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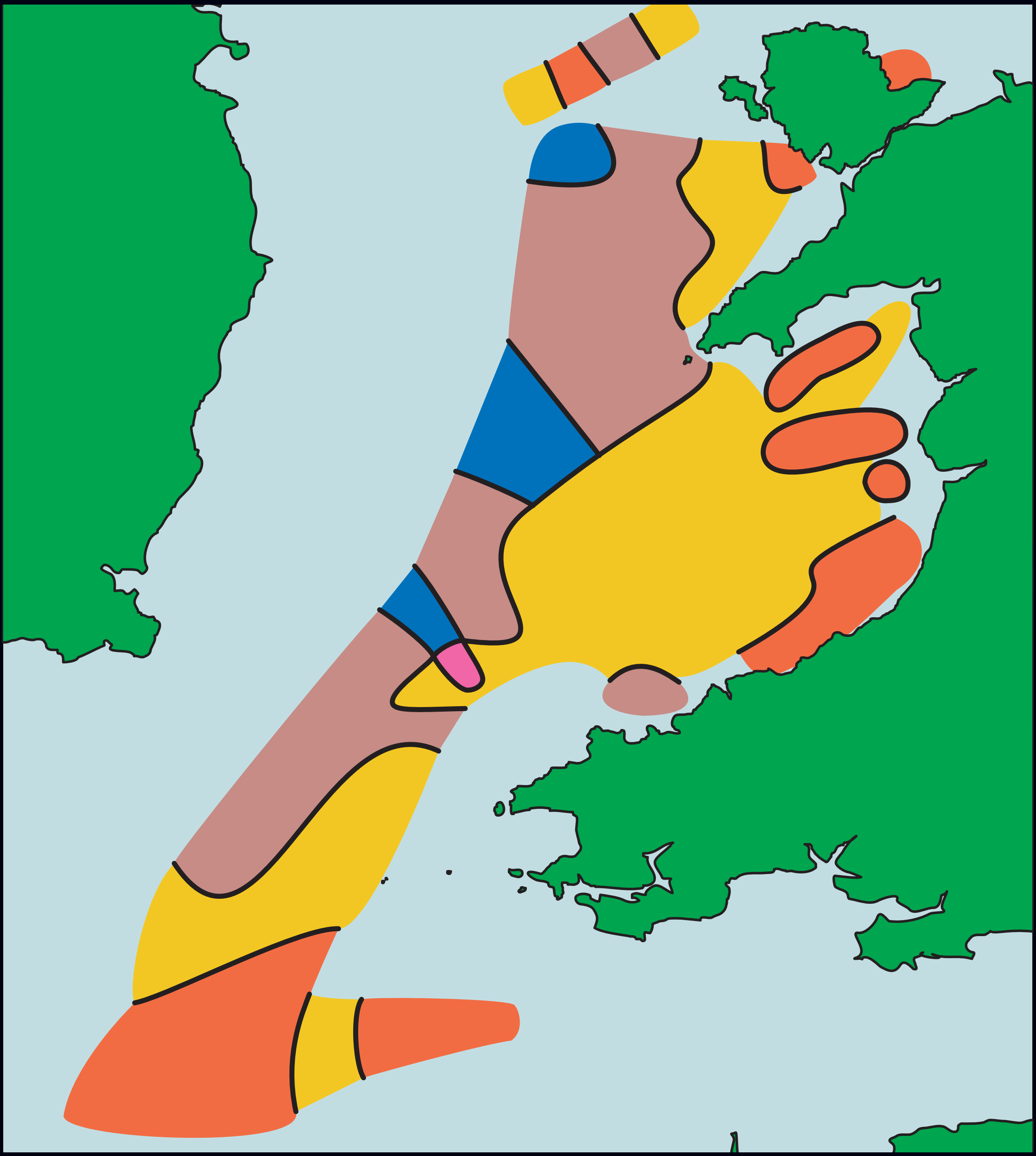
NATIONAL MUSEUMS & GALLERIES OF WALES

BIOMÔR 1

Benthic Biodiversity in the Southern Irish Sea

Andrew S. Y. Mackie, P. Graham Oliver & E. Ivor S. Rees



BIOMÔR Reports.
Studies in Marine Biodiversity and Systematics

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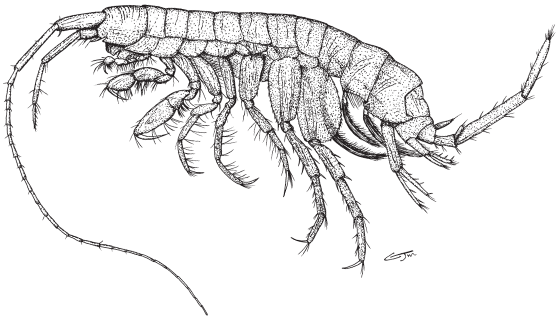

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Forewords

One of the primary objectives of the Department of Zoology in the National Museums & Galleries of Wales is to compile data on all the fauna of Wales. Until fairly recently, as most research has focused on the terrestrial fauna, the immediately adjacent marine environment has been largely neglected. The fact that Wales is bounded on three sides by sea points immediately to the imbalance in this programme. Therefore a strategy was implemented to address the issue and in the mid 1980s the Department began to forge links with many other bodies interested in marine studies. A series of biological investigations were undertaken, beginning with littoral sites and progressing to the offshore surveys which form the basis of this report.

The collections resulting from these surveys are maintained at the National Museum and Gallery, Cardiff, as a data base for consultation, continuing research and education. The discovery of numerous species new to science illustrates the value of this work as a contribution towards our understanding of biodiversity in and around Wales. At the same time, the work is generating invaluable information on benthic ecology, which is a powerful tool in monitoring environmental changes and the potential effects of pollution.

Taxonomic studies form the core of research in the Department of Zoology; international in scope, they reflect the size and range of comparative material in the collections. We regard the publication of this first BIOMÔR report as a significant commitment towards our continuation of such research surveys in the marine areas around Wales. Co-operative ventures with industry are essential if we are fully to link museum research to practical applications. In this case we are very grateful to Marathon Oil U.K., Ltd. for their support.

Colin Ford
Director
National Museums & Galleries of Wales

In ecological terms the continental shelves of the world's seas are among the most productive amd diverse marine habitats on the planet. Our increasing use of the continental shelf for food, other natural resources industrial and recreational activity makes it especially important that we understand this realm and how our activities may affect it.

The U.K. offshore oil and gas industry has grown rapidly in developing the oil and gas reserves of the U.K. continental shelf. During that period, the industry has undertaken numerous studies and research projects. These have helped advance our knowledge and understanding of the distribution and variety of benthic marine life, and the impact exploration and production activities have upon it.

This publication by the National Museum of Wales and its associated experts examines an area of the Irish Sea which, hithero, has not been well studied. It is an important and timely piece of work. Marathon Oil U.K., Ltd. is pleased to support this work as it honours a company commitment to promote sound scientific information. I believe this study makes an important contribution to the environmentally responsible management of our activities in an area where we are exploring actively for oil and gas.

The information contained in this report will be valuable to the scientific community, conservation agencies, offshore operators and other sea users. I hope that readers find it both informative and interesting.

John V. Parziale
President
Marathon Oil U.K., Ltd.

Abstract

Surveys of the benthic invertebrates of the southern Irish Sea were carried out in 1989 and 1991. Both quantitative (grab) and qualitative (trawl and dredge) samples were taken for faunal and sediment analysis.

The fauna is very rich with some 1030 species recorded. Polychaete worms dominate the fauna followed by the Crustacea and Mollusca. The fauna is not only diverse but is also very abundant, reaching 17,348 individuals per square metre.

Many taxonomic problems were encountered, indicating that there remains much basic work to be undertaken. Over twenty polychaete species are possibly new to science and a new species of solenogastre mollusc has already been described. In addition there are many records of species new to British waters as well as to the Irish Sea.

The southern Irish Sea can be said to be part of the “Boreal” zoogeographic province but there are also more southern “Lusitanian” influences in the area of the Celtic Deep.

Three major faunal assemblages are defined which coincide with general sediment distributions relative to depth. "Assemblage A" occurred in the deeper mud and sandy mud regions of the Celtic Deep; "Assemblage B" was found in the inshore sandy and muddy sand areas, and "Assemblage C" coincided with the offshore gravelly sediments. The traditional view of fixed communities is not supported here, rather there occurs a mosaic of looser assemblages overlapping in their responses to changing environmental conditions.

Species diversity was measured and showed that the gravelly sediments supporting "Assemblage C" were the richest with an average of 145 taxa per station. Diversity indices were calculated and a Shannon-Wiener value of 6.34 is the highest yet recorded from British waters. The high species richness values from the southern Irish Sea compare well with those reported from the very diverse deep-sea benthos.

The southern Irish Sea can be regarded as a significant pool of marine biodiversity warranting care and further investigation.

Crynodeb

Cafodd archwyliad o’r anifeiliaid bychain di-asgwrn-cefn o ddeuheuol Môr Iwerddon ei chario allan ym 1989 a 1991. Cymerwyd samplau mesurol (“grab”) ac ansoddol (treillio a glanhau) i ddadansoddi’r ffawnau a’r gwaddod.

Mae cyfoeth y ffawna yn uchel. Cofnodwyd tua 1030 rhywogaeth. Y mwydod Polychaete sydd yn dominyddu’r ffawna ac yna’r Crustacea a’r Mollusca. Yn ogystal â chyfoeth mae’r ffawna yn un helaeth, yn cyrraedd 17348 o unigolion y medr sqwâr.

Cafwyd nifer o broblemau tacsonomig, yn dangos bod yna lawer o waith sylfaenol i’w wneud. Mae’n bosib fod dros ugain o rhywogaethau Polychaete yn newydd i wyddoniaeth ac mae un rhywogaeth o folwsg solenogastraidd wedi ei ddisgrifio yn barod. Yn ychwanegol, mae nifer o recordiau o rhywogaethau sydd yn newydd i ddyfroedd Prydain yn ogystal a Môr Iwerddon.

Mae’n bosib dweud bod deheuol Môr Iwerddon yn rhan o’r dalaith swodaearyddol Boreal ond hefyd mae dylanwadau mwy deheuol Lwsitanaidd yn ardal y Dyfnder Celtaidd.

Mae tri brif ymgynulliad o ffawnau yn cael eu ddiffinio sydd yn cyfateb i ddosbarthiad y gwaddod ym mherthnasol i ddyfnder. Megis ymgynulliad A yn y mwd dyfnaf a’r rhannau mwd tywodlyd o’r Dyfnder Celtaidd; ymgynulliad B yn yr ardaloedd tywodlyd a tywod mwdlyd gyda’r glannau; cyfatebodd ymgynulliad C gyda gwaddodau graean yr alltraeth. Nid yw’r barn traddodiadol o chymdeithasau sefydlog yn cael ei cynnal, yn hytrach mae frythwaith o ymgynulliadau llac sydd yng nghorgyffwrdd yn eu ymatebion i newidiadau yng nghyflwr yr amgylchedd.

Mesuriwyd amrywiaeth y rhywogaethau a dangoswyd bod y gwaddodau graean sydd yn cynnal ymgynulliad gyda’r mwyaf cyfoethog â chyfartaledd o 145 tacsa i bob orsaf. Cyfrifwyd indecsiau amrywiaeth ac mae safon Shannon-Wiener o 6.34 ym mysg yr uchaf â recordiwyd yn nyfroedd Prydain. Mae gwerth uchel cyfoeth y rhywogaeth o ddeheuol Môr Iwerddon yn cymharu’n dda gyda chofnodau amrywiol iawn o’r môr-dwfn benthos.

Mae modd ystyried deuheuol Môr Iwerddon fel cronfa sylweddol o fio-amrywiaeth morol sydd yn gwarantu gofal ac ymchwyliad pellach.

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Contents

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1. Introduction

The continental shelf waters of northwest Europe have been subject to a long history of study by taxonomists and ecologists. Certainly, European benthic invertebrates are regarded as being among the best known of any region worldwide. The benthic macrofaunal assemblages themselves have also received much attention and, in terms of their larger component species and the general sediment categories they inhabit, are often regarded as fairly predictable. However, schemes for classifying the assemblages continue to be debated (Erwin 1983; Hiscock 1991).

Nevertheless, new and unrecorded species continue to be found. This is partly due to an increase in quantitative investigations brought about by the need to monitor the effects of anthropogenic inputs on the benthic environment. The benthic sampling in such studies is often intensive and generally employs finer sieve mesh sizes (0.5 or 1.0 mm) than has historically been the case. Hence the smaller, often overlooked, species are now more efficiently sampled and their relative importance to the faunal structure of the benthos better recognised. In an increasing number of cases this has removed the previous bias towards large, though not always abundant, species and cast doubt upon the validity of the traditionally recognised 'communities'. Equally important is the fact that many of these investigations take place in areas that are at best poorly studied. In the North Sea, for example, the incidental yield of fundamental faunistic data on the offshore benthos from oil-related monitoring has been considerable.

Perhaps surprisingly, large parts of the Irish Sea are essentially unknown. As yet there has been no unified co-operative exercise comparable to that mounted under International Council for the Exploration of the Sea (ICES) in the whole North Sea (Heip *et al.* 1992; Künitzer *et al.* 1992). The benthic investigations that have taken place have been limited to a series of quite small patches, particularly in the broad shallower waters of Liverpool Bay, and off the Isle of Man and the Cumbrian coast (see Mackie 1990). This strong bias towards the northeastern part of the area serves to highlight the paucity of information concerning the southern Irish Sea. A situation that seems even more remarkable when one considers the biogeographical importance of this narrow stretch of water between western Wales and southeastern Ireland.

The southern Irish Sea region is recognised as having a marine fauna that reflects its position at the 'boundary' between two biogeographical provinces. This is evident from studies concerning environments as different as the rocky intertidal (Lewis 1964) and the sublittoral soft benthos (Hartley 1979). Certain species with known southern (Lusitanian) distributions are found near their northernmost limits, while some with more northern (boreal) centres of distribution approach their southernmost ones. Boundaries between biogeographic provinces are generally imprecise since their faunas overlap to some degree. Ekman (1953) and Briggs (1974) considered the greatest decrease in the lusitanian benthic invertebrates to occur at the western entrance to the English Channel. Hiscock (1991) has recently summarised the biogeography of the Northeast Atlantic and produced an updated map showing the different provinces (Fig. 1.1). From his boreal-lusitanian overlap zone it is clear that lusitanian species tend not to enter the southern Irish Sea. The underlying factors influencing species distributions are complex, however, temperature, salinity, turbidity and other biologically important oceanographic features are known to differ markedly between the Celtic and Irish Seas.

The National Museum of Wales initiated its benthic sampling programme in the southern Irish Sea with a research cruise in 1989. The prime aim of the programme was to obtain specimens of invertebrates for taxonomic and biogeographic purposes. A secondary objective was to obtain estimates of their numerical abundance since no quantitative data was available for the area. The survey took place against a background of enhanced interest in all aspects of the Irish Sea (Dickson 1987; Dickson & Boelens 1988; Sweeney 1989; Irish Sea Study

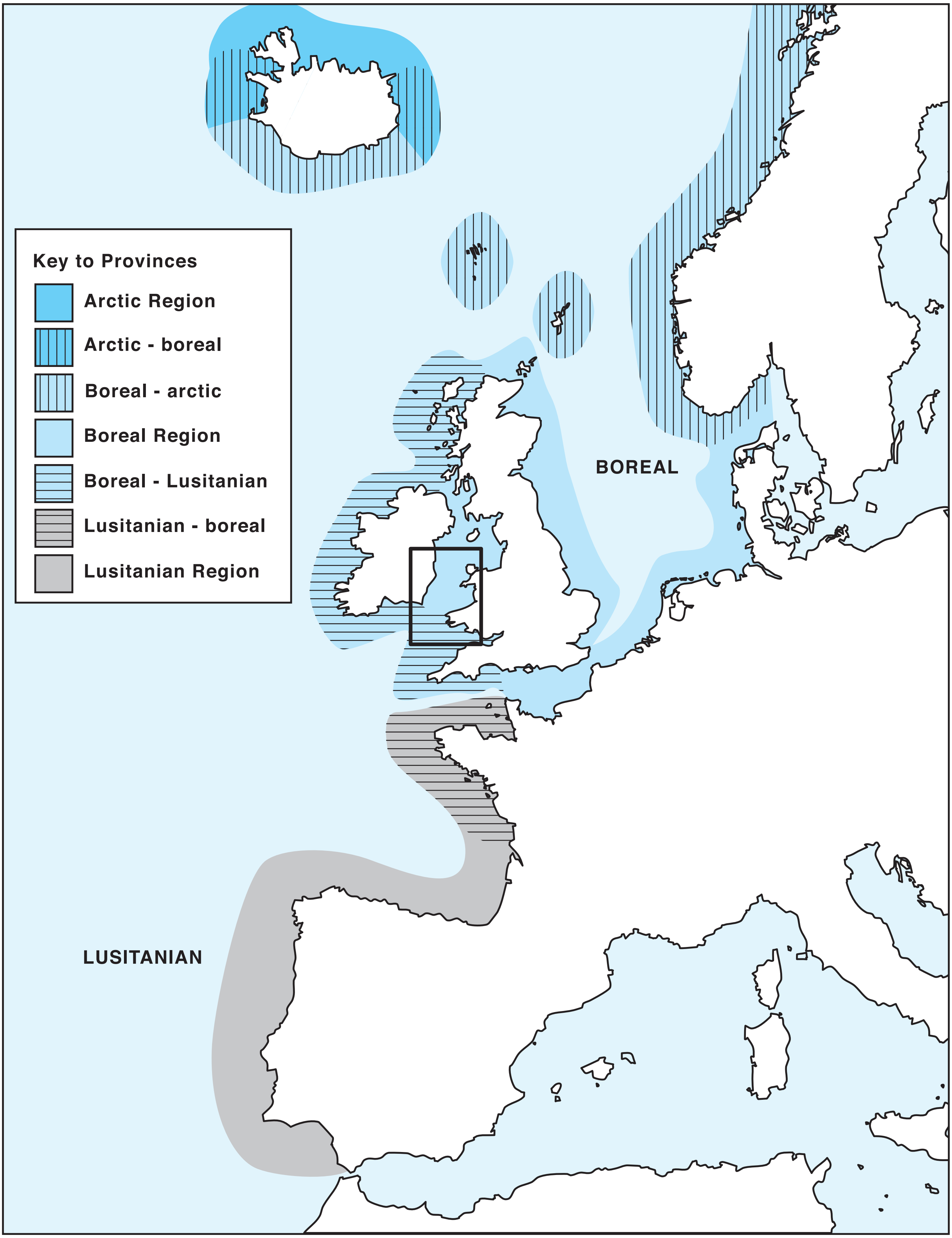


Fig. 1.1. Biogeographical provinces in the north-east Atlantic Ocean (after Hiscock 1991). BIOMÔR study area shown boxed (see Fig. 1.2).

Group 1990) and it soon became clear that our quantitative data was of considerable importance to others. A second survey was carried out in 1991 to supplement the first by investigating previously unsampled areas and, in particular, to sample across the major oceanographic feature (Celtic Sea Front) at the interface between the Irish and Celtic Seas. The subsequent licensing of hydrocarbon exploration blocks off southwest Wales has given added timeliness to the ecological aspects of the study.

The overall objectives of the two surveys can therefore be summarised as follows:

— To determine the faunal composition, diversity and extent of the benthic invertebrate assemblages of the southern Irish Sea and its approaches.

— To examine the factors influencing the faunal distributions.

— To investigate the zoogeography of the area.

— To obtain comprehensive reference material of marine invertebrates from the area and secure this in the collections of the National Museums of Wales.

— To carry out and encourage taxonomic research on the material.

The surveys were collectively called the BIOMÔR project, the title being derived from the welsh ‘bioleg’ (biology) and ‘môr’ (sea). The present publication is labelled BIOMÔR 1 as the first in a planned series reporting 'Studies in Marine Biodiversity and Systematics from the National Museum of Wales'.'

‘Biodiversity’ is one of the vogue words of the day, though it is not always defined. Several questions immediately spring to mind. —What exactly do we mean by it? —How do we measure it? —What is its relevance to the marine ecosystems around our coastline?

Biodiversity is a contraction of ‘Biological Diversity’ and is commonly used to describe the number, variety and variability of living organisms (World Conservation Monitoring Centre 1992). This can be measured at three fundamental levels, those of the gene (within species), organism (number of species or higher taxa) and ecosystem (between habitats or ‘communities’). There is continual debate about exactly how these should be quantified and what significance should be placed upon the resulting values (Harper & Hawksworth 1994; May 1994; Hambler & Speight 1995). Unfortunately there is also much argument over terminology. For many, biodiversity simply equates with the number of species (i.e. species richness) in an area.

In the context of the BIOMÔR project, biodiversity was investigated for both the organism and ecosystem categories. In the first case this was achieved by evaluating a number of species diversity indices. With the exception of species richness itself, these are calculated using both the number of species and their total or relative abundances. At the habitat level, the identification and discrimination of the species assemblages present was determined using cluster analysis, non-metric multidimensional scaling and assessments of characterising species. Taken together with species diversity these facilitated an overall assessment of biodiversity in the southern Irish Sea.

Fig. 1.2: BIOMÔR study area (shaded).

2. Historical Perspective

Scientific studies in the Irish Sea are known to have a long history. In the 12th century the renowned cleric Gerald of Wales (1188) gave a comparative account of the tides on the Welsh and Irish coasts and discussed the influence of the moon on their movements. Zoological investigations of the sublittoral benthos only really advanced when the use of various dredging devices became popular in the late 18th and early 19th century. The Irish Sea was without doubt one of the original foci for the study of the marine benthic fauna.

Early Studies

The Welsh zoologist Thomas Pennant, author of *British Zoology* (1768), was one of the earliest to make use of dredged material, receiving many specimens from William Morris of Anglesey (Matheson 1954). By the early 1800s, dredges were also starting to become an important tool for Irish naturalists. Starting with the studies of John Templeton, posthumously published by his son (Templeton 1836a, b, c), a close-knit group of naturalists developed in Belfast. Among the most prominent of these were William Thompson, George Hyndman and Robert Ball. Indeed, in 1857, Ball was elected a Fellow of the Royal Society as "the Inventor or Improver of the Naturalist's Dredge" (see Ross & Nash 1985). A more detailed account of the history of Irish sublittoral science can be found in Erwin *et al.* (1986, 1990).

The principal British proponent of dredging was undoubtedly Edward Forbes. He started dredging off the Isle of Man during the 1830s (e.g. Forbes 1835a, b; 1839) and this helped secure sponsorship from the British Association for future dredging operations by himself and others. The results were detailed in the annual reports of the Association and, in 1850, the records of over 140 'dredging papers' from many British localities were brought together and reviewed (Forbes 1851). Forbes certainly helped lay the foundation for later dredgings by workers such as John Gwyn Jeffreys, Wyville Thomson and the scientists of the *Challenger* Expedition. More importantly, his investigations and interpretations helped develop much wider concepts concerning the marine environment (Herdman 1915; Mills 1978; Rehbock 1979).

Work relevant to the Irish Sea included reports from off the Mull of Galloway (Thompson 1842), off the northeast coast of the Isle of Man (Eyton 1852a, b) and from the Strangford Lough region (Dickie 1858). After the death of Forbes in 1854, the Belfast Dredging Committee was one of the most active (Hyndman 1858, 1859, 1860) in British waters. While they sampled off the northeast coast of Ireland, the Dublin Bay Dredging Committee worked off Dublin (Kinahan 1861).

In 1885 the Liverpool Marine Biological Committee (LMBC) was created for the purpose of scientifically investigating the marine flora and fauna of Liverpool Bay. Two years later the committee established a marine laboratory on Puffin Island, Anglesey (Herdman 1889; Baker 1994). This was decommissioned in 1892 when the LMBC opened a new facility at Port Erin on the Isle of Man (Herdman 1893). The history and work of the LMBC (1885-1919) was summarised by Herdman (1920) and the development of marine biology in North Wales detailed by Crisp (1953). In their introduction to the second edition of the Marine Fauna of the Isle of Man, Bruce *et al.* (1963) provide an annotated list of the reports issued by the LMBC and later by the University of Liverpool. Staff at the University College of North Wales tried in vain to maintain the operation of the Puffin Island Laboratory, however, it finally closed in 1900. It wasn't until the mid 1950s that a replacement was set up at Menai Bridge.

Twentieth Century Developments

In the early 1900s the Ulster Fisheries and Biological Association, based at the short-lived Larne Laboratory, dredged the area from Belfast Lough to Rathlin Island. More significantly, extensive Irish investigations (1901-1907) produced detailed lists of the benthic invertebrates present in the western Irish Sea (Massy 1913). This study also trawled the area (60-140 m depth) west-southwest of the Calf of Man. Altogether, about 500 taxa (not all identified to species) were recorded and indexed, but these were predominantly only the larger and more conspicuous animals; "no special attempts were made, at the majority of the stations, to collect minute sand-haunting creatures."

The first benthic survey relevant to the eastern side of the southern Irish Sea was carried out in 1921 (July-November) and was of special importance, being one of the very first quantitative studies of the British benthos. Adopting the newly developed techniques of C. G. J. Petersen, the pioneering Danish benthic ecologist, Laurie & Watkin (1922) quantified the benthic communities of the 'Gutter', a muddy hollow in Cardigan Bay, southwest of Aberystwyth. The rather limited number of species (43) encountered was probably due to the use of a fairly coarse sieve. The National Museum of Wales revisited the area in 1991 and conducted a comparative sampling program that included Laurie & Watkin's original(?) Petersen grab. This study will be published at a later date.

There were two other inshore benthic studies of note in the years leading up to the Second World War and both were in the vicinity of the Port Erin Marine Laboratory. In the first, Moore (1933) examined the benthic faunal distributions within Port Erin Bay and compared them with those known to have existed in 1900. The second, by Jones (1940), explored the benthos within a two mile radius of the laboratory.

Postwar Studies

Northern Irish Sea

Opportunities for studying the Irish Sea benthos improved when, in 1947, the University of Liverpool and later, in 1968, the then University College of North Wales (now called University of Wales Bangor) obtained suitable research vessels. Jones (1951) readily acknowledged the importance of the RV *William Herdman* in extending the range of his benthic studies. This 60 ft research ship enabled him (Jones 1951, 1952, 1956) to extend his investigations to all the waters around the Isle of Man and off the Cumbrian coast. Surprisingly few additional areas were studied following Jones's work, although the Solway Firth received some attention (e.g. Williams *et al.* 1963; Perkins 1968; Perkins & Williams 1963).

Up until this time the main purpose of quantifying the benthos had been to provide estimates of the food (i.e. benthic invertebrates) available to commercially caught fish. In fact the fundamental characterisation of benthic 'community' types had developed as a byproduct of such studies (e.g. Petersen 1918). This all changed in the mid 1960s when an enhanced awareness to the effects of pollution increased public concern for the marine environment and changed the emphasis for most benthic studies.

The assessment of impacts became the driving force behind the quantification of benthic faunal distributions and areas subject to major pollutants such as sewage sludge (Liverpool Bay, Dublin Bay and Belfast Lough), dredge spoil (Liverpool and Dublin Bays) and radioactive effluent (from Sellafield) received particular attention (see Mackie 1990). Liverpool Bay was clearly the most studied area (Eagle 1973, 1975; Norton *et al.* 1984; Rees 1975, 1984; Rees & Walker 1983, 1984, 1988, 1991; Rees *et al.* 1972, 1976, 1977).

It is only in the last few years that oil and gas have come to the fore with an increase in exploratory activity that is also now evident in the southern Irish Sea. Prior to 1990, only the Morecambe Gas Fields, in production since 1985, had been subject to benthic monitoring surveys (see Rees 1994). Paradoxically, monitoring reports produced for commercial concerns often remained confidential or were of restricted distribution, though nowadays there is an increasing tendency for the information to be more widely disseminated.

A recent re-examination of the benthic fauna off the Cumbrian Coast (Swift 1993) revealed a lower species diversity than reported by Jones (1952). Only 40 taxa were recorded from an extensive sampling programme (1983-1989) using a 0.056 m^2 Reineck box corer and a 1 mm sieve. Jones had found at least 69 taxa using a 0.1 m^2 Van Veen grab and 2 mm sieving. However, a smaller scale survey (Jensen & Sheader 1983), employing a 0.1 m^2 Day grab and 0.5 mm sieving, recorded about 100 taxa.

Morecambe Bay, just to the south of these studies, was surveyed by Rostron (1992). She identified 16 benthic ‘communities’ using cluster analysis, though their species compositions suggested most were variations of the '*Amphiura*', '*Abra*' and 'shallow *Venus*' communities recognised by other workers. Such small-scale heterogeneity was consistent with the findings of previous studies concerning the shallower sediments of the nearby Liverpool Bay area (see above). In these situations the distributional patterns of the component communities can change dramatically within very short periods of time. This has been attributed to the combined effects of gain or loss of organically rich fines, frequency of physical disturbance from tides and storms, and biologically induced instability of the sediments.

A large scale diving study of the shallow (≤50 m) benthic habitats off Northern Ireland was carried out between 1982 and 1985 (Erwin *et al.* 1986, 1990). A total of 756 invertebrate species were recorded from the entire coastline. Similar diving studies of the British nearshore benthos are presently undertaken by the Marine Nature Conservation Review (MNCR) team of the Joint Nature Conservation Committee (e.g. Covey 1992; Emblow 1992).

Recent benthic work in the western Irish Sea has centred on Dublin Bay and the need to evaluate the possible environmental effects of sewage sludge dumping (Walker & Rees 1980; Department of the Marine 1988, 1989a, 1989b). The need for a re-evaluation of an area previously studied by Massy (1913) was highlighted by the chance discovery of an undescribed macrobenthic association (Holme & Rees 1986; Rees & Holme 1988) dominated by the polychaete *Ampharete falcata* and the bivalve *Parvicardium ovale.*

Southern Irish Sea

To date, apart from Laurie & Watkin (1922), there has been relatively little work carried out in the southern Irish Sea. Dobson *et al.* (1971) published some distributional information concerning the larger molluscs and echinoderms associated with the superficial sediments of the area. Later, Hartley & Dicks (1977) and Hartley (1979) included some stations from St. George’s Channel within their preliminary assessments of the Celtic Sea macrofauna. The latter paper listed 143 molluscan species and drew attention to a number which appeared to have reached the southern limits of their geographical distributions.

More recently, there have been two small-scale studies worthy of note. In the first, Hiscock (1986) examined the fauna associated with the shallow sublittoral Sarns that are a characteristic feature of Cardigan Bay. She found the epifauna to be most diverse in depths greater than 10 m. The second study, by Rostron (1994), considered the benthic macrofauna of the Skomer Marine Nature Reserve, southwest Wales. A total of 332 taxa were recorded from 18 grab samples, indicating the presence of a rich infauna.

The largest study of direct relevance to the present study was a qualitative baseline investigation off Carnsore Point, southeast Ireland (Keegan *et al.* 1987), a potential site for a nuclear power station. This survey encompassed 279 stations in a block bounded by the Saltee Islands to the south and west, Tuskar Rock to the east, and Wexford harbour to the north. A total of 479 species were recorded from the coarse substrates characteristic of this area of high water movement and approximately 30% of the species belonged to the sessile epifauna (sponges, hydroids, bryozoans and tunicates). The richest infaunal stations were found in shallow sheltered areas and the inferred community groups appeared to be closely linked to the sediments.

Nearby Areas

A number of detailed studies have been undertaken in the Bristol Channel region to the south of the Irish Sea. Warwick & Davies (1977) described five major community types (“*Venus*”, “*Abra*”, “*Modiolus*”, “Reduced Hard Bottom” and “Reduced Soft Bottom”) and listed 294 species from 155 stations. They found that the community distributions were only partially related to the nature of the sediments (as classified by visual assessment). In a subsequent paper (Warwick & Uncles 1980) a direct correlation was found between faunal type and tidal stress. A similar finding had been reported by Tyler (1977) in a more localised study within Oxwich Bay. However, a recent re-assessment of the inner, Severn Estuary area (Mettam *et al.* 1994) identified eight faunal groupings and these were considered to be strongly associated with different sediment categories. In another study, Tyler & Shackely (1980) investigated the benthic fauna of the linear sandbanks off the south coast of Wales.

Addy (1976) and Rostron *et al.* (1986) have described the benthic communities of Milford Haven. The latter publication reported the results of two surveys, 1982 and 1984, the second smaller and less extensive than the first. Five main community types were delineated in the 1982 survey and distinct changes in the abundance of certain species were evident relative to Addy's earlier findings.

A Preliminary Overview

The sporadic and variable nature of the benthic data for the Irish Sea prevents a definitive assessment of the macrofaunal assemblages. Nevertheless, Rees (in Dickson 1987: fig. 22) produced a generalised map of the faunal communities and this was later modified (Fig. 2.1) by Mackie (1990). Both appraisals were made by supplementing information from the benthic studies (see above) with that concerning the distribution of sediments (e.g. Cronan 1969; Dobson *et al.* 1971, Caston 1976; James & Wingfield 1987) and assuming a correlation between the two. This is often, but not always (e.g. Tyler 1977), the case and therefore their 'community' maps can only be considered rough first approximations.

Seven main Petersen-type macrofaunal communities were identified (see below), with an additional category for areas of hard substrate (i.e. rock, boulders and stones) which may have particular epifaunal communities.

The "Amphiura" *Community*

Referred to as the 'Boreal Offshore Muddy Sand Association' by Jones (1950), this community occurs in offshore muddy sands at shallow to moderate depth (15-100 m). Typical species include the brittlestar *Amphiura filiformis*, urchin *Echinocardium cordatum* and tower shell *Turritella communis*. The main Irish Sea locations are between Ireland and the Isle of Man, and off the Cumbrian coast. Smaller patches occur inshore in areas such as Liverpool Bay and Cardigan Bay.

The "Brissopsis" *Community*

Referred to as the 'Boreal Offshore Mud Association' by Jones (1950), this community occurs in offshore muds at shallow to moderate depth (15-100 m). Typical species include the urchin *Brissopsis lyrifera* and brittlestar *Amphiura chiajei*. The main Irish Sea location is in the mud of the deep western basin below about 70m. A smaller patch occurs off Cumbria. These locations in conjunction with the nearby *Amphiura* communities coincide with those of the *Nephrops* fisheries.

The "Abra" *Community*

Included in the 'Boreal Offshore Muddy Sand Association' by Jones (1950), this community occurs as small pockets in shallow (5-30 m) nearshore muddy sands/muds with rich organic contents. Typical species include the bivalve mollusc *Abra alba* and polychaete worm *Lagis koreni*. This community occurs in small localised patches in embayments throughout the Irish Sea.

The "Shallow Venus" *Community*

Referred to as the 'Boreal Offshore Sand Association' by Jones (1950), this community occurs in shallow (5-40 m) nearshore sands. The characteristic '*Venus*' species is *Chamelea gallina* (= *Venus striatula*). Often such localities are in areas subjected to strong currents and the sands belong to sand bank or sand wave systems. The community is often regarded as having two sub-communities relating to their preferred sand grades/stability. The *Tellina* sub-community occurs in fine stable sands and typical species include the bivalve *Fabulina fabula* (= *Tellina fabula*) and polychaete *Magelona* '*mirabilis*'. The *Spisula* sub-community occurs in medium to coarse sands subject to disturbance and typical species include the bivalve *Spisula elliptica* and polychaete *Nephtys cirrosa*. The shallow *Venus* community is widely distributed around the Irish Sea coastline.

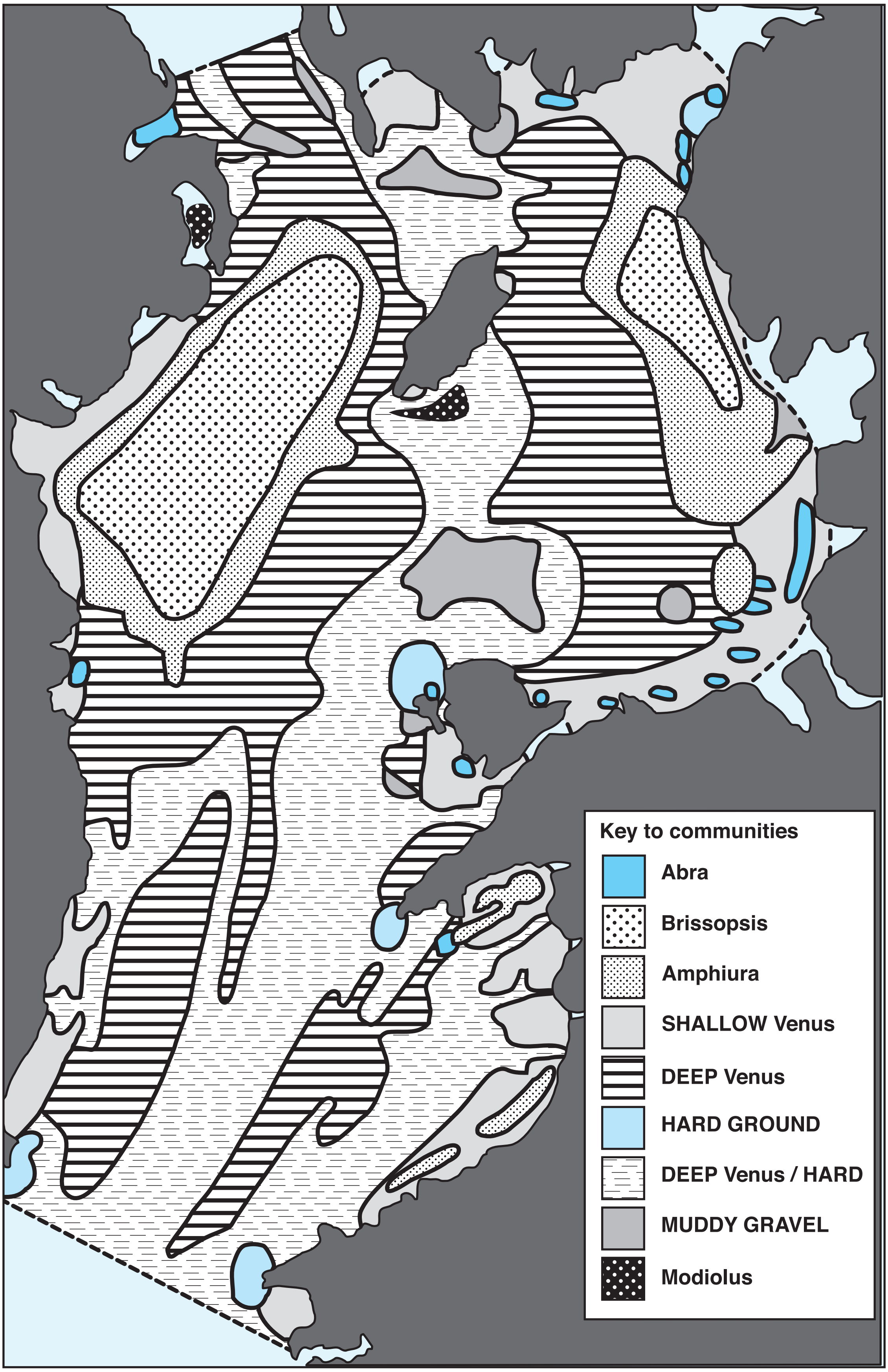


Fig. 2.1: Generalised distribution of macrobenthic communities in the Irish Sea (after Mackie 1990).

The "Deep Venus" Community

Referred to as the 'Boreal Offshore Gravel Association' by Jones (1950), this community occurs in coarse sand/gravel/shell sediments at moderate depths (40-100 m). Typical species include the urchin *Spatangus purpureus*, and bivalves *Glycymeris glycymeris*, *Astarte sulcata* and '*Venus*' spp. (*Circomphalus casina*, *Clausinella fasciata*, *Timoclea ovata*). This community dominates the Irish Sea benthos. In sand wave areas the communities often contain elements of both shallow (*Spisula* sub-community) and deep *Venus* communities.

The "Muddy-gravel" Community

Although not well-quantified in the Irish Sea as a whole, there does seem to be a strong case for considering the muddier gravels separately from the cleaner ones. This was also the view of Holme (1966) and led him to describe a 'Boreal Offshore Muddy-gravel Association' for parts of the English Channel. Rees *et al.* (1972) and Rees & Walker (1984) recorded very rich faunas from mixed muddy gravelly sands in Liverpool Bay. In the former report the highest diversities (log series α) recorded relative to depth occurred at muddy gravel stations, while the lowest diversities were found in mobile sands.

The "Modiolus" Community

Regarded as part of the 'Boreal Offshore Gravel Association' by Jones (1950), this community occurs on coarse sand/gravel/shell/stone sediments at moderate depths. Typical species include the horse mussel *Modiolus modiolus* and brittlestar *Ophiothrix fragilis*. Mackie (1990) treated the community in its own right as the epifaunal or semi-infaunal *Modiolus* can, with its tendency to clump together by byssus threads, create a stable habitat that attracts a very rich infauna. A large *Modiolus* bed is known off the southeast coast of the Isle of Man (Jones 1951) and the species occurs widely in the Irish Sea, both as isolated clumps and as true beds on rough ground subject to strong tides. It is commonly encountered between Anglesey and the Isle of Man (Eden *et al.* 1973; Hubert Rees, pers. comm.) and in parts of St. George's Channel, west of Anglesey and the Lleyn Peninsula, but the true extent of its cover is not known. Extensive beds are also present in Strangford Lough (see Seed & Brown 1977) and off the Ards Peninsula (Erwin *et al.* 1990).

"Hard Substrate" Communities

In areas of particularly high water movements, notably off headlands, the substrate can be very hard. These localities are stony and bedrock is often exposed. In areas not subject to sand scour, the benthos is commonly dominated by epifaunal species attached to the stones.

The Present Situation

Since Mackie's review little additional information concerning the benthos of the Irish Sea has been published. The data available remains fragmentary and variable in both quality and quantity. Nevertheless, an upsurge in interest in the area has occurred and a number of biological (Davies 1991; Mills 1991) and environmental (Huckbody *et al.* 1992; Taylor & Parker 1993) reviews have recently appeared.

The BIOMÔR 1 project, involving work carried out in 1989 and 1991, was the first large-scale study of the southern Irish Sea benthos. This was followed, in 1992, by the initiation of investigations in the northwestern Irish Sea under the auspices of the Department of Agriculture for Northern Ireland (DANI). The sampling grid of this program encloses an area bordered by Anglesey and Dublin in the south and the Isle of Man in the west (Hensley 1994), and is therefore contiguous with the northernmost BIOMÔR stations. A paper concerning the the benthos of the muddier sediments within the DANI study area is expected shortly (Hensley, *in press*).

3. Sampling Methods and Treatments

The primary aims of the BIOMÔR project arose from a recognition that the benthic invertebrate fauna of the southern Irish Sea was essentially unknown. The sampling methods and procedures were therefore designed to maximise the usefulness of the data obtained. In achieving this, priority was given to obtaining specimens in the best possible condition. This aided the identification and enumeration processes necessary for the univariate and multivariate analyses, and increased the potential value of the material for taxonomic research. The specimens were retained and have been incorporated into the biodiversity reference collections of the National Museum of Wales.

Benthic Sampling

Two benthic surveys were carried out, the first in the summer of 1989 and the second in the summer of 1991, using the RV *Prince Madog* (University College of North Wales). The sampling was quantitative whenever conditions permitted and station selection followed a semi-stratified strategy; stations being positioned within the known sediment types (and across their 'boundaries') throughout the depth range present. Where possible, sediment for particle size analysis was taken from a supplementary quantitative sample.

For reasons of political sovereignty sampling was restricted to the eastern (Welsh) side of the area, from Anglesey in the north to the Celtic Deep in the south (Fig. 3.1). A sampling log was kept for each survey period (Appendix 1). While the 1989 log simply summarised the sampling, the 1991 log was annotated and detailed the deployment of gear and its efficiency. A synopsis of the sampling is provided in Table 3.1. A camera sledge was used to photograph the seabed at selected stations.

As part of the 1991 survey, additional sampling was carried out in the 'Gutter' region, southwest of Aberystwyth. Ten stations were studied using both Van Veen and Petersen grabs in an attempted comparison with the 1921 study of Laurie & Watkin (1922). Sediment samples were also taken and the sampling area remotely surveyed using the ROXANN acoustic system (see Rees 1993). This part of the 1991 survey will be published in a separate publication at a later date.

Quantitative Sampling

Quantitative sampling was carried out using a heavy (~60 kg) long-armed continuous warp-rigged Van Veen grab (Plate 1). This type of grab, though prone to low success in poor weather, was considered to be the most efficient in obtaining good penetrative samples on harder sediments (see Mackie 1981; Riddle 1984, 1989). The grab employed was measured and found to take a sample covering an area of a 0.112 m^2. This is within the range (0.099-0.116 m^2; mean 0.110 m^2) found by Riddle (1984) in an examination of ten '0.1 m^2' Van Veens. Three replicates were taken at each station, the largest two being sieved for the macrofauna. A large sediment sample was taken from the third and the remainder qualitatively sieved for additional invertebrate specimens. Samples were deemed 'quantitative' if the volume of sediment collected was visually estimated at not less than about 4 litres and there was no leakage on retrieving the grab. Stones caught between the jaws were the most common cause of failure.

The quantitative macrofaunal sampling was restricted to duplicate grabs due to the practical limitations of ship-time and cost-effectiveness. In an exploratory work such as this, priority was given to sampling as many stations as possible and two samples have previously been found adequate for studies involving diversity indices and classification analysis (see Riddle 1984; Kingston & Riddle 1989).

In the 1989 survey, quantitative samples were obtained from 30 of the 34 stations investigated. The 1991 stations were selected to augment the coverage of the first survey and 21 of the 39 stations were quantitatively sampled. These later stations were mainly positioned on the rougher sediments of Cardigan Bay and the St. George's Channel, however, the apparently lower success rate of the 1991 quantitative sampling (54% vs. 88% of the stations for 1989) was not entirely due to this fact. Until quantitative sampling was aban-

Stn.	Position	Depth	Sediment summary [visual observations]	Gear
1	~53° 26.4'N, 04° 50.8'W	80 m	muddy gravelly sand [+ stones with epifauna, *Modiolus*]	VV AD
2	53° 22.9'N, 04° 59.9'W	60 m	sandy gravel [+ some mud, *Modiolus*, *Ophiothrix*]	VV
3	~53° 19.4'N, 05° 06.7'W	170 m	[patchy hard ground: sand waves / muddy gravel, *Glycymeris*]	vv
4	53° 17.5'N, 05° 13.6'W	110 m	[muddy sand, *Glycymeris*]	VV
5	53° 09.7'N, 04° 53.4'W	53 m	[mud, shell, gravel, stones]	AD
6	53° 03.2'N, 05° 10.1'W	120 m	gravelly sand [+ some mud, *Glycymeris*]	VV
7	51° 21.4'N, 06° 24.0'W	130 m	mud	VV
	~51° 21.5'N, 06° 22.4'W	~145 m		T
8	51° 21.9'N, 06° 16.9'W	130 m	sandy mud [mud]	VV
9	51° 22.5'N, 06° 08.9'W	120 m	sandy mud [mud]	VV
10	51° 23.5'N, 06° 00.0'W	110 m	muddy sand [sandy mud]	VV
11	51° 24.0'N, 05° 52.0'W	100 m	sand [fine sand]	VV
	~51° 23.9'N, 05° 51.8'W	100 m		T
	~51° 24.1'N, 05° 50.3'W	100 m		AD
12	51° 25.0'N, 05° 39.1'W	88 m	sand [fine sand, *Echinocardium*]	VV
13	51° 25.9'N, 05° 20.8'W	78 m	sand [fine sand with broken shell]	VV
14	51° 56.9'N, 05° 55.6'W	110 m	gravelly sand [+ shell & some mud]	VV
	51° 56.8'N, 05° 55.2'W	110 m		T
15	52° 01.7'N, 05° 45.1'W	112 m	gravelly sand [+ stones, shell, some mud]	VV
16	52° 05.7'N, 05° 33.7'W	112 m	sandy gravel [+ stones & shell]	VV
17	52° 10.1'N, 05° 23.1'W	120 m	gravelly sand [+ stones, some mud, *Sabellaria*]	VV
18	52° 14.1'N, 04° 23.9'W	32 m	muddy sand [sandy mud]	VV
19	52° 16.4'N, 04° 17.4'W	28 m	muddy gravelly sand [black sand / mud]	VV
20	52° 21.3'N, 04° 10.6'W	28 m	muddy sand [mud]	VV
21	52° 20.8'N, 04° 14.2'W	20 m	sand [fine sand]	VV
22	52° 20.8'N, 04° 17.9'W	26 m	sand [fine sand, some mud]	VV
23	52° 20.5'N, 04° 21.0'W	21 m	sand	VV
24	52° 42.6'N, 04° 30.3'W	58 m	muddy sand [mud]	VV
25	52° 42.4'N, 04° 24.3'W	25 m	sand [sand, mostly fine]	VV
26	52° 44.4'N, 04° 26.5'W	30 m	muddy sand [mud]	VV
27	52° 46.4'N, 04° 22.7'W	25 m	muddy sand [muddy fine sand]	VV
28	52° 48.4'N, 04° 17.9'W	18 m	sand [fine sand with shell]	VV
29	52° 51.3'N, 04° 11.5'W	18 m	sandy mud [mud]	VV
30	52° 44.4'N, 04° 47.6'W	42 m	[large shells (*Modiolus*, oyster), stones (+ ascidians, *Sabellaria*), muddy sand, gravel]	vv
31	52° 57.5'N, 04° 41.9'W	45 m	[sand, gravel, shell, stones, boulders]	vv
32	53° 09.2'N, 04° 29.5'W	20 m	fine sand [silty fine sand]	VV
33	53° 07.2'N, 04° 43.8'W	65 m	gravelly sand [+ shell]	VV
34	53° 19.5'N, 04° 09.0'W	7 m	sand [shelly mud]	VV
35	~53° 10.5'N, 04° 40.0'W	49 m	[sand, stones, *Sabellaria*]	D
36	~52° 59.4'N, 04° 45.7'W	59 m	[muddy gravel & shell]	D
37	~52° 52.8'N, 04° 46.5'W	50 m	[stony ground & *Ophiothrix*]	D
38	52° 43.5'N, 04° 41.4'W	29 m	sandy gravel [shell gravel & *Glycymeris*]	VV
39	52° 39.6'N, 04° 36.4'W	27 m	sandy gravel	VV
40	52° 35.0'N, 04° 29.5'W	24 m	[stony ground]	vv
41	52° 36.6'N, 04° 21.4'W	19 m	[stony ground]	vv
42	52° 37.2'N, 04° 13.7'W	16 m	sand [fine sand]	VV
43	52° 31.4'N, 04° 13.2'W	16 m	sand [fine sand]	VV

Table 3.1: Summary of NMW benthic research stations in the southern Irish Sea area, 1989 & 1991.

Stn.	**Position**	**Depth**	**Sediment summary [visual observations]**	**Gear**
44	52° 28.4’N, 04° 21.6’W	21 m	[‘stony ground / muddy sand’]	vv
45	52° 23.7’N, 04° 14.6’W	17 m	sand [‘fine sand’]	VV
46	52° 19.2’N, 04° 37.0’W	30 m	sandy gravel [‘coarse shell gravel’]	VV
47	52° 09.6’N, 04° 32.5’W	15 m	muddy sand [‘sandy mud’]	VV
48	52° 06.6’N, 04° 55.0’W	39 m	gravelly sand [‘coarse muddy shell gravel’]	VV
49	52° 17.1’N, 05° 00.0’W	53 m	muddy gravelly sand [‘muddy gravel’]	VV
50	52° 30.5’N, 04° 45.9’W	49 m	sand [‘silty fine sand’; some gravel]	VV
51	52° 26.2’N, 05° 01.0’W	75 m	gravelly sand [‘silty sand’, shell; some gravel]	VV
52	52° 22.2’N, 05° 14.2’W	77 m	sand [‘fine sand’ with gravel & shell]	VV
	~52° 21.8’N, 05° 13.8’W	78 m		T
53	52° 15.1’N, 05° 19.7’W	86 m	[stones / *Sabellaria*]	vv
	~52° 14.6’N, 05° 20.4’W	88 m	[*Sabellaria*]	D
54	52° 09.7’N, 05° 25.6’W	99 m	muddy sand [fine / medium sand]	VV
55	52° 01.9’N, 05° 31.0’W	95 m	gravelly sand [muddy gravel]	VV
56	51° 56.0’N, 05° 37.4’W	97 m	[fine sand-stones-gravel]	vv
	~51° 57.6’N, 05° 35.9’W	~94 m	[clean gravel, some stones]	D
	~51° 58.2’N, 05° 35.3’W	~93 m	[large pieces of shell, some stones]	T
57	51° 48.8’N, 05° 42.5’W	105 m	gravelly sand	VV
	~51° 49.1’N, 05° 42.0’W	107 m		T
58	~51° 42.4’N, 05° 45.4’W	108 m	muddy gravelly sand	VV
	~51° 42.6’N, 05° 45.1’W	108 m		T
59	51° 32.0’N, 05° 56.5’W	109 m	muddy sand [silty fine sand]	VV
	~51° 32.0’N, 05° 56.4’W	109 m	[including *Aphrodita* & sabellids]	T
60	51° 15.8’N, 05° 59.8’W	93 m	muddy sand [mud]	VV
61	51° 16.0’N, 06° 16.3’W	117 m	sandy mud	VV
62	51° 16.2’N, 06° 30.1’W	112 m	muddy sand [+ shell & gravel]	VV
	~51° 16.3’N, 06° 30.0’W	114 m	[including *Brissopsis*]	D
	~51° 16.6’N, 06° 30.0’W	115 m		S
63	51° 35.6’N, 06° 17.9’W	94 m	sand [silty fine sand]	VV
	~51° 35.7’N, 06° 17.1’W	95 m		T
64	51° 45.0’N, 06° 07.4’W	111 m	sand [+ silt & stones]	vv
	~51° 45.3’N, 06° 07.2’W	112 m		T
	~51° 45.9’N, 06° 06.7’W	111 m		T
	~51° 45.2’N, 06° 07.2’W	~110 m	[silty fine sand]	D
65	~51° 51.1’N, 06° 01.0’W	105 m	[silty coarse sand-gravel-shell]	D
	~51° 51.6’N, 06° 00.4’W	105 m		T
66	~51° 57.2’N, 05° 55.3’W	~96 m	[‘silty coarse sand’-gravel-shell]	D
	~51° 57.5’N, 05° 52.0’W	98 m	[coarse sand-gravel-stones]	T
67	52° 04.0’N, 05° 47.3’W	95 m	[silty coarse sand-shell-gravel; many *Glycymeris*]	D
	~52° 04.1’N, 05° 47.0’W	94 m		T
68	~52° 10.1’N, 05° 41.2’W	94 m	[silty coarse sand-shell-gravel; many *Glycymeris*]	D
69	~52° 16.7’N, 05° 34.6’W	~91 m	[silty coarse sand-shell-gravel, *Glycymeris*]	D
70	~52° 22.7’N, 05° 27.0’W	88 m	[silty coarse sand-gravel-shell-stones, *Glycymeris* & *Modiolus*]	D
71	~52° 37.5’N, 05° 18.1’W	113 m	[silty coarse sand-shell-gravel-stones, *Glycymeris*]	D
72	~52° 51.1’N, 05° 09.0’W	92 m	[stones-boulders-silty coarse sand-shell]	D
73	~53° 11.0’N, 05° 06.4’W	~128 m	[silty coarse sand-shell-gravel-stones, *Modiolus* (common), *Glycymeris* & *Venus*]	D

Key:	**VV**	**Van Veen Grab (quantitative)**	**vv**	**Van Veen Grab (qualitative)**
	AD	**Anchor Dredge**	**D**	**Tjärnö Dredge**
	T	**Rectangular Trawl**	**S**	**Detritus Sledge**

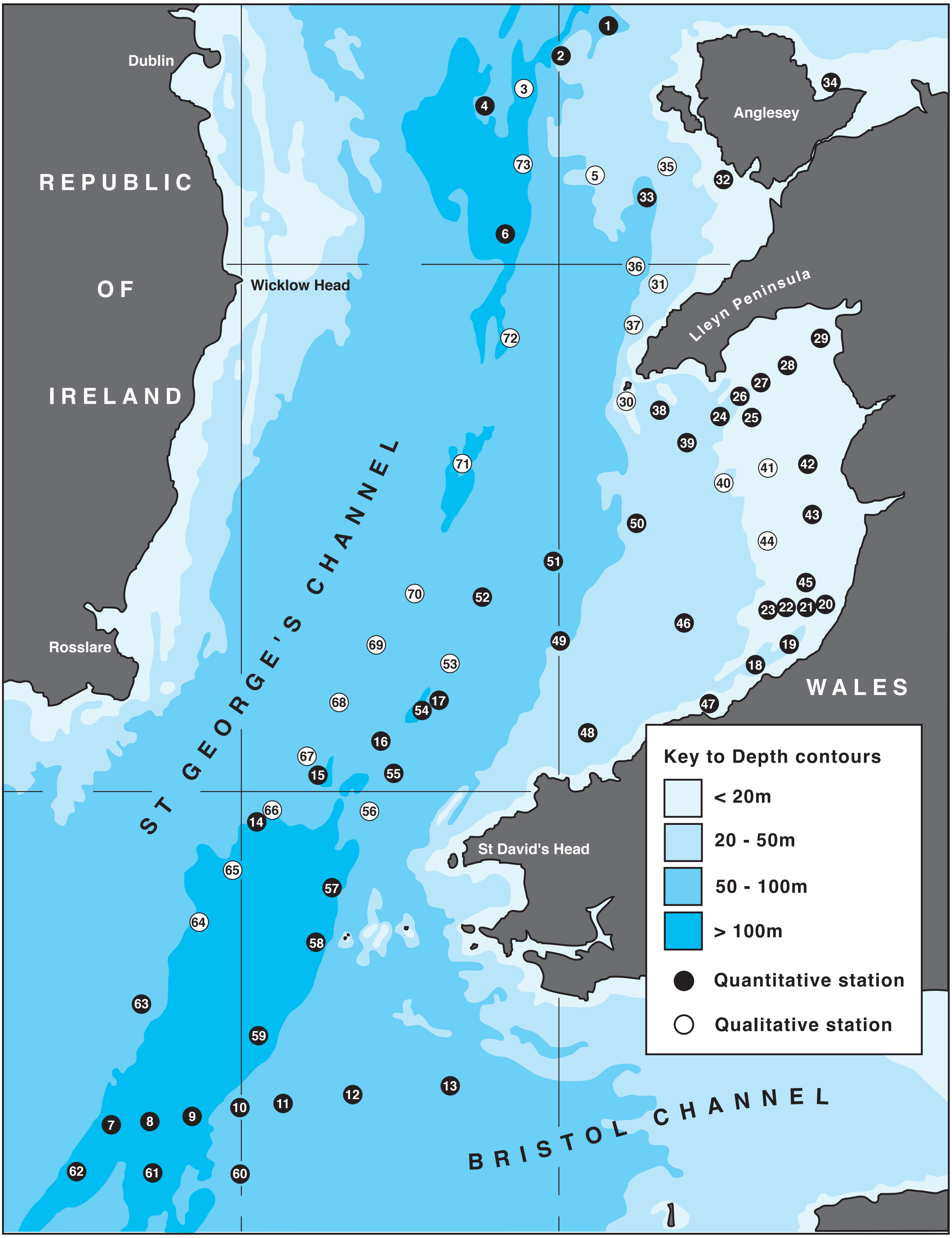


Fig. 3.1: Map of the study area showing bathymetry and distribution of sampling stations for both 1989 and 1991 programmes.

doned due to deteriorating weather, and a reduction in the amount of ship-time remaining, the success rate stood at 70%. It was regrettable that no quantitative samples were obtained from the St. George's Channel transect (Stns. 64-73) but, given calmer conditions, it is likely the grab would have worked on at least some of these stations.

Qualitative Sampling

Where grab sampling proved ineffective, the macrofauna was only examined from a qualitative point of view. In situations where a number of unsuccessful grabs had together produced a 'reasonable' amount of sediment this was sieved as a qualitative sample. Otherwise, after a number of failures, a qualitative dredge was deployed. In the first survey an anchor dredge was used. For the second survey a Tjärnö dredge (Plate 2) was the preferred sampler. This dredge, so-named since its design was based on several in use at the Tjärnö Marine Biological Laboratory (Strömstad, Sweden), had a mouth 40 cm wide and an inner collection net of 0.5mm mesh. It proved most effective on the rough gravelly sediments of the area, collecting around 20 litres of sediment.

In both surveys a 100 cm wide rectangular trawl was used in order to capture more of the larger invertebrates present in the area. In 1991 a small (30 cm wide) detritus sledge was deployed once in the Celtic Deep.

Although the first survey was centred on the study of the infauna, it was recognised that the epifauna were an important component of the coarser sediments. Accordingly, for the 1991 sampling, particular emphasis was placed upon securing representative collections of the epifauna present at each station and especially from the voluminous dredge and trawl samples.

Sample Treatment

The grab and dredge samples were individually emptied into large plastic fishboxes and immediately covered with seawater. This helped keep the samples cool and allowed the natural movement of the ship to initiate the gentle breakup of the sediment. The macrofauna were removed from the sediment as soon as practicable, with respect to the operation of the sampling gear, following the procedures (Fig. 3.2) detailed by Mackie (1994).

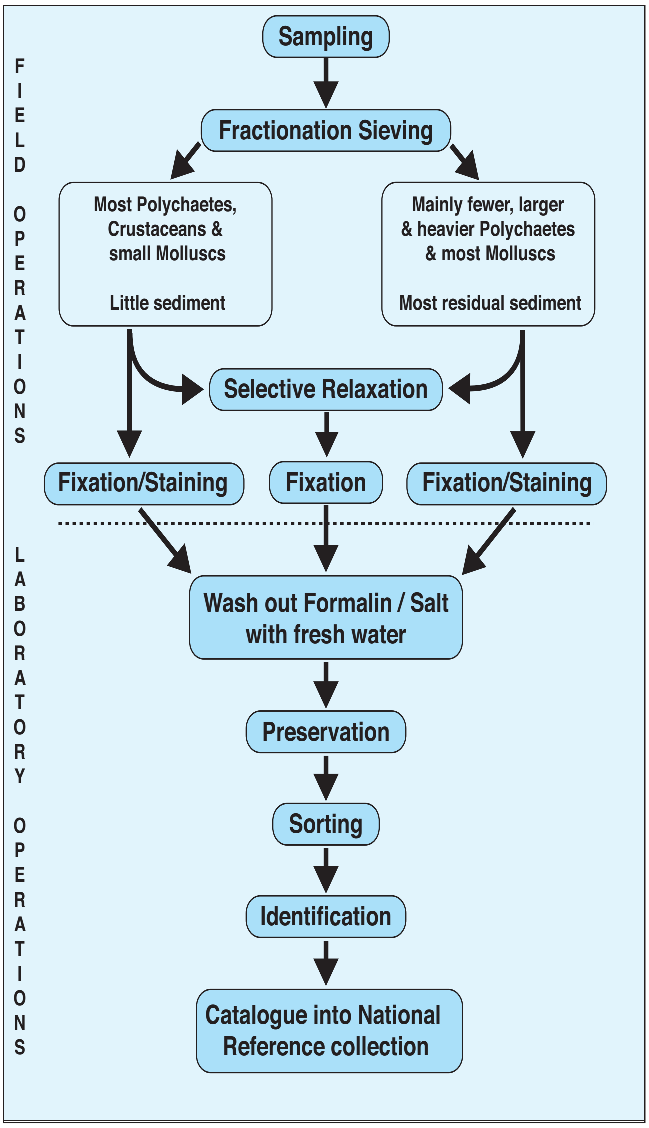


Fig. 3.2: Sample treatment procedure for benthic marine invertebrates.

Each sample was individually placed in a large wooden tray and gently washed with copious amounts of seawater. Once the tray was full, the water was released through the exit chute and sieved using a 45 cm diameter 0.5mm mesh sieve. This procedure was repeated a number of times, gradually breaking up the sediment, until the majority of the mud and suspended specimens were removed. The material retained by these initial washings contained most of the delicate worms and crustaceans, as well as the smaller molluscs, but relatively little sediment. It was placed in a labelled container and fixed in a sample concentration of about 8% formaldehyde (equivalent to 20% formalin) in seawater. The remaining unsieved sample fraction contained only the coarser sediment particles and the larger macrofauna, and could therefore be sieved with more vigour. This material itself was often further fractionated by placing a 2 mm mesh sieve above the finer one; each fraction being separately fixed in a sample concentration of about 12% formaldehyde (equivalent to 30% formalin). Once the fixative was added, each sealed sample container was gently upturned and rotated to distribute the formalin evenly throughout the sieved sediment.

A sample from a sandy gravel station may therefore be fixed as three separate fractions: washings, sand and gravel. Such fractionation greatly improves the quality of the sieved specimens and aids the later sorting phase. To help this process, most of the formalin used was strongly stained with Rose Bengal, though some qualitative samples, most epifaunal samples and certain selected specimens were fixed unstained.

At all stages of the sieving procedure care was taken to individually remove noticeably fragile animals (e.g. scaleworms, phyllodocids, terebellids, nudibranchs). Where time allowed, these were then relaxed (menthol or magnesium chloride) prior to fixation. Some were also examined live under the microscope. Large stones were retained for epifaunal analyses.

Once back at the laboratory, the sieved samples were gently, but thoroughly, washed in freshwater. This removed the formalin and salt, preventing the former from dissolving the shells of delicate molluscs. The samples were then preserved in 80% alcohol.

Sorting and Identification

The specimen-rich initial washings fractions were sorted into phyla under the dissection microscope. The remaining fractions were sorted by eye using a well-lit white tray. Pliable stork-bill forceps were used throughout to prevent damage to the delicate forms, such as thin-shelled molluscs.

For each quantitative replicate, all specimens were enumerated and identified to the most advanced level possible relative to the available taxonomic literature and the timescale for the completion of the project. For the qualitative samples, all species present were identified.

Sediment Analysis

The sediment samples removed from the third Van Veen sample were double-wrapped in labelled plastic bags and frozen on board ship. In the laboratory the sediments were defrosted and oven-dried at 100°C. A simple particle size analysis was performed based upon the procedures given in Buchanan (1984). The proportions of gravel, sand, silt and clay were determined for each quantitative station. This was supplemented by analysis of the carbonate, organic matter, organic carbon and organic nitrogen content.

The particle size analysis was carried out by Environment & Resource Technology Ltd. (IOE Group), Edinburgh. Total organic carbon and total organic nitrogen were analysed by their subcontractor, Butterworth Laboratories Ltd., Teddington.

Particle Size Analysis

Samples of the sediments were treated with 30% hydrogen peroxide until organic oxidation was complete. To prevent aggregation of the smaller particles the samples were filtered and washed in distilled water, and then resuspended in a 0.6% solution of sodium hexametaphosphate. The sediments were allowed to sequester for at least 2 hrs before being puddled through a 63 µm sieve to separate the silt/clay from the sand/gravel fraction.

The sand/gravel fractions were washed in distilled water to remove any remaining salts and oven-dried at 100°C. They were then dry sieved through stacked 2 mm (gravel) and 63 µm (sand) Wentworth analytical sieves using an electromagnetic shaker (for 15 min). The gravel and sand fractions were then weighed. Any particles passing through the 63 µm sieve were added to the silt/clay fractions prior to the pipette analyses to determine the clay contents of the sediments. The silt contents were calculated as the difference between weights of the respective silt/clay and clay fractions. The different fractions were expressed as percentages of the organic-free sediment.

Calcium Carbonate Determination

Samples of the sediments were treated with concentrated hydrochloric acid until the effervescence ceased. They were then washed on a glass-fibre filter and the residues dried to constant weight. Carbonate contents were determined by the difference between original and post-treatment weights, and expressed as percentages of the former.

Organic Matter Determination

Organic content was estimated from the weight lost after placing the dried acid-treated sediments in a muffle furnace for 2 hrs at 600°C. Organic matter was expressed as a percentage of the original pre-acidification weight.

Total Organic Carbon & Total Organic Nitrogen Determination

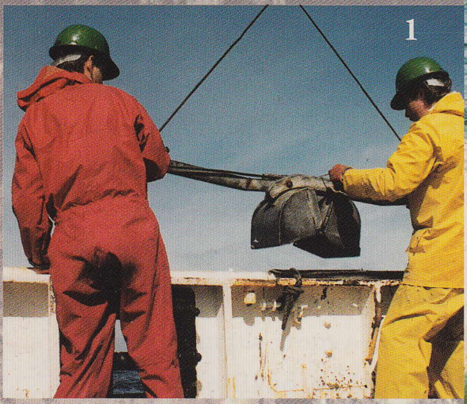
Dried samples of the sediments were treated with concentrated (37% v/v) hydrochloric acid to remove inorganic carbon in the form of carbonates. The samples were then washed with distilled water on Whatman GFC filters and the residues oven-dried at 105°C. Sediments containing coarse particles were sieved (1 mm) and the materials not retained gently ground using a porcelain mortar and pestle. Total organic carbon and total organic nitrogen contents were then determined using a Perkin Elmer 2400 Elemental Analyser. The results were expressed as percentages of the original pre-acidification weights (i.e. also correcting for coarse material removed).

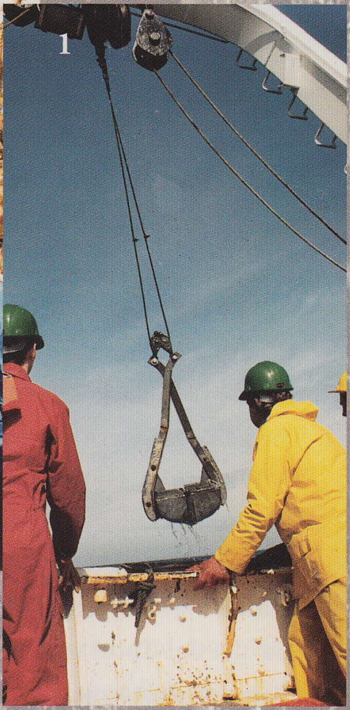
Seabed Photography

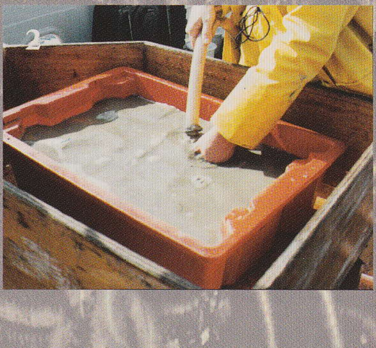
The seabed was photographed at selected locations using a remotely operated camera system. The equipment comprised a Photosea 1000 underwater camera with a Nikor 28 mm lens synchronously linked to a Photosea 1500S strobe. Triggering was acheived by means of a Photosea timer unit set to operate at 42 second intervals. All three units were fixed on a towed sledge.

The sledge was towed using wire lengths of about 2.5 times water depth in order to maintain contact with the seabed while preventing the towing warp disturbing the sediment ahead of the camera. The camera was mounted to take vertical views with the lens 0.65 m above the sediment surface. At this height the area of each image corresponded to 0.2 m^2. The strobe was set behind the camera to provide oblique illumination at 60°. At this angle backscatter from particles suspended in the water was reduced and objects standing proud of the seabed cast clear shadows. Kodak Ektachrome 200 ASA 35 mm film was used throughout.

Plate 1

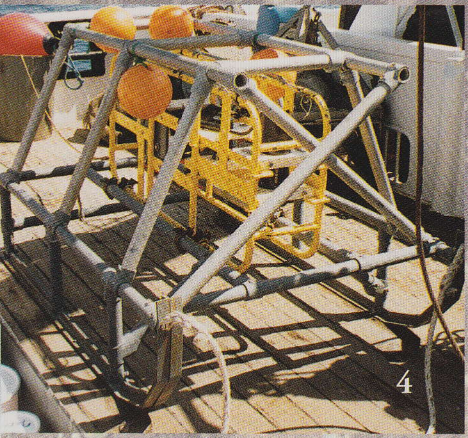


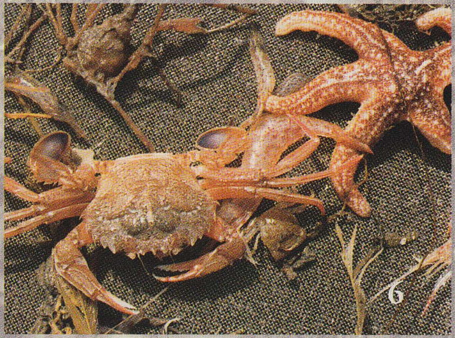




1. Operating the long arm VanVeen grab
2. Washing and sieving a sample
3. Writing the log, south of Bardsey
4. After-deck of the RV "Prince Madog"

Plate 2





1. 3ft rectangular trawl
2. Tjärnö dredge
3. "Picking over the catch"
4. Photo sledge
5. Fishing the trawl
6. Samples of catch

Plate 3

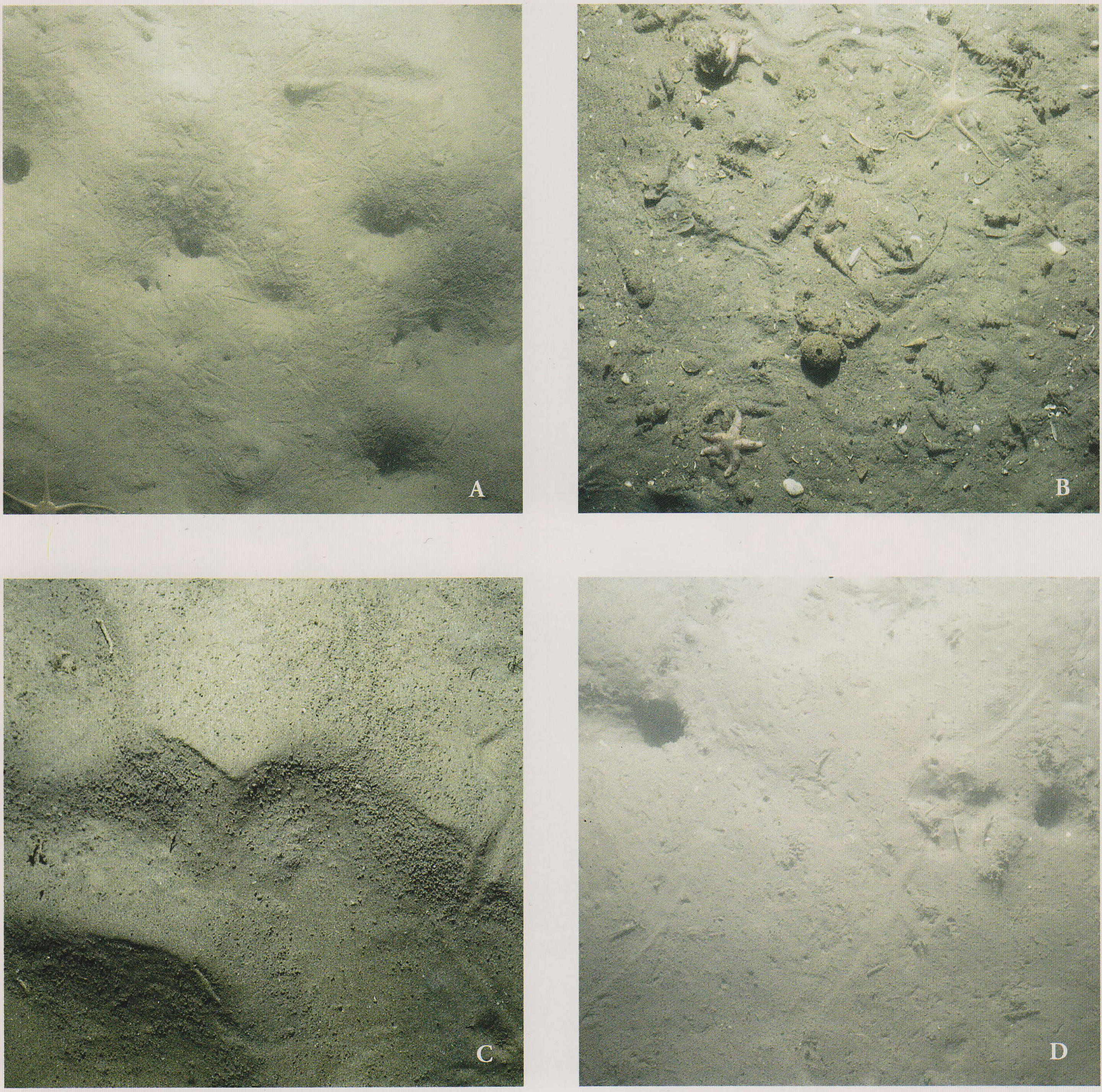


Plate 3. Generally muddy sediments, from both inshore pockets and the Celtic Deep.

A Sandy mud of the 'Trawling Ground' or 'Gutter' in Cardigan Bay to the southwest of Aberystwyth. The photograph shows strongly bioturbated ground with numerous burrows of decapod crustaceans; a *Turritella* shell and an *Ophiura* are visible on the sediment surface. Location 52°20.8' N, 04°10.7' W; Depth 27 m; Date 12.7.89.

B Muddy sand in a shallow part of Tremadog Bay. The photograph shows a seafloor with numerous trails (Lebenspuren), there are several *Turritella* and a small *Asterias*. The lighter spots emerging from the sediment are shells of *Abra abra*. The sand covered ball ascidian in the centre is abnormally frequent in photographs of this area. The colour of the sediment surface indicates that films of benthic diatoms were present. Location 52°50.8' N, 04°12.7' W; Depth 21 m; Date 13.7.89.

C Fine sand showing sharply defined ripples, from near the edge of the Celtic Deep, southwest of Milford Haven. Some lebenspuren and burrows are visible, but bioturbation has not significantly altered the current induced rippling. The numerous very small spots, showing because they give slight shadows, are thought to be made by the protozoan *Astrorhiza* which came up in large numbers on the meshes of an Agassiz trawl from near here. Location 51°24.6' N, 05°37.0' W; Depth 85 m; Date 11.7.89.

D Cohesive mud in the bottom of the Celtic Deep into which *Nephrops* and other large decapod crustaceans burrow. Location 51°21.9' N, 06°22.7' W; Depth 135 m; Date 11.7.89.

