recorded to assist with interpretation of benthic infauna data and to allow future identification of any gross changes in sediments in the vicinity of the outfall that may affect biological communities.

Sediment samples were returned to the Aquenal laboratory for determination of particle size distributions. For each 77 ml sediment sample, the material was washed through a stack of sieves by shaking them under a moderate water spray. The sieve aperture sizes used were 2 mm, 500 µm and 63 µm, and enabled separation of coarse material (gravel and other large debris), coarse sand, fine/medium sand and silt/clay. These aperture sizes are considered sufficient for monitoring changes in the fine grained (<63 µm) component of the sediments near the outfall and interpreting broad patterns of variation in benthic infauna communities.

For particle size analyses, sediments in each jar were first transferred to a 100 ml measuring cylinder containing 20 ml of water. The total sediment volume was determined and sediments were then poured through the set of sieves. Sediment particles retained on each sieve were drained and transferred back to the measuring cylinder, starting with the coarsest fraction and working through to the finest. The cumulative volume in the measuring cylinder was recorded after the contents of each sieve were transferred. The percentage by volume of each fraction was then calculated for the original sample. The combined percentage of measured fractions was subtracted from 100 to give the percentage of the <63 µm fraction.

2.5 Benthic epi-fauna and epi-flora

Surveys of benthic epi-fauna and epi-flora were performed during November 2005. These surveys were performed at sites illustrated in Figure 4 and involved the collection of duplicate quadrat photographs of the seabed at each site.

Photographs were taken using a Canon Power Shot A75 3.2 mega pixels digital camera in an underwater housing mounted in an aluminium frame above a 0.5 m^2 quadrat. The frame dimensions were designed to ensure that the quadrat filled the frame of the camera when it was switched on in standard mode. This resulted in the camera being 1.1 m above the seabed. The camera was triggered from the boat using an air-operated piston.

The area of seabed within the quadrat was illuminated using two 50 Watt lights mounted on the frame, and the site name was displayed in each photograph in the lower left corner of the quadrat. No distinction was made between the two duplicates at each site. The boat was navigated to the site, the camera lowered to the seabed and the first photograph taken. The camera was then raised off the seabed until the boat had drifted for approximately 10 m, and subsequently lowered back to the seabed to take the second of the duplicate photographs.

Photographs were downloaded and analysed to determine percentage cover of epi-fauna and epi-flora communities. Photographs were imported into Microsoft PowerPoint presentations, and a 7x7 grid created as an overlay (Figure 5). This grid provided 49 points of intersection on the photograph, with an additional point taken in the top right corner of the photograph to give 50 data points. The community or substratum at each point of intersection was described and calculated to represent 2% of the total area photographed. Communities and substrata were described using a standard set of descriptors (e.g. foliose red algae, encrusting red algae, *Sargassum* spp., ascidian *Herdmania grandis*, sand, cobbles), which were subsequently tallied to provide percentage cover for each descriptor, and therefore enabled quantitative analyses of epi-benthic communities.

In addition to providing quantitative data on epi-benthic biological community variables, the seabed quadrat photographs provide a methodology for monitoring the condition of the seabed. For example, a change from clean white-brown sands to grey-black sands is frequently associated with organic enrichment. The photographs therefore provide a qualitative visual detection tool as well as a method for assessing quantitative changes in biological variables.

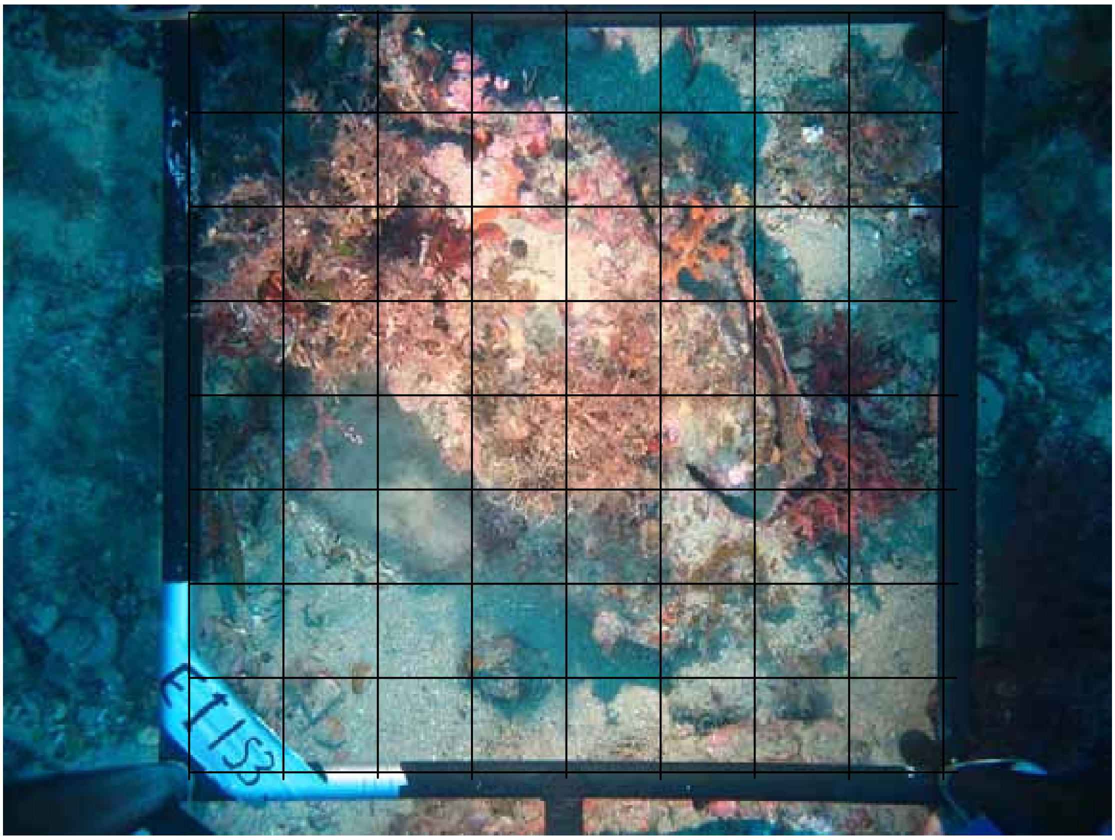

Figure 5 An epi-benthic quadrat photograph with a 7x7 grid overlay applied in Microsoft PowerPoint.

2.6 Fish

Surveys of fish were performed during December 2005/January 2006. While these were scheduled for spring 2005, the limited periods of suitable weather for work in Bass Strait prevented surveys being completed in spring. This was due primarily to a late start in field work, and earlier notification for suvey work to proceed will prevent future delays in work timetables.

Fish communities were surveyed using a baited underwater video technique described by Willis and Babcock (2000). Specific methodologies applied to the current survey are described in more detail below. The baited underwater video surveys were performed at the sites illustrated in Figure 4 (i.e. at the same sites as the epi-benthic quadrat photographs), with duplicate frames and remote video cameras deployed at each site.

The baited video system used in the previous autumn 2005 survey was revised to increase the efficiency of field operations. The system used in the current survey included four separate video units, each comprised of a Sony DCR-HC21E digital video camera recorder contained in a perspex waterproof housing. The housing was mounted on an aluminium stand such that its base was 1.41 m above the substratum when the unit was positioned on the seabed. At this height, the 0.5 m^2 frame base filled the field of view of the video recorder, which faced directly towards the seabed. A buoyed rope was attached to the frame so that it could be deployed from the boat, left to film and subsequently be retrieved. In each deployment, filming occurred for 15 minutes from the time the frame settled on the seabed. A bait bag was attached at 0.70 m from the substratum and at the centre of the camera's field of view, with its dimensions (height 25 cm, width 16 cm) used to estimate the size of fish in subsequent video analysis. The bag contained approximately 200g of standard fish bait consisting of a mixture of blue bait covered in tuna oil, and chunky sardine cat food. Atlantic salmon 'morts' used in the previous autumn 2005 survey were replaced by tuna oil in the current survey, since it was considered that the latter may have superior dispersion and fish attractant qualities. As indicated in the autumn survey report (Aquenal 2005), the timing of that survey did not allow for experimentation with bait types and hence some fine tuning of this component of the methodology was required.

At each site, two video systems were positioned so that they were approximately 30 m apart, with two sites being filmed simultaneously. A coversheet was filmed prior to the deployment of the camera frames, indicating date and site number to facilitate subsequent processing of video footage. The systems were deployed and retrieved in a 'leapfrog' fashion, their release being staggered so that by the time the fourth unit was positioned on the seabed, it was time to retrieve and reset the first and so on. This method proved less time consuming than that used in the autumn 2005 survey, and also allowed work to carry on in weather conditions that would have made the former method unworkable. The videos were set to record immediately prior to deployment and recording was stopped when the system was retrieved. This meant that a broad picture of the habitat was obtained as the frames were lowered towards and retrieved from the seabed, such that the resulting footage could assist with data interpretation. For example, a frame may land in a patch of sand in which reef fish are predominant due to the sand patch being surrounded by reef.

In the laboratory, video footage was analysed to determine the size, species composition and abundance of fish responding to the bait. Comparative abundance data was obtained by determining the maximum number of any one fish species in the field of view at one time, and calculating the total of these individual species tallies as an indicator of overall fish abundance. The time at which fish appeared in the field of view within the 15 minute survey period was also recorded to determine the time taken for fish to respond to the bait.

2.7 Statistical analyses

2.7.1 Analysis of variance (ANOVAs)

After reviewing a range of statistical designs for monitoring the impacts of Bleached Eucalyptus Kraft (BEK) pulp mill effluent on marine ecological communities, Keough and Mapstone (1995) recommended use of the MBACI design. MBACI expands on the original BACI (Before-After-Control-Impact) design by including multiple control and impact locations, denoted 'M' in the MBACI abbreviation, and surveying repeatedly before and after commissioning of the mill. This design measures impact by comparing temporal variation (before-after) between the control and impact locations.

Keough and Mapstone (1995) recommended the use of Analysis of Variance (ANOVA) procedures to analyse the MBACI data statistically, because the measurements in BEK mill monitoring programs are multi-factorial (treatment, location, sites etc). The precise ANOVA model to be used depends on how MBACI is applied to individual monitoring situations. Keough and Mapstone (1995) describe two options for re-sampling of locations on successive occasions; in the current monitoring program, the repeated measures approach is proposed, whereby the specific locations and sites (see Figures 3 and 4) are re-surveyed during subsequent pre-operational and operational surveys.

ANOVAs were applied in the previous autumn 2005 survey to assess spatial variation among the impact locations and between the control and impact locations. These analyses were used to assess the natural compatibility of the control and impact locations, since ideally these locations are biologically similar in the pre-operational phase (Keough and Mapstone 1995). The ANOVAs applied to autumn data were re-applied to data collected during the current survey to re-assess spatial variation. However, additional ANOVAs were applied here to assess temporal variation between autumn and spring, as described below. All ANOVAs and associated tests of assumptions were performed using Systat® Version 11.

Prior to analysis using ANOVAs, the Shapiro-Wilk test for normality and the Bartlett's and Levene's tests for equality of variances were applied to datasets. The latter two tests essentially perform the same function, however the Bartlett's test is sensitive to departures from normality, whilst Levene's test is comparatively robust. Therefore, where the Shapiro-Wilk test revealed non-normality in the data distribution, the results of Levene's test were adopted. Most types of data non-normality in themselves should not seriously affect the outcome of the analysis (Underwood 1981). Transformations were applied to datasets to homogenise variances where the adopted test for equality of variances produced significant results ($P<0.05$) or where assessments of data indicated that specific transformations would increase the homogeneity of variances. The biological variables analysed using the above models and data transformations applied are described in Section 3.

Three primary types of ANOVAs were performed on the spring data to assess spatial variation:

a) Comparisons of the four impact locations (WI1, WI2, EI1, EI2)
b) Comparisons of impact locations (as above) with inner control locations (WIC1, WIC2, EIC1, EIC2)
c) Comparisons of impact locations (as above) with outer control locations (WOC1, WOC2, EOC1, EOC2)

In the case of a), the ANOVAs were concerned with spatial variation among the four impact locations, whilst b) and c) were concerned with spatial variation between impact and control locations.

Note that because there were zeros in some data sets, replicate data were aggregated by taking the mean of the replicate samples for each site. The result of this data aggregation was five replicate values for each location surveyed. This approach of data aggregation was applied to the analysis of fish and epi-benthic algal datasets.

ANOVA models for the statistical comparisons conducted are provided below. Abbreviations are as follows:

SS = Sum of squares
MS = Mean square
df = Degrees of freedom
IC = Impact-Control
L = Location
S = Site
R = Residual

Of the three treatment factors included in models below, 'Impact-Control' was a fixed factor, and 'Location' and 'Site' were random factors.

In the case of comparison a) above, a one-factor ANOVA was applied as follows:

Source	df	Mean Square	F ratio
Location	(4-1) = 3	$SS_L/3$	MS_L/MS_R
Residual	4(5-1) = 16	$SS_R/16$	

In the cases of comparisons b) and c) above, two factor nested ANOVAs were applied as follows:

Source	df	Mean Square	F-ratio
Impact-Control	(2-1) = 1	$SS_{IC}/1$	$MS_{IC}/MS_{L(IC)}$
Location(Impact-Control)	2(4-1) = 6	$SS_{L(IC)}/6$	$MS_{L(IC)}/MS_R$
Residual	2*4(5-1) = 32	$SS_R/32$	

In this model, locations are nested in the main treatment factor, 'Impact/Control'.

Since data for the benthic infauna variables analysed (i.e. species richness, family richness, family abundance; see Section 3.1) did not contain zero values for individual samples, analyses were conducted for benthic infauna based on the original full survey design, without aggregation of replicate samples. This design included two replicate values for each site with five sites per location. For comparisons of the four impact locations, a two factor nested ANOVA was therefore applied as follows:

Source	df	Mean Square	F-ratio
Location	(4-1) = 3	$SS_L/3$	$MS_L/MS_{S(L)}$
Site(Location)	4(5-1) = 16	$SS_{S(L)}/16$	$MS_{S(L)}/MS_R$
Residual	4*5(2-1) = 20	$SS_R/20$	

In this model, sites are nested in the main treatment factor, 'Location'.

For comparisons between impact and control locations, three factor nested ANOVAs were applied to benthic infauna data as follows:

Source	df	Mean Square	F-ratio
Impact-Control	(2-1) = 1	$SS_{IC}/1$	$MS_{IC}/MS_{L(IC)}$
Location(Impact-Control)	2(4-1) = 6	$SS_{L(IC)}/6$	$MS_{L(IC)}/MS_{S[L(IC)]}$
Site[Location(Impact-Control)]	2*4(5-1) = 32	$SS_{S[L(IC)]}/32$	$MS_{S[L(IC)]}/MS_R$
Residual	2*4*5(2-1) = 40	$SS_R/40$	

In this model, locations are nested in the main treatment factor, 'Impact/Control', and sites are in turn nested in 'Location'.

In addition to the above ANOVAs investigating spatial variation, repeated measures ANOVAs were performed to assess temporal variation, as recommended by Keough and Mapstone (1995). Analysis of temporal variation was performed using datasets from the current survey and the autumn 2005 survey. As with the spatial ANOVAs, repeated measures temporal ANOVAs were used to compare variation among impact locations, and also between impact and inner control locations and impact and outer control locations. Note that for these analyses, ‘time’ is a fixed factor, ‘impact-control’ is also fixed, and ‘location’ is random. All analyses were performed using data aggregated across replicates for each site, since replicate samples were not performed at identical spots on the seabed in autumn and spring surveys and hence the ‘repeated measures’ approach only applies to site level data.

Output from the repeated measures analyses includes ANOVA tables for both ‘between subject’ and ‘within subject’ analyses; the latter is of primary interest here as it includes ‘time’ and interactions of ‘time’ with other treatments as factors in the model. The ANOVA tables for repeated measures analyses comparing impact locations were as follows:

‘Between Subjects’:

Source	**df**	**Mean Square**	**F-ratio**
Location	(4-1) = 3	$SS_L/3$	MS_L/MS_R
Residual	4*(5-1) = 16	$SS_R/16$	

‘Within Subjects’:

Source	**df**	**Mean Square**	**F-ratio**
Time	(2-1) = 1	$SS_T/1$	MS_T/MS_{TL}
Time*Location	1*(4-1) = 3	$SS_{TL}/3$	MS_{TL}/MS_R
Residual	4*(5-1) = 16	$SS_R/16$	

For repeated measures analyses comparing impact and control locations (inner or outer), the ANOVA tables were as follows:

‘Between Subjects’:

Source	**df**	**Mean Square**	**F-ratio**
Impact-Control	(2-1) = 1	$SS_{IC}/1$	$MS_{IC}/MS_{L(IC)}$
Location(Impact-Control)	2*(4-1) = 6	$SS_{L(IC)}/6$	$MS_{L(IC)}/MS_R$
Residual	2*4(5-1) = 32	$SS_R/32$	

‘Within Subjects’:

Source	**df**	**Mean Square**	**F-ratio**
Time	(2-1) = 1	$SS_T/1$	MS_T/MS_R
Time*Impact-Control	1*(2-1) = 1	$SS_{TIC}/1$	$MS_{TIC}/MS_{TL(IC)}$
Time*Location(Impact-Control)	2*(4-1) = 6	$SS_{TL(IC)}/6$	$MS_{TL(IC)}/MS_R$
Residual	2*4(5-1) = 32	$SS_R/32$	

It should be noted that temporal variation, in the context of the current monitoring program, consists of two components. Temporal variation in the current report is equivalent to ‘season’, since datasets from two different seasons in one year are being compared. Therefore the above repeated measures analyses are concerned with comparisons of seasonal variation among locations. However, future comparisons will also include annual comparisons for data collected during the same or different season. Therefore, either the repeated measures design will need to be modified to include ‘season’ and ‘year’ as separate factors, or it may be preferable to conduct separate repeated measures analyses for ‘autumn’ and ‘spring’ datasets. These options will be explored in more detail once the autumn 2006 data has been collected.

By convention, the chosen level of significance for effects in the above spatial and repeated measures ANOVAs was P = 0.05 (Underwood 1981). Where a significant result was obtained in the spatial analyses, the least square means were assessed and Tukey post-hoc tests conducted to determine which of the means being compared were the source of the significant variation. Post-hoc tests were not performed for repeated measures analyses, since they relate to the effect of ‘time’ and only two times were being compared.

2.7.2 Power analysis

Power analyses were performed using the Systat® Version 11 power analysis two-sample t-test and were repeated for two types of data comparisons: impact versus inner control locations, and impact versus outer control locations. Following the autumn 2005 survey, some preliminary power analyses were conducted using spatial data only. It was emphasised that, since the MBACI design is primarily interested in comparisons of temporal variation between impact and control sites, the most important aspect of power analysis could not be performed until at least two temporal datasets had been collected. The current report therefore includes a temporal power analysis using data from the two 2005 surveys. Note that this analysis relates to seasonal variation and may or may not be indicative of power in comparisons of same-season data for different years. Estimates of power may therefore differ from those obtained using same-season datasets, and it will be important to re-assess power estimates once 2006 autumn and spring datasets are available.

It should also be noted that a number of the parameter values required as input for power analyses need to be set by regulatory authorities. The parameters include α (=probability of Type I error, where the null hypothesis of no difference is falsely rejected), power (=1-β; β is the probability of a Type II error, where the null hypothesis of no difference is falsely accepted) and effect size (= level of change in populations which is considered to denote an impact). While group means and standard deviations observed during the autumn 2005 and current surveys can be utilised as input for power analyses of temporal (seasonal) variance, values for the above parameters have not yet been determined by regulatory authorities. Therefore, for the purpose of the current power analyses, the default values of α=0.05 and power = 0.8 were selected, since these represent the most widely applied conventions. Effect size requires further discussion, and was not proposed as a set percentage change in the current power analyses. Instead, the power analyses were used to determine the level of change that could be detected using the current survey design based on the α and power values above and the mean and standard deviation values calculated from survey data. Note that means and standard deviations for all biological variables (species richness, abundance etc) were determined using untransformed data.

Ultimately, a balance may be required among the α and power levels, effect size and cost issues, depending on the level of natural variance, as described by Keough and Mapstone (1995). For example, if effect sizes determined by regulatory authorities require the collection of an extremely high and unmanageable number of samples, then the option of reducing the prescribed power (1- β) level may be discussed. Such issues should be resolved following the 2006 autumn or spring surveys, at which time power analysis data will be available for temporal, including seasonal and annual, aspects of the design.

For the purpose of the power analyses conducted here, the assumption was made that the true means for control and impact locations were similar, hence it was best to use data from both control and impact locations when calculating the standard deviation between locations. The standard deviation is an important input parameter for the power analyses. This assumption was considered reasonable given that the mill was not operational and the 'impact' treatment was a temporal control, and was supported by results of the majority of the ANOVAs (see Section 3). Although sample means displayed variation, differences between impact and control locations were non-significant in most analyses. Therefore, the method of calculating means and standard deviations required as input for power analysis was as follows:

Mean values were initially derived for each location at each time using aggregated data; this involved taking a mean across the five aggregated site values. This resulted in four means for impact locations and four means for control locations (inner or outer) for each of the two surveys. Mean 2005 values were then calculated from the autumn and spring means to produce one set of values for the four impact locations and four control locations (inner or outer). Applying the assumption that there is no difference between the impact and control locations, mean change and associated standard deviation was subsequently calculated across all 8 locations (four impact, four control), the latter value to be included in the power analysis. The first mean entered as input for power analysis was in fact zero, since the assumption was that there would be no temporal change. The standard deviation calculated above was entered directly as input, and a second mean was entered into the power analysis that reflected a change in the biological variable being assessed (e.g. abundance, percentage cover, species richness or family richness), compared with the assumption of zero change. This second mean change value was adjusted until the analysis indicated that the current number of survey locations (i.e. four per treatment, eight in total for both the impact/inner control and impact/outer control comparisons) was adequate to detect it as being significant. The changes that can be detected by the current design, based on the probabilities entered into the power analysis, were recorded as changes in numbers of individuals and species/families, or changes in percentage cover. In the previous autumn 2005 survey, it was assumed that impacts would be reflected by declines in biological variables, however it is more appropriate that both declines and increases be considered as possibilities. For example, while fish numbers may decline in the vicinity of the outfall, in some instances fish are known to be attracted to mill effluents and hence may increase in number (e.g. Aquenal 2001). Changes in numbers of individuals and other paramete variables were converted to a percentage change, positive or negative, using the mean of autumn and spring means as a baseline.

Following the 2006 pre-operational monitoring surveys, discussions will be required to determine if the current design is adequate to meet regulatory requirements. If adjustments are needed, it will be useful to understand the importance of the different sampling spatial scales to statistical power, as reflected by the levels of variance these spatial scales contribute. As described above, power analysis utilises mean values derived across spatial and temporal scales, and therefore does not provide recommendations on sample numbers required at different spatial scales. Where an increase in power is required through the collection of additional samples, sample numbers should theoretically be increased at the spatial scale that contributes the most natural variance. For example, if the majority of the variance was at the level of site, rather than at the level of location, then increasing the number of sites will be more effective in increasing power than will be increasing the number of locations. This will have the effect of reducing the standard error of the mean, thereby increasing the power of the analysis. To get some indication of the spatial distribution of variance in data collected thus far, variances at different spatial scales were calculated from ANOVA mean square values. These calculations were previously performed following the autumn 2005 survey, but at that time were limited to assessments of spatial variance data. Calculations here were based on temporal variation and were performed by re-running the ANOVAs described in Section 2.7.1 using 'change' data. Change was determined by deducting spring 2005 values from autumn 2005 values and was calculated at the level of site, since replicates were not collected at identical spots on the seabed from one survey to the next. Therefore, assessments of the distribution of variance in 'change' could only be performed for aggregated data.

An example of the variance calculations is provided below using the two-factor nested model applied to aggregated data.

The model for this analysis was as follows:

Source	df	Mean Square	F-ratio
Impact-Control	(2-1) = 1	$SS_{IC}/1$	$MS_{IC}/MS_{L(IC)}$
Location(Impact-Control)	2(4-1) = 6	$SS_{L(IC)}/6$	$MS_{L(IC)}/MS_R$
Residual	2*4(5-1) = 32	$SS_R/32$	

Mean square estimates for the terms in the model were as follows (where IC = Impact-Control, L = Location, R = Residual):

$IC_{IC} = 8\sigma^2_{IC} + 2\sigma^2_{L(IC)} + \sigma^2_R$

$L(IC)_{L(IC)} = 2\sigma^2_{L(IC)} + \sigma^2_R$

$R_{R[L(IC)]} = \sigma^2_R$

As displayed by the above formulas, the variance at the level of Impact-Control includes variance at that level as well as variance at the levels of location and site (residual), while variance at the level of location includes variances derived from locations and sites. Therefore, to isolate variance contributed by individual spatial scales, variance derived from other spatial scales was deducted from the mean square values. An example is provided below, using the above model.

Mean square values obtained from the ANOVA table were, for example:

Source	Mean Square
Impact-Control	168.242
Location(Impact-Control)	74.621
Residual	62.382

Therefore, variances contributed by the individual spatial scales were as follows:

Impact-Control = (168.242 – 85.621)/8 = 10.328
Location = (74.621 – 62.382)/2 = 6.120
Site = 62.382

In the above example, the majority of the variance was explained by differences at the level of site (residual), indicating that statistical power would best be increased by sampling a larger number of sites. It should be noted that, because data was aggregated across replicates at each site, variance contributed by site in the above model in fact includes variance at both the levels of site and replicate. Therefore, increasing the number of sites or replicates may be the most effective method of increasing statistical power of the design.

The above variance calculations were performed for the analyses involving benthic infauna, epi-benthic biota and fish metrics to assess spatial distributions of variance. The results of these calculations will provide guidance should any design modification be required on the basis of power analyses and resulting regulatory guidelines. It is important that the distribution of variance be assessed in light of temporal variation, and while this has been achieved here by analysing variance in 'change' between autumn and spring 2005, this change comprises seasonal variation only. As indicated in Section 2.7.1, annual change assessed during the same season may differ from seasonal variation and hence the distributions of variances should be re-assessed following the 2006 autumn and spring surveys.

Note that it is not conventional to perform the above calculations using data that has been log transformed. Therefore 'change' was derived using untransformed data and was also imported into ANOVAs without transformation.

2.7.3 Other statistical analyses

A variety of additional univariate and multivariate statistical methods was applied to the benthic infauna data using Primer® (Carr 1996) Version 5.2.2. In contrast to the MBACI approach and the ANOVAs described in Section 2.7.1, these techniques were not concerned with delineating the statistical significance of variation between control and impact locations. Their application was instead to provide supplementary tools for the interpretation of patterns of spatial and temporal variation.

Species richness (i.e. number of species present), family richness (i.e. number of families present) and family abundance (i.e. number of individuals per family) of benthic infauna communities were investigated using the ANOVA models described above in Section 2.7.1 (refer to Section 3.1). The following indices were calculated to provide additional information on benthic infauna diversity at the locations surveyed, and were applied to the family-level data:

Diversity (Shannon-Wiener), $H = -\sum_i \rho_i(\log \rho_i)$
Where H is a measure of family richness with regard to the proportion of the total count contributed by each family. i.e. ρ_i is the proportion of the total count arising from the $_i$th family.

Dominance (Simpson's), $D = 1/\sum pi^2$
Similar to H, D measures of 'evenness' of the community from 0 to 1 using calculations of the percentage of each family present in the samples; the inverse of D was calculated in order to maintain a consistent mathematical relationship with family richness.

Richness (Margalef's), d = (F-1)/log N
Where d is a measure of the number of families (F) present for a given number of individuals.

K-dominance curves were also calculated for benthic infauna samples. K-dominance curves rank the families collected at each site from most abundant to least abundant and allow easy determination of levels of faunal dominance. K-dominance curves provide a useful indicator of benthic infauna community health, with large y-intercept values and steep curves indicative of high levels of faunal dominance and hence low levels of community health.

Multivariate analysis included cluster analysis and multi-dimensional scaling (MDS) in order to produce the best graphical depictions of faunal similarities between samples. For these analyses, the data matrix showing total abundance of families at each location was double root-transformed and then converted to a symmetric matrix of biotic similarity between pairs of locations using the Bray-Curtis similarity index. These procedures follow the recommendations of Faith *et al*. (1987) and Clarke (1993) for data matrices with numerous zero records (i.e. zero records for particular taxa). The usefulness of the two dimensional MDS display of relationships between sites is indicated by the stress statistic, which if <0.1 indicates that the depiction of relationships is good, and if >0.2 that the depiction is poor (Clarke 1993). Following application of MDS analysis, Simper analyses were conducted to ascertain which families had contributed most to patterns of similarity observed in the MDS plot.

Note that the above methods applied in Primer® to benthic infauna data were not used for the analysis of epi-benthic quadrat photographs or baited fish video analyses. A requirement for MDS analyses is that no samples contain zero values (although zero records for particular taxa may exist, as referred to above for MDS analyses), a condition that was not met in the epi-benthic quadrat and baited fish video surveys. Epi-benthic quadrat surveys do not produce data of appropriate taxonomic resolution for the diversity indices or K-dominance plots, whilst large numbers of zero results and low species richness in the baited fish video surveys either prelude or reduce the value of these analyses.

3 RESULTS

3.1 Benthic infauna

The full set of benthic infauna results, indicating abundances of families and number of species per family for each sample collected is included in Appendix 2 (abundances of families) and Appendix 3 (numbers of species per family). A summary of this data is provided in Table 1 below, where total numbers of individuals (abundance) and families are presented by Phylum for each impact and control location. The results at each location are based on pooled data for ten samples (i.e. two replicates each at five sites). Total number of species could not be calculated for each location by Phylum or otherwise, since this variable was recorded only at the level of sample, and species totals could not be generated for sites or locations (refer to Section 2.3). Instead, the mean number of species per sample was calculated for each location, as presented in Table 1. This involved calculating mean species number per family across all ten samples at each location and then tallying the mean values for families to give total mean numbers per Phylum. Note that all identified specimens of Phylum Arthropoda belonged to Subphylum Crustacea.

Table 1 Total numbers of individuals and families, and tallied mean numbers of species per sample, for each Phylum at control and impact locations.

Taxa	EI1	EI2	WI1	WI2	EIC1	EIC2	WIC1	WIC2	EOC1	EOC2	WOC1	WOC2
TOTAL NUMBER OF INDIVIDUALS												
Brachiopoda	0	0	1	0	1	0	1	0	0	0	0	1
Chordata	2	0	1	0	0	0	1	1	0	0	1	0
Cnidaria	1	3	0	1	0	0	0	0	2	2	1	0
Arthropoda	285	245	240	150	340	258	151	225	452	232	119	183
Echinodermata	7	21	5	9	12	2	4	2	11	0	12	7
Echiuroidea	0	0	0	0	0	0	0	1	0	0	0	1
Sipunculidea	0	0	0	0	0	1	1	0	0	0	0	0
Mollusca	35	46	30	10	31	20	30	10	108	37	38	31
Nematoda	3	0	1	2	2	6	2	50	0	1	0	42
Nemertea	8	2	3	11	18	7	11	35	7	13	3	16
Platyhelminthes	0	0	0	0	0	0	4	2	0	0	0	1
Annelida (Polychaeta)	59	7	39	16	82	118	73	158	67	43	27	161
Annelida (Oligochaeta)	2	2	1	1	0	2	6	2	0	0	2	7
Porifera	0	0	1	0	3	1	0	1	0	0	0	1
TOTAL	402	326	322	200	489	415	284	487	647	328	203	451
TOTAL NUMBER OF FAMILIES												
Brachiopoda	0	0	1	0	1	0	1	0	0	0	0	1
Chordata	1	0	1	0	0	0	1	1	0	0	1	0
Cnidaria	1	2	0	1	0	0	0	0	1	2	1	0
Arthropoda	29	18	25	18	25	37	29	28	27	30	19	31
Echinodermata	1	1	2	2	2	1	1	1	1	0	1	2
Sipunculidea	0	0	0	0	0	1	1	0	0	0	0	0
Echiuroidea	0	0	0	0	0	0	0	1	0	0	0	1
Mollusca	14	11	13	7	6	8	12	6	15	11	13	10
Nematoda	1	0	1	1	1	1	1	1	0	1	0	1
Nemertea	1	1	1	1	1	1	1	1	1	1	1	1
Platyhelminthes	0	0	0	0	0	0	1	1	0	0	0	1
Annelida (Polychaeta)	13	6	11	9	17	16	15	21	20	15	13	24
Annelida (Oligochaeta)	1	1	1	1	0	1	1	1	0	0	1	1
Porifera	0	0	1	0	1	1	0	1	0	0	0	1
TOTAL	62	40	57	40	54	67	64	63	65	60	50	74
MEAN NUMBER OF SPECIES PER SAMPLE												
Brachiopoda	0	0	0.1	0	0.1	0	0.1	0	0	0	0	0.1
Chordata	0.1	0	0.1	0	0	0	0.1	0.1	0	0	0.1	0
Cnidaria	0.1	0.2	0	0.1	0	0	0	0	0.1	0.2	0.1	0
Arthropoda	10.9	8.9	11.9	7.1	12.7	12.7	9.8	9.7	16.3	11.4	7.8	9.4
Echinodermata	0.4	0.8	0.5	0.5	0.7	0.2	0.2	0.2	0.6	0.1	0.6	0.5
Sipunculidea	0	0	0	0	0	0.1	0.1	0	0	0	0	0
Echiuroidea	0	0	0	0	0	0	0	0.1	0	0	0	0.1
Mollusca	2.7	1.8	2.3	0.8	2	2.3	2.1	0.8	4.6	2.7	3.6	2.2
Nematoda	0.2	0	0.1	0.1	0.2	0.4	0.4	1.3	0	0.1	0	1.2
Nemertea	0.6	0.2	0.3	0.5	1.2	0.7	0.7	1.2	0.3	0.9	0.3	0.9
Platyhelminthes	0	0	0	0	0	0	0.4	0.2	0	0	0	0.1
Annelida (Polychaeta)	4.6	0.7	3.3	1.4	6.2	4.7	6	8.4	5.6	3.7	2.5	10.2
Annelida (Oligochaeta)	0.2	0.2	0.1	0.1	0	0.1	0.1	0.2	0	0	0.2	0.2
Porifera	0	0	0.1	0	0.3	0.1	0	0.1	0	0	0	0.1
TOTAL	19.8	12.8	18.8	10.6	23.4	21.3	20	22.3	27.5	19.1	15.2	25

A total of 4554 animals was collected during the spring 2005 benthic infauna sampling program, with these animals representing a total of 140 families, compared with 7199 animals and 163 families during the autumn 2005 survey. Crustaceans (Arthropoda) were by far the most abundant group (2880 individuals), followed by polychaetes (850) and molluscs (426). Animal abundance at locations varied from 200 to 647, at a mean value of 380 per location, compared with a mean of 600 per location in autumn 2005. Total abundance for impact locations was 1250, whilst at inner control locations it was 1675 and at outer control locations it was 1629. This indicates relatively even animal abundances across the three location categories, in contrast to autumn 2005 when total faunal abundance at inner controls was approximately twice that recorded at impact and outer control locations.

Of the 140 families collected, 56 belonged to the Crustacea, 33 each belonged to the Mollusca and Polychaeta, and the remaining 18 represented other taxa. The total number of families at locations ranged from 40 to 74, at a mean value of 58 per location, compared with a mean of 69 in autumn 2005. At the four combined impact locations a total of 97 families was recorded, whilst totals of 105 and 108 were recorded at inner and outer control locations respectively. Therefore numbers of families recorded were comparable among the impact, inner control and outer control sets of locations, similar to the results for autumn 2005.

Mean number of species per sample, based on tallied means for families and subsequently phyla, ranged from 10.6 to 27.5 at a mean value of 19.7, compared with a mean value of 24.8 in autumn 2005. At impact locations, the mean number of species per sample ranged from 10.6 to 19.8 at a mean of 15.5, whilst at inner controls values ranged from 20.0 to 23.4 at a mean of 21.8 and at outer controls from 15.2 to 27.5 at a mean of 21.7. These results indicate that numbers of species per sample were comparable at the inner and outer control locations and slightly reduced at impact locations.

Patterns of variation in benthic infauna communities were assessed further using a range of univariate and multivariate analyses applied to family-level data. Given the large number of samples collected, the analyses and figures described below are based on data pooled for locations to facilitate graphical illustration.

The results of MDS analysis for spring data are presented in Figure 6. The low stress statistic associated with the MDS plot (0.1) indicates an accurate depiction of relationships among locations. The major groupings in the plot display associations with position along the coast, since the four impact locations formed a broad group in the top section of the plot, while the eastern control locations formed a relatively tight group in the bottom right section. Three of the four western control sites also exhibited a high level of similarity, whilst the fourth, WOC1, was highly differentiated from all other locations. There was a higher similarly between eastern and western control locations than between either set of control locations and the impact locations, despite the geographical separation of the eastern and western controls. A similar finding was documented for the autumn 2005 survey, and may be due to the larger sand beds located in the vicinity of the impact locations. Position along the coast appeared to be more important in patterns of similarity than depth, although this is consistent with the fact that depths vary only ~3 m between ‘offshore’ and ‘nearshore’ locations. The autumn 2005 survey did detect some groupings between distant locations positioned at the same depth, but like the current survey, concluded overall that there was no clear association of benthic infauna with ‘offshore’ or ‘nearshore’ locations.

Simper analysis revealed that the crustacean families Apseudidae (Tanaidacea), Phoxocephalidae (Amphipoda), Urohaustoriidae (Amphipoda) and Leptochelidae (Tanaidacea) contributed most to differences between impact and control locations in Figure 6. The Apseudidae were considerably less abundant at impact locations than at controls, a finding consistent with the results of the autumn 2005 survey, while the Phoxocephalidae were also more common at the controls. In contrast, the Urohaustoriidae and Leptochelidae were more common at the impact locations, although all four of the above families were widespread at impact and control locations. The Apseudidae and Phoxocephalidae also contributed largely to the separate groupings of eastern and western control sites in the MDS plot. These two families, in addition to the crustacean taxa Diastylidae (Cumacea) and Ostracoda, were more abundant at the eastern controls than at the western controls. The outlying western control location WOC1 was differentiated from other locations primarily as a result of the absence of the Phoxocephalidae, a family that was common elsewhere, and the increased abundance of the Diastylidae. A wide range of additional families contributed to the patterns of variation observed.

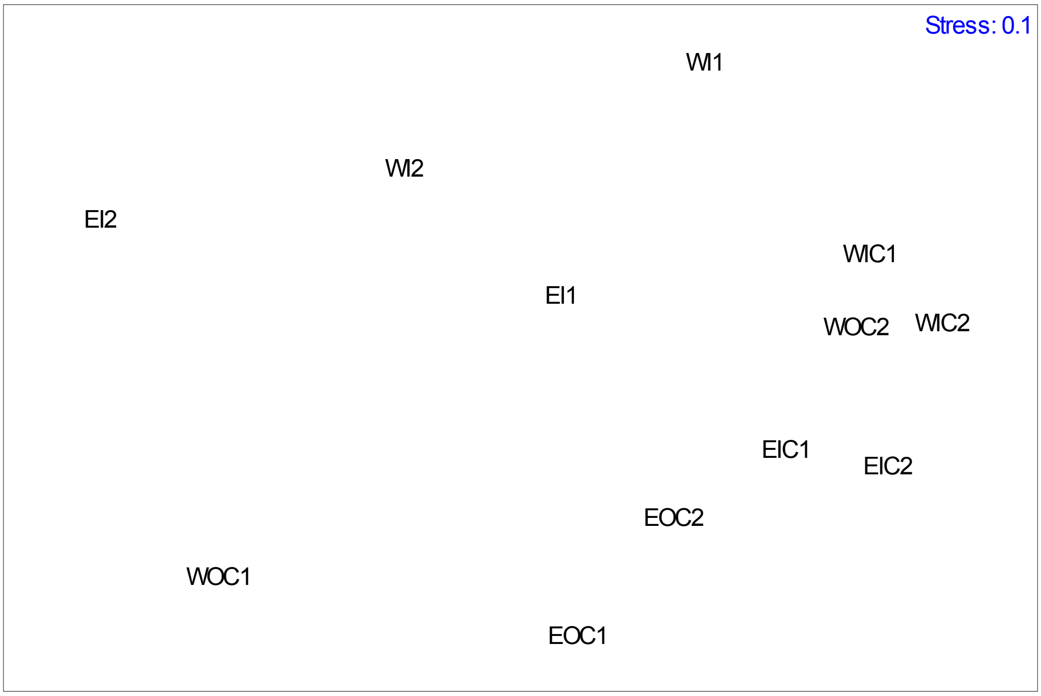

Figure 6 MDS plot depicting patterns of benthic infaunal similarity among locations in spring 2005 data.

The MDS analysis was re-run using location data for both spring and autumn 2005. The results of this analysis are presented in Figure 7, with the stress statistic for the MDS plot (0.15) indicating an acceptable depiction of relationships among locations/times. The two major groupings in the plot reflect seasonal variation, since the autumn data formed a group on the left and the spring data a group on the right. Simper analysis suggested that seasonal differences were primarily due to the reduced abundance of the crustacean families Apseudidae and Diastylidae in spring, although smaller changes in the abundance in a wide range of other families also contributed to seasonal differences observed. The results in Figure 7 suggest that in terms of the precise composition of benthic infauna communities, seasonal variation exceeds spatial variation within the study area.

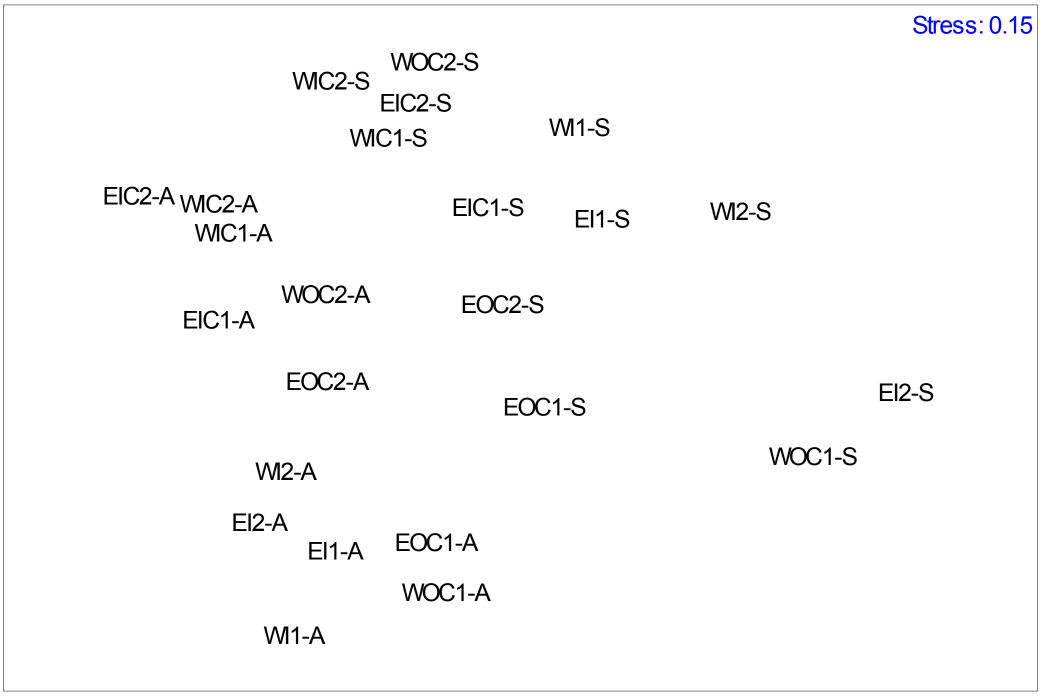

Figure 7 MDS plot depicting patterns of benthic infaunal similarity among locations in autumn (A) and spring (S) 2005 data.

K-dominance curves for the individual impact and control locations are presented in Figure 8. The y-intercept in this plot represents the percentage of the benthic infauna numbers at each location contributed by the most abundant family, with high values indicative of elevated faunal dominance. Across all locations, y-intercept values ranged from approximately 10 to 20%, with the exception of EIC1, which recorded an intercept value of ~ 30%. The latter value is indicative of higher faunal dominance, in terms of benthic infauna families, at EIC1 than at other locations. This is consistent with the results of the autumn 2005 survey, which also reflected higher dominance at EICI. The slopes of the K-dominance curves provide additional information on faunal dominance, with steeper curves reflecting dominance by a small number of taxa. In the current survey, the curves reflect similar patterns of dominance among locations to the y-intercept values, with the exceptions of EI2 and EIC1. Whilst having an elevated y-intercept value and higher dominance over the first 5 species than other locations, the remaining section of the EIC1 curve incorporating the 6th most common and less common species is comparable to curves for other locations. Conversely, location EI2 had a low y-intercept value but steep curve slope, indicating higher dominance than other locations among less common taxa.

The K-dominance curves depicted in Figure 8 are indicative of biologically diverse, undisturbed conditions. The y-intercept value for EIC1 was 50% during the autumn survey, a value more typical of a disturbed environment, but had reduced to 30% in the current survey. In both surveys the remaining assemblages at this location included a large number of low-abundance familes, synonymous with undisturbed conditions. The high y-intercept value at this location in autumn was caused by a very high abundance of the crustacean family Apseudidae (Tanaidacea). Many tanaids are ephemeral in nature, occurring in potentially high densities and subsequently disappearing altogether, without necessarily reflecting changes in environmental condition. The Apseudidae still had elevated numbers at EIC1 during the current spring survey and was the most abundant family at this location, however numbers were approximately one third those recorded in the previous autumn survey (i.e. 148 versus 426).

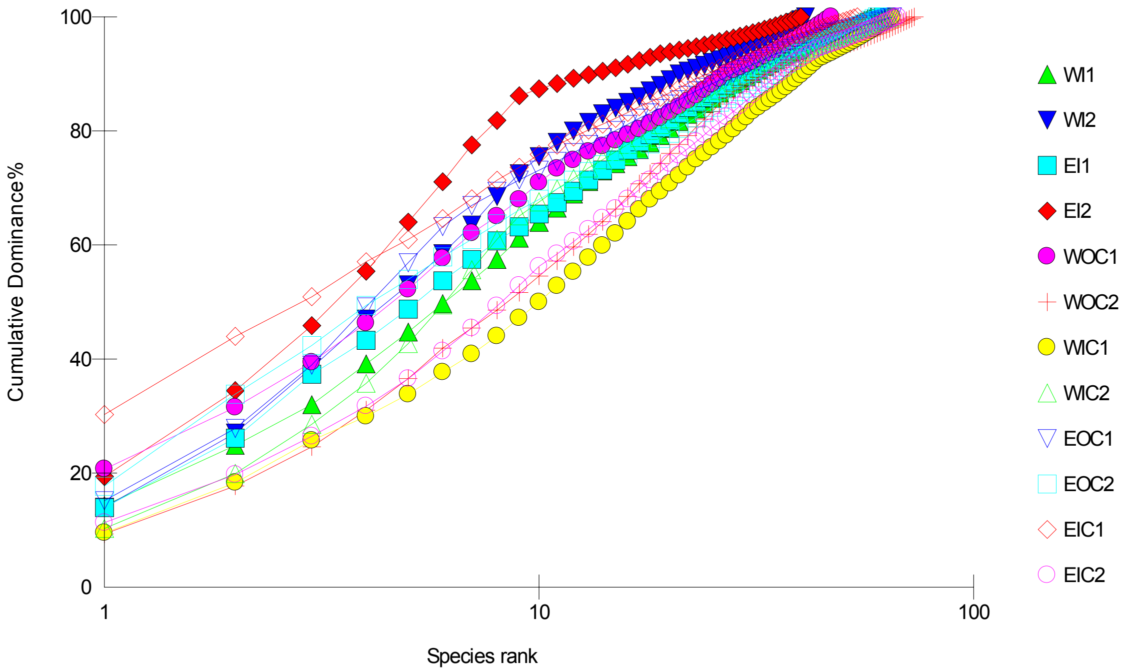

Figure 8 K-Dominance curves for impact and control locations, based on pooled data for samples collected at each location.