Plate 4

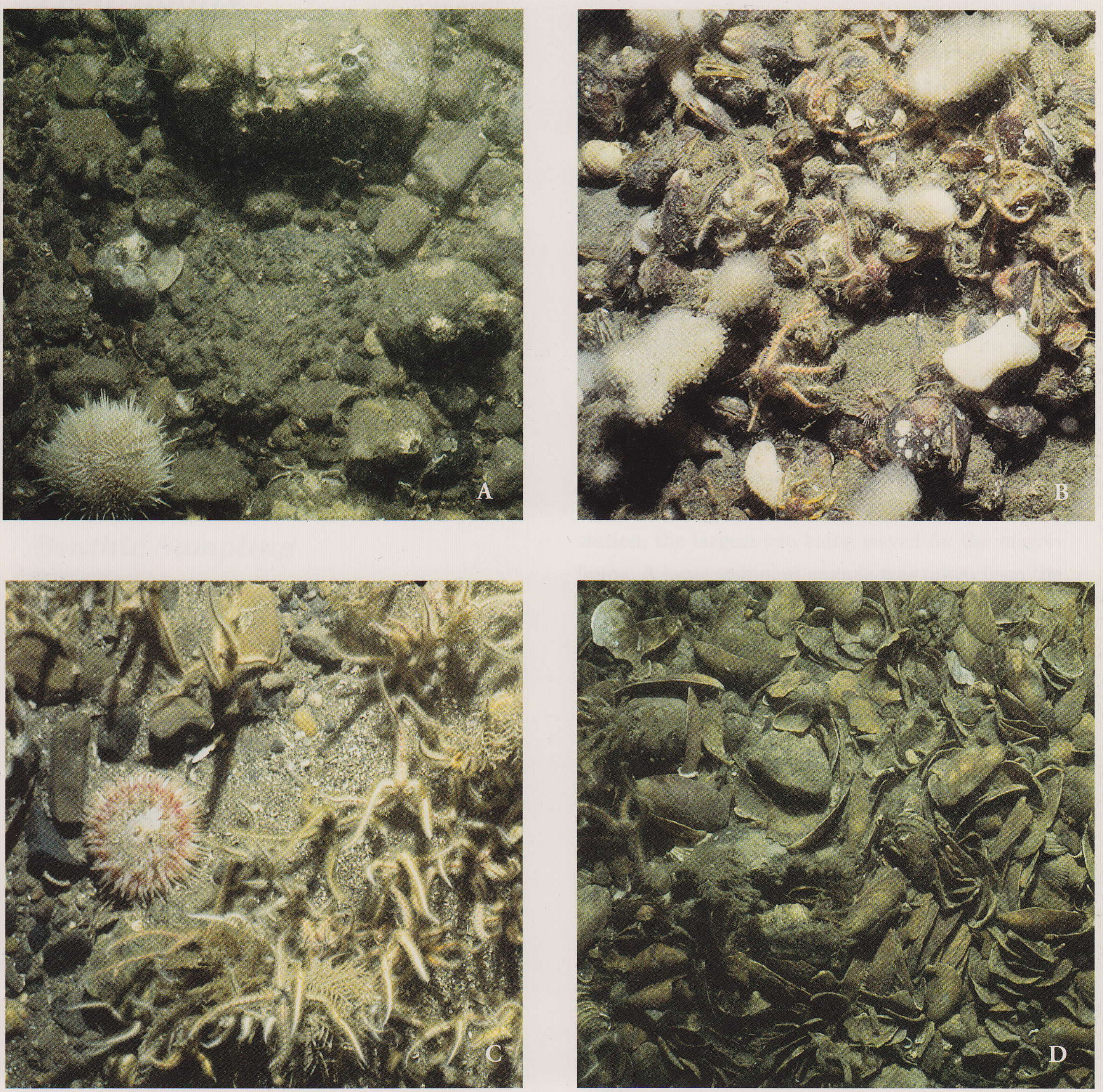


Plate 4. Hard grounds in tide swept areas.

A Glacial lag veneer with embedded boulders and cobbles from north of Pen Lleyn. The larger stones are colonised by *Balanus balanus* and serpulid polychaetes, but other epifauna here is probably limited by sand scour. The urchin is *Echinus elegans*, a more offshore open shelf species than *E. esculentus*, distinguishable by the differing lengths of spines in rows. Location 52°53.8' N, 04°51.5' W; Depth 66 m; Date 26.5.92.

B Beds of the horse mussel *Modiolus modiolus* occur in discrete patches off the north side of Lleyn, providing a distinctive and species rich biotope that overlays the lag gravel. The photograph shows many large *Modiolus* with their siphons open to feed and partly embedded in the bioherm of shell and mud which the bed builds up. The mud comes mainly from the faecal pellets of the filter feeding mussels. There are frequent colonies of the soft-coral *Alcyonium digitatum* growing on the mussels and brittle stars *Ophiothrix fragilis* are common. Location 52°55.9' N, 04°39.4' W; Depth 26 m; Date 16.6.94.

C Dense beds of the brittle star *Ophithrix fragilis* occur on moderately tide swept lag gravel grounds off headlands such as Point Lynas, Anglesey, where the anemone *Urticina eques* is also quite common. Location 53°24.8' N, 04°11.3' W; Depth 32 m; Date 12.11.90.

D Considerable deposits of long dead shell patchily provide a distinctive habitat. This one north of Lleyn is made up almost entirely of *Modiolus* shells. Location 52°53.5' N, 04°48.9' W; Depth 62 m; Date 26.5.92.

4. The Study Area

Ireland and Great Britain, the two largest islands on the northwest European continental shelf, are separated from each other by a channel which is loosely referred to as the Irish Sea. This channel is about 330 km in length and typically reaches 80-110 m deep along the main north-south axis. At modern sea levels the immersed area includes an extensive, but shallow (<50 m), embayment to the east of the Isle of Man. Therefore, on maps, the Irish Sea appears to be less a channel and more a semi-enclosed basin with constrictions at both ends. The narrower 170 km long southern part, essentially comprising the deep St. George's Channel and shallow Cardigan Bay, links the broader northern part to the more open shelf waters of the Celtic Sea (Fig. 3.1).

Geographical Definitions

The extent of the lrish Sea has variously been defined as including the whole of the area between Ireland and Britain or just the wider northern part from Anglesey to the Mull of Galloway. For fisheries statistical purposes the Irish Sea (lCES area VlIA) extends between Latitudes 52° and 55°N, that is from Strumble Head to Loch Ryan, and covers an area of some 45000 km^2. In this study, the term "southern Irish Sea" has been applied to the section between the northwest corner of Anglesey (53° 25'N) and St. David's Head, Pembrokeshire (51° 50'N). Had the study extended across into Irish coastal waters, the southern limit there would have been placed at Carnsore Point.

The Celtic Sea–southern Irish Sea interface is of considerable interest oceanographically. The cold tidally mixed waters of the St. George's Channel meet the temperature stratified waters of the Celtic Sea forming a discontinuity known as the Celtic Sea Front. This boundary between water masses varies in its exact position, but usually curves northwards between the Smalls and Carnsore Point (Pingree 1978; Simpson & Pingree 1978). Fronts are of considerable biological interest since they are areas of enhanced phytoplankton productivity. Zooplankton, heterotrophic bacteria, fish, seabirds and cetaceans are also reported to congregate at fronts (reviewed by Holligan 1981, Owen 1981, and Mann & Lazier 1991). Consequently, the underlying benthos could be considered likely to receive enhanced detrital inputs. To encompass this region within the study area sampling was extended about 40 km past the surface manifestation of the front and into the Celtic Sea.

With the inclusion of the Celtic Sea stations, the samples may be considered as being representative of four main sub-areas:

St. George's Channel

From St. David's Head north to Anglesey, the gravelly sediments of the deep central channel were sampled by three short traverses (Stns. 1-4, 5 & 6 and 14-17) and two long transects (Stns. 52 -56 and 66-73) along the main axis.

Celtic Deep

The transition from the coarse sediments of the St. George's Channel to the deep muddy sediments to the south of the Celtic Sea Front were investigated by the continuation of the channel transects (Stns. 57-61 and 62-65). Additional sampling was carried out on a transverse transect (Stns. 7-13) from the Celtic Deep (110-145 m) muds to the shallower (78-100 m) sands at the mouth of the Bristol Channel, southwest of Milford Haven.

Cardigan Bay

Sampling in this very large shallow bay concentrated on the narrow muddier inshore strips between Aberystwyth and New Quay (Stns. 18-20 & 47) and in Tremadog Bay (Stns. 24-29). In the 1991 survey, particular attention was given to the 'Gutter', a trough in the seabed, southwest of Aberystwyth. A traverse was made from 'Muddy Hollow' into Tremadog Bay, between the Lleyn coast and Sarn Badrig. Being shallow and shielded from the main tidal streams, Tremadog Bay has some of the warmest bottom water found anywhere offshore from the Welsh coast. The remaining stations in Cardigan Bay were situated on the sands and gravels of the area, and included a short transect west from the Gutter (Stns. 20-23).

Caernarfon Bay

Most of the sampling to the north of Bardsey was offshore in the strong tidal stream areas of St. George's Channel but a few samples were taken on the gravel grounds off the north coast of the Lleyn Peninsula (Stns. 31, 33 & 35-37) and inshore on the sandy ground off the west coast of Anglesey (Stn. 32).

In addition, samples were taken from the shallow sandy sediments of Red Wharf Bay (Stn. 34) on the north of Anglesey.

Bathymetry

The general morphology of the southern Irish Sea is indicated on Figure 3.1. The simplified depth contours on this map are derived from Admiralty charts.

Primarily the region comprises a channel with shallower shelves on either side. Along its central axis the channel has depths of 80 to 110 m. Small deeper grooves off Holyhead reach 170 m and in the Celtic Deep, only 7.5 km west of the Smalls, depths reach around 140 m. At the 50 m contour St. George's Channel is about 60-70 km wide. This depth contour runs across the mouths of Cardigan and Caernarfon Bays coming very close to land off St. Davids Head and Bardsey. Cardigan Bay is notably shallow, the 20 m contour being about 30 km offshore from Barmouth and enclosing nearly half the total area of the bay.

Water Masses and Movements

Water movements in the Irish Sea are complex, involving the combined influences of water density, tides and weather (Bowden 1980). The physical, chemical and biological attributes of the benthic habitat are all shaped by their influence (see Hiscock 1983). Most dramatic are the destructive disturbances of shallow-water benthic assemblages during severe storms (Rees *et al.* 1977), however, more subtle effects may concern larval settlement, and food and oxygen supply.

Salinity

There is a distinct gradation in salinity between the Celtic Sea and northern Irish Sea (Bowden 1950; Bowden 1980; Anon 1978; Orford 1989). This is due to the greater river run-off into the more enclosed Irish Sea and the direct contact the Celtic Sea has with the open Atlantic (Bowden 1955). Mean annual surface salinities over the Celtic Deep, to the west of the Smalls Lighthouse are just in excess of 35‰, whilst in the northern Irish Sea, to the east of a line between Anglesey and the Isle of Man, mean salinities are less than 34‰. Although there is not much seasonal difference in the Celtic Sea, in the inner parts of the eastern Irish Sea salinities may fall below 30‰ in winter.

It was the salinity gradient that first alerted oceanographers to there being inflows from the Celtic Sea (Bassett 1910), isohaline contour plots often showing a finger of high salinity water extending northwards into St. George's Channel. Plots of the caesium-137 concentrations in filtered water samples (Hunt 1980; Mauchline 1980) mirror salinity and provide supporting evidence for a main inflow in the middle of the channel.

Residual Flows and Mixing

Given that about three quarters of macrobenthic species in temperate waters reproduce with a prolonged pelagic dispersal phase (Thorson 1950), advection by residual flows and dispersal by tidal mixing have important influences on the range of species and their relative abundance as recruits to the benthos. Where species have specific habitat requirements, these must be met both in the natal area and where the recruits successfully colonise. White *et al.* (1988) showed that a proportion of larvae were lost from the northwest Irish Sea *Nephrops* stock because they drifted away from the limited area of suitable cohesive mud.

Based partly on the salinity evidence, partly on moored recording current meters and partly on the use of drifters, Ramster & Hill (1969) drew schematic diagrams of surface and near bottom residual currents throughout the Irish Sea. In the northern Irish Sea where residuals are weaker, more recent computer modelling has cast doubt on the consistency of some of the suggested flows, but in St. George's Channel they continue to support an inward mid-channel flow.

With residual flows into St. George's Channel from the Celtic Sea there should, in the longer term, be more opportunity for recruitment from the south than from the northern Irish Sea. However, in such a tidally turbulent area, with long tidal excursions, the scope for dispersal against the predominant residual flow is greater than were a similar strength residual to occur in an area with shorter tidal excursions. The evidence of radioactivity dispersal from the northeast Irish Sea down into the St. George's Channel supports the suggestion that mixing might play a significant part in larval transport here. The complex interplay of residual flows and tidal mixing is therefore likely to diversify the range of species recruiting to the channel benthos.

On the Irish side of the northern Irish Sea there is strong evidence for a salinity driven southwards flow along the coast, particularly during the early months of the year. Although density considerations suggest that much of this flow rotates around the stratified area in the deep western basin, salinity and fish egg dispersal data suggests that some of the coastal current may continue south from Dublin towards Carnsore Point. The existence of a southwesterly current passing around Carnsore Point into the Celtic Sea has been postulated by Cooper (1967). On the Welsh side there is known to be an anti-clockwise circulation in the Bristol Channel and there are suggestions that some of the outflow may round Pembrokeshire and enter the Welsh side of the southern Irish Sea.

Flushing Time

Flows through the Irish Sea are influenced by both density driven flows and by wind stress, particularly on the Celtic Sea and other adjoining seas (Bowden & Hughes 1961). There may even be longer term variations inflenced by patterns of circulation in the Atlantic and the position of the Gulf Stream (Taylor *et al*. 1992). Major discrepancies exist between flushing times deduced for different sectors of the Irish Sea in the pre-1976 and post-1976 periods (Dickson *et al*. 1987). This was based partly on modelling of trace contaminants from Sellafield. The section between St. Davids Head and Holyhead, with an estimated volume of 1100 km^3 was estimated to have a flushing time of 12 months in the pre-1976 period and only 6 months in the post-1976 period. Biological evidence for subtle flushing induced variability in the Irish Sea comes from the changes in the pattern of summer spread of the indicator chaetognaths *Sagitta setosa* and *S. elegans* in the eastern Irish Sea (Khan & Williamson 1970; Williamson 1983). Substantial changes to the populations of a range of benthic species in Liverpool Bay were shown by Rees & Walker (1991) to be remarkably coincident with similar changes to the benthos shown at North Sea sites by Buchanan & Moore (1986).

Surges

The Celtic Sea presents a funnel shape towards the southwest. Thus severe weather conditions in the Southwest Approaches give rise to storm surges in the southern Irish Sea. Howarth (1975) has shown, from variations in electrical currents generated in sub-sea telephone cables, that storm surges can give rise to temporary flows in the St. George's Channel that are an order of magnitude greater than the normal residual. He observed flows first to the south out of the channel followed by surges inwards. With surges being substantially greater than the residual flows, the potential exists for erratic advection into the area of the larvae of species that would not normally be expected to have self sustaining populations here. At the margins of biogeographic provinces such erratic recruitment is likely to make an additional contribution to the overall biodiversity of the area. Southward & Southward (1977) offered this explanation for the erratic occurrence of a southern hermit crab species in the western English Channel. Davenport & Rees (1993) reported an occasion when floating weed patches in the northern Irish Sea contained a western Atlantic isopod, as well as substantial quantities of *Zostera* fragments that were thought to have come from the south coast of Ireland.

Temperature and Stratification

Parts of the Celtic Sea develop particularly strong thermal stratification during the summer months. This is because stirring by the tides and waves is insufficient to overcome the buoyancy of the solar heated surface water. Data presented in the atlas of Lee & Ramster (1981) and other data bank sources used by Bowers (1984) show that the difference between surface and bottom (at 108 m) temperature may exceed 7°C in the central part of the Celtic Sea, southwest of the Nymphe Bank. Bottom temperatures in this area remain at near the winter mixed-water values of 9.0-9.5°C until the stratification breaks down in November and the bottom temperature rises to 10.5-11.0°C. The benthic fauna therefore experiences a seasonal variation of less than 2°C.

The stratification that commences in early April spreads east, reaching the waters above the Celtic Deep by the middle of the month (Pingree 1975). In this part of the BIOMÔR study area average mixed-water temperatures in March are 8.5-9.0°C. The thermocline develops over the summer months and, by early September, surface temperatures increase to 15.0-16.0°C, while bottom temperatures only rise by 3.0-3.5°C reaching 11.0-12.0°C. Thus the mid-summer difference between the two water layers is approximately 4°C.

Temperature profiles in the Celtic Sea reveal a sharp thermocline at about 40 m depth (Bowers 1984), below which the properties of the water mass remain relatively constant. This differs from the situation in the northwestern Irish Sea, just outside the present study area. Here the primary thermocline occurs at 18-20 m and other secondary pycnoclines are often evident in the deeper water.

In St. George's Channel, vigorous mixing due to strong tidal currents prevents thermal stratification, however, its depth and topography are such that the overlying water column is large enough to temper the influence of seasonal warming. Consequently summer bottom temperatures are around 1.0°C less than at the surface. Late winter bottom temperatures are about 8.0-9.0°C in mid-channel, reaching 12.0-13.0°C in August (Lee & Ramster 1981; James 1977). Thus the benthic fauna of the St. George's Channel experiences a seasonal variation of some 4.0-5.0°C. This contrasts with a variation of about 13.0-15.0°C in the shallow coastal bays.

Glémarec (1973) developed a two-level classification scheme for macrobenthic assemblages that took into account thermal stability at the seabed (to define "étages") and sediment composition (to define "facies"). His term "open sea étage" was used for areas where there was strong stratification and therefore only very small differences between winter and summer seabed temperatures. The deep Celtic Sea part of the BIOMÔR study area would come into this category. At the opposite end of the scale he used the term "infra-littoral étage" for shallow nearshore areas where there were large seasonal temperature variations. The shallow parts of the study area, and most obviously Tremadog Bay, would fit this category. Despite being tidally mixed, the central part of the St. George's Channel appears less easy to assign to the intermediate "coastal étage" category. The reduced benthic temperature variation (4-5°C) places the St. George's Channel rather more toward the open sea étage.

Fronts

A front can be simply described as the transitional zone between two water masses of differing character. In summer, a well-marked front develops at the interface between the warm surface stratified water of the Celtic Sea and the cold tidally-mixed water of the St. George's Channel. The exact position of the front varies but it generally runs in an arc from off the Smalls towards Carnsore Point (Fig. 4.1). In thermal photographs from satellites the boundary is often shown to develop eddies in the baroclinic flow which is generated along the front (Pingree & Griffiths 1978). Due to Coriolis effects the flow, generated on the immediate stratified side, is anti-clockwise. Within the study area, a second less well defined front occurs where the warmed outflow from the northern end of Cardigan Bay meets the cooler mixed waters of St. George's Channel.

In the summer months, when the surface stratified waters are isolated from the underlying water mass, there is a tendency for nutrient depletion to inhibit phytoplankton growth. Conversely, in the unstratified water, phytoplankton production may be light-limited due to the combined influence of turbidity and constant vertical mixing. Optimal conditions for photosynthesis exist where nutrients can be transferred to the clearer stratified water and thus the highest densities of phytoplankton are often found on this side of the front (Savidge 1976). Pingree *et al.* (1976) described the pattern of phytoplankton production from the spring through to autumn and found the spring and autumn blooms to parallel the establishment and breakdown of the thermocline. In summer the blooms, situated at the frontal boundaries, required nutrient inputs to develop.

The exact mechanisms for nutrient transfer are still not fully understood but large-scale eddies at the frontal boundary are considered important (Pingree 1978, 1979; Simpson *et al.* 1978). Other implicated processes include temporary stratification in response to the spring-neap tide cycle and diffusion through the thermocline (Pingree 1975). Furthermore, signs of upwelling have frequently been noted on the immediate mixed side of frontal boundaries (Savidge & Foster 1978). On echo-sounders, the pattern of mid-water scattering is often seen to change when passing across fronts. Internal waves on the thermocline are particularly pronounced at the edge of stratified areas and may bring about additional mixing of nutrients. Sonar observations across the Celtic Sea Front often reveal a zone with a particularly intense scattering layer. The horizontal width of this zone approximates to the difference between the tidal excursion on spring and neap tides (Rees & Brander 1986).

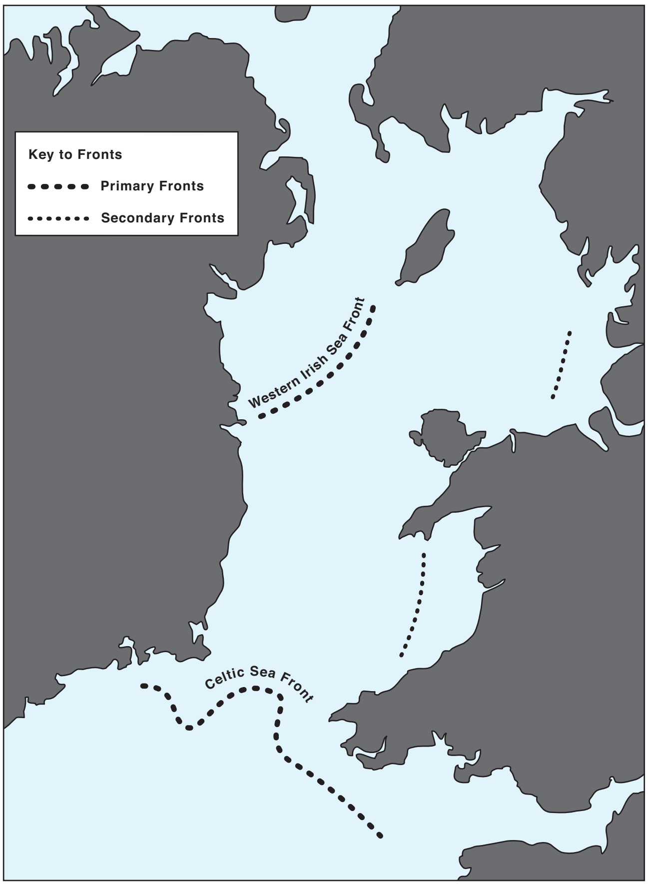


Fig. 4.1: Approximate positions of frontal boundaries in the Irish Sea (Adapted from various sources).

Biological studies in frontal regions have concentrated upon the phytoplankton, but increased zooplankton densities have also been reported (Pingree *et al.* 1974; Floodgate *et al.* 1981). In some cases, enhanced bacterial activity has been noted (Floodgate *et al.* 1981; Fogg 1985), as have congregations of fish and seabirds (Fogg *et al.* 1985; Rees & Tasker 1990).

Despite the complementary nature of these reports, not all studies have shown consistent biological enhancement. For example, Scrope-Howe & Jones (1985) did not find a consistent peak in zooplankton density at the western Irish Sea Front. Further, in a detailed review, Le Fèvre (1986) questioned the validity of the high frontal productivity theory.

Bedforms and Sediments

Seabed sediments throughout the Southern Irish Sea have been mapped by the British Geological Survey (BGS). Most of the present study area is covered by the 1:250 000 sheet entitled “Cardigan Bay” (BGS 1988; see also James & Wingfield 1987), with some station positions located in the areas of the adjacent “Anglesey” and “Lundy” sheets. Some of the data on which the BGS maps were based came from their own geophysical, sidescan and grab surveys, some from Admiralty archives and much from studies by the Geology Department, University of Wales Aberystwyth (Dobson *et al.* 1971). Since sidescan sonar was widely employed the maps indicate where the main areas of sand waves and other mobile sediment features are found as well as classifying the sediments by grain sizes.

Geological History

Over virtually all the bed of the Irish Sea, the underlying rock strata are overlain by substantial deposits of glacial till or outwash gravel and sand. Since relative sealevels were complicated by the isostatic rebound it is unclear as to the extent of glacio-marine deposits or those laid down under freshwater in the deeper depressions of the Irish Sea (Kidson & Tooley 1977; Devoy 1989). Whatever the precise origin of the Pleistocene and early Holocene deposits, it was the erosion of these by the advancing surf zones as relative sealevels rose that largely determined the modern seabed topography and the composition of the sediments. This is particularly so for the bulk of St. George's Channel where sandy gravels contain a lot of cobbles and other lag residues of the earlier coastal erosion. Where tidal currents are particularly strong, the lag forms little more than a veneer over the boulder clay. Indeed, there are areas where the BGS map implies glacial deposits exposed at the bed surface.

Bedforms

From studies of the alignment and shape of sand waves and other features on the seabed Stride (1963, 1974) and Johnson *et al.* (1982) showed that there appeared to be a bed load parting zone across the southern Irish Sea roughly on a line from Bardsey to Wicklow (Fig. 4.2). South of this, residual movement was towards the Celtic Sea while north of it the sands were generally moving towards the main northern Irish Sea basin. Modelling of bottom stress due to tidal movements (Pingree & Griffiths 1979) confirms the sand transport pattern and the asymmetry of the sand waves. However, Harvey (1966) found some abnormally large sand waves within a deep trench in the seabed to the west of Holyhead that had symmetrical profiles.

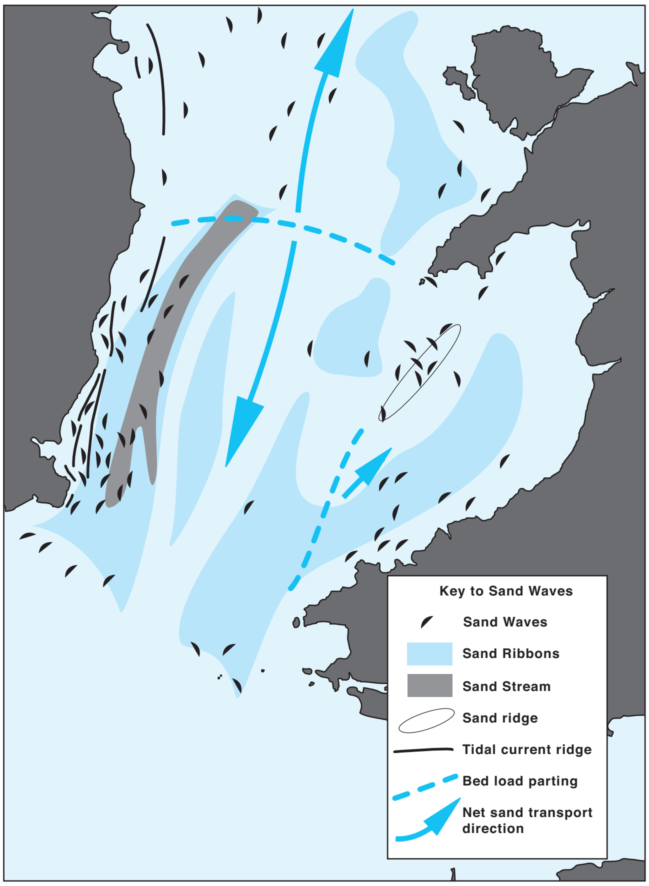


Fig. 4.2: Major sand features and movements in the southern Irish Sea (adapted from various sources).

The BGS maps and that produced by Dobson *et al.* (1971) show that large areas of the central part of St. George's Channel are scoured clear of sand sheets and sand waves, but that sand ribbons do occur quite widely (Fig. 4.2). These must add to the medium scale heterogeneity of this environment. Major sand features are found to either side of the main channel axis. On the Welsh side these superficial features most commonly occur as sand wave fields across the bays, with sand ribbons particularly evident off St. David's Head. The topography of the whole Irish coast from Wexford to Dublin is more complex and is dominated by a major series of linear sand banks lying parallel to the coast.

Observations on Soft Sediments

Photographic examination of the muddy sands and muds from both shallow inshore and deep offshore waters proved remarkably informative.

The apparently similar muddy sands of the shallow 'Gutter' and Tremadog Bay, in Cardigan

Bay, showed distinct differences in structure. In the first bioturbation was very obvious, the seabed being pitted (Plate 3A) with the burrows of decapod crustaceans (*Callianassa* & *Upogebia*). In Tremadog Bay these crustaceans were infrequent, though more animals were in evidence on sediments characteristically coated with films of benthic diatoms (Plate 3B). The diatoms flourish because the bay is sheltered from the swell waves and the water is shallow and tends to be of low turbidity. In the summer, water temperatures here may exceed 20°C (Bowers l991).

In the fine sands (85-100 m), near the edge of the Celtic Deep, current induced rippling was present (Plate 3C). and the large foraminiferid *Astrorhiza limicola* locally common (e.g. Stn. 11). The more cohesive muds of the Celtic Deep proper were smoother, but were conspicuously pitted by the burrows of the Norway Lobster, *Nephrops norvegica* (Plate 3D).

Observations on Gravelly Sediments

Using a combination of remote cameras and anchor dredges, Rees (1993) examined the lag veeneer at depths of 50-70 m northwest of Bardsey (Plate 4A). He found the seabed to be armoured by a cobble pavement with shell fragments, mud and sand embedded between the stones. The stony veneer was thin enough for dredges to bite through into the rigid glacial clay and for burrowing benthic organisms to be living partly in the surface of the clay.

The derivation of the interstitial mud was not determinable. Direct bioturbation from the underlying glacial till, processes akin to filtration by the tidal current shear and biodeposition through the faecal pellets of suspension feeding organisms were all identified as potential or partial sources. ln localised areas where there are fully developed beds of horse mussels (*Modiolus modiolus*) there is no doubt that biodeposits form a major part of the fine fraction of the sediment. The mussels, clumped together with interwoven byssus threads (Plate 4B), shield the seabed from strong tidal currents and enable sediments with unexpectedly high proportions of mud to occur. In slightly less tidally scoured areas *Ophiothrix fragilis* becomes more prevalent and dense congregations of the brittlestar can occur (Plate 4C), sometimes completely covering the sediment surface.

Biodeposition by mussels can be considerable. For example, with *Mytilus edulis*, the biodeposition rate of 5 million mussels on a Spanish raft has been estimated at 1.90kg dry weight per day (Camacho 1991). Mussel biodeposition has likewise been shown to be important in the coastal waters of the Baltic (Kautsky & Evans 1987). It is therefore possible that mussel beds could account for the anomalous mud patches (off Holyhead) in the sediment maps of the lrish Sea Study Group (1990).

In situ observations, using TV cameras, in areas of Liverpool Bay has shown that the dead shells of large bivalves, lying concave side downwards, can also protect the sediment surface from disturbance (Rees 1976). In St. George's Channel, the large and robust shells of *Glycymeris glycymeris* and *Aequipecten opercularis* are particularly frequent, serving in both the direct armouring role and as substrata for sessile epifauna. However, Kaiser & Spencer (1993) have shown that colonies of the soft coral *Alcyonium digitatum* on *Aequipecten* shells off Anglesey were only able to grow to the point where the added tide stress made the shells vulnerable to turning. Shells of *Modiolus modiolus* have been found forming massed accumulations off the Lleyn Peninsula (e.g. Stn. 30). In some of these the shells appeared on photographs to be loose (Plate 4D), but in others the dead shells were closely packed and lying on edge.

Cobbles, living mussels and dead mollusc shells all contribute to the small-scale heterogeneity of the seabed and increase the available niches for the benthic invertebrate fauna. Analysis of photographs from these coarse sediments lends support for a corresponding increase in biodiversity.

Heterogeneity at medium scales can best be appreciated by sonar techniques (Rees 1993). In areas with sand ribbons and perhaps linear grooves, alternations between hard ground and sand biotopes are to be expected, similar to those studied in the English Channel by Holme & Wilson (1985) using camera sledges and sidescan sonar.

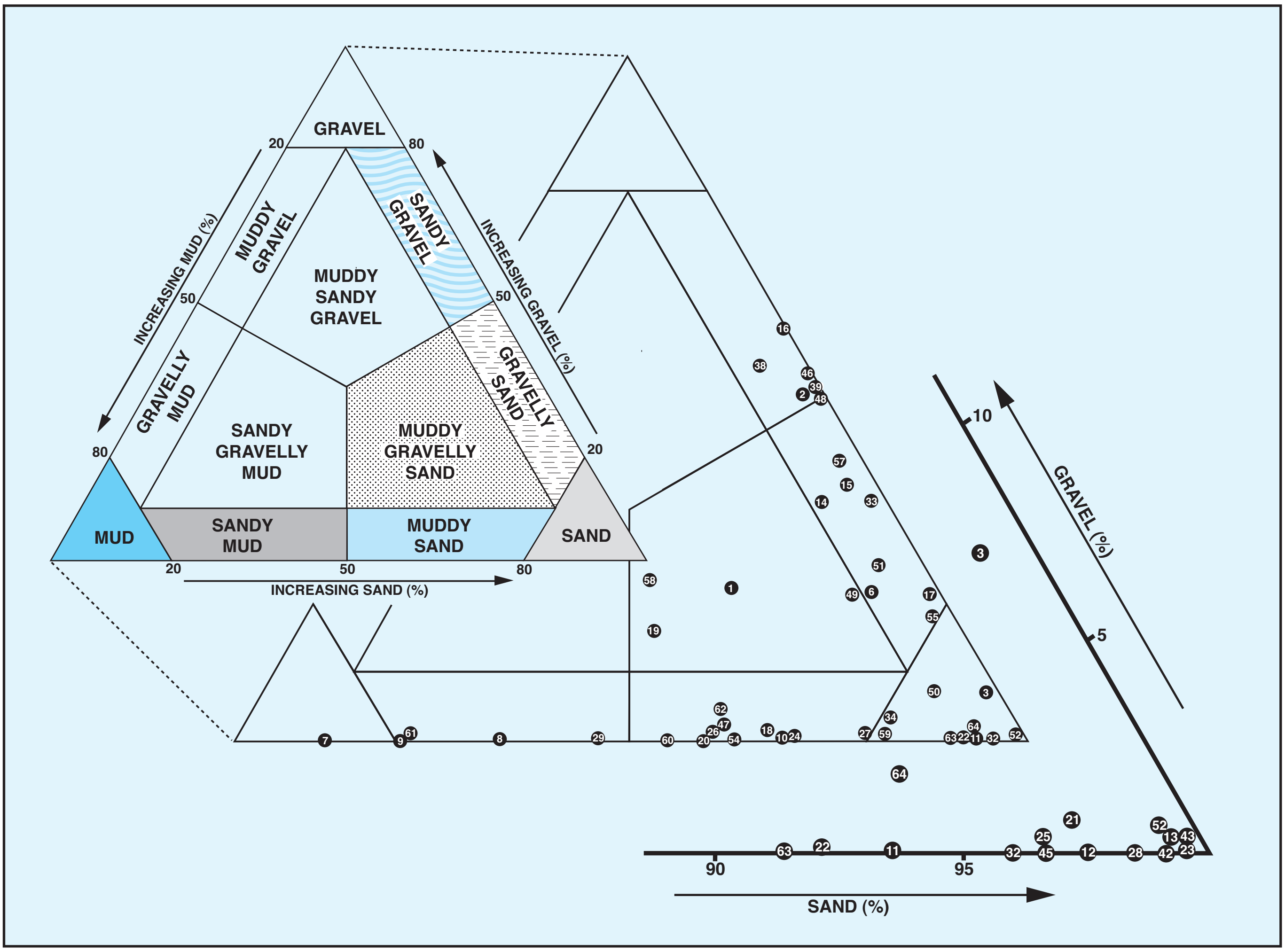


Fig. 4.3: Sediment characterisation trigon for BIOMÔR stations (after Buchanan 1971).

Sediment Characterisation

The composition of the sediment at each station is summarised in Table 4.1. This includes sediment samples from two locations (Stns. 3 & 64) for which only qualitative faunal samples were obtained. Conversely, no sediment sample was collected from the quantitatively sampled station 4.

Using the data on proportions of gravel, sand and mud, the station data has been plotted on a trigon (Fig. 4.3). This was then used to prepare a generalised sediment map of the study area (Fig. 4.4). The sand contours off the coast of Cardigan Bay were modified to indicate the known presence of the morainic sarns. These shallow stony reefs are aligned in a southwesterly direction and project up to 20 km into the bay.

The trigon used here conforms to one presented by Buchanan (1971) rather than the one based on that proposed by Folk (1954) and used on the BGS maps. There are many different ways of subdividing such triangular graphs, however, the geological categorisation was considered to be too biased toward the gravel component. In biological terms, the mud and sand components may be at least as important.

Rees *et al.* (1972) considered the mud to play a crucial role in holding water, filling pore spaces and binding coarser sands and gravel together. Indeed, they believed that measuring mud content by dry weight downplayed its importance and they preferred to use relative mud volume by settlement. The implication of this study was that both very high and very low sediment mud content decreased faunal richness. The enhanced richness of mixed sediments is supported by evidence from the Irish Sea (Jones 1952, 1956; Craig & Jones 1966) and elsewhere (e.g. Mackie *et al.* 1993).

Of course, there is no reason to suppose that the rather arbitrary division levels, used in either trigon scheme, will coincide with the ecotone points between benthic assemblages. For example, during sampling of an abundant '*Amphiura* community' around the Morecambe Gas Field, the same assemblage of species was found across the artificial 50:50 muddy sand to sandy mud division (Rees *et al.* 1986).

In fact, despite the different sediment classifications, the respective sediment maps showed good agreement. The southern Irish Sea area was dominated by sandy gravel, with a distinct south-westerly strip of gravelly sand across the outer part

Stn.	Gravel (%)	Sand(%)	Silt (%)	Clay(%)	Silt / Clay(%)	CO_3(%)	Org(%)	Org. C(%)	Org.N(%)
1	21.40	52.09	12.03	13.96	25.99	22.69	3.04	0.19	0.02
2	50.14	47.11	1.10	1.42	2.52	23.93	1.48	0.11	0.01
3	7	91.84	0.64	0.49	1.13	31.65	0.48	0.14	0.01
6	21.60	69.76	4.85	3.58	8.43	29.36	1.07	0.14	0.01
7	0	11.07	44.76	43.49	88.26	34.56	4.85	1.39	0.14
8	0	33.64	40.79	25.57	66.36	36.70	3.40	0.93	0.10
9	0	20.79	49.33	29.05	78.38	39.88	3.91	1.21	0.12
10	0.01	69.39	19.54	10.63	30.17	38.77	2.67	0.69	0.04
11	0.01	93.54	3.71	2.74	6.45	31.38	1.50	0.21	0.01
12	0.01	97.47	1.07	1.20	2.27	20.43	0.77	0.10	<0.01
13	0.35	98.87	0.19	0.33	0.51	18.74	0.64	0.07	<0.01
14	34.69	57.14	1.61	6.44	8.04	46.38	1.01	0.29	0.03
15	37.09	58.47	1.67	2.41	4.09	40.06	1.19	0.14	0.02
16	59.38	40.26	0.27	0.05	0.32	21.39	1.12	0.06	<0.01
17	21.29	77.32	0.38	0.89	1.27	13.84	0.44	0.10	0.01
18	1.10	67.02	12.76	18.66	31.42	26.89	0.76	0.48	0.03
19	13.61	45.18	21.0	19.70	40.70	20.03	2.39	0.50	0.04
20	0.03	59.30	22.2	18.13	40.33	21.86	2.37	0.42	0.04
21	0.83	96.70	1.39	1.08	2.47	8.49	0.44	0.09	<0.01
22	0.09	92.09	1.72	6.06	7.78	9.49	1.96	0.07	<0.01
23	0.14	99.26	0.18	0.17	0.35	10.95	0.69	0.04	0.05
24	0.02	70.11	19.23	9.71	28.94	18.72	2.79	0.53	0.07
25	0.34	96.46	1.18	1.95	3.13	17.35	2.14	0.12	0.02
26	0.41	59.96	25.32	14.29	39.63	17.22	2.02	0.32	0.03
27	0.48	79.38	9.14	10.65	19.79	11.94	2.92	0.18	0.02
28	0.01	98.48	0.62	0.87	1.49	9.20	0.58	0.06	0.01
29	0.13	46.20	21.41	32.52	53.93	13.35	2.14	0.18	0.02
32	0	95.73	2.99	0.81	3.80	17.09	1.93	0.15	0.02
33	34.85	62.67	1.35	1.03	2.37	20.40	0.72	0.10	0.02
34	3.27	81.18	7.12	7.98	15.10	17.57	2.25	0.30	0.01
38	54.73	39.09	3.94	2.24	6.18	68.06	0.82	0.02	<0.01
39	51.62	48.11	0.09	0.17	0.25	15.37	2.87	0.56	0.08
42	0.04	99.10	0.20	0.66	0.86	9.49	1.49	0.04	<0.01
43	0.37	99.30	0.13	0.20	0.33	8.33	0.73	0.06	0.01
45	0.03	96.67	0.89	2.41	3.30	7.56	1.33	0.14	0.02
46	53.34	46.47	0.09	0.14	0.23	21.33	2.50	0.05	<0.01
47	0.87	59.55	28.86	10.09	38.95	40.00	2.86	0.35	0.03
48	49.40	49.90	0.40	0.18	0.59	29.27	1.37	0.11	0.01
49	21.35	67.50	5.48	5.67	11.15	21.44	3.72	0.21	0.01
50	7.21	84.75	4.25	3.69	7.94	19.20	2.43	0.30	0.02
51	25.31	68.64	3.15	2.68	5.83	16.24	0.89	0.20	0.01
52	0.61	98.71	0.10	0.53	0.63	9.29	0.39	0.04	<0.01
54	0.02	62.94	4.03	33.39	37.42	7.46	0.68	0.04	<0.01
55	17.82	79.50	1.43	1.21	2.65	16.65	0.85	0.09	0.01
57	40.94	56.31	1.27	1.37	2.64	26.30	1.17	0.13	<0.01
58	22.81	41.28	16.14	20.19	36.33	33.71	1.34	0.15	0.01
59	0.26	81.88	8.89	8.38	17.26	28.61	1.81	0.21	<0.01
60	0	54.50	28.45	16.87	45.32	35.50	2.66	0.39	0.03
61	0.11	21.19	39.78	38.92	78.70	37.35	7.46	1.01	0.09
62	4.62	59.07	9.10	26.79	35.89	32.94	4.31	0.66	0.07
63	0	91.37	7.43	1.21	8.63	18.94	1.23	0.15	<0.01
64	1.82	92.75	2.03	3.36	5.39	20.57	1.54	0.12	0.02

Table 4.1: Composition of sediments for each quantitative sampling station for both 1989 and 1991 programmes.

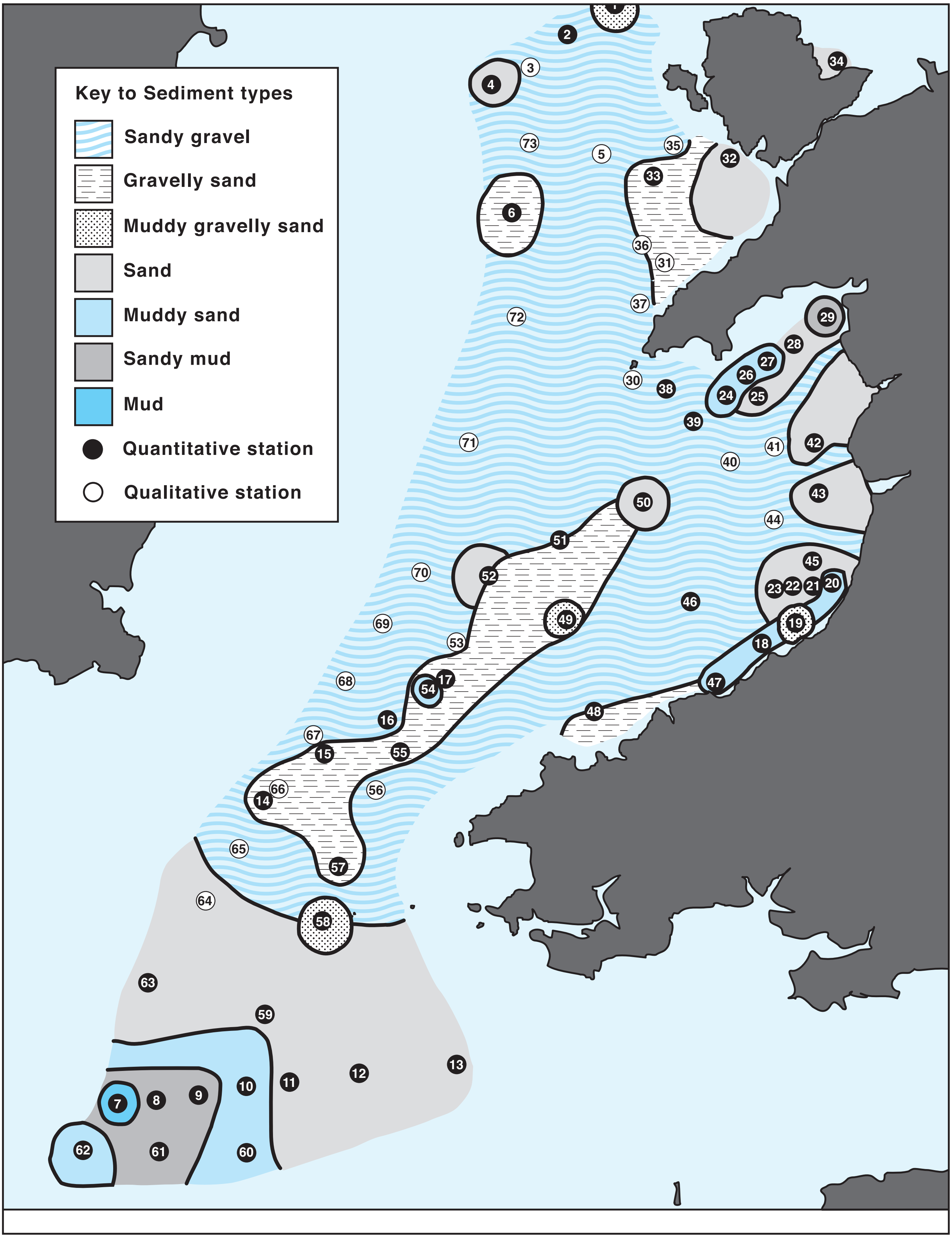


Fig. 4.4: Distribution of sediments in the southern Irish Sea based on BIOMÔR data.

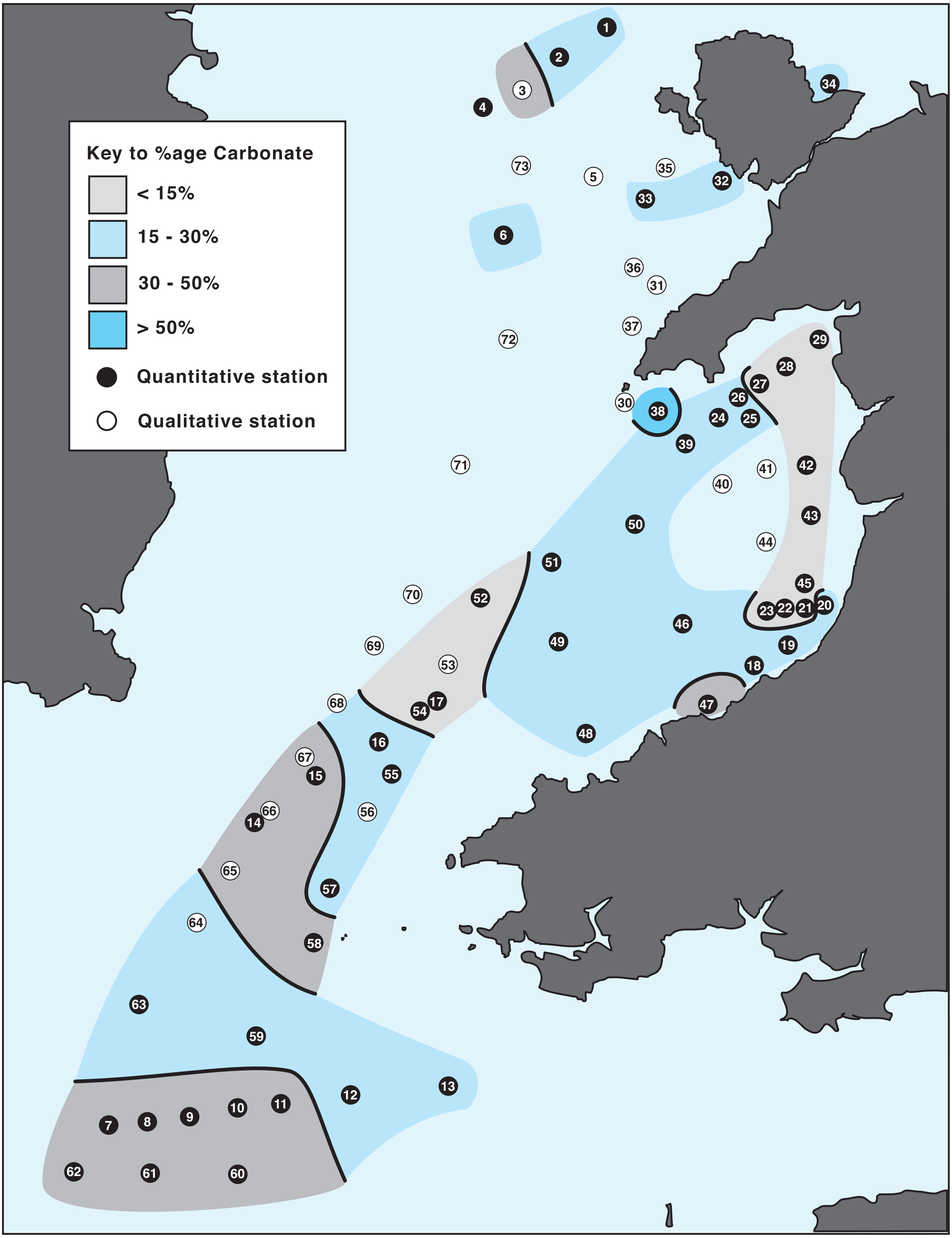


Fig. 4.5: Carbonate distribution in the southern Irish Sea from BIOMÔR data.

of Cardigan Bay. Gravelly sand similarly occurred off the Lleyn Peninsula and across the outer part of Caernarfon Bay. In Cardigan Bay the sands and muddy sands were largely distributed along the inshore margins. According to James & Wingfield (1987) the mean grain size of the sand component of St. George's Channel/Cardigan Bay sediments decreases towards the coast. Other sand patches were found in the inner part of Caernarfon Bay, at the mouth of the Bristol Channel and sporadically throughout the offshore gravels.

Where St. George's Channel widens out into the Celtic Sea, tidal turbulence decreases over quite a short distance permitting both thermal stratification of the water and the deposition of finer deposits. Thus in mid-channel to the west of Ramsey and the Smalls there is a rapid transition from sediments with a significant lag gravel component to sand, muddy sands and finally to cohesive sandy muds and mud in which large decapod crustaceans such as *Nephrops norvegicus* can construct semi-permanent burrows.

The carbonate content of the sediments had a somewhat varied distribution (Fig. 4.5). In general the lowest values were found associated with the sandier sediments, particularly those found in the shallower parts of Cardigan Bay. A notably high concentration (68%) was found southeast of Bardsey (Stn. 38), while moderately high levels occurred off Aberporth (Stn. 47), between Pembrokeshire and Ireland and in the Celtic Deep area. Although dead mollusc shells were the most visible source of carbonate (Table 3.1; Appendix 1), particularly in the offshore coarse sediments, other organisms can also contribute significant amounts.

The carbonate levels of the muddy areas of Cardigan Bay have been found to be higher than the nearby sands (James & Wingfield 1987). This was explained by the recognition that these areas act as sinks for dead foraminiferid tests (Atkinson 1971) and shell fragments. Dobson *et al.* (1971) examined the composition of the calcareous components of the southern Irish Sea sediments and found the most important sources to be bivalves, barnacles, bryozoans, gastropods, urchins and brittlestars. These workers recorded their highest carbonate levels (up to 72%) from the central part of St. George's Channel, an area not quantitatively investigated in this study. It is therefore likely that the Celtic Deep accumulates calcareous debris from the coarser sediments of the area, and significant contributions from foraminiferids and ostracods may be expected.

Selective advection by landward residual flows, aided by cyclic resuspension, has been shown by Rees *et al.* (1976) to be responsible for the presence of detritus enriched sediments in nearshore pockets in Liverpool Bay. Although there is less data on nearbed residual advection in Cardigan Bay, the foraminiferid data suggests the muddy sediments of the 'Gutter' may similarly receive more organic detritus than could be accounted for by the primary production of the immediate area (but see below). In the other major muddy sand part of Cardigan Bay, Tremadog Bay, the benthic diatoms present must add to the biodegradable carbon available to the benthic fauna. Higher organic carbon concentrations were indeed found in these areas (Fig. 4.6), though the highest levels were to be found in the offshore muddy sediments of the Celtic Deep.

The muddy Celtic Deep marks the southern end of a sharp depositional gradient normal to the axis of the tidal current. Moreover, it is on the stratified side of the Celtic Sea frontal boundary. As such it could be anticipated that the area would receive large detrital inputs and enriched benthic assemblages might develop. For example, an unusual and enriched fauna has been found in similar hydrographic circumstances in the northwestern Irish Sea, just north of Dublin (Holme & Rees 1986; Rees & Holme 1988). The factors involved in promoting a somewhat comparable situation in the southern North Sea were studied by Creutzberg *et al.* (1984) and Creutzberg (1985). Perhaps surprisingly, the high benthic biomass observed was attributed to the relocation of organic matter from nearby turbulent areas rather than to the higher productivity associated with the front.

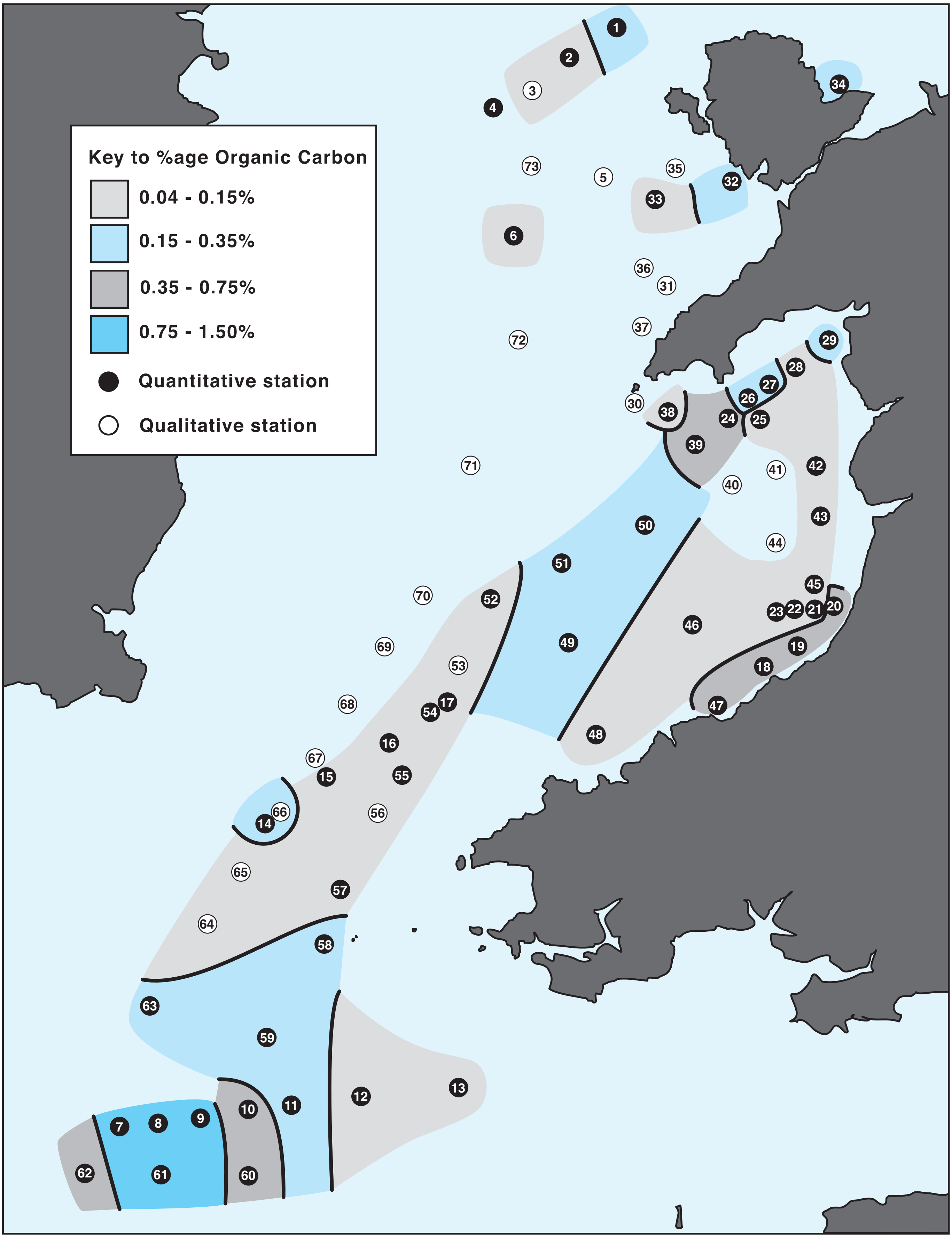


Fig. 4.6: Distribution of organic carbon in the southern Irish Sea from BIOMÔR data.

It should be noted that, despite having a generally higher mud content, the Celtic Deep sediments contained, at most, only one third of the carbon found in the North Sea study. The sandy sediments of the BIOMÔR study area likewise possessed relatively less carbon, their levels being more comparable to those recorded from like sediments off Carnsore Point (Keegan *et al.* 1987).

The organic content of sediments is commonly found to be positively correlated with the amount of silt-clay present. This has been attributed to the similar settling velocities of the respective constituent particles (e.g. Hartnoll 1983). In addition, colloidal and dissolved organic matter can adsorb to both inorganic and organic particles with the smaller fractions, having the larger surface areas, being most important (Lenz 1972; Sharp 1973). Suspension feeding invertebrates also help increase the organic content of sediments through the biodeposition of undigested refractile substances. The overall distribution of organic matter within the sediment is further modified by bioturbation due to the activities of deposit feeders and actively burrowing animals, by bacterial remineralisation, and by resuspension processes (see Steele & Baird 1972; Pearson & Rosenberg 1978; Deuser 1979; Wassmann 1984).

An examination of the relationship between silt-clay and organic carbon, in the BIOMÔR study area, produced some interesting findings. A positive association (Fig. 4.7) was found, though the correlation coefficient (r = 0.842; p<0.0001) was not particularly high in comparison with findings from other areas (e.g. Creutzberg *et al.* 1984; pers. obs.). Examination of the data revealed this to be due to inclusion of four ‘anomalous’ stations (Stns, 29, 39, 54 & 58). In relative terms, station 39 had an unusually high carbon content, whereas the others had surprisingly low carbon levels. Omission of these stations from the analysis produced an even stronger correlation (r = 0.943; p<0.0001) between the two variables.

The reasons for the non-conformity of these stations cannot be determined here and, in any case, these undoubtedly differ for each location. For example, station 54 was known to possess a very impoverished fauna, the composition of which appeared indicative of an area subject to severe physical disturbance. The sediment there was unusual, being composed of sand with a very high clay content. It is likely therefore that this was derived from the boulder clay known to be present in St. George’s Channel, rather than from deposition from the water column, hence explaining the low carbon content. This is, however, an unlikely explanation for the inshore Tremadog Bay locality (Stn. 29). Indeed, in general, organic carbon levels in the muddier Cardigan Bay sediments appeared slightly lower than might have been anticipated (see also Fig. 4.6).

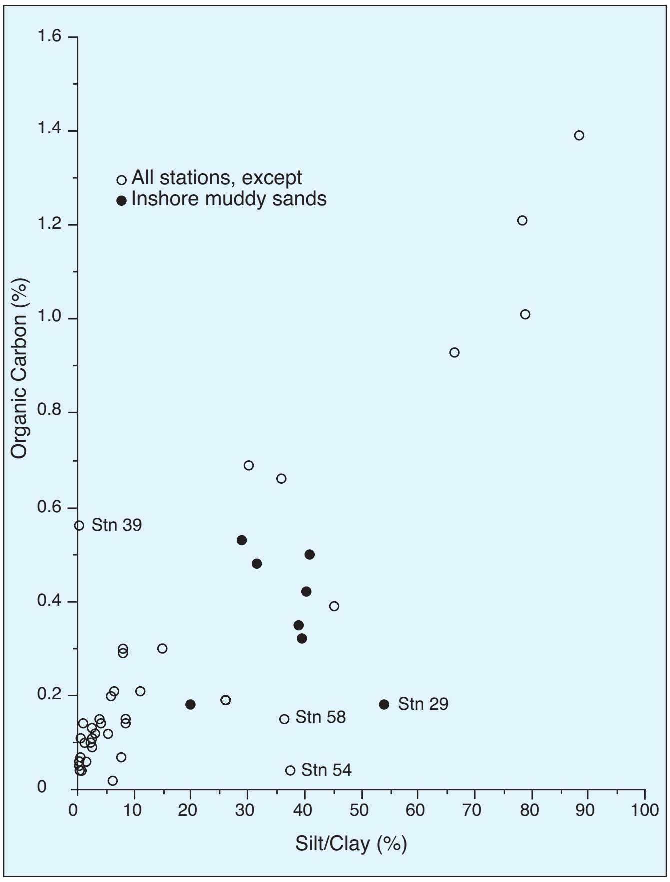


Fig. 4.7: Relationship between organic carbon and silt/clay.

5. Benthic Macrofauna

The southern Irish Sea and its approaches were found to have a very rich benthic fauna, with over 1030 macrofaunal species recorded from the 73 stations (Table 5.1). Of this total, 80% could be considered infaunal and 20% epifaunal. The infaunal macrofauna, however, included certain semi-epifaunal forms such as some echinoderms, molluscs and crustacea.

Taxonomic Group	Number of taxa
Infauna	
Annelida	379
Mollusca	162
Crustacea	211
Copepoda (Associates)	11
Pycnogonida	10
Arachnida (Acari)	4
Echinodermata	37
Sipuncula	6
Phoronida	4
OTHERS	10
Epifauna	
Porifera	43
Hydrozoa	44
Anthozoa	25
Bryozoa	75
Tunicata	24
TOTAL	**1045**

Table 5.1: Taxonomic composition of the benthic invertebrate fauna of the southern Irish Sea area.

The annelids dominated the fauna, comprising over one third of the total species encountered and 45% of the infauna alone. The second and third largest groups were the Crustacea and Mollusca which respectively accounted for 20% and 16% of the total. The Bryozoa were the dominant epifaunal group, accounting for over a third of such taxa and 7% of the overall total.

For the quantitative grab samples, the Annelida accounted for 49% of the species and 55% of the individuals. Such dominance is typical of offshore benthic habitats on the continental shelf of northeastern Europe (pers. obs.). The species value was very similar to those from off the Isle of Man (Southward 1957) and from various North Sea locations. The numerical contribution was, however, noticeably lower compared to the North Sea. This was due to some large abundances among other faunal groups, particularly the Mollusca. Indeed, the Mollusca were numerically dominant at stations 10, 13, 23, 42 and 54.

Two taxonomic groups, the copepod associates and the halicarid mites, were included in the systematic species list (Appendix 2) but, as they were undoubtedly undersampled, were not used in any of the data analyses. Additional groups, such as the nematodes, benthic copepods and ostracods were also infrequent in the 0.5 mm sievings. These were considered meiofaunal and therefore excluded from this macrofaunal study.

The full data from the quantitative and qualitative samples are detailed in Appendices 3 and 4. The following faunistic accounts were prepared by their acknowledged authors.

5.1 Annelida

Andrew S. Y. Mackie & Peter R. Garwood

Introduction

The Annelida were the largest component of the southern Irish Sea benthic fauna, with the Polychaeta the dominant class with 373 species. As the total number of polychaete species in British waters has been estimated at 900-950 (Mackie 1992), the BIOMÔR survey area can be considered to possess a very rich polychaete fauna. The remaining annelids comprised five oligochaete taxa and one leech. However, the number of oligochaete species recorded would certainly have been somewhat higher had greater taxonomic discrimination been possible.

It is beyond the scope of this publication to provide an account of each polychaete species encountered. Attention here has been given to observations which may prove helpful to other workers, though more detailed studies (particularly concerning taxonomy) are already underway and will be published elsewhere. Thus, one paper involving the re-establishment of one long synonymised species, *Melinna elisabethae* McIntosh, 1885 (Fig. 5.1 A & B), will soon appear (Mackie & Pleijel, *in press*). Identification of the BIOMÔR Polychaeta was carried out by the authors. With only a few exceptions, the Syllidae, Nereidae, Nephtyidae, Cirratulidae and Capitellidae were identified by Dr. Peter Garwood, the remainder being the responsibility of Andrew Mackie. The authors gratefully acknowledge Drs. Phyllis and Wyn Knight-Jones for their opinions on certain sabellids, and for identifying most serpulids and spirorbids. Dr. Fredrik Pleijel kindly offered advice concerning several phyllodocid and hesionid specimens.

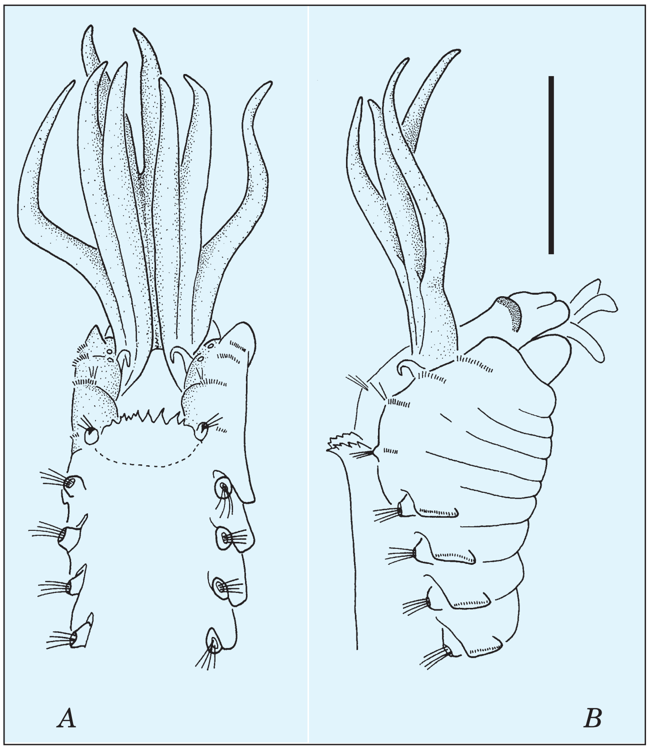


Fig. 5.1; Anterior dorsal (A) and lateral (B) view of Melinna elisabethae. *Scale bar = 1mm (from Mackie & Pleijel, in press).*

Historical Aspects

Studies on the annelid fauna of the Irish Sea have historically been somewhat sporadic and were generally limited in scope. Johnston (1840a, 1840b, 1845) described a number of polychaetes collected by the eminent Irish naturalists of the day, including William Thompson, James Drummond, George Hyndman and Robert Ball. The species described included *Spinther oniscoides* and *Nereis longissima*. Additional publications of note covered the polychaetes of Liverpool Bay (Carrington 1865), of Anglesey, Liverpool Bay and the Isle of Man (Gibson 1896; Hornell 1891), of Dublin Bay (Southern 1910) and a variety of Irish localities (McIntosh 1897).

Other works were restricted to single families or small groups of species. Thus Williams (1864) and Baird (1865) respectively described a chaetopterid and polynoid from Anglesey, and Arwidsson (1911) gave an account of some Irish maldanids. As part of the Liverpool Marine Biological Committee's *L.M.B.C. Memoirs on Typical British Marine Plants and Animals* series, Gravely (1909) described the polychaete larvae of Port Erin, Fordham (1925) produced a detailed study of the sea-mouse *Aphrodita aculeata,* and Thomas (1940) gave an account of *Amphitrite johnstoni*, *Sabella pavonina* and *Pomatoceros triqueter*.

In more recent times, Knight-Jones & Walker (1985) described two new sabellids (*Demonax cambrensis* & *D. torulis*) from Liverpool Bay, while Walker (1972) and Chambers (1989) recorded species (*Goniadella gracilis* and *Leucia nivea*) new to British waters. Autecological publications include an account (Nicolaidou 1983) of the life history and production of the *Lagis koreni*, a pectinariid common in the Irish Sea.

The most comprehensive studies to date were carried out by Southward (1955, 1956, 1957) and examined the polychaetes of the Isle of Man. In the main taxonomic account (Southward 1956), she added 89 species to the 191 already known from the area and introduced two new species *(Aricidea minuta* & *Phisidia aurea*). The 16 species that were also new records for British waters as a whole were discussed in her earlier publication. As a complement to the earlier general benthic investigations of Jones (1951), her third paper detailed the quantitative and qualitative distributions of the species to the southwest of the island. A classified and annotated list of polychaetes recorded from the Isle of Man was provided by Bruce *et al.* (1963).

For the southern Irish Sea, the largest published study to date listed 104 polychaete species from off Carnsore Point (Keegan *et al.* 1987). There have also been several publications from nearby areas that have relevance to the BIOMÔR study area. One major survey of the Celtic Sea (Hartley

& Dicks 1977) included some stations in the southern part of St. George's Channel. A total of 113 polychaete taxa were recorded, but unfortunately many were only preliminary identifications and no subsequent refinement was published. Further to the south, the deep-water polychaetes from beyond the continental shelf were catalogued by Amoureux (1977, 1982a, 1982b). Perhaps of more direct importance, two new species (*Scalibregma celticum* Mackie, 1991 and *Chaetozone gibber* Woodham & Chambers, 1994) have recently been described from the shallow waters of Milford Haven.

Taxonomy and Identification

In the nineteenth and early twentieth centuries the voluminous works of Claparède, Ehlers, Grube, Langerhans, McIntosh, Quatrefages, Saint-Joseph and Sars, among others, laid the considerable foundations of north European polychaete taxonomy. Monographs by McIntosh (1900, 1908, 1910, 1915, 1922, 1923) and Fauvel (1923, 1927) consolidated matters, but ironically helped slow taxonomic research in the region. Fauvel's monographs were (and still are) standard texts and the most recent 'replacement' (Hartmann-Schröder 1971) was published nearly 25 years ago.

The last 10-15 years, coinciding with increased benthic monitoring, have seen an upsurge in polychaete taxonomy. New identification manuals and reviews (e.g. in the *Marine Invertebrates of Scandinavia* and *Synopses of the British Fauna* series) have been produced and descriptions of new species published.

Literature

The literature consulted during the identification of the BIOMÔR polychaetes was considerable, there being no 'complete' taxonomic work available. Key works used included Day (1967a, 1967b), Fauchald (1977), Fauvel (1923, 1927), George & Hartmann-Schröder (1985), Hartmann-Schröder (1971), Holthe (1986), Pleijel (1993), Pleijel & Dales (1991). The 'Clare Island Survey' report of Southern (1914) proved particularly useful, with 12 of the 16 species originally described therein also being found in the southern Irish Sea area.

Numerous small papers were consulted and some are cited in the following text. Nevertheless, a considerable number of problem or potentially new species were encountered. These were identified to the most precise level possible with respect to our knowledge and experience, and no attempt was made to 'fit' them to published names. For the purposes of the overall BIOMÔR study, priority was given to the separation of taxa. A full classified species list with authorities is given in Appendix 2.

Problem Taxa

Species of certain genera, belonging to a number of polychaete families (e.g. Polynoidae, Phyllodocidae, Syllidae, Dorvilleidae, Cirratulidae), are renowned for being difficult to identify. Often this simply reflects the inadequacies of their published descriptions and after studied revision the identification problems often disappear. For example, *Phyllodoce maculata* and *P. mucosa* were for years difficult to separate, however, following a revision (Pleijel 1988) of *Phyllodoce* the differences between the two became clear.

In this study, taxa considered in need of revision included syllids of the genera *Syllis* and *Autolytus,* most dorvilleid genera (*Ophryotrocha, Parougia, Schistomeringos, Ougia*), several spionid genera (*Spio*, *Microspio, Scolelepis*), the scalibregmatid genus *Asclerocheilus*, the capitellid genus *Notomastus*, the ampharetid genus *Ampharete,* the terebellid genus *Polycirrus* and the sabellid genus *Chone.* Some relatively infrequent species proved difficult since little information was available concerning intraspecific variation (e.g. the form of the unpaired buccal process in species of *Arabella* and *Drilonereis*). Hence, the significance of observed differences relative to published descriptions could not be determined.

Among other 'troublesome' species were *Sphaerosyllis hystrix, Lumbrineris scopa,* and *Loimia* sp. Until relatively recently, the first was regarded as a distinctive and readily recognised species. However, since Perkins (1980) described several related species (*S. magnidentata*, *S. taylori*), taxonomists have examined their specimens more closely. The present material had more segments and appeared more dorsoventrally flattened than usual, and could represent an undescribed species.

Lumbrineris scopa was separated into two subspecies, *L. scopa scopa* and *L. scopa aequilobata*, by Winsnes (1981), the two being primarily distinguished by the presence of elongated pre- and post-acicular lobes in the posterior region of the latter. Whole specimens of the present material were predominantly Winsnes's subspecies, however, a few appeared to correspond with Fauchald's stem species and fragmented specimens could not be assigned to either. No study has been made of the effect posterior regeneration might have on the development of the elongated parapodial lobes which are localised to a relatively small number of the posteriormost setigers. Such regeneration was observed on a number of specimens and, from these, it was thought possible that the presence of elongated lobes could in fact be the 'normal' condition. If, following a loss of the tail region, these only re-appeared slowly or failed to develop then specimens corresponding to *L. scopa scopa* would result. This is of course unproven but, for the purposes of this study, all specimens have been referred to *L. scopa* Fauchald, 1974.

The terebellid, *Loimia* sp., was superficially similar to *Lanice conchilega* with which it sometimes co-occurred. Nevertheless, the two can be distinguished by reference to the configuration of their thoracic glandular shields. They also differed in the form of their thoracic uncini, the major character distinguishing their respective genera.

Species difficult to identify because they had fragmented and their particular taxonomic characters were either missing or the separate fragments could not be matched, included certain cirratulids, most polynoid scaleworms and the apistobranchids. The Maldanidae presented similar problems but, where possible, species were identified by matching heads and tails with whole specimens of confirmed identity. A further complication with these was the high frequency of anterior or posterior (sometimes both) regeneration, presumably as a result of predation. Hence, for example, a common species such as *Praxillella affinis* may have been overestimated and other less frequent species of *Praxillella* overlooked. The two species of *Clymenura* were often only quantified by reference to their different pygidia.

A typical example of damage-induced identification difficulty was presented by *Jasmineira caudata* and *J. elegans*. These two small and very similar sabellids are separated, in identification keys, by the presence of a delicate caudal cirrus in the former. Nevertheless, it was found that acaudate specimens could be identified by examination of the Rose Bengal staining patterns of their abdominal glandular pads. The inner and upper margins of the pads stained brighter than the surrounding tissue in *J. elegans*, but this did not occur in *J. caudata*.

Despite recent publications (Eibye-Jacobsen 1987, 1991; Pleijel 1993; Pleijel & Dales 1991), the genus *Eumida* remained a problem. Several 'large' specimens could not be assigned to any of the recognised north European species and juveniles of all the species proved difficult due to possible confusion with the small *E. ockelmanni*.

Juvenile Specimens

Due to their small size and frequent under-development (or lack) of adult morphological features, juveniles present particular difficulties in quantitative benthic investigations. Where possible juvenile specimens have been enumerated with the adults of their species, though in some cases this proved impossible (e.g. polynoid scaleworms) within the time-scale of this study. To rectify this situation more intensive morphological examinations would have been necessary, and even then may have been unsuccessful.

Nevertheless, it was possible to separate some numerically important species. The two pectinariids, *Amphictene auricoma* and *Lagis koreni*, were prime examples. Juveniles of both were common, though adults of *A. auricoma* were infrequent compared to *L. koreni*. As adults, the two species are readily separable by the form of the anterior dorsal brim; serrated in *A. auricoma* and smooth in *L. koreni*. However, 'small' examples of *A. auricoma* were found to possess only slightly serrate brims and the smallest juveniles had smooth rims. Though difficult, and undoubtedly some errors were made, juveniles were distinguished by the lateral separation (*A. auricoma*) or fusion (*L. koreni*) of the tentacular membrane with the dorsal brim.

Juvenile specimens of *Thelepus cincinnatus* and *T. setosus* were unexpectedly found to possess notosetae on segment II (first branchiate segment). Consequently, using standard identification keys (e.g. Holthe 1986) they would have been identified as species of *Streblosoma* rather than *Thelepus*. Close examination showed that these notosetae, arising at the lower posterior side of each branchial group, were very fine, few in number and not associated with any obvious notopodia. Furthermore, consideration of a range of specimen sizes indicated that they were a temporary feature confined to the smallest individuals.

In the Sabellidae it was noted that small specimens of *Sabella pavonina* had very few thoracic companion setae. Indeed, in the smallest juveniles there was only a single companion seta per neuropodial torus and this was often easily overlooked. As the presence or absence of companion setae is an important character distinguishing genera in the Sabellinae, this emphasises the care needed when identifying small specimens.

Potential New Species

In addition to the possibility of new species being found among the problem taxa listed above, a quite considerable number of species were positively recognised as being potentially undescribed. These included *Eulalia* sp., *Ehlersia* sp. A, *Opisthodonta* sp., *Sphaerosyllis* sp. A, *Kefersteinia* sp., *Nephtys* sp. A, *Scoloplos* sp., *Paradoneis* sp. *Levinsenia* sp., Spionidae gen. A, Spionidae gen B, *Scolelepis* sp., *Parascolelepis* sp., *Prionospio* sp., *Magelona* sp. A or B, *Chaetozone* spp., *Diplocirrus* sp., *Euclymene* sp., *Pista* sp., *Polycirrus* sp. A, *?Pseudofabricia* sp., *Bushiella* sp. and *Neodexiospira* sp.

More detailed study and a thorough search through polychaete scientific literature will be necessary before these can be named. Some may eventually prove to be previously described species which have, over the years, become forgotten or been erroneously placed in synonymy with other species. Nevertheless, work is currently underway (Mackie, in prep.) describing Spionidae gen. A and Spionidae gen B. These two spionids from Cardigan Bay are closely related to *Atherospio disticha* (Fig. 5.2), originally described from a Scottish sea loch (Mackie & Duff 1986) but newly found in the Celtic Deep (Stns. 7, 8 & 61) and off the Swedish west coast (mud; 50 m), in the Kattegat (Susan Smith, pers. comm.). Spionidae gen. B is morphologically similar to a species (*Polydora guillei* Laubier & Ramos, 1974) described from the Mediterranean Sea. The two BIOMÔR species, together with *Atherospio, Pygospiopsis* Blake, 1983, and *Pseudatherospio* Lovell, 1994, form a distinct group within the Spionidae. A phylogenetic analysis of spionid genera is also underway (Sigvaldadóttir, Mackie & Pleijel, in prep.).

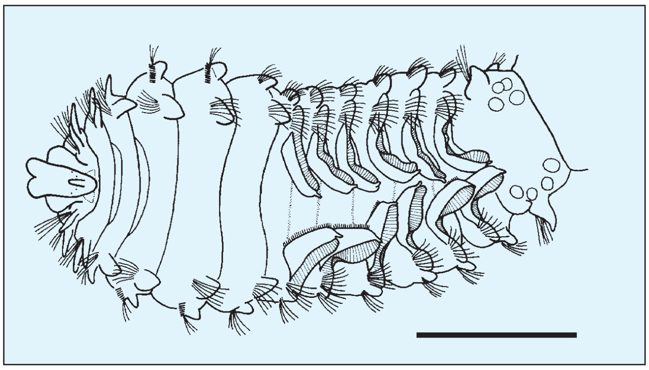


Fig. 5.2: Anterior dorsal view of Atherospio disticha. Scale bar = 1mm. (from Mackie & Duff 1986)

Space prohibits detailed accounts of all the species, though a few notes can be given. The phyllodocid *Eulalia* sp. is very similar to *E. mustela* Pleijel, 1987, a species common in the offshore gravelly sediments of the Irish Sea. Of the syllids, *Opisthodonta* sp. has distinctive phyllodociform ventral cirri, while *Sphaerosyllis* sp. A has characteristically large globular papillae on the posterior dorsum. The nephtyid *Nephtys* sp. A has branchiae from setiger 5 and poorly developed postsetal lamellae.