Values for diversity indices are illustrated graphically in Figure 9 in conjunction with data on total abundance ('number of individuals') and number of families at each location. Comparisons among impact, outer control and inner control locations found abundances to be relatively even across these three location categories (see earlier in this section). However, within these categories, there was considerable variation in animal abundance, with the highest abundance at EOC1 being approximately three times the lowest abundances recorded at WI2 and WOC1 (Table 11). Numbers of families were consistent across the control locations, with the exception of a noticeable reduction at WOC1, but were more variable at the impact locations. At the 'offshore' locations WI1 and EI1, numbers of families were comparable to those at the majority of the control sites, while the nearshore locations WI2 and EI2 recorded reduced numbers of families.

The Shannon-Wiener diversity index displayed little variation across the locations surveyed, but was reduced at EI2, an impact location that also had relatively low animal and family numbers (Table 11). A similar result was observed for Margalf's richness index, with consistent values across most control sites and the 'offshore' impact locations, and reduced values at the 'nearshore' impact locations WI2 and EI2. Inverse Simpson's dominance index, which measures 'evenness' of the community, displayed more variation. While values were again reduced at WI2 and EI2, they were also reduced at a number of control locations, particularly EIC1. This is consistent with the K-dominance analysis, since the two locations displaying the highest dominance values in that analysis, EIC1 and EI2, also recorded the lowest inverse

Simpson's values. As can be seen from Figure 9, there is no clear relationship between diversity or dominance and position along the coast or depth.

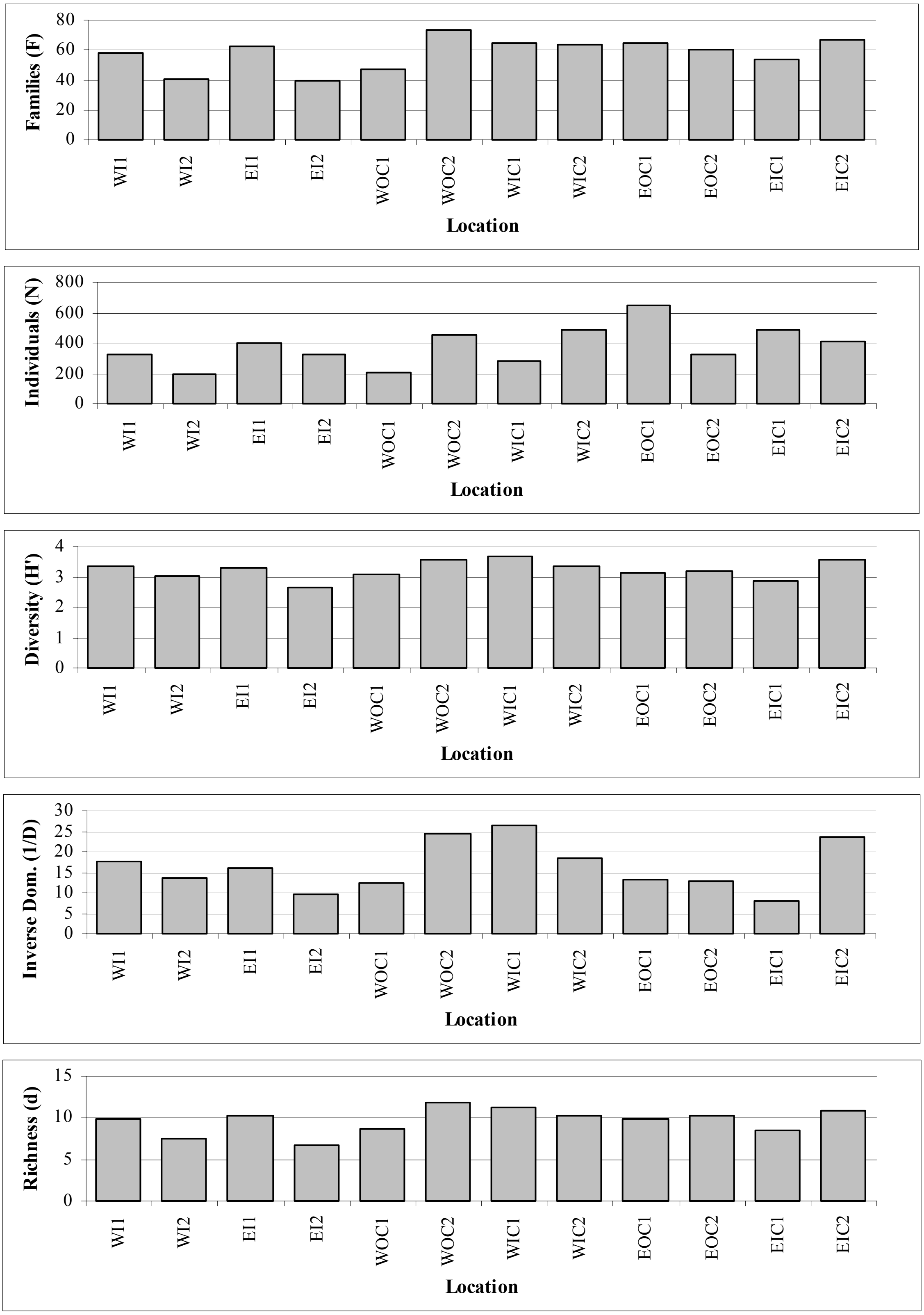

Figure 9 Benthic infauna diversity indices for impact and control locations. F = Number of families, N = Number of individuals, H' = Shannon-Wiener diversity index, 1/D = inverse Simpson's dominance index, d = Margalef's richness index.

The above analyses are useful for interpreting patterns of biological variation across the locations surveyed, but do not assess the statistical significance of variation observed. This was instead investigated using ANOVAs, as described in Section 2.7.1. Variables analysed included abundance, family richness (= number of families) and species richness (= number of species).

ANOVAs were performed to compare the four impact locations, the impact locations with the inner control locations, and the impact locations with the outer control locations. The transformation ln(x+1) was applied to abundance data, whilst family and species richness data were not transformed prior to analysis. The results of comparisons among the four impact locations are provided in Table 2, whilst the results of comparisons between impact and inner control locations, and between impact and outer control locations, are provided in Table 3 and Table 4 respectively.

The results of ANOVAs indicate that there were no significant differences among sites in the benthic infauna variables analysed. Similarly, animal abundance did not differ significantly among the four impact locations, however species and family richness did exhibit significant variation among locations (Table 2). Assessments of least square means and the results of Tukey's post-hoc tests indicate that the major source of variation among locations in the analyses of species and family richness were differences between the 'nearshore' (WI2 and EI2) and 'offshore' (WI1 and EI1) locations. The latter locations supported larger numbers of species and families than the former, although significant differences were only detected in comparisons of WI2 and EI1. This contrasts with the autumn 2005 results, which indicated no significant differences among the four impact location in abundance, species richness or family richness. It is possible that the differences detected in the current survey are seasonally based, however repetition of autumn and spring surveys is required to delineate between seasonal and longer term (e.g. annual) temporal variation. If future surveys support the finding of significant variation among impact locations, during certain seasons or otherwise, the post-commissioning impact determination analyses will need to interpet data on this basis. For example, it may be necessary to run the analyses separately for subsets of impact locations, depending on their level of pre-operational similarity with control locations.

Similar to the analyses above, comparisons between impact and control locations found no significant differences in benthic infauna variables among sites (Tables 3 and 4). In the analyses comparing impact and inner control locations, there were no significant differences among locations, or between impact and control treatments, for analyses of animal abundance and species richness (Table 3). However, significant differences were detected between impact and control treatments in the analysis of family richness data. Examination of least square means indicates that this variation was the result of significantly higher family richness values at control sites compared with the impact sites. Closer examination of the data indicates that reduced family numbers at the impact sites occurred at the 'nearshore' locations, as described above for the analyses comparing the four impact locations.

In comparisons of impact and outer control locations, differences between impact and control treatments were consistently non-significant across all three benthic infauna variables (Table 4). However, all variables exhibited significant variation among locations. Post-hoc tests indicated that the major source of variation among locations for animal abundance was control location EOC1. This location recorded significantly higher animal numbers than WOC1 and WI2. In the case of species and family richness, the major source of variation was again EOC1, which recorded significantly higher richness values than the 'nearshore' impact locations WI2 and EI2, however WOC2 also recorded significantly higher values than WI2.

Table 2 Results of ANOVAs comparing benthic infauna variables among the four impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
Location	1.627	3	0.542	1.807	0.187
Site(Location)	4.799	16	0.300	0.791	0.680
Residual	7.584	20	0.379		
Family Richness					
Location	253.100	3	84.367	4.963	0.013
Site(Location)	272.000	16	17.000	0.677	0.784
Residual	502.000	20	25.100		
Species Richness					
Location	547.475	3	182.492	4.365	0.020
Site(Location)	669.000	16	41.812	0.529	0.900
Residual	1580.500	20	79.025		

Table 3 Results of ANOVAs comparing benthic infauna variables between impact and inner control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
Impact-Control	1.229	1	1.229	2.743	0.149
Location(Impact-Control)	2.688	6	0.448	0.970	0.461
Site[Location(Impact-Control)]	14.787	32	0.462	1.032	0.457
Residual	17.904	40	0.448		
Family Richness					
Impact-Control	432.450	1	432.450	9.185	0.023
Location(Impact-Control)	282.500	6	47.083	1.370	0.257
Site[Location(Impact-Control)]	1100.000	32	34.375	0.806	0.734
Residual	1707.000	40	42.675		
Species Richness					
Impact-Control	605.000	1	605.000	5.884	0.051
Location(Impact-Control)	616.950	6	102.825	1.297	0.287
Site[Location(Impact-Control)]	2537.000	32	79.281	0.826	0.709
Residual	3839.000	40	95.975		

Table 4 Results of ANOVAs comparing benthic infauna variables between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
Impact-Control	2.501	1	2.501	2.491	0.166
Location(Impact-Control)	6.025	6	1.004	2.997	0.019
Site[Location(Impact-Control)]	10.723	32	0.335	1.112	0.372
Residual	12.059	40	0.301		
Family Richness					
Impact-Control	340.313	1	340.313	3.298	0.119
Location(Impact-Control)	619.175	6	103.196	3.103	0.016
Site[Location(Impact-Control)]	1064.400	32	33.262	1.252	0.248
Residual	1062.500	40	26.562		
Species Richness					
Impact-Control	627.200	1	627.200	2.533	0.163
Location(Impact-Control)	1485.950	6	247.658	3.351	0.011
Site[Location(Impact-Control)]	2364.800	32	73.900	1.059	0.427
Residual	2790.000	40	69.750		

The results of the above comparisons of impact and control locations reveal some differences from the autumn 2005 analyses. The main difference is that in the autumn analyses, variation between the impact and control locations was consistently non-significant. The latter result is the most desirable pre-operational finding, since it indicates no difference between impact and control locations prior to effluent discharge, thus simplifying post-operational assessments of changes at impact locations relative to control locations. In the current spring 2005 survey, only family richness exhibited significant variation between impact and control treatments, and only in the comparisons between impact and inner control locations. Further monitoring will determine whether this is a seasonally dependent pattern of variation, and hence provide guidance on implications for future analyses of impact on benthic infaunal family richness.

The above ANOVAs were concerned with spatial variation within the spring 2005 dataset, however repeated measures ANOVAs were also performed to assess seasonal variation between autumn and spring, as described in Section 2.7.1. The results of the repeated measures ANOVAs are presented in Table 5 for comparisons among impact locations, Table 6 for comparisons between impact and inner control locations and Table 7 for comparisons between impact and outer control locations. The 'within subject' tables in each case include the effect of 'time' and the interaction of 'time' with 'impact-control' treatments, and are therefore of primary interest in assessing temporal variation.

Temporal comparisons for the impact locations indicate that variation between the autumn and spring 2005 datasets for all three benthic infauna variables analysed was non-significant (Table 5). Interactions between time and location were also consistently non significant, indicating that temporal variation did not differ significantly among the four impact locations.

Table 5 Results of repeated measures ANOVAs for comparisons of temporal variation in benthic infauna variables among impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
'Between Subjects'					
Location	0.552	3	0.184	1.196	0.343
Residual	2.460	16	0.154		
'Within Subjects'					
Time	2.249	1	2.249	6.046	0.091
Time*Location	1.116	3	0.372	1.736	0.200
Residual	3.428	16	0.214		
Species Richness					
'Between Subjects'					
Location	39.569	3	13.190	0.533	0.666
Residual	395.750	16	24.734		
'Within Subjects'					
Time	620.156	1	620.156	5.868	0.094
Time*Location	317.069	3	105.690	2.077	0.144
Residual	814.150	16	50.884		
Family Richness					
'Between Subjects'					
Location	29.619	3	9.873	0.879	0.473
Residual	179.700	16	11.231		
'Within Subjects'					
Time	262.656	1	262.656	6.044	0.091
Time*Location	130.369	3	43.456	2.193	0.129
Residual	317.100	16	19.819		

In comparisons between impact and inner control locations, highly significant temporal variation was detected for all three benthic infauna variables (Table 6), with significant declines in abundance, species richness and family richness recorded in spring 2005. However, the interaction between time and the impact-control treatments was consistently non-significant, indicating that temporal effects did not differ significantly between the impact and control treatments. Interactions between time and location were significant, indicating that temporal effects varied significantly among locations.

Temporal analyses of impact and outer control location data revealed similar results, with significant temporal variation detected overall for the benthic infauna variables analysed (Table 7), again as a result of declines in abundance, species richness and family richness in spring 2005. Interactions of time with impact-control treatments were consistently non-significant, indicating that temporal effects did not differ significantly between impact and control treatments. However, as for comparisons of impact and inner controls, interactions between time and location were significant, indicating that temporal effects varied significantly among locations.

Table 6 Results of repeated measures ANOVAs for comparisons of temporal variation in benthic infauna variables between impact and inner control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
'Between Subjects'					
Impact-Control	1.730	1	1.730	1.893	0.218
Location(Impact-Control)	5.487	6	0.914	2.700	0.031
Residual	10.838	32	0.339		
'Within Subjects'					
Time	4.756	1	4.756	26.169	0.000
Time*Impact-Control	0.004	1	0.004	0.005	0.946
Time*Location(Impact-Control)	4.811	6	0.802	4.412	0.002
Residual	5.816	32	0.182		
Species Richness					
'Between Subjects'					
Impact-Control	669.903	1	669.903	4.407	0.081
Location(Impact-Control)	912.019	6	152.003	2.213	0.067
Residual	2198.450	32	68.702		
'Within Subjects'					
Time	1332.528	1	1332.528	32.295	0.000
Time*Impact-Control	1.653	1	1.653	0.011	0.920
Time*Location(Impact-Control)	938.594	6	156.432	3.791	0.006
Residual	1320.350	32	41.261		
Family Richness					
'Between Subjects'					
Impact-Control	616.050	1	616.050	11.992	0.013
Location(Impact-Control)	308.237	6	51.373	1.622	0.173
Residual	1013.700	32	31.678		
'Within Subjects'					
Time	726.012	1	726.012	37.526	0.000
Time*Impact-Control	16.200	1	16.200	0.254	0.632
Time*Location(Impact-Control)	383.187	6	63.865	3.301	0.012
Residual	619.100	32	19.347		

The most important component of the repeated measures ANOVAs is the Time*Impact-Control term. In post-operational surveys, this term will be used to determine whether the impact locations have been affected significantly by effluent discharges by comparing changes encountered at them with any changes at the control locations. It is desirable therefore that pre-operational (natural) temporal variation does not differ between the control and impact locations, as was found to be the case in the above comparisons of benthic infauna variables between autumn and spring 2005 data.

Table 7 Results of repeated measures ANOVAs for comparisons of temporal variation in benthic infauna variables between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Ln(x+1)Abundance					
'Between Subjects'					
Impact-Control	0.182	1	0.182	0.481	0.514
Location(Impact-Control)	2.270	6	0.378	1.653	0.165
Residual	7.321	32	0.229		
'Within Subjects'					
Time	1.226	1	1.226	6.682	0.015
Time*Impact-Control	1.027	1	1.027	2.010	0.206
Time*Location(Impact-Control)	3.064	6	0.511	2.784	0.027
Residual	5.871	32	0.183		
Species Richness					
'Between Subjects'					
Impact-Control	15.312	1	15.312	0.398	0.551
Location(Impact-Control)	230.687	6	38.448	0.814	0.567
Residual	1512.200	32	47.256		
'Within Subjects'					
Time	198.450	1	198.450	4.888	0.034
Time*Impact-Control	446.513	1	446.513	3.167	0.125
Time*Location(Impact-Control)	845.837	6	140.973	3.472	0.009
Residual	1299.200	32	40.600		
Family Richness					
'Between Subjects'					
Impact-Control	63.012	1	63.012	3.127	0.127
Location(Impact-Control)	120.887	6	20.148	0.826	0.559
Residual	780.800	32	24.400		
'Within Subjects'					
Time	154.013	1	154.013	8.598	0.006
Time*Impact-Control	110.450	1	110.450	1.715	0.238
Time*Location(Impact-Control)	386.337	6	64.390	3.595	0.008
Residual	573.200	32	17.912		

3.2 Sediment particle size

Sediment particle size, measured to differentiate coarse material (e.g. gravel, shells), coarse sand, fine/medium grained sand and fine material (e.g. silty, clay), was conducted at benthic infauna sampling sites to help characterise the sediments occupied by these communities. One sediment sample was collected for analysis from each site, with five samples therefore collected per location. Mean particle size distributions were calculated for each location based on values for the five sites, with results presented in Figure 10 for impact locations, Figure 11 for inner control locations and Figure 12 for outer control locations. Raw particle size data depicting

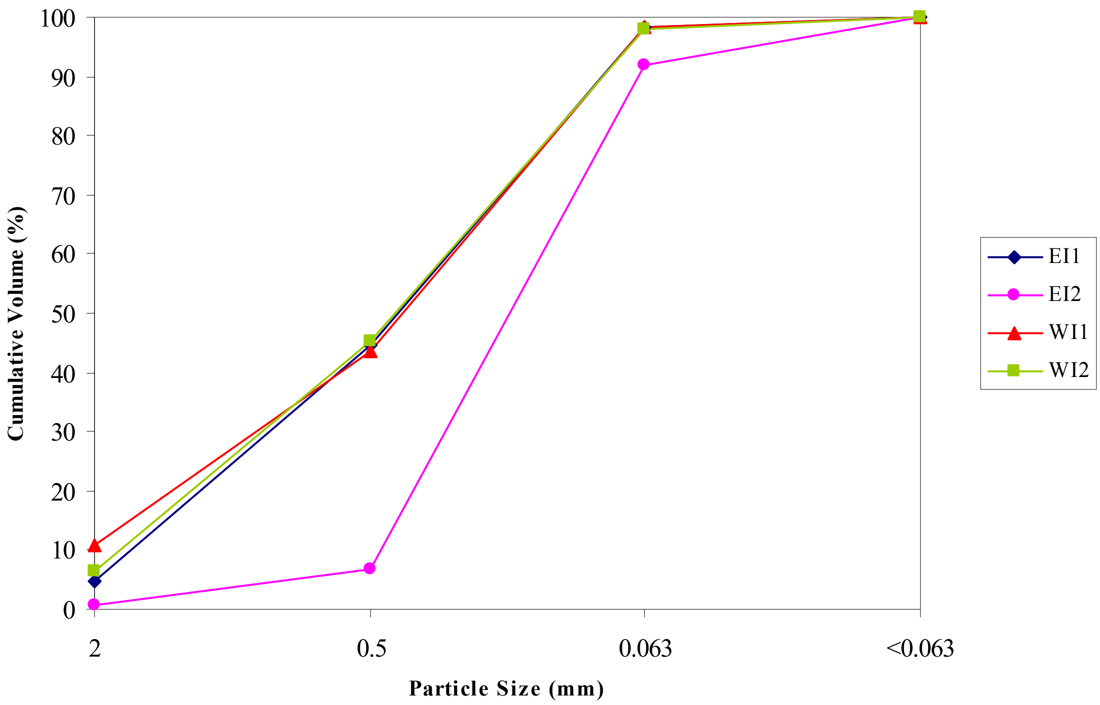

Figure 10 Mean particle size distributions at impact locations.

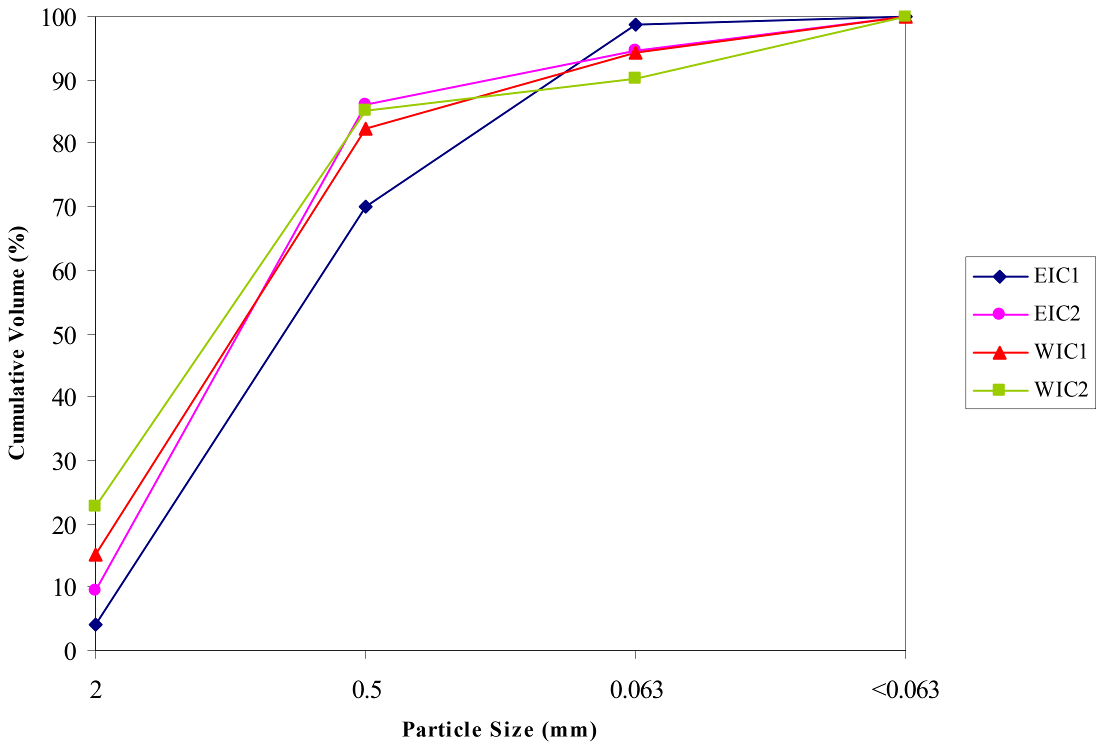

Figure 11 Mean particle size distributions at inner control locations.

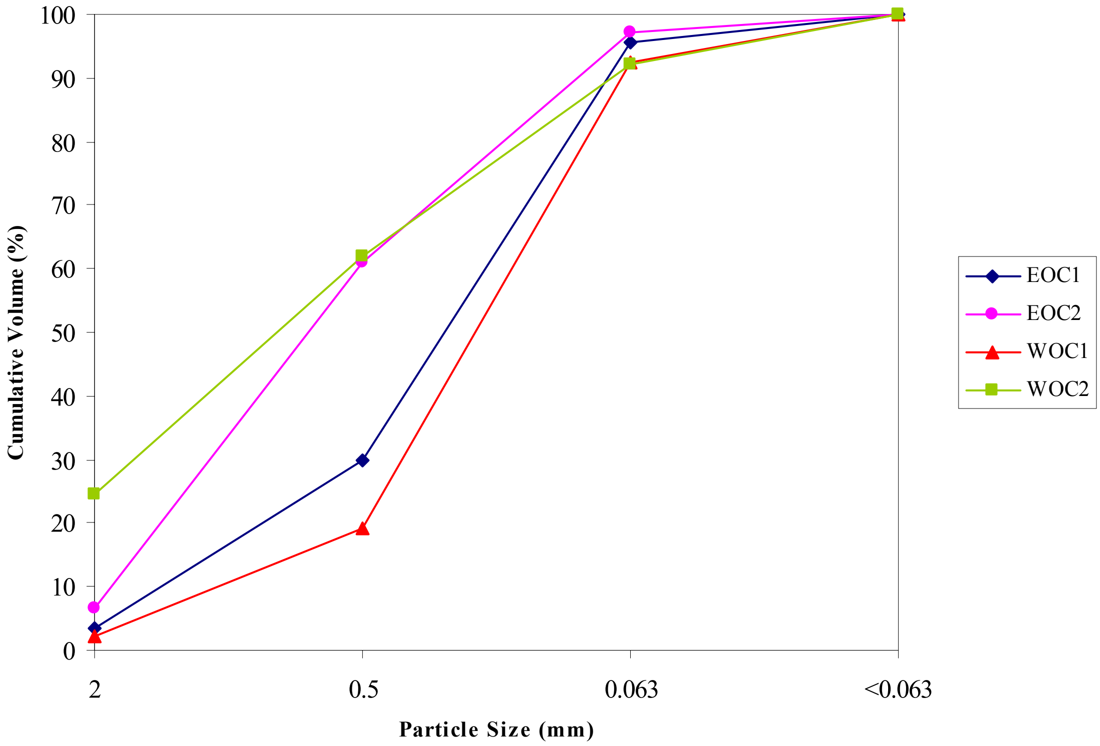

Figure 12 Mean particle size distributions at outer control locations.

percentage values for the different sieve aperture sizes is presented in Appendix 4 for all sites surveyed. It should be noted that the sediments collected were not necessarily typical of the survey sites because some grab deployments failed due to pieces of rock or gravel preventing the grab from closing. Due to the lack of cohesive material in the sediments, any small opening resulted in loss of unconsolidated sediments from the grab during its retrieval. Hence the particle size analysis is only applicable to benthic faunal analysis and future monitoring of potential changes in the fine component due to effluent fallout, rather than accurately characterising all unconsolidated sediments at the site.

At the impact locations, sediments were comprised mostly of sandy material, with fine-medium sands dominating at all four locations (Figure 10). Particle size profiles were very similar at EI1 and the western impact locations, while EI2 had a much lower volume of coarse sand and consisted almost entirely of fine-medium sands. Coarse material >2 mm, as well as fines <0.063 mm, each comprised ≤10% of material at all locations. These results are similar to those for autumn 2005, although EI2 samples at that time contained 20% coarse material.

At the inner control locations, sediments were dominated by coarse sands, with small proportions of fine-medium sands and fines (Figure 11), a result that replicates the autumn 2005 findings. Volumes of coarse material <2 mm at the eastern inner controls were comparable to those at impact locations, but were slightly greater (~ 15-25%) at the western locations. Overall, particle size distributions indicate coarser sediments at the inner controls than at the impact locations. This may reflect both the closer proximity of adjacent reefs and greater water movement at the inner controls.

As with the above locations, samples from outer controls consisted primarily of sands, with fine-medium sands dominating at the deeper locations EOC1 and WOC1 and relatively equal proportions of coarse and fine-medium sands occurring at the shallower locations EOC2 and WOC2 (Figure 12). Coarse material >2 mm comprised <10% of material at all locations except WOC2, where it comprised 25% of the samples. Volumes of fines <0.063 mm were consistently low across all locations, contributing <10%. These results are similar to those for autumn 2005, and indicate that sediment particle size distributions at the outer controls are comparable to those at the impact locations.

The dominance of coarse and fine-medium sands across the study area is indicative of high to moderate levels of water movement that are likely to be consistent in open areas of sand, but more variable in areas containing inter-mixed reef. The results of particle size analyses will be useful for monitoring any future changes in the proportion of fines as a possible result of mill operation and will also assist with interpreting any changes in benthic infauna communities.

3.3 Benthic epi-fauna and epi-flora

The full set of results from the epi-benthic quadrat photographs, indicating percentage cover of categories of substrata, flora and fauna in each photograph analysed, is provided in Appendix 5 (impact sites) and Appendix 6 (control sites).

Seabed substrata, fauna and flora categories (=descriptors) recorded from the quadrat photographs are listed in Table 8, with mean values provided for the control and impact locations. For each location, the mean value was derived from the 10 photographs taken (2 photographs each at five sites). Mean values across all 12 locations were then also calculated and are included in Table 8.

Across all locations, the mean percentage cover of bare sand was 51.4% (Table 8), whilst mean values of 58.7%, 28.2% and 67.2% were recorded for impact, inner control and outer control locations respectively. These results are similar to those recorded during the autumn 2005 monitoring survey (Aquenal 2005), with the exception that sand cover in impact quadrats was 16% greater in the current survey. Percentage cover of dead shell material was low across all locations, with a mean value of 1.9% overall, and values ranging from 1.4% to 2.4% for the sets of impact and control locations described above for sand cover. Mean percentage cover of reef was 26.1% across all locations (Table 8), 16.7% for impact locations alone, 41.3% for inner controls and 20.5% for outer controls. These results reflect slightly reduced bare reef cover in impact quadrats compared with the previous autumn survey, but increased reef cover at both the inner and outer controls. At the impact locations, this result, combined with reduced algal cover (see below) was associated with increased coverage of sand. At control locations, where sand cover remained fairly consistent, increased cover of bare reef may be attributed to reduced algal abundance.

Fauna recorded were dominated by sponges, ascidians and bryozoans, with annelids, cnidarians and molluscs also recorded in several control quadrats (Table 8). Species or taxa descriptors achieving the highest overall mean percentage cover values were the plate sponge (0.8%), ascidian *Polycarpa viridis* (0.2%), red finger sponge (0.1%) and orange bryozoan (0.1%). Percentage cover of fauna was low at all locations, with a mean value of 2.6% across all locations, 3.2% for impact locations alone, 2.5% for inner controls and 2.1% for outer controls. These results reflect a slight reduction in faunal cover at the impact sites compared with the autumn survey, but small increases at the control sites.

Table 8 Substrata and epi-benthic fauna and flora categories recorded in quadrat photographs, with mean percentage cover data for control and impact locations.

Descriptor	WI1	WI2	EI1	EI2	WOC1	WOC2	WIC1	WIC2	EOC1	EOC2	EIC1	EIC2	TOTAL
SUBSTRATA													
Total % sand cover	47.8	54.6	77	55.4	83.4	42.8	46.8	27	69.4	73.2	28	10.8	51.4
Total % shell cover	0.4	0.6	7.2	1.4	0	1.4	0.4	4.4	4.4	1.4	0.2	0.6	1.9
Low reef	0.8	0	0	3.8	5.4	7	0	16.6	0	0	0	6.8	3.4
Cobbles	23.2	16	1.8	8.6	3.4	20	23	16	2.4	17.6	38.8	15	15.5
Cobbles and pebbles	0	0	0	0	0	0	0	15.6	0	0	0	0	1.3
Cobbles and sand	0	0	0	0	0	0	0	0	0	2	0	17.8	1.7
Patchy low reef	1.4	2.6	0.6	5	0	0	0	0	0	0	0	8.4	1.5
Patchy sandy reef	0	0	0	0	0	0	0	0	5.4	0	0	5.6	0.9
Pebbles	0	0.4	0	2.4	0	0.6	0	0	18	0	0.8	0.8	1.9
Total % reef cover	25.4	19	2.4	19.8	8.8	27.6	23	48.2	25.8	19.6	39.6	54.4	26.1
FAUNA													
Ascideacea													
Ascidian sp.	0	0	0	0	0	0	0	0	0	0	0.2	0	0.02
Amphicarpa meridiana	0	0	0	0	0	0	0	0.2	0	0	0	0	0.02
Herdmania sp.	0	0	0	0	0	0.2	0.2	0.2	0	0	0	0	0.05
Phallusia obesa	0.2	0	0	0	0	0	0	0	0	0	0	0	0.02
Polycarpa viridis	0	0.6	0.6	0	0.2	0	0.2	0	0	0	0	0.4	0.17
Red colonial ascidian	0	0	0	0	0	0	0	0	0	0.2	0	0	0.02
Yellow compound ascidian	0	0	0	0	0	0	0	0	0	0	0	0.4	0.03
Compound ascidian	0	0	0.4	0	0	0	0	0	0	0	0	0	0.03
Bryozoa													
Biflustra perfragilis	0	0	0	0	0	0	0.2	0	0	0	0	0	0.02
Brown bryozoan	0	0	0	0	0	0	0	0	0	0	0	0.2	0.02
Orange bryozoan	1.2	0	0	0	0	0	0	0	0	0	0	0	0.10
Curly orange bryozoan	0	0	0	0	0	0	0.2	0	0	0	0	0	0.02
Triphyllozoon sp.	0	0	0	0	0	0.2	0	0	0	0	0	0	0.02
Porifera													
Brain sponge	0	0	0	0.6	0	0	0	0	0	0	0	0	0.05
Beige finger sponge	0	0	0	0	0	0	0	0.2	0	0	0	0	0.02
Grey encrusting sponge	0	0	0	0	0	0	0	0.6	0	0	0	0.4	0.08
Grey finger sponge	0	0	0	0	0	0.2	0	0	0	0	0	0	0.02
Grey sponge	0	0	0	0.4	0	0	0	0	0	0	0	0	0.03
Orange sponge	0.2	0	0	0	0	0	0	0	0	0	0	0	0.02
Orange sponge with tubercles	0	0.8	0	0	0	0	0	0	0	0	0	0	0.07
Orange finger sponge	0	0	0	0	1	0	0	0	0	0	0	0	0.08
Orange encrusting sponge	0	0	0	0	0	0	0	0.2	0	0	0.8	0	0.08
Orange ball sponge	0	0	0	0	0	0	0.4	0	0	0	0	0	0.03
Plate sponge	3.4	0	0	1.6	0	4	0	0	0	0	0	1	0.83
Purple cup sponge	0	0	0	0	0	0.2	0	0	0	0	0	0	0.02
Red encrusting sponge	0	0.2	0	0	0	0	0	0.2	0	0	0	0.2	0.05
Red finger sponge	1	0	0	0	0.2	0.2	0	0	0	0	0	0	0.12
Small cream sponge	0	0	0	0	0	0	0	0	0	0	0.2	0	0.02
Small pink encrusting sponge	0	0	0	0	0	0.2	0	0	0	0	0	0	0.02
Sponge	0	0	0	0	0	0	0	0	0	0.2	0	0	0.02
Small yellow lobed sponge	0.6	0	0	0	0	0	0	0	0	0	0	0	0.05
Yellow encrusting sponge	0	0	0	0	0	0	0.2	0	0	0	0	0.8	0.08
Yellow tubular sponge	0.4	0	0	0	0	0	0	0	0	0	0	0.2	0.05

Descriptor	WI1	WI2	EI1	EI2	WOC1	WOC2	WIC1	WIC2	EOC1	EOC2	EIC1	EIC2	TOTAL
Yellow tubercle sponge	0	0	0	0	0.2	0.2	0	0	0	0	0	0	0.03
Yellow finger sponge	0	0	0	0.2	0	0	0	0	0	0	0	0	0.02
Yellow sponge	0	0	0	0	0	0	0	0	0	0	0	0.2	0.02
White sponge	0.2	0	0	0	0	0	0	0	0	0	0	0	0.02
White tubercle sponge	0	0	0	0	0	0.8	0	0	0	0	0	0	0.07
White encrusting sponge	0	0	0	0	0	0	0.2	0	0	0	0	0	0.02
White finger sponge	0	0	0	0	0	0	0.4	0	0	0	0	0	0.03
Annelida													
Calcareous serpulid worms	0	0	0	0	0	0	0	0.8	0	0	0	0	0.07
Cnidaria													
Acabaria sp.	0	0	0	0	0	0.2	0	0	0	0	0	0	0.02
Mollusca													
Chlamys asperrimus	0	0	0	0	0	0	0.2	0	0	0	0.2	0	0.03
Total % fauna cover	7.2	1.6	1	2.8	1.6	6.4	2.2	2.4	0	0.4	1.4	3.8	2.57
ALGAE													
Brown algae	1	7.6	0	0	0.6	4.8	5.2	5.8	0	1.8	0	5.4	2.68
Brown filamentous	1.6	2.2	1	0.2	0	0	0	0.8	0	0	0	2.8	0.72
Brown foliose	0.8	4.8	5.6	1.4	0	0.6	2.2	5.4	0	0.4	7.6	1.8	2.55
Brown holdfast	0.4	0	0	0	0	0	0	0.2	0	0	0	0	0.05
Brown benthic	1.2	0	0	0	0	0	0	0	0	0	0.2	0	0.12
Caulerpa cactoides	0	0	0.4	0	0	0	0	0.4	0	0.2	0	0.2	0.10
Caulerpa sp.	0.4	0.4	0	0.2	0	0.6	0	0	0	0	6	0	0.63
Codium fragile	0.6	0	0	0	0	0	0	0	0	0	0	0.2	0.07
Codium sp.	0.4	0	0.8	0.6	0	0	0	0	0	0	0.8	3.4	0.50
Cystophora sp.	0	0	0.2	0	0	0	0	0	0	0	0	0	0.02
Dictyosphaeria sericea	0.4	0.4	0	0	0	0.2	0.2	0	0	0.2	0	0	0.12
Ecklonia sp.	0	0	0	0	0	0	0.4	0	0	0	0	0	0.03
Filamentous algae	0	0	0.4	0	0	0	0	0	0	0	0	0	0.03
Green algae	0	0	0	0	0	1	0	0	0	0	0	0	0.08
Green filamentous	0.8	0	0	0	0	0	0	0	0	0	0	0	0.07
Green foliose	0	0.8	0	0	0	0	0	0	0	0	0.6	3.4	0.40
Sonderopelta sp.	0.2	0.4	0	0	0	0	0	0.4	0	0	0.2	1.2	0.20
Red algae	0	0.6	0	0	0.4	1.6	2	0	0.4	0.8	0	0	0.48
Red coralline	3.2	2.4	0.6	0.8	1.4	3	4.8	2.8	0	1	4	3.6	2.30
Red filamentous	0	0	0	0	0	0	0	0	0	0	0	2	0.17
Red foliose	5	4.2	2.4	0.2	2.8	9.2	12.6	1	0	0.8	7.2	3	4.03
Ulva sp.	0	0	0	0	1	0.8	0	0	0	0	0	0	0.15
Zonaria sp.	3.2	0.4	1	0	0	0	0.2	1.2	0	0.2	4.2	3.4	1.15
Total % algae cover	19.2	24.2	12.4	3.4	6.2	21.8	27.6	18	0.4	5.4	30.8	30.4	16.65
SEAGRASS													
Heterozostera tasmanica	0	0	0	17.2	0	0	0	0	0	0	0	0	1.43
TOTAL % COVER	100	100	100	100	100	100	100	100	100	100	100	100	100

Flora recorded was composed primarily of algae, although the seagrass Heterozostera tasmanica was recorded at one location, EI2 (Table 8). The algae were dominated by red foliose species (4.0% cover), whilst unidentified brown algae (2.7%), brown foliose algae (2.6%), red coralline algae (2.3%) and *Zonaria* sp. (1.2%) were the next most abundant taxa. Across all locations, the mean percentage cover of algae (all taxa) was 16.7% (Table 8), whilst at impact locations it was 14.8%, at inner controls it was 26.7% and at outer locations it was 8.5%. As recorded in the previous autumn survey, mean algal cover at impact locations was therefore intermediate to values recorded for the two sets of controls. However, average algal cover at all locations was reduced compared with the earlier survey, with reductions of 13.9%, 5.4% and 11.5% recorded for impact, outer control and inner control locations respectively. Percentage cover of seagrass at EI2 was 4.3%, nearly identical to the result recorded in autumn, however the low coverage of seagrass (1.4%) recorded at WOC1 in autumn was not replicated in the current survey.

The above information is useful for interpreting patterns of biological variation across the locations surveyed, however the statistical significance of variation required further investigation using ANOVAs, as outlined in Section 2.7.1. The variables assessed using ANOVAs were selected on the basis of suitability of data for this type of analysis. Biological variables of interest relate to percentage cover of flora and fauna communities, however due to the very large number of zero values for fauna cover at replicate and site levels (see Appendix 5 and Appendix 6), the fauna data was not suitable for analysis. Two indicators of algal abundance did produce data suitable for application of ANOVAs: percentage cover of red foliose algae and percentage cover of algae (all taxa). However, the absence of red foliose algae at all sites at one control location resulted in exclusion of this location from the respective spring spatial analysis as described below.

Data for the above two algal variables were aggregated as described in Section 2.7.1, and analyses performed to compare the four impact locations, the impact locations with the inner control locations, and the impact locations with the outer control locations. Tests performed in Systat® Version 11 indicated that variances were not significantly heterogeneous, and data were not transformed prior to analysis. The location EOC1 recorded zero red foliose algal cover at all 5 sites, such that this location was removed from the analysis comparing red foliose algae between impact and outer control locations. For this analysis, the exclusion of EOC1 resulted in altered degrees of freedom associated with model effects. At several other locations, red foliose algae were only recorded at one of the five sites. While these data were utilised, the applicability of red foliose algal cover as a variable for inclusion in future MBACI analyses will require ongoing assessment.

The results of comparisons among the four impact locations are provided in Table 9, whilst the results of comparisons between impact and control locations (inner and outer) are provided in Table 10.

Comparisons of percentage cover of red foliose algae and total algae (all taxa) among the four impact locations revealed no significant differences (Table 9). Similarly, in comparisons between impact and control locations, percentage cover of total algae and red foliose algae did not differ significantly among the eight locations included in the analyses or between impact and control locations (Table 10). These results are similar to those obtained in April 2005, although at that time, one significant result was obtained at the level of ‘location’ for the comparison of total algal cover between impact and outer control locations. The ANOVA results for the current survey indicate that percentage cover of algal communities did not vary significantly between locations or between sets of impact and control locations.

The ANOVAs described above were concerned with spatial variation within the spring 2005 dataset, however repeated measures ANOVAs were also performed to assess seasonal variation between autumn and spring, as described in Section 2.7.1. Note that some temporal datasets for algal cover exhibited heterogenous variances, and hence the the transformation ln(x+1) was applied, with the result that variances were consistently homogenous.

Table 9 Results of ANOVAs comparing algal variables among the four impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
% cover of red foliose algae					
Location	68.150	3	22.717	1.404	0.278
Residual	258.800	16	16.175		
% cover of algae (all taxa)					
Location	1217.200	3	405.733	1.516	0.249
Residual	4282.000	16	267.625		

Table 10 Results of ANOVAs comparing algal variables between impact and inner control locations, and between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
IMPACT VS INNER CONTROL LOCATIONS					
% cover of red foliose algae					
Impact-Control	90.000	1	90.000	1.166	0.322
Location(Impact-Control)	463.100	6	77.183	1.505	0.208
Residual	1640.800	32	51.275		
% cover of algae (all taxa)					
Impact-Control	1416.100	1	1416.100	4.849	0.070
Location(Impact-Control)	1752.200	6	292.033	1.405	0.243
Residual	6649.200	32	207.787		
IMPACT VS OUTER CONTROL LOCATIONS					
% cover of red foliose algae					
Impact-Control	14.860	1	14.860	0.285	0.616
Location(Impact-Control)	260.683	5	52.137	1.432	0.243
Residual	1019.200	28	36.400		
% cover of algae (all taxa)					
Impact-Control	403.225	1	403.225	0.966	0.364
Location(Impact-Control)	2504.150	6	417.358	2.057	0.087
Residual	6494.000	32	202.938		

The results of the repeated measures ANOVAs are presented in Table 11 for comparisons among impact locations, Table 12 for comparisons between impact and inner control locations and Table 13 for comparisons between impact and outer control locations. The 'within subject' tables in each case include the effect of 'time' and the interaction of 'time' with 'impact-control' treatments and are therefore of primary interest in assessing temporal variation.

Temporal comparisons for the impact locations revealed significant variation between the autumn and spring 2005 datasets for red foliose algae, but not for algae (all taxa) (Table 11). A significant decline in the cover of red foliose algae occurred between the two surveys, whilst total algal cover did not change significantly. Interactions between time and location were consistently non significant, indicating that temporal variation did not differ significantly among the four impact locations.

In comparisons between impact and inner control locations, significant temporal variation was detected for red foliose algae and total algae (Table 12), with percentage cover of both declining over time. However, the interaction between time and the impact-control treatments was consistently non-significant, indicating that temporal effects did not differ significantly between the impact and control treatments. Interactions between time and location were also non-significant, indicating that temporal effects did not vary significantly among locations.

Temporal analyses of impact and outer control location data revealed similar results, with significant temporal variation detected overall for both red foliose algae and total algae (Table 13), again as a result of a decline in algal cover. Interactions of time with impact-control treatments and location were consistently non-significant, indicating that temporal effects did not differ significantly between impact and control treatments or among locations.

The most important component of the repeated measures ANOVAs is the Time*Impact-Control term, as described in Section 3.1. The non-significant pre-operational temporal variation in algal variables, as described above, will facililitate detection of impacts in post-operational surveys.

The finding of reduced algal cover between autumn and spring is contradictory to the expectation of increased algal growth in spring/summer. The consistency of the declines in the above temporal comparisons suggests that these reductions in cover are not the result of small spatial changes in locations of replicates. Instead, they may be associated with a reduction of algal cover during winter that has not yet been fully replaced by new spring/summer growth.

3.4 Fish

The full set of results from the baited fish video surveys, indicating the numbers and species of fish recorded for each video analysed (two per site), is provided in Appendix 7.

Eleven fish species and 732 individual fish were recorded during the baited video survey program, compared with 16 species and 293 individuals in the previous autumn 2005 survey. Small numbers of crustaceans (crabs) and molluscs (octopus) were also observed. Total numbers of each fish species, as well as crustacean and mollusc species, recorded at the survey locations in the current survey are presented in Table 14. These are based on data aggregated across 10 video surveys (two each at five sites) per location.