In the Paraonidae, *Paradoneis* sp. has only a few short branchiae and posseses acicular lyriform notosetae similar to those of *P.* cf. *ilvana* (see below), while *Levinsenia* sp. is more slender than *L. gracilis* and has more elongate branchiae. The latter has also been found in the Firth of Clyde (Myles O'Reilly, pers. comm.).

In the Spionidae, *Parascolelepis* sp. needs to be assessed in relation to the species recently described by Sikorski (1994). *Prionospio* sp. (Fig. 5.3) was previously assigned (Mackie 1984) to *P. multibranchiata* Berkeley, 1927, but recent re-collection (Mackie) of the Canadian species has confirmed their separate identities.

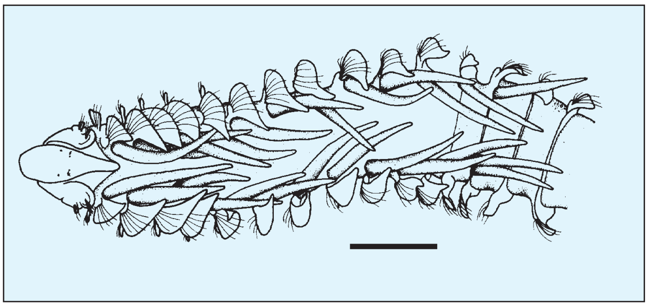


Fig. 5.3: Anterior dorsal view of Prionospio *sp. Scale bar = 0.5mm (from Mackie 1983)*

North European magelonid polychaetes have received considerable attention (Glémarec 1966; Wilson 1958, 1959) but the oldest species in the region, *Magelona mirabilis* (Johnston, 1865), has long been in need of redescription. Until the revision of Jones (1977) this species had been compounded with *M. papillicornis* Müller, 1858 from Brazil. Since then, it has become clear (Jones, pers. comm.; Mackie, pers. obs.) that two morphologically similar species were accommodated by European descriptions (Fauvel 1927; Hartmann-Schröder 1971) of *M. mirabilis* (as *M. papillicornis*). Both species, here temporarily designated *Magelona* sp. A and *Magelona* sp. B, were encountered in the present survey, though the latter was rare. They can be distinguished by the presence *(Magelona* sp. A) or absence *(Magelona* sp. B) of superior notopodial cirri on posterior thoracic setigers and lateral pouches between setigers 10 and 11.

The flabelligerid, *Diplocirrus* sp. has an epidermis evenly covered in small circular papillae and is perhaps the same species noted (as Chlorhaemidae sp. 448) by Hartley & Dicks (1977). In the Terebellidae, *Pista* sp. is similar to *P. cristata* and is possibly that referred to by Banse (1980) as *Pista* sp. III. The small *Polycirrus* sp. A is very distinctive, having a tesselate epidermis and a conspicuously large tentacular lobe.

The two specimens of *Bushiella* from St. George's Channel, off St. David's Head (Stn. 16) are of particular interest, representing the first European record for this spirorbid genus. The other potentially new spirorbid, *Neodexiospira* sp., appears intermediate between *N. brasiliensis* and *N. foraminosus*.

Taxonomic Remarks

Several species (e.g. *Paradoneis* cf. *ilvana, Aricidea* cf. *philbinae* & *Peresiella* cf. *clymenoides)* were only tentatively identified due to small discrepancies between their morphologies and respective published descriptions. For the two paraonids, *P. ilvana* was originally illustrated (Castelli 1985: fig. 4A) as having anterior interramal papillae and, uniquely, *A. philbinae* was described (Brown 1976) having small post-branchial papillae. Neither of these features were observed in the present material. The capitellid *Peresiella clymenoides* was so named (Harmelin 1968) in acknowledgement of its maldanid-like head region, but this was not observed either.

The significance of these small differences cannot be determined without detailed comparative examination of type or topotypic material. In the case of *P. clymenoides*, some degree of variation in the morphology of the head has been recorded in both Mediterranean (type locality) and southern Irish specimens (Dineen 1982). Further reservations concerning the identity of the paraonids arise because their inclusion in British faunal lists would represent substantial increases to their geographical ranges. Castelli's species was previously known from the Mediterranean, while *A. philbinae* has only been recorded from Florida and the Gulf of Mexico (Brown 1976; Gaston 1984). Furthermore, the latter occurred in intertidal to shallow (30 m) fine sands and muddy sands, whereas the Irish Sea material was characteristically found in the offshore gravels (45-170 m).

Spio multioculata Rioja, 1918 was another species identified with some doubt. The two anterior fragments from off St. David's Head (Stns. 17

& 66) agreed well with published descriptions, however, a similarity with the genus *Marenzelleria* was recognised. Examination of the posterior region for absence or presence of notopodial hooks would be necessary to confirm the correct generic assignation of these specimens.

Mackie (1984) published a redescription of *Prionospio cirrifera* Wirén, 1883 and noted some variability in the number of branchiae and occurrence of interparapodial pouches. His figured specimen and all northern North Sea material with six pairs of branchiae, and often possessing pouches, approach *P. aluta* Maciolek, 1985. The BIOMÔR specimens all conformed to Mackie's 'inshore' form in possessing only five branchial pairs and always lacking pouches. The relationship between these specimens and Wirén's arctic *P. cirrifera*, which has six pairs of branchiae and no pouches remains unresolved.

Some large specimens of *Scalibregma celticum* Mackie, 1991 (Fig. 5.4 A & B) from station 5 appeared aberrant, having only three pairs of branchiae from setiger 3, rather than the normal four pairs from setiger 2 (Fig. 5.4A). Though unusual for adult *S. celticum*, this branchial arrangement is typical of *S. stenocerum* (Bertelsen & Weston, 1980) from Florida. This possible introduction of an American species into British waters requires further study.

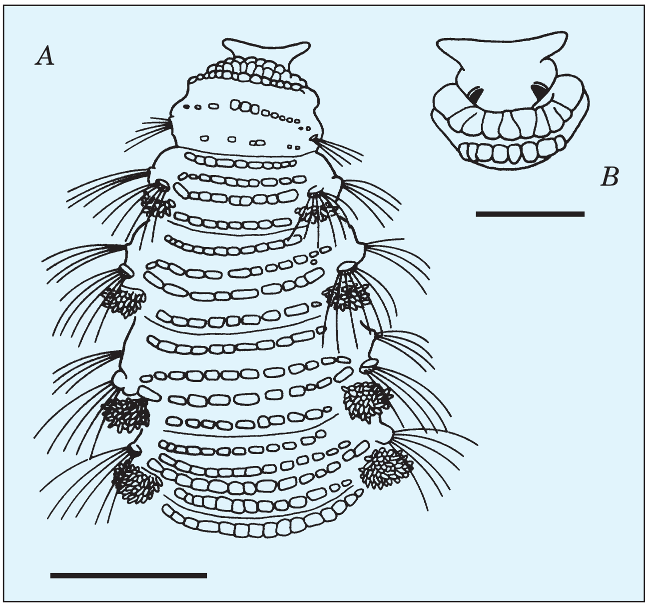


Fig. 5.4: Anterior dorsal (A) and head (B) view of Scalibregma celticum. *Scale bars = 1mm (Fig. A), 0.5mm (Fig. B). (from Mackie 1991b).*

Three species, *Nereis elitoralis* Eliason, 1962, *Notoproctus* sp., and *Lysilla nivea* Langerhans, 1884 were of interest from taxonomic and zoogeographical viewpoints. The discovery of both *N. elitoralis* and *N. longissima* in the study area enabled confirmation of their separate identities. Contrary to the conclusion of Chambers & Garwood (1992), the relative length of the dorsal cirri was a distinguishing feature between the two. Furthermore, adult specimens of *N. elitoralis* had no dorsal supra-acicular ligule on the parapodia of the first three setigers. In nereids these are usually only lacking from the first two uniramous parapodia. The small maldanid *Notoproctus* sp. was possibly that described from Trondheimsfjord, Norway, as *N. oculatus* var. *minor* Arwidsson, 1906. The terebellid *Lysilla nivea,* originally described from Madeira, was identified by the presence of spinose notosetae. The epithelium of this species was conspicuously speckled with dark brown spots.

Finally, the original generic name for the pilargid commonly known as *Synelmis klatti* (Freidrich, 1950) has recently been re-instated (Licher 1994) and the correct name for the species is *Glyphohesione klatti.* Following a phylogenetic analysis, Licher & Westheide (1994) have proposed that the pilargid genera be incorporated into the Hesionidae. Since the authors did not include any 'true' hesionid genera in their analysis, we feel this may be premature and prefer to retain the Pilargidae for the present.

Commensal Species

Commensalism within the Polychaeta is not uncommon and of all the families, members of the Polynoidae are the most frequent co-habitees. In the present survey a few species were clearly in association, though most recognised commensals had become separated from their hosts.

Thus *Polynoe scolopendrina* was occasionally discovered inside the tube of the terebellid *Thelepus setosus* and *Malmgrenia castanea* was sometimes found among the spines of the sea-urchin *Spatangus purpureus.* A single specimen of *Acholoe squamosa* was found free in the grab sievings of station 25, however, its host, *Astropecten* *irregularis* was also present. This polynoid inhabits the ambulacral grooves of the starfish.

Malmgrenia andreapolis was common in the softer sediments of Cardigan Bay, but in all cases was free of any host species. The species has been recorded in association with the brittlestar *Acrocnida brachiata* and synaptid holothurians (Pettibone 1993). These echinoderms (*A. brachiata*, *Leptosynapta inhaerans* & *Labidoplax digitata*) were variously present at stations having *M. andreapolis*. Another known commensal (on *Echinus esculentus*) found unattached (Stn. 67) was *Adyte assimilis*. The two large sea-urchins recorded from this location were *Psammechinus miliaris* and *Spatangus purpureus*.

Parasitic Species

In comparison with commensalism, parasitism within the Polychaeta is rare. Endoparasitic polychaetes, however, commonly belong to the family Arabellidae (see Pettibone 1957).

Two specimens of *Haematocleptes terebellidis* Wirén, 1886 were collected, one from the edge (95 m) of the Celtic Deep (Stn. 63) and the other from the deep (113 m) central part of St. George's Channel (Stn. 71). The latter specimen was free in the dredge sievings, but its reported host (*Terebellides stroemi*) was also present. The more southerly finding was extremely interesting, since the parasite was discovered inside a specimen of *Ampharete falcata* Eliason, 1955.

This represents a new host record for an infrequently collected parasite. Apart from its original discovery off the Swedish west coast (130 m), the species has recently been found off Greenock, Clyde Estuary (Myles O'Reilly, pers. comm.). In that case the parasite was also free in the benthic sample, though several large *T. stroemi* were present and the body wall was ruptured in one.

Distribution

The Polychaeta exhibited some very distinct distribution patterns within the study area. A detailed analysis of the whole infauna is presented later in this publication (Chapter 7), therefore only a summary is presented here.

Species showing a marked preference for the deep soft sediments of the Celtic Deep included *Pseudomystides spinachia*, *Glyphohesione klatti*, *Glycera rouxii*, *Levinsenia* sp., *Prionospio dubia*, *Ophelina modesta* and *Ampharete falcata*. The muddier parts additionally had *Nephtys hystricis* and *Atherospio disticha*, with *Gyptis rosea* and *Ancistrosyllis groenlandica* prominent. In the sandier parts *Sphaerodoridium claparedii* could be found, together with *Aricidea laubieri, Cirrophorus furcatus* and *Ophelina cylindricaudata*.

The inshore soft sediments were characterised by the presence of *Malmgrenia andreapolis* and *Glycera tridactyla*. In the muddier parts Spionidae gen. A and *Melinna palmata* were also important, while *Magelona* sp. A featured in the sandier areas.

The gravelly sediments possessed numerous exclusive species including *Pseudomystides limbata*, many syllids, *Goniadella gracilis*, *Polydora caulleryi*, *Polydora* cf. *caeca*, *Macrochaeta clavicornis*, *Asclerocheilus* spp., *Phisidia aurea*, *Lysilla nivea* and *Hydroides norvegica*. The generally deeper gravels were distinguished by the presence of *Aricidea* cf. *philbinae*, *Paradoneis* cf. *ilvana*, with the Terebellidae notably common and certain Serpulidae (e.g. *Filograna implexa*, *Filogranula gracilis* & *Josephella marenzelleri*) locally abundant. The shallower gravels of outer Cardigan Bay included *Amphitritides gracilis*, with *Podarke pallida* and *Sphaerosyllis hystrix* prominent.

A noticeable feature of the polychaete distributions was the tendency for congeneric species to have distinct distributions, often being found in quite different sediments and/or different depths. Thus *Pseudomystides limbata* and *Gyptis propinqua* were found in gravels, while *P. spinachia* and *G. rosea* were present in the deep soft sediments. *Levinsenia gracilis* was restricted to several inshore muddy locations, while *Levinsenia* sp. was exclusive to the deeper soft sediments. *Melinna palmata* characterised inshore muds and *M. elisabethae* was found in mixed gravelly locations.

Similar findings were evident for other congeneric species. Thus for *Glycera*, *G. rouxii*, *G. tridactyla* and *G. lapidum* tended to be found respectively in the deep soft sediments, the shallow

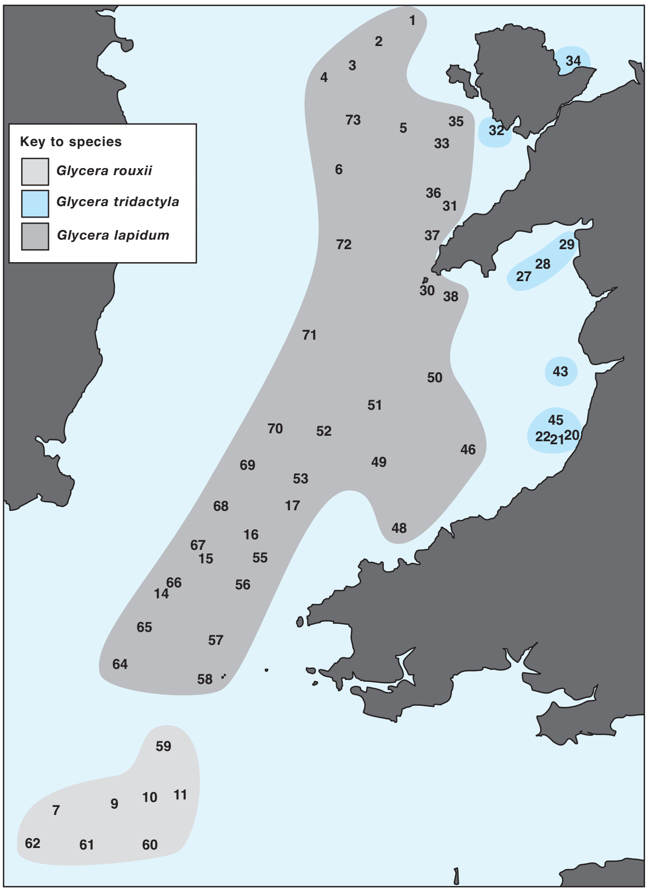


Fig. 5.5: Map showing the distribution of Glycera rouxii, G. tridactyla *and* G. lapidum.

soft sediments, and the gravels (Fig. 5.5). *Glycera oxycephala* was found in both the shallow sands and the gravels, while *G. alba* was absent from the gravels. For *Prionospio*, *P. dubia* was restricted to the deep soft sediments and *P. banyulensis* was found in the offshore gravels and sands. *Prionospio* sp. and *P. fallax* occurred in both the shallow and deep soft sediments, while *P. cirrifera* was distributed throughout most of the offshore sediments irrespective of category. For *Ampharete*, *A. falcata* was characteristic of the deep soft sediments while the morphologically similar *Ampharete* sp. A and *Ampharete* sp. B were almost mutually exclusive. The former showed a distinct preference for both inshore and offshore muds and sands, while the latter was characteristic of the gravels (Fig. 5.6).

Zoogeography

Zoogeographical studies concerning European polychaetes are complicated by the incompleteness of our taxonomic knowledge and a past tendency for the overestimation of species distributions. In more recent times attention focused on 'cosmopolitan species' (e.g. Mackie, 1991a, 1991b) has revealed the presence of previously unrecognised species. For these reasons no overall assessment of zoogeography has been attempted and consideration has been confined to notable additions to the fauna of the southern Irish Sea area.

A number of species were previously only known from more southerly regions. These included *Ophelia celtica* Amoureux & Dauvin, 1981 (from Brittany and the Celtic Sea, west of Lands End), *Dioplosyllis cirrosa* Gidholm, 1962 (from Brittany), *Palposyllis prosostoma* Hartmann-Schröder, 1977 (from off southwest Portugal), *Paradoneis ilvana*? Castelli, 1985 (from western Italy), *Lysilla nivea* and *Filogranula gracilis* Langerhans, 1884 (from Madeira), and *Prionospio dubia* Maciolek, 1985 (from South Africa). The last mentioned was recently re-described by Sigvaldadóttir & Mackie (1993) and appeared to be a widely distributed species.

Conversely, species described from more northern areas included *Orbinia armandi* (McIntosh, 1910), *Nothria britannica* (McIntosh, 1903) and *Sthenelais zetlandica* McIntosh, 1876

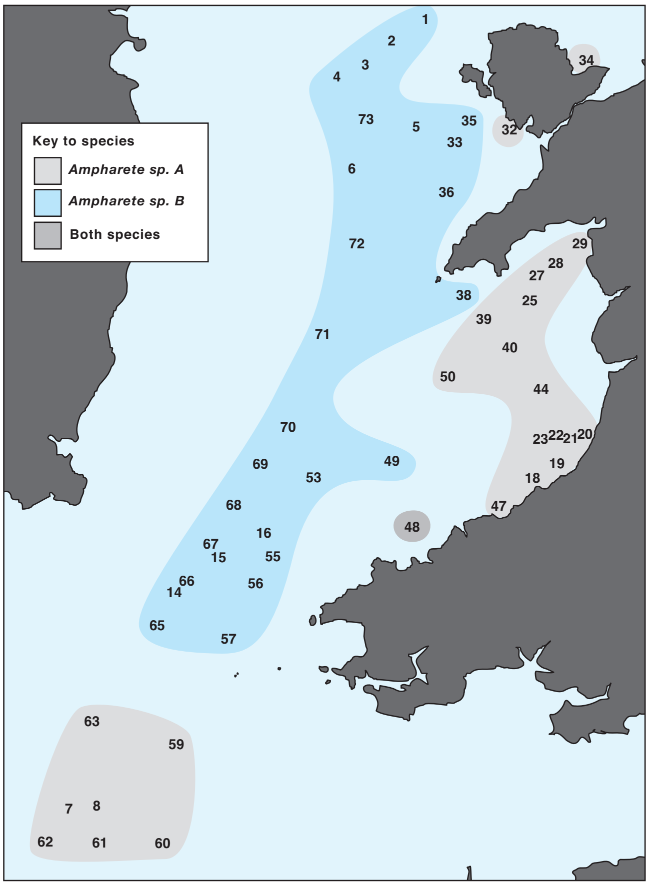


Fig. 5.6: Map showing the distribution of Ampharete sp. A., *and* Ampharete sp. B.

(from the Shetland Isles), *Nereiphylla lutea* (Malmgren, 1865) and *Goniada pallida* Arwidsson, 1898 (from the west coast of Sweden). The sigalionid, *S. zetlandica*, has been previously recorded from the Irish Sea (Gibson 1896) but the citation was later, perhaps erroneously, referred (Bruce *et al.* 1963) to *S. minor* Pruvot & Racovitza, 1895. Species such as *S. zetlandica*, *N. lutea* and *O. armandi* may be more widespread than imagined, a lack of sampling in their rough sediment habitat perhaps responsible for their apparent rarity.

There is, of course, no reason why an original locality should be considered to represent the centre of a species geographical distribution. The true range of a species can only be determined by widespread sampling. For example, *Eulalia microoculata* Pleijel, 1987, described from Trondheimsfjord (Norway), has recently been found off Spain and Portugal (Pleijel 1993) as well as in the Irish Sea (this publication).

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5.2 Mollusca

Ian J. Killeen

Introduction

The Mollusca comprise a major component of the marine benthic fauna and as a group it has long been popular with shell collectors and biologists. In the northern Irish Sea, the fauna around the Isle of Man has a history of study (Bruce *et al.* 1963). A survey carried out in the Celtic Sea south and west of St. David's Head (Hartley 1979) provided details of the fauna further south. However, the southern Irish Sea, and Cardigan Bay in particular, has not been studied in detail and its molluscan fauna is rather poorly known compared to other British sea areas. The data collected during this survey has filled a considerable gap in the knowledge of the marine Mollusca of the southern Irish Sea and has provided a wealth of new distributional and ecological information.

Existing knowledge of the distribution of the marine Mollusca in British waters is summarised by Seaward (1990). The nomenclature used here follows Smith & Heppell (1991).

Caudofoveata & Solenogastres

Much of the most interesting new data from this survey is for the primitive molluscan classes Caudofoveata and Solenogastres. Their biology, ecology and distribution in British waters are not well known due to several factors: They have a vermiform morphology which means they are frequently not recognised as molluscs, they can be difficult to identify and they are exclusively benthic. Of the eight species found, one was an undescribed species of *Tegulaherpia*, and two others were previously unrecorded in British waters (Caudwell *et al.*, 1995).

Most records for the caudofoveate *Chaetoderma nitidulum* are from northern waters (Seaward 1990) although Hartley (1979) recorded it at several stations, mainly in Celtic Deep. Further records from this survey are also from Celtic Deep where it is a typical component of the fauna in the soft sediments at depths of 90-120 m. Four solenogaster species were found: *Rhopalomenia* *aglaopheniae* which is a mainly southern species was found at four sites coiled around the hydroid *Lytocarpia myriophyllum*; *Neomenia carinata*, another mainly southern species; *Nematomenia banyulensis* and *Eleutheromenia sierra*. The two latter species are notable as previous records are scant. *Nematomenia banyulensis* was known from the west coast of Scotland, northern North Sea and from a single station in the southern Irish Sea (Hartley 1979). It was the commonest solenogaster recorded during this survey being found at thirteen stations in St. George's Channel. *Eleutheromenia sierra* was also recorded from St. George's Channel occurring at many of the same stations as *N. banyulensis*. Both species appear to be meiofaunal in silty sand or shell gravel habitats at depths between 59 and 125 m. The only previous British record for *E. sierra* was based on a single, damaged specimen in a haul of sand and shell gravel trawled from 52 m off Cardigan Bay (Hartley 1979).

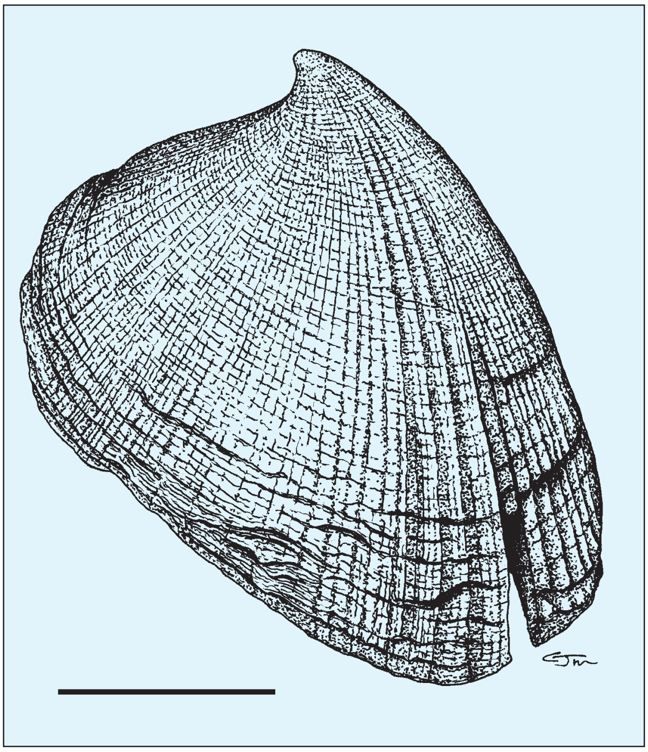

Fig. 5.7: Emarginula crassa. *Scale bar = 1 cm.*

Polyplacophora

Chitons (class Polyplacophora) were found at most stations except those where the substratum was soft mud. These animals can be difficult to identify, particularly when stained and curled-up. However, three species were recorded, of which only *Leptochiton asellus* was common and ubiquitous. *Hanleya hanleyi* was recorded from shell gravel in St. George's Channel stations at depths of 86-125 m. This is an Atlantic Boreal species, generally considered to be rare (Jones & Baxter 1987). It is known from a scattering of localities around the British Isles.

Gastropoda

Sixty one species of prosobranch and pyramidellid gastropods were recorded, a significant number of which represent new Sea Area records. Many of these are for the micro species which have been collected as a result of the small sieve mesh employed. Others, however, are for uncommon species or species not previously recorded at particular depths and habitats:

Emarginula crassa (Fig. 5.7) is a northern species that extends south down the west coast of Britain, although live records are few. Hartley (1979) recorded a single specimen from a depth of 98 m, northwest of the Scilly Isles and there are old records for the northern Irish Sea. Live specimens were found in shell gravel trawled from 92 m west of Lleyn suggesting that although this species does extend south it is restricted to deep water.

Calliostoma formosum. A single juvenile specimen from Cardigan Bay was examined by Dr Shelagh Smith and tentatively identified as this species. Although generally a northern species it was also recorded from the southern Irish Sea and Celtic Sea by Hartley (1979).

A suite of small species typically associated with shell gravel was found at many of the stations on the required substrate including most of those in St. George's Channel. This includes: *Dikoleps nitens*, *Skenea serpuloides*, *Obtusella alderi* and *Caecum glabrum*. Most of the records filled a gap in the known distributions of these species.

An interesting feature of the gastropod data was the depth at which many of the species were recorded. *Tricolia pullus*, according to Graham (1988) feeds on red weeds and lives to a depth of 35 m. It was found at several stations to the west of Anglesey and Lleyn in depths from 49-125 m, where they are presumably feeding upon detritus. Similarly *Rissoa interrupta* was found at a depth of 94 m in St. George's Channel.

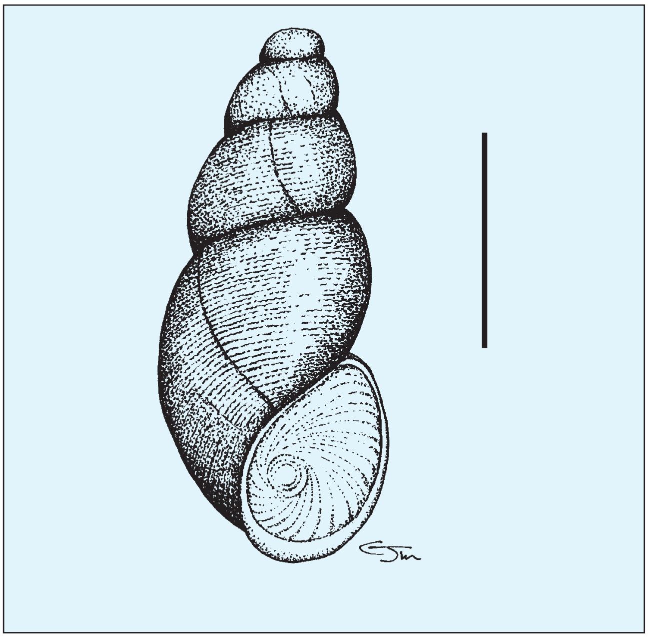

Fig. 5.8: Ceratia proxima. *Scale bar = 1mm.*

Three other small prosobranchs merit comment. *Hyala vitrea* and *Ceratia proxima* (Fig. 5.8) both inhabit sub-littoral muddy habitats. Both are infrequently recorded alive, therefore their known distribution is patchy. Specimens of both were recorded from the muddy sediments in Cardigan Bay and in Celtic Deep. At the latter location, the depth of 120 m represents a considerable increase on the limit of 50 m given by Graham (1988). *Tornus subcarinatus* is a southern species recorded alive from a few places in southern and south-west England. The live specimens found in the 'Gutter' are the first recorded from the Irish Sea for nearly a century. The habitat for *T. subcarinatus* does not appear to be well known. Graham (1988) states that it lives amongst sand under large rocks at LWST, yet the Gutter samples and recent specimens from the Isle of Wight and Dorset (Killeen & Light, pers. obs.) have been from sublittoral mud.

The naticid *Polinices fuscus* is another southern species that extends to south-western and western waters of the British Isles. It was found at low density in a number of samples from Celtic Deep and at the southern end of St. George's Channel. All stations were at depths of 93-130 m and on substrates of mud or muddy sand. Curiously this species was not recorded by Hartley (1979) even from Celtic Deep. It is possible that many of his records for *P. montagui* (a mainly northern species) were *P. fuscus*.

Surprisingly few pyramidellid gastropods were found during this survey. Most species are ectoparasitic on other animals, particularly polychaetes, although the specific host for many is unknown. Specimens from St. George's Channel have been tentatively identified as *Jordaniella nivosa*. However, they do not compare well with other British material and may well represent a species unrecognised in our waters. Records were obtained for three other rarely recorded species: *Ondina divisa*, *O. warreni* and *Megastomia conoidea*. The latter is said (Graham 1988) to feed on *Astropecten* yet none were found at the two Celtic Deep stations where *O. conoidea* was recorded.

Opisthobranchia

Apart from the bullomorph *Cylichna cylindracea*, the shelled opisthobranchs were rather uncommon in the southern Irish Sea. Single specimens of *Diaphana minuta* were recorded over a wide area. Most of these represented new records for the Sea Areas covered by this survey.

Nudibranchs were not well recorded during this survey. This was due in part to the nature of the substrates but also the method of sampling and preservation techniques employed. The opportunity to collect and preserve specimens on board ship was restricted due to time constraints imposed by the sampling program, thus most material was only recovered subsequently from preserved trawl samples containing hydroids. Once nudibranchs are fixed without relaxing and stained with rose bengal they are very difficult to identify. It has, therefore, not been possible to assign many of the specimens to species although three families were represented: Dendronotacea, Doridacea and Aeolidacea. Most common were the aeolid *Eubranchus tricolor*, and *Doto* spp, especially *D. fragilis* which feeds on *Nemertesia antennina*.

Scaphopoda

The Scaphopoda were represented by a single species *Pulsellum lofotense*. According to Jones & Baxter (1987) this is a deep water species recorded from depths of 200 m or more. It had been found on mud in *ca.* 100 m off the Isle of Man in 1895 (Bruce *et al.* 1963), otherwise the only recent live records are from Sea Areas Rockall and Fisher (Seaward 1990). *Pulsellum lofotense* occurred frequently in fine sand and mud at several stations in Celtic Deep in depths between 93 and 130 m, thus representing an apparent southerly extension of its range.

Bivalvia

The molluscan fauna from the area covered by the present survey is dominated by the bivalves, both in terms of numbers of species and numbers of individuals. The majority of the species had been previously recorded from the southern Irish Sea although many were known only from dead shells. There is no up-to-date work on the bivalves of British waters and, therefore, details of their ecology (depth and substrate preferences) are not as well documented as for other classes of molluscs. A total of 77 species were found of which the following merit comment:

Jupiteria minuta. This species is common in the north, especially down the west coast of Scotland becoming much less common further south. Hartley (1979) recorded a single specimen from 108 m, west of St. David's Head and speculated that *J. minuta* reached the southerly limit of its distribution in the Celtic Sea. Although it has since been recorded from Isle of Wight waters (pers. obs.) it does become rarer to the south. Data from this survey have shown that *J. minuta* occurs throughout St. George's Channel from off St. David's Head to northwest of Anglesey. It occurred at low density in coarse sediments, muddy gravel, shell, stones in depths from 40-125 m, although most were from >80 m.

The following 3 species are members of the superfamily Galeommatoidea. Many of the species within this group are commensal with other animals such as echinoderms or sipunculans whereas others do not have a recognised host. Some species are not often recorded and thus would appear to be rare, although to some degree this may be due to failure in sampling or recognition of the host.

Semierycina nitida. This species is distributed around much of the British Isles although most recent live records are from the west coasts. It is not known to be a commensal and Tebble (1966) suggests that it inhabits gravelly and stony sand. Many specimens were found in the mud and muddy sand in the 'Gutter' and surrounding area in Cardigan Bay in depths of *ca.* 20 m. However, specimens were also retrieved from the more gravelly, shelly substrates in the deeper water of St. George's Channel.

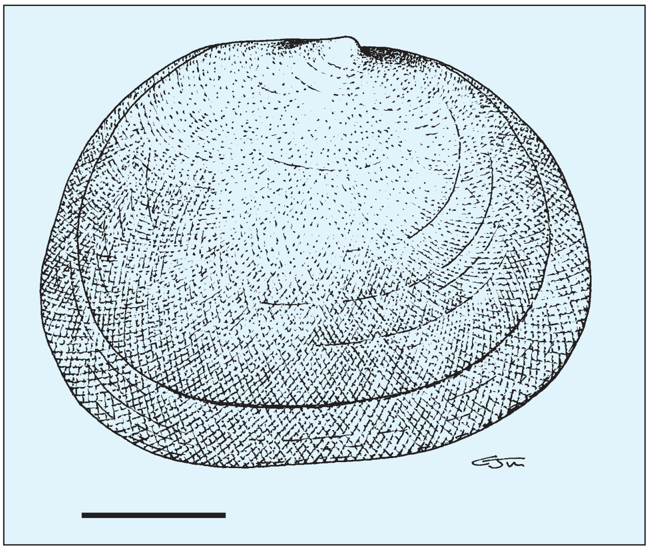

Fig. 5.9: Lepton squamosum. *Scale bar = 2mm.*

Lepton squamosum (Fig. 5.9). A southern species for which there are few recent live records. Specimens were found at seven of the stations in the 'Gutter' and surrounding area in samples containing the callianassid *Eupogebia*. In some of the samples *L. squamosum* was actually found attached to the underside of the shrimp.

Devonia perrieri. This species was also found in the shallow water muds and fine sediments of the Gutter area of Cardigan Bay. It is commensal with the holothurian *Leptosynapta*. As with the two previous species, live records of *D. perrieri* are infrequent although its general distribution around the coast suggest it may be under-recorded.

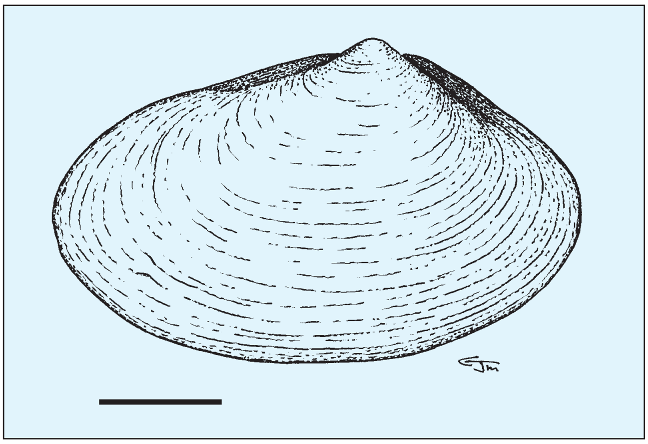

Fig. 5.10: Lutraria lutraria *juvenile. Scale bar = 1mm.*

Lutraria lutraria. Small (<4 mm) elliptical bivalves were found at most of the stations in Cardigan Bay. They were subsequently determined as juvenile *L. lutraria* (Fig. 5.10) although the shell morphology differs significantly form that of the adult. No adult or sub-adults were found and it is presumed that were living deeper in the substrate than could be reached by the grab.

Arctica islandica. As with the preceding species, *A. islandica* was recorded only as juveniles. Specimens, usually less than 2 mm were found throughout the Cardigan Bay sampling area and occasionally elsewhere. Unlike *Lutraria* this large bivalve does not live deep within the sediment and it is, therefore, surprising that not a single live adult was collected. This indicates that the species is living at very low density but that large quantities of spat are released over a wide area, although few would survive to maturity.

Zoogeography

The recorded presence of both southern (e.g. *Galeodea rugosa*) and northern (e.g. *Jupiteria minuta*) elements in the southern Irish Sea has led to speculation that this is an area of transition between Boreal and Lusitanian faunal provinces. Indeed, it may be that the Celtic Sea Front marks a boundary between the faunal units.

The Celtic Deep, lying south of the front, is particularly interesting. Although the fauna of these deep water muds is relatively impoverished it does include elements of both northern (e.g. *Pulsellum lofotense*) and southern (e.g. *Polinices fuscus*) faunas that were not found elsewhere in the survey area.

The fauna of St. George's Channel was rich and remarkably consistent. It did include species regarded as northern such as *Hanleya hanleyi* and *Emarginula crassa* in the deeper water at the northern end.

There was no evidence of truly southern species penetrating the Celtic Sea Front. Certainly, species such as *Galeodea rugosa*, recorded in the past from St. George's Channel, and *Callista chione*, recorded from Cardigan Bay, have not been seen alive for many years. This would suggest that many of these species have retreated and become extinct in the southern Irish Sea.

Most of the positive findings of this survey record typically northern elements present in the southern Irish Sea. Negative findings suggest that southern elements previously known from the region are no longer present. A simplistic conclusion could imply a retreat of southern faunal units and an expansion of northern units through some climatic change. Generally the so-called northern species are found in deeper water both in St. George's Channel and the Celtic Deep. Their previous absence is more likely to be through the lack of sampling

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5.3: Crustacea

James McD. Mair

Introduction

A total of 211 crustacean taxa were identified from the quantitative and qualitative samples at the 73 stations. The Amphipoda, with 114 species, were the dominant group, with the remaining 46% of the crustacean fauna including 45 Decapoda, 22 Cumacea, 20 Isopoda and 6 Tanaidacea.

Species Richness

A number of quantitative stations were found to contain a sparse crustacean fauna (around 12 or less species); i.e. two locations (Stns. 16 & 54) in the deep (99-112 m) and generally gravelly St. George's Channel, the shallow (7-58 m) softer sediments of Cardigan Bay (Stns. 19, 20, 24 and 47) and Red Wharf Bay (Stn. 34), and most of the muddy Celtic Deep (Stns. 7, 8, 9, 10, 61 & 62) and sandy approaches to the Bristol Channel (Stns. 12, 13). Thus the lowest species richness values were predominantly obtained from soft muds and sands, irrespective of depth.

Station 11 (also located in the Celtic Deep), however, was found to have the largest crustacean fauna both in terms of species (36) and specimens (over 400). Two other localities with a relatively large number (34) of crustacean species were both from coarser offshore sediments in St. George's Channel: station 6 (southwest of Anglesey) and station 15 off St. David's Head.

Consideration of the qualitative dredge and grab data generally confirmed the view that the deeper offshore gravels had the highest species richness (30-35), despite the 'anomalous' station 11. Nevertheless, the richest crustacean fauna (42 species) was to be found in the dredge sample from the somewhat shallower muddy gravel (Stn. 36; 59 m) off the Lleyn Peninsula. Notably high species numbers (30-34) were also obtained from shallow (21-50 m) stony grounds (Stns. 30, 37 & 44).

Distribution

An investigation into the distribution of some of the more abundant crustaceans throughout the sampling area indicated that some species were found throughout most of the survey area while others were confined to particular localities. Species having a somewhat general distribution included the amphipods *Harpinia pectinata*, *Urothoe elegans* and *Stenothoe marina*.

Several species had distributions confined to relatively shallow depths (i.e. usually less than about 30 m) and fine sands, such as those found in the inner part of Cardigan Bay and off Anglesey. Typical examples of this were *Ampelisca brevicornis* (Fig. 5.11), *Siphonoecetes kroyeranus* and *Iphinoe*

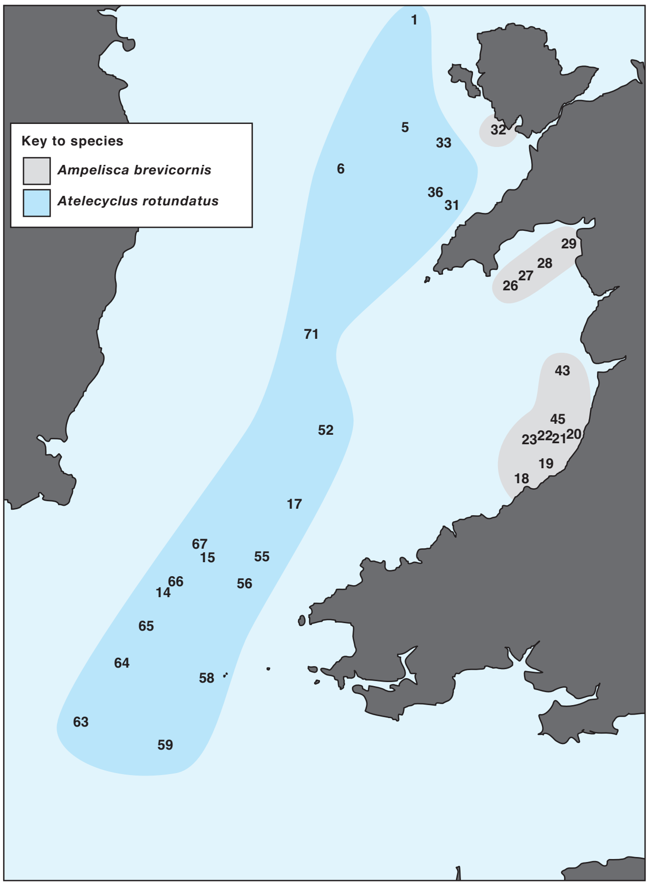

Fig. 5.11: Occurrence of Ampelisca brevicornis *and* Atelecyclus rotundatus.

trispinosa. Others were similarly distributed but extended into slightly deeper water and coarser sediments (e.g. *Argissa hamatipes* & *Gnathia* spp.). *Ampelisca tenuicornis* (Fig. 5.12), *Pariambus typicus*, *Bodotria pulchella* and *Pseudocuma longicornis* also occurred sporadically even further offshore.

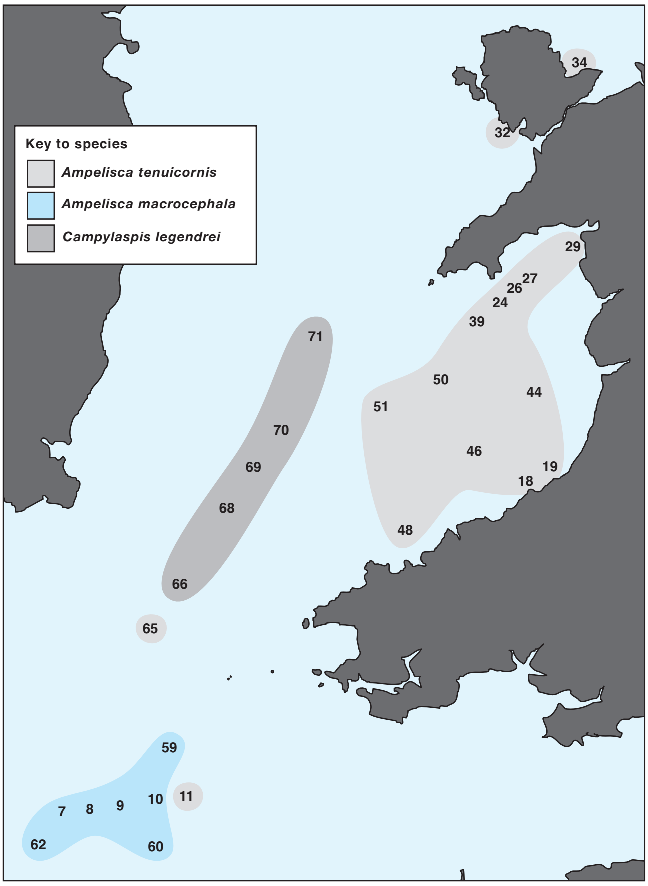

Fig. 5.12: Occurrence of Ampelisca tenuicornis, A. macrocephala *and* Campylaspis legendrei.

For the cumacean *P. longicornis* the distribution could perhaps be better described as bipartite, the species occurring in both inshore (Cardigan and Caernarfon Bays) and offshore (Stns, 11, 13 & 64) sands. More pronounced examples of this distribution pattern were exemplified by *Perioculodes longimanus* (Fig. 5.13), *Leptognathia gracilis* and *Eudorella truncatula*.

Several species were only present in the deep waters (>90m) and soft sediments of the Celtic Deep to the southwest of Pembrokeshire. These included the amphipods *Ampelisca macrocephala* (Fig. 5.12) and *Eriopisa elongata*, the tanaid *Araphura brevimana*, the isopods *Pseudarachna hirsuta* and *Eugerda tenuimana*, the cumacean *Leucon nasica*, and the decapod *Nephrops norvegicus*. The most numerous species at station 11 were *Urothoe elegans* (102 specimens) and *Gammaropsis palmata* (92 specimens). Though both occurred at other stations, they were not present in such high numbers. The oedicerid amphipod *Westwoodilla caecula* was unique to this location.

Finally, a large number of species were common to the offshore coarse sediments of St. George's Channel, many also occurring closer to the shore off the Lleyn Peninsula and Caernarfon Bay. These included *Eusirus longipes*, *Cressa dubia*, *Haploops tubicola*, *Dyopedos monocanthus*, *Unciola planipes*, *Janira maculosa*, *Pandalus montagui*, *Atelecyclus rotundatus* (Fig. 5.11) and *Monodaeus couchi* (Fig. 5.13). Several species had more restricted distributions. For example, *Lysianassa plumosa* and *Campylaspis legendrei* (Fig. 5.12) were both confined to the southern mid-channel area.

According to Lincoln (1979), there are very few amphipod records for the Cardigan Bay census area. This study greatly enhances our knowledge with

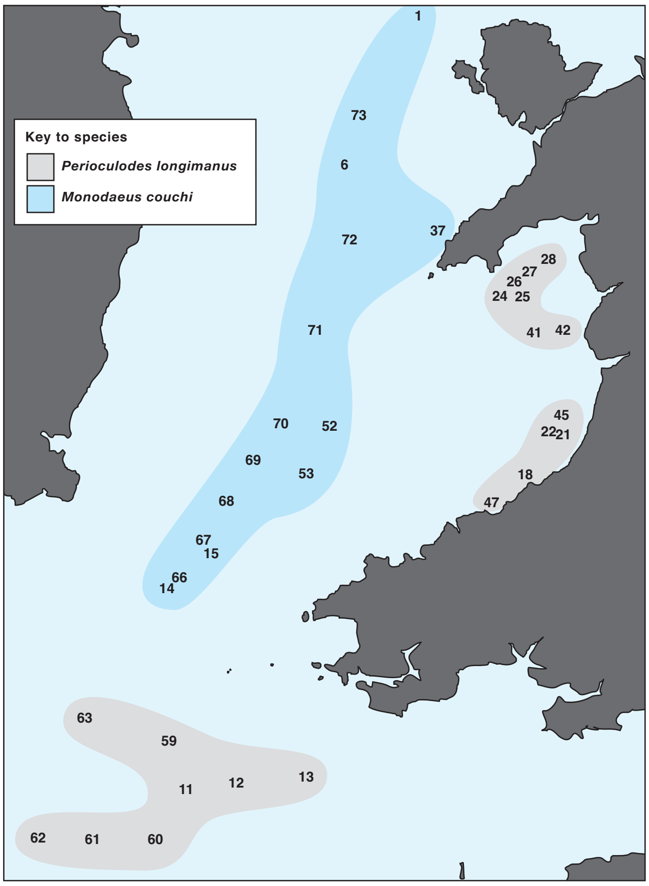

Fig. 5.13: Occurrence of Perioculodes longimanus *and* Monodaeus couchi.

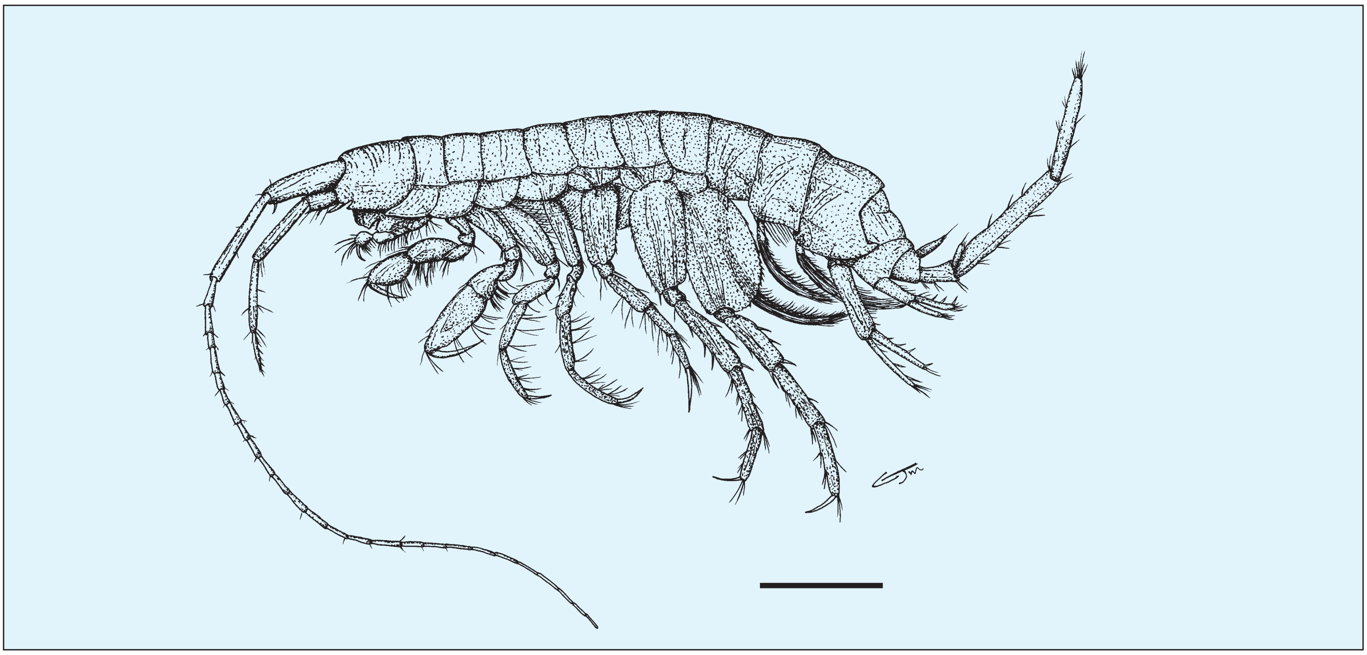

Fig. 5.14: Eriopisa elongata. *Scale bar = 1mm.*

many new records including *Perioculodes longimanus*, *Synchelidium haplocheles*, *Amphilochus neapolitanus*, *Metopa pusilla*, *Urothoe marina*, *Tmetonyx similis*, *Austrosyrrhoe fimbricatus*, *Atylus vedlomensis*, *Atylus swammerdami*, *Megaluropus agilis*, *Ceradocus semiserratus*, *Melita obtusata*, *Photis longicaudata*, and *Haploops tubicola*. Five specimens of *Lembos longipes* were collected in Cardigan Bay. This was of interest since Lincoln (1979) noted that there were no specimens available from British waters, despite records from several areas including Anglesey. The author has also recorded this species from various locations in the British sector of the northern North Sea.

Another species for which there is no British material available is *Eriopisa elongata*, illustrated here (Fig. 5.14) by Christopher Meechan. Twenty-one specimens were collected from the outer Bristol Channel (Stns. 10, 11 and 59) and Nymphe Bank (Stn. 8) census areas. All these stations were from the Celtic Deep in water depths of 100 m or over and, in general, the sediments were sandy muds. This species has been recorded from 150 m in the Clyde and Argyll area (Norman 1889), and also by the author at several localities of similar depth and sediment in the northern North Sea.

Depth Distribution

Several species were found at depths generally greater than indicated by Lincoln (1979). For example, *Apherusa bispinosa* described as being "usually shallow subtidal" was found at 100-110 m (Stns. 11 & 14). Likewise, *Perioculodes longimanus*, described as having a depth range from about 5-50 m, was recorded on four occasions (Stns. 11, 59, 61 & 62) at depths greater than 100 m.

Associations

A number of amphipod species known to live in association with other animals were found. *Tritaeta gibbosa* (recorded from stations 1, 6 & 72), is often found associated with sponges and ascidians. *Melita obtusata* (from a number of stations, with 12 specimens being found at Stn. 18) has been reported as being commensal on an anemone (Hartnoll 1971). *Gammaropsis nitida* (from several stations, with 14 specimens being found at Stn. 33) is generally intimately associated with hermit crabs, often in the topmost whorl of the occupied shell (Myers & McGrath 1982). However, no hermit crab was found in the grab samples from this station.

Taxonomy

The taxonomy of several species and groups of amphipods has been noted as being confused, with misidentifications being common. Lincoln (1979) indicated that some were notoriously difficult and, since his work, several other studies have revised and added species to the British and Irish amphipod lists. In the present survey difficulties were encountered with a number of species groups, though this was partly due to a lack of large adult specimens. The following groups may, therefore merit closer taxonomic examination:

— *Iphimedia eblanae*, *I. minuta* and *I. obesa*.

This group has been studied in detail by Myers *et al.* (1987) in a paper which also described three new species from Irish waters.

— *Pontocrates arenarius* and *Pontocrates* sp. indet.

According to Moore & Beare (1993), *P. arenarius* would appear to be confined to the intertidal zone and sublittoral specimens are most likely to be *P. altamarinus* or *P. arcticus*.

— *Leucothoe lilljeborgi*, *L. incisa* and *Leucothoe* sp.

Myers & Costello (1986) described these as sibling species with overlapping morphological variation; the diagnostic characteristics in subadults being ill-defined.

— *Ampelisca* genus.

Following the descriptions and keys produced by Lincoln (1979) several other studies have tried to resolve the identification difficulties in this genus. Dauvin & Bellan-Santini (1988) produced a key to the *Ampelisca* species of the northeastern Atlantic, while Myers & McGrath (1991, 1994) described some additional characteristics useful in separating several morphologically similar species.

The author also recognises identification problems in the following:

— Amphipods of the genera *Metopa*, *Bathyporeia*, *Jassa* (it is suspected that most of the juvenile specimens belong to *Jassa pusilla*).

— Isopods of the genera *Munna*, *Cirolana* and *Eurydice*.

— The cumacean genus *Diastylis*.

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5.4 Pycnogonida

Roger N. Bamber

Introduction

Previous records for pycnogonids in the Irish Sea are almost all limited to littoral or shallow inshore waters, although Carpenter (1905) recorded a few specimens from deeper waters off the east coast of Ireland. Hartley, during a survey of molluscs of the Celtic Sea (see Hartley 1979) collected pycnogonid material, of which only unusual records of the deep-water species *Paranymphon spinosum* Caullery, 1896 persist (Bamber & Thurston, *in press*).

The present surveys, undertaken by the National Museum of Wales in 1989 and 1991, collected samples throughout the Irish Sea from west of Anglesey, Cardigan Bay and St. George's Channel to the Celtic Deep, and to depths of 170 m. This was the first time pycnogonids had been collected from this area of sea bed and valuable information was obtained on the bathymetric distribution of shelf species; there being few British records from the depths covered by BIOMÔR 1.

Ten species of pycnogonid were recorded from the surveys, representing notable depth range extensions for three species and the rare occurrence of a fourth. Five of the species were common throughout the area. They occur within the "Deep *Venus*" — "Deep *Venus*/Hard" communities (= Assemblage C of this publication) as delimited by Mackie (1990). They are discussed below in taxonomic order as in Arnaud & Bamber (1987).

Species Accounts

Nymphonidae

Nymphon brevirostre Hodge, 1863. A small littoral-infralittoral species common around the coasts of the British Isles; previously recorded from English, Welsh and Irish coasts of the Irish Sea. Elsewhere, known from the Russian Arctic, Scandinavia and Northern Europe. Normally found above 20 m depth with occasional records to 60 m; the present samples extend its bathymetric range to 130 m. It occurred throughout the sampling area, but was notably common in the deeper waters of St. George's Channel and into the Celtic Deep. The species is normally associated with hydrozoans and, in these samples, showed a clear preference for coarser substrates.

Nymphon hirtum (Fabricius, 1794). This species was once deemed to be Subarctic-Boreal in distribution, occurring off Iceland, Greenland and Scandinavia, but there are sporadic records from off Belgium and around the British Isles as far south as Weymouth (Bamber, unpublished). In the Irish Sea, Carpenter (1905) recorded individual immature specimens from "off Kish Bank, 25-27 fathoms" and "Lambay Deep" in 1902, and there are historic records for Calf Stack and Port Erin, on the Isle of Man (Bruce *et al.* 1963). The present surveys recorded *N. hirtum* at five stations (17, 53, 55, 67, 70) all to the northern end of the Celtic Deep opposite Carnsore Point (Fig. 5.15), and at depths from 87 to 120 m. The species is normally considered infralittoral but has been recorded to 200 m.

Nymphon brevitarse Krøyer, 1844 (Fig. 5.15). This sublittoral species is rarely recorded and controversy has existed in the past over its possible synonymy with *N. brevirostre*. Four specimens attributed to this species were recorded in

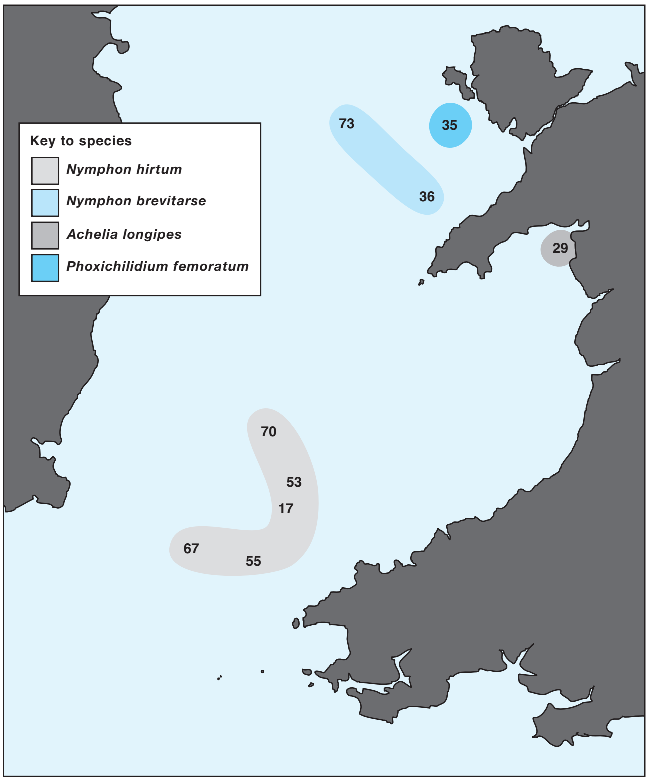

Fig. 5.15: Occurrence of four infrequently recorded pycnogonids.

the present surveys, the first records for the Irish Sea: Stn. 36 (59 m), 2 subadults; Stn. 73 (125-132 m), 1 adult male (Fig. 5.16 A-C) and 1 subadult.

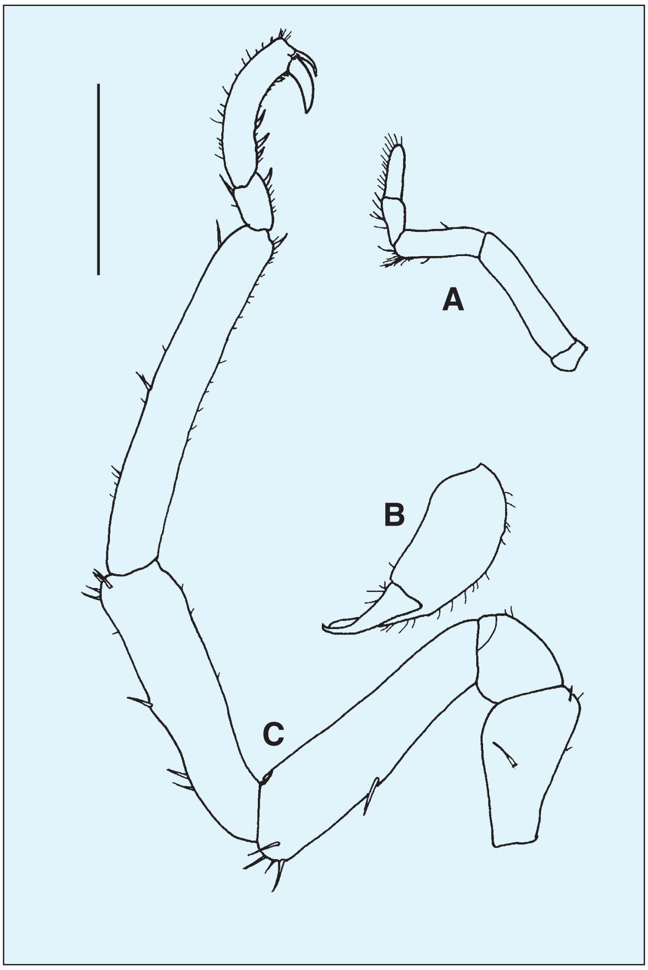

Fig. 5.16: Nymphon brevitarse, *specimen from Station 73. A. Left palp. B. Left chela, ventral view. C. 3rd left leg. Scale bar = 0.5mm for A and B, 1mm for C.*

The male has a trunk length of *ca.* 2 mm; the ratio of palp articles 5:4 is 1.25, the chela fingers 0.6 times the length of the palm, and the main claws are twice the length of the auxiliary claws, and 0.37 times the length of the curved propodus. The abdomen approximately equals the length of the 4th lateral processes, and the proboscis is as long as the preocular cephalon ("neck" of Hedgpeth 1948; see his key, p. 182, for distinctions of this species). The ocular tubercle is a low dome with 2 lateral papillae. There are no large lateral spines on coxa 1, but a single pair exists on coxa 2.

Of the sympatric species, the lack of hirsuteness (notably on the tibiae and on the posterior edges of the trunk segments), only 3 sole spines, larger inter-lateral-process gaps and shorter abdomen preclude this from being *N. hirtum*. The palp-article proportions, distal leg article and claw proportions, sole spination and chela proportions distinguish it from *N. brevirostre*, which is a less robust species. Similar-sized specimens of both of these species were available from the survey for comparison. The remaining species sharing this zoogeography and bathymetry, *N. grossipes* (O. Fabricius?) Krøyer, 1844, has chela fingers almost as long as the palm, more numerous and larger sole spines and a larger body size at maturity. Other species from shallower or greater depths are even more distinct. Thus, although the tarsus of the present material is proportionately shorter than as shown by Sars (1891: plate 3, figure 3), the proportions are consistent with Krøyer's (1844) description. Morphological variability of this feature is also known in the related species *N. brevirostre* (see Bamber 1982), and therefore I consider these specimens to be Krøyer 's species.

Ammotheidae

Achelia echinata Hodge, 1864. A common species around British and Irish coasts and widespread in the Northeast Atlantic; normally considered littoral to circalittoral. The present surveys recorded this species down to 170 m and throughout the area as far south as west of St. David's Head. Breeding adults occurred as deep as 112 m (station 15). This species was again associated with coarser substrates.

Achelia longipes (Hodge, 1864) (*Ammothella longipes* auctt.). A shallow water species found around the British Isles, here only recorded from 18 m depth at station 29 near Porthmadog (Fig. 5.15).

Endeidae

Endeis spinosa (Montagu, 1808). Found on the coarser sediments throughout the area (Fig. 5.17) except within Cardigan Bay and south of station 64; often common. The depth range for this material was 49 to 130 m, chelate juveniles occurring from 60 to 113 m.

This species is normally thought to occur

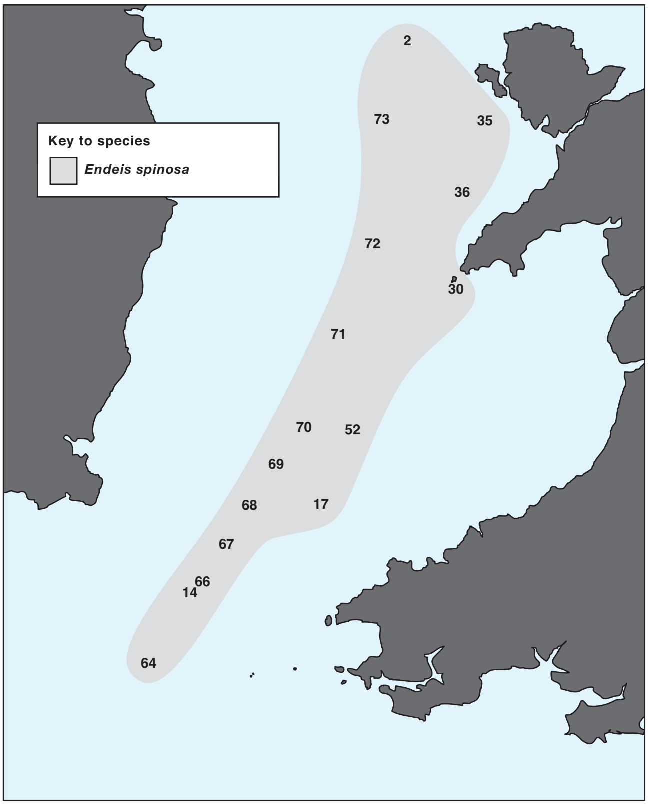

Fig. 5.17: Occurrence of Endeis spinosa.

above *ca.* –15 m CD, being 'replaced' at greater depths by *E. charybdaea* (Dohrn, 1881). Ideally, *E. spinosa* has a femur length ≥ tibia 2 length, auxiliary claw <60% of main claw, and <20 cement gland pores, unlike *E. charybdaea* (tibia 2 > femur, auxiliary claws ≥ 60% of main claw, >20 cement gland pores). Many of the males were examined for numbers of cement gland pores, and the range within this material was 13 to 17. Typically, femur and tibia 2 were subequal in length and the auxiliary claw 52% of the main claw. No specimens of *E. charybdaea* were collected, although King *et al.* (1986) recorded that species from off the Pembroke coast.

Callipallenidae

Callipallene brevirostris (Johnston, 1837). Species of this genus are infrequently recorded, owing to their small size and cryptic appearance. The present records are from throughout the survey area and between 24 and 130 m depth, breeding adults being common at all depths down to 120 m.

Some of this material, notably the ovigerous males, accords with the morphology of *C. producta* (Sars, 1888); variously *C. brevirostris producta* (see Stock 1952). The latter appears to be a deeper water species (or phenotype). It remains unclear whether these two represent different species or varieties of the same species, and some extensive comparative morphology is required to resolve this issue. I have called all the material in the Irish Sea samples *C. brevirostris*.

Phoxichilidiidae

Anoplodactylus petiolatus (Krøyer, 1844). A species of remarkable bathymetric range from the littoral to 1520 m in the North Atlantic, recorded here throughout the sample area and at depths between 18 and 170 m. Breeding adults only occurred at station 48. This species is often recorded from fine sediments, and in the present samples it was more commonly associated with such substrates.

Phoxichilidium femoratum (Rathke, 1799). One female was recorded at station 35, in 49 m (Fig. 5.15). This species is normally littoral; a single specimen may be the result of contamination from shallower material, for example the ship's hull.

Pycnogonidae

Pycnogonum littorale (Ström, 1762). This species is common throughout the northern Northeast Atlantic at depths from the littoral to 1262 m. Records in the present surveys were notable for the large numbers of postprotonymphon larvae at six sites below 77 m and exclusive of adults at five of these. Though of less frequent occurrence, its distribution within the area was similar to *Endeis spinosa*.

Zoogeography

Five of these species, *Nymphon brevirostre*, *N. hirtum*, *N. brevitarse*, *Phoxichilidium femoratum* and *Pycnogonum littorale*, demonstrate a subarctic-boreal/southern boreal distribution around the British Isles. Three of the common species, *Achelia echinata*, *Endeis spinosa* and *Callipallene brevirostris*, as well as *Achelia longipes*, show a southern distribution which appears to relate to summer isotherms. *Anoplodactylus petiolatus* is eurybathic and widespread in the North Atlantic. None of the nine British species demonstrating classic Lusitanian distributions were recorded in these surveys.

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5.5 Parasitic and Commensal Copepoda

Myles G. O'Reilly

Introduction

In comparison with their fish-infesting counterparts, copepods associated with invertebrates have received little attention. Those occurring in or around British waters were reviewed for the first time by Gotto (1993). Many of the 230 species discussed therein remain poorly known with a fair number unrecorded since their original, and often inadequate, descriptions from up to one hundred years ago. The material recovered in the present study includes species new to British waters and to their invertebrate hosts. Of further interest was the collection of specimens potentially representing an enigmatic parasite unrecorded since its discovery in 1902. Other species or genera, perhaps new to science, may be expected to turn up in British waters as benthic ecologists peruse their invertebrate specimens with a more informed eye.

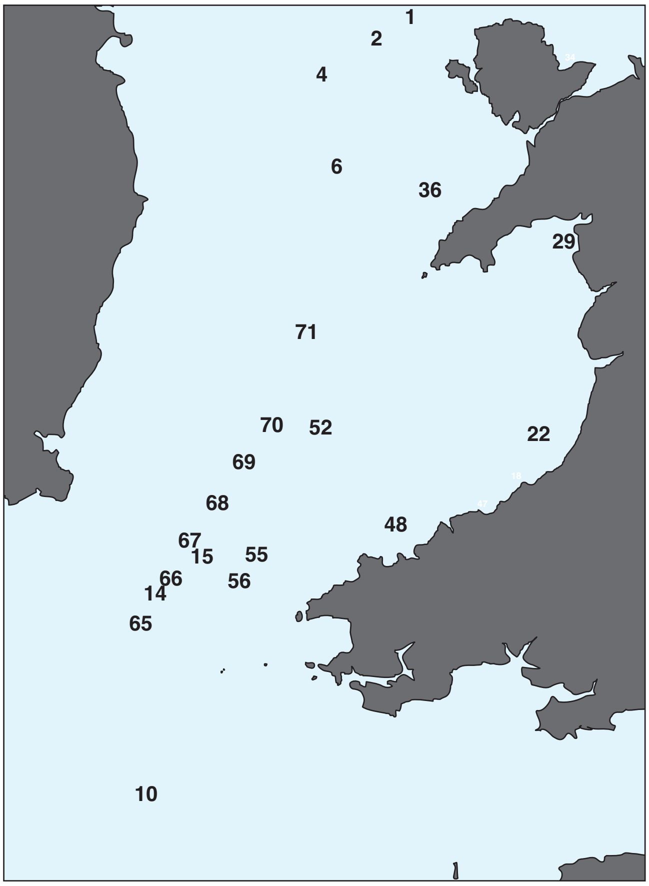

Fig. 5.18: Map showing stations from which invertebrate associated copepods were recorded.

In the following account the species are considered according to their systematic classification. The majority of copepod species were found associated with animals from the coarse sediments in the deeper waters of St. George's Channel (Fig. 5.18).

Cyclopoida Burmeister, 1834

Notodelphyidae Dana, 1853

Gunenotophorus globularis Buchholz, 1869

Material examined: Stn. 56 (off St. David's Head, 94 m), 1 gravid female found among dredge sievings.

An associate of various solitary ascidians. Widely distributed with records from the British Isles, Scandinavia, the Mediterranean, Florida, South Africa and the Indian Ocean.

Botachus cylindratus Thorell, 1859

Material examined: Stn. 70 (St. George's Channel, 88 m), 1 gravid female.

An associate of solitary ascidians. Widely recorded around the British Isles, Scandinavia and the Mediterranean.

?Ascidicolidae Thorell, 1859

?*Jeanella minor* (Scott, 1902)

Material examined: Stn. 22 (SW of Aberystwyth, Cardigan Bay, 26 m), 2 ovigerous females detached from any host.

The body is oblong-ovate (Fig. 5.19), 1.8mm long and without appendages except for short triangular antennules, lobate antennae and, posteriorly, a small median papilla. A tiny suctorial mouth appears to be present between the antennae.

Scott (1902) briefly described this species, under the name *Platypsyllus minor*, from specimens, including an ovigerous female, dredged from 15 m depth near North Craig in the Firth of Forth. In 1904, he altered the generic name to *Jeanella* as his earlier name had been pre-occupied. Though found apart from any host, the reduced morphology led Scott to suspect that his specimens gained protection as endoparasites or commensals, most probably from ascidians. Thus he placed them in the Ascidicolidae, though the complete absence of legs is more akin with some genera of the allied Notodelphyidae which also infest ascidians. Such clandestine habits may explain why this distinctive genus has never been recorded since its original description. The new material bears a striking resemblance in shape and size to Scott's figures, though the antennules do not bear the minute setae he described and antennae are clearly present rather than being obsolete. It is possible that these discrepancies may be attributed to inaccuracies in the original description, however, re-collection from the type locality would be required to confirm this suggestion.

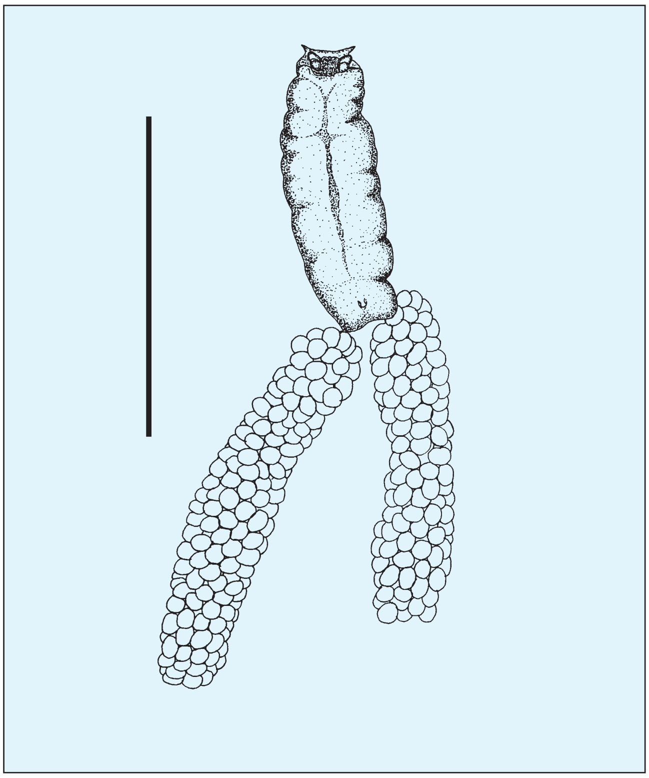

*Fig. 5.19: ?*Jeanella minor*, ovigerous female, ventral, from Stn. 22. Scale bar = 2mm.*

Poecilostomatoida Thorell, 1859

Sabelliphilidae Gurney, 1927

Sabelliphilus elongatus M. Sars, 1862

Material examined: Stn. 1 (off Anglesey, 80 m), 1 ovigerous female removed from radiole of fanworm *Sabella pavonina* Savigny, 1820. Stn. 68 (St. George's Channel, 94 m), 1 ovigerous female removed from radiole of *S. pavonina*.

A species widely recorded from British and European waters. It is found attached to the fan radioles of *Sabella pavonina* or *S. spallanzanni* (Viviani, 1805). A sibling species, *Sabelliphilus sarsi* Claparède, 1970, occurs on the body (not the fan) of *S. spallanzanni* from the Brittany coast to the Mediterranean Sea. Morphological and biological details are provided by Gotto (1960) and Bocquet & Stock (1964).

Clausidiidae Embleton, 1901

Hersiliodes latericia (Grube, 1869)

Material examined: Stn. 29 (Tremadoc Bay, 18 m), 1 small male, 1.7 mm long, removed from the tube of the polychaete *Praxillura longissima* Arwidsson, 1906.

The male of this species has a characteristic large knob-like protrusion on the basis of the maxilliped (see Bocquet *et al.* 1963). It has been recorded from the Channel and Atlantic coasts of France, and in the Mediterranean, usually in association with *Clymenura clypeata* (Saint-Joseph, 1894), though *Euclymene oerstedii* (Claparède, 1863) has also been suggested as a probable host. There are only three published records from British waters; Hunstanton, Norfolk, prior to 1905 (see Hamond 1973), from Lough Hyne, southwest Ireland, and Dublin Bay (see Holmes & Gotto 1992). However, the species has been collected regularly from Stanswood Bay in the Solent since 1988 (Bamber, unpublished) and, in 1991, was also found at the Lancelot Field (55° 25’ N, 01° 20’ E) about 110 km east of Blyth, Northumberland (Garwood, unpublished). The new find represents a new host species and the first record from Welsh waters.

Leptinogaster histrio (Pelseneer, 1929)

Material examined: Stn. 4 (off Anglesey, 110 m), 1 mature female found free from any host.

The genus has been reviewed by Gooding (1963). It was established in 1929 by Pelseneer to accommodate *L. pholadis*, a new species associated with the bivalve *Pholas dactylus* Linnaeus, 1758 from Naples. At the same time, Pelseneer created another new genus, *Strongylopleura*, for *S. histrio* obtained from *Abra alba* (Wood, 1802) at Boulogne-sur-Mer, France. Bocquet & Stock (1958) redescribed both species from new material collected from the French and Dutch coasts respectively. They concluded that both belonged to the same genus, *Leptinogaster* having page priority. They also synonymised another genus, *Myocheres* M.S. Wilson, 1950, with *Leptinogaster*. Their Dutch material of *L. histrio* was recovered from *Abra alba* and *Macoma balthica* Linnaeus, 1758, with up to 80% of the latter infested. Bacescu & Pór (1959) recorded *L. histrio* infesting *Corbulomya maeotica* Milatchevici in the Black Sea during the summer but the copepod apparently becomes free-living in winter. Jepsen (1960) studied aspects of its biology and the effect on its host, *M. balthica*, at Cuxhaven in the Elbe estuary.

The new Irish Sea find represents the first record from British waters. It is surprising that an associate of such a well-studied bivalve species has not previously been collected in this area.

Nereicolidae Claus, 1875

Nereicola ovatus Keferstein, 1863

Material examined: Stn. 10 (Celtic Sea, 110 m), 4 female parasites attached to the posterior region, between setigers 51 and 64, of a small specimen (16 mm for 70 setigers) of *Nereis elitoralis* Eliason, 1962. The copepods were attached laterally, between the parapodia, and were all mature, each having remnants of ovisac stalks. Three ovisacs were collected but had become detached prior to examination. They are illustrated (Fig. 5.20) as if attached to two of the specimens.