The most common species identified overall and at each location was Degen's leatherjacket, which accounted for 549 individuals and 75% of fish observed. Other relatively common

Table 11 Results of repeated measures ANOVAs for comparisons of temporal variation in algal variables among impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
% cover of red foliose algae					
'Between Subjects'					
Location	4.740	3	1.580	0.964	0.434
Residual	26.222	16	1.639		
'Within Subjects'					
Time	21.047	1	21.047	25.206	0.015
Time*Location	2.505	3	0.835	0.480	0.701
Residual	27.851	16	1.741		
% cover of algae (all taxa)					
'Between Subjects'					
Location	9.197	3	3.066	1.060	0.393
Residual	46.259	16	2.891		
'Within Subjects'					
Time	9.311	1	9.311	8.759	0.060
Time*Location	3.189	3	1.063	0.488	0.695
Residual	34.822	16	2.176		

Table 12 Results of repeated measures ANOVAs for comparisons of temporal variation in algal variables between impact and inner control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
% cover of red foliose algae					
'Between Subjects'					
Impact-Control	2.394	1	2.394	1.381	0.284
Location(Impact-Control)	10.404	6	1.734	1.325	0.275
Residual	41.875	32	1.309		
'Within Subjects'					
Time	46.710	1	46.710	36.269	0.000
Time*Impact-Control	0.120	1	0.120	0.103	0.759
Time*Location(Impact-Control)	6.990	6	1.165	0.905	0.504
Residual	41.212	32	1.288		
% cover of algae (all taxa)					
'Between Subjects'					
Impact-Control	22.076	1	22.076	13.798	0.010
Location(Impact-Control)	9.603	6	1.600	0.930	0.487
Residual	55.044	32	1.720		
'Within Subjects'					
Time	9.906	1	9.906	8.054	0.008
Time*Impact-Control	1.364	1	1.364	1.099	0.335
Time*Location(Impact-Control)	7.445	6	1.241	1.009	0.437
Residual	39.356	32	1.230		

Table 13 Results of repeated measures ANOVAs for comparisons of temporal variation in algal variables between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
% cover of red foliose algae					
'Between Subjects'					
Impact-Control	11.557	1	11.557	2.149	0.193
Location(Impact-Control)	32.268	6	5.378	3.733	0.006
Residual	46.097	32	1.441		
'Within Subjects'					
Time	20.529	1	20.529	18.150	0.000
Time*Impact-Control	3.831	1	3.831	2.509	0.164
Time*Location(Impact-Control)	9.163	6	1.527	1.350	0.264
Residual	36.194	32	1.131		
% cover of algae (all taxa)					
'Between Subjects'					
Impact-Control	11.333	1	11.333	1.322	0.294
Location(Impact-Control)	51.439	6	8.573	3.664	0.007
Residual	74.877	32	2.340		
'Within Subjects'					
Time	11.683	1	11.683	8.840	0.006
Time*Impact-Control	0.805	1	0.805	1.121	0.330
Time*Location(Impact-Control)	4.305	6	0.718	0.543	0.772
Residual	42.289	32	1.322		

species were the barber perch, common gurnard perch, draughtboard shark and sand flathead (Table 14). These species were dispersed widely across the study area, including impact and control locations, but were not recorded at all locations. The rosy wrasse, a species not recorded during the autumn survey, was identified as solitary individuals or in small numbers at locations EI1, WOC1 and WOC2. Six species, the toothbrush leatherjacket, globe fish, old wife, Port Jackson shark, horseshoe leatherjacket and purple wrasse, were recorded in very low numbers during the previous autumn survey but were not recorded here.

The mean abundance of fish per location was 67.5 for impact locations, 59 for inner controls and 57 for outer controls, compared with 22, 35 and 17 for these three respective sets of locations in the autumn survey. Large increases in fish numbers were therefore recorded across the entire study area. There are several factors that may account for this increase in abundance, including seasonal variation and altered methodologies (see Section 4). It is not possible to separate the effects of these factors at this stage, however future surveys using the standard methodology applied here will assist with interpretation of causal factors for temporal variation.

Mean fish species richness was low across all subsets of locations, ranging from six at the inner controls, through to seven at the impact locations and 10 at the outer controls. However, these richness values are higher than those recorded in autumn, which were five, six, and four at the above three sets of locations respectively. When species richness data is averaged across the individual 12 locations, a mean species number of 5.8 was recorded in both surveys.

Small numbers of invertebrates were also attracted to baits and recorded during the baited video surveys. These included spider crabs and hermit crabs, which were recorded primarily at the eastern outer control locations, and one maori octopus (Table 14).

Table 14 Total numbers of fish (and invertebrates) recorded using baited video surveys at the impact and control locations.

Scientific Name	Common Name	EI1	EI2	WI1	WI2	EIC1	EIC2	EOC1	EOC2	WIC1	WIC2	WOC1	WOC2	TOTAL
FISH														
Thamnaconus degeni	Degen's Leatherjacket	86	50	37	39	64	51	25	41	42	21	71	22	549
Caesioperca rasor	Barber Perch	10	3	14	1	4	4	0	0	4	10	6	3	59
Pseudolabrus psittaculus	Rosy Wrasse	1	0	0	0	0	0	0	0	0	0	1	3	5
Neosebastes scorpaenoides	Common Gurnard Perch	3	1	3	2	0	0	0	1	2	7	2	8	29
Notolabrus tetricus	Blue-throated Wrasse	1	0	0	0	0	1	0	0	0	1	1	2	6
Helicolenus percoides	Red Gurnand Perch	0	0	0	0	0	0	0	0	0	0	2	0	2
Cephaloscyllium laticeps	Draughtboard Shark	4	0	2	2	4	2	2	6	2	4	2	1	31
Platycephalus bassensis	Sand Flathead	1	7	0	0	0	0	16	2	0	0	2	0	28
Meuschenia scaber	Velvet Leatherjacket	1	0	1	1	2	2	0	1	2	2	2	2	16
Pseudophycis bachus	Red Cod	0	0	0	0	0	1	0	0	1	3	0	0	5
Mustelus antarcticus	Gummy Shark	0	0	0	0	0	0	0	2	0	0	0	0	2
INVERTEBRATES														
Pagurid sp.	Hermit Crab	0	1	0	0	0	0	1	2	0	0	0	0	4
Leptomithrax gaimardii	Spider Crab	0	0	0	0	0	0	9	10	0	0	0	0	19
?*Octopus maorum*	Maori Octopus	0	0	0	0	1	0	0	0	0	0	0	0	1
Fish abundance		107	61	57	45	74	61	43	53	53	48	89	41	732
Fish species richness		8	4	5	5	4	6	3	6	6	7	9	7	11
Invertebrate abundance		0	1	0	0	1	0	10	12	0	0	0	0	24

The above information is useful for interpreting patterns of biological variation across the locations surveyed, however the statistical significance of variation required further investigation using ANOVAs. The variables selected for analysis using ANOVAs were fish abundance and fish species richness, and data were aggregated as described in Section 2.7.1. ANOVAs were performed to compare the four impact locations, the impact locations with the inner control locations, and the impact locations with the outer control locations.

Variances in fish data were homogenous, and hence data were not transformed prior to analysis. The results of ANOVAs comparing impact locations are presented in Table 15, while the results of comparisons between impact and control locations are presented in Table 16.

Fish abundance varied significantly among the four impact locations (P=0.040, Table 15), contrasting with the non-significant result recorded for the autumn survey. A Tukey’s post hoc test revealed that significant variation was due to elevated abundance at location EI1, with abundance at that location significantly higher than at WI2, the latter recording the lowest abundance. Species richness did not differ significantly among the four impact locations, consistent with previous autumn survey results. Similarly, fish abundance and species richness did not differ significantly between the control and impact locations (Table 16), although fish abundance differed at the level of ‘location’ in the comparison of impact and outer control locations. A Tukey’s post hoc test indicated that the significant variation was again primarily due to elevated abundance at location EI1.

The ANOVAs described above were concerned with spatial variation within the spring 2005 dataset, however repeated measures ANOVAs were also performed to assess seasonal variation between autumn and spring, as described in Section 2.7.1. The results of the repeated measures ANOVAs are presented in Table 17 for comparisons among impact locations, Table 18 for comparisons between impact and inner control locations and Table 19 for comparisons between impact and outer control locations. The ‘within subject’ tables in each case include the effects of ‘time’ and the interaction of ‘time’ with ‘impact-control’ treatments, and are therefore of primary interest in assessing temporal variation.

Temporal comparisons for the impact locations indicate that variation between the autumn and spring 2005 datasets for both fish abundance and species richness was non-significant (Table 17). Interactions between time and location were also consistently non significant, indicating that temporal variation did not differ significantly among the four impact locations.

In comparisons between impact and inner control locations, highly significant temporal variation was detected for both fish variables (Table 18), with significant increases in abundance and species richness recorded in spring 2005. However, the interaction between time and the impact-control treatments was consistently non-significant, indicating that temporal effects did not differ significantly between the impact and control treatments. Interactions between time and location were also non-significant, indicating that temporal effects did not vary significantly among locations.

Temporal analyses of impact and outer control location data revealed similar results, with significant temporal variation detected overall for the fish variables analysed (Table 19), again as a result of increases in abundance and species richness in spring 2005. Interactions of time with impact-control treatments, and with location, were consistently non-significant, indicating that temporal effects did not differ significantly between impact and control treatments or among locations.

Table 15 Results of ANOVAs comparing fish variables among the four impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Fish Abundance					
Location	110.950	3	36.983	3.495	0.040
Residual	169.300	16	10.581		
Fish Species Richness					
Location	2.100	3	0.700	1.455	0.264
Residual	7.700	16	0.481		

Table 16 Results of ANOVAs comparing fish variables between impact and inner control locations, and between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
IMPACT VS INNER CONTROL LOCATIONS					
Fish Abundance					
Impact-Control	7.225	1	7.225	0.333	0.585
Location(Impact-Control)	130.250	6	21.708	2.217	0.067
Residual	313.300	32	9.791		
Fish Species Richness					
Impact-Control	0.000	1	0.000	0.000	1.000
Location(Impact-Control)	5.200	6	0.867	1.641	0.168
Residual	16.900	32	0.528		
IMPACT VS OUTER CONTROL LOCATIONS					
Fish Abundance					
Impact-Control	12.100	1	12.100	0.391	0.555
Location(Impact-Control)	185.500	6	30.917	2.955	0.021
Residual	334.800	32	10.463		
Fish Species Richness					
Impact-Control	1.056	1	1.056	2.708	0.151
Location(Impact-Control)	2.338	6	0.390	0.588	0.737
Residual	21.200	32	0.662		

Table 17 Results of repeated measures ANOVAs for comparisons of temporal variation in fish variables among impact locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Abundance					
'Between Subjects'					
Location	45.025	3	15.008	2.794	0.074
Residual	85.950	16	5.372		
'Within Subjects'					
Time	207.025	1	207.025	8.213	0.064
Time*Location	75.625	3	25.208	2.747	0.077
Residual	146.850	16	9.178		
Species Richness					
'Between Subjects'					
Location	1.275	3	0.425	1.133	0.365
Residual	6.000	16	0.375		
'Within Subjects'					
Time	4.225	1	4.225	4.410	0.127
Time*Location	2.875	3	0.958	0.964	0.434
Residual	15.900	16	0.994		

Table 18 Results of repeated measures ANOVAs for comparisons of temporal variation in fish variables between impact and inner control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Abundance					
'Between Subjects'					
Impact-Control	0.800	1	0.800	0.061	0.813
Location(Impact-Control)	78.750	6	13.125	1.976	0.098
Residual	212.500	32	6.641		
'Within Subjects'					
Time	245.000	1	245.000	28.171	0.000
Time*Impact-Control	22.050	1	22.050	1.383	0.284
Time*Location(Impact-Control)	95.650	6	15.942	1.833	0.124
Residual	278.300	32	8.697		
Species Richness					
'Between Subjects'					
Impact-Control	0.703	1	0.703	0.644	0.453
Location(Impact-Control)	6.544	6	1.091	2.071	0.085
Residual	16.850	32	0.527		
'Within Subjects'					
Time	14.028	1	14.028	20.266	0.000
Time*Impact-Control	0.703	1	0.703	1.299	0.298
Time*Location(Impact-Control)	3.244	6	0.541	0.781	0.591
Residual	22.150	32	0.692		

Table 19 Results of repeated measures ANOVAs for comparisons of temporal variation in fish variables between impact and outer control locations.

Source	Sum of Squares	df	Mean Square	F-ratio	P
Abundance					
'Between Subjects'					
Impact-Control	13.203	1	13.203	0.777	0.412
Location(Impact-Control)	101.994	6	16.999	3.242	0.013
Residual	167.800	32	5.244		
'Within Subjects'					
Time	363.378	1	363.378	40.757	0.000
Time*Impact-Control	1.653	1	1.653	0.092	0.772
Time*Location(Impact-Control)	108.044	6	18.007	2.020	0.092
Residual	285.300	32	8.916		
Species Richness					
'Between Subjects'					
Impact-Control	0.000	1	0.000	0.000	1.000
Location(Impact-Control)	6.800	6	1.133	2.790	0.027
Residual	13.000	32	0.406		
'Within Subjects'					
Time	19.013	1	19.013	20.554	0.000
Time*Impact-Control	2.112	1	2.112	2.104	0.197
Time*Location(Impact-Control)	6.025	6	1.004	1.086	0.392
Residual	29.600	32	0.925		

The most important component of the repeated measures ANOVAs is the Time*Impact-Control term, as described in Section 3.1. The non-significant pre-operational temporal variation in fish variables, as described above, will facililitate detection of impacts in post-operational surveys.

3.5 Power analysis

The results of power analyses of autumn-spring 2005 datasets are provided in Table 20. Note that the table includes mean values (i.e. derived from eight location means in each case) for spring and autumn, mean 2005 values derived from autumn and spring means, and standard deviation values calculated from mean 2005 values for the eight locations (four impact, four control). Only the latter standard deviation values were used as direct input for the power analyses.

Following the autumn 2005 survey, some initial power analyses were conducted using spatial variance data, and the assumption was made that a difference would be reflected by lower biological values at the impact locations (e.g. lower abundance, species diversity). The percentage difference between impact and control locations was calculated that could be detected as significant using the current design. These analyses had limited value because, in the absence of temporal data, they did not examine power of temporal comparisons between impact and control locations, the most important comparisons for detecting impact using the MBACI

Table 20 Results of power analyses for temporal variation in biological variables.

Community	Variable	Autumn Mean	Spring Mean	2005 Mean	2005 SD	Power analysis - Change detected	% Change Detected vs 2005 Mean
IMPACT VS INNER CONTROL LOCATIONS							
fish	abundance	2.83	6.33	4.58	1.07	2.6 individuals	56.8%
fish	species richness	1.06	1.90	1.48	0.32	0.8 species	54.1%
epi-benthic algae	% red foliose algae	18.90	4.45	11.68	3.23	7.7% cover	66.0%
epi-benthic algae	% algae	33.40	20.75	27.08	7.07	16.9% cover	62.4%
benthic infauna	abundance	69.91	36.31	53.11	28.23	67.3 individuals	126.7%
benthic infauna	species richness	27.14	18.98	23.06	4.75	11.4 species	49.4%
benthic infauna	family richness	20.99	14.98	17.99	3.63	8.7 families	48.4%
IMPACT VS OUTER CONTROL LOCATIONS							
fish	abundance	1.94	6.20	4.07	0.31	3.1 individuals	76.2%
fish	species richness	1.09	2.06	1.58	1.28	0.8 species	50.8%
epi-benthic algae	% red foliose algae	13.65	3.08	8.37	5.53	13.2% cover	157.8%
epi-benthic algae	% algae	21.2	11.63	16.42	11.31	27.0% cover	164.5%
benthic infauna	abundance	47.09	37.03	42.06	7.10	17 individuals	40.4%
benthic infauna	species richness	22.18	19.03	20.61	1.87	4.5 species	21.8%
benthic infauna	family richness	17.49	14.71	16.10	1.62	3.9 families	24.2%

design. Similarly, the possibility of increased biological variable values cannot be ruled out (as described in Section 2.7.2), such that both increases and declines in values need to be considered in the power assessments. The results presented in Table 20 indicate absolute changes (e.g. 10 species, 20% algal cover) and percentage changes (25% of individuals, 50% species numbers) that could be detected by the current design, whereby the changes could be positive or negative. The percentage changes were calculated using the mean 2005 values, calculated from autumn and spring means, as a baseline. The data suitable as a baseline for future assessments of power may depend on the temporal scale at which power is being assessed (e.g. seasonal, annual).

Power analyses results for fish abundance indicated that increases or declines ranging from 56.8% to 76.2% of individuals, compared with the mean 2005 baseline, would be detected as significant using the current survey design. For fish species diversity, changes of 50.8% to 54.1% of mean 2005 numbers would be detectable (Table 20).

In the case of algal cover, levels of power differed considerably between impact/inner control and impact/outer control comparisons. For comparisons with inner controls, changes in red foliose algae and total algae of 66% and 62.4% respectively, compared with 2005 means, would be detectable. However power was reduced in the outer control comparisons, and changes of 157.8% and 164.5% respectively would be detected at the default probability levels (Table 20).

Similarly, the power analyses results for benthic infaunal abundance differed markedly between the inner and outer control analyses. The power analyses indicated that, with the current number of survey locations, declines or increases of 126.7% of benthic infaunal individuals would be detected as significant in impact/inner control comparisons, whilst changes of 40.4% would be detected in impact/inner control comparisons. In the case of species richness, changes ranging from 21.8% to 49.4% would be detected as significant, while changes of 24.2% to 48.4% in family richness would be detectable (Table 20), relative to the mean 2005 baseline values. Overall, greater power would be achieved in impact versus outer control comparisons than in the impact versus inner control locations.

The detectable changes above, where they reflect a decline in variable values, reveal one of the limitations of the power analysis. For algal variables in impact versus outer control analyses, and benthic infanal abundance in the impact versus inner control analyses, the percentage change that would be detected as a significant impact exceeded 100%. For increases in variable values, changes exceeding 100%, while denoting a low level of power, remain feasible. However, for declines in values, reductions by >100% are not feasible and suggest that a total loss of the communities of concern would not be detected as a significant impact. This suggests that for the above variables, additional samples are required to increase the power of the design. For the remaining variables, where a <100% change would be detectable, the adequacy of the power achieved using the existing design is subject to discussions with regulatory authorities.

It should be recalled that the power analyses are based on standard probabilities, and it is possible that in some cases smaller changes than those presented in Table 20 will be detectable, while in other cases, larger changes may be required for detection. This suggests that while power analyses provide a useful guide for levels of detection, the inclusion of various biological variables in the ongoing Gunns monitoring program should consider factors additional to the power analyses results, such as likelihood of the variables being influenced by the effluent. Certain methodologies also have multiple uses, such as detection of changes in sediment appearance and health using the epi-benthic quadrat photographs.

Variances contributed by individual sampling spatial scales were derived from mean square estimates to determine which spatial scales account for most variance. These variances were calculated from ANOVA mean square values, as described in Section 2.7.2, with results provided in Table 21. Similar calculations were performed following the autumn 2005 survey, however these calculations used spatial data from the autumn survey only, while the ANOVAs performed here for variance assessment utilised 'change' data (i.e. spring values subtracted from autumn values). The current calculations are more relevant to the MBACI design, since they examine variance in temporal data, however there is the limitation that calculations could only be performed on aggregated data, as described in Section 2.7.2. Therefore, the 'residual' term in the analyses corresponds to variance at the level of site (i.e. data aggregated for replicates), and includes variance contributed at both site and replicate levels. No separate assessment could be made of variance contributed at the level of site versus the level of replicate. Note that where calculations produced negative variance values, these variances were assumed to be zero.

The results show that for comparisons among impact locations, the primary source of variance was at the level of site (residual), which incorporated variance among sites and variance between replicates, rather than at the level of location. In fact, variance among locations was negligible for fish species richness and the two algal variables. For benthic infauna variables, variance contributed at the level of site was considerably greater than variance contributed by locations, while for fish abundance, sites contributed only marginally more variance than locations (Table 21).

For comparisons of fish variables between impact and control locations, most variance again was attributable to site, with comparably low or negligible variances attributable to location or treatment differences. A similar result was obtained for the algal variables, with consistently high portions of variance attributable to site differences.

The above results suggest that for fish and algal variables, a larger number of sites per location, or replicates per site (since the residual variance indicated in Table 21 includes variance at both site and replicate levels), would be more effective in increasing statistical power of analyses than a larger number of locations.

For benthic infauna variables, variance was more evenly distributed across the spatial scales. Analysis of change in benthic infauna abundance data showed that the primary source of variance was site for comparisons of the four impact locations. However, for comparisons of impact and control locations, location contributed a comparable or greater portion of variance than site (Table 21).

Table 21 Temporal variances calculated for different spatial scales using mean square values from ANOVAs of aggregated 'change' data. IC = impact-control.

	Fish abundance	Fish species richness	% red foliose algae cover	% algae cover	Benthic infauna abundance	Benthic infauna family richness	Benthic infauna species richness
IMPACTS							
Location	16.0	0	0	0	148.9	54.8	23.6
Residual	18.4	1.99	403.3	880.4	850.8	101.8	39.6
IMPACTS VS INNER CONTROLS							
IC	1.53	0.04	3.76	0	0	0	0
Location	7.24	0	0	254.9	4374	115.2	44.5
Residual	17.4	1.38	319.0	550.8	2359	82.5	38.7
IMPACTS VS OUTER CONTROLS							
IC	0	0.28	150.1	20.1	138.2	76.4	11.5
Location	9.09	0.08	38.6	48.1	649.2	100.4	46.5
Residual	17.8	1.85	223.2	473.9	650.0	81.2	35.8

4 SUMMARY AND CONCLUSIONS

The second pre-operational marine ecological monitoring survey at the proposed Gunns pulp mill outfall site at Five Mile Bluff was performed during spring 2005. The survey design replicated that applied during the first pre-operational survey in autumn 2005 and was based on the requirements of the MBACI approach recommended by Keough and Mapstone (1995). As described by Aquenal (2005) for the autumn survey, there were various ‘unknowns’ at the time of the spring survey, including the exact composition and toxicity of the proposed effluent stream, the anticipated direction, spatial extent and magnitude of effluent dispersion, the regulatory ‘effect’ size, and natural temporal variances in marine ecological community variables in the vicinity of the outfall. As a result, the positions and numbers of survey locations, sites and replicates were retained from the autumn survey on the basis of generalised expectations and other considerations outlined by Aquenal (2005), but should be considered provisional until the above information gaps are filled.

The variables analysed were identical to those investigated during the autumn survey and included the abundance and diversity of benthic infauna and fish communities and the percentage cover of epi-benthic algae. These biological variables were originally selected for monitoring on the basis of having been shown in previous studies to be susceptible to anthropogenic impacts. Comparisons of these variables were performed among the four impact locations, to determine if there is any pre-operational variation in close vicinity to the outfall, and between impact and control locations. The latter involved comparisons of impact locations with inner control locations and with outer control locations. These comparisons were considered more relevant than comparisons of impact locations with east or west control locations, since available information indicates that current movement, and therefore likely effluent dispersion, occurs in both easterly and westerly directions in the region (e.g. Aquenal 2002). Note however that the present survey did not incorporate an assessment of currents at the outfall site, and the issue of effluent dispersion has been addressed more comprehensively elsewhere in the IIAS.

The previous autumn survey assessed spatial variation in biological variables for the above sets of locational comparisons, and similar spatial analyses were conducted here using the spring data. However, while the autumn analyses were limited to assessments of spatial variation, the collection of spring data allowed additional analyses of temporal variation using repeated measures Analyses of Variance (ANOVAs). This is in fact a more critical aspect of the analysis, since the MBACI design detects impact by comparing temporal variation between impact and control locations. It is important to investigate levels of natural temporal variation in the absence of the outfall, since the presence of significant natural variation will affect the interpretation of post-commissioning data. The most desirable scenario is that there is no significant natural temporal variation between impact and control locations prior to the introduction of outfall discharges.

The benthic infauna surveys revealed a diverse assemblage typical of environmentally healthy conditions, although there was a reduction in abundance, family richness and species richness compared with the autumn 2005 survey. During both surveys, the fauna was dominated by crustaceans and, to a lesser extent, molluscs and polychaetes. In autumn, there was a peak in animal abundance and family richness at the eastern inner control locations, however abundances were comparable at impact and control locations during the current spring survey. Multi-dimensional Scaling (MDS) analysis of spring data indicated associations of benthic infauna with position along the coast, since the impact locations, eastern control locations and, to a lesser extent, western control locations formed separate groupings. This suggests that changes along the coast are more important than changes over the small depth difference (~ 3 m) separating the ‘nearshore’ and ‘offshore’ sets of locations. MDS analysis of autumn and spring data revealed separate groupings for the two survey periods, suggesting that seasonal shifts in benthic communities exceeded spatial variation. Seasonal differences were based primarily on changes in the abundance of some of the most common crustacean families, rather than changes in the presence/absence of certain families. These crustacean families can be ephemeral in nature and hence contribute to temporal variation in the absence of significant changes in environmental conditions.

Analyses of Variance (ANOVAs) detected significant variation among the four impact locations in benthic infaunal species and family richness, contrasting with the similar values recorded for impact locations in the autumn survey. Benthic infaunal abundance did not exhibit significant variation among impact locations in either the autumn or spring surveys. Most analyses indicated comparable values of benthic infauna variables between impact and control locations, however family richness differed between inner control and impact locations. The latter result, as well as the above differences among the four impact locations, was due to low family richness values at the nearshore impact locations (WI2, EI2). It is unclear at this stage whether this finding is seasonally based, that is, being detectable during spring but not autumn, or is caused by changes over a non-seasonal temporal scale. Data from autumn and spring surveys in 2006 will help to address this question, and will be used to determine implications for post-commissioning analyses should the above natural spatial differences continue to be exhibited at seasonal or other temporal scales.

Temporal analyses of benthic infauna variables recorded significant variation overall between autumn and spring in comparisons of impact and control locations, but not in comparisons of the four impact locations. However, variation between impact and control locations was consistently non-significant over time. The latter finding is more pertinent in relation to the MBACI approach, since the comparisons of temporal change between impact and control locations are used to test for impact. The above results reflecting similar natural temporal variation between impacts and controls provides a useful baseline against which impact can be assessed.

Epi-benthic quadrat photographs revealed a 16% increase in sand cover at impact locations compared with the autumn survey, reflecting the mobile nature of sands in this part of Bass Strait. The increase in sand cover resulted in decreases in cover of both bare reef and algal communities. Sand cover was more temporally consistent at control locations, however bare reef cover increased at the latter locations due to a reduction in algal density. A reduction in algal cover was therefore experienced at both the impact and control locations, and may reflect seasonal declines over winter that had not yet been replenished by spring growth. The epi-benthic fauna was comparable to that observed in autumn, being dominated by sponges, ascidians and bryozoans, and contributed a consistently low level of cover. Flora recorded was composed primarily of algae, although the seagrass Heterozostera tasmanica was recorded at one location, EI2. The algae were dominated by red foliose species, whilst unidentified brown algae, brown foliose algae, red coralline algae and *Zonaria* sp. were the next most abundant taxa. As with the autumn survey, two epi-benthic variables provided data suitable for analysis using ANOVAs: percentage cover of red foliose algae and percentage cover of algae (all taxa).

Consistent with autumn results, no significant spatial variation in red foliose algal cover or algal (all taxa) cover was detected among the impact locations or between impact and control locations in the spring data. Temporal analyses revealed significant declines in cover of red foliose algae in comparisons of impact locations and declines in both red foliose and total algal cover in comparisons of impact and control locations. However, temporal variation did not differ significantly between impact and control locations in any of the analyses performed. This suggests that patterns of natural temporal variation are comparable at control and impact locations, and hence the pre-operational temporal data will provide a useful baseline against which impact may be assessed following commissioning of the outfall.

A total of 11 fish species was recorded during the baited video survey program, compared with 16 during the autumn survey. However, species recorded in autumn and not spring were recorded in very low numbers, and mean species richness per location was in fact identical for the two surveys. Species richness per impact, inner control and outer control subsets of locations increased in spring. The most common species in both surveys was Degen's leatherjacket, while the barber perch was also consistently abundant. Fish abundance more than doubled between autumn and spring, mostly due to an increase in total numbers of Degen's leatherjacket from 95 to 549. The increase in fish abundance may reflect seasonal changes in activity or changes at a non-seasonal temporal scale. For example, approaching breeding season, some fish species may tend to aggregate and therefore react to bait in larger numbers. The type of bait used also differed between the two surveys, since there was no opportunity to experiment with bait types prior to the autumn survey and, following the low fish numbers recorded at that time, one component of the bait was revised in spring. It is notable that the mean reaction time of fish, calculated as the time between the quadrat frame settling on the seabed and the arrival of the first fish in the video frame, was 7 minutes 28 seconds in the autumn survey and 4 minutes 38 seconds in spring. While this may represent seasonal variation in fish activity, it may be due to improved attractant qualities of the bait. It is proposed that the bait type used in spring will be adopted for subsequent surveys. Therefore, while it is not possible to separate the effects of natural temporal variation and methodologies for the 2005 surveys, subsequent autumn and spring pre-operational surveys using the standard bait type will provide a controlled assessment of temporal effects.

ANOVAs found that fish species richness did not differ significantly among impact locations, but fish abundance did due to elevated numbers at EI1. Consistent with autumn surveys, fish species richness and abundance did not vary significantly between impact and inner control or outer control locations. Temporal analyses found that there was no significant variation between autumn and spring at the impact locations. In comparisons of impact and control locations, there was significant variation between autumn and spring due to increases in both fish species richness and abundance. However, temporal variation did not differ significantly between impact and control locations, suggesting that natural temporal variation is comparable across these subsets of locations. This being the case, the pre-operational temporal data will provide a useful baseline against which to detect any future impacts of outfall discharges.

While there was evidence of some significant spatial and temporal variation in the biological communities surveyed, temporal variation did not differ significantly between impact and control locations in benthic infaunal, algal or fish variables. This finding will facilitate the detection of any post-operational impacts, since differences in temporal variation between impact and control locations will be detected as being unnatural. At the same time, it is important that the analyses conducted here are of sufficient power to detect differences in temporal variation, and hence also to detect impacts of a prescribed size in future analyses. Following the autumn survey, some initial power analyses were conducted on spatial data to estimate the levels of spatial change that were detectable using the current design. It was emphasised however that since the primary interested of the MBACI design is the comparison of temporal variation between impact and control locations, the most pertinent aspect of the power analysis could not be performed until a temporal dataset was available. The power analyses were therefore repeated here using mean values derived from autumn and spring datasets. It was recognised that impacts associated with effluent outfalls could result in increases (e.g. fish attracted to the outfall, proliferation of one benthic infaunal pollution indicator species) or declines (e.g. reduced fish or benthic infaunal species richness) in values and hence the levels of detection determined from power anayses were expressed as changes which may be positive or negative. Percentage changes were calculated using the mean 2005 values, derived from autumn and spring means, as a baseline. However, the data used as a baseline in future power analyses may depend on the temporal scale of the comparisons being made (e.g. seasonal, annual).

Separate power analyses were conducted for comparisons of impact locations with inner controls and with outer controls, and revealed some differing levels of power for these two respective sets of comparisons. On the basis of the default power parameters applied in the analyses (α=0.05, power=0.8), results suggested that in the comparison of impact and inner control locations, the current design would detect a 126.7% change in benthic infaunal abundance, while changes in the range of 48.4% to 66.0% would be detectable for other biological variables. In the comparisons of impact and outer control locations, changes of 157.8-164.5% would be detectable for algal variables, while changes of 50.8-76.2% and 21.8-40.4% would be detectable for fish and benthic infaunal variables respectively. These results suggest that, on the basis of variation observed between autumn and spring in 2005, the current design is of insufficient power for the algal variables in comparisons of impact and outer control locations and for benthic infaunal abundance in impact and inner control comparisons. In these cases, power analyses suggest that a 100% decline would not be detected as a significant impact. The question as to the adequacy of power for the remaining variables remains unresolved until a regulatory 'effect size' is determined. However, initial examinations of the power data indicate that benthic infaunal species and family richness provide the most power variables for impact assessment. The next most powerful variables are the fish variables, whilst the algal variables currently provide least power on average. However, given that algal sampling intensity can be increased more cost effectively than the other biological sampling methods, improvements in the power of algal analyses can be readily achieved.

Estimates of variances contributed at different spatial scales suggested that for fish and algal variables, power of the design would best be increased by sampling a larger number of sites or replicates, rather than sampling additional locations. In the case of benthic infaunal variables, location contributed a comparable or larger portion of variance than sites/replicates. Increasing power of the design for these variables could therefore be undertaken at any of the spatial scales, and the scale chosen may depend on the practicality of locating additional suitable soft sediment areas for benthic infauna sampling.

The implications of the power analyses results for survey design adequacy should be assessed in light of several factors. Firstly, temporal variation has only been assessed at one temporal scale in one year and may or may not be indicative of variation experienced at the temporal scale of the monitoring program. Related to this is the fact that the 'baseline' used for estimating percentage change detectable using the current design was calculated over only one year. We recommend that more temporal data be collected prior to confirming the effect size and other power parameters with regulatory authorities. Hence, this information would contribute to assessments of which variables may require increased sampling intensity, and calculations of additional sample numbers required, to achieve adequate power and detection of the prescribed effect size. For example, it may be that same-season annual variation (ie autumn-autumn, spring-spring) is less than seasonal variation (autumn-spring) and that comparisons at this level require less samples to achieve adequate statistical power. In the longer term, a more appropriate and cost-effective design could therefore be achieved by having a greater understanding of patterns of temporal variation. It is recommended that the annual versus seasonal comparisons be made following the collection of two further datasets in autumn and spring 2006. The urgency of confirming the final design, including adequate sample numbers to achieve the agreed power and effect size, depends on the anticipated date for commissioning of the outfall. RPDC (2004) recommend 2.5 years of pre-operational monitoring, and it is important that the design applied during that time is the final design to also be applied during post-operational monitoring.

5 REFERENCES

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Appendix 1 Sites surveyed, indicating survey types, geographical coordinates and depths.

Location	Site	Benthic infauna & particle size			Benthic epi-fauna/epi-flora & Baited fish video		
		Easting	Northing	Depth (m)	Easting	Northing	Depth (m)
WOC1	WOC1S1	483353	5460716	29	483391	5460707	28
	WOC1S2	483423	5460716	29	483289	5460694	28
	WOC1S3	483417	5460765	29	483327	5460622	28
	WOC1S4	483284	5460661	29	483342	5460753	28
	WOC1S5	483332	5460666	29	483351	5460658	28
WOC2	WOC2S1	483842	5460395	26	483436	5460435	26
	WOC2S2	482885	5460415	26	483450	5460377	25
	WOC2S3	482865	5460442	26	483338	5460430	26
	WOC2S4	483381	5460480	26	483371	5460478	27
	WOC2S5	483395	5460488	27	483401	5460369	25
WIC1	WIC1S1	486528	5462066	28	486886	5461800	28
	WIC1S2	486447	5462080	28	486965	5461881	29
	WIC1S3	486490	5462080	28	487008	5461773	29
	WIC1S4	486990	5461881	28	486977	5461784	28
	WIC1S5	487021	5461815	29	487012	5461843	29
WIC2	WIC2S1	486861	5461384	23	486890	5461481	24
	WIC2S2	486530	5461419	23	486873	5461350	23
	WIC2S3	486533	5461434	24	486757	5461414	24
	WIC2S4	486518	5461410	24	486845	5461406	23
	WIC2S5	486859	5461384	24	486826	5461492	24
EOC1	EOC1S1	493114	5462087	29	493145	5462281	27
	EOC1S2	493169	5462124	29	493210	5462371	27
	EOC1S3	493043	5462158	29	493230	5462234	27
	EOC1S4	493068	5462071	29	493250	5462301	27
	EOC1S5	493036	5462097	29	493223	5462337	27
EOC2	EOC2S1	493228	5461303	23	493294	5461323	24
	EOC2S2	493262	5461307	23	493371	5461316	24
	EOC2S3	493326	5461318	23	493350	5461398	25
	EOC2S4	493316	5461346	23	493297	5461376	25
	EOC2S5	493332	5461311	23	493348	5461361	24
EIC1	EIC1S1	489328	5461796	27	489551	5462059	28
	EIC1S2	489324	5461827	27	489603	5462111	28
	EIC1S3	489348	5461827	26	489532	5462001	27
	EIC1S4	489329	5461811	27	489502	5462067	27
	EIC1S5	489304	5461811	27	489635	5462042	27
EIC2	EIC2S1	489503	5461285	23	489838	5461466	24
	EIC2S2	489538	5461283	23	489750	5461381	24
	EIC2S3	489514	5461244	23	489832	5461347	24
	EIC2S4	489512	5461280	23	489912	5461423	25
	EIC2S5	489518	5461241	23	489854	5461409	24

Location	Site	Benthic infauna & particle size			Benthic epi-fauna/epi-flora & Baited fish video		
		Easting	Northing	Depth (m)	Easting	Northing	Depth (m)
WI1	WI1S1	487865	5461081	28	487790	5461204	28
	WI1S2	487759	5461055	28	487884	5461235	28
	WI1S3	487677	5460995	28	487789	5461292	28
	WI1S4	487809	5461204	28	487829	5461261	28
	WI1S5	487888	5461203	29	487767	5461258	28
WI2	WI2S1	488043	5460694	23	488187	5460787	24
	WI2S2	488031	5460760	23	488172	5460695	24
	WI2S3	488138	5460781	23	488103	5460818	24
	WI2S4	488139	5460758	24	488153	5460742	24
	WI2S5	488173	5460669	25	488098	5460723	24
EI1	EI1S1	488557	5461662	28	488557	5461662	28
	EI1S2	488598	5461632	28	488598	5461632	28
	EI1S3	488678	5461574	28	488678	5461574	28
	EI1S4	488640	5461604	28	488640	5461604	28
	EI1S5	488560	5461613	28	488560	5461613	28
EI2	EI2S1	488759	5460937	24	488759	5460937	24
	EI2S2	488733	5460953	23	488733	5460953	23
	EI2S3	488763	5461000	23	488763	5461000	23
	EI2S4	488797	5461002	23	488797	5461002	23
	EI2S5	488697	5461038	23	488697	5461038	23

Appendix 2 Benthic infauna data: abundances of families (* = threatened mollusc, *Gazameda gunnii*).

a) Locations EI1, EI2 and EIC1.

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaeta	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	0	0	0	0	0	0	0	5	0	13	0	3	0	1	0	1	0	0	0	0	0	0	0	1	0	0
Aoridae	5	0	0	0	0	0	0	3	0	2	1	0	10	1	0	0	0	0	2	0	0	0	2	0	0	0	1	0	0	0
Caprellidae	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophiidae	0	0	2	3	0	0	10	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dexaminidae	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0
Eophiliantidae	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	2	1	0	0	0	0	0	2	0	0	0	0	3	0	1	0	0	0	0	0	2	0	0	1	0	0	1	0	0	0
Isaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischyrocereidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lysianassidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Melitidae	0	1	0	0	0	0	0	3	1	0	0	0	0	2	24	2	3	2	4	0	1	0	0	0	0	0	1	2	0	0
Oedicerotidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0	0
Paradaliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoxocephalidae	17	2	4	9	4	3	8	2	2	5	9	3	9	3	6	2	4	3	6	4	4	4	4	0	2	2	1	11	2	4
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Synopiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Urohaustoriidae	0	0	0	1	5	0	1	0	1	0	7	9	18	3	4	8	3	4	2	5	0	0	3	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bodotriidae	0	0	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Diastylidae	12	0	0	0	24	7	0	1	1	0	3	0	4	4	3	5	1	0	2	6	2	6	1	0	0	1	3	5	4	8
Nannastacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pilumnidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	2	0	0	0	0	1	3	0	0
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gnathiidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Limnoriidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nebaliidae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Ostracoda	4	0	1	6	4	1	1	1	0	6	1	0	5	2	1	2	1	0	1	1	21	11	4	0	2	2	14	4	7	2
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	33	1	5	7	0	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	45	15	3	2	2	0	43	8	14	16
Kalliapseudidae	3	1	1	0	1	0	3	0	2	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	1	1	0
Leptochelidae	7	1	2	2	1	0	2	4	2	1	0	0	0	0	0	1	0	0	0	0	1	0	2	1	2	0	1	4	0	0
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Ophiuridae	0	0	0	1	0	2	2	0	2	0	2	3	2	3	2	1	3	0	1	4	0	1	3	1	2	2	2	0	0	0
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	2	0	0	1	2	2	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Philinidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	2
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Condylocardiidae	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	5	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	1
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	0	0	0	0	1	0	0	0	0	0	3	7	4	5	0	1	0	7	4	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	2	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	4	5	1	5
Gastropoda sp.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Nematoda																														
Nematoda	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Nemertea																														
Nemertea	2	1	0	2	0	0	2	0	1	0	0	0	0	0	1	0	1	0	0	0	1	2	2	1	1	3	4	2	1	1
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Dorvilleidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	2	0
Eunicidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0
Lumbrineridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Onuphidae	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Paraonidae	7	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	4	1
Glyceridae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1
Hesionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
Nereididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Syllidae	9	1	0	1	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	2	1	3	2	1
Sabellidae	1	0	1	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	1	6	3	0	0	0	0	0	1	4	2
Serpulidae	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae	0	0	1	1	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	0	0
Cirratulidae	1	0	0	0	2	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Terebellidae	3	0	1	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	2
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Flabelligeridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichobranchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	131	9	28	42	50	22	38	35	16	40	24	27	69	39	52	26	20	13	26	29	116	55	32	8	13	17	87	63	58	48

Appendix 2 cont.

b) Locations EIC2, EOC1 and EOC2.

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaeta	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	2	2	1	0	0	4	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0
Ampithoidae	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0
Aoridae	20	1	2	0	1	0	0	0	4	0	1	0	0	1	3	1	1	0	1	0	1	0	0	1	0	0	0	1	0	0
Caprellidae	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Corophiidae	3	3	1	3	0	0	0	0	2	4	2	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	2	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Dexaminidae	2	2	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	10	0	0	0	1	0	0	1	3	0	1	0	0	1	0	1	0	1	1	0	1	1	2	0	0	0	0	0	0	0
Isaeidae	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0
Ischyrocereidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	1	0	0	1	0	2	1	0	0	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Lysianassidae	2	2	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0	1	0	1	0
Melitidae	0	0	3	0	1	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	2	0	3	1	0	0	0	4	0	0
Oedicerotidae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Paradaliscidae	2	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoxocephalidae	8	7	1	5	3	6	2	4	10	1	13	2	4	5	2	9	2	9	14	6	7	3	16	5	0	2	9	4	6	1
Platyischnopidae	0	0	0	1	2	1	0	0	0	0	3	0	0	1	0	2	0	0	1	0	0	2	0	0	0	0	0	0	0	0
Podoceridae	3	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synopiidae	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	2	0	0	0	0	0	0	0	2	17	6	8	11	0	4	11	12	10	3	1	0	0	0	0	0	0	0	1	1
Copepoda	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bodotriidae	0	0	0	0	0	0	0	0	0	0	1	2	2	3	3	0	1	1	0	0	1	0	0	0	1	0	0	0	0	1
Diastylidae	3	0	1	1	1	1	0	3	2	2	16	8	11	9	0	10	4	6	2	6	4	3	4	5	3	0	0	6	0	3
Nannastacidae	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	3	0	0
Palaemonidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0
Pilumnidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	0	0	0	0	0	2	0	3	1	0	0	1	0	1	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Gnathiidae	0	0	0	0	0	3	0	2	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Holognathidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Limnoriidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0
Nebaliidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	3	5	0	1	5	0	0	1	2	0	9	2	2	3	4	7	4	3	4	3	1	1	6	3	0	1	3	2	6	0
Pagurapseudidae	0	0	0	0	1	0	0	3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	0	0	6	2	3	3	0	1	5	0	12	0	4	2	7	7	24	12	0	30	7	2	2	3	3	4	11	2	20	4
Kalliapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Leptochelidae	1	1	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuridae	0	1	0	0	1	0	0	0	0	0	2	2	1	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	1	0	1	0	0	0	0	0	1	1	8	1	3	0	4	1	3	1	3	0	0	1	0	0	0	1	0	1	0	0
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellidae *	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteriidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	0	0	0	0	0	0	0	0	0	1	2	2	4	0	1	4	15	16	3	3	1	0	1	0	1	0	0	0	0	3
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tellinidae	0	0	0	0	0	0	0	1	0	0	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	0	0	0	1	1	0	4	3	2	0	0	0	8	0	0	0	4	2	1	2	2	0	0	3	1	2	3	1
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda																														
Nematoda	0	0	0	0	0	1	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Nemertea																														
Nemertea	1	0	0	1	1	0	0	2	2	0	0	0	0	0	2	0	0	0	4	1	0	1	5	3	2	1	0	1	0	0
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dorvilleidae	2	8	0	1	0	1	1	3	3	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eunicidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Lumbrineridae	0	0	0	1	1	3	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0
Glyceridae	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
Hesionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0
Nereididae	5	2	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	1	12	0	0	19	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Syllidae	2	0	2	0	5	3	0	5	5	0	1	0	0	0	5	1	0	1	1	0	0	0	4	0	0	0	3	0	1	0
Sabellidae	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae	0	0	0	0	0	0	0	0	0	1	1	1	0	0	2	0	2	1	0	1	0	0	0	1	0	0	5	2	1	0
Cirratulidae	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	3	3	0	1	0	0	0	0	0	0	0	0	1	0
Terebellidae	2	0	1	0	0	1	0	0	2	1	0	1	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0	0
Chrysopitelidae	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabelligeridae	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Trichobranchidae	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	80	43	32	19	30	43	7	42	88	33	109	35	47	46	73	60	73	80	63	62	38	33	63	31	13	14	36	40	45	18

Appendix 2 cont.

c) Locations WI1, WI2 and WIC1.

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaeta	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aoridae	1	0	1	0	3	8	2	1	0	2	0	0	1	0	0	0	1	1	2	5	0	0	0	0	0	0	3	1	2	0
Caprellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Corophiidae	1	2	1	0	0	10	2	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
Dexaminidae	1	1	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	0	0	1	1	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0
Isaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischyrocereidae	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Leucothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Lysianassidae	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Melitidae	0	0	1	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	3	0	0
Oedicerotidae	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Paradaliscidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Phoxocephalidae	1	6	10	5	4	9	3	0	3	5	0	3	0	2	6	1	2	3	2	4	1	3	2	2	4	1	2	3	7	0
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Synopiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Bodotriidae	0	2	3	0	1	3	0	2	0	1	0	1	1	0	1	0	1	0	2	0	0	1	1	0	1	2	0	1	2	0
Diastylidae	0	2	2	0	4	5	0	2	0	1	1	3	0	0	3	2	0	1	1	1	0	0	0	0	0	0	2	1	0	0
Nannastacidae	1	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Leucosiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	3	0	1	1
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pilumnidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Gnathiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnoriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	0	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nebaliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0
Ostracoda	1	3	1	0	0	2	2	1	1	2	1	2	0	4	1	0	9	0	0	0	0	2	2	1	0	2	1	0	1	0
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	4	1	3	0	8	4	1	0	0	2	3	0	2	4	0	9	6	0	1	1	0	1	1	0	4	3	1	10	7	0
Kalliapseudidae	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	3	0	0	1	1	0	0	0	0	0	1	1	0	0	0
Leptochelidae	13	5	4	0	8	2	0	1	0	1	2	7	2	1	0	4	9	0	1	2	0	0	2	1	0	0	5	1	0	0
Leptognathidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphiuridae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuridae	1	0	0	0	1	0	0	1	1	0	0	0	2	0	3	3	0	0	0	0	0	2	0	0	0	1	0	1	0	0
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Trochidae	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Buccinidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Columbellidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	1	7	0	0	0	1	2	0	1	0	0	0	0	1	0	0	0	1	0	1	0	2	0	0	0	0	0	1	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	0	0	4	0
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	1	1	0	1	0	1	0	2	0
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda																														
Nematoda	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	1	0	0	0	0	0	0
Nemertea																														
Nemertea	1	0	0	1	0	1	0	0	0	0	0	2	4	0	0	1	3	0	0	1	0	1	5	0	1	2	0	1	1	0
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1
Dorvilleidae	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0
Eunicidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Lumbrineridae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hesionidae	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Nereididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	1	0	3	1	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	4	1	0	1	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syllidae	1	1	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	4	0	1	7	1
Sabellidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0
Spionidae	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirratulidae	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Terebellidae	0	1	0	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	3	0	1	3	2	0	1
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabelligeridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Trichobranchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Porifera																														
Tethyidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TOTAL	33	41	31	11	51	82	29	14	10	22	9	24	14	17	16	25	53	13	11	18	8	33	31	14	31	36	37	44	45	8

Appendix 2 cont.

c) Locations WIC2, WOC1 and WOC2.