Nereicola ovatus was first described infesting *Perinereis cultrifera* (Grube, 1840) from the Normandy coast and a few years later was collected nearby in the Channel Isles. Since then it has been widely reported from the Mediterranean (see Laubier 1965) and was also recorded from *Nereis zonata* Malmgren, 1867 in the Black Sea (Stock 1966). Details of the morphology are given by Dantan (1929) and by Laubier (1965). Though multiple infestations are frequent with up to 15 copepods per host, the number of infested hosts often appears to be small. Dantan (*loc. cit.*) examined over 12000 *Nereis rava* Ehlers, 1868 and over 15000 *Platynereis dumerillii* (Audouin & Milne

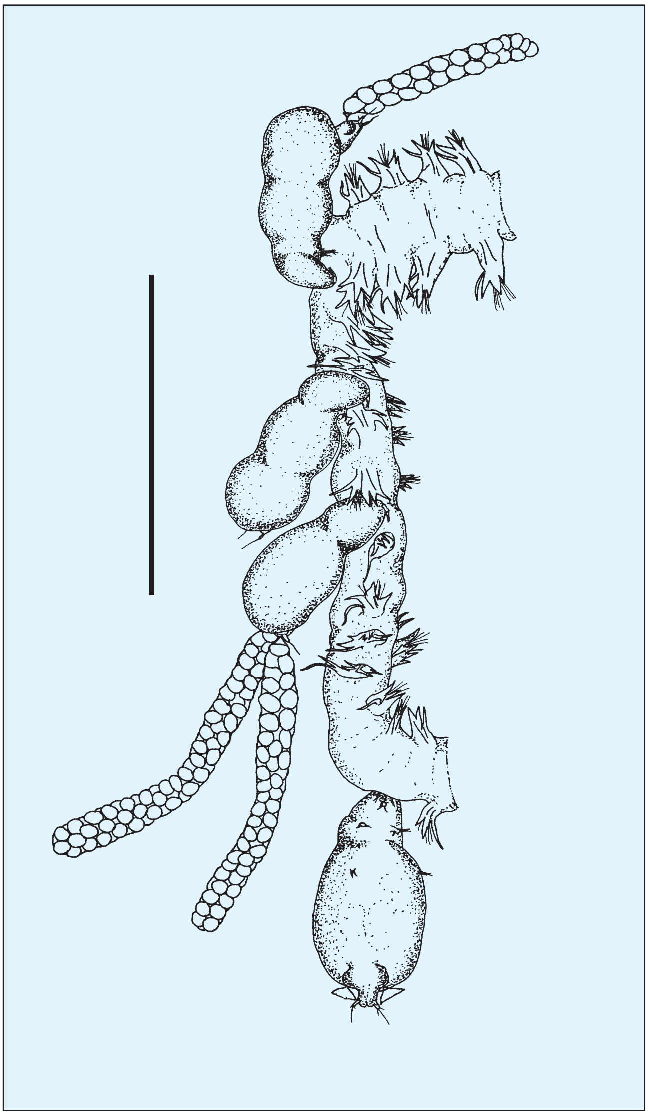

Fig. 5.20: Nereicola ovatus*, ovigerous female parasites attached to* Nereis elitoralis *from Stn. 10. Copepods viewed laterally except lower specimen which shows ventral aspect. Scale bar = 2mm.*

Edwards, 1834) from the Bay of Alger, Algeria, to find only 13 parasitised worms.

The new find is of considerable interest, representing a new host species and a northwestern extension of the known range of *N. ovatus*.

Seliodes bocqueti Carton, 1963

Material examined: Stn. 65 (off St David's Head, 105 m), 1 mature female attached to the dorsum of a juvenile *Harmothoe* sp. Stn. 15 (off St David's Head, 112 m), 1 juvenile female attached to the dorsum of an anterior fragment of a juvenile *Harmothoe* sp. Stn. 67 (off St David's Head, 95 m), 1 juvenile female detached from any host. Stn. 68 (off St David's Head, 94 m), 1 ovigerous female attached to the anterior dorsum of anterior fragment of the scaleworm *Malmgrenia castanea* McIntosh, 1874 (Fig. 5.21). Stn. 70 (St. George's Channel, 94 m), 1 ovigerous female on a juvenile *Harmothoe* sp.

Seliodes bocqueti is known only from the Channel coast of France associated with *Adyte assimilis* (McIntosh, 1874). Nevertheless, material ascribed to this species has recently been collected in association with *Gattyana cirrosa* Pallas, 1766 from Kosterfjord, Sweden, and several localities off the east coast of Britain (O'Reilly, unpublished).

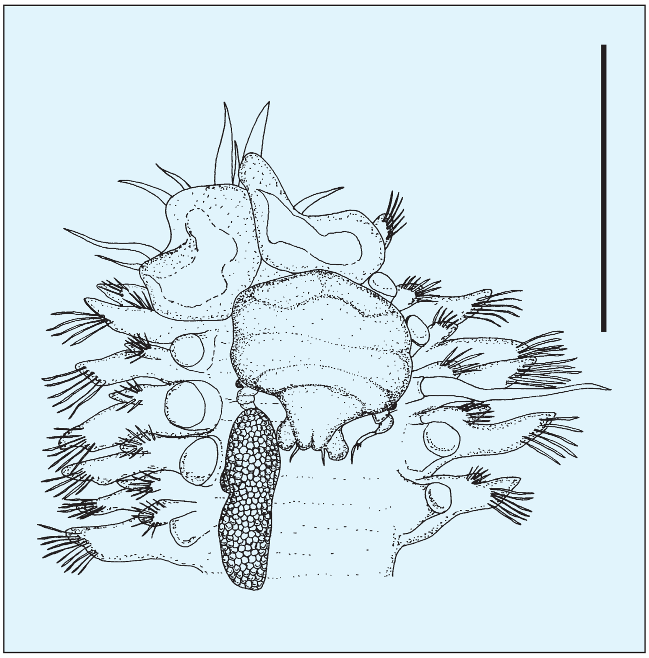

Fig. 5.21: Selioides bocqueti*, ovigerous female with single ovisac remaining, viewed dorsally, attached to anterior dorsum of* Malmgrenia castanea *from Stn. 68. Scale bar = 2mm.*

Another similar species, *Seliodes bolbroei* Levinsen, 1878, has already been recorded from British waters: Loch Fyne (see Scott 1905) and off St. Abbs Head, Firth of Forth (O'Reilly, unpublished). This species infests a variety of scaleworm hosts, including *G. cirrosa*, and has been recorded from the Arctic, Denmark, Sweden and the eastern North Sea (see Bresciani 1967). Levinsen introduced *Selioides* to acknowledge the similarity of his new species to *Selius bilobus* Krøyer, 1837, a parasite known from a single female attached to *Lepidonotus squamatus* (Linnaeus, 1767) in the Kattegat. Surprisingly, Krøyer's species, the first copepod associate ever described from an annelid, has never been seen since.

Selioides bocqueti bears an even more striking resemblance to *Selius bilobus*, a fact remarked upon by Carton (1965). Allowing for some inaccuracies in the inadequate description of *S. bilobus*, it seems conceivable that they may be congeneric, perhaps even conspecific. Initial inspection of the new material, presently attributed to *S. bocqueti*, lends support to this postulation, though a more detailed examination is required to confirm this.

Siphonostomatoida Latreille, 1829

Cancerillidae Giesbrecht, 1897

Cancerilla tubulata Dalyell, 1851

Material examined: Stn. 4 (off Anglesey, 110 m), 1 ovigerous female attached to oral side of small specimen of *Amphipholis squamata* (Delle Chiaje, 1828). Stn. 71 (St. George's Channel, 113 m), 2 mature female, one detached from any host, the other associated with a small *A. squamata*. Stn. 52 (Outer Cardigan Bay, 77 m), 1 immature female detached from any host.

Widely recorded around the British Isles, but also known from Scandinavia, the Mediterranean and western North America. This was the first copepod associate of echinoderms to be described from British waters (see Scott 1905). Some details of its development and biology are given by Carton (1968a, 1968b).

Xenocoelomidae Bresciani & Lutzen, 1966

Aphanodomus terebellae (Levinsen, 1878)

Material examined: Stn. 65 (off St.David's Head, 105 m), 6 female parasites infesting as many *Lanassa venusta* (Malm, 1874), the ovipore protuberance piercing each host's body wall ventrally between setigers 8 to 11. Both ovisacs remained attached in 1 specimen and a single ovisac was evident on 3 specimens; short broken strands were the only ovisac remnants on the other 2 parasites. Stn. 66 (off St.David's Head, 98 m), 1 ovigerous female with single ovisac remaining and one much smaller female, both protruding ventrally around setiger 11 from the same *L. venusta*. Stn. 67 (off St David's Head, 95 m), 1 ovigerous female with 2 damaged ovisacs protruding laterally from setiger 16 of a small specimen (~13 mm long, <2 mm wide) of *Polycirrus medusa* Grube, 1850; 1 mature female without ovisacs but with ovipore protuberance ventrally on setiger 9 of *L. venusta*. Stn. 68 (St. George's Channel, 94 m), 1 mature female without ovisacs but with ovipore protuberance ventrally on setiger 9 of *L. venusta*. Stn. 69 (St. George's Channel, 91 m), 2 mature female without ovisacs but with ovipore protuberance extruding ventrally from setiger 9 and 11 respectively in 2 specimens of *L. venusta*. Stn. 71 (St. George's Channel, 113 m), 1 ovigerous female with 2 damaged ovisacs protruding from an abdominal fragment of *Polycirrus* sp; 2 mature female without ovisacs but with ovipore protuberances extruding ventrally from setigers 8 and 10 of same *L. venusta*; 2 mature female without ovisacs but with ovipore protuberance ventrally on setigers 10 and 11 respectively in 2 specimens of *L. venusta*. Stn. 6 (St. George's Channel, 120 m), 1 ovigerous female with two ovisacs protruding ventrally between setigers 8 and 9 from a small specimen of *L. venusta*.

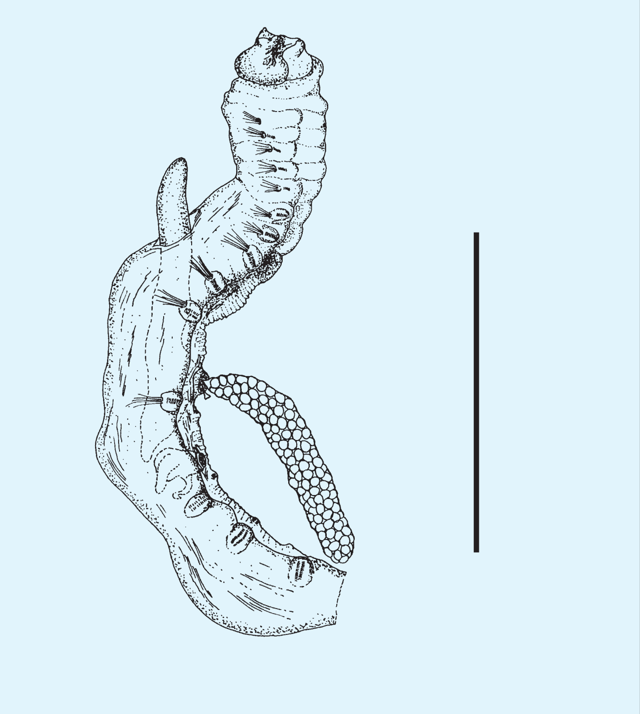

Fig. 5.22: Aphanodomus terebellae, *ovigerous female, with single ovisac remaining, and smaller female, without ovisacs, infesting* Lanassa venusta *from Stn. 66. The shape of the parasites is shown through body wall of host with dashed line. Lateral extension of larger female has ruptured dorsal body wall of host during fixation process. Scale bar = 2mm.*

Aphanodomus terebellae is a highly transformed copepod devoid of any external segmentation or appendages. The body is normally 2-3 mm long but is greatly extended laterally into an oblong or crescent shape about 6-8 mm wide. It is almost entirely endoparasitic within the coelomic cavity of its polychaete host, except on maturation when a small posterior protuberance pierces the host's external body wall. This is surmounted by a single pore through which paired ovisacs are attached (Figs. 5.22 & 5.23). Its anatomy, development and peculiar reproductive biology have been the subject of detailed investigations by Bresciani & Lutzen (1966, 1972, 1974).

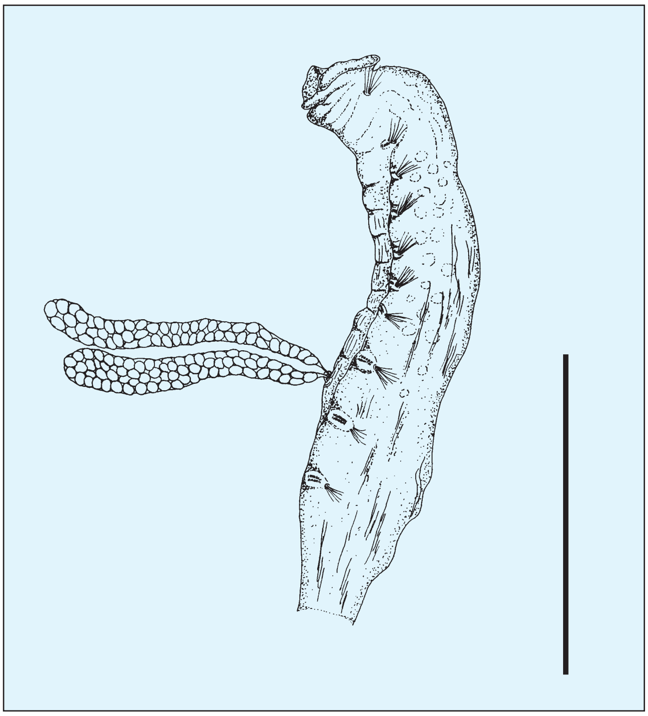

Fig. 5.23: Aphanodomus terebellae*, ovigerous female, with both ovisacs present, infesting* Lanassa venusta *from Stn. 66. Scale bar = 2mm.*

All previous records are from Arctic waters (Quebec, Greenland, Iceland & Kara Sea) infesting a range of terebellid polychaetes: *Amphitrite cirrata* O. F. Müller, 1771, *Artacama probiscidea* Malmgren, 1865, *Thelepus cincinnatus* Fabricius, 1780, *Nicolea zostericola* (Örsted, 1844) and *Nicolea venustula* Montagu, 1818.

The Irish Sea material represents two new host species and a considerable southerly extension of the known range. Interestingly, Bresciani & Lutzen (1966) examined 200 specimens of *Thelepus cincinnatus*, the most frequently recorded host, from the Gullmarfjord, Kattegat and Øresund but failed to find any parasitised specimens.

Species determination of such degenerate copepods is extremely difficult. It is possible that several species may be involved; each restricted to one or two allied hosts. The Irish Sea population seems to have a particular affinity for *Lanassa venusta*. At the stations listed above some 13-55% of this terebellid were visibly parasitised, the highest incidence being at station 65. The new material also appears to be somewhat smaller than that from the Arctic, though this may be a reflection of the small host size or some other environmental factor.

Harpacticoida Sars, 1903

Ectinosomatidae?

Ectinosomatidae sp.?

Material examined. The specimens, associated with the serpulid *Hydroides norvegica* Gunnerus, 1768, were only discovered when preserved worms were extracted from their calcareous tubes. A total of 48 copepods (including 8 ovigerous female) were recorded from 12 infested worms collected from stations 2, 4, 14, 15, 36, 48, 52, 55 and 65. Up to 20 copepods were noted on a single worm, though 1-3 per worm was the more usual infestation level.

The copepods were found compressed against each worm's body, often embedded in congealed epithelial mucus (Fig. 5.24). In addition, about 10 detached copepod ovisacs were observed. These had been squashed between the worms' bodies and their tube walls in such a manner that the contained eggs occurred in a single plane.

Records of parasitic or commensal copepods are relatively rare within the Harpacticoida. Gotto (1993) lists only 10 from an estimated 900 British species and none of these have been recorded from polychaetes. However, one of the two tisbid species cited by Gotto as an occasional commensal of holothurians has also been implicated (Guerin & Cubizolles 1987) as an associate of larval polychaetes. More recently, Moore & O'Reilly (1993) recorded the diosaccid *Bulbamphiascus imus* (Brady,

1872) as a co-habitee within the membranous tubes of the polychaete *Capitella capitata* (Fabricius, 1780) from the Firth of Clyde. This species has also been widely recorded as a free-living member of the meiobenthos.

The relatively high number of harpacticoids recovered from the Irish Sea *Hydroides* specimens implies that they are regular co-habitees. Preliminary examination suggests they belong to neither the Tisbidae nor Diosaccidae, but rather to the Ectinosomatidae. To my knowledge there do not appear to be any previous records of commensal ectinosomatids. More detailed studies will be required to confirm their place within this family and determine their precise identity.

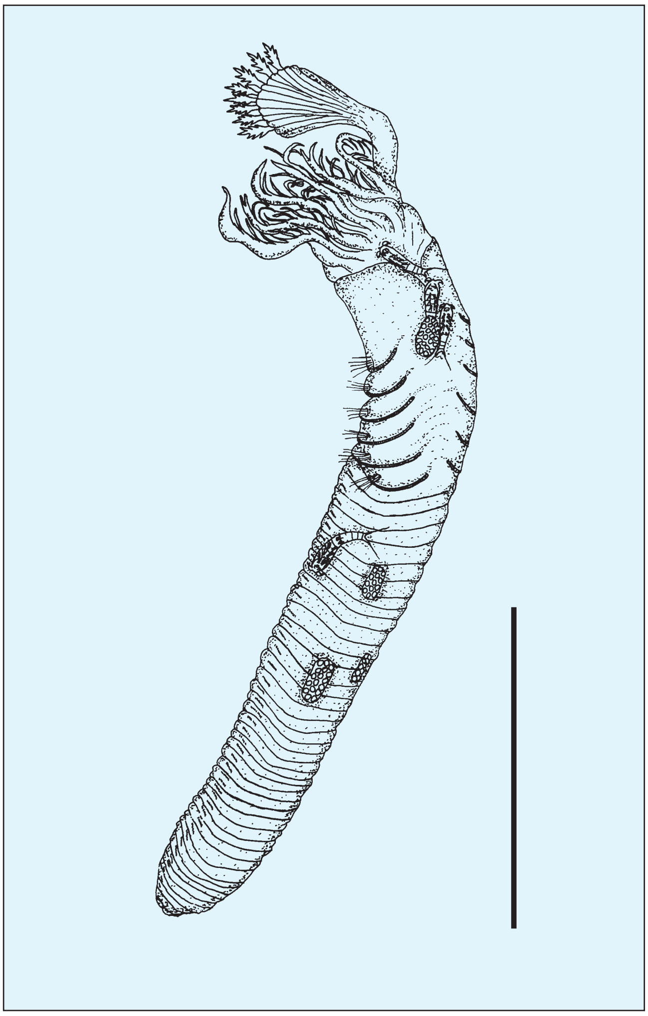

Fig. 5.24: Hydroides norvegica, *juvenile from Stn. 55, with 4 harpacticoid co-habitees and 3 detached ovisacs compressed against the body. Scale bar = 2mm.*

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5.6 Miscellaneous Phyla

Andrew S. Y. Mackie & Sheila S. C. Westwood

Introduction

The remaining enumerable animals were predominantly infaunal or 'semi-infaunal' and were dominated by the Echinodermata. The Nemertea, Phoronida and Sipuncula were also prominent, and the larger Foraminiferida (ASTRORHIZIDAE) locally so, but the Brachiopoda and Cephalochordata (*Branchiostoma*) were rare. Among the mainly epifaunal animals, the Tunicata were common on the coarser sediments. Together with certain of the larger Cnidaria (e.g. *Alcyonium*), the Echiura, some Entoprocta and the Enteropneusta, these miscellaneous animals were collectively referred to as the 'Other Phyla'.

The identification of such a diverse assortment of animals is difficult, requiring the use of quite different taxonomic characters for each group. The identification keys, where available, are of variable quality and practicability, and juveniles often remain unresolved. The main sources used for identification were Emig (1979) for phoronids, Gibbs (1977) for sipunculans, Millar (1970) for ascidians, and Mortensen (1927) and Picton (1993) for echinoderms. Hayward & Ryland (1990a, b) proved grenerally useful for all groups. With only a few exceptions, identifications were by Trevor Telfer (Institute of Offshore Engineering, Edinburgh) for the 1989 stations and by Sheila Westwood for the 1991 stations.

In the present study the nemerteans have been treated as one taxon. It was possible to recognise different morphological forms (= species?), particularly among specimens from local areas of like sediments, but it proved impossible to be confident of consistency for material collected across the full range of sediments and depths. The current key to British Nemertea (Gibson 1982) requires the examination of living specimens and particular fixation/preservation techniques are essential.

The halacarid mites (Arachnida: Acari) were only occasionally found in the 0.5 mm sieved samples; smaller meshed sieves would have been necessary for adequate collection. They were not included in any of the numerical analyses and are included here because previous records are infrequent. All were identified by Dr. Roger N. Bamber.

Echinodermata

Asteroidea

The starfish, though not particularly abundant, were of particular interest with respect to their zoogeographical distributions.

Hippasteria phrygiana (Parelius, 1768), the 'Rigid Cushion Star', was trawled off St. David's Head (Stn. 66; 98 m) in the middle of St. George's Channel. This species is infrequently recorded in British waters but has previously been found in Scotland, Shetland, the North Sea and Plymouth Sound. On a wider scale, it is also known (20-800 m) from Scandinavia, Iceland and Greenland. Little is known about this species except that it lives on flat sediment bottoms feeding on echinoderms and bivalves.

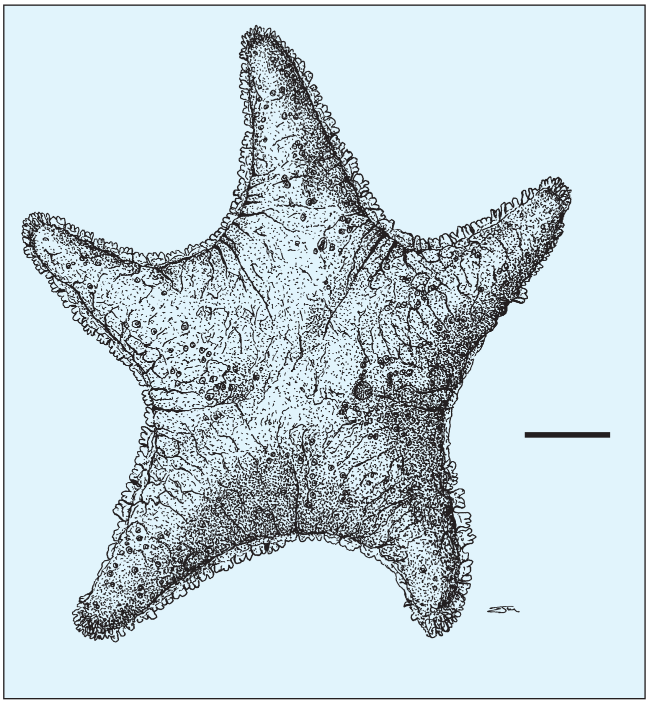

Fig. 5.25: Marginaster capreensis.
Scale bar = 10mm

Primarily a Mediterranean species, *Marginaster capreensis* (Gasco, 1876) has rarely been reported in British seas. Mortensen (1927) only cited this from deep-water (2487 m) off northwest Ireland, though otherwise it was known from shallower waters (50-600 m). In the present study, 3 specimens (one figured: Fig. 5.25) were recorded from the trawl at station 14 (110 m).

Another uncommon species found in the same vicinity (Stns. 66 & 67) as the previous two species was *Stichastrella rosea* (O. F. Müller, 1776). This species is more usually found in exposed rocky situations (Picton 1993). It is rare south of the English Channel coast, but occurs north to arctic Norway in 4-430 m.

Henricia oculata (Pennant, 1777), 'Bloody Henry', was found more widely on the offshore (80-113 m) coarse sediments (Stns. 1, 14, 66, 71). This apparently southern species has been recorded from the Irish Sea, and the south and west coasts of Britain, but it can be difficult to distinguish from the northern *Henricia sanguinolenta*. The two are known to occur together on the west coast of Scotland. According to Picton (1993) the species is common in habitats subjected to high water movement.

Ophiuroidea

The dredges and trawls from the deeper parts of St. George's Channel yielded the greatest number and diversity of adult ophiuroids and echinoids. The sediment of this area ranged from muddy sand in the south (Stn. 59) to coarse sandy gravel with shell and stones in the north (Stn. 73). Juvenile ophiuroids were widely distributed across the survey area with particularly high densities noted at stations 56 and 59.

The brittlestars were notable for exhibiting distribution patterns that primarily corresponded with sediment type. *Ophiothrix fragilis* (Abilgaard, 1789) and *Amphipholis squamata* (Delle Chiaje, 1828) were common throughout the coarser sediments. *Ophiactis balli* (Thompson, 1840), however, was restricted to the deeper mid-channel stations (Fig. 5.26). Of the species inhabiting the finer substrata, *Amphiura filiformis* (O.F. Müller, 1776) was common in the silty sands and sands of both the shallow inshore and deep offshore (Fig. 5.26). On the other hand, *Amphiura chiajei* Forbes, 1845 was virtually restricted to the siltier deeper stations in the Celtic Deep, while *Amphiura (Acrocnida) brachiata* (Montagu, 1804) was found in the shallower sediments of Cardigan and Red Wharf Bays.

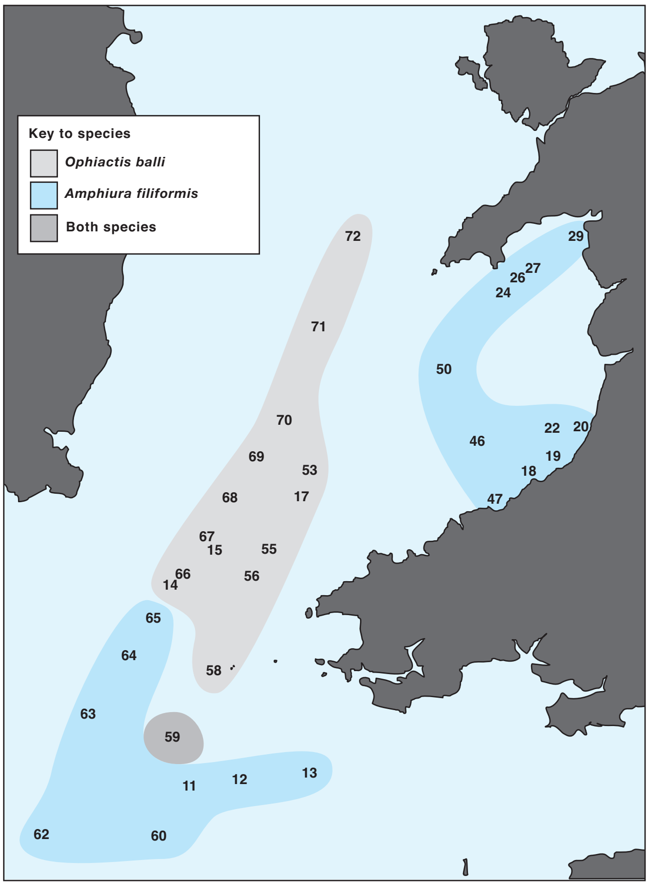

Fig. 5.26: Distribution of Ophiactis balli *and* Amphiura filiformis.

Echinoidea

The most commonly encountered echinoid was *Echinocyamus pusillus* (O. F. Müller, 1776). It was widely distributed in the predominantly coarse sediments to be found offshore. Although this small urchin has been recorded all round the British Isles, it nevertheless appeared less frequent north of the Lleyn Peninsula (Fig. 5.27). The larger echinoids were all infrequently encountered, but tended to be associated with different sediment types. For example, whereas *Spatangus purpureus* O. F. Müller, 1776 occurred in the deeper offshore gravels (80-112 m), *Echinocardium cordatum* (Pennant, 1777) generally favoured the shallower sands (i.e. 7-28 m, but also to 112 m), and *Brissopsis lyrifera* (Forbes, 1841) was restricted to the muddier sediments of the Celtic Deep (Fig. 5.27).

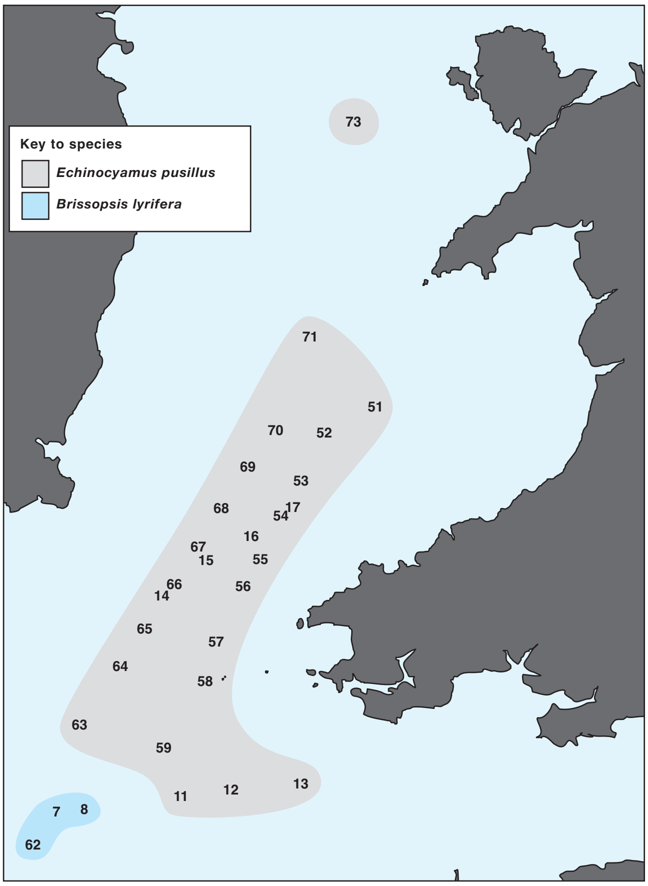

Fig. 5.27: Distribution of Echinocyamus pusillus *and* Brissopsis lyrifera.

Holothuroidea

Leptosynapta minuta (Becher, 1906) was the most interesting holothurian found (Stns. 56, 58 & 73). Originally described from Heligoland in the North Sea, the only previous record from the British Isles was from off the west coast of Ireland (Picton 1993). It is thought likely that this species has a wider geographical distribution but remains under-recorded because of its small size (~1 cm long). The present records are from greater depths (94-128 m) than the original discovery (~20 m) and the sediments are also coarser, though Picton recorded it as occurring "amongst maerl and coarse gravel in areas of strong current". The largest number of specimens were collected at station 56.

Phoronida

At least three phoronid species were present in the BIOMÔR material. These have been tentitatively identified as *Phoronis pallida* Silén, 1952, *P. ovalis* Wright, 1856, and *P. muelleri* Selys-Longchamps, 1903.

The distinctively 'annulated' *P. pallida*, occurring in the shallow, and generally silty, sands of Cardigan and Caernarfon Bays was newly recorded for the British Isles. The species was, however, found in somewhat deeper water (20-49 m) compared to previous European records (1-14 m) from Sweden, the German Bight and Spain (Emig 1979)

The identifications of the remaining two species were more problematical. The first of these, *P. ovalis*?, was found boring within dead bivalve shells. Although such shell was common in the coarser offshore sediments, the species was probably under-recorded due to oversight of its cryptic lifestyle. Its identity was regarded as questionable because many specimens appeared to possess a collar-fold; a feature of the genus *Phoronopsis*. However, as the tentacle-bearing lophophore is retractable in this species (Emig 1979; Ryland 1990), it could be that the 'collars' were simply artefacts attributable to the fixation process. For the numerical analyses the remaining species was recorded as *Phoronis* spp. since some of the material was fragmented and its identity as *P. muelleri* could not be confirmed.

Brachiopoda

A single species, *Gwynia capsula* (Jeffreys, 1859), was recorded from two gravelly localities (Stns. 31 & 35), 45 and 49 m, in the outer parts of Caernarfon Bay. The identification of the specimens was confirmed by Dr. Michael G. Bassett, who kindly provided the following notes.

The specimen from station 35 was characteristic of this micromorphic species. Apart from its minute size and very thin shell, its identity was confirmed by the milk-white translucent colour, subequally biconvex smooth valves, subcircular outline, straight hinge, rectimarginate anterior commissure, relatively large foramen with small, disjunct deltidial plates, and distinctive, relatively large and widely spaced endopunctae.

The four specimens from station 31 were smaller and probably represent younger growth stages. At least one was somewhat more elongateoval in outline, but there was no reason to doubt their assignment to *G. capsula*.

This species has been fairly widely reported in the coastal regions of the Irish Sea (e.g. Brunton & Curry 1979). It is one of the few brachiopods known to remain meiofaunal in its adult state, occupying a wide range of mesopsammic habitats. In addition to attachment to stones (especially the undersides), it is known to live within dead shells and serpulid tubes, and in the interstices of shell gravels (e.g. Davidson 1887; Swedmark 1964, 1967, 1971; Crisp & Williams 1971; Bassett 1984).

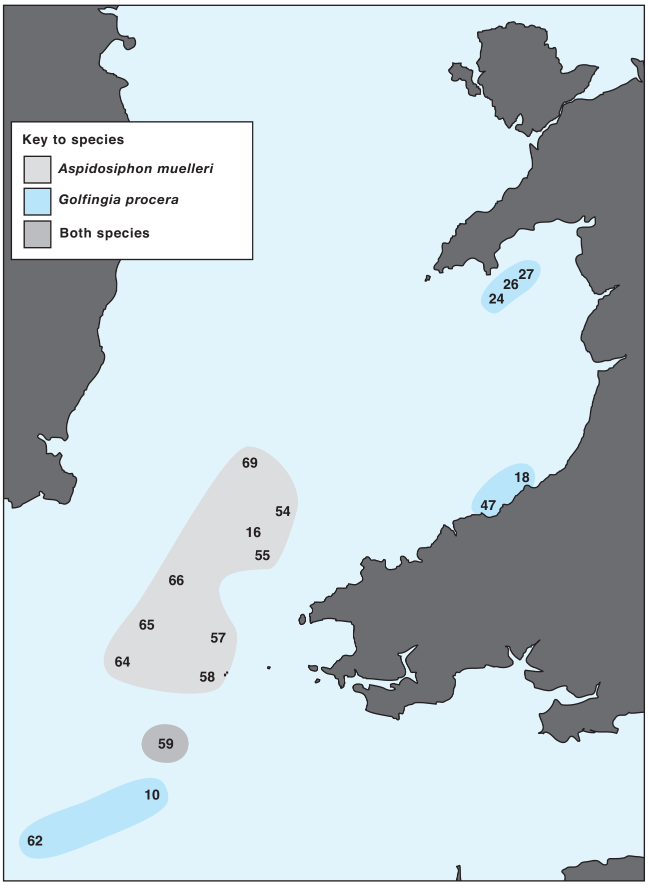

Fig. 5.28: Distribution of Aspidosiphon muelleri *and* Golfingia procera.

Sipuncula

Among the sipunculans the most distinctive distributions were exhibited by *Aspidosiphon muelleri* Diesing, 1851 and *Golfingia procera* (Mobius, 1875). The first was confined to the deep mid-channel region between Pembrokeshire and Carnsore Point whereas the second was found in the muddy sands of both the Celtic Deep and the shallower Cardigan Bay (Fig. 5.28). *Aspidosiphon muelleri* was of additional interest in view of its apparent rarity in British waters (Knight-Jones & Ryland 1990), despite being distributed from Shetland and Norway to the Mediterranean and West Africa (Gibbs 1979).

Tunicata

Apart from *Dendrodoa grossularia* (van Beneden, 1846), the tunicates were relatively infrequently encountered. A common species, with a wide geographical range in the North Atlantic and Arctic, *D. grossularia* was found throughout the coarse offshore sediments. It was locally very abundant and also occurred on the few stones that were present on the softer inshore sediments (e.g. Stns. 27 & 29).

Polycarpa fibrosa (Stimpson, 1852) is likewise generally distributed around the British Isles but is not common (Miller 1970). It was found in small numbers at four locations (Stns. 40, 48, 53 & 59) on sediments ranging from muddy to gravelly sand, and on stones.

Foraminiferida

There appeared to be two types of large foraminiferid present in the survey material, both belonging to the Astrozhizidae. A few specimens of the first were only found at a shallow (21 m) coarse sediment locality in Cardigan Bay (Stn. 44). The specimens had a test which was fairly rigid, incorporating large sediment particles. The second had a softer, less-arenaceous, test and was restricted to the deep sands and muddy sands (88-109 m) of the Celtic Deep (Stns. 11, 12, 59 & 63). Specimens of this form, identified as *Astrorhiza limicola* Sandahl, 1858, were particularly abundant at station 11.

It is not clear whether the two ‘forms’ represent different species or are simply variations of *A. limicola*. Buchanan & Hedley (1960) considered the composition of the test to reflect the type of sediment present in any given area and therefore differences between animals obtained from different locations was of little significance.

Acari

Four species of halacarid mites were found in the BIOMÔR collections. All have been previously recorded from the Irish Sea, mostly from off Strangford Narrows (see Green & Macquitty 1987). Species occurrences are given below; each record is for a single specimen.

Arhodeoporus gracilipes (Trouessart, 1889) was recorded from three offshore locations, one off the Lleyn Peninsula (Stn. 36) and the others in St. George's Channel (Stns. 65 & 66). In each case the sediments were gravelly and the depths ranged from 59-105 m.

Copidognathus lamellosus (Lohmann, 1893) and *Copidognathus* cf. *rhodostigma* (Gosse, 1855) were both collected from sand, 49 m depth, in the outer part of Cardigan Bay (Stn. 50).

Lohmanella falcata (Hodge, 1863) was recorded from two locations, one in Cardigan Bay (Stn. 46) and the other in St. George's Channel (Stn. 66). The sediments were both gravelly and the depths were 30 m and 96 m respectively.

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5.7 Epifauna

Gerd Könnecker

Introduction

The southern Irish Sea, with its variety of hard substrates and strong current flow, offers ideal conditions for a large number of epibenthic organisms. The composition of the sessile epibenthos extracted from the qualitative samples is described and its zoogeographical implications and ecological parameters discussed.

Ecological Parameters

Two features characterise the study area, a substrate that in the main consists of hard packed sediment with a large proportion of shell, gravel and stones, and strong currents leading to extensive mixing of the water column and lack of well defined thermoclines. This combination favours Bryozoa and Hydroidea, with Porifera prominent at only a few stations. Most Porifera, with the exception of *Polymastia* and *Suberites* spp., have a very short larval life span and the development of a rich faunal composition therefore requires extensive coherent hard substrates. The sponge fauna over much of the study area shows this “island” effect in its settlement pattern, with *Prosuberites epiphytum* being the most widespread species recorded. The majority of the Porifera recorded were small forms typical of offshore gravel deposits, with only a quarter of the species representing bigger or upright forms. By contrast, the Bryozoa and Hydroidea were represented by numerous large and bushy forms, which in turn offer a suitable substrate for a number of smaller or epizoic species.

Porifera

Amongst the poriferans, those typical of offshore gravel habitats were *Eurypon* spp., *Paratimea constellata*, *Halicnemia patera* and *Hymeraphia stellifera*. *Amphilectus fucorum* and *Myxilla rosacea* were typically associated with clumps of the bryozoan *Cellaria*.

The family Axinellidae was very poorly represented in the survey material; the only species recorded were *Bubaris vermiculata* and *Axinella infundibuliformis*, each with a single record. This family is characteristic of cold stenothermal conditions and the warmer waters of the Irish Sea prevent its occurrence. It was also absent from Carnsore Point (Keegan *et al.* 1987) and from the adjacent Celtic Sea surveys. There are, however, records from the northern Irish Sea.

Bryozoa and Hydrozoa

The bryozoan fauna was dominated by the large bushy species *Flustra foliacea*, found in large amounts throughout the study area. This is a typical species of areas with strong currents and provides a major attachment surface for other species.

The other main component of the larger forms was the hydroid *Hydrallmania falcata*, recorded at virtually every station. Other bigger species were *Nemertesia* spp., *Diphasia* spp. and *Sertularia cupressina*. These larger species supported a rich variety of typical epizoids, namely the hydroids *Calycella syringa*, *Filellum serpens*, *Lafoea dumosa*, *Campanularia hincksii*, *Clythia hemisphaerica* and *Laomedea* spp. Typical epizoid bryozoa were *Electra pilosa*, *Aetea anguina*, *Tubulipora liliacea* and *Cellepora pumicosa*.

A number of species form a “turf”; the most important of these were the bryozoans *Eucratea loricata*, *Bicellariella ciliata*, *Bugula* spp., *Crisia* spp.,*Vesicularia spinosa* and *Amathia lendigera*.

A large proportion of the bryozoa encrusting stones and shells were typical of such habitats in most environments around the British coasts and of ubiquitous distribution. The more prominent of these were *Conopeum reticulum*, *Electra pilosa*, *Porella concinna*, *Escharella* spp., *Schizomavella* spp., *Microporella ciliata*, *Chorizopora brongniartii* and *Disporella hispida*.

Zoogeographical Aspects

Porifera

This is probably the least known group with generally few and scattered records. However, all species recorded in this study have a wide geographical distribution in the Atlantic and North Sea. A notable exception was *Polymastia agglutinans* which is at the northwestern limit of its distribution and the only previous British record was from Cornwall.

Hydroidea

Although better known than the sponge fauna all recorded species from this study were well within their reported range.

Anthozoa

This group had perhaps the highest bias towards a southern distribution, with *Aureliania heterocera*, *Aiptasiogeton pellucidus*, *Hormathia coronata*, *Paraphellia expansa*, *Amphianthus dohrnii* and *Edwardsia claparedii* all confined to the southern and southwestern sea areas of Britain.

Bryozoa

While many species were of ubiquitous distribution, nevertheless there were a number of species confined to southern or southwestern waters. These were *Crassimarginatella solidula*, *Alderina imbellis*, *Cauloramphus spiniferum*, *Cellaria salicornuoides*, *Bugula plumosa*, *Puellina innominata*, *Umbonula ovicellata* (this species is at its northern limit), *Hippoporina pertusa*, *Pentapora foliacea*, *Phylactella labrosa*, *Schizotheca fissa*, *Plagioecia sarniensis* and *Lichenopora radiata*.

By contrast, the three species of the genus *Amphiblestrum* are at the southern limit of their distribution in the study area.

Tunicata

Most of the species recorded in this group were of ubiquitous distribution around the British Isles, with only *Archidistoma aggregatum*, *Perophora listeri* and *Pyura microcosmus* confined to southern or southwestern sea areas. The overall picture was of a fauna typical of offshore gravel substrates around the British Isles with a sizeable number of species confined to the southwestern sea areas.

Discussion

The sessile epibenthos in the area studied was, in the main, fairly uniform throughout. The distribution would seem to be governed more by local topography and substrate conditions than by geographical location. The turbulent water conditions and subsequent mixing in the water column prevent an establishment of the cold stenothermal “étage circalittoral” established by Cabioch (1968) and other French workers and which correspond with the *Axinella dissimilis* Association and the *Tethyopsilla tetilla* Association (Könnecker 1977). The epifauna was also virtually identical to that recorded in the survey off Carnsore Point (Keegan *et al.* 1987).

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6. Classification and Ordination

Marine ecologists have long sought to describe the faunal assemblages of the seabed. The analysis of pattern in the benthic habitat can be said to have commenced in earnest with the quantitative studies of Petersen. In a summary of his work, Petersen (1924) characterised benthic communities according to the dominance, constancy and fidelity of the component species. This bears much in common with the terrestrial phytosociological approach of Braun-Blanquet (1932). Thorson (1957) and others developed Petersen's ideas further, but some considered these classification techniques prone to subjectivity (e.g. Stephenson *et al*. 1972) and doubted the existence of communities composed of regularly recurring species (e.g. Whittaker 1962). Much attention was therefore placed upon the development and use of objective analytical methodologies. These were summarised by Clifford & Stephenson (1975), Gauch (1982), Jongman *et al*. (1987) and Manly (1994).

Multivariate analyses of benthic environments can usually be accommodated under two collective terms, classification and ordination. Classification analyses seek to assign entities to groups, whereas ordinations attempt to place these spatially so that similar entities are close and dissimilar ones distant. Commonly used classification methods include cluster analysis and two-way indicator species analysis (TWINSPAN; Hill 1979b). Ordination techniques include principal components analysis (PCA), correspondence analysis (CA) and its 'corrected' modification -detrended correspondence analysis (DECORANA; Hill 1979a), canonical correspondence analysis (CCA) and multidimensional scaling (MDS; see Kruskal & Wish 1978).

An important factor in the use of these techniques has been the advance of computer technology. Mainframe computers gradually became available for general ecological research from the early 1960s, though they were neither common nor particularly easy to use. Within twenty years, personal computers were becoming both popular and increasingly powerful. Today these are routinely used to run rapidly evolving ecological computer packages such as PRIMER (Plymouth Routines in Multivariate Ecological Research), which includes MDS, PCA and cluster analysis, MVSP (Multi-Variate Statistical Package; Kovach 1993), which includes DECORANA, PCA, and cluster analysis, and CANOCO (ter Braak 1987-1992), an extension of DECORANA.

Materials and Methods

The benthic macrofaunal assemblages of the BIOMÔR study area were investigated by cluster analysis and non-metric multidimensional scaling (MDS). The results from the MDS analyses were 'matched' to combinations of environmental variables using the experimental BIO-ENV procedure (Clarke & Ainsworth 1993) developed for PRIMER.

All analyses were carried out on a Dell 325P computer fitted with a maths co-processor, a 250 MB hard disc and 12 MB RAM. In addition to the examination of the 'Total Fauna' (excluding qualitatively assessed epifauna), separate cluster and MDS analyses were also carried out on each of the major faunal components (i.e. Annelida, Mollusca, Arthropoda, 'Other Phyla' & Epifauna).

Cluster Analysis

Cluster analysis is a technique in which entities are sequentially linked together according to their similarity (or dissimilarity) producing a two dimensional hierarchical structure (dendrogram). Clusters result where two or more distinct groupings are present. Where the differences between entities are small, but incremental, 'chaining' may occur and often no clusters will be found.

Quantitative analyses employed the Bray-Curtis similarity coefficient (Table 6.1) as this has been shown to accurately reflect true similarity (Bloom 1981). Species abundances were scaled by a $\log_{10}$ (x+1) transformation in order to limit the influence of species exhibiting very high numerical dominance. The hierarchy of the dendrograms was determined by group average fusion.

Qualitative (binary) analyses used the Czekanowski similarity coefficient (Table 6.1), which is algebraically identical to the Bray-Curtis. In order to investigate the fauna of the entire survey area, the majority of these analyses utilised all available data. These dendrograms, and those from the separate faunal components, are presented in Appendix 6.

Index	**Equation**
Bray-Curtis	$200 \dfrac{\sum \min(n_{ij}, n_{ik})}{\sum (n_{ij}, + n_{ik})}$

where n_{ij} = abundance of the ith species at site J
n_{ik} = abundance of the ith species at site K

Czekanowski	$100 \left(\dfrac{2C}{2C + A + B} \right)$

where C = number of species common to sites J & K
A = number of species unique to site J
B = number of species unique to site K

Table 6.1: Equations for calculating Similarity Indices.

It was recognised that the use of the entire data would introduce some bias towards stations sampled by dredges and trawls. This bias could possibly be reduced by the future inclusion of supplementary data from the qualitative sievings of the sediment sample residues. For the present, consultation of the number of taxa recorded per sampling method (Table 6.2 & Appendix 5: Tables A5.1-A5.4) showed that the totals for two Van Veen grabs were of similar magnitude to those from the dredges. Therefore the analysis of the 'Total Fauna' using only data from either of these two sampling methods was considered more reliable.

Two computer programs (PRIMER and MVSP) were utilised. All final analyses and graphics were derived from PRIMER, though the version (3.1) then available* to us could not run the largest data matrices. These were initially analysed using MVSP (maximum 750 species) with the resulting similarity matrices then being edited and imported into PRIMER. With the exception of the binary analyses for the 'Total Fauna' , which had single-occurrence species deleted, no data reductions were made.

*Since the BIOMÔR data was analysed, PRIMER (v4.0) has been released with a much increased computation capability (Martin Carr, pers. comm.).

Non-metric Multidimensional Scaling (MDS)

In multidimensional scaling the similarities (e.g. Bray-Curtis coefficient) between each pair of entities are used to produce a 'map' which ideally will show the inter-relationships of all. The goodness of fit is measured by the stress value; an ideal representation having zero stress. Relative stress values increase with increasing number of entities and decreasing dimensions. Generally, for two dimensional plots, a stress below 0.1 is good and below 0.2 is useful (see Clarke 1993). A value greater than 0.3 indicates that an ordination is little better than a random representation.

Two dimensional MDS plots were produced using PRIMER. In each analytical run nine iterations were calculated. If no global minimum stress value (i.e. at least two identical lowest values) was obtained then the analysis was repeated. Results for the separate faunal components are presented in Appendix 7.

Environmental Influences

The BIO-ENV procedure of Clarke & Ainsworth (1993) sets out to measure the agreement between the rank correlations of the biological (Bray-Curtis similarity) and environmental (Euclidean distance) matrices. A weighted Spearman rank correlation coefficient (ρ_W) is used to determine the harmonic rank correlations between the biological matrix and all possible combinations of the environmental variables. Correlations of 0.8 or more are regarded as representing a very good match.

The procedure was executed as part of the PRIMER package. The 'Total Fauna' quantitative data sets (1989, 1991, and combined surveys) were used with the omission of stations 4 and 54. The

Grp	Stn	VV	vv	AD	D	D+T	T	S	Total
A	7	61	-	-	-	-	39	-	76
	8	61	-	-	-	-	-	-	61
	9	51	-	-	-	-	-	-	51
	10	70	-	-	-	-	-	-	70
	63	121	-	-	-	-	71	-	160
	59	94	-	-	-	-	98	-	139
	60	94	-	-	-	-	-	-	94
	61	63	-	-	-	-	-	-	63
	62	70	-	-	79c	-	-	(19e)	107
	11	141	-	109a	-	(34d)	69a	-	220
	64	-	-	-	(85e)	85b	(10e)	-	175
	50	127	-	-	-	-	-	-	127
B	18	91	-	-	-	-	-	-	91
	19	71	-	-	-	-	-	-	71
	20	70	-	-	-	-	-	-	70
	24	53	-	-	-	-	-	-	53
	26	77	-	-	-	-	-	-	77
	47	70	-	-	-	-	-	-	70
	34	80	-	-	-	-	-	-	80
	27	98	-	-	-	-	-	-	98
	29	116	-	-	-	-	-	-	116
	12	65	-	-	-	-	-	-	65
	13	64	-	-	-	-	-	-	64
	43	73	-	-	-	-	-	-	73
	45	68	-	-	-	-	-	-	68
	28	77	-	-	-	-	-	-	77
	42	76	-	-	-	-	-	-	76
	32	93	-	-	-	-	-	-	93
	21	95	-	-	-	-	-	-	95
	22	75	-	-	-	-	-	-	75
	25	102	-	-	-	-	-	-	102
	23	75	-	-	-	-	-	-	75
C	67	-	-	-	173a	(32d)	26a	-	221
	68	-	-	-	198	-	-	-	198
	69	-	-	-	215	-	-	-	215
	70	-	-	-	166	-	-	-	166
	71	-	-	-	241	-	-	-	241
	73	-	-	-	214	-	-	-	214
	6	192	-	-	-	-	-	-	192
	15	194	-	-	-	-	-	-	194
	66	-	-	-	155a	(33d)	115a	-	241
	72	-	-	-	161	-	-	-	161
	36	-	-	-	193	-	-	-	193
	1	145	-	90	-	-	-	-	188
	2	156	-	-	-	-	-	-	156
	4	107	-	-	-	-	-	-	107
	14	167	-	-	-	-	134	-	238
	5	-	-	159	-	-	-	-	159
	31	-	146	-	-	-	-	-	146
	30	-	160	-	-	-	-	-	160
	35	-	-	-	143	-	-	-	143
	37	-	-	-	131	-	-	-	131
	57	114	-	-	-	-	12	-	121
	58	134	-	-	-	-	69	-	171
	65	-	-	-	141a	(31d)	120a	-	229
	51	130	-	-	-	-	-	-	130
	52	136	-	-	-	-	94	-	182
	17	137	-	-	-	-	-	-	137
	33	131	-	-	-	-	-	-	131
	49	133	-	-	-	-	-	-	133
	55	157	-	-	-	-	-	-	157
	16	125	-	-	-	-	-	-	125
	53	-	38	-	163	-	-	-	169
	56	-	-	-	-	126	-	-	126
	39	133	-	-	-	-	-	-	133
	48	182	-	-	-	-	-	-	182
	46	141	-	-	-	-	-	-	141
	38	144	-	-	-	-	-	-	144
	3	-	84	-	-	-	-	-	84
D	40	-	81	-	-	-	-	-	81
	44	-	131	-	-	-	-	-	131
	41	-	61	-	-	-	-	-	61
	54	29	-	-	-	-	-	-	29

a - excluding Mollusca (recorded as combined Dredge + Trawl).
b - excluding Annelida (recorded as separate Dredge + Trawl).
c - including Arthropoda from Sledge.
d - Mollusca only.
e - Annelida only.

Table 6.2: Total number of taxa recorded for each sampling regime.

first was omitted because no sediment data was available for this location, the second because of its ‘anomalous’ nature (see below) relative to the remaining 49 stations. The abundances were $\log_{10}$ (x+1) transformed as before.

The following environmental variables were used: gravel (%), sand (%), silt (%), clay (%), silt-clay (%), carbonate (%), organic matter (%), organic carbon (%), organic nitrogen (%), depth and latitude. All concentration (%) variables were $\log_e$ (x+1) transformed to reduce skewness in the data.

To investigate the possible differences between the correlations using only silt, only clay or silt-clay combined, two analyses were carried out per data set. This also served to reduce computation time.

Quantitative Cluster Analysis

The dendrograms derived from the quantitative data of both the 1989 and 1991 surveys (Fig. 6.1) revealed the presence of three main faunal assemblages (A-C). The combined quantitative analysis (Fig. 6.2) confirmed this and there were strong indications of further structure within each assemblage. This last analysis, combining surveys separated by 2 years, could exhibit some bias due to possible temporal alteration of the benthic faunal composition. Nevertheless, stations from similar

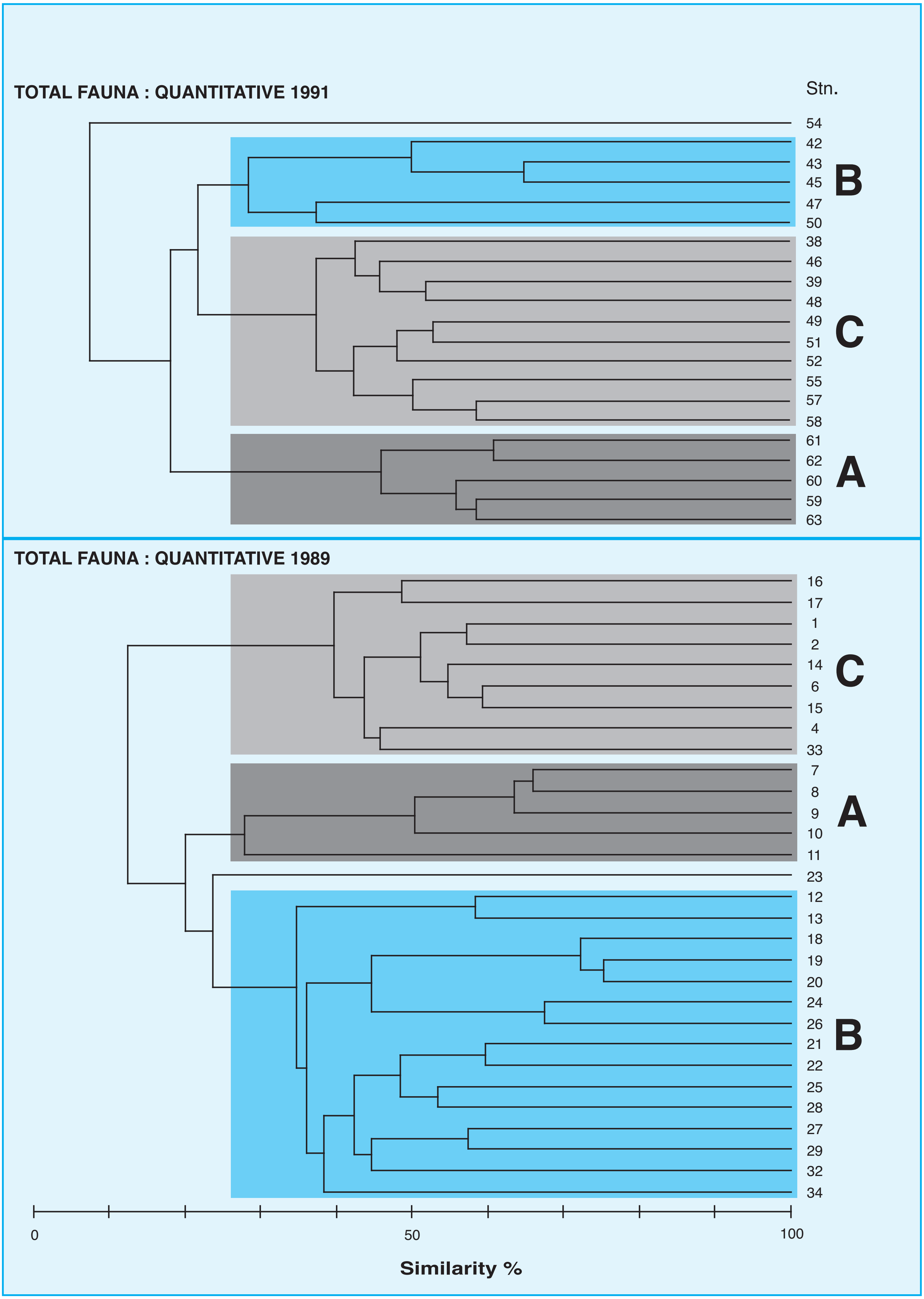


Fig. 6.1: Bray - Curtis classifications of the southern Irish Sea macrofauna.

Fig. 6.2: Bray - Curtis classification of the southern Irish Sea macrofauna.

sediments and depths generally seemed to have clustered together (compare Figs. 3.1, 4.4 & 6.3) suggesting such alterations were subtle at most.

Assemblage A was located in the soft sediments of the Celtic Deep, southwest of Pembrokeshire, with the stations more or less subdividing into those of the muds (Group A1) and those of the sands (Group A2).

Assemblage B was more complex, but was predominantly composed of inshore stations having soft sediments (sands and muddy sands). There were two main clusters of stations forming Groups B1 and B4. The first was located in the muddier sediments associated with depressions in the Cardigan Bay seabed (e.g. the 'Gutter'), while the second coincided with the nearby sands. Conversely, Group B2 (Stns. 12 & 13) was found in the deeper sands (78-88 m) of the Bristol Channel approaches. Group B3 included two shallow inshore locations (Stns. 32 & 34) and one deeper offshore one (Stn. 50), though all had sandy sediments. It should be noted, however, that the offshore station was located in an area of Cardigan Bay in which sandwaves and a sand ridge have been indicated (Dobson *et al.* 1971; see Fig. 4.2). Environmental conditions there may therefore be somewhat unusual.

Assemblage C accounted for all stations having gravelly sediments. Two subunits were identified; the stations of Group C1 were generally located offshore, whereas those of Group C2 occurred in outer Cardigan Bay. There was some suggestion of partitioning within C1 but the separation of clusters was not particularly clearcut.

Two locations (Stns. 23 & 54) were not clearly associated with any assemblage or group. The inshore station was closest to Assemblage B, whereas the deeper station 54 differed from all three. This location was characterised by loose clayey-sand containing a very sparse fauna, which may possibly be indicative of an area subject to severe tidal disturbance.

The clustering patterns for the Annelida (Appendix 6: Figs. A6.3 & A6.4), Mollusca (Figs. A6.7 & A6.8) and Arthropoda (Figs. A6.11 & A6.12) were in fairly good agreement relative to the composition of the three main assemblages. The dendrograms for the Annelida, the dominant faunal component, produced the best match with those for the 'Total Fauna'. Conversely, those for the 'Other Phyla' (Figs. A6.15 & A6.16), the smallest and most incompletely identified component, were poorly matched. Interestingly, in the molluscan analyses, station 54 was included in Assemblage C.

There was some variation in the constituent groups of the main clusters, particularly in relation to Assemblages B and C, and the affiliation of a few stations changed according to faunal component. Assemblage A was the most consistent with only station 11 changing position (molluscan analyses) by clustering with the sandy inshore station 32.

For each of the three main faunal components the stations of 'Assemblage B' more or less subdivided into two groups which respectively coincided with muddy sands and sands. There were, however, marked differences in the affiliations of stations 12 and 13, 23, and 50.

The annelid composition of stations 12 and 13 was most similar to that found in the inshore sands of Cardigan Bay, while the molluscan composition resembled that of the inshore muddy sands. The arthropods of these two stations were distinct from both station groups. The annelids of station 23 were distant from those of assemblage B, whereas the arthropods were most similar to those of the inshore sandy group and the molluscs resembled those of the shallower Cardigan Bay gravels. Conversely, the annelids and arthropods of station 50 were closest to those of the shallow gravels, while the molluscs of this station (and Stn. 39) were similar to those of the inshore sands.

For the annelids and arthropods the stations of Assemblage C showed some indication of subdividing into two groups coinciding with the offshore gravels and the Cardigan Bay gravels. The more inshore group ('C2') in each case was larger than that identified from the overall 'Total Fauna' dendrogram. Nevertheless, for all three main faunal components, the station clustering patterns within Assemblage C could also be interpreted as approximating to a compositional gradient from the

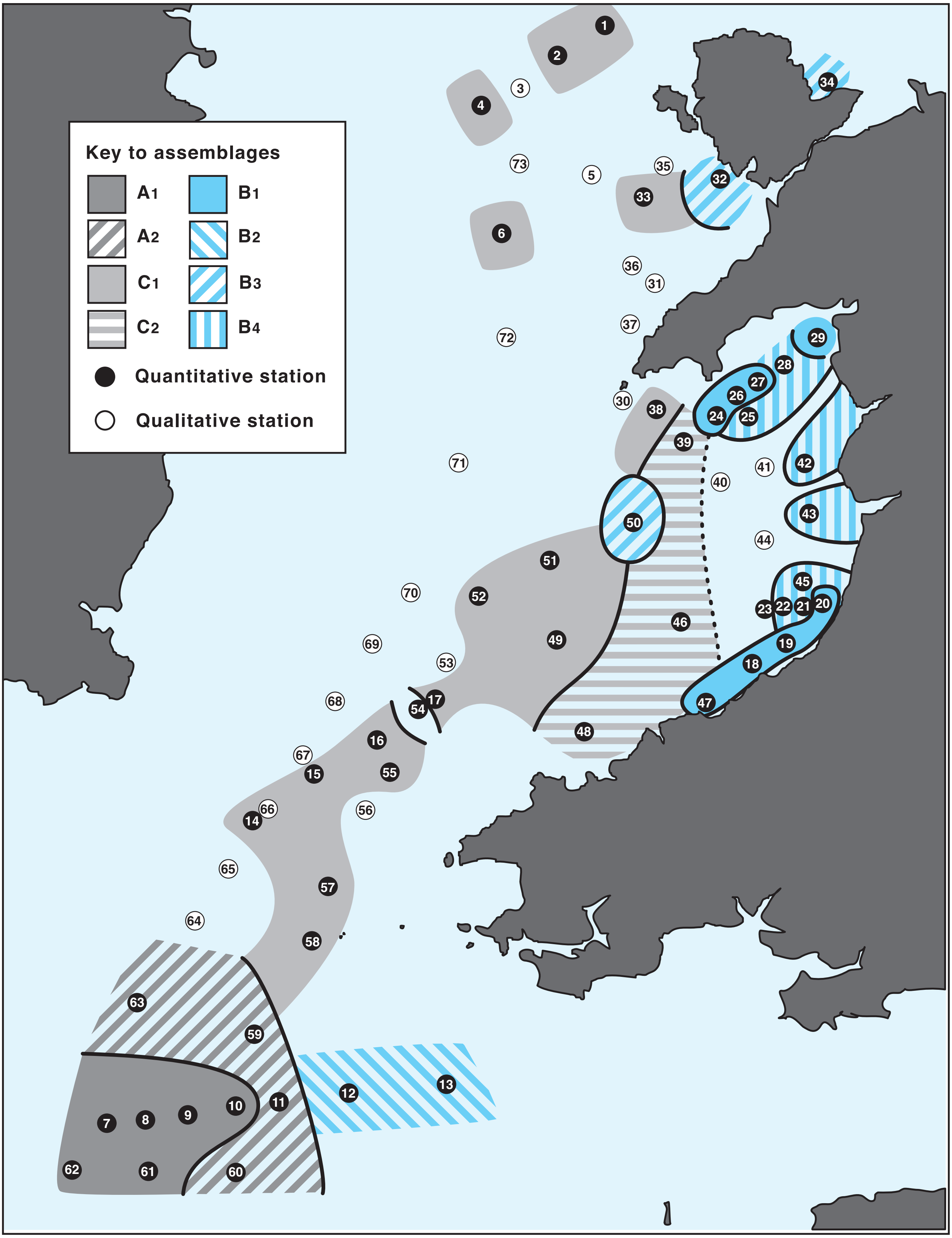
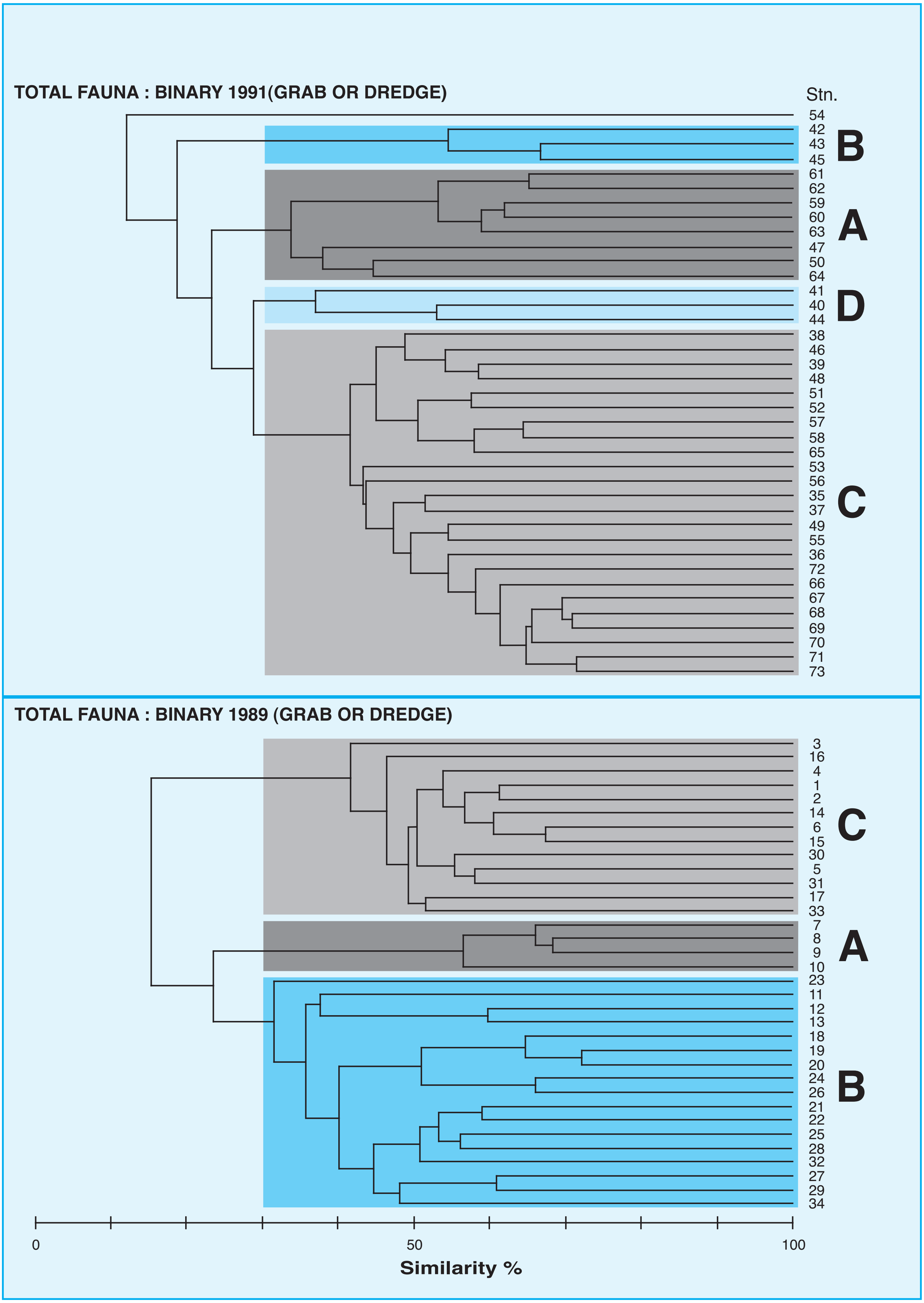


Fig. 6.3: Macrofaunal assemblages in the southern Irish Sea as determined by Bray-Curtis classification.



TOTAL FAUNA : BINARY 1991(GRAB OR DREDGE)

TOTAL FAUNA : BINARY 1989 (GRAB OR DREDGE)

Fig. 6.4: Czekanowski classifications for the southern Irish Sea macrofauna.

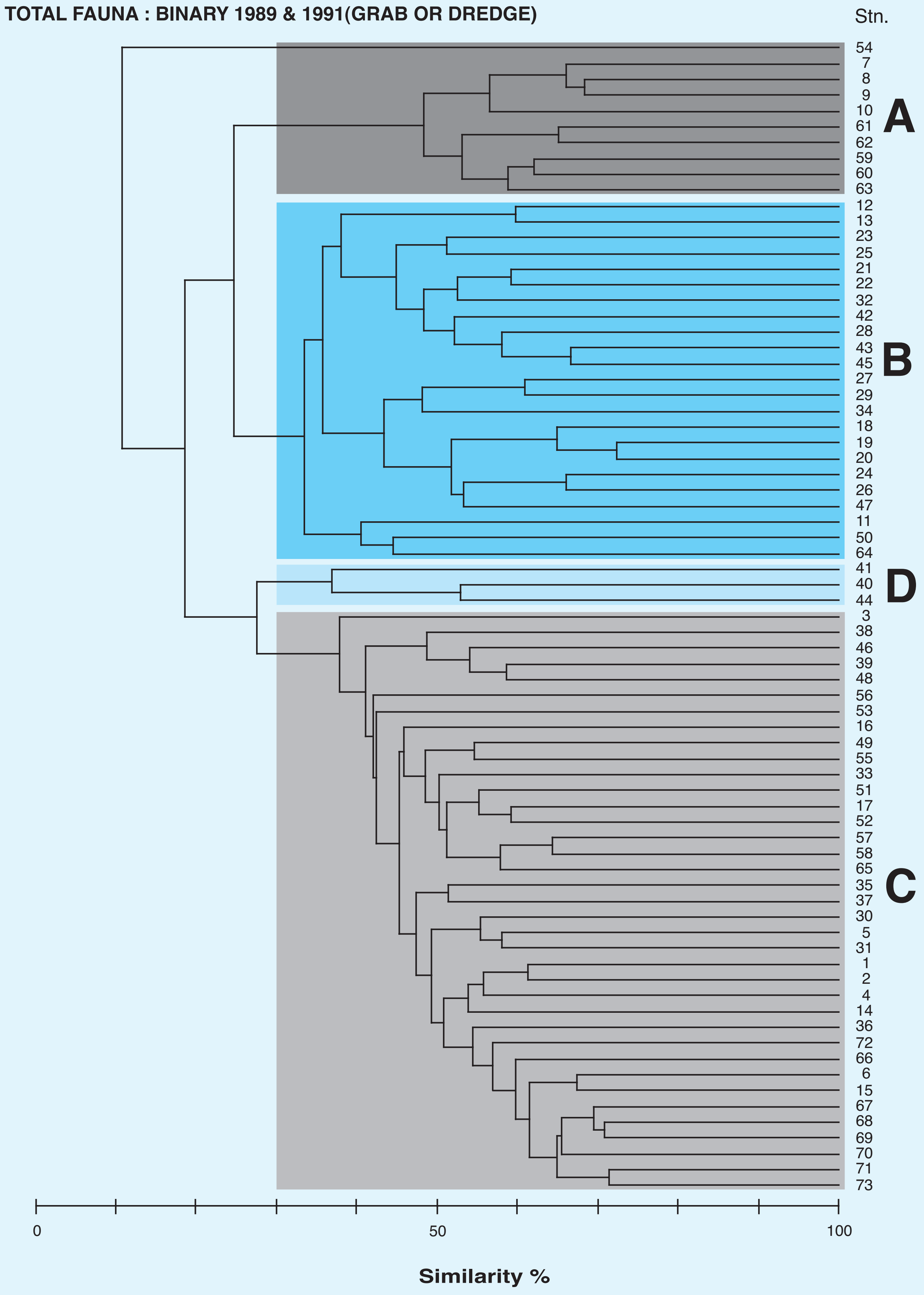


Fig. 6.5: Czekanowski classification for the southern Irish Sea macrofauna.

generally deeper St. George's Channel area to the shallower Cardigan Bay.

Binary Cluster Analysis

In qualitative cluster analyses using presence-absence (binary) data every species present has the same value, whatever its abundance. Thus incidental species represented by very few individuals can have a marked influence on the clustering pattern. Despite this, quantitative and qualitative analyses of the same data set often produce broadly similar results (pers. obs.), though some stations in the binary analysis usually occupy 'anomalous' positions relative to their position in the quantitative dendrograms. In this study, matters were further complicated by the use of data derived from combinations of different sampling methods. Consequently the results should be viewed with caution.

Examination of the binary dendrograms (grab-dredge) for the 'Total Fauna' (Figs. 6.4 & 6.5) revealed the same three assemblages (see Fig. 6.6) found in the quantitative analyses plus an additional one (Assemblage D). Indeed, the general trends in both types of analysis were the same.

Both Assemblage A and B could be subdivided as before, though a number of stations exhibited different allegiances. Group 'B3', in this case, differed markedly from its quantitative counterpart, sharing only station 50. For assemblage C there was again evidence of an outer Cardigan Bay group and some suggestion of a further partition in the offshore gravels (Fig. 6.6: dotted lines). Overall, this could simply represent a gradient of change. Assemblage D comprised three stony stations in the shallower parts of Cardigan Bay. A more complete resolution of Assemblages C and D can only be resolved by additional quantitative sampling. Station 54 was again quite distinct.

The 'complete' binary analyses of the 'Total Fauna' (Appendix 6: Figs. A6.1 & A6.2) produced similar results. The dendrograms were intermediate between those obtained from the quantitative and binary (grab-dredge) treatments. Interestingly, the inclusion of additional data completely removed the rather variable Group 'B3' and station 50 was incorporated into a larger cluster of outer Cardigan Bay stations. Assemblage D was again distinct.

The dendrograms for the different faunal components are provided for reference only (Figs. A6.5 & A6.6, A6.9 & A6.10, A6.13 & A6.14, and A6.17 & A6.18), no further interpretation being warranted at this stage. Note, however, that the locations categorised above as Assemblage D (i.e. Stns. 40, 41 & 44) were variously somewhat discrete from Assemblage C (Mollusca), included in a Cardigan Bay cluster within Assemblage C (Arthropoda) or approached Assemblage B (Annelida). The epifaunal dendrogram for the 1991 survey (Fig. A6.19) exhibited extensive chaining and no underlying structure could be determined.

Quantitative MDS

The MDS ordinations derived from the quantitative data of the 1989 and 1991 surveys (Figs. 6.7 & 6.8) each indicated three main station groupings. These corresponded to assemblages A-C as recognised from the cluster analysis and two outliers (Stns. 23 & 54) were again evident. In the combined survey plot (Fig. 6.9) the patterns were confirmed by highlighting the stations previously assigned to the three assemblages. The stress values for all three plots were low indicating good representations of the inter-relationships between the fauna of each station.

The structure within each assemblage was in good agreement with that revealed by the cluster analysis. Only a few 'discrepancies' were found between the two techniques. Assemblage A again showed clear evidence of being composed of two sub-units (Groups A1 & A2), though station 10 now appeared closer to the sandy Group A2 stations.

For Assemblage B, the stations of Groups B1 and B4 formed distinctly separate units with those of Group B2 occurring between the two. On the other hand, Group B3 stations did not form a distinct unit. The inshore Anglesey locations (Stns. 32 & 34) were clearly related to Group B4, while station 50 was rather distant from all other Group B stations. This suggests Group 'B3' may be an artefact produced by the clustering procedure. The sequential linking to clusters can sometimes iso-

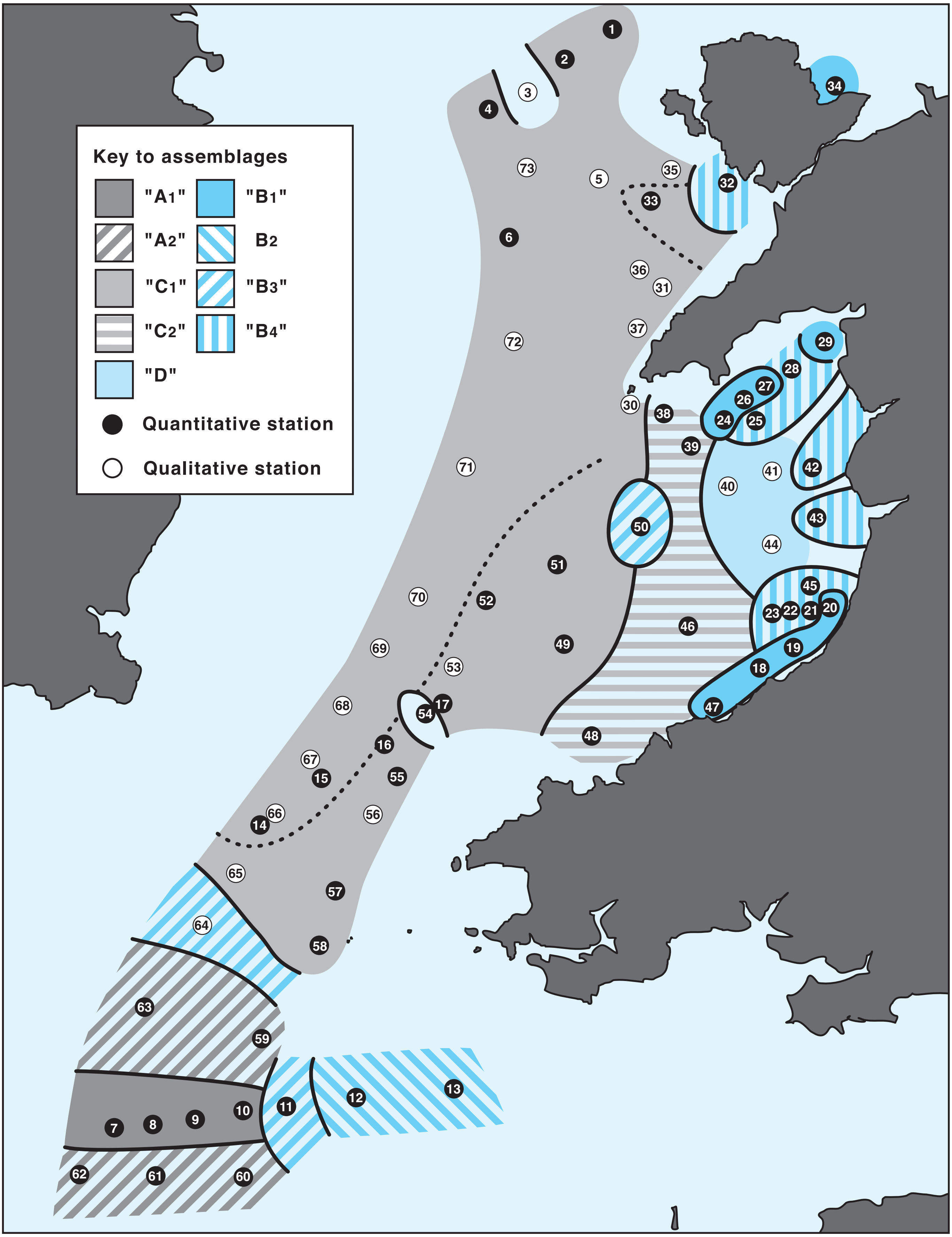


Fig. 6.6: Macrofaunal assemblages in the southern Irish Sea as determined by Czekanowski classification.

late some stations of slightly different composition. Their subsequent combinations with other unlinked stations may then result in somewhat heterogeneous groupings.

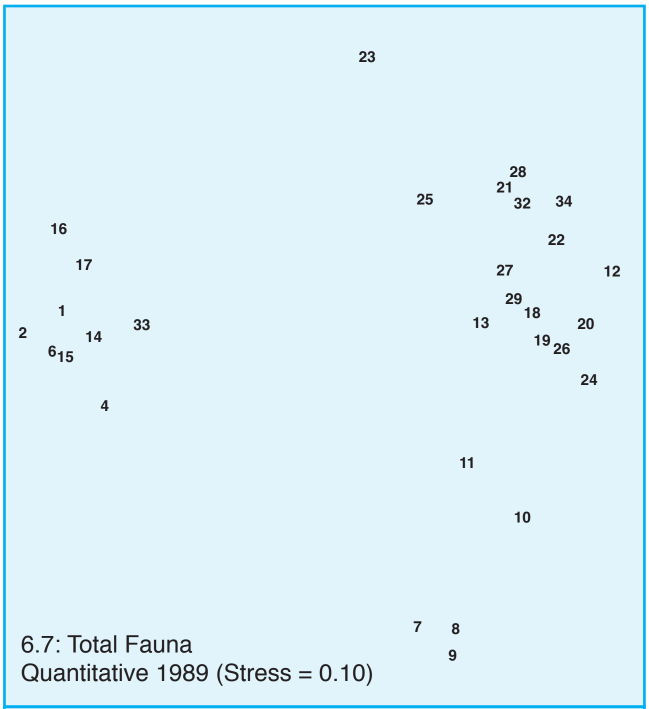
The separation of Group C1 and C2 was not well-defined. Group C2 stations (and station 51) were situated together, closer to Group B4 stations, but the ordination pattern rather supports a gradient of faunal change from offshore (e.g. Stns. 4, 6, 14 & 15) into the shallower Cardigan Bay gravels (Stns. 39, 46 & 48).

The ordinations of the three main faunal components revealed the same general spatial arrangement of the assemblages. The annelid plots (Appendix 7: Figs. A7.5-A7.7) almost exactly matched those obtained for the 'Total Fauna' and the stress values were the same. In comparison, more variation was evident in the mollusc (Figs. A7.11-A7.13) and arthropod (Figs. A7.17-A7.19) plots. The assemblages were less compact, sometimes less discrete and the stress values were higher. The 'Other Phyla' ordinations (Figs. A7.23-A7.25) showed no distinct pattern.

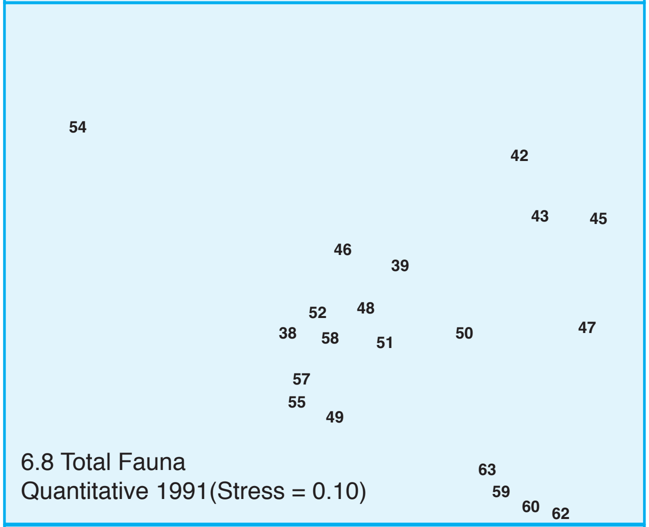
Binary MDS

The binary ordinations (grab-dredge) for the 'Total Fauna' (Figs. 6.10 & 6.11) were similar to the quantitative ones, especially in relation to the 1989 survey, and stress values were comparable. The 1991 plot additionally revealed Assemblage D. In the combined analysis (Fig. 6.12) the assemblages identified by the cluster analysis were highlighted. All four assemblages were separate, however, the inclusion of stations 11, 50 and 64 in Assemblage B appeared suspect. As in the quantitative analysis, station 11 was shown to be close to other members of Group A2. On the other hand, the species composition of station 50 appeared intermediate between Assemblages B and C, with that of station 64 intermediate between Assemblages A and C. Station 54 was again found to be separate from all other stations.

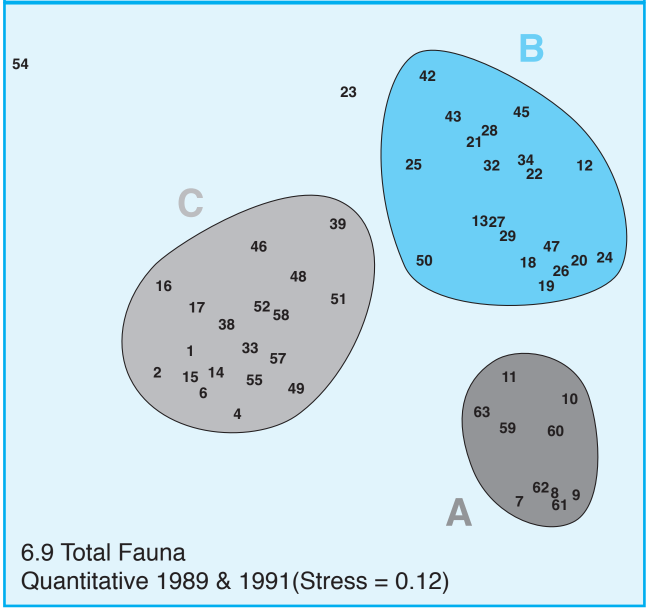
The 'complete' binary ordinations for the 'Total Fauna' (Appendix 7: Figs. A7.1-A7.3) produced comparable results. Here the intermediate nature of the species composition of stations 11,



6.7: Total Fauna
Quantitative 1989 (Stress = 0.10)

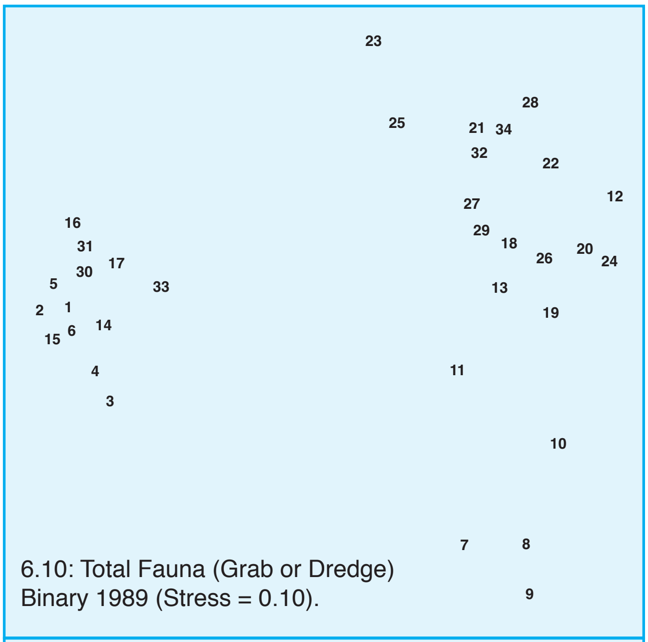


6.8 Total Fauna
Quantitative 1991(Stress = 0.10)

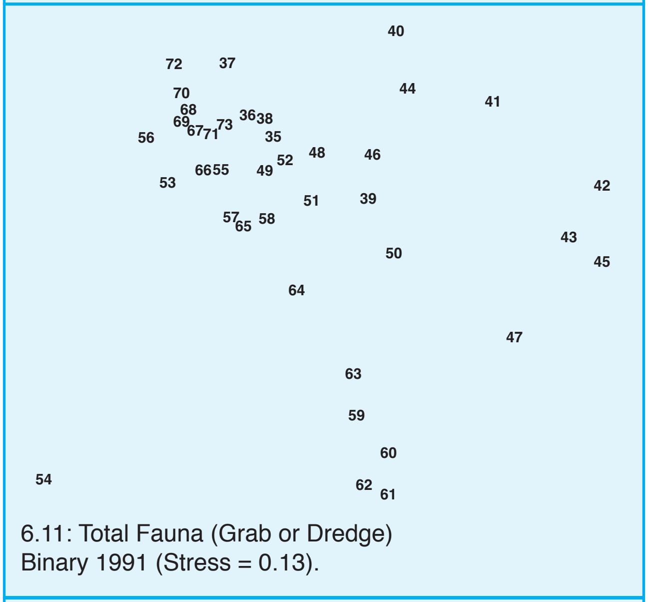


6.9 Total Fauna
Quantitative 1989 & 1991(Stress = 0.12)

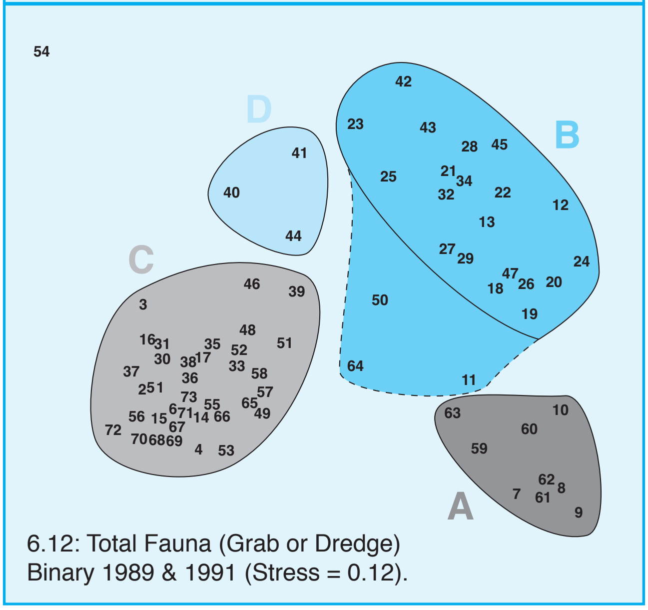
Figs. 6.7- 6.9: Non-metric multidimensional scaling (MDS) ordinations using log transformed abundances



6.10: Total Fauna (Grab or Dredge) Binary 1989 (Stress = 0.10).



6.11: Total Fauna (Grab or Dredge) Binary 1991 (Stress = 0.13).



6.12: Total Fauna (Grab or Dredge) Binary 1989 & 1991 (Stress = 0.12).

Figs. 6.10- 6.12: Non-metric multidimensional scaling (MDS) ordinations using binary data.

64 and 50 was even more obvious. There were distinct trends for the species composition within Assemblage A to grade towards Assemblage C and for that within Assemblage C to grade toward Assemblage D.

For the three main faunal components, the annelid plots (Figs. A7.8-A7.10) again provided the best match with those obtained for the 'Total Fauna' and the stress values were almost identical. Nevertheless, the annelid species composition of Assemblage D was shown closer to that of Group 'B4' stations. More variation was evident in the mollusc (Figs. A7.14-A7.16) and arthropod (Fig. A7.20-A7.22) plots. The assemblages were less compact and less discrete, with higher stress values. The 'Other Phyla' (Figs. A7.26-A7.28) and epifaunal (Fig. A7.4) ordinations showed no distinct pattern.

Environmental Influences

The results from the BIO-ENV procedure (Tables 6.3-6.5) identified combinations of either three or four variables as best 'explaining' the faunal MDS ordinations. For comparative purposes these have been presented alongside the next best combinations.

No. of variables	Best variable combinations	Correlation(ρ_w)
3	**Gravel-Silt-Depth**	**0.78**
	Gravel-Silt/Clay-Depth	0.77
	Gravel-Carbon-Depth	0.75
	Gravel-Clay-Depth	0.75

Table 6.3: Harmonic rank correlations (ρ_w) between faunal and environmental similarity matrices for the 1989 survey.

In each case gravel, silt (or silt-clay) and depth were identified as major variables producing the best match with the faunal distributions. Their relative importance to each assemblage has been illustrated by superimposing scaled symbols (Figs. 6.14-6.16) on the faunal MDS ordination (Fig. 6.13). Latitude was additionally implicated as being of particular importance for both the 1991

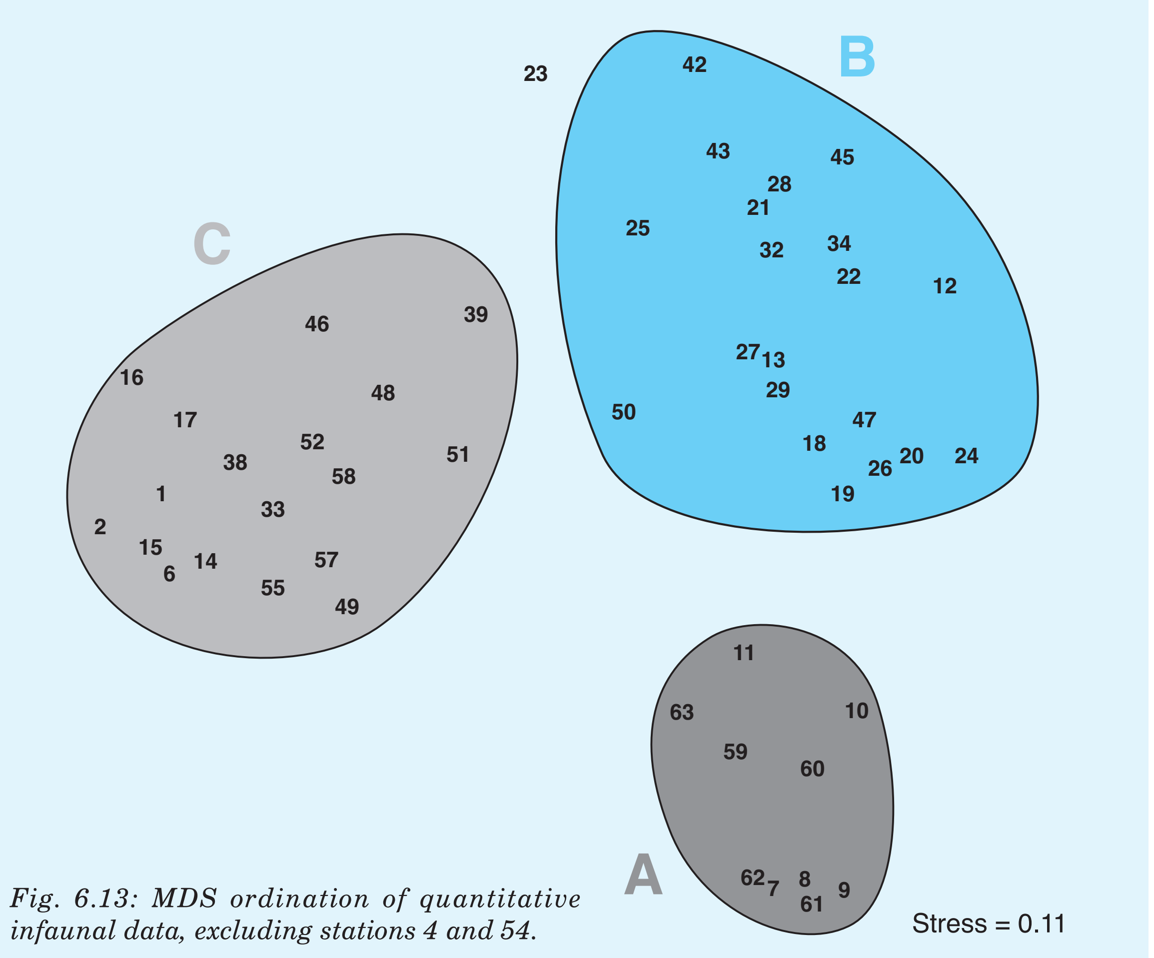


Fig. 6.13: MDS ordination of quantitative infaunal data, excluding stations 4 and 54.

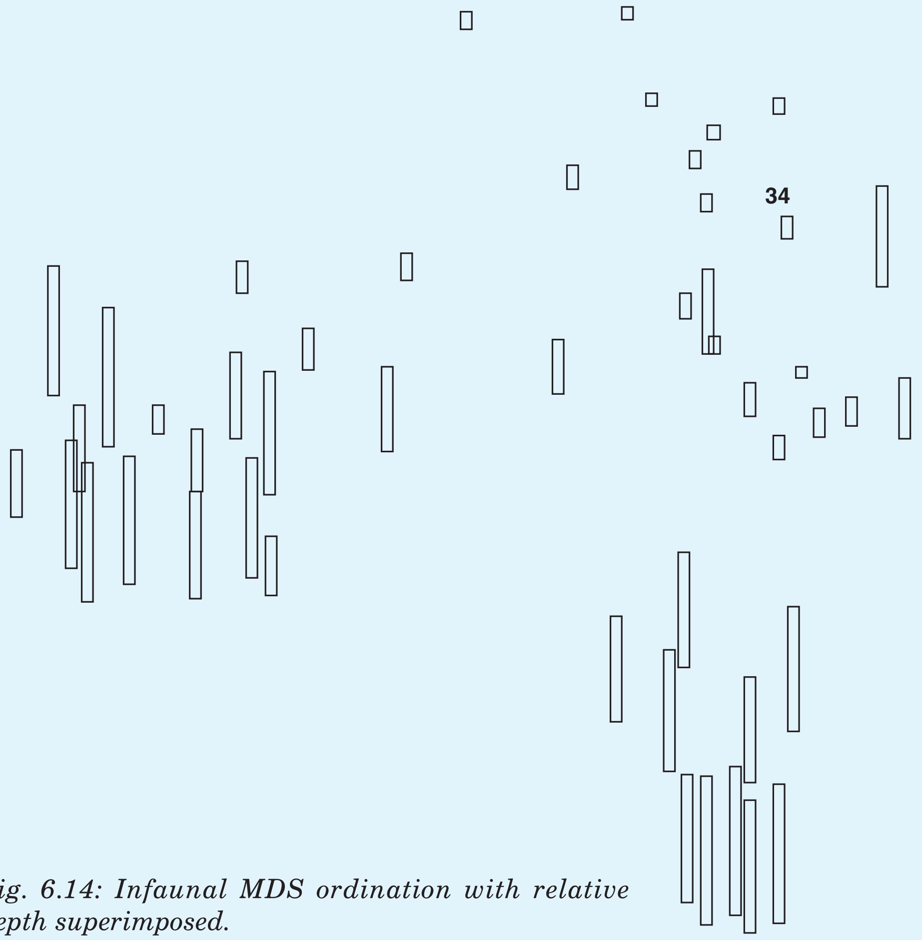


Fig. 6.14: Infaunal MDS ordination with relative depth superimposed.

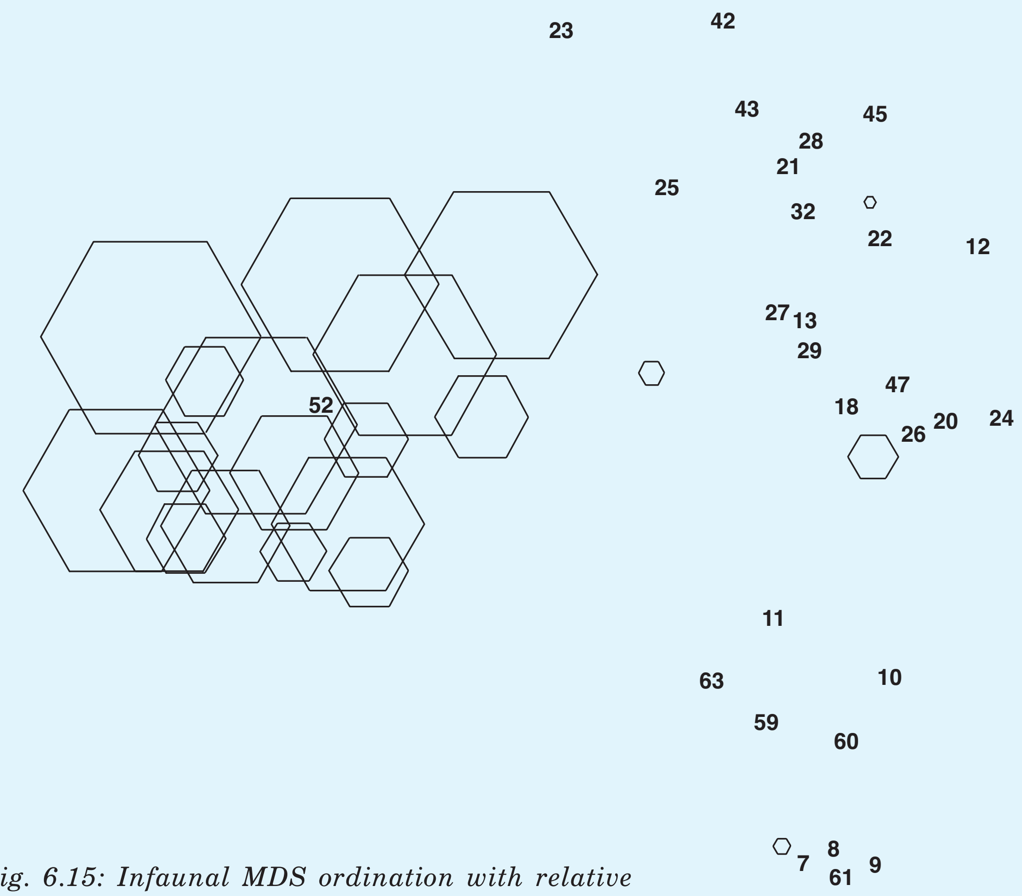


Fig. 6.15: Infaunal MDS ordination with relative gravel content of sediment superimposed.

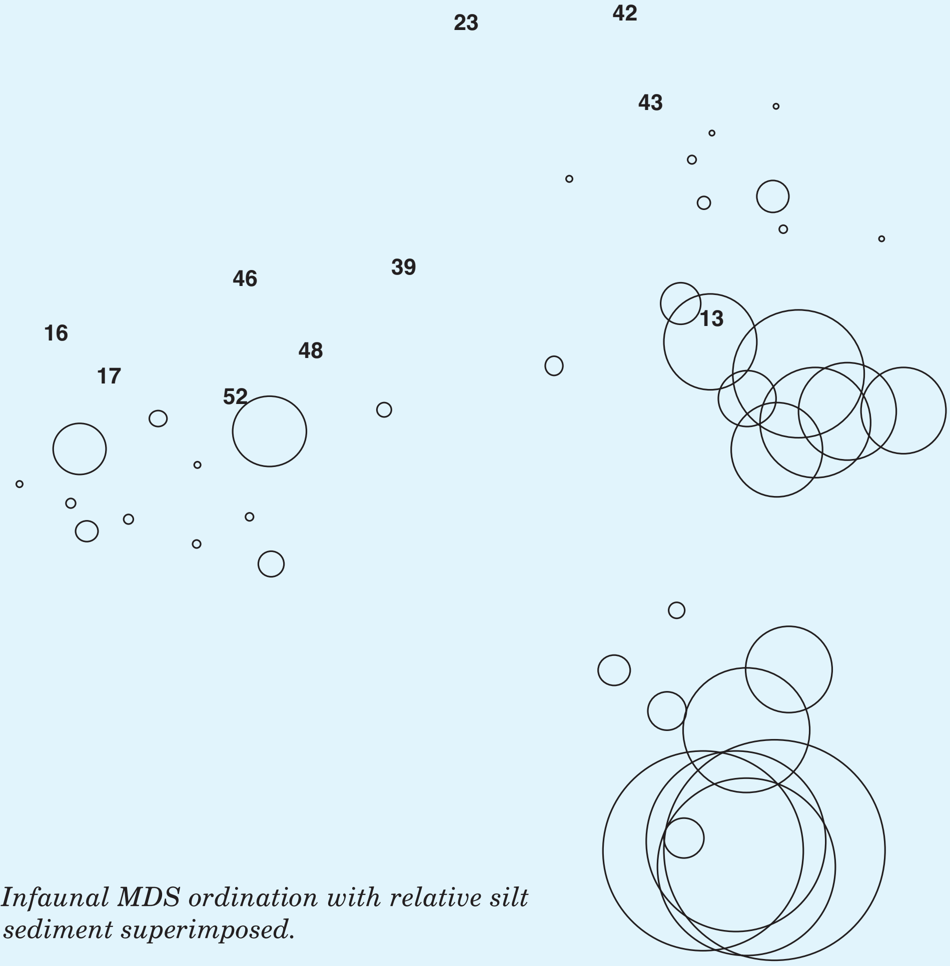


Fig. 6.16: Infaunal MDS ordination with relative silt content of sediment superimposed.

No. of variables	Best variable combinations	Correlation (ρ_w)
3	Gravel-Depth-Latitude	0.68
	Gravel-Silt-Depth	0.68
	Gravel-Silt/Clay-Depth	0.68
	Gravel-Depth-Latitude	0.68
4	**Gravel-Silt-Depth-Latitude**	**0.70**
	Gravel-Silt/Clay-Depth-Latitude	**0.70**
	Gravel-Carbon-Depth-Latitude	0.67
	Gravel-Carbonate-Depth-Latitude	0.67
	Gravel-Organic matter-Depth-Latitude	0.67
5	Gravel-Silt-Carbon-Depth-Latitude	0.67
	Gravel-Silt-Carbonate-Depth-Latitude	0.67
	Gravel-Silt/Clay-Carbonate-Depth-Latitude	0.67

Table 6.4: Harmonic rank correlations (ρ_w) between faunal and environmental similarity matrices for the 1991 survey (excluding station 54).

survey and the combined analysis. Organic carbon also featured highly among the best combinations, however, this variable has generally been found to be mutually correlated with silt-clay. This was also found to be so in the present study (see Fig. 4.7).

The highest correlation values were less (only slightly so for the 1989 survey) than deemed 'very good' by Clarke & Ainsworth (1993). Nevertheless, given the size and complexity of the Irish Sea data, we believe the correlations to be good. Of course, the identification of the important variables is dependant upon those investigated, how they are quantified and how they themselves are influenced by other unmeasured variables. The last mentioned is particularly important since there is no guarantee that the calculated best variable combination actually 'caused' the faunal assemblages observed (see Clarke & Ainsworth 1993; Clarke 1993).

In the present study the particle size composition of the sediments was only quantified in broad gravel, sand, silt and clay categories. A more detailed categorisation may have revealed correlations with other more precise particle size parameters. Sediment structure in any given locality will be determined by the topography of the seabed,

No. of variables	Best variable combinations	Correlation (ρ_w)
3	**Gravel-Silt-Depth**	**0.71**
	Gravel-Silt/Clay-Depth	0.70
	Gravel-Carbon-Depth	0.69
	Gravel-Clay-Depth	0.68
4	Gravel-Silt-Depth-Latitude	0.70
	Gravel-Silt/Clay-Depth-Latitude	0.69
	Gravel-Silt-Carbon-Depth	0.68
	Gravel-Silt/Clay-Carbon-Depth	0.68
5	Gravel-Silt-Carbon-Depth-Latitude	0.69
	Gravel-Silt/Clay-Carbon-Depth-Latitude	0.68

Table 6.5: Harmonic rank correlations (ρ_w) between faunal and environmental similarity matrices for the combined 1989 and 1991 surveys (excluding station 54).

depth and the prevailing water movements, hence other interrelated factors such as near-bottom tidal stress can sometimes better explain faunal distributions (e.g. Warwick & Uncles 1980). Likewise, the implication of depth and latitude may, at least in part, reflect water temperature. Temperature is a major factor in determining faunal distributions (see Glémarec 1973).

The nature of the sediments has often been cited as a major factor influencing the distribution of the benthic infauna (e.g. Jones 1950; Thorson 1957; Hartnoll 1983). It was interesting that the present analysis identified both the finest and coarsest particles as being important. The mud component affects sediment cohesiveness and water content, and (with interrelated organic content) plays a major role in its oxygen permeability. In addition, many infaunal animals use mud in the construction of their tubes. Alternatively, the interstices and crevices of large sediment particles provide more niches for colonisation and their exposed surfaces space for the attachment of epifauna. The epifauna, in turn, increase the available niche space, while the larger pebbles and stones help protect the underlying sediments from scouring by high water flows.

Discussion

Sampling and data analysis are both critical factors in the recognition of faunal assemblages. The positioning of the sampling stations is clearly important. In this study the sampling was semi-stratified, with certain stations positioned in known sediment types within certain areas. This was particularly the case with the inshore muddy sediments of Cardigan Bay. It is therefore perhaps not surprising that, in later cluster analysis, these stations should form a grouping. Attempts were made to reduce this bias by sampling in transects across sediment 'boundaries', however, it must be recognised that the stations were considerable distances apart. This was purely for reasons of cost-effectiveness in relation to the project aims. As pointed out by (Künitzer *et al.* 1992), "The classification of the benthic fauna into assemblages is a matter of scale". Thus the BIOMÔR survey provides a general picture of faunal distributions in the southern Irish Sea, but additional structure may be revealed by more intensive and localised study.

All aspects of the data processing and analysis can influence the results. The selection of a particular transformation, similarity coefficient and clustering strategy combination may yield quite different results from another. No multivariate analytical technique can be considered perfect therefore, in this study, two different methods (cluster analysis and MDS) were used to test the validity of the findings from each. The methods were found to complement each other well and confirmed the identification of the major assemblages and their main subdivisions.

7. Macrofaunal Assemblages

In the previous chapter the macrofaunal assemblages and their subunits were identified by multivariate analyses. These were then correlated with environmental variables in an attempt to explain their respective distributions. The next important stage is to determine the species that characterise each assemblage or group.

In a series of papers Petersen (1914, 1915, 1918) developed his ideas concerning the recognition and quantification of marine benthic macrofaunal communities. The nine communities proposed were characterised by species of regular occurrence, large biomass and/or high abundance. Rare or 'seasonal' animals were excluded from the characterising species, as were most of the smaller and often difficult to identify forms such as the annelids.

Petersen (1924) summarised his work on the benthic communities off Denmark and detailed a three category scheme for their characterisation. Species were examined in relation to their abundance, frequency of occurrence and fidelity. From these assessments Petersen defined his first, second and third order characterising species.

— First order characterising species occurred in some quantity and practically everywhere in one community only.

— Second order characterising species occurred in some quantity in certain parts of one community only.

— Third order characterising species occurred in two or more communities, but were conspicuously abundant in one only.

All other more common species were referred to as "associated animals" and were not important in defining the communities.

Spärck (1937) produced a different scheme by introducing frequency (occurring in ≥50% of samples) and biomass (accounting for ≥15% of total animal weight) limits on the main characterising species; numerical data was not used. Other constituent species were termed "dominants" (≥5% total weight), "influents" (2-5% total weight) and "recedents" (≤2% total weight).

Later, Thorson (1957) retained Petersen's characterising categories, but modified them by incorporating quantitative requirements derived from Spärck's proposals. The characterising species were defined as follows:

— First order characterising species were conspicuous, occurring in some quantity (≥50% samples; ≥5% total weight per sample) practically everywhere in one community only.

— Second order characterising species occurred in some quantity (≥50% samples; ≥5% total weight per sample) in certain parts of one community only.

— Third order characterising species occurred in two or more communities, but were conspicuously abundant in one only (≥70% samples; ≥10% total weight).

— Associated animals included all other more common animals of a community (≥25% samples; ≥2% total weight per sample) which were were not particularly characteristic.

The recognition of benthic 'communities' or assemblages from abundance and biomass data was examined by Stephenson *et al.* (1972). Their reassessment of Petersen's original data, using cluster analysis, showed that classifications based on abundance data differed from those using biomass. The results of both were also at variance with Petersen's intuitive site groupings and a combined abundance and biomass classification was not considered feasible.

Many accounts of benthic communities have been published and attempts have been made to describe these in relation to various environmental factors (e.g. Jones 1950; Glémarec 1973), including sediment composition, temperature, depth and salinity. The search for a unified descriptive method continues to this day (e.g. Erwin 1983; Hiscock 1991). Alternatively, some workers have rejected concepts of fixed 'communities' and have considered any assemblages encountered to be composed of species which co-occur because of their overlapping responses to environmental gradients (e.g. Mills 1971). Nevertheless, whether one believes in discrete recurring communities or continua, it is necessary to objectively determine the distinguishing species of any faunistically different area of the seabed.

In more recent times characterising species have been variously determined using objective computer techniques. Typical programs include TWINSPAN (two-way indicator species analysis) developed by Hill (1979b) and SIMPER (similarity percentages) developed by Carr & Hall as part of the PRIMER package (see Clarke 1993).

Materials and Methods

Unfortunately the versions of TWINSPAN and SIMPER available to us could not accommodate the large number of species obtained in the BIOMÔR study. Therefore a modified Petersen-type classification scheme was devised based primarily upon fidelity and frequency of occurrence; biomass was not investigated. The five indicator species categories (Table 7.1) ranged in decreasing fidelity from 'Exclusive' to 'Common'.

The species vs. station matrix for the quantitative data was re-arranged with the stations ordered according to the dendrogram obtained from the 'Total Fauna' cluster analysis. The limits of each assemblage and its constituent groups were marked and species were then manually assigned to one of the five categories. The fifth category, having no discriminatory worth was excluded from the tabulations of the results.

The categorisation was restricted to the quantitative data because the clusters obtained from the qualitative analysis did not exactly match those from the quantitative one. Dredging, by its very nature, is liable to sample a wider area than a grab and hence samples collected in this way may include species from more than one assemblage or group.

In order to obtain a balanced assessment of the species composition for each assemblage group, the top '25' species (ranked by abundance) were also presented. The rank order tabulations were produced using a program (STIRLING3) written by Colin Moore and based on that described in Moore (1983). Top-ranked species for all 51 quantitative stations are tabulated in Appendix 8.

In the following accounts, comments have additionally been made on species which, by virtue of their size or appearance, were likely to have been highlighted by previous workers. Such species were often used in field evaluations of Petersen-type communities.

Indicator	Description
Exclusive	Occurring in at least 50% of the stations within a single assemblage or group.
Shared	Occurring in at least 50% of the stations within a group and also elsewhere within the same assemblage.
General	Occurring in at least 50% of the stations within a group or assemblage and also sporadically within other assemblages.
Partial	Occurring in at least 50% of the stations within two or more different assemblages or groups, but exhibiting noticeably higher abundances within one particular grouping.
Common	Occurring in at least 50% of the stations within two or more different assemblages or groups, but exhibiting no distinct preference for a single grouping.

Table 7.1: Indicator categories for the characterisation of macrofaunal assemblages.

Assemblage A

This assemblage, in the deep soft sediments of the Celtic Deep, was characterised by twelve exclusive species (Table 7.2). Most of these were small polychaetes; the more conspicuous species being

Glycera rouxii, *Prionospio dubia* and the tubicolous ampharetid *Ampharete falcata*. The last mentioned was very abundant, while the spionid was only moderately so, with the large glycerid occurring in extremely low numbers. The easily recognised bivalve *Nucula sulcata* was evenly distributed, and moderately abundant, throughout the assemblage.

The ophiuroid *Amphiura chiajei* and naticid gastropod *Polinices fuscus* were two large species which occurred regularly in low numbers, with each additionally being recorded once from another assemblage.

Indicator	Species	
Exclusive	Pseudomystides spinachia Glyphohesione klatti Glycera rouxii Levinsenia sp. Apistobranchus sp. A? Prionospio dubia	Ophelina modesta Ampharete falcata Pulsellum lofotense Nucula sulcata Ampelisca macrocephala Pseudarachna hirsuta
General	Parougia eliasoni Prionospio sp. Polinices fuscus	Nuculoma tenuis Amphiura chiajei
Partial	Abra nitida	Corbula gibba

Table 7.2: Indicator species for Assemblage A.

Among the dominant species (Tables 7.4 & 7.6; Appendix 8), *Abra alba* and *Abra nitida* were prominent, but both occurred in other assemblages and many specimens were small. Nevertheless, *Abra nitida* reached its highest abundances in this assemblage.

In the literature on benthic 'communities', species groupings bearing close similarities to this assemblage have either been regarded as a single unit (Thorson 1957), as two subdivisions of one community (Buchanan 1963) or as two communities in their own right (Petersen 1924; Jones 1950, 1951). None of these accounts of '*Amphiura* communities' exactly match the Celtic Deep assemblage and the affinities of the two groups (A1 & A2) are best considered separately (see below).

Nevertheless, a comparison of the Assemblage A indicators with the characterising species presented by Jones (1951) and Buchanan (1963) revealed the consistent presence of *Glycera rouxii* and *Abra nitida*. Interestingly, *Nucula sulcata* was also cited in Jones's northwestern Irish Sea study and Massy (1913) had earlier recorded *Pseudoarachna hirsuta* from this same area. Finally, it is worth noting that very dense populations of *Ampharete falcata* have been observed at around 75 m depth in the vicinity of the Western Irish Sea Front (Holme & Rees 1986; Rees & Holme 1988). In comparison, a major difference between the two areas was the complete lack of the bivalve *Parvicardium ovale* in the Celtic Deep assemblage.

Group A1

Occurring in the muddier sediments of the Celtic Deep, this subunit additionally possessed the readily recognisable *Nephtys hystricis*, *Nephrops norvegica* and *Saxicavella jeffreysi* (Table 7.3). The nephtyid polychaete was moderately abundant, the others less so. The bivalve *Saxicavella jeffreysi* may possibly live commensally in the burrows of the Norway Lobster *Nephrops norvegicus* (pers. obs.). The small, rarely recorded, spionid *Atherospio disticha* was remarkable for being the dominant species in the mud of station 7 (Appendix 8). Exclusive species of infrequent occurrence (i.e. <50% of the stations) were the small ampharetid *Eclysippe vanelli* and the large burrowing echinoid *Brissopsis lyrifera*.

Species showing a preference for Group A1 included the distinctive dorsoventrally flattened

Indicator	Species	
Exclusive	Nephtys hysticis Atherspio disticha Amphicteis gunneri	Saxicavella jeffreysi Diastylis lucifera Nephrops norvegicus
Shared	Gyptis rosea Ancistrosyllis groenlandica	Leucon nasica
General	Parascolelepis sp.	

Table 7.3: Indicator species for Assemblage Group A1.

pilargid *Ancistrosyllis groenlandica*, which was present in low numbers. The other two shared species were moderately abundant.

In terms of relative abundance the most notable assemblage indicators in this group were the small thread-like paraonid *Levinsenia* sp. and the spionid *Prionospio* sp. (Table 7.4). Both species were considerably less numerous in Group A2.

Group A1 shows clear similarities with the '*Amphiura chiajei* community' of Petersen (1924), the '*Amphiura chiajei* subcommunity' of Buchanan (1963), and the 'Boreal offshore mud association' of Jones (1950). Within the Irish Sea a directly comparable fauna can be found in the extensive deep mud between Ireland and the Isle of Man (Massy 1913; Jones 1951; Southward 1957). Group A1 indicators reported from this 'Boreal offshore mud association' were *Diastylis lucifera*, *Nephrops norvegicus*, *Brissopsis lyrifera*, *Leucon nasica* and *Ancistrosyllis groenlandica*. Furthermore, it is

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum %
1	Abra alba	4	223	0–1119	11.20	11.20
2	Abra nitida	2	162	0–807	8.16	19.36
3	Levinsenia sp.	6	151	62–410	7.60	26.97
4	NEMERTEA spp.	6	72	22–201	3.60	30.56
5	Tubificoides amplivasatus	6	66	9–129	3.37	33.93
6	Lumbrineris scopa	6	62	49–80	3.11	37.04
7	Ampharete falcata	5	61	0–268	3.07	40.11
-	OPHIUROIDEA juv.	6	61	41–107	3.07	43.18
9	Cylichna cylindracea	4	60	0–317	3.03	46.22
10	Praxillella affinis	6	57	13–120	2.88	49.10
11	Spiophanes kroyeri	6	55	9–111	2.73	51.84
-	Nuculoma tenuis	4	55	0–196	2.73	54.57
13	Mediomastus fragilis	6	44	31–54	2.21	56.78
-	Nucula sulcata	6	44	18–76	2.21	58.99
15	Prionospio sp.	6	43	4–98	2.13	61.12
-	Magelona minuta	6	43	18–94	2.13	63.26
17	Mysella bidentata	1	36	0–218	1.84	65.09
18	Leucon nasica	6	34	4–107	1.72	66.82
-	Corbula gibba	5	34	0–173	1.72	68.54
20	Apistobranchus spp.	5	31	0–62	1.57	70.11
21	Glyphohesione klatti	6	28	13–54	1.42	71.54
22	Atherospio disticha	3	28	0–129	1.39	72.92
23	Aricidea catherinae	5	26	0–54	1.27	74.19
24	Exogone hebes	4	24	0–66	1.16	75.36
25	Galathowenia sp. A	6	21	4–45	1.09	76.44

Table 7.4: Top ranked taxa for Assemblage Group A1 (Stns. 7, 8, 9, 10, 61, 62).

probable that the recorded *Nephtys incisa* and *Oxydromus propinquus* were actually *Nephtys hystricis* and *Gyptis rosea* respectively. The taxonomy of both these species has recently been revised and more accurate determinations are now possible (see Rainer 1990; Pleijel 1993). With the exception of *Leucon nasica*, all the Group A1 exclusive species were also recorded from the 'Boreal offshore muddy sand association', however, as the subdivision of sediment types was solely visual, this may not be significant. A notable difference between the two areas was the regular presence of the burrowing decapod *Calocaris macandreae* at the northern Irish Sea locality. This species was not encountered in the BIOMÔR samples, though Petersen (1924) and Josefson (1981) considered it very characteristic of the Kattegat '*Amphiura chiajei* community', and Buchanan (1963) had remarked upon its occurrence in his Northumberland '*Amphiura chiajei* subcommunity'. Elsewhere in the Irish Sea, *Nephrops norvegicus* has also been found in the more localised shallower mud off the Cumbrian coast (Jones 1952) but the associated fauna differed markedly from the deeper mud to the west of the Isle of Man.

The differences between similar macrofaunal assemblages was commented upon by Buchanan (1963). As here, he noted that *Brissopsis lyrifera* was relatively infrequent and, contrary to its importance in Petersen's community, did not feature as a characterising species. McIntyre (1961) quantitatively compared the infauna of two deep muddy locations; one in Loch Nevis on the west coast of Scotland, the other in the northern North Sea. Despite sharing many species (including *Ancistrosyllis groenlandica*, *Amphiura chiajei*, *Leucon nasica*, *Calocaris macandreae* and *Eriopisa elongata*), clear differences were found between the assemblages. Predation, benthic temperature variability and local phytoplankton productivity were put forward as possible modifying factors. Pearson (1970) described comparable assemblages from the deep muds of Loch Linnhe and Loch Eil.

Indicator	Species	
Exclusive	Sphaerodoridium claparedii Vitreolina philippi Myrtea spinifera	Cirolana borealis Pleurogonium inerme
Shared	Aricidea laubieri Cirrophorus furcatus Ophelina cylindricaudata	Chaetoderma nitidulum Eriopisa elongata Eugerda tenuimana
General	Aricidea wassi Myriochele danielsseni Limacina retroverse Leucothoe lilljeborgi	Microjassa cumbrensis Araphura brevimana Astrorhiza limicola
Partial	Terebellides stroemi Urothoe elegans	Leptognathia gracilis

Table 7.5: Indicator species for Assemblage Group A2.

Group A2

The exclusive species of the sandier sediments of this subunit (Table 7.5) included two readily recognisable species, the bivalve *Myrtea spinifera* and the large isopod *Cirolana borealis*, though both were present in very low numbers. The moderately abundant *Vitreolina philippi*, a small glassy gastropod, was the most numerous Group A2 exclusive. The most obvious shared species favouring this group were the slender opheliid *Ophelina cylindricaudata* and the shiny vemiform caudofoveate *Chaetoderma nitidulum*.

The assemblage exclusives showing relatively higher abundances in this group were the small mollusc *Pulsellum lofotense* (the only scapho-

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	OPHIUROIDEA juv.	4	550	214–883	8.67	8.67
2	Abra nitida	3	328	0–611	5.19	13.85
3	Galathowenia sp. A	4	314	103–696	4.94	18.79
4	Praxillella affinis	4	305	62–580	4.82	23.61
5	Ampharete falcata	4	248	72–473	3.92	27.53
6	Araphura brevimana	4	205	107–286	3.23	30.76
7	Terebellides stroemi	4	190	76–330	3.01	33.77
8	Urothoe elegans	4	144	9–455	2.29	36.05
9	SPATANGIDAE juv.	2	143	0–562	2.27	38.32
10	NEMERTEA spp.	4	139	103–205	2.20	40.52
11	Spiophanes kroyeri	4	138	45–232	2.18	42.70
12	Scalibregma inflatum	2	127	0–490	2.00	44.70
13	Diplocirrus glaucus	4	120	72–214	1.90	46.60
14	Abra alba	1	117	0–469	1.85	48.44
15	Gammaropsis palmata	3	110	0–410	1.74	50.18
16	Chaetozone sp. A	2	109	0–263	1.72	51.91
17	Phaxas pellucidus	4	105	41–156	1.65	53.56
18	Pulsellum lofotense	4	104	31–179	1.63	55.19
19	Cylichna cylindracea	4	101	35–156	1.58	56.78
20	Nuculoma tenuis	2	95	0–223	1.49	58.27
21	Harpinia pectinata	3	92	0–169	1.46	59.73
22	Paradoneis lyra	4	86	4–218	1.35	61.08
23	Pseudarachna hirsuta	4	82	27–169	1.30	62.38
-	Astrorhiza limicola	3	82	0–249	1.30	63.68

Table 7.6: Top ranked taxa for Assemblage Group A2 (Stns. 11, 59, 60, 63).

pod encountered in the study) and the isopod *Pseudarachna hirsuta* (Table 7.6). Other important top-ranked species were the small tanaid *Araphura brevimana* and the large foraminiferid *Astrorhiza limicola*, though a few specimens of both were also found at the nearby station 12 (Group B2). The trichobranchid *Terebellides stroemi* and amphipod *Urothoe elegans* featured high among the dominant species, but these were of much lower fidelity.

Group A2 somewhat resembles the muddy sand fauna at 60-70 m depth to the west of the Isle of Man, the species recorded by Jones (1956) including the group indicators *Myrtea spinifera*, *Cirolana borealis*, *Ophelina cylindricaudata*, *Chaetoderma nitidulum* and *Astrorhiza limicola*. Elsewhere there was some general correspondence with the offshore *Astrorhiza* variation of the '*Amphiura filiformis* subcommunity' described by Buchanan (1963). The main characterising species (*Amphiura filiformis*), however, had no value as an indicator species in the BIOMÔR study, additionally occurring in the markedly different Groups B1 and B2 (see below). Furthermore, of the group indicators, only *Astrorhiza limicola* featured in the Northumberland study. Indeed, in terms of species composition, Group A2 has perhaps more in common with the foraminiferid-*Amphiura* assemblages of the northern North Sea (e.g. McIntyre 1961; Hartley 1984). For example, Hartley (1984) recorded all the group exclusive and shared indicators except *Vitreolina philipppi*, *Cirrophorus furcatus* and *Eugerda tenuimana*, though he did not identify them as being characteristic.

Assemblage B

This assemblage was primarily associated with soft inshore sands and muddy sands, with Group B2 (Stns. 12 & 13) and station 50 (Group B3) occuring in somewhat deeper sands. The characterisation of Groups B2 and B3 was less precise than Groups B1 and B4 due to their small number of constituent stations (two and three respectively). Further, to prevent their disproportionate influence on the characterisation of the assemblage as a whole, joint absences unique to Group B2 were not considered significant.

Only three exclusive species were identified (Table 7.7), none of which occurred in the Group B2. The most distinctive was the patterned polynoid polychaete *Malmgrenia andreapolis*, a commensal of ophiuroids and holothurians. The long-armed ophiuroid *Amphiura brachiata* was also exclusive to this assemblage and was sometimes common (e.g. Stns. 22 & 34; see Appendix 8), however, it was only present in 20% of the stations.

Indicator	Species	
Exclusive	Malmgrenia andreapolis Glycera tridactyla	Ampelisca brevicornis
General	Phyllodoce rosea Magelona filiformis	Pseudocuma longicornis Diastylis rugosa
Partial	Podarkeopsis capensis Spiophanes bombyx Amphictene auricoma Lagis koreni	Mysella bidentata Phaxas pellucidus Phoronis spp.

Table 7.7: Indicator species for Assemblage B.

All the species categorised as general indicators were virtually exclusive to Assemblage B, only rarely occurring elsewhere. The small bivalves *Mysella bidentata* and *Phaxas pellucidus*, and the tubicolous polychaetes *Spiophanes bombyx*, *Amphictene auricoma* and *Lagis koreni*, were notable for their very high abundances. These five partial indicators were among the top-ranked species at most stations in this assemblage (Appendix 8), their sometimes extreme dominance often being due to large numbers of small or juvenile specimens.

A feature of the four constituent groups of this assemblage was the general prevalence of the shared exclusive indicators *Magelona* sp. A and *Fabulina fabula* in Groups B2-B4 (see below). The magelonid polychaete and tellinid bivalve varied in their relative importance within each of these groups, but neither was significant in the characterisation of Group B1.

Assemblage B has clear affinities with the '*Amphiura*' and 'Shallow *Venus*' communities of Petersen (1924) and the 'Boreal offshore muddy sand' and 'Boreal offshore sand' associations of Jones (1950). Group B1 corresponds closest to the first mentioned in each case, while Groups B2-B4 resemble published accounts of the second.

Group B1

This subunit occurred in the muddier inshore sediments of Cardigan Bay. Two species were exclusive (Table 7.8), the most numerically significant being the large tubicolous ampharetid *Melinna palmata* (Table 7.9). Two additional exclusive species (*Lepton squamosum* and *Leucothoe* sp.) occurred in small numbers at less than 50% of the stations. The small bivalve *Lepton squamosum* is a known commensal of the large burrowing crustacean *Upogebia deltaura*, which was also found at this locality.

The unusual 'annulated' phoronid *Phoronis pallida* was the highest ranked (32) shared species. Other such species (*Levinsenia gracilis* and *Devonia perrieri*) were of interest despite being found at less than 50% of the stations. The paraonid *Levinsenia gracilis* was relatively high in the abundance rankings for stations 24 and 26 (Appendix 8). Conversely only a few specimens of *Devonia perrieri* were collected. This small bivalve is a known commensal of leptosynaptid holothurians.

Two species of significance in the next category were the polychaetes *Nephtys incisa* and *Monticellina dorsobranchialis*. Both were moderately abundant within the group and only occurred

Indicator	Species	
Exclusive	SPIONIDAE gen. A	Melinna palmata
Shared	Callianassa sp. Phoronis pallida	Labidoplax digitata
General	Nereis longissima Nephtys incisa Monticellina dorsobranchialis	Semierycina nitida Diastylis laevis Golfingia procera
Partial	Prionospio fallax Magelona alleni	Magelona minuta Tubificoides amplivasatus

Table 7.8: Indicator species for Assemblage Group B1.

as single specimens at one or two stations elsewhere. The more numerous species, the bivalve *Semierycina nitida*, showed less fidelity.

Three of the partial indicators were among the top 5 ranked species. Conversely, the less abundant magelonid, *Magelona alleni*, was the largest and most conspicuous member of this category.

Laurie & Watkin (1922) surveyed the 'Gutter', part of the area here designated as Group B1. The species present were found to be indicative of a form of Petersen's '*Amphiura* community', which they provisionally termed the '*Turritella*-*Amphiura* grouping'. In the Irish Sea, related faunas include those described from the muddy sands

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Mysella bidentata	8	1545	27–3803	20.29	20.29
2	Tubificoides amplivasatus	6	556	0–1939	7.31	27.60
3	Phaxas pellucidus	8	469	9–1747	6.15	33.75
4	Magelona minuta	7	437	0–1338	5.74	39.49
5	Prionospio fallax	8	347	22–776	4.56	44.05
6	Abra alba	5	331	0–1502	4.35	48.40
7	Amphictene auricoma	6	236	0–807	3.11	51.51
8	Mediomastus fragilis	8	192	27–807	2.52	54.03
9	Amphiura filiformis	8	190	9–642	2.50	56.52
10	Lumbrineris gracilis	7	183	0–370	2.40	58.92
11	Melinna palmata	6	182	0–629	2.39	61.31
12	Spiophanes bombyx	6	174	0–624	2.29	63.60
13	Lagis koreni	8	164	18–463	2.15	65.75
14	Phoronis spp.	8	159	27–334	2.10	67.85
15	Pholoe tuberculata	8	151	31–308	1.98	69.83
16	NEMERTEA spp.	8	138	27–303	1.81	71.63
17	Tharyx killariensis	8	116	22–280	1.52	73.16
18	Semierycina nitida	4	82	0–223	1.08	74.23
19	Spio sp. A	7	81	0–406	1.07	75.30
20	Pariambus typicus	7	79	0–455	1.04	76.34
21	Galathowenia sp. A	5	75	0–446	0.99	77.33
22	Dendrodoa grossularia	2	71	0–366	0.93	78.26
23	Magelona alleni	7	71	0–169	0.92	79.18
24	Levinsenia gracilis	3	67	0–280	0.89	80.06
25	Mytilus edulis	6	64	0–241	0.84	80.91

Table 7.9: Top ranked taxa for Assemblage Group B1 (Stns. 18, 19, 20, 24, 26, 27, 29, 47).

off the Cumbrian coast (Jones 1952; Jensen & Sheader 1986; Swift 1993) and to the west of the Isle of Man (Jones 1951; 1956).

A conspicuous absentee from Laurie & Watkin's study was the large ampharetid *Melinna palmata*. This polychaete was here identified as an exclusive indicator for the group, yet it has only infrequently been recorded from other inshore Irish Sea locations (e.g. Southward 1957). A lusitanian-boreal species, *Melinna palmata* has rarely been recorded from the east coast of Britain (e.g. Hunter & Rendall 1986) and does not occur in the Kattegat, thus explaining its absence from Petersen's community definitions. Nevertheless, it is frequently found in inshore muddy locations on the south (Ford 1923; Howell & Shelton 1970; Eagle & Hardiman 1977; Probert 1981; Oyenekan 1988) and west coasts of the British Isles (Clark & Milne 1955; Grehan *et al.* 1991; Mackie, unpubl.), and on the Atlantic coast of France (Toulemont 1972; Glémarec 1973; Cabioch *et al.* 1982; Dauvin 1982; Glémarec *et al.* 1986). In addition, the species occurs in abundance in the sheltered waters of Milford Haven (Addy 1976; Rostron *et al.* 1986).

In France, a distinct '*Melinna palmata-Abra alba*' faunal grouping has been recognised. The Cardigan Bay Group B1, however, appears closer to the Cumbrian and southern English *Amphiura* grounds. This will be further investigated in BIOMÔR 2, the re-appraisal of the 'Gutter' benthos.

Group B2

This group was located in the deeper sands at the mouth of the Bristol Channel and, comprising only two stations, was difficult to define. No exclusive indicator species (Table 7.10) were found, and of the shared species, only the decapod *Corystes cassivelaunus* appeared more prevalent relative to its presence in other Assemblage B groups. Neither of the two general indicators can be accepted with confidence since their designation as such may well be an artefact created by the application of the categorisation scheme to only two stations. The small cumacean *Eudorellopsis deformis* was conspicuously abundant at station 12 (Table 7.11; Appendix 8), however, the significance of this can only be determined by additional sampling.

Aside from the partial indicators for the overall assemblage, the important characterising top-ranked species were the shared indicator *Magelona* sp. A and the general assemblage indicator *Magelona filiformis*. Conversely, for the same respective indicator categories, *Fabulina fabula* and *Pseudocuma longicornis* were rare. This virtual lack of *Fabulina*, coupled to the large numbers of *Amphiura filiformis*, *Cylichna cylindracea* and *Echinocyamus pusillus* (more representative of other assemblages or groups) serves to highlight the intermediate nature of the group. *Aricidea wassi*, *Araphura brevimana* and *Astrorhiza limicola* were sporadically present, but otherwise were only found in Assemblage A.

Group B2 has obvious similarities with Groups B3 and B4, but additional sampling in the outer Bristol Channel would be necessary to fully evaluate its status and its affiliation to related '*Venus*' grounds (see Warwick & Davis 1977) to the east.

Group B3

As discussed in the previous chapter, this group is of doubtful validity. Again the small number of constituent stations has complicated matters and the group characterisation must be viewed with caution. Two of the locations (Stns.

Indicator	Species	
Shared	Magelona sp. A Fabulina fabula	Callianassa sp. Corystes cassivelaunus
General	Acteon tornatilis	Eudorellopsis deformis

Table 7.10: Indicator species for Assemblage Group B2.

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Mysella bidentata	2	4494	223–8765	41.74	41.74
2	Lagis koreni	2	1578	588–2568	14.66	56.40
3	Scalibregma inflatum	2	1183	201–2167	10.99	67.39
4	OPHIUROIDEA juv.	2	564	245–883	5.24	72.63
5	Amphiura filiformis	2	362	98–624	3.35	75.98
6	Cylichna cylindracea	2	232	66–397	2.15	78.14
7	Spiophanes bombyx	2	227	210–245	2.11	80.25
8	Poecilochaetus serpens	2	194	62–325	1.80	82.05
9	SPATANGIDAE juv.	2	161	62–259	1.49	83.54
10	Scoloplos armiger	2	127	103–152	1.18	84.72
-	Echinocyamus pusillus	2	127	27–227	1.18	85.90
12	Eudorellopsis deformis	1	123	0–245	1.14	87.04
13	Amphictene auricoma	2	107	62–152	0.99	88.03
14	Chaetozone sp. A	2	94	13–173	0.87	88.90
15	Magelona sp. A	2	85	35–134	0.79	89.69
16	Bathyporeia sp.	2	76	31–120	0.70	90.39
17	Magelona filiformis	2	64	22–107	0.60	90.99
18	Exogone hebes	1	62	0–125	0.58	91.57
19	Owenia fusiformis	2	56	35–76	0.52	92.09
20	Lanice conchilega	2	54	13–94	0.50	92.59
-	Phaxas pellucidus	2	54	49–58	0.50	93.08
-	Abra prismatica	2	54	9–98	0.50	93.58
23	Harpinia antennaria	1	47	0–94	0.43	94.02
24	Tharyx killariensis	2	43	9–76	0.39	94.41
25	NEMERTEA spp.	2	41	18–62	0.37	94.78

Table 7.11: Top ranked taxa for Assemblage Group B2 (Stns. 12, 13).

32 & 34) corresponded to shallow (7-20 m) inshore sands. The third location (Stn. 50), also sandy, was in somewhat deeper water (49 m) further offshore.

Both exclusive indicators (Table 7.12) were found in two of the three stations, with the slender phyllodocid *Phyllodoce mucosa* more abundant than the large shelled opisthobranch *Scaphander lignarius*. The shared indicators were equally or more (e.g. *Phoronis pallida*) important in other Assemblage B groups. The larger phyllodocid *Phyllodoce groenlandica* was the only general indicator to occur at all three stations, albeit in fairly small numbers.

All the partial indicators were within the top 20 ranked species for the group (Table 7.13) and occurred at all three stations, as well as widely in other assemblages.

The group seems directly related to the larger Group B4 and a more detailed discussion seems unwarranted.

Indicator	Species	
Exclusive	Phyllodoce mucosa	Scaphander lignarius
Shared	Magelona sp. A Fabulina fabula	Phoronis pallida
General	Phyllodoce groenlandica Nephtys caeca	Nephtys assimilis
Partial	Eumida bahusiensis Pseudopolydora pulchra	Lanice conchilega Nucula nitidosa

Table 7.12: Indicator species for Assemblage Group B3.

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Abra alba	3	2106	13–3317	16.89	16.89
2	Lagis koreni	3	2006	116–5640	16.09	32.98
3	Spiophanes bombyx	3	1161	874–1578	9.31	42.29
4	Phaxas pellucidus	3	902	9–2577	7.23	49.52
5	Lanice conchilega	3	791	152–2046	6.34	55.86
6	Scalibregma inflatum	3	635	58–1498	5.09	60.95
7	Chaetozone sp. A	2	441	0–1311	3.54	64.49
8	Pariambus typicus	3	305	13–535	2.44	66.94
9	Spio sp. A	3	280	161–463	2.25	69.19
10	Mediomastus fragilis	3	268	9–767	2.15	71.33
11	Nucula nitidosa	3	192	22–348	1.54	72.87
12	Ampharete sp. A	3	187	18–339	1.50	74.37
13	Eumida bahusiensis	3	179	125–259	1.43	75.80
14	Nephtys juv.	3	168	9–450	1.35	77.15
-	Poecilochaetus serpens	2	168	0–393	1.35	78.50
16	TUBIFICIDAE spp.	3	137	18–352	1.10	79.59
17	NEMERTEA spp.	3	118	22–255	0.94	80.54
18	Pholoe tuberculata	3	107	18–249	0.86	81.39
19	Pseudopolydora pulchra	3	100	9–183	0.80	82.19
20	AMPHARETINAE juv.	1	91	0–272	0.73	82.92
21	Fabulina fabula	2	76	0–142	0.61	83.53
22	Phoronis spp.	3	74	9–120	0.60	84.12
23	Mysella bidentata	3	73	18–169	0.58	84.71
24	Amphiura brachiata	1	70	0–210	0.56	85.27
25	Tellimya ferruginosa	1	61	0–183	0.49	85.76

Table 7.13: Top ranked taxa for Assemblage Group B3 (Stns. 32, 34, 50).

Group B4

This group, the second major subunit of the assemblage, was found in the shallow sands of Cardigan Bay. The only true exclusive species was the amphipod *Microprotopus maculatus* (Table 7.14), which was regularly present in small numbers. Another exclusive, the small spionid *Scolelepis* sp., occurred at slightly less than 50% of the stations.

The shared indicators *Magelona* sp. A, *Fabulina fabula* and the amphipod *Siphonoecetes kroyeranus* were moderately abundant (Table 7.15). The last mentioned and the remaining two, less abundant, species were sporadic elsewhere within the assemblage.

Nephtys cirrosa was the most notable general indicator, only infrequently occurring in other Assemblage B groups although it was also prominent at the ungrouped station 23. This nephtyid polychaete is known to prefer sandy locations influenced by strong water movement. The opheliid *Ophelia borealis* showed less fidelity but was numerically dominant within this category. Another opheliid *Travisia forbesii*, was found in slightly less than 50% of the stations and elsewhere only occurred at the anomalous station 54. No adult specimens of the potentially large bivalve *Arctica islandica* (ranked 26) were collected.

The small bivalve *Thracia phaseolina* was the highest ranked partial indicator. Two other important species for Group B4 were the general assemblage indicators *Pseudocuma longicornis* and *Magelona filiformis*.

The overall species composition of this group strongly resembles Petersen's 'Shallow *Venus* community' and Thorson's '*Venus gallina* community'. Jones (1950) categorised it as the 'Boreal offshore sand association', although he later (Jones 1951) referred to it as the 'Offshore fine sand community'. Whatever the name, the group is known to vary in species composition according to sand grain size and stability (Thorson 1957). Finer compacted sands favour *Fabulina fabula* and *Magelona* sp., whereas generally coarser loose sands influenced

Indicator	Species	
Exclusive	Microprotopus maculatus	
Shared	Magelona sp. A Fabulina fabula Cochlodesma praetenue	Siphonoecetes kroyeranus Iphinoe trispinosa
General	Nephtys cirrosa Ophelia borealis Mactra stultorum Ensis ensis	Arctica islandica Dosinia lupinus Atylus swammerdami Bodotria pulchella
Partial	Acanthocardia echinata	Thracia phaesolina

Table 7.14: Indicator species for Assemblage Group B4.

by greater water movement tend to have *Spisula elliptica* and *Nephtys cirrosa*. The changes in species composition relative to the prevailing environmental conditions have been well-studied in the nearby Bristol Channel (Warwick & Davies 1977; Tyler 1977; Tyler & Shackley 1980; Warwick & Uncles 1980; Shackley & Collins 1984).

In the Irish Sea, comparable faunas have been recorded from the Liverpool Bay area (Eagle 1973; 1975; Rees *et al.* 1976; Rostron 1992), off the Cumbrian coast (Jones 1952), off the Isle of Man (Jones 1951) and off the east coast of Ireland (Walker & Rees 1980). The higher energy *Nephtys cirrosa-Spisula elliptica* component is very evident

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Phaxas pellucidus	7	1226	98–3245	17.29	17.29
2	Spiophanes bombyx	7	1152	330–2269	16.25	33.54
3	Lagis koreni	7	613	66–2448	8.64	42.17
4	Amphictene auricoma	4	561	0–3544	7.91	50.08
5	OPHIUROIDEA juv.	6	276	0–998	3.90	53.98
6	Pseudocuma longicornis	7	216	13–508	3.04	57.02
7	NEMERTEA spp.	7	199	49–807	2.80	59.82
8	Owenia fusiformis	6	151	0–753	2.13	61.95
9	Mysella bidentata	6	143	0–620	2.02	63.97
10	Mya truncata	1	133	0–932	1.88	65.84
11	Ophelia borealis	7	132	4–397	1.85	67.69
12	Thracia phaseolina	6	110	0–303	1.55	69.25
13	Phoronis spp.	5	104	0–593	1.46	70.71
14	Lumbrineris gracilis	6	95	0–317	1.34	72.05
15	Mediomastus fragilis	7	93	22–196	1.31	73.36
16	Spio sp. A	7	81	13–120	1.15	74.51
17	Magelona filiformis	5	81	0–406	1.15	75.66
18	Pariambus typicus	7	76	9–134	1.08	76.73
19	Abra alba	7	67	13–120	0.95	77.68
20	Nephtys cirrosa	6	67	0–183	0.94	78.63
21	Ensis ensis	5	65	0–192	0.92	79.54
22	Magelona sp. A	6	64	0–263	0.90	80.44
23	Siphonoecetes kroyeranus	6	61	0–165	0.86	81.30
24	Chaetozone sp. A	7	50	9–80	0.71	82.01
25	Fabulina fabula	4	47	0–245	0.66	82.68

Table 7.15: Top ranked taxa for Assemblage Group B4 (Stns. 21, 22, 25, 28, 42, 43, 45).

off Carnsore Point (Keegan *et al.* 1987).

Similar sandy faunas are known all round the British Isles (e.g. Ford 1923; Clark & Milne 1955; McIntyre 1958; Buchanan 1963; Holme 1966; McIntyre & Eleftheriou 1968; Rees 1983) and in the southern North Sea (Davis 1923, 1925; Govaere *et al.* 1980; Vanosmael *et al.* 1982; Creutzberg *et al.* 1984).

In shallow, but generally further offshore, sandy areas of the southern North Sea the fauna often shares some features of coarser gravelly sediments (Govaere *et al.* 1980; Vanosmael *et al.* 1982). In addition, certain sandwave or sandbank areas may be dominated by *Ophelia borealis* or *Hesionura elongata*. In studies off the French coast, the former has been considered characteristic of a distinct community (Cabioch & Glaçon 1975, 1977) or of an intermediate fauna (Glémarec 1973). In Cardigan Bay, *Ophelia borealis* was only a general indicator for Group B4 and was never the dominant species. Overall, the species composition of the group was more indicative of relatively stable environmental conditions. *Ophelia borealis* was, however, recognised as an important member of the medium sands off Carnsore Point (Keegan *et al.* 1987), and small numbers have been found on the sandbanks at the mouth of Dublin Bay (Walker & Rees 1980) and in Liverpool Bay (Norton *et al.* 1984).

The small interstitial phyllodocid *Hesionura elongata* has been found in extremely high numbers (up to 7700/m^2; Vanosmael *et al.* 1982) on a North Sea sandbank. Moreover, the highest densities of this species appear to be found in coarser, presumably more unstable, sands near the crests of sandwaves (Mackie, unpubl. obs.; southern North Sea). This species was not found in any significant numbers on either the inshore sands or the deeper gravelly sands, though it was a general indicator for Group C2 (see Table 7.19). Although no data is currently available, both *Ophelia borealis* and *Hesionura elongata* may yet prove to be more abundant in the larger sand structures to be found in the western part of the southern Irish Sea.

Assemblage C

Occurring throughout the gravelly sediments of the BIOMÔR study area, this was the richest and most extensive of the three main assemblages. As such, it was characterised by a large number of species (Table 7.16). Two constituent groups were tentatively identified (Chapter 6), though their separation was arguable. Comparative distinctions between the two were further hampered by the disparity in the number of stations included in each. As a result, the account of each group has been focused on their individual characteristics.

The assemblage exclusives were moderately abundant at most, and the majority were small-bodied polychaetes. One of the more conspicuous species was the serpulid *Hydroides norvegica* with its calcareous tubes highly visible on the surfaces of stones and pieces of shell. Other relatively large polychaetes were *Polydora caulleryi* and *Polydora* cf. *caeca*, however their cryptic or boring habits made them less obvious. The most abundant exclusives were the tubicolous ampharetid *Ampharete* sp. B and the small amphipod *Guernea coalita*.

Additional assemblage exclusives which were present at slightly less than 50% of the stations were *Eulalia* sp., *Trypanosyllis* sp., *Spio armata*, *Balanus* spp. and *Maera othonis*.

An extremely large number of general indicators were identified with the readily recognisable tunicate *Dendrodoa glossularia* having the highest abundance. Other conspicuous species with generally high to moderate abundance were the sabellariid *Sabellaria spinulosa*, the serpulid *Pomatoceros lamarckii*, the chiton *Leptochiton asellus*, the bivalves *Nucula nucleus* and *Timoclea ovata*, the cirripede *Verruca stroemia* and the ophiuroid *Amphipholis squamata*.

Two other infrequent (<50% of stations) general indicators were the sabellid *Chone* sp. B and the amphipod *Unciola planipes*. Both were locally abundant (see Appendix 8).

In the partial indicator category, the small spionid *Aonides paucibranchiata* was the dominant species. The more conspicuous species were the larger spionid *Laonice bahusiensis*, and the distinctive molluscs *Astarte sulcata* and *Spisula elliptica*.

Indicator	Species
Exclusive	Pseudomystides limbata Syllis sp. D Syllis sp. H Syllis sp. J Odontosyllis fulgurans Sphaerosyllis sp. Autolytus sp. C Goniadella gracilis Polydora caulleryi Polydora cf. caeca Macrochaeta clavicornis Asclerocheilus spp. Ampharete sp. B Phisidea aurea Lysilla nivea Hydroides norvegica Guernea coalita
General	Lepidonotus squamatus Pisione remota Eumida sanguinea Eulalia mustela Syllis sp. E Eusyllis blomstrandi Syllides sp. A Sphaerosyllis bulbosa Sphaerosyllis taylori Sphaerosyllis tetralix Autolytus alexandri Glycera lapidum Nematonereis unicornis Protodorvillea kefersteini Aricidea cerrutii Caulleriella zetlandica Notomastus sp. C Clymenura johnstoni Sabellides octocirrata Polycirrus sp. A Sabellaria spinulosa Chone filicaudata Pomatoceros lamarkii Leptochiton assellus Nucula nucleus Timoclea ovata Achelia echinata Callipallene brevirostris Anoplodactylus petiolatus Verruca stroemia Atylus vedlomensis Cheirocratus sp. Jassa sp. Amphipholis squamata Dendrodoa grossularia
Partial	Laonice bahusiensis Aonides paucibranchiata Grania spp. Astarte sulcata Spisula elliptica Megamphopus cornutus

Table 7.16: Indicator species for Assemblage C.

Assemblage C clearly corresponds to the 'Deep *Venus* community' of Petersen (1915, 1924) and the 'Boreal offshore gravel association' of Jones (1950), later referred to as the 'Boreal offshore gravel community' (Jones 1951). Holme (1966) followed the latter's earlier categorisation, additionally distinguishing a separate 'Boreal offshore muddy-gravel association'.

The fauna of the BIOMÔR gravels showed some signs of subdivision but the two groups (C1 & C2) did not entirely conform to those proposed by Holme (1966). For example, his offshore gravel classification included *Nucula hanleyi*, *Glycymeris glycymeris and Tapes rhomboides (as Venerupis rhomboides*), with *Nucula nucleus* in the muddier category. In the present study, *Glycymeris* was found in Group C1 with *Nucula hanleyi* restricted to Group C2. *Nucula nucleus* and *Tape*s were evident in both groups; the latter additionally occurring in Assemblage D.

Jones (1951) indicated that certain species did show some distributional preference within the gravels to the west of the Isle of Man. Some of these observations support the separation of Group C2 (see below). Rees *et al.* (1976) believed the gravelly sediments to the east of the Isle of Man to be similar to those on the west, and to those described by Holme.

Group C1

The larger subunit of Assemblage C was found throughout the gravelly sediments of St. George's Channel, and in the outer regions of Cardigan and Caernarfon Bays. As for the assem-

Indicator	Species	
Exclusive	Syllis sp. C Aricidea cf. philbinae Paradoneis cf. ilvana Aphelochaeta sp. B Pseudopotamilla spp. Pseudofabricia sp. Protula tubularia	Glycymeris glycymeris Palliolum tigerinum Cressa dubia Maerella tenuimana Munna sp. Hyas spp.
General	Nereis zonata Jupiteria minuta Modiolus modiolus	Nymphon brevirostre Gammaropsis maculata Dyopedos monocanthus
Partial	Exogone verugera	Polydora flava

Table 7.17: Indicator species for Assemblage Group C1.

blage as a whole, the group exclusives (Table 7.17) included a considerable number of small species. The three large species of note were the serpulid *Protula tubularia*, and the bivalves *Glycymeris glycymeris* and *Palliolum tigerinum*. None of the exclusives featured among the top-ranked species (Table 7.18).

Additional exclusives which were present at less than 50% of the stations were *Gyptis propinqua*, *Hesiospina* sp., *Scalibregma celticum*,

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Modiolus modiolus	13	262	0–1346	5.26	5.26
2	Dendrodoa grossularia	9	242	0–1453	4.84	10.10
3	Mediomastus fragilis	15	223	0–932	4.46	14.56
4	Aonides paucibranchiata	16	165	18–410	3.31	17.87
5	Sphaerosyllis bulbosa	12	144	0–914	2.91	20.78
6	Filogranula gracilis	3	113	0–1422	2.27	23.05
7	Exogone verugera	15	107	0–343	2.14	25.19
8	Echinocyamus pusillus	9	92	0–276	1.85	27.04
9	Leptochiton asellus	16	89	4–286	1.77	28.81
10	Sphaerosyllis taylori	16	77	4–234	1.54	30.36
11	Polycirrus spp.	16	72	4–214	1.45	31.80
12	Laonice bahusiensis	16	70	4–169	1.39	33.20
13	Lumbrineris gracilis	16	67	9–232	1.36	34.55
14	Paradoneis lyra	16	66	4–201	1.34	35.89
15	Josephella marenzelleri	2	63	0–691	1.26	37.16
16	Exogone hebes	16	62	9–165	1.24	38.39
17	HARMOTHOINAE indet.	15	61	0–196	1.22	39.62
18	Scalibregma inflatum	10	58	0–325	1.16	40.78
19	Sabellaria spinulosa	12	57	0–352	1.14	41.92
20	Glycera lapidum	16	56	9–134	1.12	43.04
-	Ampharete sp. B	12	56	0–615	1.12	44.17
22	Unciola planipes	5	56	0–821	1.11	45.28
23	Abra alba	11	55	0–441	1.10	46.37
24	NEMERTEA spp.	15	52	0–129	1.05	47.42
25	Pholoe tuberculata	15	47	0–134	0.94	48.37

Table 7.18: Top ranked taxa for Assemblage Group C1(Stns. 1, 2, 4, 6, 14, 15, 16, 17, 33, 38, 49, 51, 52, 55, 57, 58).

Indicator	Species	
Exclusive	Amphitritides gracilis Nucula hanleyi	Ampelisca typica
Shared	Podarke pallida Sphaerosyllis hystrix	Schistomeringos neglecta Gibbula tumida
General	Hesionura elongata Nereis elitoralis Nothria britannica Pista cristata Caecum glabrum	Goodallia triangularis Parvicardium scabrum Eurydice spp. Porcellana sp.
Partial	Streptosyllis bidentata	Ampelisca tenuicornis

Table 7.19: Indicator species for Assemblage Group C2.

Notoproctus sp., *Thelepus cincinnatus*, *Eupolymnia nesidensis*, *Filogranula gracilis*, *Josephella marenzelleri*, *Metopa pusilla*, *Cumella pygmaea*, *Ateleyclus rotundatus* and *Ophiothrix fragilis*. The two encrusting serpulids, *Filogranula gracilis* and *Josephella marenzelleri*, were extremely abundant locally (Stns. 6 & 15; see Appendix 8). Dredge and trawl samples indicate that this is also the case in relation to *Filograna implexa*, which can form clumped networks of erect calcareous tubes.

The most important general indicator was the large mussel *Modiolus modiolus*. This species was the dominant species for the group, though this was due to the presence of large numbers of juveniles. Other ‘large’ or easily recognised general indicators were the nereid *Nereis zonata* and the bivalve *Jupiteria minuta*.

Additional less frequent (<50% of stations) general indicators were *Notomastus* sp. B, *Obtusella alderi* and *Golfingia elongata*.

Group C1 is the main faunal grouping in the southern Irish Sea and is directly comparable with the ‘Offshore gravel community’ described from off the Isle of Man (Jones 1951). There are also many similarities with both the ‘Reduced hard bottom community’ and the ‘*Modiolus* community’ as described from the Bristol Channel by Warwick & Davies (1977), though *Glycymeris glycymeris* was a notable absentee from the species reported.

Outwith the Irish Sea-Bristol Channel area, the closest comparable faunas are those described from the English Channel gravels (Ford 1923; Cabioch 1961; Holme 1966; Glémarec 1973). In a number of accounts of gravelly sediments, in the North Sea (Davis 1923), English Channel (Cabioch & Glaçon 1975, 1977) and further south (Toulemont 1972; Glémarec 1973), a subunit or variation characterised by the presence of the cephalochordate *Branchiostoma lanceolatum* has been recognised. Indeed, the presence of this species was acknowledged by Thorson (1957), when he named the gravel fauna the ‘*Venus fasciatum-Spisula elliptica-Branchiostoma* community’. However, *Branchiostoma* was not prominent in the southern Irish Sea.

Group C2

This small group of three stations from within Cardigan Bay had three exclusive species (Table 7.19). Only the bivalve *Nucula hanleyi*, a species morphologically similar to *Nucula nucleus*, was present in any significant numbers.

The most distinctive shared species was the top-shell *Gibbula tumida*, however, the small syllid *Sphaerosyllis hystix* was more abundant and had a higher fidelity to the group.

While the onuphid *Nothria britannica* and the terebellid *Pista cristata* were perhaps the largest general indicators present, the small, but distinctive, bivalve *Goodallia triangularis* was by far the dominant indicator species (Table 7.20).