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaeta	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	6	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	0	0	0	2	0	0	0	0	0
Aoridae	0	0	0	1	1	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4	0
Caprellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophiidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dexaminidae	0	0	0	1	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	1	0	0	3	0	1	1	1	0	0	0	0	0	0	0	0	1	0	5	0	0	1	0	0	0	0	0	0	0	0
Isaeidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ischyrocereidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Lysianassidae	0	0	0	0	1	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Melitidae	0	0	1	0	2	24	8	1	1	5	2	0	0	0	0	0	0	1	0	0	8	7	0	0	1	0	0	0	13	0
Oedicerotidae	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Paradaliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Phoxocephalidae	5	2	2	1	2	3	1	2	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	5
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synopiidae	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	0	0	0	0	0	0	0	0	0	6	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	1
Copepoda	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bodotriidae	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Diastylidae	0	0	1	0	0	0	0	0	0	2	24	4	2	5	1	0	0	3	3	0	0	0	2	2	1	0	1	4	1	0
Nannastacidae	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pilumnidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anthuridae	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	2	0
Arcturidae	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gnathiidae	0	0	0	0	3	21	0	4	0	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	0	0	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	3	0	0	0	0	11	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Limnoriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nebaliidae	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	3	0	1	0	1	1	1	0	1	1	1	3	2	1	2	3	5	5	0	0	2	1	1	0	3	1	0	1	0	1
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	1	1	3	0	9	7	0	10	0	2	0	0	0	0	0	1	3	0	12	0	3	0	1	1	19	2	0	0	12	0
Kalliapseudidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	1	0	0	0	4	0	2	0	1	1	0	0	0
Leptochelidae	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	2	9	0	1	6
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ophiuridae	0	0	0	0	0	1	0	0	0	1	2	2	0	1	0	2	1	0	4	0	3	0	0	0	1	0	0	0	1	1
Echiura																														
Echiura	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	0	0	0	0	0	2	0	0	0	0	2	0	2	0	0	2	0	2	4	2	0	1	0	0	0	0	0	0	0	1
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	2	0	1	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	2	0	0	0	0	4	1	1	4	0	4	0
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Nematoda																														
Nematoda	5	2	9	1	3	4	0	12	0	14	0	0	0	0	0	0	0	0	0	0	0	0	8	7	12	14	0	0	1	0
Nemertea																														
Nemertea	3	0	3	2	2	5	4	11	0	5	1	0	0	0	0	0	1	1	0	0	2	1	4	0	6	3	0	0	0	0
Platyhelminthes																														
Platyhelminthes	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	5	1	0	1	0	6	0	0	1	0
Dorvilleidae	2	1	2	0	3	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	3	1	0	3	0	0	0	0	3	0
Eunicidae	3	0	0	2	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0	0	2	1	2	0	3	0	0	0	2	0
Lumbrineridae	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	3	3	0	0	0	0	0
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyceridae	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Hesionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Nereididae	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	2	0
Phyllodocidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pisionidae	6	2	4	3	8	5	0	6	0	13	0	0	0	0	0	0	0	0	1	0	0	0	3	3	5	2	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Syllidae	3	0	2	0	1	9	1	2	1	15	0	0	0	0	0	0	0	0	0	0	7	3	1	6	4	7	0	0	2	1
Sabellidae	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	3	0	0	0	1
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	0	0	0	1	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	0	1	0
Spionidae	0	0	0	0	0	0	0	0	0	1	3	1	2	0	2	1	1	1	0	0	2	0	0	0	3	1	1	0	1	0
Cirratulidae	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Terebellidae	2	0	0	0	0	1	1	0	0	7	0	1	0	0	0	0	0	0	1	0	4	0	1	1	9	3	1	0	6	0
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Flabelligeridae	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Trichobranchidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	2	7	0	0	2	0
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	43	8	36	20	41	131	32	55	13	115	51	18	13	11	11	18	19	17	40	5	66	34	27	46	92	69	23	7	73	20

Appendix 3 Benthic infauna data: number of species per family (* = threatened mollusc, *Gazameda gunnii*).

a) Locations EI1, EI2 and EIC1.

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaete	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0
Aoridae	1	0	0	0	0	0	0	2	0	1	1	0	2	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
Caprellidae	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophiidae	0	0	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dexaminidae	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0
Eophiliantidae	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	1	1	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
Isaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischyrocereidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lysianassidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Melitidae	0	1	0	0	0	0	0	1	1	0	0	0	0	1	2	1	2	2	2	0	1	0	0	0	0	0	1	1	0	0
Oedicerotidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0	0
Paradaliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoxocephalidae	3	2	2	2	2	2	2	1	1	2	3	2	2	2	3	2	3	1	2	2	2	3	3	0	1	1	1	3	1	1
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synopiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Urohaustoriidae	0	0	0	1	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	2	0	0	1	0	0	0	0	0	0	0
Bodotriidae	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Diastylidae	1	0	0	0	1	2	0	1	1	0	1	0	1	1	1	2	1	0	1	1	1	1	1	0	0	1	1	2	2	2
Nannastacidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pilumnidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	1	0	0
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gnathiidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Limnoriidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nebaliidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	3	1	1	2	0	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	2	2	1	2	1	0	2	2	3	2
Kalliapseudidae	1	1	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0
Leptochelidae	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0	1	2	0	0
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ostracoda	4	0	1	4	3	1	1	1	0	3	1	0	3	2	1	2	1	0	1	1	8	7	2	0	2	2	6	3	4	2
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuridae	0	0	0	1	0	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Philinidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	1
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Condylocardiidae	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	2	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	2	1	2
Gastropoda sp.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda																														
Nematoda	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Nemertea																														
Nemertea	1	1	0	2	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	1	1	1	1	1	2	2	1	1	1
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Dorvilleidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	1	0
Eunicidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0
Lumbrineridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Onuphidae	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0
Glyceridae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Nereididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Syllidae	6	1	0	1	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	2	1	2	2	1
Sabellidae	1	0	1	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0	0	0	1	1	1
Serpulidae	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	1
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae	0	0	1	1	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirratulidae	1	0	0	0	2	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Flabelligeridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Terebellidae	3	0	1	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	2
Trichobranchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Taxa	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	41	9	18	24	18	12	17	23	12	28	9	10	22	14	16	13	13	8	13	12	44	28	19	8	9	14	31	32	30	19

Appendix 3 cont.

b) Locations EIC2, EOC1 AND EOC2.

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaete	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0
Ampithoidae	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0
Aoridae	2	1	1	0	1	0	0	0	1	0	1	0	0	1	2	1	1	0	1	0	1	0	0	1	0	0	0	1	0	0
Caprellidae	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Corophiidae	1	1	1	1	0	0	0	0	1	2	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Dexaminidae	2	2	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Eusiridae	2	0	0	0	1	0	0	1	2	0	1	0	0	1	0	1	0	1	1	0	1	1	2	0	0	0	0	0	0	0
Isaeidae	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
Ischyrocereidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	1	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Lysianassidae	2	2	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0	1	0	1	0
Melitidae	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	1	0	0	0	2	0	0
Oedicerotidae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Paradaliscidae	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoxocephalidae	3	3	1	3	2	3	1	2	2	1	3	2	2	2	1	2	1	3	3	2	2	1	4	2	0	2	3	2	2	1
Platyischnopidae	0	0	0	1	1	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Podoceridae	1	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synopiidae	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	1	0	0	0	0	0	0	0	1	2	2	1	2	0	2	2	3	1	2	1	0	0	0	0	0	0	0	1	1
Bodotriidae	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0	1	1	0	0	1	0	0	0	1	0	0	0	0	1
Diastylidae	2	0	1	1	1	1	0	1	1	1	2	2	2	2	0	1	2	2	1	1	1	2	2	2	1	0	0	2	0	1
Nannastacidae	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0
Palaemonidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0
Pilumnidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	0	0	0	0	0	1	0	1	1	0	0	1	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Gnathiidae	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Holognathidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limnoriidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Sphaeromatidae	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Nebaliidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurapseudidae	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	0	0	3	1	2	1	0	1	1	0	2	0	1	1	2	2	2	2	0	2	3	1	2	2	2	1	1	2	2	1
Kalliapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Leptochelidae	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	2	2	0	1	5	0	0	1	2	0	5	2	2	3	4	4	2	3	3	2	1	1	3	2	0	1	2	1	4	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuridae	0	1	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	1	0	1	0	0	0	0	0	1	1	2	1	2	0	1	1	1	1	2	0	0	1	0	0	0	1	0	1	0	0
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turitellidae *	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Pteriidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	2	1	2	1	1	1	0	1	0	1	0	0	0	0	1
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tellinidae	0	0	0	0	0	0	0	1	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	0	0	0	1	1	0	1	2	2	0	0	0	2	0	0	0	2	1	1	2	2	0	0	3	1	1	3	1
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda																														
Nematoda	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Nemertea																														
Nemertea	1	0	0	1	1	0	0	2	2	0	0	0	0	0	1	0	0	0	1	1	0	1	2	2	1	1	0	1	0	0
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dorvilleidae	1	2	0	1	0	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eunicidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Lumbrineridae	0	0	0	1	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0	0
Chrysopitelidae	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyceridae	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0
Nereididae	1	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Syllidae	2	0	2	0	3	1	0	3	1	0	1	0	0	0	5	1	0	1	1	0	0	0	3	0	0	0	2	0	1	0

Taxa	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Sabellidae	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Spionidae	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1	1	0	1	0	0	0	1	0	0	2	2	1	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirratulidae	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	0	1	0	0	0	0	0	0	0	0	1	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabelligeridae	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Terebellidae	1	0	1	0	0	1	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Trichobranchidae	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	33	23	27	14	25	20	5	25	34	18	43	22	20	23	36	29	18	34	31	20	22	25	35	21	8	11	15	25	21	11

Appendix 3 cont.

c) Locations WI1, WI2 and WIC1.

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Ascidiacea	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaete	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aoridae	1	0	1	0	1	3	1	1	0	2	0	0	1	0	0	0	1	1	1	3	0	0	0	0	0	0	2	1	1	0
Caprellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Corophiidae	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
Dexaminidae	1	1	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
Isaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischyrocereidae	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Leucothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Lysianassidae	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Melitidae	0	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2	0	0
Oedicerotidae	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Paradaliscidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Phoxocephalidae	1	2	2	2	3	4	2	0	2	2	0	2	0	2	3	1	1	2	2	2	1	1	2	1	2	1	2	2	3	0
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Synopiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Bodotriidae	0	2	1	0	1	2	0	2	0	1	0	1	1	0	1	0	1	0	1	0	0	1	1	0	1	1	0	1	2	0
Diastylidae	0	1	1	0	2	1	0	1	0	1	1	1	0	0	2	1	0	1	1	1	0	0	0	0	0	0	2	1	0	0
Nannastacidae	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Leucosiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	1	1

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	1	0	0
Pilumnidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthuridae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Arcturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Gnathiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnoriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nebaliidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	3	1	1	0	1	1	1	0	0	1	2	0	1	2	0	1	2	0	1	1	0	1	1	0	2	2	1	2	1	0
Kalliapseudidae	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	1	0	0	0
Leptochelidae	2	1	1	0	1	1	0	1	0	1	1	1	1	1	0	1	2	0	1	1	0	0	1	1	0	0	1	1	0	0
Leptognathidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Ostracoda	1	2	1	0	0	2	1	1	1	1	1	1	0	3	1	0	5	0	0	0	0	1	1	1	0	2	1	0	1	0
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphiuridae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuridae	1	0	0	0	1	0	0	1	1	0	0	0	1	0	1	2	0	0	0	0	0	1	0	0	0	1	0	1	0	0
Echiura																														
Echiura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Trochidae	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Buccinidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Columbellidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	1	2	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turitellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	0	0	3	0
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	1	0	1	0	1	0
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nematoda																														
Nematoda	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0
Nemertea																														
Nemertea	1	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	2	0	0	1	0	1	1	0	1	1	0	1	1	0
Platyhelminthes																														
Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1
Dorvilleidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Eunicidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Lumbrineridae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

Taxa	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Glyceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesionidae	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Nereididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	1	0	2	1	0
Phyllodocidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syllidae	1	1	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	2	0	1	7	1
Sabellidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraonidae	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Spionidae	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirratulidae	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabelligeridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Terebellidae	0	1	0	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	3	2	0	1
Trichobranchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Porifera																														
Tethyidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TOTAL	21	24	15	8	20	39	23	10	7	17	7	13	8	14	10	10	30	7	9	13	7	20	22	10	21	23	26	30	30	8

Appendix 3 cont.

d) Locations WIC2, WOC1 and WOC2.

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Brachiopoda																														
Brachiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chordata																														
Pyuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asymmetronidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clitellata																														
Oligochaete	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Cnidaria																														
Anthozoa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea																														
Ampeliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ampithoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0
Aoridae	0	0	0	1	1	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	2	0
Caprellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophiidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dexaminidae	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0
Eophiliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eusiridae	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2	0	0	1	0	0	0	0	0	0	0	0
Isaeidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ischyrocereidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucothoidae	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lysianassidae	0	0	0	0	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Melitidae	0	0	1	0	1	2	2	1	1	1	1	0	0	0	0	0	0	1	0	0	2	3	0	0	1	0	0	0	2	0
Oedicerotidae	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Paradaliscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Phliantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Phoxocephalidae	2	1	2	1	1	2	1	2	2	1	2	2	2	2	1	3	0	2	1	3	2	0	2	2	0	2	0	1	2	2
Platyischnopidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Podoceridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sebidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Stenothoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Synopiidae	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Urohaustoriidae	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	1
Bodotriidae	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Diastylidae	0	0	1	0	0	0	0	0	0	1	2	2	2	1	1	0	0	1	1	0	0	0	2	1	1	0	1	1	1	0
Nannastacidae	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
Alpheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Leucosiidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nannosquillidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Palaemonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Pasiphaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectinariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pilumnidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portunidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anthuridae	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	1	0
Arcturidae	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirolanidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gnathiidae	0	0	0	0	1	2	0	1	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0
Holognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Janiridae	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Limnoriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serolidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeromatidae	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nebaliidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurapseudidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apseudidae	1	1	2	0	2	2	0	2	0	1	0	0	0	0	0	1	1	0	3	0	1	0	1	1	1	1	0	0	1	0
Kalliapseudidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	0	0	1	0	1	0	1	1	0	0	0
Leptochelidae	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	1	1	0	1	1
Leptognathidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototanaidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	2	0	1	0	1	1	1	0	1	1	1	2	2	1	1	3	2	4	0	0	2	1	1	0	2	1	0	1	0	1
Echinodermata																														
Echinometridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Amphiuridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ophiuridae	0	0	0	0	0	1	0	0	0	1	1	1	0	1	0	1	1	0	1	0	1	0	0	0	1	0	0	0	1	1
Echiura																														
Echiura	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Mollusca																														
Fissurellidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochidae	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0	0	0	0	1
Philinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retusidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gadilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Mytilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Buccinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Columbellidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eatoniellidae	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2	0	1	0	0	0
Marginellidae	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Olividae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Cerithiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turitellidae *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrococcidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naticidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Flabbelinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuspidariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Myochamidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoloricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pteriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carditidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Condylocardiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galeommatidae	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0
Lucinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montacutidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psammobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solenidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	0	0	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	1	0	0	0	0	2	1	1	2	0	2	0
Gastropoda sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opisthobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Nematoda																														
Nematoda	2	1	2	1	1	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4	3	0	0	1	0
Nemertea																														
Nemertea	2	0	1	1	1	2	2	1	0	2	1	0	0	0	0	0	1	1	0	0	2	1	2	0	3	1	0	0	0	0
Platyhelminthes																														
Platyhelminthes	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta																														
Capitellidae	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	1	0	0	1	0
Dorvilleidae	2	1	1	0	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	1	0
Eunicidae	1	0	0	1	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	1	0	3	0	0	0	1	0
Lumbrineridae	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0
Oenonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onuphidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Oweniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysopitelidae	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Glyceridae	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Goniadidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Hesionidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Nereididae	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	0
Phyllodocidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pisionidae	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sigalionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Syllidae	2	0	2	0	1	6	1	1	1	6	0	0	0	0	0	0	0	0	0	0	6	3	1	5	4	4	0	0	2	1
Sabellidae	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0	1
Serpulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirorbidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opheliidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbiniidae	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Paraonidae	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	0	1	0
Scalibregmidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Magelonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0	0	1	0	0	0	1	1	1	0	1	0
Ampharetidae	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirratulidae	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	1	0	1	2	0	0	1	0	1	0	0	0	0
Ctenodrilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flabelligeridae	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Taxa	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Terebellidae	1	0	0	0	0	1	1	0	0	2	0	1	0	0	0	0	0	0	1	0	3	0	1	1	3	2	1	0	1	0
Trichobranchidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	0	0	1	0
Porifera																														
Tethyidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Sipuncula																														
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	24	5	22	12	19	47	22	16	11	45	23	17	13	10	11	18	14	17	19	10	43	26	19	29	38	34	12	4	33	12

Appendix 4 Particle size data (mm) for sites surveyed at impact, inner control and outer control locations.

Site	2 %	0.5 %	0.063 %	<0.063 %	Site	2 %	0.5 %	0.063 %	<0.063 %
EI1 S1	0.6	56.5	29.9	13.0	WIC1 S1	13.2	80.9	83.8	100.0
EI1 S2	1.4	30.6	41.7	26.4	WIC1 S2	25.0	77.5	97.5	100.0
EI1 S3	12.9	40.0	27.1	20.0	WIC1 S3	0.7	4.3	77.1	100.0
EI1 S4	0.6	30.5	62.3	6.5	WIC1 S4	11.4	57.1	82.9	100.0
EI1 S5	5.2	41.6	53.2	0.0	WIC2 S1	45.5	74.0	76.6	100.0
EI2 S1	88.9	5.6	2.8	2.8	WIC2 S2	51.0	88.2	98.0	100.0
EI2 S2	1.3	3.9	85.7	9.1	WIC2 S3	50.0	95.0	100.0	100.0
EI2 S3	0.6	13.6	74.0	11.7	WIC2 S4	57.5	97.5	100.0	100.0
EI2 S4	1.3	14.3	75.3	9.1	WIC2 S5	35.9	84.4	90.6	100.0
EI2 S5	1.3	3.9	79.2	15.6	EOC1 S1	0.6	7.8	90.9	100.0
WI1 S1	1.4	2.9	80.0	15.7	EOC1 S2	0.6	5.2	87.0	100.0
WI1 S2	1.3	3.9	74.0	20.8	EOC1 S3	1.3	7.8	90.9	100.0
WI1 S4	20.8	62.3	2.6	14.3	EOC1 S4	1.3	15.6	92.2	100.0
WI1 S5	24.7	50.6	9.1	15.6	EOC1 S5	0.6	18.2	89.6	100.0
WI2 S1	1.3	51.9	37.7	9.1	EOC2 S1	9.1	81.8	94.8	100.0
WI2 S2	2.6	26.0	67.5	3.9	EOC2 S2	10.4	74.0	87.0	100.0
WI2 S3	0.6	11.0	76.6	11.7	EOC2 S3	0.6	44.2	90.9	100.0
WI2 S4	5.2	79.2	14.3	1.3	EOC2 S4	2.6	63.6	97.4	100.0
WI2 S5	1.3	79.2	19.5	0.0	EOC2 S5	0.6	35.1	92.2	100.0
EIC1 S1	28.6	66.2	67.5	100.0	WOC1 S1	47.5	88.1	89.8	100.0
EIC1 S2	19.5	79.2	83.1	100.0	WOC1 S2	21.8	87.3	96.4	100.0
EIC1 S3	2.6	41.6	90.9	100.0	WOC1 S3	78.0	94.0	100.0	100.0
EIC1 S4	3.9	77.9	90.9	100.0	WOC1 S4	1.3	10.4	87.0	100.0
EIC1 S5	16.9	72.7	77.9	100.0	WOC1 S5	2.6	10.4	89.6	100.0
EIC2 S1	7.1	85.7	91.4	100.0	WOC2 S1	14.3	41.6	88.3	100.0
EIC2 S2	10.5	94.7	100.0	100.0	WOC2 S2	0.6	3.9	96.1	100.0
EIC2 S3	42.9	57.1	58.6	100.0	WOC2 S3	12.0	84.0	100.0	100.0
EIC2 S4	2.6	83.1	93.5	100.0	WOC2 S4	2.6	27.3	80.5	100.0
EIC2 S5	34.4	68.8	69.5	100.0	WOC2 S5	22.2	59.7	83.3	100.0

Appendix 5 Percentage cover of substrata, flora and fauna in epi-benthic quadrat photographs taken at impact sites.

a) Eastern impact sites

Descriptor	EI1 S1-1	EI1 S1-2	EI1 S2-1	EI1 S2-2	EI1 S3-1	EI1 S3-2	EI1 S4-1	EI1 S4-2	EI1 S5-1	EI1 S5-2	EI2 S1-1	EI2 S1-2	EI2 S2-1	EI2 S2-2	EI2 S3-1	EI2 S3-2	EI2 S4-1	EI2 S4-2	EI2 S5-1	EI2 S5-2
SUBSTRATA																				
Total % sand cover	100	84	52	94	68	76	60	36	100	100	54	62	82	6	12	8	68	88	92	82
Total % shell cover	0	16	0	0	32	24	0	0	0	0	0	0	0	8	2	4	0	0	0	0
Low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0
Cobbles	0	0	10	0	0	0	0	8	0	0	0	0	0	50	26	10	0	0	0	0
Patchy low reef	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
Pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0
Total % reef cover	0	0	16	0	0	0	0	8	0	0	0	0	0	74	64	60	0	0	0	0
FAUNA																				
Ascideacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compound ascidian	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Phallusia obesa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycarpa viridis	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brain sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Grey sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Orange sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange sponge with tubercles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plate sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0
Red finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small yellow lobed sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Total % fauna cover	0	0	0	0	0	0	0	10	0	0	0	0	0	0	12	16	0	0	0	0
ALGAE																				
Brown algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown filamentous	0	0	0	4	0	0	6	0	0	0	0	0	0	2	0	0	0	0	0	0
Brown foliose	0	0	8	0	0	0	16	32	0	0	0	0	0	6	8	0	0	0	0	0
Brown holdfast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown benthic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium sp.	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Cystophora sp.	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyosphaeria sericea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filamentous algae	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Green filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green foliose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonderopelta sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red coralline	0	0	4	0	0	0	0	2	0	0	0	0	0	4	0	4	0	0	0	0
Red foliose	0	0	10	0	0	0	6	8	0	0	0	0	0	0	0	2	0	0	0	0
Zonaria sp.	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % algae cover	0	0	32	6	0	0	40	46	0	0	0	0	0	12	10	12	0	0	0	0
SEAGRASS																				
Heterozostera tasmanica	0	0	0	0	0	0	0	0	0	0	46	38	18	0	0	0	32	12	8	18

b) Western Impact Sites

Descriptor	WI1 S1-1	WI1 S1-2	WI1 S2-1	WI1 S2-2	WI1 S3-1	WI1 S3-2	WI1 S4-1	WI1 S4-2	WI1 S5-1	WI1 S5-2	WI2 S1-1	WI2 S1-2	WI2 S2-1	WI2 S2-2	WI2 S3-1	WI2 S3-2	WI2 S4-1	WI2 S4-2	WI2 S5-1	WI2 S5-2
SUBSTRATA																				
Total % sand cover	**100**	**100**	**38**	**12**	**20**	**34**	**46**	**38**	**50**	**40**	**100**	**100**	**62**	**92**	**14**	**44**	**22**	**24**	**48**	**40**
Total % shell cover	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**4**
Low reef	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbles	0	0	26	20	28	20	38	36	38	26	0	0	24	8	2	16	20	46	20	24
Patchy low reef	0	0	0	0	0	0	0	0	0	14	0	0	0	0	26	0	0	0	0	0
Pebbles	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Total % reef cover	**0**	**0**	**26**	**28**	**28**	**20**	**38**	**36**	**38**	**40**	**0**	**0**	**28**	**8**	**28**	**16**	**20**	**46**	**20**	**24**
FAUNA																				
Ascideacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compound ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phallusia obesa	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Polycarpa viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	0	0
Bryozoa	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Orange bryozoan	0	0	0	6	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
Porifera	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Brain sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange sponge	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange sponge with tubercles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
Plate sponge	0	0	0	0	30	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red finger sponge	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Small yellow lobed sponge	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White sponge	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Yellow finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % fauna cover	**0**	**0**	**0**	**12**	**32**	**4**	**2**	**6**	**4**	**12**	**0**	**0**	**0**	**0**	**4**	**8**	**2**	**0**	**2**	**0**
ALGAE																				
Brown algae	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	26	40	4	0	6
Brown filamentous	0	0	0	0	10	0	6	0	0	0	0	0	2	0	0	0	0	4	0	16
Brown foliose	0	0	0	0	0	0	2	0	4	2	0	0	0	0	32	0	0	0	16	0
Brown holdfast	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown benthic	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa sp.	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Codium sp.	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cystophora sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyosphaeria sericea	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0
Filamentous algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green filamentous	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green foliose	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
Sonderopelta sp.	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Red algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Red coralline	0	0	6	10	0	4	2	8	0	2	0	0	0	0	4	4	0	10	2	4
Red foliose	0	0	0	12	0	24	0	6	4	4	0	0	0	0	6	0	16	12	8	0
Zonaria sp.	0	0	28	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0
Total % algae cover	**0**	**0**	**36**	**44**	**20**	**42**	**14**	**20**	**8**	**8**	**0**	**0**	**10**	**0**	**52**	**32**	**56**	**30**	**30**	**32**
SEAGRASS																				
Heterozostera tasmanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 6 Percentage cover of substrata, flora and fauna in epi-benthic quadrat photographs taken at control sites.

a) Eastern inner control sites

Descriptor	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2
SUBSTRATA																				
Total % sand cover	**24**	**28**	**64**	**18**	**42**	**18**	**20**	**28**	**20**	**18**	**20**	**10**	**0**	**0**	**6**	**0**	**6**	**24**	**34**	**8**
Total % shell cover	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**
Low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	0	0	0	0	0
Cobbles	60	12	16	50	20	46	26	34	60	64	10	24	6	0	0	0	0	38	24	48
Cobbles and pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbles and sand	0	0	0	0	0	0	0	0	0	0	0	0	0	78	0	64	36	0	0	0
Patchy low reef	0	0	0	0	0	0	0	0	0	0	16	36	0	0	0	0	32	0	0	0
Patchy sandy reef	0	0	0	0	0	0	0	0	0	0	0	0	56	0	0	0	0	0	0	0
Pebbles	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Total % reef cover	**60**	**20**	**16**	**50**	**20**	**46**	**26**	**34**	**60**	**64**	**26**	**60**	**62**	**78**	**68**	**64**	**68**	**38**	**24**	**56**
FAUNA																				
Ascideacea																				
Ascidian sp.	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphicarpa meridiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herdmania sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycarpa viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0
Red colonial ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow compound ascidian	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Bryozoa																				
Biflustra perfragilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown bryozoan	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Curly orange bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triphyllozoon sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera																				
Beige finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Grey finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange encrusting sponge	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange ball sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plate sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Purple cup sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Red finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small cream sponge	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm. pink encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	2	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Yellow tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow sponge	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Annelida																				
Calcareous serpulid worms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																				
Acabaria sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																				
Chlamys asperrimus	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

Descriptor	EIC1 S1-1	EIC1 S1-2	EIC1 S2-1	EIC1 S2-2	EIC1 S3-1	EIC1 S3-2	EIC1 S4-1	EIC1 S4-2	EIC1 S5-1	EIC1 S5-2	EIC2 S1-1	EIC2 S1-2	EIC2 S2-1	EIC2 S2-2	EIC2 S3-1	EIC2 S3-2	EIC2 S4-1	EIC2 S4-2	EIC2 S5-1	EIC2 S5-2
Total % fauna cover	**8**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**2**	**0**	**2**	**8**	**10**	**2**	**10**	**4**	**0**	**2**	**0**	**0**
ALGAE																				
Brown algae	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	18	0
Brown filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	8	4	8	8	0	0	0
Brown foliose	2	8	0	6	14	10	14	8	8	6	0	0	0	0	0	0	8	10	0	0
Brown holdfast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown benthic	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Caulerpa sp.	0	30	0	16	0	0	8	0	0	6	0	0	0	0	0	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Codium sp.	0	0	0	0	4	4	0	0	0	0	4	6	0	4	2	4	0	4	0	10
Dictyosphaeria sericea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecklonia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green foliose	0	0	4	0	0	0	0	2	0	0	0	0	28	4	0	2	0	0	0	0
Sonderopelta sp.	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	8	0	0	0	0
Red algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red coralline	2	4	4	4	4	6	4	4	4	4	4	6	0	2	0	10	0	8	2	4
Red filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	6	0
Red foliose	0	10	12	4	14	10	12	10	0	0	0	0	0	0	0	0	0	0	10	20
Ulva sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonaria sp.	2	0	0	0	0	6	16	12	6	0	4	10	0	2	8	0	10	0	0	0
Total % algae cover	**8**	**52**	**20**	**30**	**36**	**36**	**54**	**36**	**18**	**18**	**52**	**22**	**28**	**20**	**16**	**32**	**26**	**36**	**36**	**36**

b) Eastern outer control sites

Descriptor	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
SUBSTRATA																				
Total % sand cover	**88**	**92**	**90**	**88**	**80**	**50**	**6**	**0**	**100**	**100**	**28**	**24**	**100**	**100**	**74**	**88**	**92**	**72**	**86**	**68**
Total % shell cover	**12**	**8**	**10**	**12**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**6**	**0**	**0**	**2**	**4**
Low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbles	0	0	0	0	4	10	6	4	0	0	62	54	0	0	24	6	0	0	6	24
Cobbles and pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbles and sand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	16	0	0
Patchy low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patchy sandy reef	0	0	0	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	0
Pebbles	0	0	0	0	14	36	88	42	0	0	0	0	0	0	0	0	0	0	0	0
Total % reef cover	**0**	**0**	**0**	**0**	**18**	**46**	**94**	**100**	**0**	**0**	**62**	**54**	**0**	**0**	**24**	**6**	**4**	**16**	**6**	**24**
FAUNA																				
Ascideacea																				
Ascidian sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphicarpa meridiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herdmania sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycarpa viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red colonial ascidian	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Yellow compound ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa																				
Biflustra perfragilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curly orange bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triphyllozoon sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Descriptor	EOC1 S1-1	EOC1 S1-2	EOC1 S2-1	EOC1 S2-2	EOC1 S3-1	EOC1 S3-2	EOC1 S4-1	EOC1 S4-2	EOC1 S5-1	EOC1 S5-2	EOC2 S1-1	EOC2 S1-2	EOC2 S2-1	EOC2 S2-2	EOC2 S3-1	EOC2 S3-2	EOC2 S4-1	EOC2 S4-2	EOC2 S5-1	EOC2 S5-2
Porifera																				
Beige finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange ball sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plate sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purple cup sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small cream sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm. pink encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Yellow encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida																				
Calcareous serpulid worms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																				
Acabaria sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																				
Chlamys asperrimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % fauna cover	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
ALGAE																				
Brown algae	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4	6	0
Brown filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown foliose	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Brown holdfast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown benthic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Caulerpa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyosphaeria sericea	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Ecklonia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green foliose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonderopelta sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red algae	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	8	0	0
Red coralline	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	2
Red filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red foliose	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
Ulva sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonaria sp.	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Total % algae cover	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**8**	**22**	**0**	**0**	**0**	**0**	**4**	**12**	**6**	**2**

c) Western inner control sites

Descriptor	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2
SUBSTRATA																				
Total % sand cover	**32**	**28**	**60**	**40**	**70**	**80**	**32**	**30**	**54**	**42**	**18**	**58**	**46**	**40**	**8**	**56**	**8**	**36**	**0**	**0**
Total % shell cover	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**38**	**6**	**0**	**0**	**0**	**0**
Low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	82
Cobbles	42	40	14	24	4	2	20	0	38	46	36	10	44	30	30	10	0	0	0	0
Cobbles and pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	64	0	0
Cobbles and sand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patchy low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patchy sandy reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % reef cover	**42**	**40**	**14**	**24**	**4**	**2**	**20**	**0**	**38**	**46**	**36**	**10**	**44**	**30**	**30**	**10**	**92**	**64**	**84**	**82**
FAUNA																				
Ascideacea																				
Ascidian sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphicarpa meridiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Herdmania sp.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0
Polycarpa viridis	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red colonial ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow compound ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa																				
Biflustra perfragilis	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Brown bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curly orange bryozoan	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Triphyllozoon sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera																				
Beige finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Grey encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Grey finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Orange ball sponge	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Plate sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purple cup sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Red finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small cream sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm. pink encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow encrusting sponge	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White encrusting sponge	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White finger sponge	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Yellow sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida																				
Calcareous serpulid worms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
Cnidaria																				
Acabaria sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca																				
Chlamys asperrimus	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % fauna cover	**2**	**2**	**0**	**0**	**0**	**2**	**0**	**16**	**0**	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**12**	**6**
ALGAE																				
Brown algae	10	8	20	12	0	0	2	0	0	0	4	0	0	20	14	20	0	0	0	0
Brown filamentous	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	6

Descriptor	WIC1 S1-1	WIC1 S1-2	WIC1 S2-1	WIC1 S2-2	WIC1 S3-1	WIC1 S3-2	WIC1 S4-1	WIC1 S4-2	WIC1 S5-1	WIC1 S5-2	WIC2 S1-1	WIC2 S1-2	WIC2 S2-1	WIC2 S2-2	WIC2 S3-1	WIC2 S3-2	WIC2 S4-1	WIC2 S4-2	WIC2 S5-1	WIC2 S5-2
Brown foliose	0	0	0	0	4	6	6	4	0	2	18	20	2	6	0	8	0	0	0	0
Brown holdfast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Brown benthic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
Caulerpa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyosphaeria sericea	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecklonia sp.	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green foliose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonderopelta sp.	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Red algae	0	0	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red coralline	8	12	0	8	0	0	10	0	6	4	12	2	0	4	2	0	0	0	2	6
Red filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red foliose	0	6	0	0	22	10	30	50	2	6	10	0	0	0	0	0	0	0	0	0
Ulva sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonaria sp.	2	0	0	0	0	0	0	0	0	0	0	8	4	0	0	0	0	0	0	0
Total % algae cover	**20**	**30**	**26**	**36**	**26**	**16**	**48**	**54**	**8**	**12**	**44**	**32**	**10**	**30**	**20**	**28**	**0**	**0**	**4**	**12**

d) Western outer control sites

Descriptor	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
SUBSTRATA																				
Total % sand cover	**16**	**18**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**40**	**58**	**26**	**42**	**12**	**0**	**100**	**90**	**36**	**24**
Total % shell cover	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Low reef	30	24	0	0	0	0	0	0	0	0	0	0	0	0	52	18	0	0	0	0
Cobbles	16	18	0	0	0	0	0	0	0	0	44	26	10	0	16	0	0	0	46	58
Cobbles and pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbles and sand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patchy low reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Patchy sandy reef	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pebbles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Total % reef cover	**46**	**42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**44**	**26**	**10**	**0**	**68**	**18**	**0**	**0**	**46**	**64**
FAUNA																				
Ascideacea																				
Ascidian sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphicarpa meridiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herdmania sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Polycarpa viridis	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red colonial ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow compound ascidian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa																				
Biflustra perfragilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curly orange bryozoan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triphyllozoon sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Porifera																				
Beige finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Orange finger sponge	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Descriptor	WOC1 S1-1	WOC1 S1-2	WOC1 S2-1	WOC1 S2-2	WOC1 S3-1	WOC1 S3-2	WOC1 S4-1	WOC1 S4-2	WOC1 S5-1	WOC1 S5-2	WOC2 S1-1	WOC2 S1-2	WOC2 S2-1	WOC2 S2-2	WOC2 S3-1	WOC2 S3-2	WOC2 S4-1	WOC2 S4-2	WOC2 S5-1	WOC2 S5-2
Orange encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orange ball sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plate sponge	0	0	0	0	0	0	0	0	0	0	0	0	32	4	4	0	0	0	0	0
Purple cup sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Red encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red finger sponge	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Small cream sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm. pink encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubular sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow tubercle sponge	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
White tubercle sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
White encrusting sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White finger sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow sponge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida																				
Calcareous serpulid worms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria																				
Acabaria sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Mollusca																				
Chlamys asperrimus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % fauna cover	**12**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**36**	**6**	**6**	**12**	**0**	**2**	**0**	**2**
ALGAE																				
Brown algae	0	6	0	0	0	0	0	0	0	0	6	0	16	8	0	0	0	6	10	2
Brown filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown foliose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Brown holdfast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown benthic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa cactoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caulerpa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0
Codium fragile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Codium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dictyosphaeria sericea	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Ecklonia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green algae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Green foliose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonderopelta sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red algae	0	4	0	0	0	0	0	0	0	0	2	2	0	6	6	0	0	0	0	0
Red coralline	10	4	0	0	0	0	0	0	0	0	6	0	2	0	6	6	0	0	8	2
Red filamentous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red foliose	10	18	0	0	0	0	0	0	0	0	0	0	10	34	0	46	0	2	0	0
Ulva sp.	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
Zonaria sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total % algae cover	**26**	**36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**2**	**28**	**52**	**14**	**70**	**0**	**8**	**18**	**10**

Appendix 7 Fish (and invertebrates) recorded during baited video surveys.

Sample	*Thamnaconus degeni*	*Caesioperca rasor*	*Pseudolabrus psittaculus*	*Neosebastes scorpaenoides*	*Notolabrus tetricus*	*Helicolenus percoides*	*Cephaloscyllium laticeps*	*Platycephalus bassensis*	*Parika scaber*	*Pseudophycis bachus*	*Mustelus antarcticus*	Pagurid sp.	*Leptomithrax gaimardii*	?*Octopus maorum*	**Total individuals**	**Total fish**	**Total fish species**
EI1 S1-1	3		1												**4**	**4**	**2**
EI1 S1-2	7				1										**8**	**8**	**2**
EI1 S2-1	8	2		1											**11**	**11**	**3**
EI1 S2-2	12			1											**13**	**13**	**2**
EI1 S3-1	8	2													**10**	**10**	**2**
EI1 S3-2	2						1	1							**4**	**4**	**3**
EI1 S4-1	13	3													**16**	**16**	**2**
EI1 S4-2	4	3		1											**8**	**8**	**3**
EI1 S5-1	17						2		1						**20**	**20**	**3**
EI1 S5-2	12						1								**13**	**13**	**2**
EI2 S1-1	2	2		1											**5**	**5**	**3**
EI2 S1-2	5	1													**6**	**6**	**2**
EI2 S2-1	8							1							**9**	**9**	**2**
EI2 S2-2	1											1			**2**	**1**	**1**
EI2 S3-1	2														**2**	**2**	**1**
EI2 S3-2	6							1							**7**	**7**	**2**
EI2 S4-1	3														**3**	**3**	**1**
EI2 S4-2	12							2							**14**	**14**	**2**
EI2 S5-1	3							1							**4**	**4**	**2**
EI2 S5-2	8							2							**10**	**10**	**2**
EIC1 S1-1	7	2							1						**10**	**10**	**3**
EIC1 S1-2	12	1					1							1	**14**	**14**	**3**
EIC1 S2-1	6						1								**7**	**7**	**2**
EIC1 S2-2	6						1								**7**	**7**	**2**
EIC1 S3-1	3														**3**	**3**	**1**
EIC1 S3-2	5	1													**6**	**6**	**2**
EIC1 S4-1	6						1		1						**8**	**8**	**3**
EIC1 S4-2	8														**8**	**8**	**1**
EIC1 S5-1	6														**6**	**6**	**1**
EIC1 S5-2	5														**5**	**5**	**1**
EIC2 S1-1	6														**6**	**6**	**1**
EIC2 S1-2	2														**2**	**2**	**1**
EIC2 S2-1	5														**5**	**5**	**1**
EIC2 S2-2	12	3			1		1								**17**	**17**	**4**
EIC2 S3-1	2														**2**	**2**	**1**
EIC2 S3-2	2									1					**3**	**3**	**2**
EIC2 S4-1	6								1						**7**	**7**	**2**
EIC2 S4-2	5								1						**6**	**6**	**2**
EIC2 S5-1	2														**2**	**2**	**1**
EIC2 S5-2	9	1					1								**11**	**11**	**3**
EOC1 S1-1	1							2							**3**	**3**	**2**
EOC1 S1-2	1							1					1		**3**	**2**	**2**

Sample	*Thamnaconus degeni*	*Caesioperca rasor*	*Pseudolabrus psittaculus*	*Neosebastes scorpaenoides*	*Notolabrus tetricus*	*Helicolenus percoides*	*Cephaloscyllium laticeps*	*Platycephalus bassensis*	*Parika scaber*	*Pseudophycis bachus*	*Mustelus antarcticus*	Pagurid sp.	*Leptomithrax gaimardii*	?*Octopus maorum*	**Total individuals**	**Total fish**	**Total fish species**
EOC1 S2-1	2							2					1		**5**	**4**	**2**
EOC1 S2-2	3							2					2		**7**	**5**	**2**
EOC1 S3-1	6												1		**7**	**6**	**1**
EOC1 S3-2	1							2				1			**4**	**3**	**2**
EOC1 S4-1	2							1							**3**	**3**	**2**
EOC1 S4-2	4							1							**5**	**5**	**2**
EOC1 S5-1	3						1	2					2		**8**	**6**	**3**
EOC1 S5-2	2						1	3					2		**8**	**6**	**3**
EOC2 S1-1	2						1								**3**	**3**	**2**
EOC2 S1-2	3														**3**	**3**	**1**
EOC2 S2-1	13							1			1		2		**17**	**15**	**3**
EOC2 S2-2	4			1				1			1		7		**14**	**7**	**4**
EOC2 S3-1	1						1						1		**3**	**2**	**2**
EOC2 S3-2	3											2			**5**	**3**	**1**
EOC2 S4-1	3						1		1						**5**	**5**	**3**
EOC2 S4-2	6						1								**7**	**7**	**2**
EOC2 S5-1	3						1								**4**	**4**	**2**
EOC2 S5-2	3						1								**4**	**4**	**2**
WI1 S1-1	3						1								**4**	**4**	**2**
WI1 S1-2	9	1		1			1								**12**	**12**	**4**
WI1 S2-1	3	6													**9**	**9**	**2**
WI1 S2-2	4	4		1					1						**10**	**10**	**4**
WI1 S3-1	3			1											**4**	**4**	**2**
WI1 S3-2	9														**9**	**9**	**1**
WI1 S4-1	2														**2**	**2**	**1**
WI1 S4-2	3	3													**6**	**6**	**2**
WI1 S5-1	1														**1**	**1**	**1**
WI1 S5-2															**0**	**0**	**0**
WI2 S1-1	4														**4**	**4**	**1**
WI2 S1-2															**0**	**0**	**0**
WI2 S2-1	2														**2**	**2**	**1**
WI2 S2-2	6														**6**	**6**	**1**
WI2 S3-1	5	1													**6**	**6**	**2**
WI2 S3-2	2						1								**3**	**3**	**2**
WI2 S4-1	8						1								**9**	**9**	**2**
WI2 S4-2	9			1											**10**	**10**	**2**
WI2 S5-1	2								1						**3**	**3**	**2**
WI2 S5-2	1			1											**2**	**2**	**2**
WIC1 S1-1	1			2											**3**	**3**	**2**
WIC1 S1-2	4									1					**5**	**5**	**2**
WIC1 S2-1	7														**7**	**7**	**1**
WIC1 S2-2															**0**	**0**	**0**
WIC1 S3-1	2														**2**	**2**	**1**
WIC1 S3-2	2														**2**	**2**	**1**
WIC1 S4-1	13	4					1								**18**	**18**	**3**
WIC1 S4-2	5														**5**	**5**	**1**

Sample	*Thamnaconus degeni*	*Caesioperca rasor*	*Pseudolabrus psittaculus*	*Neosebastes scorpaenoides*	*Notolabrus tetricus*	*Helicolenus percoides*	*Cephaloscyllium laticeps*	*Platycephalus bassensis*	*Parika scaber*	*Pseudophycis bachus*	*Mustelus antarcticus*	Pagurid sp.	*Leptomithrax gaimardii*	*?Octopus maorum*	**Total individuals**	**Total fish**	**Total fish species**
WIC1 S5-1									2						**2**	**2**	**1**
WIC1 S5-2	8						1								**9**	**9**	**2**
WIC2 S1-1		3		1			1		2						**7**	**7**	**4**
WIC2 S1-2	2	1		1			1								**5**	**5**	**4**
WIC2 S2-1	1			1	1										**3**	**3**	**3**
WIC2 S2-2	3														**3**	**3**	**1**
WIC2 S3-1	3									1					**4**	**4**	**2**
WIC2 S3-2	1														**1**	**1**	**1**
WIC2 S4-1	2						1								**3**	**3**	**2**
WIC2 S4-2	9						1								**10**	**10**	**2**
WIC2 S5-1		1		1						1					**3**	**3**	**3**
WIC2 S5-2		5		3						1					**9**	**9**	**3**
WOC1 S1-1	8	1	1												**10**	**10**	**3**
WOC1 S1-2	5														**5**	**5**	**1**
WOC1 S2-1	4						1								**5**	**5**	**2**
WOC1 S2-2	8							1							**9**	**9**	**2**
WOC1 S3-1	3														**3**	**3**	**1**
WOC1 S3-2	5														**5**	**5**	**1**
WOC1 S4-1	10								1						**11**	**11**	**2**
WOC1 S4-2	4							1	1						**6**	**6**	**3**
WOC1 S5-1	14	4		1	1	2									**22**	**22**	**5**
WOC1 S5-2	10	1		1			1								**13**	**13**	**4**
WOC2 S1-1	4			1											**5**	**5**	**2**
WOC2 S1-2	3				1										**4**	**4**	**2**
WOC2 S2-1	1	2							1						**4**	**4**	**3**
WOC2 S2-2			3	3	1										**7**	**7**	**3**
WOC2 S3-1	1														**1**	**1**	**1**
WOC2 S3-2	3	1		2											**6**	**6**	**3**
WOC2 S4-1	2			1			1								**4**	**4**	**3**
WOC2 S4-2	4			1					1						**6**	**6**	**3**
WOC2 S5-1	2														**2**	**2**	**1**
WOC2 S5-2	2														**2**	**2**	**1**