Three of the indicators (*Nucula hanleyi*, *Gibbula tumida* & *Pista cristata*) were identified by Jones (1951) as showing a preference for the

Rank	Species	f	Mean/m^2	Range/m^2	%	Cum.%
1	Mediomastus fragilis	3	660	9–1712	10.04	10.04
2	Abra alba	3	347	27–901	5.27	15.31
3	Aonides paucibranchiata	3	325	31–334	4.95	20.27
4	Goodallia triangularis	3	217	45–490	3.30	23.57
5	Phaxas pellucidus	2	205	0–593	3.12	26.69
6	Sphaerosyllis taylori	3	186	138–272	2.83	29.52
7	NEMERTEA spp.	3	179	156–245	2.71	32.23
8	Lagis koreni	3	156	4–299	2.38	34.61
9	Syllis sp. E	3	153	22–366	2.33	36.94
10	Spiophanes bombyx	2	144	0–352	2.19	39.13
11	Spio sp. A	3	142	27–286	2.17	41.30
12	Ampelisca tenuicornis	3	119	9–201	1.81	43.11
13	Lumbrineris gracilis	3	104	31–241	1.58	44.70
-	Scalibregma inflatum	2	104	0–179	1.58	46.28
15	Streptosyllis bidentata	3	95	85–103	1.45	47.73
16	Ampharete sp. A	2	89	0–179	1.36	49.08
17	Golfingia juv.	3	87	27–125	1.31	50.40
18	Pholoe sp.	2	83	0–236	1.27	51.66
-	Pariambus typicus	2	83	0–187	1.27	52.93
20	AMPHARETINAE juv.	1	81	0–245	1.24	54.17
21	Syllis sp. H	3	79	49–94	1.20	55.37
22	HARMOTHOINAE indet.	3	73	4–142	1.11	56.48
-	Caulleriella zetlandica	2	73	0–187	1.11	57.59
24	Pisione remota	2	68	0–107	1.04	58.63
-	Goniadella gracilis	3	68	22–98	1.04	59.67

Table 7.20: Top ranked taxa for Assemblage Group C2 (Stns. 39, 46, 48).

finer gravels. He speculated that the fauna of such deposits would be less species rich than the coarser gravels since wave action would more easily disturb the smaller particles. Unfortunately the sediment data available does not facilitate the subdivision of the gravel component of the sediments. All were categorised as sandy gravels (Fig. 4.3) and the visual assessments (Table 3.1; and Appendix 1) noted the presence of shell. The sediment analyses (Table 4.1) indicated low mud contents, despite the observation for station 48.

Tentative support for the view of Jones comes from the presence of *Hesionura elongata*, *Streptosyllis bidentata* and *Goodallia triangularis* among the group indicators. The first mentioned is known to prefer unstable sands (see above) and there are indications that the same may be true for the second and third (Mackie, unpubl. obs.; southern North Sea); the last mentioned additionally being the dominant species at the anomalous (unstable?) station 54 (Appendix 8).

Assemblage D

This assemblage of three stony stations (Stns. 40, 41 & 44) in the shallower parts of Cardigan Bay was only recognised from the qualitative cluster and MDS analyses. The small number of stations and lack of quantitative data make it difficult to define. Indeed an examination of its species composition revealed no exclusive species.

Species provisionally considered to be general assemblage indicators were the hesionid polychaetes *Kefersteinia cirrata* and *Syllidia armata*, the gastropods *Pusillina inconspicua* and *Partulida spiralis*, the bivalve *Tapes rhomboides*, the amphipod *Gitana sarsi* and the decapod *Eurynome* sp.

Additional information is required concerning this assemblage. It is likely the same fauna extends inshore to the sarns, however, its relationship with Assemblage C remains unresolved.

Discussion

Superficially, the broad agreement between the postulated (Fig. 2.1) and deduced (Fig. 6.3) assemblages appears to lend support for the occurrence of discrete, recognisable and recurring benthic communities. More detailed examination of the faunal composition of each BIOMÔR assemblage or group rather suggests otherwise. The evidence agrees better with the concept of continua; species co-occuring according to their individual preferences. We have therefore chosen not to name our assemblages and their subunits according to traditional community designations.

In the foregoing descriptions and discussions concerning the benthic fauna of the southern Irish Sea many differences were evident in relation to allied faunas. It was perhaps significant that the best agreement was to be found in connection with those 'traditional communities' recognised as having somewhat variable species compositions. Hence Assemblage C and Group B4 closely matched literature definitions of 'Deep *Venus*' and 'Shallow *Venus*' communities, whereas more discrepancies were evident for Assemblage A and Group B1 with respect to the two '*Amphiura* communities'.

Of course, one could redefine the 'communities' to encompass more variability, however, this raises problems when characterising species are infrequent or even absent! This situation has been noted by various workers (e.g. Buchanan 1963; Holme 1966) and in this study. Conversely, BIOMÔR indicator species have been recorded in abundance in faunal assemblages described from elsewhere, yet not been identified as characterising. For example, *Glyphohesione klatti* was here found to be an exclusive of Assemblage A whereas, in the North Sea, this species (as *Synelmis klatti*) had no indicator status in a TWINSPAN analysis (Künitzer *et al.* 1992).

Another alternative would be to simply describe many more communities, subcommunities, facies or variations. This approach has been notably employed by French researchers (e.g. Toulemont 1972; Glémarec 1973) and works well for the particular area under study; the different categorisations aiding the recognition of changes in faunal composition. Difficulties arise when attempts are made to recognise these same components in benthic studies from other, often distant, localities. As with traditional Petersen-type classifications, discrepancies will undoubtedly be found and there will be a tendency to name any 'new' species-grouping encountered. The cumulative effect of this could be the categorisation of an almost unlimited number of 'communities', many only distinguished by relatively small differences in the combination or abundance of their constituent species. Indeed, in areas where the benthic habitat is very heterogeneous over small distances, the potential for recognising numerous species groupings is extremely high. The shallow Liverpool Bay area is a prime example of a situation where the benthos is known to exhibit considerable spatial and temporal variability (e.g. Rees *et al.* 1976; Rees & Walker 1983, 1984, 1991; Norton *et al.* 1984; Rostron 1992).

It is perhaps important to remember that, historically, 'communities' have primarily been defined using the larger, more conspicuous, animals of high biomass. Further, the extent of these was often somewhat subjectively determined. Nowadays, the emphasis in benthic sampling has moved toward the smaller animals that were previously undersampled or ignored. The use of objective computer programs centred on presence and abundance cannot be expected to produce identical results to those of the earlier workers (see Stephenson *et al.* 1972). Programs such as the increasingly popular TWINSPAN (e.g., see Eleftheriou & Basford 1989; Künitzer *et al.* 1992; Mettam *et al.* 1994) may also identify different indicator species. Indeed, the identification of indicators will be dependant upon the methodology employed by each program and may very well differ from those found by categorisation schemes such as used here.

The validity, inter-relationships and affinities of the BIOMÔR assemblages and groups can only be confirmed by additional quantitative sampling. In a local sense this would involve extra sampling within the area (especially in St. George's Channel) as well in all adjacent waters. Zoogeographically this should be concentrated north and south of the study area.

8. Species Diversity

The conservation of biological diversity (biodiversity) has become one of the major issues of the late twentieth century. There is a worldwide recognition that reductions in the diversity of life will, sooner or later, affect us all in some manner. Indeed, it is our many different perceptions of how this may express itself that makes the case for the maintenance and protection of biodiversity so strong. Consequently, biodiversity can be considered from scientific, ecological, economic, nutritional, medical, aesthetic, ethical and political viewpoints (World Conservation Monitoring Centre 1992).

The quantification of biodiversity is fundamental to the identification of any changes that may be taking place and to our understanding of their possible consequences. Biodiversity can be measured at many levels and in numerous different ways (Harper & Hawksworth 1994; May 1994; Hambler & Speight 1995). For many, biodiversity simply relates to the number of species (i.e. species richness) in an area. In the marine environment there has been much debate both about how many species are present and where the greatest diversities are to be found (e.g. Briggs 1994). Particular attention has been directed toward the deep-sea benthos (Hessler & Sanders 1967; Grassle & Maciolek 1992; Rex *et al.* 1993), with its unusually high species richness. In these studies of the deep-sea, species richness has generally been expressed as the estimated number of species present in a sample of any given number of individuals not exceeding the total abundance. Using this interpolative rarefaction technique, comparative assessments of the generated curves can be made; steep high curves indicating a richer fauna than shallow low ones. Alternatively, the estimated number of species for one particular abundance level (e.g. of 100 individuals) can be compared.

The number of species is, however, not the only measure of diversity. The relative abundances of the different species are also important. An area in which the species are equally abundant should be regarded as more diverse than one where the same number of species are of disparate abundance. Hence diversity measures often incorporate both species richness and evenness (or dominance) in their calculation.

Ideally diversity should be determined using all the information presented by the species abundance distribution (May 1975). A number of theoretical models (e.g. log normal, log series, broken stick) have been proposed, though controversy exists over their applicability in field situations (Hughes 1984). In terms of popularity it has become more commonplace to express diversity by means of a diversity index. Such indices reduce the numerical complexity of a fauna to a single figure which can then be used in comparative studies. Diversity indices have been widely employed in assessments of the richness or 'health' of benthic macrofaunal assemblages, particularly in relation to environmental monitoring programmes. The basic premise behind their use is that increases in environmental stress bring about decreases in diversity.

There are many different diversity indices. Some are simple total species-abundance ratios (e.g. Margalef index), others are derived from theoretical species abundance models (e.g. Fisher's log series α) and a number are based upon the proportional abundances of the species (e.g. Shannon-Wiener, Brillouin, & Simpson indices). Having different underlying principles, each index has its own strengths and weaknesses (see Magurran 1988). For example, the Shannon-Wiener index has been criticised for being unduly influenced by the abundance of the dominant species (e.g. Kempton & Taylor 1976; Pearson & Rosenberg 1978; Statzner 1981) and has only moderate discriminatory ability. Nevertheless, it is the most commonly used diversity index. Likewise, there are a number of evenness indices (e.g. Pielou, & Heip evenness) and these too have different properties (Heip 1974; Heip & Engels 1974; Routledge 1983).

Kempton & Taylor (1976) described an interesting diversity index (mid-range statistic, Q) which makes use of both species richness and the relative abundance distribution but does not require adherence to any theoretical model. When the cumulative number of species are plotted against the logarithm of species abundance a sigmoidal curve results. The index is calculated using the gradient of the 'straight' mid part of the curve. It therefore concentrates on species of medium abundance and is not prone to overemphasis due to either the dominant or rare species. It has also been usefully shown that the index approximates to Fisher's log series index (i.e. $Q=\alpha$), even though the theoretical model from which it is derived may not produce the best fit to the data.

An alternative approach to comparing species abundance distributions was proposed by Lambshead *et al.* (1983). Cumulative percent abundance is plotted against log species rank producing curves whose shapes are largely determined by the most abundant species. These k-dominance curves are therefore high in assemblages where some of the species are extremely abundant (i.e high dominance, low diversity) and low in those where all are more equally abundant (i.e. high evenness, high diversity). Warwick (1986) developed the method further by additionally introducing curves derived from biomass data. He found that, taken together, changes in the relative positions of the abundance and biomass curves could be used to indicate alterations in the structure of benthic assemblages. Although not used here, this technique has been successfully applied in a number of environmental impact studies, particularly those involving pollution by organic enrichment (see Warwick 1993).

Materials and Methods

Diversity and evenness measures were calculated for each station (combined replicates*) using a program (STIRLING3) written by Colin Moore and based on that described in Moore (1983). To facilitate comparison with other studies, past and future, a number of different indices were determined (Table 8.1).

The indices of Margalef (d), Simpson (D), Fisher (α), Shannon-Wiener (H') and Pielou's Evenness (J) are commonly employed in ecological studies. Brillouin's index (H) and Heip's Evenness (E) were also calculated. The former has been considered the appropriate index for most ecological studies (Kaesler *et al.* 1978), though Heip & Engels (1974) recommended the Shannon-Wiener index. Heip & Engels (1974) showed the evenness measure of Heip (1974) to be theoretically superior to other evenness indices. The Shannon-Wiener, Pielou and Heip indices were calculated using $\log_2$ values. Diversity was additionally displayed as rarefaction curves generated by the Hurlbert method (see Moore 1983). The estimated number of species (ES) for sample sizes of 50, 100, 200 and 500 individuals were also presented.

Fisher	α	$\frac{S}{\log_e\left(1+\frac{N}{\alpha}\right)}$
Margalef	d	$\frac{S-1}{\mathrm{Log}_e N}$
Simpson	D	$1-\sum\frac{ni(ni-1)}{N(N-1)}$
Brillouin	H	$\frac{\log_e N!-\sum\log_e ni!}{N}$
Shannon -Wiener	H'	$-\sum\frac{ni}{N}\log_2\frac{ni}{N}$
Pielou	J	$\frac{H'}{\log_2 S}$
Heip	E	$\frac{2^{H'}-1}{S-1}$
Where		S = Total Number of Species. N = Total Number of Individuals. n_i = Number of individuals of the $_i$th species.

Table 8.1: Diversity and evenness indices.

*Combined data was used primarily for convenience (having also been used in the multivariate analyses) and because several authors (see below) had indicated little difference with respect to single samples. A preliminary assessment of single versus combined replicates indicated some enhancement (relative to replicate averages) of the diversity values (except D) obtained from the latter treatment. Conversely, evenness was reduced. However, the diversity values for the 'richest' replicate and the combined replicates were usually very similar, as were the evenness values for the 'poorest' replicate and the combined replicates.

For example, at station 14, diversity values were: α (replicates 49.16, 56.33; average 52.75; combined 57.78), H' (5.91, 6.26; 6.10; 6.34) and ES_{100} (50.77, 56.43; 53.60; 55.12). Corresponding evenness values were J (0.86, 0.89; 0.88; 0.86) and E (0.51, 0.59; 0.55; 0.48). At station 43: α (14.98, 15.88; 15.43; 16.75), H' (3.59, 4.01; 3.80; 3.95), ES_{100} (26.77, 27.80; 27.29; 27.86), J (0.63, 0.67; 0.65; 0.64) and E (0.22, 0.24; 0.23; 0.20).

Abundance

The numerical abundance of the southern Irish Sea macrofauna was very variable within each assemblage group (Table 8.2). Taken collectively, the highest densities were to be found in Assemblage B; the number of individuals (average scaled values) being 12485/m^2 in Group B3, 10781/m^2 in Group B2, 7625/m^2 in Group B1, and 7105/m^2 in Group B4. Equivalent densities for Assemblage C (overall 5243/m^2) were 4993/m^2 in Group C1 and 6579/m^2 in Group C2. In comparison, Group A2 was similar with 6349/m^2, while Group A1 had only 1987/m^2. Station 54 had a very sparse fauna.

The annelids were the most numerically dominant faunal component in each assemblage group (but not at every station), accounting for 55.07% of the total quantitative abundance. The molluscs, comprising 27.00% of the total, were dominant at stations 10, 13, 23, 42 and 54. Their densities also approached those of the annelids at stations 18, 20, 26 and 50, as did the 'others' (echinoderms, sipunculids etc.) at station 57. Overall, the 'others' and the arthropods respectively accounted for only 9.91 and 8.02% of the total individuals.

The proportional representation of each faunal component was difficult to examine because of the high variability in the data, however, a few general observations were made. With the exception of a few stations, the molluscs were numerically best represented in Assemblage B. Conversely the arthropods were of least significance in much of Assemblage B (particularly in Groups B1-B3) and Group A1. In relation to other Group A2 stations, the molluscs were noticeably less abundant at station 11, but the arthropods were at (and the 'others' near) their maximum group presence.

Species Richness

A total of 672 enumerable taxa were collected from the 102 quantitative grabs. Of these, 49.26% were annelids, 23.51% were arthropods, 19.05% were molluscs and 8.18% were 'others'.

Assemblage C, occurring in the gravelly sediments, supported the richest fauna, having an average of 145 taxa per station (Table 8.3). For the other assemblages, the number of taxa averaged 113 in Group A2 (Celtic Deep 'sands'), 81 in Groups B1 (inshore muddy sand) and B4 (inshore sand), and 63 and 65 respectively in Groups A1 (Celtic Deep muddy sediments) and B2 (offshore sand). The questionable Group B3 (sand) had an average of 100 taxa per station, while the total for the ungrouped station 23 was similar to the B4 average. Station 54 had only 29 species.

The species richness distribution patterns can also be considered in relation to the numerical abundance of the fauna. A simple plot of species against individuals (Fig. 8.1) clearly showed parallel increases in species richness from Group B1 to Assemblage A to Assemblage C. The plots for Groups B2-B4 were unusual, exhibiting no obvious relationship between the number of species and the number of individuals per station.

As the number of taxa collected by the dredge was found to approximate to that taken by two Van Veen grabs from a similar location (see Table 6.2; and Appendix 5) these data sources were combined to produce generalised species richness maps for the entire BIOMÔR study area. Consideration of the total fauna per station (Fig. 8.2) revealed a broad trend for species richness to increase from east to west toward the generally deeper offshore gravels of St.George's Channel. The number of taxa also increased in the south, from the Celtic Deep toward the southern Irish Sea.

Group	Station	Annelida	Mollusca	Arthropoda	Others	TOTAL
A1	7	180	29	37	29	275
	8	221	34	22	33	310
	9	170	54	48	23	295
	61	303	72	17	34	426
	62	317	262	20	68	667
	10	177	440	37	43	697
A2	59	435	190	130	235	990
	63	639	269	193	163	1264
	60	699	346	155	103	1303
	11	1001	247	415	469	2132
B1	19	766	335	31	188	1320
	20	787	710	23	356	1876
	18	1135	1061	47	264	2507
	47	556	314	77	28	975
	24	402	142	44	23	611
	26	972	953	80	63	2068
	27	886	754	50	101	1791
	29	1466	589	266	195	2516
B2	12	957	209	125	344	1635
	13	916	2015	26	238	3195
B3	32	1243	128	207	53	1631
	50	1369	1296	101	107	2873
	34	2689	993	108	96	3886
B4	43	823	239	187	42	1291
	45	697	214	211	48	1170
	28	704	459	63	82	1308
	21	995	753	81	270	2099
	22	1805	998	70	574	3447
	25	465	324	146	43	978
	42	249	405	174	19	847
	23	136	322	28	26	512
C1	6	1384	249	249	105	1987
	15	917	534	170	107	1728
	14	661	133	87	101	982
	1	870	169	94	34	1167
	2	1292	464	244	83	2083
	38	715	127	50	148	1040
	57	369	94	35	358	856
	58	526	136	232	182	1076
	55	833	138	169	509	1649
	17	626	168	97	87	978
	52	604	87	102	121	914
	16	426	133	81	81	721
	49	542	33	47	136	758
	51	678	164	45	63	950
	4	234	49	62	26	371
	33	504	39	67	24	634
C2	39	622	517	234	95	1468
	48	1406	160	158	138	1862
	46	784	104	109	94	1091
	54	15	58	11	18	102

Table 8.2: Number of individuals per 0.224m^2.

Group	Station	Annelida	Mollusca	Arthropoda	Others	TOTAL
A1	7	34	9	13	5	61
	8	37	7	11	6	61
	9	30	7	9	5	51
	61	39	7	10	7	63
	62	42	10	9	9	70
	10	39	12	10	9	70
A2	59	49	17	17	11	94
	63	62	16	27	16	121
	60	57	16	15	6	94
	11	64	23	37	17	141
B1	19	37	14	11	9	71
	20	37	13	9	11	70
	18	48	16	17	10	91
	47	41	11	12	6	70
	24	25	9	12	7	53
	26	40	15	14	8	77
	27	51	14	22	11	98
	29	60	22	22	12	116
B2	12	34	13	10	8	65
	13	33	12	11	8	64
B3	32	47	15	21	10	93
	50	78	18	17	14	127
	34	40	16	12	12	80
B4	43	39	11	17	6	73
	45	26	17	16	9	68
	28	34	16	18	9	77
	21	43	26	17	9	95
	22	33	20	14	8	75
	25	48	21	24	9	102
	42	29	23	20	4	76
	23	37	18	14	6	75
C1	6	119	28	37	8	192
	15	105	37	36	16	194
	14	98	22	32	15	167
	1	94	20	24	7	145
	2	98	21	29	8	156
	38	96	21	17	10	144
	57	70	12	17	15	114
	58	89	15	14	16	134
	55	98	11	31	15	155
	17	86	16	25	10	137
	52	77	19	28	12	136
	16	77	20	14	14	125
	49	88	14	19	12	133
	51	91	11	18	10	130
	4	66	9	23	9	107
	33	91	12	22	6	131
C2	39	79	20	25	9	133
	48	111	21	29	21	182
	46	85	21	23	12	141
	54	10	8	8	3	29

Table 8.3: Number of taxa per 0.224m^2.

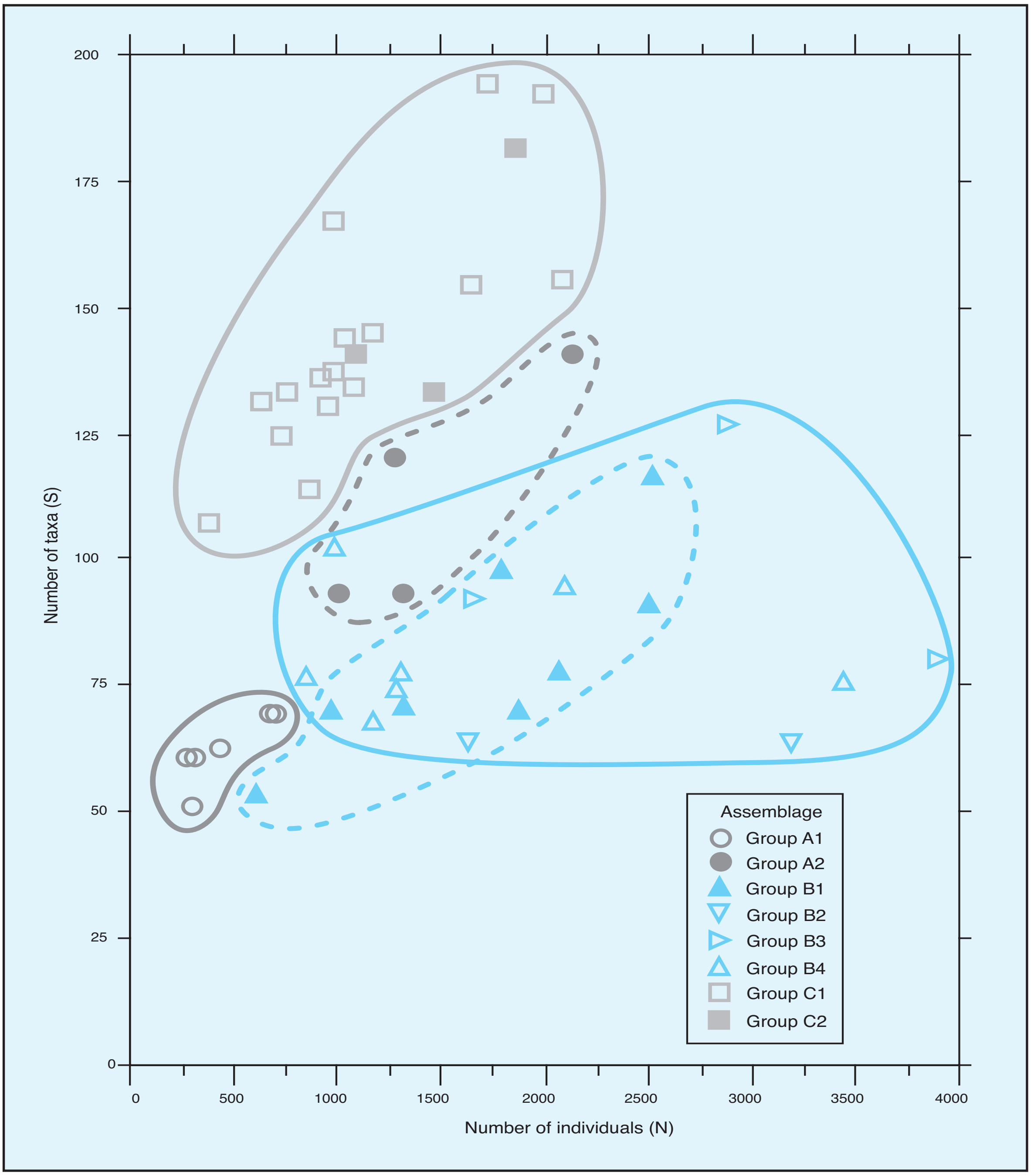


Fig. 8.1: Relationship between number of individuals and number of taxa for each station.

Thus, the softer sediments supported less species per station than the coarser gravels.

Although there were differences between the patterns exhibited by the different faunal components (Appendix 9: Figs. A9.1-A9.3), the main trends were the same. On all the maps, station 11 was noteworthy for having a conspicuously higher species richness than nearby locations.

The annelids were the richest faunal component at every station, accounting for between 34.48 (Stn. 54) and 70.00% (Stn. 51), average 55.50%, of the taxa recorded. The overall station average was 18.28% (range 10.45-26.32%; Stns. 58 & 42) for the arthropods, 16.31% (7.10-30.26%; Stns. 55 & 42) for the molluscs and 9.91% (4.17-15.71%; Stns. 6 & 20) for the 'others'.

The proportional representation of each faunal component was relatively constant across assemblage Groups A2, B1, B2 and B3: annelids (51.93-53.99%), arthropods (16.29-20.65%), molluscs (16.16-19.38%), others (10.84-12.41%). In Groups A1, C1 and C2, the annelids had a comparatively greater species presence (averaging 58.81, 63.03 & 60.22% respectively) and this primarily corresponded to decreases (to 13.75, 12.23 & 13.82%) in the molluscan contributions. The annelids were

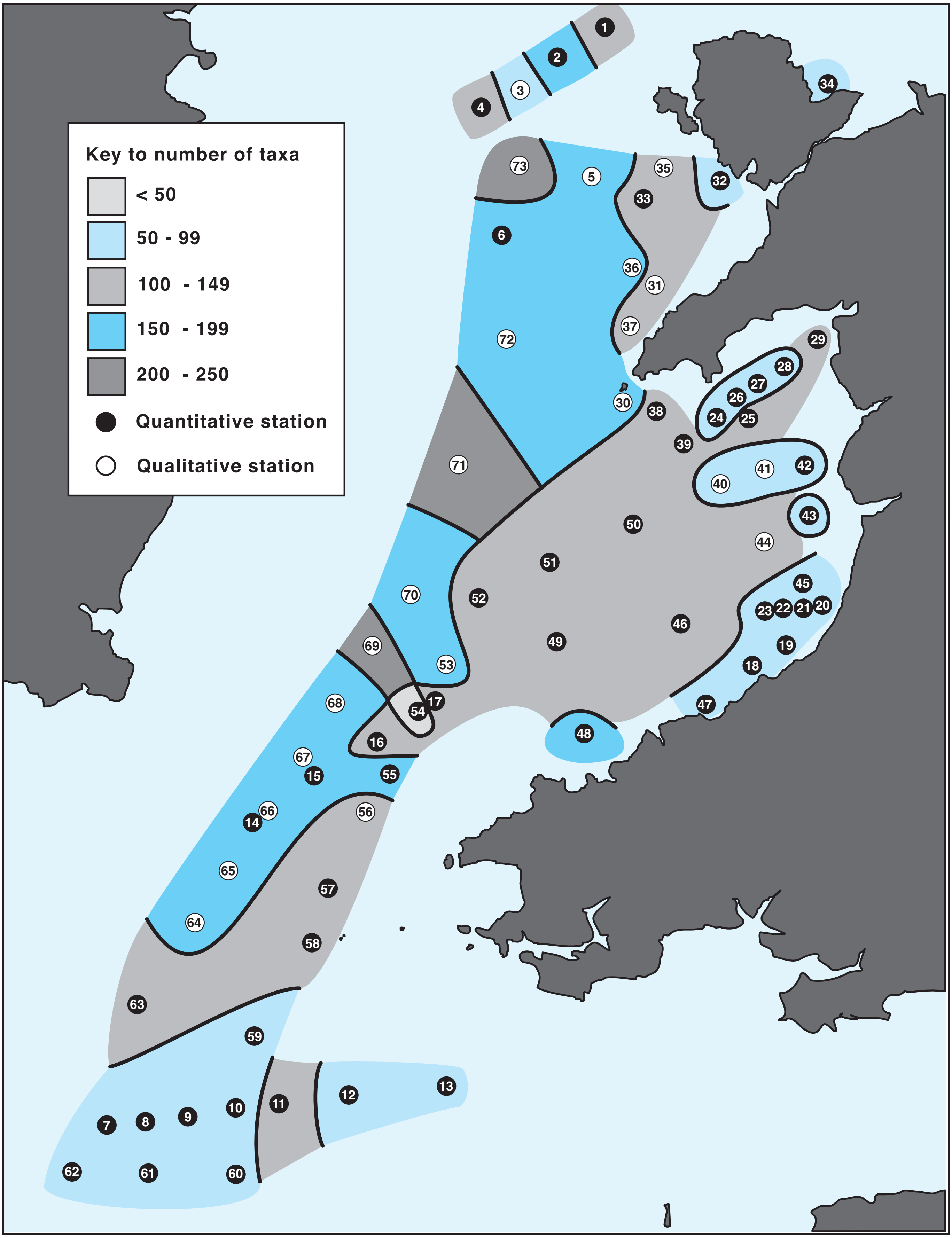


Fig. 8.2: Diagrammatic representation of number of infaunal taxa per station (grab or dredge data only).

least prominent (44.33%) in Group B4, where the molluscs (23.68%) and arthropods (22.37%) were of increased importance.

Diversity

In addition to the 'total fauna' (Table 8.4), the diversity indices were also calculated for each of the faunal components. The latter have been included (Appendix 10; Tables A10.1-A10.4) for reference only and are not discussed below. As the 'other phyla' were represented by the least number of taxa and included the highest degree of taxonomic uncertainty, the diversities for this component (Table A10.4) must be viewed with caution (see Wu 1982).

Most of the diversity indices confirmed the differences between the assemblages and groups as revealed by the species richness data. Simpson's D, the exception, did not distinguish Group A2 from Assemblage C (see Table 8.4). This lack of sensitivity to species richness is well-known and the index is often referred to as a dominance index. Therefore it showed more discriminatory ability with respect to Assemblage B (particularly Groups B2-B4), where the top-ranked species had higher dominance (see Appendix 8) and evenness (J, E) was correspondingly lower.

Two of the indices (Fisher's α & Margalef's d), while differing slightly in their relative diversities at several stations, showed a similar overall distribution pattern (e.g. Fig. 8.3) within the BIOMÔR area. Since both these indices are biased toward species richness the general trends were the same as indicated by the species totals.

Fisher's Index

For Fisher's index, the highest diversities were found in Assemblage C (35.31-57.78; average 45.25) and Group A2 (23.24-33.92; 28.91). The lowest values (11.34-13.94) were found at several stations in Assemblage B (i.e. Stns. 12, 13, 22 & 24) and at station 54. The diversities of Group A1 (17.79-24.29; average 20.72), B1 (13.94-25.13; 17.91), Group B3 (14.26-27.20; 20.95) and Group B4 (13.53-28.66; 19.04) were all approximately similar.

There have been relatively few published estimates of Fisher's diversity for the benthic environment. In the context of the Irish Sea, Rees *et al.* (1972) re-analysed the Cumbrian data of Jones (1952) and found diversities from 10-11 for fine sand, 8-9 for muddy sand and 2-3 for mud. Similar treatment of published data from the west of the Isle of Man (Jones 1956) produced a diversity of 23 for the deep muddy sand. In their study, Rees *et al.* (1972) recorded maximum diversities of 13-15 for the shallower muddy sands and 40 for the muddy gravels of Liverpool Bay. Walker & Rees (1980) found diversities of 6-28 in shallow sands or muddy sands, 10-33 in the deeper muddier sediments and 2-30 from the generally coarse sands on the sandbanks in the Dublin Bay area.

Unfortunately these figures are not directly comparable with the present study. In Jones (1952, 1956) the data presented was for a combined sample size of 1.0 m^2 and the samples were sieved through a 2 mm mesh. In both Rees *et al.* (1972) and Walker & Rees (1980) a 1.0 mm sieve was used, and the sample sizes were 0.5 m^2 and 0.2 m^2 respectively. Although there is some information on the influence of sample size on Fisher's index (see Riddle 1984), the effect of sieve size is unknown.

Mackie (unpublished) and Mackie *et al.* (1993) used exactly the same sampling procedure as employed in the the BIOMÔR report. The first mentioned concerned the benthic assemblages of a Scottish sea loch (10-35 m) and found Fisher diversities of 10.72-17.04 (average 14.40) for mud, 15.15-39.69 (22.75) for sandy mud, 43.95-46.10 (45.03) for muddy sand, and 23.94-28.23 (26.40) for mixtures of mud, sand and gravel. The second study was conducted in an area of Hong Kong subjected to organic pollution and, in comparison, the diversities were markedly lower for 'similar' sediments: 2.64-6.92 (average 4.83) for mud and 24.00 for muddy sand.

Fisher's index has also been applied in North Sea monitoring work. Mackie (in IOE 1984) recorded diversities (per 0.5 m^2; 0.5 mm sieve) of 29.82-40.72 (average 35.37) in the fine to medium sands (110 m) of the Brae Oilfield. From the data presented by Riddle (1984) the Fisher diversity

Group	Stn.	S	N	∝	d	D	H	H’	J	E
A1	7	61	275	24.29	10.68	0.96	3.28	5.17	0.87	0.58
	8	61	310	22.73	10.46	0.96	3.24	5.08	0.86	0.55
	9	51	295	17.79	8.79	0.95	3.09	4.82	0.85	0.54
	61	63	426	20.42	10.24	0.93	3.07	4.74	0.79	0.42
	62	70	667	19.72	10.61	0.90	2.97	4.51	0.74	0.32
	10	70	697	19.39	10.54	0.85	2.71	4.13	0.67	0.24
A2	59	94	990	25.52	13.48	0.95	3.47	5.23	0.80	0.39
	63	121	1264	32.94	16.80	0.96	3.66	5.50	0.80	0.37
	60	94	1303	23.24	12.97	0.96	3.54	5.28	0.81	0.41
	11	141	2132	33.92	18.27	0.97	3.76	5.59	0.78	0.34
B1	19	71	1320	16.06	9.74	0.94	3.17	4.71	0.77	0.36
	20	70	1876	14.34	9.15	0.88	2.80	4.13	0.67	0.24
	18	91	2507	18.51	11.50	0.85	2.71	3.99	0.61	0.17
	47	70	975	17.28	10.03	0.91	2.84	4.26	0.69	0.26
	24	53	611	13.94	8.11	0.90	2.76	4.18	0.73	0.33
	26	77	2068	15.77	9.96	0.87	2.61	3.85	0.61	0.18
	27	98	1791	22.28	12.95	0.90	2.87	4.27	0.65	0.19
	29	116	2516	25.13	14.69	0.94	3.45	5.10	0.74	0.29
B2	12	65	1635	13.54	8.65	0.85	2.63	3.90	0.65	0.22
	13	64	3195	11.34	7.81	0.59	1.61	2.38	0.40	0.07
B3	32	93	1631	21.39	12.44	0.93	3.12	4.64	0.71	0.26
	50	127	2873	27.20	15.82	0.88	2.90	4.29	0.61	0.15
	34	80	3886	14.26	9.56	0.83	2.40	3.52	0.56	0.13
B4	43	73	1291	16.75	10.05	0.83	2.64	3.95	0.64	0.20
	45	68	1170	15.73	9.48	0.79	2.51	3.77	0.62	0.19
	28	77	1308	17.88	10.59	0.88	2.81	4.20	0.67	0.23
	21	95	2099	20.48	12.29	0.86	2.76	4.08	0.62	0.17
	22	75	3447	13.53	9.09	0.88	2.61	3.82	0.61	0.18
	25	102	978	28.66	14.67	0.94	3.41	5.16	0.77	0.34
	42	76	847	20.22	11.12	0.91	3.07	4.64	0.74	0.32
	23	75	512	24.21	11.86	0.87	2.76	4.27	0.69	0.25
C1	6	192	1987	52.45	25.15	0.96	4.00	5.99	0.79	0.33
	15	194	1728	56.07	25.89	0.95	3.92	5.90	0.78	0.30
	14	167	982	57.78	24.09	0.98	4.14	6.34	0.86	0.48
	1	145	1167	43.63	20.39	0.96	3.71	5.63	0.78	0.34
	2	156	2083	39.04	20.28	0.95	3.68	5.49	0.75	0.28
	38	144	1040	45.35	20.58	0.98	3.96	6.02	0.84	0.47
	57	114	856	35.31	16.74	0.89	3.13	4.79	0.70	0.24
	58	134	1076	40.36	19.05	0.96	3.80	5.76	0.82	0.40
	55	155	1649	41.92	20.79	0.95	3.73	5.60	0.77	0.31
	17	137	978	43.36	19.75	0.97	3.85	5.86	0.83	0.42
	52	136	914	44.21	19.80	0.97	3.93	6.00	0.85	0.47
	16	125	721	43.66	18.84	0.97	3.74	5.75	0.82	0.42
	49	133	758	46.73	19.91	0.97	3.81	5.86	0.83	0.43
	51	130	950	40.74	18.81	0.97	3.88	5.91	0.84	0.46
	4	107	371	50.38	17.92	0.98	3.85	6.11	0.91	0.64
	33	131	634	50.12	20.15	0.97	3.87	6.00	0.85	0.49
C2	39	133	1468	35.51	18.10	0.95	3.62	5.43	0.77	0.32
	48	182	1862	49.93	24.04	0.94	3.73	5.60	0.75	0.26
	46	141	1091	43.13	20.01	0.98	4.02	6.10	0.85	0.48
	54	29	102	13.52	6.05	0.88	2.27	3.77	0.78	0.45

Table 8.4: Diversity and evenness values for each BIOMÔR station.

values for a combined sample size of 0.5 m^2 are likely to be slightly enhanced with respect to one of 0.2 m^2.

Hence, despite the problems inherent in comparing data sets from different areas and sampling procedures, it is clear that the Fisher diversity values for the offshore gravels are as high as, or higher than, those recorded from other British localities.

Shannon-Wiener Index

The Shannon-Wiener index (H') has become the standard measure of diversity in marine benthic studies. In this study, the values for Brillouin's Index (H) almost exactly paralleled those of the Shannon-Wiener (H') and therefore have not been discussed separately. The highest H' values were found in Assemblage C (4.79-6.34; average 5.80) and Group A2 (5.23-5.59; 5.40). The lowest values (2.38-3.99) were found at eight stations in Assemblage B and at station 54. The diversities of the Group A1 stations (4.13-5.17; 4.74) were generally slightly higher than those of Groups B1 (3.85-5.10; 4.31), Group B3 (3.52-4.64; 4.15) and Group B4 (3.77-5.16; 4.23).

The distribution of H' diversity estimates in the BIOMÔR area (Fig. 8.4) differed slightly from that shown by Fisher's index (Fig. 8.3), however, the general trends were the same. Diversity tended to be lower in the muds and sands, and higher in the gravels.

There have been several studies concerning the behaviour of the Shannon-Wiener index under different sampling regimes. For example, Riddle (1984) and Kingston & Riddle (1989) found H' to remain stable for combinations of two or more grabs. The latter authors and Levell *et al.* (1989) also showed that, for unpolluted locations, diversity values were relatively unaffected by the sieve mesh size (0.5 or 1.0 mm) used.

The Shannon-Wiener diversities of the BIOMÔR area could only be partially compared with other studies since data was not available for 'exact' equivalents of each assemblage. Nevertheless, the results from a number of publications can be used to put the the southern Irish Sea diversity estimates in perspective.

Group B4, occurring in sandy inshore areas, can be compared with the fauna of like sediments in the southern North Sea, though it must be noted that the sands there appear less stable. Working off the Belgian coast, Govaere *et al.* (1980) recorded an average diversity of 3.28 in their 'open sea zone'. In the more stressed conditions associated with a linear sandbank, Vanosmael *et al.* (1982) found diversities of 1.55-3.26 (average 2.40) using the Brillouin index ($\log_2$ values). The lowest Assemblage B diversity (2.38) was from the offshore sand of station 13 (Group B2), however, the species composition there differed markedly from that found on the Belgian sandbank.

Group A1, found in the Celtic Deep 'muds', showed faunistic similarities with the *Nephrops* grounds (80 m depth) off the Northumberland coast. Buchanan & Warwick (1974) reported an annual diversity range of 3.9-4.2 from this location. The later publication of a 15 year investigation (Buchanan & Moore 1986) revealed a temporal range of 3.34-4.29. Hence diversity (H') appears to be generally higher in the Celtic Deep.

Buchanan & Moore (1986) also reported diversities of 4.86-5.64 from a parallel 14 year study of the Northumberland muddy sands (55 m). The fine sands (see Basford & Eleftheriou 1988) of the more northern parts of the North Sea have baseline diversities of 4.4-5.8 (Kingston 1987). Both sets of figures encompass the range of values found for Group A2 in the sandier parts of the Celtic Deep.

No directly comparable data was available for Group B1. The species cited by Addy (1976) and Probert (1981) suggested similar faunas existed in Milford Haven and off the south coast of Cornwall. In the former publication, 'fine' sediment stations having the largest populations of *Melinna palmata* (a Group B1 exclusive species) yielded diversities of 2.86-3.41. In the latter, a baseline diversity (excluding crustacea) of around 3.8 was indicated. Therefore both these areas appear to have a less diverse fauna than the inshore muddy sands of Cardigan Bay. However, it may be noted that *Melinna palmata* has also been found in abun-

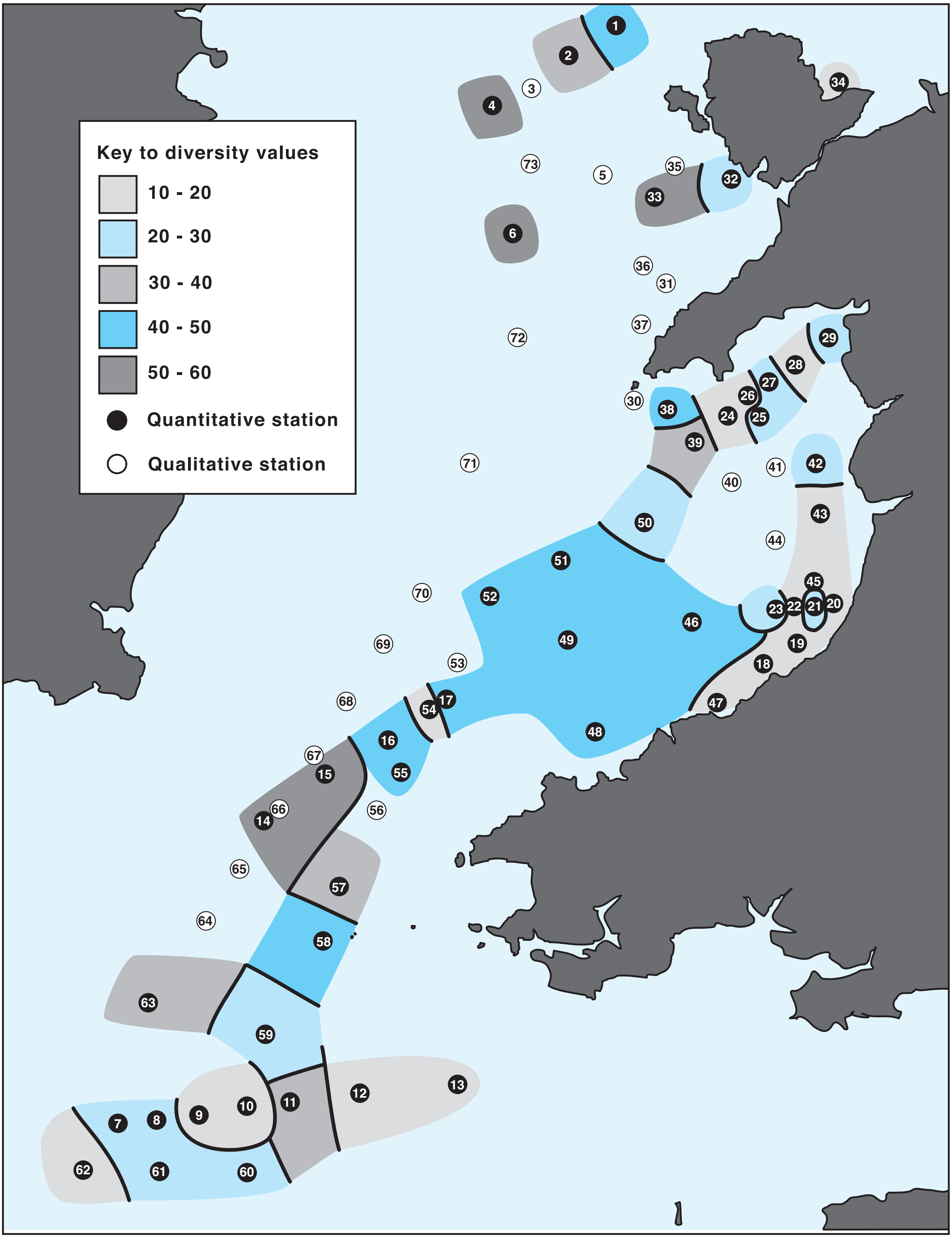


Fig. 8.3: Diagrammatic representation of Fisher's diversity (α) values for BIOMÔR stations.

dance in the muddier sediments of Loch Creran, on the west coast of Scotland (Mackie, unpublished). Comparable H' diversities there were 3.32-4.51 (average 3.81) for mud, 3.65-5.14 (4.51) for sandy mud, 5.44-5.50 (5.47) for muddy sand, and 4.37-4.72 (4.57) for mixtures of mud, sand and gravel.

The faunal diversity of gravelly sediments has received relatively little attention from benthic ecologists. This undoubtedly reflects the difficulties faced in obtaining quantitative samples and consequently diversity data for this habitat is sparse. The muddy gravel fauna of Assemblage C (Stns. 1, 58 & 49) was noticeably more diverse than that inhabiting comparable sediments in Loch Creran. Instead, the sea loch fauna had diversities closer to that recorded from the more inshore station 19 (Group B1), which also had a similar mud-gravel-sand sediment (see Fig. 4.3). These observations lend some support to the view that the standard procedures for characterising sediments do not necessarily yield biologically meaningful results (Morgans 1956). Particle size analysis simply reduces a complex sediment structure into its basic constituents and ignores the interaction between inorganic particles, carbonates and organic matter. Furthermore, other unmeasured factors (e.g. water movement/oxygenation, porosity, bioturbation) may also be involved.

Assemblage C stations generally had the most diverse fauna of the BIOMÔR study area. Certainly, we have never before observed a higher Shannon-Wiener diversity than that recorded (6.34) from the gravelly sands of station 14. The only comparable diversity (6.20) was recently obtained from the coarse gravels on the west coast of Shetland (ESGOSS 1994).

Evenness

The two evenness measures (J & E) each showed considerable variation throughout the study area. Both sets of data identified Assemblage B stations as generally having the lowest evenness (e.g. Fig. 8.5). Notable features were the high evenness values in the muddy sediments of the Celtic Deep and at the impoverished station 54.

Rarefaction

The Hurlbert rarefaction curves were plotted on a log scale in order to produce a unified display of stations with widely different total abundances. For clarity the curves for the 51 stations (Appendix 11) were arranged on a series of eight graphs so that cross-overs were minimised. With the exception of the highest (Stn. 14; or Stn. 4) and lowest (Stn. 13) curves, each station was depicted once. Such a large number of curves naturally made direct comparisons difficult, though the general trends for each assemblage were clear (Fig. 8.6): in relative terms, diversity was high in Assemblage C, moderately high in Assemblage A, and moderate to low in Assemblage B.

An alternative method of comparing rarefaction curves involves consideration of the estimated number of species (ES) for a set number of individuals (e.g. 100). This has found particular favour in deep-sea studies (e.g. Grassle & Maciolek 1992), though a weakness in the method arises when rarefaction curves cross each other and two different curves give rise to the same value (Simberloff 1978). The method has the advantage of facilitating rapid assessments of the relative diversities of many curves.

For comparative purposes the ES values for several different abundance levels have been tabulated (Table 8.5). Note that, strictly speaking (due to a number of taxonomic uncertainties), “taxa” would perhaps be a more appropriate term than “species”. However, to avoid confusion, “species” has been used in the following account.

A comparison of the estimated number of species for 100 individuals (ES_{100}) showed Assemblage C to be richest (37-55; average 48 species), followed by Group A2 (38-42; 40 species). Group A1 stations (30-39; 34 species) were generally slightly richer than those of Groups B1, B3 and B4 (collectively 21-39; average 28 species). Interestingly, station 54 was ‘richer’ than station 12 (Group B2). This can be attributed to the difference in evenness (or dominance) between the two stations and highlights another potential problem with this technique (see Gage & May 1993).

The very high ES values from the offshore

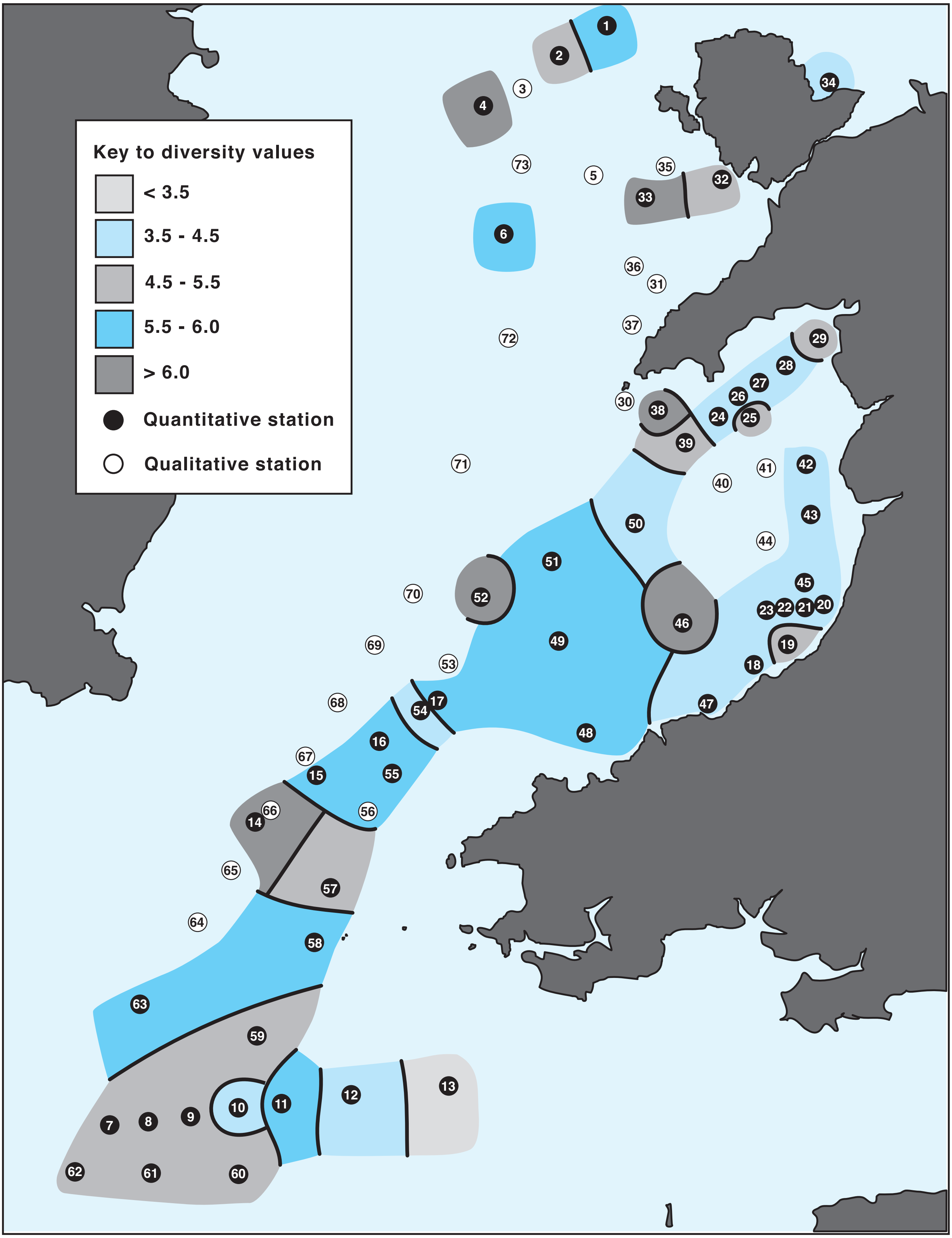


Fig. 8.4: Diagrammatic representation of Shannon-Wiener diversity (H') values for BIOMÔR stations.

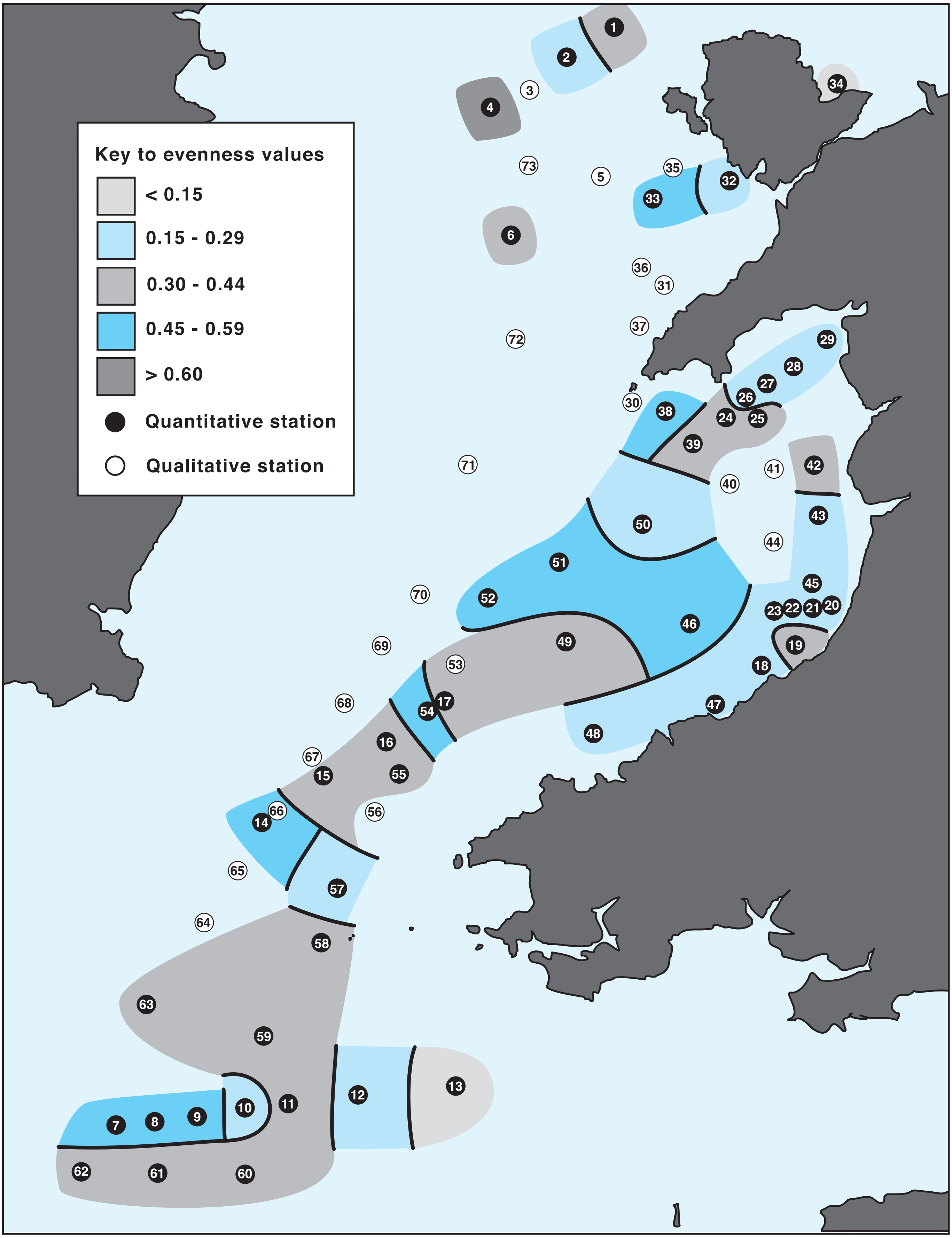


Fig. 8.5: Diagrammatic representation of Heip evenness (E) values for BIOMÔR stations.

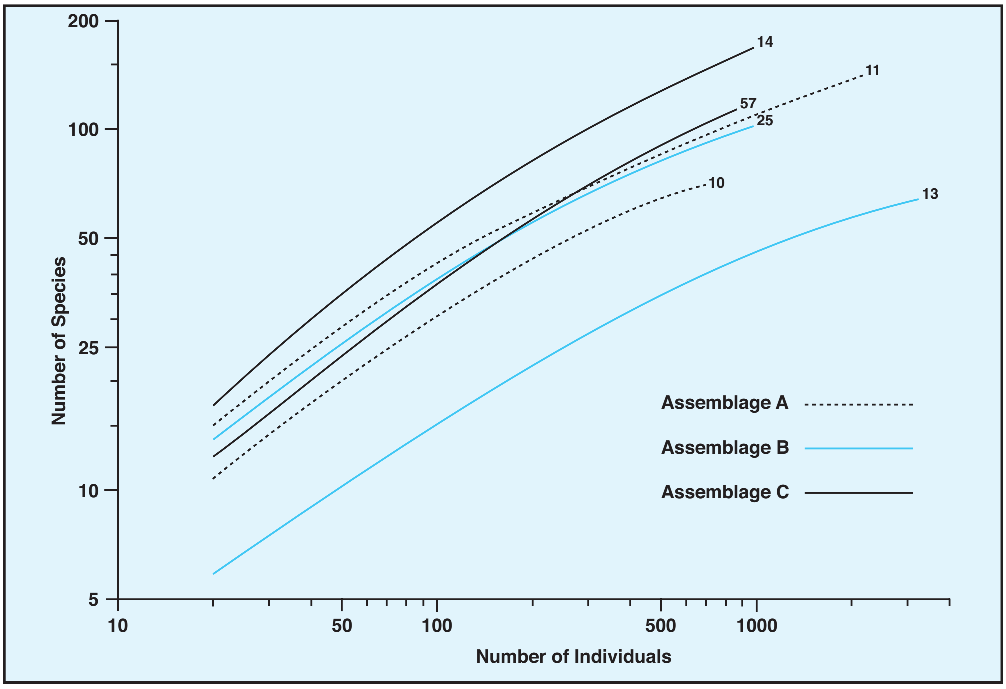


Fig. 8.6: Upper and lower Hurlbert rarefaction curves for each macrofaunal assemblage.

gravels of the southern Irish Sea compare very favourably with those cited by Grassle & Maciolek (1992) for the deep-sea. This brings into question the prevailing belief that the benthos of the deep-sea and shallow tropical waters have higher species diversities than shallow temperate areas (Grassle & Maciolek 1992; Etter & Grassle 1992; World Conservation Monitoring Centre 1992). In fact, the available data (e.g. Riddle 1988; Alongi 1990; Mackie *et al*. 1993; Kendall & Aschan 1993) does not support the supposed richness of the tropics. Nevertheless, it seems probable that, with more study, high diversities will also be found in other benthic situations worldwide.

Conclusion

The southern Irish Sea area has a very diverse fauna, with some 1030 macrofaunal species recorded from the 73 stations (see Table 5.1). A total of 672 taxa were enumerated from the 51 quantitative stations. Using a number of univariate methods, Assemblage C was found to have the highest species diversities in the study area (Tables 8.4 & 8.5). Indeed, the macrofaunal diversities of these gravelly sediments were of the same magnitude as those recorded from the species rich deep-sea.

The evidence from the deep-sea and the present study suggests high diversities can occur in markedly different sediment types and depth zones. While the identification of areas of high diversity is relatively straightforward, explaining their cause is quite a different matter.

For Assemblage C, sediment heterogeneity can be considered an obvious, but potentially important, 'causative' factor. Correlations between increased spatial complexity and high species diversity have been demonstrated for a wide range of animal groups (see summaries in Giller 1984; and Putman 1994) and, in this study, gravel and silt were identified as two of the three main variables 'influencing' the species distributions (see Chapter 6). The frequent presence of a well-developed epifauna (especially 'bushy' hydroids and bryozoans) would have further added to this complexity, providing additional microhabitats suitable for colonisation by other invertebrates.

Many theories have been proposed to explain the high diversities of the deep-sea benthos (see Rex 1981, 1983; Gage & Tyler 1991; Etter & Grassle 1992), some of which could equally be applied to shallower areas. The general consensus, however, is that high diversities are the result of a combination of factors. The determination of these factors remains one of the major challenges facing benthic scientists.

Group	Stn.	ES_{50}	ES_{100}	ES_{200}	ES_{500}
A1	7	27.18	38.62	53.03	-
	8	26.14	37.48	51.05	-
	9	23.67	32.60	43.47	-
	61	23.72	34.15	46.34	-
	62	21.93	31.90	43.68	62.73
	10	19.90	30.41	43.75	63.43
A2	59	26.47	38.93	53.76	76.96
	63	27.90	41.08	57.64	85.02
	60	26.62	37.94	50.68	70.01
	11	28.41	42.10	58.75	85.06
B1	19	21.91	29.65	38.32	52.31
	20	18.83	26.19	34.70	48.16
	18	17.90	25.21	34.04	49.23
	47	18.65	27.37	38.74	56.53
	24	18.93	26.85	36.33	49.98
	26	16.51	23.58	32.23	45.87
	27	18.46	26.74	37.99	58.88
	29	25.21	37.74	52.44	73.40
B2	12	17.79	24.64	32.09	44.08
	13	10.18	15.13	22.36	34.67
B3	32	21.23	30.36	41.88	61.61
	50	18.89	28.87	42.73	66.72
	34	14.18	20.54	28.76	41.97
B4	43	18.58	27.86	39.20	55.74
	45	18.17	27.04	37.80	54.12
	28	19.11	28.09	39.13	56.31
	21	18.35	27.50	39.05	57.84
	22	15.75	21.38	28.53	39.51
	25	25.52	38.81	55.80	81.67
	42	22.62	33.65	46.79	65.76
	23	20.91	33.05	48.95	74.31
C1	6	31.42	50.58	76.59	118.76
	15	30.44	49.36	75.41	119.75
	14	34.77	55.12	82.01	128.24
	1	28.76	45.02	67.03	104.35
	2	27.35	42.72	63.09	96.37
	38	32.33	49.73	71.90	108.36
	57	23.73	37.34	56.19	89.61
	58	30.67	48.49	70.53	103.80
	55	28.92	45.24	66.69	101.56
	17	30.94	47.48	68.72	104.17
	52	32.50	50.78	73.53	108.70
	16	30.07	46.05	67.59	106.69
	49	31.15	48.94	72.89	113.08
	51	31.86	49.49	70.80	103.34
	4	35.14	55.35	80.84	-
	33	32.81	52.63	78.60	119.30
C2	39	27.32	41.27	59.17	89.17
	48	28.67	45.67	68.38	107.85
	46	33.24	51.56	74.14	109.03
	54	19.21	26.57	-	-

Table 8.5: Number of species (ES) per 50, 100, 200, and 500 individuals as predicted by the Hurlbert rarefaction method.

9. Overview

The southern Irish Sea and its approaches were found to have a very rich benthic macrofauna, with some 1030 macrofaunal species recorded from the 73 stations. Of this total, approximately 80% could be considered 'infaunal' and 20% epifaunal.

Faunal Composition

The annelids dominated the fauna, comprising 37% of the total species encountered and 45% of the infauna alone. The second and third largest faunal groups were the Crustacea and Mollusca which respectively accounted for 20% and 16% of the total. The Bryozoa dominated the epifauna, accounting for 36% of such taxa and 7% of the overall total.

A total of 672 enumerable taxa were collected from the 102 grabs at the 51 quantitative stations. Of these, 49% were annelids, 24% were arthropods, 19% were molluscs and 8% were 'others'.

Abundance

Macrofaunal density ranged from an estimated 455/m^2 (Stn. 54) to 17348/m^2 (Stn. 34).

The annelids were numerically dominant with 55% of the total quantitative abundance (69312 individuals). The molluscs, comprised 27%, with the 'others' and the arthropods respectively accounting for only 10% and 8% of the total individuals.

Taxonomy

Taxonomic problems were evident for many of the phyla encountered. Some of these were due to difficulties in the identification of juvenile or damaged specimens. Others concerned poorly known, compounded, or perhaps undescribed species (e.g. many polychaetes, some solenogastres, the gastropod *Jordianella nivosa*, several amphipods and isopods, the phoronids). The BIOMÔR material has already proved useful in studies concerning the taxonomic validity of a number of species (e.g. the re-establishment of *Melinna elisabethae*; Mackie & Pleijel, *in press*).

New Species

Over twenty polychaetes and one harpacticoid copepod (associated with the serpulid polychaete *Hydroides norvegica*) were recognised as possibly representing species new to science. A new species of solenogastre has been described (Caudwell *et al.*, 1995), and two new spionid polychaetes are under study (Mackie, in prep.).

New records

Two solenogastre species and one copepod parasite (*Nereicola ovatus* on *Nereis elitoralis*) were newly recorded from British waters. Within the BIOMÔR area, a number of amphipod crustaceans, several molluscs (e.g. *Emarginula crassa*, *Dikoleps nitens*, *Skenea serpuloides*, *Obtusella alderi, Caecum glabrum, Diaphana minuta*), and two parasitic copepods (?*Jeanella minor* & *Hersiliodes latericia*) were found to represent new Sea Area records.

Depth Distribution

Several gastropods (*Tricolia pullus, Rissoa interrupta, Hyala vitrea, Ceratia proxima*), pycnogonids (*Nymphon brevirostre, Achelia echinata, Endeis spinosa*), amphipods (*Apherusa bispinosa, Perioculodes longimanus*) and a holothurian (*Leptosynapta minuta*) were collected at depths noticeably greater than those previously recorded.

Zoogeography

As with 'new records', zoogeographical assessments must be made with caution. Range extensions may reflect inadequacies in our knowledge, rather than 'true' changes in distribution. For this reason, no detailed investigation was made of polychaete zoogeography. However, some species belonging to several different phyla were notable for their occurrence in the BIOMÔR area.

Northern species occurring in more southern locations than usual included the scaphopod *Pulsellum lofotense*, the amphipod *Eriopisa elongata* and the parasitic copepod *Aphanodomus terebellae* (on terebellid polychaetes).

Southern species occurring in more northern locations than usual included the asteroid *Marginaster capreensis* and the sponge *Polymastia agglutinans*.

A more definitive assessment of the zoogeography of the area can only be made following additional investigations in nearby waters, particularly in the Celtic Sea to the south.

Faunal Assemblages

The cluster analyses and MDS ordinations supported the recognition of three major assemblages (A-C) in the BIOMÔR study area. An additional assemblage (D) probably occurs in the shallow coarse sediments of Cardigan Bay but, as yet, this has not been subject to quantitative analysis.

There was evidence of distinct subdivision within Assemblages A (Groups A1 & A2) and Assemblage B (Groups B1, B2 & B4). Group B3, however, appeared to be an artefact of the cluster analysis and certain stations (notably Stn. 50) clearly had intermediate faunal compositions. Assemblage C could perhaps be subdivided into Groups C1 and C2 (at least), though the results were equally supportive of a faunal gradation within this assemblage. The assemblage groupings for the various faunal components each exhibited some differences in relation to the overall infaunal pattern, with the Annelida showing the closest match.

By simple observation the assemblages and their subunits were found to coincide well with the general sediment distributions relative to depth. More rigorous analysis (BIO-ENV procedure) confirmed this, implicating gravel, silt and depth together as the environmental combination best explaining the overall faunal distribution pattern.

Assemblage A, occurring in the deeper waters of the Celtic Deep, was characterised by the presence of *Pseudomystides spinachia, Glyphohesione klatti, Glycera rouxii, Levinsenia* sp., *Prionospio dubia, Ophelina modesta, Ampharete falcata, Pulsellum lofotense, Nucula sulcata, Ampelisca macrocephala* and *Pseudarachna hirsuta*. The two subunits Groups A1 and A2 respectively approximated to the muddier and sandier sediments of the area.

Group A1 stations possessed *Nephtys hystricis, Atherospio disticha, Amphicteis gunneri, Saxicavella jeffreysi, Diastylis lucifera* and *Nephrops norvegica,* with *Gyptis rosea, Ancistrosyllis groenlandica* and *Leucon nasica* prominent.

Group A2 stations had *Sphaedodoridium claparedii, Vitreolina philippi, Myrtea spinifera, Cirolana borealis* and *Pleurogonium inerme,* together with *Aricidea laubieri, Cirrophorus furcatus, Ophelina cylindricaudata, Chaetoderma nitidulum, Eriopisa elongata* and *Eugerda tenuimana.*

Assemblage B was more complex, but was predominantly composed of inshore stations having soft sediments (sands and muddy sands) and featuring *Malmgrenia andreapolis, Glycera tridactyla* and *Ampelisca brevicornis*. The two main subunits were Groups B1 and B4.

The first was located in the muddier sediments (15-58 m) associated with depressions in the Cardigan Bay seabed and was characterised by the presence of Spionidae sp. A and *Melinna palmata*, together with *Callianassa* sp., *Phoronis pallida* and *Labidoplax digitata*.

The second coincided with the nearby sands (16-26 m) and had *Microprotopus maculatus,* along with *Cochlodesma praetenue, Siphonoecetes kroyeranus* and *Iphinoe trispinosa*. Conversely, Group B2 (Stns. 12 & 13) was found in the deeper sands (78-88 m) of the Bristol Channel approaches and was distinguished by having *Corystes cassivelaunus*. Both sandy Assemblage B groups possessed *Magelona* sp. A and *Fabulina fabula*.

Assemblage C coincided with the gravelly sediments from deep (170 m) to shallow depths (27 m). Distinguishing species included *Pseudomystides limbata, Odontosyllis fulgurans, Sphaerosyllis* sp., *Goniadella gracilis, Polydora caulleryi, Polydora* cf. *caeca, Macrochaeta clavicornis, Asclerocheilus* spp., *Ampharete* sp. B, *Phisidea aurea, Lysilla nivea, Hydroides norvegica* and *Guernea coalita*.

Group C1 encompassed the majority of stations (29-170 m) and also featured *Aricidea* cf. *philbinae, Paradoneis* cf. *ilvana, Protula tubularia, Glycymeris glycymeris, Palliolum tigerinum, Cressa dubia* and *Maerella tenuimana*.

Group C2, confined to the outer part of Cardigan Bay (27-39 m), possessed *Amphitritides gracilis, Ampelisca typica* and *Nucula hanleyi*, with *Podarke pallida, Sphaerosyllis hystrix, Schistomeringos neglecta* and *Gibbula tumida* prominent.

Assemblage D was only found in the shallower stony parts of Cardigan Bay and was not quantitatively defined. Species showing some preference for this assemblage were *Kefersteinia cirrata, Syllidia armata, Pusillina inconspicua, Partulida spiralis, Tapes rhomboides, Gitana sarsi* and *Eurynome* sp.

The assemblages and groups were compared with similar faunas from other localities. Only in broad terms could the southern Irish Sea fauna be considered to conform to 'traditional community' concepts *sensu* Petersen. Rather, the data supports the idea of distribution continua; species forming somewhat looser assemblages according to overlaps in their responses to prevailing environmental conditions.

Species Diversity

Species richness increased from east to west toward the deeper offshore gravels of St. George's Channel. The number of taxa also increased in the south, from the Celtic Deep toward the southern Irish Sea. Thus, the softer sediments supported less species per station than the coarser gravels.

Assemblage C supported the richest fauna, having an average of 145 taxa per station. For the other assemblages, the number of taxa averaged 113 in Group A2, 81 in Groups B1 & B4, and 63 & 65 respectively in Groups A1 and B2. The questionable Group B3 had an average of 100 taxa per station, while the total for the ungrouped station 23 was similar to the B4 average. Station 54 had only 29 species.

A comparison of the estimated number of species for 100 individuals (ES_{100}) showed Assemblage C to be richest (average 48 species), followed by Group A2 (40 species). Group A1 stations (34 species) were generally slightly richer than those of Groups B1, B3 and B4 (average 28 species).

The use of various diversity indices produced similar trends. Diversity tended to be lower in the muds and sands, and higher in the gravels.

For Fisher's index (α), the highest diversities were found in Assemblage C (average 45.25) and Group A2 (average 28.91). The diversities of Group A1, B1, B3 and B4 (averages 17.91-20.95) were all approximately similar. The lowest values (11.34-13.94) were found at four stations in Assemblage B and at station 54.

The highest Shannon-Wiener (H') diversities were found in Assemblage C (average 5.80) and Group A2 (average 5.40). The diversities of the Group A1 stations (average 4.74) were generally slightly higher than those of Groups B1, B3 and B4 (averages 4.15-4.31). The lowest values (2.38-3.99) were found at eight stations in Assemblage B and at station 54.

The diversity values for all the BIOMÔR assemblages compared well with those from other areas. Assemblage C stations generally had the most diverse fauna of the BIOMÔR study area. The Shannon-Wiener diversity (6.34) from station 14 was the highest recorded from British waters. Furthermore, the high ES values from the southern Irish Sea gravels compared very favourably with those reported for the deep-sea benthos.

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Appendix 1

Logs of the 1989 and 1991 National Museum of Wales research cruises in the southern Irish Sea

These logs have been included to illustrate the working operations of both cruises. The logs give an indication of the working times required in the southern Irish Sea especially where the sediments are coarse. It should be noted that the dredges were generally deployed only after many grabs failed; future surveys should take this into account. Also of interest are the first impressions of the samples taken and how these compared with the sediment analyses.

Log of the 1989 cruise

Ship: R.V. *Prince Madog*

Personnel aboard ship: A. S. Y. Mackie, P. G. Oliver, E. I. S. Rees, A. Woodham

Samples Sorted by: A. Woodham

Samples identified by: A. S. Y. Mackie & P. R. Garwood (Polychaeta), I. J. Killeen, A. J. Trew & P. G. Oliver (Mollusca), J. McD. Mair (Crustacea), R. N. Bamber (Pycnogonida), M. G. O'Reilly (Copepod Associates), T. Telfer (Other Phyla)

	10.7.89
Stn. 1 :	NW of Anglesey (~53° 26.4’N, 04° 50.8’W), 80 m, shell gravel with stones, *Modiolus,* hydroids, sponges, bryozoa etc.
1631 - 1710	3 Van Veen grabs [A, B & C (sediment sample)].
1631	Position (53° 26.1’N, 04° 51.5’W), 80 m.
1700	Position (53° 26.6’N, 04° 50.1’W), 80 m.
Stn. 2 :	W of Anglesey (53° 22.9’N, 04° 59.9’W), 60 m, muddy gravel with *Modiolus* & *Ophiothrix.*
1755 - 1808	3 grabs [A, B & C (sediment sample)].
Stn. 3 :	W of Anglesey (~53° 19.4’N, 05° 06.7’W), 170 m patchy hard ground (sand wave type/ muddy gravel) & *Glycymeris.*
1845 - 1935	Unsuccessful grabs, all 4 samples small and combined as qualitative sample; no representative sediment sample.
1845	Position (53° 19.8’N, 05° 06.8’W), 170 m.
1900	Position (53° 19.5’N, 05° 06.7’W), 170 m.
1930	Position (53° 19.0’N, 05° 06.5’W), 170 m.
Stn. 4 :	W of Anglesey (53° 17.5’N, 05° 13.6’W), 110 m, muddy sand & *Glycymeris.*
2005 - 2024	3 smallish grabs [A, B & C (this boulder clay); no sediment sample].
Stn. 5 :	Caernarfon Bay, SW of Holy Island (53° 09.7’N, 04° 53.4’W), 53 m, muddy shell gravel with stones.
2155 - 2214	Grabs unsuccessful, only one small sample obtained. Anchor Dredge used; no sediment sample.
Stn. 6 :	St. George’s Channel, SW of Anglesey (53° 03.2’N, 05° 10.1’W), 120 m, mud-sand-gravel & *Glycymeris.*
2331 - 2351	4 grabs [A, B & C/D (smaller samples; sediment sample from C)].
	11.7.89
Stn. 7 :	Celtic Deep (51° 21.4’N, 06° 24.0’W), 130 m, mud.
1241	3 full grabs [A, B & C (sediment sample)]
1300	Rectangular Trawl deployed (51° 21.5’N, 06° 23.7’W), 140 m.
1330	Position (51° 21.5’N, 06° 22.4’W), 145 m.
1345	Rectangular Trawl retrieved (51° 21.7’N, 06° 22.3’W), 140 m.
1350	Camera Sledge deployed (51° 21.9’N, 06° 22.0’W), 140 m.
1405	Camera Sledge retrieved (51° 22.2’N, 06° 21.4’W), 130 m.
Stn. 8 :	Celtic Deep (51° 21.9’N, 06° 16.9’W), 130 m, mud.
1442 - 1455	3 grabs [A, B & C (sediment sample)].
Stn. 9 :	Celtic Deep (51° 22.5’N, 06° 08.9’W), 120 m, mud.
1531 - 1542	3 grabs [A, B & C (sediment sample)].
Stn. 10 :	Celtic Deep (51° 23.5’N, 06° 00.0’W), 110 m, sandy mud.
1648 - 1713	3 grabs [A, B & C (sediment sample)].
Stn. 11 :	SW of Milford Haven (51° 24.0’N, 05° 52.0’W), 100 m, fine sand.
1745	3 grabs [A, B & C (sediment sample)]
1800	Anchor Dredge (51° 23.9’N, 05° 51.8’W): large sample (= 4 or 5 grabs); many maldanids.
1807	Rectangular Trawl deployed (51° 24.0’N, 05° 51.7’W), 100 m.
1830	Rectangular Trawl retrieved (51° 24.2’N, 05° 49.9’W), 100 m.

Stn. 12 : SW of Milford Haven (51° 25.0'N, 05° 39.1'W), 88 m, fine sand & *Echinocardium.*

1938 3 grabs [A, B & C (sediment sample)].
1957 Camera sledge deployed (51° 24.8'N, 05° 38.6'W), 85 m.
2035 Camera sledge retrieved (51° 24.5'N, 05° 36.6'W), 85 m.

Stn. 13 : SW of Milford Haven (51° 25.9'N, 05° 20.8'W), 78 m, muddy sand & broken shell.

2143 - 2155 3 grabs [A, B & C (sediment sample)].

12.7.89

Stn. 14 : St. George's Channel, W of St. David's Head (51° 56.9'N, 05° 55.6'W), 110 m, shell gravel with mud.

0600 - 0619 3 grabs [A, B & C (sediment sample)].
0624 - 0640 Rectangular Trawl (51° 56.8'N, 05° 55.2'W), 110 m.

Stn. 15 : St. George's Channel, NW of St. David's Head (52° 01.7'N, 05° 45.1'W), 112 m, mud-sand-gravel-stones.

0815 - 0850 5 grabs [A, B & C - F (small samples; sediment from C)].

Stn. 16 : St. George's Channel, NW of St. David's Head 52° 05.7'N, 05° 33.7'W), 112 m, shell-sand-gravel-stones.

1001 - 1036 3 grabs [A, B & C (sediment sample)].

Stn. 17 : St. George's Channel, N of Strumble Head (52° 10.1'N, 05° 23.1'W), 120 m, stones-sand-mud-gravel & *Sabellaria.*

1205 - 1234 4 grabs [A, B & C/D (small samples; sediment from C)].

Stn. 18 : Cardigan Bay, off New Quay (52° 14.1'N, 04° 23.9'W), 32 m, sandy mud.

1653 - 1703 3 grabs [A, B & C (sediment sample)].

Stn. 19 : Cardigan Bay, off Aberaeron (52° 16.4'N, 04° 17.4'W), 28 m, black sand/mud.

1735 - 1745 3 grabs [A, B & C (sediment sample)].

1815 Camera Sledge deployed (52° 19.7'N, 04° 12.9'W), 30 m.
1845 Camera Sledge retrieved (52° 20.5'N, 04° 11.4'W), 28 m.

Stn. 20 : Cardigan Bay, SW of Aberystwyth (52° 21.3'N, 04° 10.6'W), 28 m, mud.

1900 - 1930 3 grabs [A, B & C (sediment sample)].
1935 Camera Sledge deployed (52° 21.0'N, 04° 10.4'W), 28 m.
2005 Camera Sledge retrieved (52° 20.2'N, 04° 12.1'W), 25 m.

Stn. 21 : Cardigan Bay, SW of Aberystwyth (52° 20.8'N, 04° 14.2'W), 20 m, fine sand.

2025 - 2035 3 grabs [A, B & C (sediment sample)].

Stn. 22 : Cardigan Bay, SW of Aberystwyth (52° 20.8'N, 04° 17.9'W), 26 m, silty fine sand.

2044 - 2107 3 grabs [A, B & C (sediment sample)].

Stn. 23 : Cardigan Bay, SW of Aberystwyth (52° 20.5'N, 04° 21.0'W), 21 m, sand.

2203 - 2218 3 grabs [A, B & C (sediment sample)].

13.7.89

Stn. 24 : Tremadog Bay (52° 42.6'N, 04° 30.3'W), 58 m, mud.

0804 - 0812 3 grabs [A, B & C (sediment sample)].

Stn. 25 : Tremadog Bay (52° 42.4'N, 04° 24.3'W), 25 m, sand (mostly fine).

0840 - 0850 3 grabs [A, B & C (sediment sample)].
0920 Camera Sledge deployed (52° 44.3'N, 04° 26.6'W), 28 m.
0950 Camera Sledge retrieved (52° 45.5'N, 04° 26.1'W), 25 m.

Stn. 26 : Tremadog Bay (52° 44.4'N, 04° 26.5'W), 30 m, mud.

1002 - 1012 3 grabs [A, B & C (sediment sample)].

Stn. 27 :	Tremadog Bay (52° 46.4’N, 04° 22.7’W), 25 m, muddy fine sand.
1046 - 1051	3 grabs [A, B & C (sediment sample)].
1107	Camera Sledge deployed (52° 46.8’N, 04° 21.7’W), 20 m.
1122	Camera Sledge retrieved (52° 47.1’N, 04° 21.1’W), 21 m.
Stn. 28 :	Tremadog Bay (52° 48.4’N, 04° 17.9’W), 18 m, fine sand with shell.
1230 - 1237	3 grabs [A, B & C (sediment sample)].
Stn. 29 :	Tremadog Bay (52° 51.3’N, 04° 11.5’W), 18 m, mud.
1310	3 grabs [A, B & C (sediment sample)].
1330	Camera Sledge deployed (52° 51.1’N, 04° 11.3’W), 20 m.
1400	Camera Sledge retrieved (52° 50.7’N, 04° 12.9’W), 22 m.
Stn. 30 :	Cardigan Bay, off Bardsey Island (52° 44.4’N, 04° 47.6’W), 42 m, large shells (*Modiolus* / oyster) with stones (+ ascidians, *Sabellaria* etc.) over muddy sand/gravel.
1640	5 small grabs [combined qualitative sample; no sediment sample].
Stn. 31 :	Caernarfon Bay, W of Lleyn Peninsula (52° 57.5’N, 04° 41.9’W), 45 m, sand-gravel-shell-stones & boulders.
1924 - 1940	4 - 5 grabs [only 1 good, remainder combined for qualitative sample; no sediment sample].

14.7.89

Stn. 32 :	Caernarfon Bay, off Aberffraw (53° 09.2’N, 04° 29.5’W), 20 m, silty fine sand.
0600	3 grabs [A, B & C (sediment sample)].
Stn. 33 :	Caernarfon Bay (53° 07.2’N, 04° 43.8’W), 65m, sand - gravel - shell.
0713	3 grabs [A, B & C (sediment sample)].
Stn. 34 :	Anglesey, Red Wharf Bay (53° 19.5’N, 04° 09.0’W), shelly mud.
1253 - 1258	3 grabs [A, B & C (sediment sample)].

Log of the 1991 cruise

Ship: R.V. *Prince Madog*

Personnel aboard ship: A. S. Y. Mackie, P. G. Oliver, E. I. S. Rees, I. J. Killeen, O. Rees, G. Könnecker

Samples Sorted by: I. J. Killeen

Samples identified by: A. S. Y. Mackie & P. R. Garwood (Polychaeta), I. J. Killeen, A. J. Trew & P. G. Oliver (Mollusca), J. McD. Mair (Crustacea), R. N. Bamber (Pycnogonida), M. G. O'Reilly (Copepod Associates), S .S. C. Westwood & A. S. Y. Mackie (Other Phyla), G. Könnecker (Epifauna)

29.7.91

Stn. 35 :	Caernarfon Bay, SW of Holy Island (53° 10.5'N, 04° 40.0'W), 49 m, stony ground.
1600	Unsuccessful grab. — few pebbles & *Flustra* only.
1603-1609	3 unsuccessful grabs. — pebbles, sand & *Sabellaria.*
1615	Tjärnö Dredge deployed (3 min. on bottom). — good sample: sand, stones, *Sabellaria.*
1628	Unsuccessful grab.

Stn. 36 :	Caernarfon Bay, off Lleyn Peninsula (52° 59.4'N, 04° 45.7'W), 59 m, muddy gravel & shell.
1734	Unsuccessful grab. — some gravel & a little mud.
1736	Unsuccessful grab.— very small sample.
1739-1741	2 unsuccessful grabs. Too much current for grab to work, though grab sampling should be possible here.
1752	Tjärnö Dredge deployed (3 min. on bottom). — good sample.

Stn. 37 :	Off Porth Colmon, Lleyn Peninsula (52° 52.8'N, 04° 46.5'W), 50 m, stony ground.
1840-1842	2 unsuccessful grabs.— pebbles & *Ophiothrix.*
1845	Tjärnö Dredge deployed (3 min. on bottom).— unsuccessful: chaffer blocking dredge mouth.
1859	Tjärnö Dredge redeployed (3 min. on bottom) with ends of chaffer weighted with chain.— good sample: many *Ophiothrix* & some stones.

Stn. 38 :	Cardigan Bay, SE of Bardsey Island (52° 43.5'N, 04° 41.4'W), 29 m, shell gravel & *Glycymeris.*
2022	Good grab.— EISR took part for heavy metal survey (MAFF 409); remainder sieved with C residue.
2024	Good grab.— A.
2026	Good grab.— B.
2028	Good grab.— C (sediment sample).

Stn. 39 :	Cardigan Bay, SE of Bardsey Island (52° 39.6'N, 04° 36.4'W), 27 m.
2112	Good grab.— A.
2114	Good grab.— B.
2116	Good grab.— C (sediment sample).

Stn. 40 :	Cardigan Bay (52° 35.0'N, 04° 29.5'W), 24 m, stony ground.
2207	Unsuccessful grab.— jaws jammed open with stones.
2209-2111	2 unsuccessful grabs.— stones only.
2212	Unsuccessful grab.— jaws jammed open with stones.

Stn. 41 :	Cardigan Bay (52° 36.6'N, 04° 21.4'W), 19 m, stony ground.
2310	Unsuccessful grab.— jaws jammed open with stones.
2211-2213	3 unsuccessful grabs.— stones only.
2214	Unsuccessful grab.— jaws jammed open with stones.

30.7.91

Stn. '42' :	Cardigan Bay. off Sarn-y-Bwch (52° 37.3'N, 04° 12.9'W), 12 m, stony ground.
0655-0700	5 unsuccessful grabs.— jaws jammed open with stones. Changed to heavier Van Veen.
0710-0714	4 unsuccessful grabs.— trigger didn't release.

Station repositioned

Stn. 42 :	Cardigan Bay, off Sarn-y-Bwch (52° 37.2'N, 04° 13.7'W), 16 m, fine sand.
0755	Good grab, but sediment coarser than following grabs.— D.
0756	Good grab.— A.
0757	Good grab.— B.
0759	Good grab.— C (sediment sample).

Stn. 43 :	Cardigan Bay, off Aberdyfi (52° 31.4'N, 04° 13.2'W), 16 m, fine sand.
0848	Good grab.— A.
0850	Good grab.— B.
0852	Good grab.— C (sediment sample).

Stn. 44 :	Cardigan Bay (52° 28.4'N, 04° 21.6'W), 21 m, stony ground/muddy sand.
0941-0946	4 unsuccessful grabs.
0948	Unsuccessful grab.— jaws jammed open with stones.
0949	Unsuccessful grab.
	Note: *Doto fragilis* living on *Nemetesia ramosa* (specimen disintegrated before preservation).

The following "G" stations are part of a detailed survey of the muddy trough known as the "Gutter". The results of this comparative grab study will be published at a later date.

Stn. G1 :	Cardigan Bay, SW of Aberystwyth (52° 22.3'N, 04° 10.2'W), 24 m, sandy mud.
1304	Good grab.— Van Veen A.
1308	Good grab.— Van Veen B.
1311	Good grab.— Van Veen C (sediment sample).
1317	Good grab.— Petersen A.
1324	Good grab.— Petersen B.
	Note: Lionel Kelloway (BBC Radio) on board throughout, recording programme on 'Gutter' part of survey. Rectangular Trawl also deployed.— *Turritella* & '*Pectinaria*' abundant.

Stn. G2 :	Cardigan Bay, SW of Aberystwyth (52° 21.7'N, 04° 10.7'W), 21 m, mud.
1632	Good grab.— Van Veen A.
1634	Good grab.— Van Veen B.
1636	Good grab.— Van Veen C (sediment sample).
1640	Good grab.— Petersen A.
1643	Good grab.— Petersen B.
	Note: Petersen samples noticeably smaller than Van Veens.

Stn. G3 :	Cardigan Bay, SW of Aberystwyth (52° 21.3'N, 04° 10.9'W), 21 m, mud.
1836	Good grab.— Van Veen A.
1838	Good grab.— Van Veen B.
1839	Unsuccessful grab.— trigger didn't release.
1841	Good grab.— Van Veen C (sediment sample).
1844	Good grab.— Petersen A.
1846	Good grab.— Petersen B.

Stn. G4 :	Cardigan Bay, SW of Aberystwyth (52° 20.8'N, 04° 11.3'W), 22 m, mud.
1959	Good grab.— Van Veen A.
2001	Good grab.— Van Veen B.
2003	Good grab.— Van Veen C (sediment sample).
2006	Good grab.— Petersen A.
2008	Unsuccessful grab.— very small sample.
2009	Good grab.— Petersen B.
	Note: Petersen samples smaller than Van Veens.

Stn. G5 :	Cardigan Bay, SW of Aberystwyth (52° 21.1'N, 04° 11.7'W), 23 m, sandy mud.
2058	Unsuccessful grab.— trigger didn't release.
2100	Good grab.— Van Veen A.
2103	Medium sized sample.— Van Veen C (sediment sample).
2105	Good grab.— Van Veen B.
2107	Good grab.— Petersen A.
2109	Good grab.— Petersen B.
	Notes: Petersen samples noticeably smaller than Van Veens. *Astropecten* & *Acholoe* menthol relaxed prior to being fixed.

31.7.91

Stn. G6 :	Cardigan Bay, SW of Aberystwyth (52° 21.5'N, 04° 11.3'W), 20 m.
0630	Good grab.— Van Veen A.
0632	Good grab.— Van Veen B.
0634	Good grab.— Van Veen C (sediment sample).
0637	Good grab.— Petersen A.
0639	Good grab.— Petersen B.

Stn. G7 :	Cardigan Bay, SW of Aberystwyth (52° 22.2'N, 04° 10.8'W), 22 m, sandy mud.
0813	Good grab.— Van Veen A.
0815	Good grab.— Van Veen B.
0821	Good grab.— Van Veen C (sediment sample).
0824	Good grab.— Petersen A.
0826	Good grab.— Petersen B.

Stn. G8 :	Cardigan Bay, SW of Aberystwyth (52° 21.9'N, 04° 9.7'W), 21 m, sandy mud.
0931	Very small sample (sieved with C residue).
0932	Unsuccessful grab.— trigger didn't release.
0934	Good grab.— Van Veen A.
0935	Good grab.— Van Veen B.
0936	Unsuccessful grab.— trigger didn't release.
0938	Good grab.— Van Veen C (sediment sample).
0940	Unsuccessful grab.— extremely small Petersen sample; not kept.

0942	Good grab.— Petersen A.
0944	Good grab.— Petersen B.

Stn. G9 :	Cardigan Bay, SW of Aberystwyth (52° 21.2’N, 04° 10.18’W), 23 m.
1031	Good grab.— Van Veen A.
1033	Good grab.— Van Veen B.
1035	Good grab.— Van Veen C (sediment sample).
1038	Good grab.— Petersen A.
1039	Good grab.— Petersen B.

Stn. G10 :	Cardigan Bay, SW of Aberystwyth (52° 20.8’N, 04° 10.5’W), 23 m.
1132	Good grab.— Van Veen A.
1135	Good grab.— Van Veen B.
1136	Unsuccessful grab.— trigger didn’t release.
1137	Good grab.— Van Veen C (sediment sample).
1138	Good grab.— Petersen A.
1140	Good grab.— Petersen B.

Gutter :	Cardigan Bay, SW of Aberystwyth.
1215-1500	Mapping of Gutter area using ROXANN.

Stn. 45 :	Cardigan Bay, W of Aberystwyth (52° 23.7’N, 04° 14.6’W), 17 m, fine sand.
1536	Grab, stones, mud - sand - gravel.— D.
1538	Good grab.— A.
1540	Good grab.— B.
1542	Good grab.— C (sediment sample).

Gutter :	Cardigan Bay, SW of Aberystwyth.
1620	Camera Sledge deployed (52° 21.9’N,04° 10.7’W), 21 m.
1650	Camera Sledge retrieved (52° 21.1’N, 04° 11.6’W), 22 m. Still camera not working.
1745	Detritus Sledge deployed (52° 21.5’N, 04° 10.7’W), 20 m.— 3 min. on bottom.
1752	Detritus Sledge retrieved (52° 21.3’N, 04° 10.7’W), 20 m.— full of mud. **Note**: *Eumida* & *Ophiodromus* relaxed (menthol) and fixed.
1930	Camera Sledge deployed (52° 22.1’N, 04° 10.29’W), 22 m.— Video camera working; pictures very murky.
2055	Camera Sledge retrieved (52° 21.9’N, 04° 10.09’W), 22 m.
2115	Camera Sledge redeployed (52° 22.1’N, 04° 12.6’W), 15 m.— Video murky.
2230	Camera Sledge retrieved (52° 22.5’N, 04° 11.8’W), 18 m.

1.8.91

Stn. 46 :	Cardigan Bay (52° 19.2’N, 04° 37.0’W), 30 m, coarse shell gravel.
0554	Good grab.— A.
0556	Good grab.— B.
0558	Good grab.— C (sediment sample).

Stn. ‘47’ :	Cardigan Bay, off Aberporth (52° 10.0’N, 04° 33.5’W), 18 m, stony ground.
0710-0713	3 unsuccessful grabs. **Note**: *Antedon* relaxed ($Mg Cl_2$) and fixed.

Station repositioned

Stn. 47 :	Cardigan Bay, off Aberporth (52° 09.6’N, 04° 32.5’W), 15 m, sandy mud.
0721	Good grab.— A.
0722	Good grab.— B.
0723	Good grab.— C (sediment sample).

Stn. 48 :	Cardigan Bay, NE of Fishguard (52° 06.6’N, 04° 55.0’W), 39 m, coarse muddy shell gravel.
0905	Unsuccessful grab.— jaws jammed open with stones.
0906	Grab misfired at surface.
0908	Good grab.— A.
0910	Fair grab.— C (sediment sample).
0912-0916	3 unsuccessful grabs.
0918-0924	4 unsuccessful grabs.— jaws jammed open with stones.
0925	Good grab.— B.

Stn. 49 :	Cardigan Bay (52° 17.1’N, 05° 00.0’W), 53 m, muddy gravel.
1036	Unsuccessful grab.— ‘small sample’.
1038	Small grab.— A.
1041	Small grab.— C (sediment sample).
1044	Small grab.— B.
1047	Unsuccessful grab.— ‘small sample’.
1051	Repositioning.
1054	Wire tangled on grab.
1057	Unsuccessful grab.— ‘small sample’; grab leaking.
1101	Unsuccessful grab.— ‘small sample’. **Note**: Current too strong for grab to work properly; larger samples should be obtainable here.

Stn. 50 :	Cardigan Bay (52° 30.5’N, 04° 45.9’W), 49 m, silty fine sand (some gravel).
1245	Small grab.— C (sediment sample).

1248	Unsuccessful grab.— poor sample.
1252	Good grab.— A.
1254	Good grab.— B.
Stn. 51 :	Cardigan Bay (52° 26.2'N, 05° 01.0'W), 75 m, silty sand & shell (some gravel).
1418	Small grab.— C (sediment sample).
1422	Good grab.— A.
1425	Good grab.— B (sediment somewhat coarser than A).
Stn. 52 :	St. George's Channel (52° 22.2'N, 05° 14.2'W), 77 m, fine sand with gravel & shell.
1537	Good grab.— A.
1541	Unsuccessful grab.— jaws jammed open with stones.
1544	Good grab.— B.
1546	Good grab.— C (sediment sample).
1550	Rectangular Trawl deployed.— failed (cod-end opened).
1605	Trawl redeployed (52° 21.9'N, 05° 13.7'W), 78 m.
1618	Trawl retrieved (52° 21.6'N, 05° 14.0'W), 77 m. **Note**: *Sthenelais* relaxed.
Stn. 53 :	St. George's Channel (52° 15.1'N, 05° 19.68'W), 86 m, stones/*Sabellaria*.
1709-1724	6 unsuccessful grabs.— scrapings of sand, stones & *Sabellaria.*
1728	Tjärnö Dredge deployed (52° 14.7'N, 05° 20.0'W), 88 m.— unsuccessful: chaffer blocking dredge mouth.
1737	Tjärnö Dredge redeployed.— 3 min. on bottom.
1744	Tjärnö Dredge retrieved (52° 14.6'N, 05° 20.7'W), 88 m.— good sample; *Sabellaria.*Note: 3 *Nereiphylla lutea* (dredge) relaxed (Mg Cl$_2$) and fixed. *Doto fragilis* (specimen preserved); *Cuthona foliata* (recorded).
Stn. 54 :	St. George's Channel (52° 09.7'N, 05° 25.6'W), 99 m, fine/medium sand.
1825 - 1831	3 unsuccessful grabs.
1835	Good grab.— A.
1838 - 1841	2 unsuccessful grabs.— scraping only.
1845	Good grab.— B.
1848	Unsuccessful grab.— jaws jammed open with stones.
1852	Unsuccessful grab.
1856	Good grab.— C (sediment sample). **Note**: Sediment appeared faunistically poor; no obvious animals seen.

Stn. 55 :	St. George's Channel (52° 01.9'N, 05° 31.0'W), 95 m, muddy gravel.
1947	Good ('smallish') grab.— A.
1950-1955	2 unsuccessful grabs.— jaws jammed open with stones.
1958	Unsuccessful grab.— trigger didn't release.
2001	Unsuccessful grab.— poor sample.
2006	Unsuccessful grab.— scraping only.
2010	Unsuccessful grab.— *Sabellaria*!
Repositioning	
2022	Unsuccessful grab.— poor sample.
2026	Good grab.— B.
2030	Good grab.— C (sediment sample).
Stn. '56' :	St. George's Channel (51° 56.1'N, 05° 37.5'W), 99 m, sand-stones-gravel.
2136	Unsuccessful grab.— scraping only.
2141	Unsuccessful grab.— empty.
2144	Unsuccessful grab.— jaws jammed open with stones.
2148	Unsuccessful grab.— trigger didn't release.
2152	Unsuccessful grab.— scraping only. Large swell making handling of grab difficult: Station abandoned.

2.8.91

0900	Arrived Milford Haven for refuelling & for water.
1100	Visited Oil Pollution Research Unit at Fort Popton; borrowed Van Veen grab as backup for remainder of cruise.

3.8.91

~0830	Departed Milford Haven.
Stn. 56 :	St. George's Channel (51° 56.0'N, 05° 37.4'W), 97 m, sand-stones-gravel-shell.
1257-1313	5 unsuccessful grabs. — stones-pebbles, some fine sand. Ship drifting throughout.
1320-1328	Tjärnö Dredge deployed (~51° 57.6'N, 05° 35.9'W), ~94 m, (3 min. on bottom).— good sample (clean gravel & some stones).
~1332	Rectangular Trawl deployed.
1346	Rectangular Trawl retrieved (51° 58.5'N, 05° 35.0'W), 92 m. — large pieces of shell (some stones). **Note**: *Doto fragilis*; cf. *Eubranchus* sp. (specimen preserved).

Stn. 57 : St. George’s Channel (51° 48.8’N, 05° 42.5’W), 105 m.

1527	Small grab.— C (sediment sample).
1531	Unsuccessful grab.— trigger didn’t release.
1535	Good grab.— A.
1539	Good grab.— B.
1542	Rectangular Trawl deployed.
1556	Position (51° 49.3’N, 05° 41.6’W), 109m.

Stn. 58 : St. George’s Channel (~51° 42.4’N, 05° 45.4’W), 108 m, silty sand & gravel.

1655	Unsuccessful grab.— trigger didn’t release.
1700	Good grab.— A.
1704	Good grab.— B.
1709	Small grab.— C (sediment sample).
1712	Rectangular Trawl deployed (51° 42.5’N, 05° 45.3’W), 109 m.
1715	Position (51° 42.6’N, 05° 45.1’W), 108m.
1722	Rectangular Trawl retrieved.
	Note: 1 *Nereiphylla lutea* (Sample A) relaxed (Mg Cl_2).

Stn. 59 : Celtic Deep (51° 32.0’N, 05° 56.5’W), 109 m, silty fine sand.

1905	Good grab.— A.
1911	Good grab.— B.
1916	Small grab.— C (sediment sample).
1920	Rectangular Trawl deployed (51° 32.0’N, 05° 56.3’W), 109 m.
1930	RectangularTrawl retrieved (51° 33.09’N, 05° 56.6’W), 109 m. — includes *Aphrodita* & sabellids.

Stn. 60 : Celtic Deep (51° 15.8’N, 05° 59.8’W), 93 m, mud.

2135	Small grab.— C (sediment sample).
2140	Good grab.— A.
2145 - 2210	6 small samples, each about about 1/2 grab volume.
2215	Good grab.— B.
	Note: Problems with boat drift pulling grab over.

4.8.91

Stn. 61 : Celtic Deep (51° 16.0’N, 06° 16.3’W), 117 m, mud with some sand.

0605	Good grab.— A.
0611	Good grab.— B.
0617	Good grab.— C (sediment sample).

Stn. 62 : Celtic Deep (51° 16.2’N, 06° 30.1’W), 112 m, mud with shell & gravel.

0727	Good grab.— A.
0732	Good grab.— B.
0738	Unsuccessful grab-trigger didn’t release.
0744	Good grab.— C (sediment sample).
0747	Tjärnö Dredge deployed (51° 16.2’N, 06° 30.0’W), 114 m.— 2.5 min. on bottom.
0758	Tjärnö Dredge retrieved (~51° 16.5’N, 06° 30.0’W), 114 m. — good sample (including *Brissopsis*).
0800	Detritus Sledge deployed.— 5 min. on bottom.
0816	Sledge retrieved (51° 16.8’N, 06° 29.9’W), 115 m.— sample small & clean having sieved itself or washed out on retrieval; many cumaceans.

Stn. 63 : Nymphe Bank (51° 35.6’N, 06° 17.9’W), 94 m, silty fine sand.

1045	Small grab.— C (sediment sample).
1051	Medium grab.— A.
1056	Unsuccessful grab.— small sample; grab leaking.
1102	Unsuccessful grab.— small sample
1107	Unsuccessful grab.— very small sample.
Repositioning	
1119	Good grab.— B.
1123	Rectangular Trawl deployed (51° 35.6’N, 06° 17.3’W), 95 m.
1135	Rectangular Trawl retrieved (51° 35.9’N, 06° 16.8’W), 95 m.

Stn. 64 : St. George’s Channel (51° 45.0’N, 06° 07.4’W), 111 m, silty sand with stones etc.

1257	Small grab.— C (sediment sample).
1303	Unsuccessful grab.— very small sample.
1309	Unsuccessful grab.— empty.
Repositioning	
1320	Unsuccessful grab.— scraping only.
1330	Rectangular Trawl deployed (51° 45.3’N, 06° 07.2’W), 112 m.
1346	Rectangular Trawl retrieved.— small sample; net inverted.
1352	Rectangular Trawl redeployed (51° 45.9’N, 06° 06.7’W), 111 m.— successful.

Deteriorating weather imminent (Force 5-6). Left for shelter at Rosslare.

5.8.91

Sheltering off Rosslare, Eire.

1330	Set sail for Station 64 as weather moderate (force 3-4) and due to deteriorate on Tuesday 6 August.

Stn. 64 : St. George's Channel (~51° 45.2'N, 06° 7.2'W), ~110 m, silty fine sand.

1745 Tjärnö Dredge deployed (51° 45.1'N, 06° 07.3'W), 112 m. — 10 min. on bottom!
Note: Live Leatherback Turtle sighted & photographed (PGO) close to boat.
1800 Tjärnö Dredge retrieved (51° 45.4'N, 06° 07.0'W), 107 m.

Stn. 65 : St. George's Channel (~51° 51.1'N, 06° 01.0'W), 105 m, silty coarse sand-gravel-shell.

1851 Tjärnö Dredge deployed (51° 51.0'N, 06° 01.1'W), 105 m.— 4 min. on bottom.
1903 Tjärnö Dredge retrieved (51° 51.3'N, 06° 00.8'W), 104 m.— good sample.
1906 Rectangular Trawl deployed (51° 51.5'N, 06° 00.6'W), 105 m.— 7 min on bottom.
1921 Rectangular Trawl retrieved (51° 51.8'N, 06° 00.2'W), 105 m.
Note: *Eledone cirrhosa*.

Stn. 66 : St. George's Channel (51° 57.2'N, 05° 55.3'W), 95 m, silty coarse sand-gravel-shell.

2025 Tjärnö Dredge deployed (51° 57.2'N, 05° 55.3'W), 95 m.— 3 min. on bottom.
2045 Tjärnö Dredge retrieved (51° 57.3'N, 05° 55.2'W), 97 m.— good sample.
2048 Rectangular Trawl deployed (51° 57.5'N, 05° 55.0'W), 98 m.— 3 min. on bottom.
2057 Rectangular Trawl retrieved (51° 57.5'N, 05° 49.9'W), 97 m.— good sample: coarse sand-gravel-stones

Stn. 67 : St. George's Channel (52° 04.0'N, 05° 47.3'W), 95 m, silty coarse sand-shell-gravel & many *Glycymeris.*

2204 Tjärnö Dredge deployed (52° 03.5'N, 05° 47.8'W), 94 m,.— 3 min. on bottom.
2213 Tjärnö Dredge retrieved.— empty.
2214 Tjärnö Dredge redeployed.— 3 min. on bottom.
2219 On bottom (52° 04.0'N, 05° 47.3'W), 95 m.
2225 Tjärnö Dredge retrieved.— good sample.
2230 Rectangular Trawl deployed (52° 03.9'N, 05° 47.3'W), 94 m.— 3 min. on bottom.
2239 Rectangular Trawl retrieved (52° 04.2'N, 05° 46.7'W), 94 m.— good sample.
Note: Large (~28cm) *Phyllodoce laminosa* from trawl relaxed (Mg Cl_2).

Stn. 68 : St. George's Channel (~52° 10.1'N, 05° 41.2'W), 94 m, silty coarse sand-shell-gravel & many *Glycymeris*.

2342 Tjärnö Dredge deployed (52° 09.9'N, 05° 41.4'W), 94 m.— 3 min. on bottom.
2352 Tjärnö Dredge retrieved (52° 10.4'N, 05° 41.0'W), 93m.— good sample.
Note: 30 *Glycymeris* not kept.

6.8.91

Stn. 69 : St. George's Channel (~52° 16.7'N, 05° 34.6'W), 91 m, silty coarse sand-shell-gravel & *Glycymeris.*

0055 Tjärnö Dredge deployed (52° 16.6'N, 05° 34.6'W), 92 m.— 3 min. on bottom.
0106 Tjärnö Dredge retrieved (52° 16.9'N, 05° 34.5'W), 90 m.— good sample.
Note: *Doto* sp.

Stn. 70 : St. George's Channel (~52° 22.7'N, 05° 27.0'W), 88 m, silty coarse sand-gravel-shell-stones, *Glycymeris* & *Modiolus.*

0159 Tjärnö Dredge deployed (52° 22.5'N, 05° 27.3'W), 88 m.— 2 min. on bottom.
0210 Tjärnö Dredge retrieved (52° 23.0'N, 05° 26.6'W), 88 m.— good sample.
0300 Sieving completed.

Stn. 71 : St. George's Channel (~52° 37.5'N, 05° 18.1'W), 113 m, silty coarse sand-shell-gravel-stones & *Glycymeris.*

0709 Tjärnö Dredge deployed (52° 37.3'N, 05° 18.1'W), 113 m.— 2 min. on bottom.
0719 Tjärnö Dredge retrieved (52° 37.7'N, 05° 18.0'W), 112 m.— good sample.
Note: *Doto fragilis*.

Stn. 72 : St. George's Channel (~52° 51.1'N, 05° 09.0'W), 92 m, stones-boulders-silty coarse sand-shell.

0901 Tjärnö Dredge deployed (52° 50.9'N, 05° 09.1'W), 92 m.— 2 min. on bottom.
0910§ Tjärnö Dredge retrieved (52° 51.4'N, 05° 08.9'W), 92 m.— good sample.
Note: *Doto* cf. *millbayana.*

Stn. 73 : St. George's Channel (~53° 11.0'N, 05° 06.4'W), ~128 m, silty coarse sand-shell-gravel-stones, *Modiolus* (common), *Glycymeris* & '*Venus*'.

1231 Tjärnö Dredge deployed (53° 10.9'N, 05° 06.4'W), 125 m.— 2 min. on bottom.
1250 Tjärnö Dredge retrieved (53° 11.1'N, 05° 06.4'W), 132 m.— good sample.

1830 Arrived Menai Bridge.

Appendix 2

Systematic list of all taxa recorded from both 1989 and 1991 surveys

PROTOZOA

RHIZOPODA

Astrorhizidae
Astrorhiza limicola Sandahl, 1858
Astrorhizidae sp.

PORIFERA

CALCAREA

Clathrinidae
Clathrina coriacea (Montagu, 1818)
Sycettidae
Scypha ciliata (Fabricius, 1780)

DEMOSPONGIAE

Oscarellidae
Oscarella lobularis (Schmidt, 1842)
Suberitidae
Suberites carnosus (Johnston, 1842)
Prosuberites epiphytum (Lamarck,1815)
Laxosuberites sp.
Polymastiidae
Polymastia agglutinaris Ridley & Dendy1886
Polymastia mammilaris (Müller, 1806)
Polymastia robusta Bowerbank, 1866
Spirastrellidae
Spirastrella minax (Topsent, 1888)
Clionidae
Cliona celata Grant, 1826
Cliona vastifica Hancock, 1849
Cliona viridis (Schmidt, 1868?)
Timeidae
Timea stellata (Bowerbank,1866)
Axinellidae
Axinella infundibuliformis (L., 1758)
Bubaris vermiculata (Bowerbank, 1862)
Desmoxyidae
Halicnemia patera Bowerbank 1862
Euryponidae
Eurypon clavatum (Bowerbank, 1866)
Eurypon coronula (Bowerbank, 1869)
Eurypon lacazei (Topsent, 1891)
Hymerapia stellifera (Bowerbank, 1866)
Hemiasterellidae
Paratimea constellata (Topsent, 1893)
Stelligera stuposa (Ellis & Solander,1786)
Raspedilidae
Raspailia ramosa (Montagu, 1818)
Mycalidae
Mycale macilenta (Bowerbank, 1866)
Biemna variantia (Bowerbank, 1861)
Desmacella inornata (Bowerbank,1866)
Amphilectus fucorum (Esper,1794)
Myxillidae
Myxilla rosacea (Lieberkuhn, 1859)
Iophon hyndmani (Bowerbank, 1858)
Iophon piceus (Vosmaer,1882)
Stylopus dujardini (Levinsen, 1887)
Hymedesmia paupertas (Bowerbank, 1866)
Clathriidae
Plocamionida ambigua (Bowerbank, 1866)
Microciona armata Bowerbank, 1866
Microciona laevis Bowerbank, 1866
Chalinidae
Haliclona fistulosa (Bowerbank, 1866)
Haliclona rosea (Bowerbank, 1866)
Pachychalina caulifera (Vosmaer, 1882)
Dysideidae
Dysidea fragilis (Montagu, 1818)
Aplysillidae
Aplysilla rosea (Barrois, 1876)
Aplysilla sulfurea Schulze, 1878
Halisarcidae
Halisarca dujardini Johnston, 1842

CNIDARIA

HYDROZOA

Tubulariidae
Tubularia larynx Ellis & Solander, 1786
Tubularia indivisa L.,1758
Corynidae
Syncoryne gravata Wright, 1858
*Syncoryne sarsi*i Loven, 1835
Eudendriidae
Eudendrium ramosum (L., 1758)
Perigonimus repens (Wright)
Bougainvilliidae
Bougainvillia ramosa (van Beneden, 1844)
Hydractiniidae
Hydractina echinata (Fleming, 1828)
Phialellidae
Opercularella lacerata (Johnston, 1847)
Lovenellidae
Calycella syringa (L.,1758)
Phialellidae
Campanulina acuminata (Alder, 1856)
Lafoeidae
Filellum serpens (Hassal, 1852)
Lafoea dumosa (Fleming, 1820)
Campanulinidae
Cuspidella costata (Hincks, 1868)
Cuspidiella grandis (Hincks, 1868)
Haleciidae
Halecium beanii (Johnston, 1838)
Halecium halecinum (L.,1758)
Halecium labrosum Alder, 1859
Halecium muricatum (Ellis & Solander, 1786)
Halecium tenellum Hincks, 1861
Aglaopheniidae
Aglaophenia tubulifera (Hincks, 1861)
Thecocarpus myriophyllum (L.,1758)
Plumulariidae
Kirchenpaueria pinnata (L., 1758)
Halopteris catharina (Johnston, 1833)
Plumularia setacea (L., 1758)
Nemertesia antennina (L., 1758)
Nemertesia ramosa (Lamouroux,1821)
Sertulariidae
Abietinaria abietina L., 1758
Abietinaria filicula (Ellis & Solander, 1786)
Amphisbetia operculata (L., 1758)
Diphasia attenuata (Hincks, 1866)
Diphasia pinastrum Ellis & Solander, 1786
Diphasia margareta
Diphasia rosacea (L., 1758)
Hydrallmania falcata (L., 1758)
Sertularella gayi (Lamouroux,1821)
Sertularella polyzonias (L., 1758)
Sertularella rugosa (L., 1758)
Sertularella tenella (Alder, 1856)
Sertularia cupressina Linnaeus, 1758

Campanulariidae

Campanularia hincksii Alder, 1856
Clytia hemisphaerica (L., 1758)
Laomedea angulata Hincks, 1861
Laomedea flexuosa Alder, 1857
Rhizocaulus verticillatus (L., 1758)

ANTHOZOA

Alcyoniidae

Alcyonium digitatum L., 1758
Alcyonium sp.

Pennatulacea

Pennatulacea juv.

Virguliidae

Virgularia mirabilis (O.F. Müller, 1776)

Hormathiidae

Paraphellia expansa (Haddon, 1886)
Amphianthus dohrnii (von Koch, 1878)

Athenaria

Athenaria indet.

Haloclavidae

Mesacmaea mitchelii (Gosse,1855)
Haloclavidae indet.

Ceriantharidae

Cerianthus lloydii Grosse, 1869
Cerianthus sp.

Edwardsiidae

Edwardsia cf. *claparedii* (Panceri, 1869)
Edwardsiidae sp. A
Edwardsiidae sp. B

Epizoanthidae

Epizoanthus incrustatus (Duben & Koren,1847)

ACTINIARIA

Actiniaria sp.

Actiniidae

Urticina sp.

Aurelianiidae

Aureliania heterocera (Thompson, 1853)

Aiptasiidae

Aiptasiogeton pellucidus (Hollard, 1848)

Metridiidae

Metridium senile (L., 1761)

Sagartiidae

Sagartiogeton undatus (O.F. Müller, 1788)
Sagartia sp.

Hormathiidae

Hormathia coronata (Gosse,1859)

Caryophylliidae

Caryophyllia smithii Stokes & Broderick, 1828

PLATYHELMINTHES

TURBELLARIA

Turbellaria spp.

NEMERTEA

Nemertea spp.

ENTOPROCTA

Entoprocta sp.

Pedicellinidae

Pedicellina cernua (Pallas, 1771)

SIPUNICULA

Sipuncula sp.

Golfingiidae

Golfingia procera (Mobuis, 1875)
Golfingia elongata Keferstein, 1862
Golfingia vulgaris (de Blainville, 1827)
Golfingia spp. juv.

Aspidosiphonidae

Aspidosiphon muelleri Diesing, 1851

Phascolionidae

Phascolion strombi (Montagu, 1804)

ECHIURA

Echiuridae

Echiuridae sp.

Bonellidae

Bonellia viridis Rolando, 1821

ANNELIDA

POLYCHAETA

Amphinomidae

Pareurythoe borealis (Sars, 1862)

Euphrosinidae

Euphrosine borealis Örsted, 1843
Euphrosine foliosa Audouin & Milne Edwards,1833

Spintheridae

Spinther oniscoides Johnston, 1845

Aphroditidae

Aphrodita aculeata Linnaeus, 1758
Hermonia hystrix (Savigny, 1818)

Polynoidae

Alentia gelatinosa (Sars, 1835)
Lepidonotus squamatus (Linnaeus, 1758)
Adyte assimilis (McIntosh, 1874)
Subadyte pellucida (Ehlers, 1864)
Acholoe squamosa (Chiaje, 1827)
?Eunoe sp.
Gattyana cirrosa (Pallas, 1766)
Harmothoe extenuata (Grube, 1840)
Harmothoe fragilis Moore, 1910
Harmothoe fraserthomsoni McIntosh, 1897
Harmothoe glabra (Malmgren, 1865)
Harmothoe impar (Johnston, 1839)?
Harmothoe zetlandica McIntosh, 1876
Malmgrenia andreapolis McIntosh, 1874
Malmgrenia castanea McIntosh, 1876
Malmgenia mcintoshi (Tebble & Chambers, 1982)
Malmgrenia spp.
Polynoe scolopendrina Savigny, 1822
Harmothoinae indet.

Sigalionidae

Sigalion mathildae Audouin & Milne Edwards,1830
Sthenelais boa (Johnston, 1833)
Sthenelais limicola (Ehlers, 1864)
Sthenelais zetlandica McIntosh, 1876

Pholoidae

Pholoe tuberculata Southern, 1914
Pholoe sp.

Pisionidae

Pisione remota Southern, 1914

Phyllodocidae

Notophyllum foliosum (Sars, 1835)
Nereiphylla lutea (Malmgren, 1865)
Chaetoparia nilssoni Malmgren, 1867
Paranaitis kosteriensis (Malmgren, 1867)

Phyllodoce groenlandica Örsted, 1842
Phyllodoce laminosa Lamarck, 1818
Phyllodoce lineata (Claparède, 1870)
Phyllodoce longipes Kinberg, 1866
Phyllodoce maculata (Linnaeus, 1767)
Phyllodoce mucosa (Örsted, 1843)
Phyllodoce rosea (McIntosh, 1877)
Pterocirrus macroceros (Grube, 1860)
Eumida bahusiensis Bergström, 1914
Eumida ockelmanni Eibye-Jacobsen, 1987
Eumida sanguinea (Örsted, 1843)
Eumida sp. A
Eumida sp. B
Eulalia aurea Gravier, 1896
Eulalia ornata Saint-Joseph, 1888
Eulalia bilineata (Johnston, 1839)
Eulalia expusilla Pleijel, 1987
Eulalia microoculata Pleijel, 1987
Eulalia mustela Pleijel, 1987
Eulalia sp.
Pseudomystides limbata (Saint-Joseph, 1888)
Pseudomystides spinachia Petersen & Pleijel,1993
Hesionura elongata (Southern, 1914)
Mystides caeca Langerhans, 1879
Eteone flava (Fabricius, 1780)
Eteone foliosa Quatrefages, 1866
Eteone longa (Fabricius, 1780)
Mysta picta (Quatrefages, 1866)
Phyllodocidae juv.

Lacydoniidae

Lacydonia miranda Marion & Bobretzky, 1875

Hesionidae

Gyptis propinqua Marion & Bobretzky, 1875
Gyptis rosea (Malm, 1874)
Podarkeopsis capensis (Day, 1963)
Hesiospina sp.
Kefersteinia cirrata (Keferstein, 1862)
Kefersteinia sp.
Ophiodromus flexuosa (Chiaje, 1827)
Podarke pallida (Claparède, 1864)
Nereimyra punctata (Müller, 1788)
Syllidia armata Quatrefages, 1866
Microphthalmus sp.

Pilargidae

Ancistrosyllis groenlandica McIntosh, 1879
Glyphohesione klatti Friedrich, 1950

Nereidae

Nereis elitoralis Eliason, 1962
Nereis longissima Johnston, 1840
Nereis zonata Malmgren, 1867
Nereis cf. *flavipes* Ehlers, 1868
Nereis fucata (Savigny, 1820)
Nereis juv.
Websterinereis glauca (Claparède, 1870)

Syllidae

Eurysyllis tuberculata Ehlers, 1864
Haplosyllis spongicola (Grube, 1855)
Syllis sp. B
Syllis sp. C
Syllis sp. D
Syllis sp. E
Syllis sp. F
Syllis sp. H
Syllis sp. J
Syllis sp. L
Syllis sp. M
Syllis juv.
Trypanosyllis sp.
Amblyosyllis sp.
Dioplosyllis cirrosa Gidholm, 1962
Ehlersia ferrugina Langerhans, 1881
Ehlersia sp.
Eusyllis blomstrandi Malmgren, 1867
Eusyllis lamelligera Marion & Bobretzky, 1875
Odontosyllis fulgurans (Audouin & Milne Edwards,1833)
Odontosyllis gibba Claparède, 1863
Opisthodonta pterochaeta Southern, 1914
Opisthodonta sp.
Pionosyllis lamelligera Saint-Joseph, 1886
Palposyllis prosostoma Hartmann-Schröder, 1977
Streptosyllis bidentata Southern, 1914
Syllides sp. A
Syllides sp. B
Syllides sp. C
Eusyllinae indet.
Brania swedmarki Gidholm, 1962
Exogone furcifera Eliason, 1962
Exogone hebes (Webster & Benedict, 1884)
Exogone naidina Örsted, 1845
Exogone verugera (Claparède, 1868)
Sphaerosyllis bulbosa Southern, 1914
Sphaerosyllis hystrix Claparède, 1863
Sphaerosyllis taylori Perkins, 1980
Sphaerosyllis tetralix Eliason, 1920
Sphaerosyllis sp.
Sphaerosyllis indet.
Autolytus alexandri Malmgren, 1867
Autolytus inermis Saint-Joseph, 1886
Autolytus sp. A
Autolytus sp. B
Autolytus sp. C
Autolytus sp. D
Autolytus sp. E
Autolytus sp. F
Autolytus indet.
Proceraea sp. A
Proceraea sp. B
Procerastea halleziana Malaquin, 1893
Procerastea nematodes Langerhans, 1884
Autolytoid stolon

Sphaerodoridae

Commensodorum commensalis (Lützen, 1961)
Sphaerodoropsis sp.
Sphaerodoridium claparedii (Greeff, 1866)
Sphaerodorum gracilis (Rathke, 1843)
Ephesiella peripatus (Claparède, 1863)

Nephtyidae

Aglaophamus rubella (Michaelsen, 1897)
Nephtys cirrosa Ehlers, 1868
Nephtys caeca (Fabricius, 1780)
Nephtys longosetosa Örsted, 1843
Nephtys assimilis Örsted, 1843
Nephtys hombergii Savigny, 1818
Nephtys kersivalensis McIntosh, 1908
Nephtys hystricis McIntosh, 1900
Nephtys incisa Malmgren, 1865
Nephtys sp.
Nephtys juv.

Glyceridae

Glycera alba (Müller, 1788)
Glycera tridactyla Schmarda, 1861
Glycera gigantea Quatrefages, 1866
Glycera rouxii Audouin & Milne Edwards, 1833
Glycera lapidum Quatrefages, 1866
Glycera oxycephala Ehlers, 1887

Goniadidae
Glycinde nordmanni (Malmgren, 1866)
Goniadella gracilis (Verrill, 1873)
Goniada maculata Örsted, 1843
Goniada norvegica Örsted, 1845
Goniada pallida Arwidsson, 1898

Lumbrineridae
Lumbrineris gracilis (Ehlers, 1868)
Lumbrineris agastos Fauchald, 1974
Lumbrineris magnidentata Winsnes, 1981
Lumbrineris scopa Fauchald, 1974

Arabellidae
Arabella sp.
Haematocleptes terebellidis Wirén, 1886
Drilonereis sp.
Notocirrus scoticus McIntosh, 1869

Eunicidae
Eunice harassii Audouin & Milne Edwards, 1833
Marphysa bellii (Audouin & Milne Edwards, 1833)
Nematonereis unicornis (Grube, 1840)

Onuphidae
Hyalinoecia tubicola (Müller, 1776)
Nothria britannica (McIntosh, 1903)

Dorvilleidae
Ophryotrocha spp.
Protodorvillea kefersteini (McIntosh, 1869)
Schistomeringos neglecta (Fauvel, 1923)
Schistomeringos rudolphi (Chiaje, 1828)
Schistomeringos sp. A
Schistomeringos sp. B
Ougia subaequalis (Oug, 1978)
Ougia sp.
Parougia eliasoni (Oug, 1978)
Parougia sp. A
Parougia sp. B
Parougia sp. C
Parougia sp. D

Orbinidae
Orbinia armandi (McIntosh, 1910)
Orbinia sertulata (Savigny, 1820)
Scoloplos armiger (Müller, 1776)
Scoloplos sp.

Questidae
Questidae sp.

Paraonidae
Aricidea catherinae Laubier, 1967
Aricidea laubieri Hartley, 1981
Aricidea cf. *philbinae* Brown, 1976
Aricidea cerrutii Laubier, 1966
Aricidea simonae Laubier & Ramos, 1974
Aricidea minuta Southward, 1956
Aricidea wassi Pettibone, 1965
Aricidea sp.
Cirrophorus branchiatus Ehlers, 1908
Cirrophorus furcatus (Hartman, 1957)
Paradoneis lyra (Southern, 1914)
Paradoneis cf. *ilvana* Castelli, 1985
Paradoneis sp.
Levinsenia gracilis (Tauber, 1879)
Levinsenia sp.

Apistobranchidae
Apistobranchus spp.

Poecilochaetidae
Poecilochaetus serpens Allen, 1904

Chaetopteridae
Chaetopterus sp.
Phyllochaetopterus socialis Claparède, 1870

Spionidae
Spiophanes bombyx (Claparède, 1870)
Spiophanes kroyeri Grube, 1860
Scolelepis bonnieri (Mesnil, 1896)
Scolelepis mesnili (Bellan & Lagardére, 1971)
Scolelepis sp.
Parascolelepis sp.
Laonice bahusiensis Söderstrom, 1920
Aonides oxycephala (Sars, 1862)
Aonides paucibranchiata Southern, 1914
Prionospio banyulensis Laubier, 1966
Prionospio cirrifera Wirén, 1883
Prionospio dubia Maciolek, 1985
Prionospio fallax Söderstrom, 1920
Prionospio sp.
Spio armata Thulin, 1957
?*Spio multioculata* (Rioja, 1919)
Spio sp. A
Spio sp. B
Spio sp. C
Microspio sp.
Polydora caulleryi Mesnil, 1897
Polydora cf. *caeca* (Örsted, 1843)
Polydora flava Claparède, 1870
Polydora giardi Mesnil, 1896
Polydora hermaphroditica Hannerz, 1956
Polydora quadrilobata Jacobi, 1883
Pseudopolydora cf. *paucibranchiata* (Okuda,1937)
Pseudopolydora pulchra (Carazzi, 1895)
Pygospio elegans Claparède, 1863
Atherospio disticha Mackie & Duff, 1986
Spionidae gen. A
Spionidae gen. B

Magelonidae
Magelona alleni Wilson, 1958
Magelona filiformis Wilson, 1959
Magelona minuta Eliason, 1962
Magelona sp. A
Magelona sp. B

Cirratulidae
Aphelochaeta marioni (Saint-Joseph, 1894)
Aphelochaeta sp. A
Aphelochaeta sp. B
Monticellina dorsobranchialis (Kirkegaard, 1959)
Tharyx killariensis (Southern, 1914)
Caulleriella alata (Southern, 1914)
Caulleriella bioculata (Keferstein, 1862)
Caulleriella zetlandica (McIntosh, 1911)
Chaetozone sp. A
Chaetozone sp. B
Cirratulus sp.
Dodecaceria sp.
Cirratulidae sp. A
Cirratulidae sp. B
Cirratulidae indet.

Cossuridae
Cossura sp.

Psammodrilidae
Psammodrilus balanoglossoides Swedmark, 1953

Acrocirridae
Macrochaeta caroli Westheide, 1981
Macrochaeta clavicornis (Sars, 1835)

Flabelligeridae
Diplocirrus glaucus (Malmgren, 1867)
Diplocirrus sp.
Flabelligera affinis (Sars, 1829)
Pherusa sp. juv.

Scalibregmatidae

Scalibregma celticum Mackie, 1991
Scalibregma inflatum Rathke, 1843
Sclerocheilus minutus Grube, 1863
Asclerocheilus sp. A
Asclerocheilus sp. B

Opheliidae

Travisia forbesii Johnston, 1840
Ophelia borealis Quatrefages, 1866
Ophelia celtica Amoureux & Dauvin, 1981
Ophelina acuminata Örsted, 1843
Ophelina cylindricaudata (Hansen, 1879)
Ophelina modesta Støp-Bowitz, 1958

Capitellidae

Capitella cf. *capitata* (Fabricius, 1780)
Mediomastus fragilis Rasmussen, 1973
Notomastus sp. B
Notomastus sp. C
Notomastus sp. D
Notomastus sp. E
Notomastus indet.
Peresiella cf. *clymenoides* Harmelin, 1968

Maldanidae

Clymenella sp.
Clymenura johnstoni (McIntosh, 1915)
Clymenura sp.
Euclymene lumbicoides (Quatrefages, 1866)
Euclymene oerstedii (Claparède, 1863)
Euclymene sp.
Heteroclymene robusta Arwidsson, 1906
Praxillella affinis (Sars, 1872)
Praxillella gracilis (Sars, 1861)
Nicomache trispinata Arwidsson, 1906
Petaloproctus sp.
Notoproctus sp.
Praxillura longissima Arwidsson, 1906
Maldanidae sp. A
Maldanidae sp. B
Maldanidae indet.

Oweniidae

Galathowenia sp. A
Galathowenia sp. B
Myriochele danielsseni Hansen, 1879
Owenia fusiformis Chiaje, 1842

Pectinaridae

Amphictene auricoma (Müller, 1776)
Lagis koreni Malmgren, 1866

Ampharetidae

Melinna elisabethae McIntosh, 1885
Melinna palmata Grube, 1869
Eclysippe vanelli (Fauvel, 1936)
Ampharete falcata Eliason, 1955
Ampharete sp. A
Ampharete sp. B
Anobothrus gracilis (Malmgren, 1866)
Sabellides octocirrata (Sars, 1835)
Amphicteis gunneri (Sars, 1835)
Amphicteis midas (Gosse, 1855)
Ampharetinae juv.

Terebellidae

Streblosoma intestinale Sars, 1872
Thelepus cincinnatus (Fabricius, 1780)
Thelepus setosus (Quatrefages, 1866)
Parathelepus collaris (Southern, 1914)
Amphitritides gracilis (Grube, 1860)
Neoamphitrite affinis (Malmgren, 1866)-
Eupolymnia nesidensis (Chiaje, 1828)
Lanice conchilega (Pallas, 1766)
Loimia sp.
Axionice maculata (Dalyell, 1853)
Pista cristata (Müller, 1776)
Pista sp.
Nicolea venustula (Montagu, 1818)
Nicolea zostericola (Örsted, 1844)
Lanassa venusta (Malm, 1874)
Phisidia aurea Southward, 1956
Amaeana trilobata (Sars, 1863)
Lysilla nivea Langerhans, 1884
Polycirrus sp. A
Polycirrus spp.
Terebellidae juv.

Trichobranchidae

Terebellides stroemi Sars, 1835
Trichobranchus glacialis Malmgren, 1866
Trichobranchus roseus (Malm, 1874)

Sabellariidae

Sabellaria spinulosa Leuckart, 1849

Sabellidae

Branchiomma bombyx (Dalyell, 1853)
Demonax cambrensis Knight-Jones & Walker, 1985
Sabella pavonina Savigny, 1820
Pseudopotamilla reniformis (Bruguière, 1789)
Pseudopotamilla sp.
Chone filicaudata Southern, 1914
Chone sp. B
Chone sp. C
Euchone rubrocincta (Sars, 1861)
Jasmineira caudata Langerhans, 1880
Jasmineira elegans Saint-Joseph, 1894
Oriopsis sp.
?*Pseudofabricia* sp.
Sabellidae indet.

Serpulidae

Filograna implexa Berkeley, 1827
Filogranula calyculata (Costa, 1861)?
Filogranula gracilis Langerhans, 1884
Josephella marenzelleri Caullery & Mesnil, 1896
Protula tubularia (Montagu, 1803)
Metavermilia multicristata (Philippi, 1844)
Hydroides norvegica Gunnerus, 1768
Serpula vermicularis Linnaeus, 1767
Pomatoceros lamarckii (Quatrefages, 1866)
Pomatoceros triqueter (Linnaeus, 1758)
Serpulidae indet.

Spirorbidae

Spirorbis cuneatus Gee, 1964
Circeis spirillum (Linnaeus, 1758)
Bushiella sp.
Janua pagenstecheri (Quatrefages, 1866)
Neodexiospira sp.

Protodrilidae

Protodrilus spp.

Protodriloididae

Protodriloides chaetifer (Remane, 1926)

Polygordiidae

Polygordius appendiculatus Fraipont, 1887
Polygordius lacteus Schneider, 1868

OLIGOCHAETA

Enchytraeidae

Grania spp.
Enchytraeidae sp.

Tubificidae
Tubificoides amplivasatus (Erséus, 1975)
Tubificoides benedeni (Udekem, 1855)
Tubificidae spp.

HIRUDINEA
Pontobdella vosmaeri Apathy,1888

CHELICERATA

PYCNOGONIDA
Nymphonidae
Nymphon brevirostre Hodge, 1863
Nymphon hirtum (Fabricius, 1794)
Nymphon brevitarse Kroyer, 1844
Ammotheidae
Achelia echinata Hodge, 1864
Achelia longipes (Hodge, 1864)
Endeidae
Endeis spinosa (Montagu, 1808)
Callpallenidae
Callipallene brevirostris (Johnston, 1837)
Phoxichilidiidae
Anoplodactylus petiolatus (Kroyer, 1844)
Phoxichilidium femoratum (Rathke, 1799)
Pycnogonidae
Pycnogonum littorale (Strøm, 1762)

ARACHNIDA

ACARI
Halacaridae
Arhodeoporus gracilipes (Trouessart, 1889)
Copidognathus lamellosus (Lohmann, 1893)
Copidognathus cf. rhodostigma (Gosse, 1855)
Lohmanella falcata (Hodge, 1863)

CRUSTACEA

CIRRIPEDIA
Cirripedia indet.
Verrucidae
Verruca stroemia (O.F. Müller, 1788)
Balanidae
Balanus spp.

CYCLOPOIDA
Notodelphyidae
Gunenotophorus globularis Buchholz, 1869
Botachus cylindratus (Scott, 1902)
Ascidicolidae
Jeanella minor (Scott, 1902)

POECILOSTOMATOIDA
Sabelliphilidae
Sabelliphilus elongatus M.Sars, 1862
Clausidiidae
Hersiliodes latericia (Grube, 1869)
Leptinogaster histro (Pelseneer, 1929)
Nereicolidae
Nereicola ovatus Keferstein, 1863
Seliodes bocqueti Carton, 1963

SIPHONOSTOMATOIDA
Cancerillidae
Cancerilla tubulata Dalyell, 1851
Xenocoelomidae
Aphamodomus terebellae (Levinsen, 1878)

HARPACTICOIDAE
Ectinosomatidae
Ectinosomatidae sp.

MYSIDACEA
Mysida spp.

AMPHIPODA
Amphipoda sp.
Calliopiidae
Apherusa bispinosa (Bate, 1856)
Eusiridae
Eusirus longipes Böck, 1861
Paramphithoidae
Epimeria cornigera (Fabricius, 1779)
Epimeria sp.
Oedicerotidae
Perioculoides longimanus (Bate & Westwood, 1868)
Pontocrates arenarius (Bate, 1858)
Pontocrates sp.
Synchelidium maculatum Stebbing, 1906
Synchelidium haplocheles (Grube, 1864)
Westwoodilla caecula (Bate, 1856)
Plustidae
Parapleustes assimilis (Sars, 1882)
Parapleustes bicuspis (Kröyer, 1838)
Stenopleustes nodifer (Sars, 1882)
Amphilochidae
Amphilochus manudens Bate, 1862
Amphilochus neapolitanus Della Valle, 1893
Amphilochus sp.
Gitana sarsi Böck, 1871
Paramphilochoides sp.
Peltocoxa brevirostris(Scott & Scott, 1893)
Leucothoidae
Leucothoe incisa Robertson, 1892
Leucothoe lilleborgi Böck, 1861
Leucothoe spinicarpa (Abildgaard, 1789)
Leucothoe sp.
Colomastigidae
Colomastix pusilla Grube, 1861
Cressidae
Cressa dubia (Bate, 1857)
Stenothoidae
Metopa alderi (Bate, 1857)
Metopa pusilla G. O. Sars, 1892
Metopa sp.
Stenothoe marina (Bate, 1856)
Urothoidae
Urothoe elegans (Bate, 1856)
Urothoe marina (Bate, 1857)
Phoxocephalidae
Harpinia antennaria Meinert, 1890
Harpinia crenulata (Boeck,1871)
Harpinia pectinata G. O. Sars, 1891
Metaphoxus fultoni (Scott, 1890)
Lysianassidae
Lysianassa ceratina (Walker, 1889)
Lysianassa plumosa Böck, 1871

Acidostoma sp.
Hippomedon denticulatus (Bate, 1857)
Euonyx chelatus Norman, 1867
Scopelocheirus hopei (Costa, 1851)
Tmetonyx similis (G. O. Sars, 1891)
Tryphosella sarsi Bonnier, 1893
Tryphosites longipes (Bate & Westwood, 1861)
Lysianassidae sp. juv.

Synopiidae
Austrosyrrhoe fimbriatus (Stebbing & Robertson, 1891)
Austrosyrrhoe sp.

Argissidae
Argissa hamatipes (Norman, 1869)

Acanthonotozomatidae
Iphimedia eblanae Bate, 1857
Iphimedia obesa Rathke, 1843
Iphimedia minuta G. O. Sars, 1882
Iphimedia sp.
Acanthonotozomatidae sp.

Lilljeborgidae
Lilljeborgia pallida (Bate, 1857)
Lilljeborgia sp. juv. cf. *kinahana* (Bate, 1862)
Lilljeborgia sp. juv.
Listriella sp.

Atylidae
Atylus falcatus Metzger, 1871
Atylus swammerdami (Milne-Edwards, 1830)
Atylus vedlomensis (Bate & Westwood, 1862)

Dexaminidae
Guernea coalita (Norman, 1868)
Tritaeta gibbosa (Bate, 1862)

Ampeliscidae
Ampelisca brevicornis (Costa, 1853)
Ampelisca diadema (Costa, 1853)
Ampelisca macrocephala Lilljeborg, 1852
Ampelisca spinipes Böck, 1861
Ampelisca tenuicornis Lilljeborg, 1855
Ampelisca typica (Bate, 1856)
Ampelisca sp.
Haploops tubicola Lilljeborg, 1855

Pantoporeiidae
Bathyporeia elegans Watkin, 1938
Bathyporeia aff. *tenuipes* Meinert, 1877
Bathyporeia sp.

Melphidippidae
Megaluropus agilis Hoek, 1889
Melphidippella macra (Norman, 1869)

Melitidae
Ceradotus semiserratus (Bate, 1862)
Cheirocratus assimilis (Lilljeborg, 1852)
Cheirocratus sundevallii (Rathke, 1843)
Cheirocratus sp.
Eriopisa elongata (Bruzelius, 1859)
Maera othonis (Milne-Edwards, 1830)
Maerella tenuimana (Bate, 1862)
Melita obtusata (Bate,1862)
Melita sp. juv.

Isaeidae
Gammaropsis maculata (Johnston, 1828)
Gammaropsis nitida (Stimpson, 1853)
Gammaropsis palmata (Stebbing& Robertson, 1891)
Gammaropsis sophiae (Böck, 1861)
Megamphopus cornutus Norman, 1869
Microprotus maculatus Norman, 1867
Photis longicaudata (Bate & Westwood, 1862)

Ischyroceridae
Ericthonius punctatus (Bate, 1857)
Ericthonius sp.
Jassa pusilla (G. O. Sars, 1894)
Jassa sp.
Microjassa cumbrensis (Stebbing & Robertson,1891)
Ischyroceridae sp.

Aoridae
Aora gracilis (Bate, 1857)
Aora typica (Kroyer, 1845)
Lembos longipes (Lilljeborg, 1852)
Leptocheirus hirsutimanus (Bate, 1862)
Leptocheirus pectinatus (Norman, 1869)
Leptocheirus sp.
Aoridae sp.

Corophiidae
Corophium sp.
Siphonocetes kroyeranus Bate, 1856
Unciola crenatipalma (Bate, 1862)
Unciola planipes Norman, 1867
Dyopedos monocanthus Metzger, 1875
Dyopedos porrectus (Bate, 1857)

Caprellidae
Caprella linearis (Linnaeus, 1767)
Caprella sp.
Pariambus typicus (Kroyer, 1854)
Caprellidae sp.

Phtisicidae
Phtisica marina Slabber, 1769
Pseudoprotella phasma (Montagu, 1804)

ISOPODA
Isopoda sp.

Gnathiidae
Gnathia oxyuraea (Lilljeborg, 1855)
Gnathia sp. juv.

Anthuridae
Anthura gracilis (Montagu, 1808)

Cirolanidae
Cirolana borealis Lilljeborg, 1851
Conilera cylindracea (Montagu, 1803)
Eurydice pulchra Leach, 1815
Eurydice sp.

Sphaeromatidae
Sphaeroma indet.

Janiridae
Janira maculosa Leach, 1813

Munnidae
Munna sp.
Paramunna bilobata G. O. Sars, 1897
Pleurogonium inerme G. O. Sars, 1883
Pleurogonium rubicundum G. O. Sars, 1897
Pleurogonium spinosissimum G. O. Sars, 1899

Desmosomatidae
Eugerda tenuimana? (Sars, 1865)
Eugerda sp.
Desmosomatidae sp. indet

Munnopsidae
Pseudarachna hirsuta (G. O. Sars, 1863)

Arcturidae
Arcturidae sp.
Astacilla longicornis (Sowerby, 1806)

TANAIDACEA

Tanaidae
Tanaidae sp.

Paratanaidae
Araphura brevimana (Lilljeborg, 1864)
Leptognathiidae
Leptognathia breviremis (Liijeborg, 1864)
Leptognathia gracilis (Kroyer, 1842)
Tanaopsis graciloides (Liijeborg, 1864)
Typhlotanais sp.?

CUMACEA

Bodotridae
Vaunthompsonia cristata Bate, 1858
Bodotria pulchella (G. O. Sars, 1879)
Bodotria scorpiodes (Montagu, 1804)
Bodotria sp.
Iphinoe trispinosa (Goodsir, 1843)
Leuconiidae
Eudorella truncatula (Bate, 1856)
Eudorellopsis deformis (Kroyer, 1846)
Leucon nasica (Kroyer, 1841)
Nannastacidae
Campylaspis legendrei ? Fage, 1951
Campylaspis sp.
Cumella pygmaea G. O. Sars, 1865
Pseudocumatidae
Petalosarsia declivis (G. O. Sars, 1865)
Pseudocuma longicornis (Bate, 1858)
Pseudocuma similis G. O. Sars, 1900
Lampropidae
Hemilamprops rosea (Norman, 1863)
Lamprops fasciata G. O. Sars, 1863
Diastylidae
Diastylis bradyi Norman, 1879
Diastylis laevis Norman, 1869
Diastylis lucifera (Kroyer, 1841)
Diastylis rugosa ? G. O. Sars, 1865
Diastylis sp.
Diastyloides biplicata (G. O. Sars, 1865)

EUPHAUSIACEA

Euphausiacea sp.

DECAPODA

Pasiphaeidae
Pasiphaea sivado (Risso, 1816)
Hippolytidae
Caridion gordoni (Batre, 1858)
Eualus pusiolus (Kroyer, 1841)
Hippolytidae sp.
Processidae
Processa canaliculata Leach, 1815
Processa edulis crassipes Nouvel & Holthuis,1957
Processa nouveli Al-Adhub & Williamson, 1975
Processa sp.
Pandalidae
Dichelopandalus bonnieri Caullery, 1896
Pandalina brevirostris (Rathke, 1837)
Pandalus montagui Leach, 1814
Pandalus propinquus G. O. Sars, 1870
Pandalus sp.
Crangomidae
Crangon allmanni Kinahan, 1857
Crangon crangon (Linnaeus, 1758)
Pontophilus sp.
Pontophilus spinosus (Leach, 1815)
Nephropidae
Nephrops norvegicus (Linnaeus, 1758)
Callianassidae
Callianassa subterranea
Callianassa juv.
Upogebiidae
Upogebia deltaura (Leach, 1815)
Upogebia sp.
Paguridae
Eupagurus bernhardus (Linnaeus, 1758)
Paguridae sp.
Galatheidae
Galathea sp.
Munida rugosa (Fabricius, 1775)
Porcellanidae
Pisidea longicornis (Linnaeus, 1767)
Porcellana juv.
Leucosidae
Ebalia tuberosa (Pennant, 1777)
Ebalia sp.
Majidae
Hyas coarctatus Leach, 1815
Hyas sp. juv.
Inachus leptocheirus Leach, 1817
Inachus sp.
Macropodia tenuirostris (Leach, 1814)
Macropodia sp.
Eurynome sp.
Corystidae
Corystes cassivelaunus (Pennant, 1777)
Atelecyclidae
Atelecyclus rotundatus (Olivi, 1792)
Thiidae
Thia scutellata (Fabricius, 1793)
Portunidae
Liocarcinus depurator (Linnaeus, 1758)
Liocarcinus holsatus (Fabricius, 1798)
Liocarcinus marmoreus (Leach, 1814)
Liocarcinus pusillus (Leach, 1815)
Liocarcinus . juv.
Goneplacidae
Goneplax rhomboides (Linnaeus, 1758)
Xanthidae
Monodaeus couchi (Couch, 1851)
Pinnotheridae
Pinnotheres sp.

MOLLUSCA

CAUDOFOVEATA

Chaetoderma nitidulum Lovén, 1844

SOLENOGASTRES

Nematomenia banyulensis (Pruvot, 1890)
Neomenia carinata Tullberg, 1875
Eleutheromenia sierra (Pruvot, 1890)
Rhopalomenia aglaopheniae (Kow. & Marion,1887)
Pruvotina sp.
Tegulaherpia sp.
Macellomenia cf. *palifera* (Pruvot, 1890)

POLYPLACOPHORA

Leptochiton asellus (Gmelin, 1791)
Hanleya hanleyi (Bean in Thorpe, 1847)

GASTROPODA

Pleurotomarioidea
Emarginula crassa J. Sowerby, 1813
Emarginula fissura (L. 1767)

Fissurelloidea
Diodora graeca (L. 1758)

Trochoidea
Jujubinus miliaris (Brocchi, 1814)
Jujubinus montagui (W. Wood, 1828)
Gibbula tumida (Montagu, 1803)
Calliostoma formosum (McA. & Forbes, 1847)
Calliostoma zizyphinum (L. 1758)
Calliostoma granulatum (Born, 1777)
Dikoleps nitens (Philippi, 1844)
Skenea serpuloides (Montagu, 1808)
Tricolia pullus (L. 1758)

Cerithioidea
Turritella communis Risso, 1826

Bittiidae
Bittium reticulatum (da Costa, 1778)

Rissoidea
Rissoa interrupta (J. Adams, 1800)
Alvania punctura (Montagu, 1803)
Alvania semistriata (Montagu, 1808)
Obtusella alderi (Jeffreys, 1858)
Onoba semicostata (Montagu, 1803)
Pusillina inconspicua (Alder, 1844)
Ceratia proxima (Forbes & Hanley, 1850)
Hyala vitrea (Montagu, 1803)
Caecum imperforatum (Kmchr. in G. Adams, 1798)
Caecum glabrum (Montagu, 1803)

Stromboidea
Aporrhais pespelecani da Costa, 1778

Calyptraeoidea
Capulus ungaricus (L. 1758)

Lamellarioidea
Trivia arctica (Pulteney, 1799)
Velutina velutina (Müller1776)

Naticoidea
Polinices fuscus (Blainville, 1825)
Polinices polianus (delle Chiaje, 1826)

Triphoroidea
Cerithiopsis tubercularis (Montagu, 1803)

Epitonoidea
Epitonium trevelyanum (Johnston, 1841)
Epitonium clathratulum (Kmchr. in G. Adams, 1789)
Aclis minor (Brown, 1827)
Graphis albida (Kmchr. in G. Adams, 1789)

Eulimoidea
Eulima bilineata Alder, 1848
Eulima glabra (da Costa, 1778)
Pelseneeria stylifera (Turton, 1825)
Vitreolina philippi (Reneval & Ponzi, 1854)

Muricoidea
Boreotrophon truncatus (Strøm, 1768)
Trophonopsis muricatus (Montagu, 1803)
Buccinum undatatum L. 1758
Colus gracilis (da Costa, 1778)
Colus jeffreysianus (P. Fischer, 1868)
Neptunea antiqua (L. 1758)
Hinia incrassata (Strøm, 1768)
Hinia pygmaea (Lamarck, 1822)

Conoidea
Mangelia brachystoma (Philippi, 1844)
Oenopota rufa (Montagu, 1803)
Raphitoma linearis (Montagu, 1803)
Raphitoma purpurea (Montagu, 1803)

Pyrimadelloidea
Odostomia plicata (Montagu, 1803)
Odostomia unidentata (Montagu, 1803)
Brachystomia eulimoides (Hanley, 1844)
Chrysallida indistincta (Montagu, 1803)
Jordaniella nivosa (Montagu, 1803)
Megastomia conoidea (Alder, 1850)
Ondina divisa (J. Adams, 1797)
Ondina warreni (Thompson, 1845)
Partulida spiralis (Montagu, 1803)

Acteonoidea
Acteon tornatilis (L. 1758)

Philinoidea
Scaphander lignarius (L. 1758)
Cylichna cylindracea (Pennant, 1777)
Philine aperta (L. 1767)
Philine scabra (Müller, 1776)

Diaphanoidea
Diaphana minuta Brown, 1827

Retusoidea
Retusa truncatula (Bruguière, 1792)

Limacinoidea
Limacina retroversa (Fleming, 1823)

Nudibranchia
Lomanotus marmoratus (Alder & Hancock, 1842)
Dendronotus frondosus (Ascanius, 1774)
Doto fragilis (Forbes, 1838)
Goniodoris nodosa (Montagu, 1808
Onchidoris inconspicua (Alder & Hancock, 1851)
Eubranchus pallidus (Alder & Hancock, 1842)
Eubranchus tricolor Forbes, 1838

SCAPHOPODA

Siphonodentaloida
Pulsellum lofotense (M. Sars, 1864)

BIVALVIA

Nuculoidea
Nucula hanleyi Winckworth, 1931
Nucula nitidosa Winckworth, 1930
Nucula nucleus (L. 1758)
Nucula sulcata Bronn, 1831
Nuculoma tenuis (Montagu, 1808)

Nuculanoidea
Jupiteria minuta (Müller, 1776)

Limopsoidea
Glycymeris glycymeris (L. 1758)

Mytiloidea
Mytilus edulis L. 1758
Modiolus modiolus (L. 1758)
Modiolarca tumida (Hanley, 1843)
Musculus discors (L. 1767)

Limoidea
Limatula subauriculata (Montagu, 1803)

Pectinoidea
Chlamys varia (L. 1758)
Pecten maximus (L. 1758)
Aequipecten opercularis (L. 1758)
Palliolum tigerinum (Müller, 1776)
Similipecten similis (Laskey, 1811)

Anomioidea
Anomia ephippium L.1758
Pododesmus patelliformis (L.1761)
Heteronomia squamula (L. 1758)

Lucinoidea
Myrtea spinifera (Montagu, 1803)
Lucinoma borealis (L. 1758)
Thyasira flexuosa (Montagu, 1803)
Galeommatoidea
Kellia suborbicularis (Montagu, 1803)
Semierycina nitida (Turton, 1822)
Lepton squamosum (Montagu, 1803)
Montacuta substriata (Montagu, 1803)
Devonia perrieri (Malard, 1904)
Tellimya ferruginosa (Montagu, 1803)
Mysella bidentata (Montagu, 1803)
Astartioidea
Astarte sulcata (da Costa, 1778)
Goodallia triangularis (Montagu, 1803)
Cardioidea
Acanthocardia echinata (L. 1758)
Parvicardium minimum (Philippi, 1836)
Parvicardium ovale (Sowerby, 1840)
Parvicardium scabrum (Philippi, 1844)
Mactroidea
Mactra stultorum (L. 1758)
Spisula elliptica (Brown, 1827)
Spisula subtruncata (da Costa, 1778)
Lutraria lutraria (L. 1758)
Solenoidea
Ensis arcuatus (Jeffreys, 1865)
Ensis ensis (L. 1758)
Phaxas pellucidus (Pennant, 1777)
Tellinoidea
Arcopagia crassa (Pennant, 1777)
Fabulina fabula (Gmelin, 1791)
Moerella donacina (L. 1758)
Moerella pygmaea (Lovén, 1846)
Gari costulata (Turton, 1822)
Gari fervensis (Gmelin, 1791)
Gari tellinella (Lamarck, 1818)
Abra alba (W. Wood, 1802)
Abra nitida (Müller, 1776)
Abra prismatica (Montagu, 1803)
Solecurtus scopula (Turton, 1822)
Pharus legumen (L.1758)
Arcticoidea
Arctica islandica (L., 1767)
Veneroidea
Circomphalus casina (L., 1758)
Gouldia minima (Montagu, 1803)
Chamelea gallina (L., 1758)
Clausinella fasciata (da Costa, 1778)
Timoclea ovata (Pennant, 1777)
Tapes rhomboides (Pennant, 1777)
Dosinia lupinus (L., 1758)
Dosinia exoleta (L., 1758)
Mysia undata (Pennant, 1777)
Myoidea
Mya truncata L., 1758
Sphenia binghami Turton, 1822
Corbula gibba (Olivi, 1792)
Hiatelloidea
Hiatella arctica (L., 1758)
Pandoroidea
Thracia convexa (W. Wood, 1815)
Thracia phaseolina (Lamarck, 1818)
Thracia villosiuscula (Macgillivray, 1827)
Cochlodesma praetenue (Pulteney, 1799)
Lyonsia norwegica (Gmelin, 1791)
Pandora pinna (Montagu, 1803)
Poromyoidea
Cuspidaria cuspidata (Olivi, 1792)

CEPHALOPODA
Sepioidea
Sepiola atlantica Orbigny, 1840
Octopoda
Eledone cirrhosa (Lamarck, 1798)

BRACHIOPODA

Gwynia capsula (Jeffreys, 1859)

BRYOZOA

CYCLOSTOMATA
Crisiidae
Crisidia cornuta (L., 1758)
Crisia aculeata Hassell, 1841
Crisia denticulata (Lamarck, 1816)
Crisia eburnea (L., 1758)
Crisia ramosa Harmer, 1891
Oncousoecia dilatans (Johnston,1847)
Tubuliporidae
Tubulipora liliacea (Pallas, 1766)
Diastoporidae
Eurystrotos compacta (Norman, 1866)
Diplosolen obelia (Johnston, 1838)
Plagioecia patina (Lamarck, 1816)
Plagioecia sarniensis (Norman,1864)
Annectocymidae
Annectocyma major (Johnston, 1847)
Entalophoroecia deflexa (Couch,1842)
Lichenoporidae
Lichenopora radiata (Audouin, 1826)
Disporella hispida (Fleming, 1828)

CTENOSTOMATA
Alcyonidiidae
Alcyonidium diaphanum (Hudson,1762)
Alcyonidium mytili Dalyell,1848
Nolellidae
Nolella dilatata (Hincks, 1860)
Penetrantiidae
Penetrantia concharum Silen, 1946
Vesiculariidae
Vesicularia spinosa (L.,1758)
Amathia lendigera (L.,1758)
Bowerbankia imbricata (Adams,1798)
Bowerbankia gracilis Leidy, 1855

CHEILOSTOMATA
Cribilinidae
Puellina innominata (Couch, 1844)
Umbonulidae
Umbonula ovicellata Hasting,1944
Umbonula littoralis Hastings,1944
Exochellidae
Escharoides coccinea (Abildgaard,1806)
Cryptosulidae
Cryptosula pallasiana (Moll, 1803)
Hippoporinidae
Hippoporina pertusa (Esper, 1796)
Pentapora foliacea (Ellis & Solander, 1786)

Smittinidae
Smittoidea reticulata (Macgillivray, 1842)
Parasmittina trispinosa (Johnston, 1838)
Porella concinna (Busk,1854)
Phylactellidae
Phylactella labros ---a (Busk,1854)
Escharellidae
Escharella immersa (Fleming ,1828)
Escharella labiosa (Busk, 1856)
Escharella variolosa (Johnston, 1838)
Escharella ventricosa (Hassell ,1842)
Schizoporellidae
Schizoporella longirostris Hincks, 1886
Schizomavella auriculata (Hassell ,1842)
Schizomavella linearis (Hassell ,1841)
Escharina hyndmanni (Johnnston, 1847)
Cleidochasmatidae
Microporella ciliata (Pallas, 1766)
Fenestrulina malusii (Audouin, 1826)
Chorizoporidae
Chorizopora brongniartii (Audouin, 1826)
Hippothoidae
Hippothoa divaricata Lamouroux, 1821
Hippothoa flagellum Manzoni,1870
Sertelidae
Schizotheca fissa (Busk,1856)
Eucrateidae
Eucratea loricata (L.,1758)
Celleporidae
Cellepora pumicosa (Pallas, 1766)
Celleporina hassallii (Johnston,1847)
Omalosecosa ramulosa (L.,1758)
Turbicellepora avicularis (Hincks,1860)
Aeteidae
Aetea anguina (L.,1758)
Membraniporidae
Conopeum reticulum(L., 1758)
Electridae
Electra pilosa (L. , 1758)
Pyripora catenularia (Fleming, 1828)
Flustridae
Flustra foliacea (L. , 1758)
Calloporidae
Callopora aurita (Hincks,1877)
Callopora dumerilii (Audouin, 1826)
Alderina imbellis (Hincks, 1860)
Cauloramphus spiniferum (Johnston, 1832)
Amphiblestrum flemingii (Busk,1854)
Amphiblestrum solidum (Packard,1860)
Amphiblestrum minax (Busk,1860)
Membraniporella nitida (Johnston, 1838)
Scrupocellariidae
Scrupocellaria scruposa (L., 1758)
Cellariidae
Cellaria fistulosa L.,1758
Cellaria salicornioides Lamouroux, 1816
Cellaria sinuosa (Hassall,1840)
Bicellariellidae
Bicellariella ciliata (L., 1758)
Bugulidae
Bugula avicularia (L., 1758)
Bugula flabellata (Thompson in Gray, 1848)
Bugula plumosa (Pallas, 1766)

PHORONIDA
Phoronidae
Phoronis ovalis Wright, 1856
Phoronis pallida Silen, 1952
Phoronis muelleri Selys-Longchamps, 1903
Phoronis sp.

ECHINODERMATA
CRINOIDEA
Crinoidea sp. juv.
Antedonidae
Antedon bifida (Pennant, 1777)

ASTEROIDEA
Asteroidea sp. juv.
Poraniidae
Marginaster capreensis (Gasco, 1876)
Astropectinidae
Astropecten irregularis (Pennant, 1777)
Luidiidae
Luidia sarsi Duben & Koren, 1846
Goniastereridae
Hippasteria phyrgiana (Parelius, 1768)
Asterinidae
Anseropoda placenta (Pennant, 1777)
Solasteridae
Crossaster papposus (L., 1767)
Solasteridae sp. juv.
Echinasteridae
Henricia oculata (Pennant, 1777)
Strichasteridae
Strichastrella rosea (O.F. Müller, 1776)
Asteriidae
Asterias rubens L. 1758
Leptasterias muelleri (M. Sars, 1846)

OPHIUROIDEA
Opiuroidea sp. juv.
Ophiotricidae
Ophiothrix fragilis (Abildgaard, 1789)
Ophiocomidae
Ophiocomina nigra (Abildgaard, 1789)
Ophiactidae
Ophiactis balli (Thompson, 1840)
Amphiuridae
Amphiura filiformis (O.F. Müller, 1776)
Amphiura chiajei Forbes, 1845
Amphiura brachiata (Montagu, 1804)
Amphiura juv.
Amphipholis squamata (Chiaje, 1828)
Opholepidae
Ophiura albida Forbes, 1839
Ophiura affinis Lutken1859
Ophiura ophiura (L., 1758)
Ophiura spp. juv

ECHINOIDEA
Echinoidea spp. juv.
Echinidae
Psammechinus miliaris (Gmelin, 1778)
Echinus acutus Lamarck, 1816
Echinus esculentus L., 1758
Fibulariidae
Echinocyamus pusillus (O.F. Müller, 1776)

Spatangidae
Spatangus purpureus O.F. Müller, 1776
Echinocardium cordatum (Pennant, 1777)
Echinocardium flavescens (O.F. Müller, 1776)
Echinocardium indet.
Brissopsis lyrifera (Forbes, 1841)
Spatangidae juv.

HOLOTHUROIDEA
Holothuroidea sp.

Cucumariidae
Paracucumaria hyndmani (Thompson, 1840)
Thyone raphanus Duben & Koren, 1844
Thyone fusus (O.F. Müller, 1776)
Cucumariidae juv.

Synaptidae
Leptosynapta minuta (Becher, 1906)
Leptosynapta inhaerens (O.F. Müller, 1776)
Leptosynapta decaria Ostergren 1905???
Leptosynapta sp. juv.
Labidoplax digitata (Montagu, 1804)
Labidoplax juv.
Synaptidae sp.

HEMICHORDATA

ENTEROPNEUSTA
Enteropneusta spp.

TUNICATA

Ascidiacea spp.

ENTEROGONA

Clavelinidae
Archidostoma aggregatum Garstang,1891

Polyclinidae
Sidnyum turbinatum Savigny, 1816
Polyclinidae sp, indet.

Corellidae
Corella parallelogramma (O.F. Müller, 1776)

Perophoridae
Perophora listeri Forbes, 1848

Ascidiidae
Ascidiella aspersa (O.F. Müller, 1776)
Ascidiella scabra (O.F. Müller, 1776)
Ascidiella indet.
Ascidia conchilega O.F. Müller, 1776
Ascidia mentula (O.F. Müller, 1776)

Didemnidae
Didemnum maculosum (Milne-Edwards, 1841)
Leptoclinides faeroensis Bjerkan, 1905

PLEUROGONA
Pleurogona sp.

Styelidae
Polycarpa fibrosa (Stimpson, 1852)
Polycarpa sp.
Dendrodoa grossularia (Van Beneden, 1846)
Botryllus schlosseri (Pallas, 1766)
Botrylloides leachi (Savigny, 1816)

Pyuridae
Microcosmus claudicans (Savigny, 1816)
Pyura microsmos (Savigny, 1816)
Pyura squamulosa (Alder,1863)
Pyura tesselata (Forbes, 1848)

Molgulidae
Molgula citrina Alder & Hancock, 1870
Molgula manhattensis (De Kay, 1843)
Molgula oculata (Kupffer, 1875)
Molgula juv.
Eugyra arenosa (Alder & Hancock, 1848)
Molgulidae sp.

CEPHALOCHORDATA

Branchiostomatidae
Branchiostoma lanceolatum (Pallas, 1774)

Appendix 3.
Abundance data for quantitative stations.

Table A3.1	*Annelida*
Table A3.2	*Mollusca*
Table A3.3	*Arthropoda*
Table A3.4	*Other phyla*

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
POLYCHAETA																																																				
Euphrosinidae																																																				
Euphrosine foliosa	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Aphroditidae																																																				
Aphrodita aculeata	-	-	-	1	2	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6	-	-	-	-	-	1	2	24	-	-	-	1	-	-	2	2	1	1	3	49
Polynoidae																																																				
Lepidonotus squamatus	1	15	1	-	-	-	-	-	-	-	-	-	3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	5	-	-	-	-	4	-	-	-	-	-	-	-	36
Subadyte pellucida	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Acholoe squamosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Gattyana cirrosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Harmothoe fragilis	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Harmothoe fraserthomsoni	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Harmothoe glabra	-	-	-	-	-	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Harmothoe impar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Harmothoe zetlandica	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Malmgrenia andreapolis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	6	1	2	-	3	-	4	1	2	2	1	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53
Malmgenia mcintoshi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Malmgrenia spp.	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	6	-	-	-	-	-	1	18	-	1	-	-	-	-	-	1	3	2	-	-	-	2	-	-	-	-	-	-	-	38
Polynoe scolopendrina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
HARMOTHOINAE indet.	6	12	5	15	1	1	3	2	11	-	-	13	31	8	10	-	-	-	-	-	-	-	-	-	-	-	9	-	4	2	44	1	-	-	-	32	-	16	13	1	4	13	-	40	-	1	3	3	2	1	-	307
Sigalionidae																																																				
Sigalion mathildae	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	5
Sthenelais limicola	-	-	-	-	-	-	-	-	4	6	4	-	-	-	-	-	-	1	4	8	1	-	1	2	1	1	-	5	-	3	-	5	5	12	11	-	4	-	-	7	-	-	-	-	-	-	-	2	-	-	1	88
Sthenelais zetlandica	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	4
Pholoidae																																																				
Pholoe tuberculata	4	25	9	29	1	-	-	-	-	-	14	10	30	-	1	69	17	43	1	19	1	22	5	43	26	1	43	4	4	56	15	-	-	2	1	2	7	40	4	12	3	3	-	22	3	7	29	1	1	1	15	645
Pholoe sp.	2	33	2	9	-	-	-	-	-	-	-	2	5	1	1	2	-	-	-	-	-	-	-	1	2	-	15	-	-	5	1	3	-	-	-	-	-	53	4	2	7	1	-	12	-	2	-	-	-	-	-	165
Pisionidae																																																				
Pisione remota	-	1	-	-	-	-	-	-	-	-	-	-	1	45	1	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	24	-	1	-	22	-	-	-	-	15	-	-	-	1	15	-	-	-	-	-	130
Phyllodocidae																																																				
Nereiphylla lutea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Paranaitis kosteriensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Phyllodoce groenlandica	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	7	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	12
Phyllodoce lineata	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	1	11
Phyllodoce longipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Phyllodoce mucosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Phyllodoce rosea	-	-	-	-	-	1	-	-	-	2	1	-	-	-	-	-	-	-	1	7	-	1	3	-	3	5	-	-	-	2	-	-	2	8	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	40
Pterocirrus macroceros	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Eumida bahusiensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	1	-	2	4	7	28	1	58	-	12	-	1	-	1	3	-	-	34	2	-	-	-	-	-	-	-	-	1	-	158
Eumida ockelmanni	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2	2	-	-	1	-	1	-	-	-	-	-	-	-	15
Eumida sanguinea	1	6	2	1	-	-	-	-	-	-	-	-	5	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5	-	-	-	-	19	-	3	2	4	3	-	-	7	-	-	-	-	-	-	-	65
Eumida sp.A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eulalia aurea	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eulalia ornata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eulalia bilineata	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	5
Eulalia expusilla	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eulalia microoculata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eulalia mustela	10	16	6	17	1	-	-	-	-	-	-	14	23	3	13	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	8	6	-	-	-	14	-	5	1	-	2	1	-	9	12	8	1	-	-	-	-	171
Eulalia sp.	4	3	4	14	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31
Pseudomystides limbata	10	2	2	5	-	-	-	-	-	-	-	4	4	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	7	6	-	-	-	6	-	1	-	-	1	2	-	1	-	2	-	-	-	-	-	63
Pseudomystides spinachia	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	11	1	18
Hesionura elongata	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-	12	11	8	-	3	-	1	-	-	3	1	-	-	-	13	-	-	-	-	-	84
Mystides caeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Eteone flava	-	3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	10	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	21
Eteone foliosa	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eteone longa	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	4	-	-	-	-	-	-	10	3	13	-	6	6	1	4	26	5	3	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	86
Mysta picta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
PHYLLODOCIDAE juv.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Hesionidae																																																				
Gyptis propinqua	1	1	-	2	-	-	-	-	-	-	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Gyptis rosea	-	-	-	-	-	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	11	-	26
Podarkeopsis capensis	-	-	-	-	-	-	-	1	2	5	5	-	-	-	-	25	11	11	1	22	-	1	-	2	3	-	-	-	-	34	-	-	-	-	-	-	3	-	-	1	1	-	-	-	-	-	-	1	-	-	-	129
Hesiospina sp.	3	2	1	5	-	-	-	-	-	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Kefersteinia cirrata	1	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Kefersteinia sp.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Ophiodromus flexuosa	-	-	-	-	-	1	-	2	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	8
Podarke pallida	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	12	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-	21
Syllidia armata	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Microphthalmus sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pilargidae																																																				
Ancistrosyllis groenlandica	-	-	-	-	2	2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	2	14

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Glyphohesione klatti	-	-	-	-	6	6	6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4	12	5	-	44
Nereidae																																																				
Nereis elitoralis	3	-	-	2	-	-	-	1	-	-	-	1	-	6	-	-	4	1	-	-	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	15	-	2	-	-	-	-	-	-	-	3	-	1	-	-	-	43
Nereis longissima	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	1	-	-	-	-	2	-	2	-	-	18	-	-	-	-	-	-	2	1	-	-	-	-	-	1	-	-	-	-	-	-	-	36
Nereis zonata	1	-	-	5	-	-	-	-	-	-	-	41	11	1	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	4	1	10	-	-	-	-	-	87
Nereis juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	3
Syllidae																																																			
Eurysyllis tuberculata	-	1	-	4	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
Syllis sp. B	-	7	-	1	-	-	-	-	-	-	-	-	11	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	24
Syllis sp. C	4	8	-	6	-	-	-	-	-	-	-	8	5	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	38
Syllis sp. D	3	1	-	4	-	-	-	-	-	-	-	2	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	1	-	2	-	-	-	3	-	-	1	5	-	-	-	-	-	36
Syllis sp. E	1	-	-	1	-	-	-	-	-	-	-	5	5	4	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	5	-	-	-	82	2	16	1	-	1	11	-	-	1	-	-	-	-	-	-	143
Syllis sp. F	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Syllis sp. H	-	1	2	-	-	-	-	-	-	-	-	-	-	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	12	21	-	-	-	21	-	11	-	-	-	12	1	-	-	-	-	-	-	-	-	108
Syllis sp. J	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1	-	-	-	2	-	22	-	-	-	1	-	-	-	3	-	-	-	-	-	37
Syllis sp. L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Syllis sp. M	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Syllis juv.	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	3	1	-	-	-	-	-	1	-	-	1	3	-	5	-	3	-	-	-	-	-	21
Trypanosyllis sp.	1	1	-	3	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
Dioplosyllis cirrosa	5	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Ehlersia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	7	-	1	-	-	-	-	-	-	-	11
Eusyllis blomstrandi	5	13	-	17	-	-	-	-	-	-	-	2	13	17	8	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	10	1	-	-	-	-	-	1	2	-	-	1	1	13	1	-	1	-	-	-	-	108
Eusyllis lamelligera	5	1	2	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	14
Odontosyllis fulgurans	-	-	1	-	-	-	-	-	-	-	-	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	1	-	5	1	1	-	-	-	-	-	19
Opisthodonta pterochaeta	-	-	-	-	-	-	-	-	-	-	-	-	-	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	32
Opisthodonta sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pionosyllis lamelligera	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Palposyllis prosostoma	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
Streptosyllis bidentata	3	-	3	-	-	-	-	-	-	-	-	-	-	7	12	-	-	-	-	-	1	-	3	-	-	2	-	-	1	-	10	23	4	8	-	22	-	19	-	1	9	6	-	1	-	5	-	-	-	-	-	140
Syllides sp. A	-	5	-	10	-	-	-	-	-	-	-	3	1	-	2	1	1	-	-	-	-	-	2	-	-	-	-	-	2	-	1	1	-	-	-	-	-	1	2	-	2	1	-	4	5	3	-	-	-	1	-	48
Syllides sp. B	-	6	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Syllides sp. C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Brania swedmarki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Exogone furcifera	4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Exogone hebes	10	5	8	13	15	5	9	2	8	-	28	11	14	32	37	14	7	-	2	-	2	-	25	-	3	6	11	9	15	-	2	7	9	1	-	8	-	6	8	12	8	28	1	7	20	3	2	14	-	-	2	429
Exogone naidina	16	5	1	2	-	-	-	-	-	1	1	1	3	1	9	-	-	-	3	4	-	-	1	-	-	-	-	1	2	-	1	1	5	-	-	1	-	-	2	2	7	1	-	1	-	-	-	-	-	-	-	72
Exogone verugera	52	38	2	13	-	1	-	-	-	-	-	2	8	4	49	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	7	1	4	-	-	-	-	-	3	13	9	48	-	77	59	12	2	-	-	-	10	415
Sphaerosyllis bulbosa	121	205	5	55	1	-	-	-	-	-	-	15	71	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	25	14	-	-	-	11	-	7	-	-	-	-	-	2	5	13	-	-	-	-	-	553
Sphaerosyllis hystrix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8	-	-	-	20	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	30
Sphaerosyllis taylori	46	75	1	7	-	-	-	-	-	-	-	4	10	6	23	-	-	-	-	-	4	-	10	-	-	-	-	-	10	-	62	31	-	-	-	61	1	33	5	5	9	9	1	6	2	1	1	-	-	-	-	423
Sphaerosyllis tetralix	17	13	1	11	-	-	1	-	-	-	-	2	1	4	2	-	-	-	-	-	-	-	1	-	-	-	5	-	3	-	7	1	-	-	-	3	1	4	1	-	2	-	-	1	-	-	-	-	-	-	1	82
Sphaerosyllis sp.	7	4	2	19	-	-	-	-	-	-	-	2	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	53	-	-	-	-	9	-	6	-	-	1	-	-	-	-	-	-	-	-	-	-	115
Sphaerosyllis indet.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Autolytus alexandri	7	102	4	2	-	-	-	-	-	-	-	-	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	1	1	-	7	-	13	2	-	-	-	-	-	-	152
Autolytus inermis	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Autolytus sp. B	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	7
Autolytus sp. C	-	1	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	3	-	-	-	6	-	1	1	-	-	-	-	-	-	21
Autolytus sp. D	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	1	3	-	-	-	-	-	-	-	-	-	13
Autolytus sp. E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	2	-	-	-	-	-	-	-	6
Autolytus indet.	1	-	-	-	-	-	-	-	-	-	-	1	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	4	-	-	1	-	-	-	-	-	-	1	16
Proceraea sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Proceraea sp. B	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Procerastea nematodes	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
AUTOLYTOID STOLON	-	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Sphaerodoridae																																																			
Sphaerodoropsis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sphaerodoridium claparedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	2
Sphaerodorum gracilis	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	3	-	-	-	3	-	18
Ephesiella peripatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Nephtyidae																																																			
Aglaophamus rubella	-	-	-	-	-	-	-	-	4	1	6	3	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	6	-	-	-	3	6	-	3	-	-	13	52
Nephtys cirrosa	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	27	-	9	-	7	-	-	4	-	-	-	-	-	-	41	11	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	116
Nephtys caeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	6
Nephtys assimilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	5	-	-	7	-	-	-	-	-	4	5	4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	28
Nephtys hombergii	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	13	5	9	-	-	-	3	-	6	5	-	21	2	-	16	-	-	-	-	-	-	32	-	-	2	-	-	-	-	-	-	-	-	-	-	2	121
Nephtys kersivalensis	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Nephtys hystricis	-	-	-	-	9	6	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	24
Nephtys incisa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	12	18	-	-	-	20	-	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	86
Nephtys juv.	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	6	-	-	3	1	-	-	-	2	-	-	-	101	-	2	-	-	-	-	-	1	5	2	-	10	2	-	-	-	-	-	-	1	-	-	-	139

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Glyceridae																																																				
Glycera alba	-	-	-	-	6	5	1	1	4	1	5	-	-	-	-	9	4	8	2	2	-	-	-	-	1	-	4	-	-	-	-	1	-	-	-	-	1	1	-	1	-	-	-	-	-	-	3	-	-	-	1	61
Glycera tridactyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	12	40	38	35	-	1	-	-	-	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140
Glycera gigantea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Glycera rouxii	-	-	-	-	1	-	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	10
Glycera lapidum	9	10	2	27	-	-	-	-	-	-	-	30	24	17	11	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	8	-	-	-	-	3	-	10	4	2	2	14	-	10	14	15	-	-	-	-	-	216
Glycera oxycephala	1	-	5	1	-	-	-	-	-	-	1	-	-	-	2	-	-	-	3	-	3	-	1	-	-	-	-	-	-	-	-	4	4	1	-	5	-	3	-	1	4	19	3	1	1	-	-	-	-	-	-	63
Goniadidae																																																			
Glycinde nordmanni	-	-	-	1	1	-	-	-	5	-	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	1	-	-	-	1	-	1	-	-	2	1	-	1	-	-	-	22
Goniadella gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6	5	-	-	-	22	-	19	-	-	1	-	-	-	2	7	-	-	-	-	-	70
Goniada maculata	-	-	-	-	-	1	1	-	-	-	6	-	-	-	-	1	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	1	15
Goniada norvegica	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
Lumbrineridae																																																			
Lumbrineris gracilis	6	52	2	15	-	-	-	-	1	-	6	15	11	4	7	43	62	50	32	71	-	-	15	4	82	18	83	7	5	-	15	9	-	7	6	7	4	54	27	23	15	10	-	49	8	2	2	-	-	-	-	829
Lumbrineris agastos	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	3	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	13
Lumbrineris magnidentata	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Lumbrineris scopa	-	-	-	-	12	14	16	11	-	-	1	-	-	-	-	5	11	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	6	8	12	18	2	124
Arabellidae																																																			
Arabella sp.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Notocirrus scoticus	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	1	-	-	1	1	-	-	-	-	-	4	14
Eunicidae																																																			
Marphysa bellii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	4	-	6	2	5	-	-	-	-	-	-	-	-	-	3	-	25
Nematonereis unicornis	4	3	4	3	-	-	-	-	-	-	-	10	9	1	6	-	-	-	-	-	-	-	-	-	1	-	-	-	18	-	-	-	-	-	-	-	-	1	7	-	2	9	-	5	-	-	-	-	-	-	-	83
Onuphidae																																																			
Nothria britannica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Dorvilleidae																																																			
Ophryotrocha spp.	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Protodorvillea kefersteini	10	7	2	2	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8	-	10	13	-	-	-	7	-	3	-	-	3	-	-	2	-	3	-	-	-	-	-	80
Schistomeringos neglecta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	11
Schistomeringos rudolphi	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-	6
Schistomeringos sp. A	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Schistomeringos sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Ougia subaequalis	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Ougia sp.	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3
Parougia eliasoni	-	-	-	3	-	5	1	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	2	-	-	1	3	1	3	4	30
Parougia sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Parougia sp. B	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Parougia sp. C	3	-	1	3	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	11
Parougia sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	4
Orbinidae																																																			
Orbinia armandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Orbinia sertulata	-	-	-	2	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	2	1	-	-	-	1	-	-	1	-	1	-	-	1	-	1	-	1	-	-	1	18
Scoloplos armiger	-	-	-	1	-	-	-	-	10	23	34	-	-	-	-	1	-	-	1	-	-	-	10	-	-	1	8	1	1	1	-	-	-	5	-	-	-	-	5	2	24	1	-	-	-	-	-	-	-	-	-	129
Scoloplos sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Questidae																																																			
QUESTIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	4	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Paraonidae																																																			
Aricidea catherinae	-	-	1	1	1	5	12	10	14	-	-	-	-	-	-	1	2	-	-	-	-	-	-	1	-	-	25	-	6	-	1	-	-	-	-	-	2	-	25	14	4	1	-	-	-	-	-	38	6	-	-	170
Aricidea laubieri	-	-	-	-	-	-	-	10	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	-	-	1	45
Aricidea cf. philbinae	8	-	3	12	-	-	-	-	-	-	-	10	1	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	1	1	-	-	-	-	-	51
Aricidea cerrutii	-	-	1	5	-	-	-	-	-	-	-	7	6	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	2	-	-	-	-	-	1	8	1	9	-	-	1	1	2	-	-	-	-	-	56
Aricidea simonae	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Aricidea minuta	-	-	-	-	-	-	-	-	-	3	5	-	-	-	-	-	-	-	10	1	-	-	3	-	-	8	-	11	-	-	-	-	2	2	1	-	-	-	-	27	26	1	-	-	-	-	-	-	-	-	-	100
Aricidea wassi	-	-	-	-	-	-	-	-	25	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	28
Aricidea sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cirrophorus branchiatus	3	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	4	1	2	-	-	-	1	2	-	1	-	1	1	22
Cirrophorus furcatus	-	-	-	-	-	-	-	2	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	1	-	-	29
Paradoneis lyra	43	19	3	12	2	-	-	-	1	-	-	12	10	1	2	2	2	1	-	1	1	2	1	3	1	-	4	-	5	-	10	1	-	-	-	2	-	3	1	11	6	21	2	45	40	10	25	2	1	14	49	371
Paradoneis cf. ilvana	9	5	5	28	-	-	-	-	-	-	-	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	5	-	-	-	-	-	-	-	5	-	6	-	-	1	2	-	-	-	-	-	-	86
Paradoneis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	11	-	2	-	-	-	-	-	-	-	-	18
Levinsenia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	57	1	63	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	122
Levinsenia sp.	-	-	-	-	17	35	20	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	6	92	25	-	216
Apistobranchidae																																																			
Apistobranchus spp.	-	-	-	-	13	14	5	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	1	1	1	8	2	8	67
Poecilochaetidae																																																			
Poecilochaetus serpens	-	-	-	-	-	-	-	-	-	73	14	1	-	-	-	-	-	-	5	1	-	-	-	-	11	-	1	88	-	-	-	-	-	-	1	1	-	-	-	25	5	-	-	1	-	-	-	5	-	-	3	235
Chaetopteridae																																																			
Chaetopterus sp.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Phyllochaetopterus socialis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	-	10
Spionidae																																																			
Spiophanes bombyx	-	-	-	-	-	-	-	2	3	55	47	-	-	2	8	9	-	2	77	328	10	29	114	38	140	228	92	231	1	354	-	79	74	480	509	-	3	18	-	196	27	21	-	-	3	15	-	-	-	-	3	3198
Spiophanes kroyeri	1	-	5	13	10	21	2	8	37	1	3	31	3	-	-	1	-	1	-	-	-	-	-	1	-	-	-	-	1	-	-	2	-	-	-	-	-	1	5	16	18	1	-	15	11	11	25	10	7	25	52	338
Scolelepis bonnieri	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Scolelepis mesnili	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Scolelepis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Parascolelepis sp.	-	-	-	-	2	1	1	2	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	5	-	-	-	1	-	-	-	-	-	1	-	1	2	3	-	24
Laonice bahusiensis	11	14	9	26	-	-	-	-	2	-	-	28	19	17	13	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-	25	6	-	-	-	4	-	27	10	-	3	7	-	24	2	3	3	2	1	-	1	295
Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Aonides paucibranchiata	42	65	20	60	-	-	-	-	-	-	-	24	7	24	37	-	-	-	-	-	8	-	2	1	-	-	-	-	74	1	36	7	1	2	-	37	-	175	26	7	55	92	-	4	7	20	1	-	-	-	5	840
Prionospio banyulensis	-	-	-	1	-	-	-	-	51	-	-	20	11	7	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	9	44	4	3	-	-	-	166
Prionospio cirrifera	-	-	-	-	2	5	1	7	48	4	-	24	7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	1	2	1	-	4	1	-	3	3	1	3	13	136
Prionospio sp.	-	-	-	-	2	6	10	1	1	-	1	-	-	-	-	-	-	1	-	-	-	5	-	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	22	16	-	97
Prionospio dubia	-	-	-	-	-	2	2	15	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	10	-	-	-	44
Prionospio fallax	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	113	59	103	3	12	-	5	-	98	56	-	174	4	-	1	-	-	-	-	-	1	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	648
Spio armata	1	-	9	7	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
Spio sp. A	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	6	-	2	27	17	10	3	40	3	91	26	14	49	-	36	-	64	4	8	6	6	27	26	-	104	5	-	-	-	-	-	-	-	-	-	-	575
Spio sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2	-	3	2	-	-	-	-	1	-	-	-	-	-	11
Spio sp. C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5
Spio multioculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Microspio sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1	2	5
Polydora caulleryi	6	9	3	12	-	-	-	-	-	-	-	1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	13	-	-	-	-	18	-	6	22	-	14	20	-	5	-	1	-	-	-	-	-	137
Polydora cf. caeca	3	7	-	4	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	2	1	-	-	-	7	-	6	6	-	4	13	-	2	-	1	-	-	-	-	-	64
Polydora flava	4	2	1	2	-	-	-	-	-	-	-	2	4	3	31	-	1	-	-	-	-	-	-	-	-	-	7	-	-	-	4	-	-	-	-	-	-	-	-	-	-	3	-	18	1	14	-	1	-	-	1	99
Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	5	2	-	2	-	41	-	1	-	2	-	-	-	2	8	24	17	2	-	-	-	-	-	-	-	-	-	107
Pseudop' paucibranchiata	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	6
Atherospio disticha	-	-	-	-	29	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	37
SPIONIDAE gen. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
SPIONIDAE gen. B	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	9	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
Magelonidae																																																				
Magelona alleni	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	36	38	11	-	-	-	1	-	-	4	-	20	2	-	-	-	-	-	-	-	-	16	-	-	1	-	-	-	-	-	-	2	-	-	-	1	135
Magelona filiformis	-	-	-	-	-	-	-	-	1	24	5	-	-	-	-	-	-	-	1	-	-	-	3	-	2	91	38	7	-	-	-	-	-	10	23	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	207
Magelona minuta	-	1	-	-	7	4	21	6	3	-	-	-	-	-	-	30-	83	188	-	-	-	11	-	34	-	-	15	-	-	-	-	-	-	-	-	10	153	2	1	-	-	-	-	-	-	-	7	48	14	5	5	918
Magelona sp. A	-	-	-	-	-	-	-	-	-	30	8	-	-	-	-	-	-	-	9	-	-	-	1	-	-	59	2	5	-	-	-	-	4	5	22	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	146
Magelona sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cirratulidae																																																				
Aphelochaeta marioni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Aphelochaeta sp. A	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	1	-	-	-	-	4	-	-	1	-	-	-	-	3	-	-	-	-	-	16
Aphelochaeta sp. B	11	-	-	4	-	-	-	-	-	-	-	13	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6	-	-	-	-	-	-	-	-	-	-	3	-	-	-	4	-	-	-	-	-	47
Monticellina dorsobranchialis	-	-	5	6	-	-	-	-	1	-	-	-	-	-	1	19	24	18	-	-	-	-	-	2	6	-	25	-	1	-	-	-	-	-	-	-	9	-	5	1	-	-	-	-	-	-	-	-	-	-	-	123
Tharyx killariensis	5	1	1	-	-	1	-	4	24	2	17	-	-	1	-	19	63	48	-	1	-	9	-	21	5	-	5	7	3	-	8	-	-	-	-	2	38	-	11	11	19	2	-	9	4	-	-	30	1	7	3	382
Caulleriella alata	3	4	-	1	-	-	-	-	-	-	-	1	3	-	2	-	-	-	-	-	-	-	2	-	-	-	1	-	3	3	20	2	-	1	-	1	1	14	12	2	15	5	-	12	-	-	-	-	-	-	-	108
Caulleriella bioculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
Caulleriella zetlandica	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	16	-	1	7	-	-	-	-	7	42	31	30	26	-	-	2	-	-	-	-	-	-	1	167
Chaetozone sp. A	-	-	-	-	-	-	-	9	59	39	3	-	-	-	-	-	-	-	7	14	-	-	7	-	66	17	26	294	-	3	-	-	2	18	14	-	-	-	-	-	-	-	-	-	-	-	-	39	-	-	-	617
Chaetozone sp. B	-	-	-	-	-	-	-	-	-	-	-	43	13	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	10	-	-	-	-	-	78
Cirratulus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Dodecaceria sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Cirratulidae sp. A	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	8
Cirratulidae sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
CIRRATULIDAE indet.	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	4
Cossuridae																																																				
Cossura sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Psammodrilidae																																																				
Psammodrilus balanogl's	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Acrocirridae																																																				
Macrochaeta caroli	18	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	-	23
Macrochaeta clavicornis	1	3	3	6	-	-	-	-	-	-	-	3	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	25
Flabelligeridae																																																				
Diplocirrus glaucus	-	-	-	-	-	1	-	9	22	1	-	-	-	-	-	1	-	-	-	-	-	-	-	9	37	1	14	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	22	48	3	7	16	192
Diplocirrus sp.	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Flabelligera affinis	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Scalibregmatidae																																																				
Scalibregma celticum	2	1	-	7	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	-	-	-	-	1	-	-	-	-	8	-	-	-	-	-	-	-	47
Scalibregma inflatum	-	3	-	2	-	-	-	-	-	45	486	-	-	-	-	12	6	30	-	36	1	7	7	18	29	1	2	78	1	13	16	40	-	9	3	-	3	30	71	336	73	2	-	29	2	9	-	110	-	3	4	1517
Asclerocheilus spp.	4	-	-	2	-	-	-	-	-	-	-	9	10	2	16	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	4	1	-	1	11	-	4	3	16	-	-	-	-	-	84
Opheliidae																																																				
Travisia forbesii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	5	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	15
Ophelia borealis	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	18	1	8	-	30	-	-	89	-	-	-	-	-	-	18	19	31	-	-	1	-	-	-	-	1	-	-	2	-	-	-	-	-	225
Ophelia celtica	1	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	10
Ophelina acuminata	-	-	-	-	-	-	-	7	10	8	-	-	-	-	-	4	1	-	-	1	-	-	-	1	3	-	-	-	-	-	6	3	-	-	-	-	1	4	16	20	28	2	-	-	-	-	12	22	-	-	5	154
Ophelina cylindricaudata	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	7	2	-	39	61
Ophelina modesta	-	-	-	-	1	-	1	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	12	3	3	14	60
Capitellidae																																																				
Capitella cf. capitata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	2	-	-	14	-	-	1	2	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	24
Mediomastus fragilis	167	209	12	84	12	12	7	12	-	-	17	65	40	-	1	12	35	10	16	19	-	6	44	16	181	21	72	6	16	172	33	2	5	33	8	58	12	384	31	2	14	6	-	91	10	19	8	3	9	7	7	2006
Notomastus sp. B	1	1	-	1	-	-	-	-	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	11

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Notomastus sp. C	-	-	2	3	-	-	-	-	-	-	-	2	1	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	3	-	-	-	4	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	23
Notomastus sp. D	-	-	2	39	-	-	-	-	1	-	-	2	8	1	1	-	1	-	-	-	-	2	-	3	7	-	1	2	5	10	1	-	-	-	-	24	1	1	1	1	1	2	-	7	11	4	-	-	-	-	1	140
Notomastus sp. E	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	4	-	-	-	-	-	12
Notomastus indet.	3	6	-	-	-	-	-	-	-	-	-	8	9	2	3	5	2	7	2	-	7	-	4	1	4	-	1	3	2	-	1	2	-	-	-	8	1	5	2	-	1	3	-	6	2	9	3	-	-	-	11	123
Peresiella clymenoides	-	-	-	-	-	-	-	2	6	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	13
Maldanidae																																																				
Clymenella sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Clymenura johnstoni	22	14	3	14	-	-	-	-	-	-	-	4	-	2	23	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	1	1	-	-	-	3	-	12	-	8	1	32	-	-	7	7	-	-	-	-	-	161
Clymenura sp.	-	-	-	-	-	-	-	1	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	-	4	-	-	-	-	-	-	-	-	2	3	31	-	-	-	6	4	16	-	1	-	-	3	103
Euclymene lumbicoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	2
Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	-	37	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70
Euclymene sp.	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3	15	4	-	-	-	-	-	-	7	-	-	-	62
Heteroclymene robusta	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Praxillella affinis	4	3	12	9	3	22	27	3	130	-	-	3	2	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	30	-	6	1	-	-	-	-	-	2	2	16	3	10	-	10	13	2	14	93	10	12	37	482
Praxillella gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Petaloproctus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Notoproctus sp.	3	-	-	2	-	-	-	-	-	-	-	1	8	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	3	-	-	-	-	-	41
Praxillura longissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	14	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	17
MALDANIDAE sp. A	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
MALDANIDAE indet.	-	-	-	-	-	-	-	-	33	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	7	2	-	-	1	48
Oweniidae																																																				
Galathowenia sp. A	-	-	-	-	1	6	3	5	156	-	-	2	-	-	-	-	2	-	-	-	-	11	-	10-	-	-	20	11	-	-	-	-	-	-	2	-	2	4	-	1	2	-	-	-	1	9	35	23	4	10	67	477
Galathowenia sp. B	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	5	-	-	-	-	-	17
Myriochele danielsseni	-	-	-	-	-	-	-	-	27	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-	12	58
Owenia fusiformis	-	1	-	-	-	2	-	2	21	8	17	1	-	-	-	17	11	12	43	169	4	6	7	16	8	12	32	-	1	5	-	5	-	4	2	1	2	3	2	5	-	4	-	1	6	3	4	-	-	-	5	442
Pectinaridae																																																				
Amphictene auricoma	-	-	-	-	1	1	1	-	34	34	14	-	-	-	-	157	181	84	82	795	3	-	3	1	-	1	1	2	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-	-	3	1	-	-	-	1402
Lagis koreni	-	-	-	-	4	-	3	3	32	576	132	-	-	-	1	104	50	51	549	224	6	32	52	31	7	17	15	26	2	1265	-	37	22	83	15	1	4	67	-	59	20	5	-	-	1	1	-	-	2	1	1	3501
Ampharetidae																																																				
Melinna elisabethae	-	40	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	44
Melinna palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	36	11	-	-	-	-	-	3	-	-	67	-	-	-	-	-	-	-	-	-	141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	326
Eclysippe vanelli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2
Ampharete falcata	-	-	-	-	-	2	1	5	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	106	16	14	60	69	305
Ampharete sp. A	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	12	12	5	10	39	1	-	1	-	7	4	14	46	-	4	-	40	-	-	-	-	32	20	-	76	-	-	-	-	-	-	3	1	1	4	4	337
Ampharete sp. B	3	6	5	138	-	-	-	-	-	-	-	12	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	1	-	-	-	-	-	-	10	3	-	-	-	-	6	8	-	-	-	-	-	-	211
Anobothrus gracilis	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	4	-	2	-	-	19
Sabellides octocirrata	-	-	2	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	7	9	3	1	-	-	-	-	2	-	-	-	-	1	42
Amphicteis gunneri	-	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	7
AMPHARETINAE juv.	-	-	-	7	-	-	-	-	4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	3	61	1	-	-	-	-	-	11	7	3	-	1	154
Terebellidae																																																				
Streblosoma intestinale	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Thelepus cincinnatus	7	-	-	4	-	-	-	-	-	-	-	3	6	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	1	-	-	-	-	-	-	32
Thelepus setosus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2
Parathelepus collaris	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	4
Amphitritides gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Neoamphitrite affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Eupolymnia nesidensis	1	-	3	1	-	-	-	-	-	-	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	13
Lanice conchilega	2	-	-	1	-	-	-	-	2	3	21	2	-	2	16	-	-	-	23	-	-	1	5	-	15	3	13	39	11	459	-	3	-	21	3	1	-	3	2	34	10	10	-	2	2	4	-	-	-	-	-	713
Loimia sp.	-	-	-	-	-	-	-	-	8	-	1	4	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	2	1	-	-	-	-	-	21
Axionice maculata	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Pista cristata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	-	-	-	-	-	1	-	-	2	-	-	-	-	29	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	45
Pista sp.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Nicolea venustula	2	-	-	3	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	9
Nicolea zostericola	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Lanassa venusta	-	-	-	5	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Phisidia aurea	2	3	1	6	-	-	-	-	-	-	-	3	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-	2	-	2	-	-	-	-	-	9	3	-	-	-	-	-	-	41
Amaeana trilobata	-	1	1	1	-	-	-	-	-	-	-	4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Lysilla nivea	14	5	5	7	-	-	-	-	-	-	-	-	6	5	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	1	2	-	3	3	9	-	-	-	-	-	71
Polycirrus sp. A	19	4	5	6	-	-	-	-	-	-	-	4	6	1	1	-	-	-	-	-	4	-	-	-	-	-	-	-	5	-	11	4	-	-	-	2	-	-	-	-	-	2	-	2	5	8	-	-	-	-	-	89
Polycirrus spp.	15	33	8	10	-	-	-	-	-	-	-	19	17	4	29	2	-	-	-	-	1	-	18	-	3	19	-	-	3	-	48	8	-	2	-	35	-	1	1	3	3	5	-	35	8	21	-	-	-	-	1	352
TEREBELLIDAE juv.	-	2	-	1	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	15
Trichobranchidae																																																				
Terebellides stroemi	-	1	-	-	3	1	-	1	17	-	-	-	-	-	-	22	12	4	1	-	1	-	-	1	1	-	-	11	-	-	2	4	-	-	-	-	-	4	8	4	16	-	-	7	1	-	18	62	8	1	74	285
Trichobranchus glacialis	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	6
Trichobranchus roseus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sabellariidae																																																				
Sabellaria spinulosa	1	6	-	15	-	-	-	-	-	-	-	-	3	-	79	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	4	-	-	-	-	-	10	26	5	16	27	-	14	1	5	-	-	-	-	-	223
Sabellidae																																																				
Branchiomma bombyx	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Demonax cambrensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Sabella pavonina	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	6	-	-	14
Pseudopotamilla spp.	4	3	-	3	-	-	-	-	-	-	-	1	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	5	-	-	-	-	-	-	-	23
Chone filicaudata	-	2	-	2	-	-	-	-	-	-	-	1	7	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	1	11	-	-	-	2	-	10	5	1	1	-	-	5	-	-	-	-	-	-	-	54

Table A3.1 Abundance data for quantitative stations: Annelida

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Chone sp. B	-	3	1	-	-	-	-	-	-	-	-	15	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	-	-	1	-	-	1	6	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	80
Chone sp. C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	5
Euchone rubrocincta	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Jasmineira caudata	-	-	-	13	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	21
Jasmineira elegans	-	3	-	4	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	-	-	-	19
Pseudofabricia sp.	4	-	-	-	-	-	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	1	-	-	-	-	-	16
SABELLIDAE indet.	2	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	10
Serpulidae																																																				
Filograna implexa	2	-	-	4	-	-	-	-	-	-	-	-	11	18	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	42
Filogranula calyculata?	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Filogranula gracilis	-	-	-	319	-	-	-	-	-	-	-	-	87	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	407
Josephella marenzelleri	-	-	-	71	-	-	-	-	-	-	-	-	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226
Protula tubularia	2	4	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	5	2	1	-	-	-	-	-	18
Metavermilia multicristata	-	-	-	-	-	-	-	-	-	-	-	2	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
Hydroides norvegica	2	10	1	4	-	-	-	-	-	-	-	7	13	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	2	-	5	9	-	3	28	-	11	3	3	-	-	-	-	-	106
Serpula vermicularis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Pomatoceros lamarckii	-	3	-	4	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	1	-	-	-	3	4	2	9	-	-	2	-	15	-	-	-	-	-	-	-	57
Pomatoceros triqueter	-	8	-	4	-	-	-	-	-	-	-	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	27
SERPULIDAE indet.	-	-	-	1	-	-	-	-	-	-	-	-	4	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	4	-	1	2	-	-	-	-	-	-	32
Spirorbidae																																																				
Spirorbis cuneatus	1	-	-	2	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Circeis spirillum	1	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	44
Bushiella sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Janua pagenstecheri	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Neodexiospira sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Protodrilidae																																																				
Protodrilus spp.	2	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	15
Protodrioididae																																																				
Protodriloides chaetifer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Polygordiidae																																																				
Polygordius spp	-	-	-	-	-	-	-	-	-	-	-	-	2	37	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	7	-	-	-	-	1	-	-	-	2	7	-	-	-	-	-	60
OLIGOCHAETA																																																				
Grania sp.	6	4	-	1	-	-	-	-	-	-	-	1	1	2	2	-	-	-	1	-	6	-	7	-	-	-	-	-	7	-	14	7	11	13	-	5	-	15	4	-	15	6	-	33	25	22	-	-	-	9	3	220
ENCHYTRAEIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Tubificoides amplivasatus	-	-	4	-	7	18	9	2	-	-	-	-	-	-	-	-	-	31	-	1	-	160	4	365	5	-	435	-	-	12	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	10	1	29	25	34	1156
Tubificoides benedeni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
TUBIFICIDAE spp.	3	-	10	1	-	-	-	-	-	-	9	-	-	1	-	2	-	-	-	-	-	2	3	11	-	-	-	79	-	9	1	4	-	1	-	1	1	-	14	4	12	-	-	6	-	-	-	-	-	-	8	182
Total no. individuals (N)	870	1292	234	1384	180	221	170	177	1001	957	916	661	917	426	626	1135	766	787	995	1805	136	402	465	972	886	704	1466	1243	504	2689	715	622	249	823	697	784	556	1406	542	1369	678	604	15	833	369	526	435	699	303	317	639	38168

Table A3.2 Abundance data for quantitative stations: Mollusca

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
APLACOPHORA																																																				
Chaetoderma nitidulum	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	1	3	15
Nematomenia banyulensis	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
Tegulaherpia sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	3
Macellomenia cf. palifera	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Neomenia carinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Eleutheromenia sierra	-	-	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4
Pruvotina sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Rhopalo' aglaopheniae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6
POLYPLACOPHORA																																																				
Leptochiton asellus	23	28	12	49	-	1	-	-	-	-	-	12	41	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	1	-	-	-	-	-	-	4	4	-	8	9	-	64	47	1	-	-	-	-	-	322
Hanleya hanleyi	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
GASTROPODA																																																				
Emarginula fissura	1	-	1	4	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Jujubinus miliaris	-	-	-	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Gibbula tumida	1	-	-	-	-	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3	3	-	-	1	-	-	-	-	-	-	-	-	-	16
Calliostoma zizyphinum	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Dikoleps nitens	4	11	-	12	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37
Skenea serpuloides	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Tricolia pullus	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Turritella communis	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Rissoa parva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Alvania punctura	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Obtusella alderi	2	1	-	1	-	-	-	-	1	-	-	3	1	5	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
Onoba semicostata	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pusillina inconspicua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	6
Ceratia proxima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Hyala vitrea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Caecum imperforatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Caecum glabrum	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	-	2	-	-	10	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	78
Aporrhais pespelecani	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Polinices fuscus	-	-	-	-	1	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	8
Polinices polianus	-	-	-	-	-	-	-	-	3	2	4	-	1	-	-	-	-	-	6	2	3	-	1	-	-	-	1	1	-	6	-	3	-	-	-	1	-	2	-	3	-	-	-	1	-	8	-	1	-	-	-	49
Eulima bilineata	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Vitreolina philippi	-	-	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	10	47
Boreotrophon truncatus	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Trophonopsis muricatus	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Buccinum undatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Colus gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Colus jeffreysianus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
Hinia incrassata	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Hinia pygmaea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Mangelia brachystoma	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Oenopota rufa	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Brachystomia eulimoides	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Chrysallida indistincta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Megastomia conoidea	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Ondina divisa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Ondina warreni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Acteon tornatilis	-	-	-	-	-	-	-	-	2	1	1	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Scaphander lignarius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
Cylichna cylindracea	-	-	-	-	2	-	6	71	22	89	15	-	-	-	-	5	1	-	-	10	-	2	2	2	2	-	24	4	-	-	-	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	8	35	2	-	25	331
Philine aperta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47
Philine scabra	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Diaphana minuta	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	8	2	1	-	-	-	-	-	-	1	-	-	-	1	11	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	28
Retusa truncatula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	4
Limacina retroversa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	6	19	-	-	-	27
Doto fragilis	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Goniodoris nodosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
SCAPHOPODA																																																				
Pulsellum lofotense	-	-	-	-	1	2	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	40	4	12	25	112
BIVALVIA																																																				
Nucula hanleyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	13	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	34
Nucula nitidosa	-	-	-	-	1	2	-	-	15	5	-	-	-	-	-	2	-	5	5	12	-	8	3	5	11	3	11	46	-	78	-	1	-	-	7	-	3	-	-	5	-	1	-	-	-	-	-	2	1	-	-	232
Nucula nucleus	1	3	2	29	-	-	-	-	-	-	-	1	12	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3	-	3	-	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	61
Nucula sulcata	-	-	-	-	8	17	4	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	22	11	12	5	94
Nuculoma tenuis	-	-	-	-	-	-	13	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	5	1	-	-	-	-	-	-	4	-	-	35	50	15	1	-	170
Jupiteria minuta	3	13	1	13	-	-	-	-	1	-	-	3	8	-	-	1	-	-	8	2	1	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	59
Glycymeris glycymeris	3	12	18	15	-	-	-	-	-	-	-	6	21	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	95
Mytilus edulis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	54	16	12	1	3	42	-	-	5	-	8	28	-	-	1	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	180

Table A3.2 Abundance data for quantitative stations: Mollusca

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Modiolus modiolus	51	302	-	32	-	-	-	-	-	-	1	35	284	27	75	-	-	-	2	-	1	-	-	-	-	-	-	-	1	-	17	-	-	-	-	-	-	-	-	-	-	10	2	54	15	38	-	-	-	-	-	947
Modiolarca tumida	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	8
Musculus discors	6	24	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	33
Chlamys varia	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Pecten maximus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Aequipecten opercularis	2	-	2	5	-	-	-	-	12	-	-	2	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
Palliolum tigerinum	-	-	1	5	-	-	-	-	-	-	-	16	29	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	1	-	-	-	-	-	59
Similipecten similis	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Anomia ephippium	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Pododesmus patelliformis	-	-	-	6	-	-	-	-	-	-	-	2	7	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
Myrtea spinifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	3
Lucinoma borealis	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	4
Thyasira flexuosa	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	1	-	-	-	-	4	-	17	7	-	22	-	-	2	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	2	7	-	2	15	90
Kellia suborbicularis	-	-	-	-	-	-	-	-	-	-	-	-	6	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	1	-	-	-	3	-	-	-	-	-	19
Semierycina nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	40	47	20	27	2	-	-	10	-	-	-	-	-	-	2	-	-	-	-	4	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	204
Lepton squamosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Montacuta substriata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Devonia perrieri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Tellimya ferruginosa	-	-	-	-	-	-	-	3	-	9	1	-	4	-	-	1	-	7	-	-	-	-	-	-	-	-	5	-	-	41	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75
Mysella bidentata	-	2	-	5	-	-	-	49	-	50	1966	3	19	2	3	853	166	578	1	51	-	9	139	536	301	6	323	4	-	38	-	2	27	-	1	-	6	-	-	7	1	1	-	2	3	25	4	-	-	-	-	5183
Astarte sulcata	32	27	-	32	-	-	-	-	-	-	-	1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	1	-	-	-	-	-	-	5	2	1	-	3	1	-	-	-	-	-	-	-	-	116
Goodallia triangularis	-	3	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	1	-	12	-	-	-	-	-	-	-	4	110	-	-	-	10	-	26	-	-	14	2	30	-	-	-	-	-	-	-	-	220
Acanthocardia echinata	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	2	5	-	16	28	-	-	2	1	-	3	1	7	-	-	-	4	-	-	1	-	-	-	-	8	-	-	-	-	-	-	2	2	-	-	1	88
Parvicardium minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	7	18
Parvicardium ovale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Parvicardium scabrum	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Mactra stultorum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6	-	-	-	-	-	-	6	-	-	-	-	-	-	5	4	2	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	27
Spisula elliptica	24	14	-	2	-	-	-	-	-	-	3	7	-	18	22	-	-	-	3	-	8	-	5	-	-	-	-	1	4	1	16	21	6	-	-	2	-	3	-	2	16	13	16	-	5	5	-	-	-	-	-	217
Spisula subtruncata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
Lutraria lutraria	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	4	2	4	2	1	-	2	-	-	2	-	-	-	-	-	5	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	27
Ensis ensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	2	136	-	10	-	-	29	-	-	-	-	-	-	18	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	245
Phaxas pellucidus	-	-	-	-	1	-	-	7	23	11	13	-	-	-	1	103	79	34	491	728	7	2	97	18	392	352	70	27	2	2	-	133	22	180	56	-	143	5	-	578	8	3	-	-	-	-	35	9	-	2	27	3661
Arcopagia crassa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Fabulina fabula	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	55	-	-	-	-	3	10	6	19	-	32	-	-	-	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135
Moerella donacina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Moerella pygmaea	-	-	-	-	-	-	-	-	-	-	-	-	-	11	1	-	-	-	4	-	118	-	5	-	-	-	-	-	-	-	-	2	12	-	-	2	-	-	-	-	-	-	4	-	-	6	-	-	-	-	-	165
Gari costulata	-	-	-	1	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Gari fervensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	3
Gari tellinella	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Solecurtus scopula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Pharus legumen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Abra alba	6	-	7	11	10	10	28	251	105	13	4	-	6	-	1	-	-	-	20	27	1	61	8	337	26	18	28	3	5	744	-	202	19	3	11	6	142	25	2	670	99	29	-	-	4	26	-	-	-	-	-	2968
Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	30	26	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	21	-	-	4	-	-	-	-	-	-	-	-	-	43	137	37	181	115	639
Abra prismatica	-	-	-	-	-	-	1	-	-	22	2	26	-	29	38	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-	3	8	-	-	-	1	3	-	-	-	-	-	137
Arctica islandica	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	10	5	2	-	-	1	3	-	-	-	-	-	1	-	4	7	31	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	69
Circomphalus casina	-	-	-	2	-	-	-	-	-	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	16
Gouldia minima	-	-	-	-	-	-	-	-	-	-	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Chamelea gallina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	11	3	-	-	1	-	-	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Clausinella fasciata	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Timoclea ovata	2	4	-	7	-	-	-	-	-	-	4	-	27	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	5	1	1	-	-	1	-	13	6	1	5	4	2	7	10	2	1	-	-	-	-	114
Tapes rhomboides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3
Dosinia lupinus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	6	-	4	-	-	3	1	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
Dosinia exoleta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	2	-	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Mysia undata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Mya truncata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	-	-	-	1	1	209	-	-	-	-	1	2	6	1	1	-	-	-	-	-	-	-	-	-	252
Sphenia binghami	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Corbula gibba	-	-	-	-	2	1	-	2	1	-	-	-	-	-	-	-	3	1	2	-	-	-	-	-	-	-	1	-	-	-	-	2	4	2	4	-	-	-	-	1	-	-	-	-	-	-	2	14	2	39	9	92
Hiatella arctica	1	4	5	8	-	-	-	-	10	-	-	2	29	1	5	-	-	-	-	-	-	-	-	1	2	-	-	4	-	4	-	-	-	-	-	-	-	-	4	-	3	2	-	1	3	4	-	-	-	-	18	111
Saxicavella jeffreysi	-	-	-	-	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Thracia phaseolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	36	-	-	-	-	-	15	8	-	-	-	3	12	13	10	31	-	-	14	-	4	-	-	-	-	-	12	2	-	-	-	-	228
Thracia villosiuscula	1	-	-	-	-	-	-	-	-	-	-	2	1	11	-	-	-	-	-	1	30	1	11	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	76
Cochlodesma praetenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	3	-	-	-	-	-	-	-	11	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32
Lyonsia norwegica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	1	-	-	-	-	-	-	5
Total no. individuals (N)	169	464	49	249	29	34	54	440	247	209	2015	133	534	133	168	1061	335	710	753	998	322	142	324	953	754	459	589	128	39	993	127	517	405	239	214	104	314	160	33	1296	164	87	58	138	94	136	190	346	72	262	269	18712

Table A3.3 Abundance data for quantitative stations: Arthropoda

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
PYCNOGONIDA																																																				
Nymphon brevirostre	-	5	1	2	1	-	-	-	-	-	-	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	16
Nymphon hirtum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	6
Achelia echinata	-	1	1	2	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	3	-	-	5	-	12	-	-	-	-	-	-	-	30
Achelia longipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Endeis spinosa	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	5
Callipallene brevirostris	1	3	2	10	1	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4	7	-	-	1	1	13	1	-	-	-	-	-	-	48
Anoplodactylus petiolatus	1	1	2	-	-	-	-	-	1	-	4	2	-	1	-	2	-	-	-	-	-	-	-	-	-	-	11	1	1	-	1	-	-	-	-	-	-	10	5	-	6	12	-	3	-	-	-	-	-	-	-	64
Pycnogonium littorale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
CIRRIPEDIA																																																				
Verruca stroemia	-	-	1	17	-	-	-	-	-	-	-	2	49	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	6	-	10	9	11	-	-	1	-	-	111
Balanus spp.	-	-	-	1	-	-	-	-	-	-	-	-	1	60	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	2	-	-	3	-	-	-	-	-	-	-	-	-	87
CIRRIPEDIA indet.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
AMPHIPODA																																																				
AMPHIPODA sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Apherusa bispinosa	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Perioculodes longimanus	-	-	-	-	-	-	-	-	1	5	3	-	-	-	-	1	-	-	2	4	-	2	5	1	1	1	-	-	-	-	-	-	1	-	4	-	1	-	-	-	-	-	-	-	-	-	2	1	1	-	5	41
Pontocrates arenurius	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Synchelidium maculatum	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	2	-	3	-	6	-	-	-	1	1	-	1	-	-	3	10	3	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	35
Westwoodilla caecula	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Parapleustes assimilis	-	15	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
Parapleustes bicuspis	-	8	-	-	-	-	-	-	-	-	-	-	4	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	8	1	-	-	-	-	-	-	35
Stenopleustes nodifer	-	8	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	21
Amphilochus manudens	1	15	-	2	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	12	-	-	-	-	-	-	-	39
Amphilochus neapolitanus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	3	-	1	-	1	-	3	2	-	1	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Paramphilochoides sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leucothoe sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Leucothoe incisa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Leucothoe lilljeborgi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	2	10
Cressa dubia	4	52	1	12	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	17	1	-	-	-	-	-	-	91
Metopa sp.	1	4	-	-	-	-	-	-	3	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Metopa alderi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Metopa pusilla	-	19	2	15	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	40
Stenothoe marina	-	-	-	3	-	-	-	-	3	-	-	1	3	-	-	-	-	-	-	2	-	-	-	-	1	-	-	1	1	2	3	1	-	-	-	-	-	2	-	-	-	1	-	1	1	-	-	-	-	-	-	26
Urothoe elegans	-	1	-	-	-	-	-	-	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	4	-	13	9	1	-	-	-	-	2	18	-	-	8	160
Urothoe marina	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	9	-	-	-	-	-	-	-	-	-	17
Harpinia antennaria	-	-	-	-	-	1	6	13	12	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	2	20	-	-	1	97
Harpinia crenulata	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	3	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	1	-	-	-	8	-	-	1	29
Harpinia pectinata	-	-	1	4	1	2	-	5	12	-	-	2	1	-	-	-	-	-	-	-	-	20	-	51	1	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	2	-	-	35	1	4	36	192
Metaphoxus fultoni	-	-	-	1	-	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
LYSIANASSIDAE juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Acidostoma sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Hippomedon denticulatus	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	1	-	-	-	1	5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	14
Lysianassa plumosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Tmetonyx similis	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Austrosyrrhoe fimbriatus	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5	5	1	3	-	-	1	-	33	-	-	-	8	1	3	-	1	10	2	-	4	-	-	-	-	-	-	-	-	-	-	-	78
ACANTHONOTOZOMATIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Iphimedia eblanae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Iphimedia obesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lilljeborgia juv.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lilljeborgia kinahana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Lilljeborgia pallida	-	-	-	-	-	-	-	-	-	-	-	4	12	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
Atylus falcatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Atylus swammerdami	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	2	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Atylus vedlomensis	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1	-	-	-	-	-	-	-	2	-	2	-	-	-	3	-	-	-	-	-	-	8	-	3	1	-	4	-	-	-	-	1	-	-	-	-	-	28
Guernea coalita	39	36	2	24	-	-	-	-	-	-	-	16	3	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	14	1	-	-	-	13	-	5	-	-	-	1	-	-	-	-	-	-	-	-	-	166
Tritaeta gibbosa	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Ampelisca sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Ampelisca brevicornis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3	1	1	1	-	-	1	6	10	17	2	-	-	-	-	-	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55
Ampelisca macrocephala	-	-	-	-	2	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	10
Ampelisca spinipes	-	-	1	4	-	2	-	5	3	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	-	1	5	-	-	-	4	-	10	6	-	2	10	-	8	2	13	-	-	-	-	2	88
Ampelisca tenuicornis	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	1	2	-	-	-	-	1	-	2	2	-	9	1	-	8	-	45	-	-	-	2	-	33	-	11	4	-	-	-	-	-	-	-	-	-	-	130
Ampelisca typica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Haploops tubicola	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4
Bathyporeia sp.	-	-	-	-	-	-	-	-	-	27	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	20	23	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	85
Bathyporeia elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Bathyporeia tenuipes?	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
Megaluropus agilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	2	-	-	-	-	3	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	10

Table A3.3 Abundance data for quantitative stations: Arthropoda

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
MELITIDAE sp.	2	-	-	-	-	-	-	-	1	-	-	1	-	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	41
Ceradotus semiserratus	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Cheirocratus sp.	7	-	3	1	-	-	-	-	-	-	-	2	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	2	6	-	-	-	-	2	-	-	-	-	31
Cheirocratus assimilis	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cheirocratus sundevalli	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
Eriopisa elongata	-	-	-	-	-	4	-	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	21
Maera othonis	1	-	-	2	-	-	-	-	-	-	-	6	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-	1	5	-	-	-	-	-	-	-	-	-	22
Maerella tenuimana	1	-	2	-	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	1	2	-	-	1	-	-	-	-	-	-	15
Melita juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Melita obtusata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	1	-	-	-	5	1	1	-	-	-	-	-	-	-	-	-	23
Gammaropsis maculata	2	24	-	6	1	-	-	-	1	1	-	3	26	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	3	3	-	-	-	-	-	77
Gammaropsis nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Gammaropsis palmata	4	4	4	11	-	-	-	-	92	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	4	-	-	2	-	1	-	1	2	-	-	-	5	135
Megamphopus cornutus	1	-	1	4	-	-	-	-	-	-	-	-	9	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	3	22	-	-	-	15	-	2	1	2	3	9	-	1	-	7	1	-	-	-	1	97
Microprotopus maculatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	8	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Photis longicaudata	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1	-	-	-	-	18	-	8	-	-	-	-	-	-	-	-	-	-	1	35
ISCHYROCERIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Ericthonius sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	3
Ericthonius punctatus	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	15
Jassa sp.	1	12	3	8	1	-	-	-	-	-	-	-	2	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	30	1	-	-	-	-	-	-	66
Microjassa cumbrensis	-	-	-	24	-	-	-	-	30	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	62
AORIDAE sp.	-	-	16	-	-	-	-	-	4	-	-	1	-	-	5	-	-	-	1	-	-	-	2	-	1	1	10	-	-	-	-	6	-	-	-	1	-	-	3	16	4	8	-	-	1	3	-	-	-	-	-	83
Aora gracilis	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3
Lembos longipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-	-	-	-	-	5
Leptocheirus hirsutimanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	4
Leptocheirus pectinatus	1	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	7
Siphonoecetes kroyeranus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	17	-	-	4	-	3	-	-	-	-	14	37	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101
Unciola planipes	-	-	1	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-	2	-	3	-	6	184	-	-	-	-	8	250
Dyopedos monacanthus	8	1	1	15	-	-	-	-	1	-	-	11	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44
Dyopedos porrectus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
CAPRELLIDEA																																																				
CAPRELLIDAE sp.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	5
Caprella linearis	-	9	12	18	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
Pariambus typicus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	6	3	9	10	3	-	30	1	1	25	102	120	1	82	1	42	2	28	16	14	22	-	-	3	-	-	1	-	-	-	-	-	-	-	-	529
Phtisica marina	-	-	-	11	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	57
Pseudoprotella phasma	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
ISOPODA																																																				
Gnathia juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-	-	-	2	-	-	-	9	-	1	-	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	21
Gnathia oxyuraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Cirolana borealis	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Conilera cylindracea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Eurydice pulchra	-	-	-	-	-	-	-	-	-	-	-	1	-	2	7	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	28	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	43
Sphaeroma indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Janira maculosa	10	4	2	15	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	43
Munna sp.	1	5	-	5	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	7	2	2	-	-	-	-	-	24
Paramunna bilobata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pleurogonium inerme	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	3	6
Pleurogonium rubicundum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
Pleurog’m spinosissimum	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	9
Desmosomidae indet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Eugerda sp.	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Eugerda tenuimana?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	8	1	2	5	20
Pseudarachna hirsuta	-	-	-	-	8	3	8	2	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	6	-	5	10	100
ARCTURIDAE sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
TANAIDACEA																																																				
Araphura brevimana	-	-	-	-	-	-	-	1	64	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44	24	4	-	52	190
TANAIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	4
Leptognathia breviremis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3
Leptognathia gracilis	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	2	25	18	-	1	2	58
Tanaopsis graciloides	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	4	-	-	-	11	4	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	3	1	-	-	-	-	-	-	29
CUMACEA																																																				
Bodotria sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
Bodotria pulchella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	5	1	-	8	-	-	1	16	2	-	-	-	-	2	9	3	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	1	68
Bodotria scorpiodes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	12	-	-	-	-	2	1	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	30
Iphinoe trispinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	3	-	1	-	-	-	-	1	-	-	11	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Eudorella truncatula	-	-	-	-	1	-	-	4	2	-	-	-	-	-	-	4	8	5	1	-	-	1	-	1	1	-	3	-	-	-	-	1	-	-	-	-	8	-	-	3	-	-	-	-	-	-	6	4	1	-	1	55
Eudorellopsis deformis	-	-	-	-	-	-	-	-	2	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62
Leucon nasica	-	-	-	-	8	4	24	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	5	4	-	54
Campylaspis sp.	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Cumella pygmaea	-	2	-	4	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	16
Pseudocuma longicornis	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-	-	2	-	33	31	-	-	15	2	1	3	9	11	-	-	-	1	94	49	114	-	5	-	-	3	-	-	-	-	-	-	-	-	-	-	-	377

Table A3.3 Abundance data for quantitative stations: Arthropoda

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
Pseudocuma similis	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	9	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	18
Hemilamprops rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Lamprops fasciata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
Diastylis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	2	5	-	21	5	-	4	-	-	-	-	-	-	3	1	1	1	-	61
Diastylis bradyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Diastylis laevis	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	-	-	-	1	-	4	7	4	-	2	7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31
Diastylis lucifera	-	-	-	-	10	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Diastylis rugosa?	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	5	3	2	8	9	7	2	4	36	1	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85
Diastyloides biplicata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
DECAPODA																																																				
Eualus pusiolus	2	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Processa sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Processa canaliculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Processa edulis crassipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Processa nouveli	-	-	-	-	-	-	-	1	2	-	1	1	-	-	-	-	-	-	-	-	-	1	3	5	7	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29
Pandalina brevirostris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Crangon allmanni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2
Crangon crangon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Pontophilus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pontophilus spinosus	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Nephrops norvegicus	-	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5
Callianassa juv.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	5
Callianassa subterranea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Upogebia sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Upogebia deltaura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Paguridae sp.	1	5	-	1	-	-	-	-	1	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	20
Galathea sp.	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	6
Pisidea longicornis	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Porcellana juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	15	1	-	-	-	2	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	24
Ebalia sp.	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	5
Hyas juv.	-	2	1	-	-	-	-	-	-	-	-	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	13
Hyas coarctatus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Macropodia tenuirostris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Corystes cassivelaunus	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Atelecyclus rotundatus	-	-	-	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	9
Thia scutellata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Liocarcinus indet.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	5	5	1	-	2	-	-	-	1	1	2	-	3	1	-	-	-	-	-	-	-	-	-	-	24
Liocarcinus pusillus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Goneplax rhomboides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3
Monodaeus couchi	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Total no. individuals (N)	94	244	62	249	37	22	48	37	415	125	26	87	170	81	97	47	31	23	81	70	28	44	146	80	50	63	266	207	67	108	50	234	174	187	211	109	77	158	47	101	45	102	11	169	35	232	130	155	17	20	193	5562

Table A3.4 Abundance data for quantitative stations: Other Phyla

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
PROTOZOA																																																				
Astrorhiza limicola	-	-	-	-	-	-	-	-	56	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	11	76
CNIDARIA																																																				
Callycella syringa	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Alcyonium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Cerianthus sp.	-	-	-	-	-	-	-	-	1	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Cerianthus lloydii	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Paraphellia expansa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
EDWARDSIIDAE sp.	-	-	-	-	-	-	-	-	2	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	2	2	7	1	-	5	-	-	1	-	3	15	-	-	-	2	-	-	-	-	-	1	1	1	-	-	-	45
Actiniaria sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	6
Urticina sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sagartia sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-	-	-	20
Caryophyllia smithii	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Hexacorallia sp.	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
PLATYHELMINTHES																																																				
TURBELLARIA indet.	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	2	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	1	1	1	4	-	-	-	-	1	1	-	-	-	2	1	22
NEMERTEA																																																				
NEMERTEA spp.	9	-	5	21	5	12	9	7	31	4	14	8	7	7	20	66	50	68	35	181	6	7	11	7	9	13	34	6	5	16	29	35	15	32	25	35	6	50	3	57	13	11	-	31	10	9	25	46	18	45	23	1191
SIPUNCULA																																																				
Golfingia procera	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	4	-	-	-	-	-	1	-	3	3	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	2	-	-	1	-	23
Golfingia elongata	6	13	1	4	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	2	-	-	35
Golfingia vulgaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	7	-	-	-	-	-	-	-	-	-	10
Golfingia juv.	-	-	-	5	-	-	-	-	2	-	-	1	1	-	1	-	2	5	-	-	1	-	-	-	-	-	-	-	-	-	26	28	-	2	-	6	-	24	2	6	9	17	-	3	2	3	2	-	1	1	6	156
Aspidosiphon muelleri	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	7	9	1	-	-	-	-	21
Phascolion strombi	-	7	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	8	-	-	-	4	-	1	-	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	1	-	27
SIPUNCULA sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
ECHIURA																																																				
Bonellia viridis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
ECHIURIDAE sp.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	3
PHORONIDA																																																				
Phoronis ovalis?	-	9	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
Phoronis pallida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	40	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	88
Phoronis spp.	1	-	-	-	-	1	1	1	2	7	5	-	-	1	-	68	58	75	23	133	-	6	-	17	15	4	42	27	-	2	1	-	-	1	2	6	6	-	2	21	2	2	-	-	-	1	-	-	-	-	1	534
ECHINODERMATA																																																				
Asteroidea																																																				
Astropecten irregularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
SOLASTERIDAE juv.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	5
Henricia oculata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
ASTEROIDEA juv.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Ophiuroidea																																																				
Ophiothrix fragilis	2	35	1	2	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	45
Ophiocomina nigra	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Ophiactis balli	-	-	-	-	-	-	-	-	-	-	-	17	31	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	-	28	-	-	-	-	-	116
Amphiura filiformis	-	-	-	-	-	-	-	-	23	22	140	-	-	-	-	98	36	144	-	2	-	2	-	28	18	-	12	-	-	-	-	-	-	-	-	2	3	-	-	2	-	-	-	-	-	-	35	3	-	1	9	580
Amphiura chiajei	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	10	-	1	3	2	21
Amphiura brachiata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	-	2	-	2	-	-	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	78
Amphiura juv.	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Amphipholis squamata	13	16	12	70	-	-	-	-	-	-	-	5	7	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	1	-	-	2	2	-	-	7	-	19	2	-	-	-	-	-	2	172
Ophuira albida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1	10
Ophuira affinis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Ophuira ophuira	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Ophuira juv.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	14	-	2	10	-	2	7	1	-	2	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	44
OPHIUROIDEA juv.	2	-	-	1	12	14	10	24	198	198	55	4	19	2	-	2	14	4	160	224	15	-	-	-	-	35	2	3	-	10	10	-	2	5	8	13	4	5	-	3	11	1	-	17	1	14	148	48	9	13	99	1419
Echinoidea																																																				
Psammechinus miliaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Echinocyamus pusillus	-	-	-	-	-	-	-	-	11	51	6	35	29	55	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	11	54	62	33	-	-	-	-	1	411
Echinocard' cordatum	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Echinocard' flavescens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Echinocardium indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
Brissopsis lyrifera	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
SPATANGIDAE juv.	-	-	3	1	10	4	-	4	126	58	14	10	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	-	-	-	-	244
ECHINOIDEA juv.	-	-	-	-	-	-	-	2	3	-	-	2	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	6	3	9	6	-	3	1	-	1	45
Holothuroidea																																																				
Paracucum' hyndmani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CUCUMARIIDAE juv.	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	13	-	-	-	5	-	21	3	1	-	-	-	-	-	-	1	-	-	-	-	48
Thyone raphanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Leptosynapta minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Leptosynapta inhaerens	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	1	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Leptosynapta decaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Leptosynapta juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	4	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Labidoplax juv.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Labidoplax digitata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	11	5	-	-	-	-	-	1	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
SYNAPTIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	47
HOLOTHUROIDEA sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	1	5	1	-	-	-	-	-	-	-	-	-	1	5	-	-	-	1	-	-	-	2	6	-	-	-	1	-	-	-	-	-	-	27

Table A3.4 Abundance data for quantitative stations: Other Phyla

Station Taxonomic List	1	2	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	32	33	34	38	39	42	43	45	46	47	48	49	50	51	52	54	55	57	58	59	60	61	62	63	Total
HEMICHORDATA																																																				
ENTEROPNEUSTA spp.	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	1	2	5	2	1	-	-	-	-	-	1	-	8	-	-	7	2	-	1	4	-	-	1	5	3	4	-	-	3	-	2	-	2	2	1	3	63
TUNICATA																																																				
ASCIDIACEA indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	5	-	3	19	-	-	3	-	6	-	-	-	-	-	-	-	37
Ascidiella indet.	-	1	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Pleurogona sp.	-	-	-	-	-	-	-	-	6	-	-	5	-	-	5	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1	28
Polycarpa fibrosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Dendrodoa grossularia	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	45	-	82	-	-	-	67	-	-	-	-	-	-	9	77	-	15	55	-	326	256	68	-	-	-	-	-	1002
MOGULIDAE sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Mogula oculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Eugyra arenosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
CEPHALOCORDATA																																																				
Branchiostoma lanceol'm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Total no. individuals (N)	34	83	26	105	29	33	23	43	469	344	238	101	107	81	87	264	188	356	270	574	26	23	43	63	101	82	195	53	24	96	148	95	19	42	48	94	28	138	136	107	63	121	18	509	358	182	235	103	34	68	163	6870

Appendix 4.
Presence / absence data for qualitative stations.

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
POLYCHAETA																																							
Amphinomidae																																							
Pareurythoe borealis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Euphrosinidae																																							
Euphrosine borealis	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	–	●	–	–
Euphrosine foliosa	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	●	–	–	–	–
Spinitheridae																																							
Spinther oniscoides	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	●	–
Aphroditidae																																							
Aphrodita aculeata	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	●	–	–	–	–	●	–	●	●	●	–	●	●	●	●	●	–	●	●	–	●	–	●
Hermonia hystrix	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	–	●	–	●	–
Polynoidae																																							
Alentia gelatinosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
Lepidonotus squamatus	●	–	●	–	–	–	●	●	●	●	●	●	●	–	●	●	●	–	●	–	●	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●	●	●
Adyte assimilis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
Subadyte pellucida	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	●	–	●	●	–
Eunoe sp.	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Gattyana cirrosa	–	–	●	–	●	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Harmothoe extenuata	●	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–
Harmothoe fragilis	–	–	●	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●
Harmothoe fraserthomsoni	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	–	–	●	●	–	–	●	–	●	●	–
Harmothoe glabra	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Harmothoe impar	●	●	–	–	–	–	●	●	●	●	●	–	●	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	●	●
Harmothoe zetlandica	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Malmgrenia castanea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	–	●	●	–	–	–	–	–
Malmgenia mcintoshi	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–
Malmgrenia spp.	–	–	●	–	–	–	●	●	–	–	–	●	●	●	–	–	–	–	●	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	●
Polynoe scolopendrina	●	–	●	–	–	–	–	–	●	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●
HARMOTHOINAE indet.	–	●	●	–	●	●	●	●	●	●	●	●	●	●	●	●	●	–	●	–	●	–	●	–	–	●	●	●	●	●	●	●	–	●	●	●	●	●	●
Sigalionidae																																							
Sthenelais boa	–	–	–	–	–	–	–	●	–	–	–	–	●	–	●	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
Sthenelais limicola	–	–	–	–	●	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Sthenelais zetlandica	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	●	●	●	●
Pholoidae																																							
Pholoe tuberculata	●	●	●	–	●	–	●	●	●	●	●	●	●	●	●	–	●	●	●	–	–	●	–	–	–	●	–	●	●	●	–	●	–	●	●	●	●	●	●
Pholoe sp.	–	●	●	–	–	–	●	●	●	●	●	●	●	●	●	●	●	●	●	–	●	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●
Pisionidae																																							
Pisione remota	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Phyllodocidae																																							
Notophyllum foliosum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●
Nereiphylla lutea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chaetoparia nilssoni	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–
Paranaitis kosteriensis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Phyllodoce groenlandica	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Phyllodoce laminosa	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Phyllodoce lineata	–	–	–	–	●	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Phyllodoce longipes	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–
Phyllodoce maculata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–
Phyllodoce rosea	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Pterocirrus macroceros	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–
Eumida bahusiensis	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Eumida ockelmanni	●	—	●	—	—	—	—	●	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	●	—	—
Eumida sanguinea	●	—	—	—	●	—	●	●	●	—	●	●	—	—	—	—	●	●	●	—	●	—	—	—	—	—	—	—	●	●	●	●	—	●	●	—	●	●	●
Eumida sp.B	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eulalia aurea	●	—	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—
Eulalia bilineata	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	—	●
Eulalia expusilla	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	●	—	—
Eulalia mustela	—	●	●	—	—	—	●	●	●	●	●	●	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	●	●	●	●	●	—	●	●	●	●	—	●
Eulalia sp.	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	—	●	●	●	—	●
Pseudomystides limbata	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●	●	—	●	●	●	●	—	●
Pseudomystides spinachia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hesionura elongata	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Mystides caeca	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	—	—
Eteone flava	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	●	—	●
Eteone foliosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	—	●
Eteone longa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Mysta picta	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lacydonidae																																							
Lacydonia miranda	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—
Hesionidae																																							
Gyptis propinqua	—	—	●	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	●	●	—	●	—	●	●	—	●	—	●
Gyptis rosea	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Podarkeopsis capensis	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hesiospina sp.	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	●	●
Kefersteinia cirrata	●	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—
Kefersteinia sp.	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	●	●	—	●	—	—	—	—	—	—	—
Ophiodromus flexuosa	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Podarke pallida	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	●	—	●	—	—
Nereimyra punctata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—
Syllidia armata	—	—	—	—	—	—	●	●	—	—	—	—	●	●	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—
Pilargidae																																							
Ancistrosyllis groenlandica	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Glyphohesione klatti	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nereidae																																							
Nereis elitoralis	—	●	●	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	●	—	—
Nereis longissima	—	—	●	—	●	●	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	●	—	—	—	—	●	—	—
Nereis zonata	●	—	●	—	●	●	●	●	●	●	●	●	—	—	●	●	—	●	●	—	●	—	—	—	—	●	—	●	●	●	●	●	—	●	●	●	●	—	—
Nereis cf. flavipes	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nereis fucata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Websterinereis glauca	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Syllidae																																							
Eurysyllis tuberculata	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	●	●	●	●
Haplosyllis spongicola	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—
Syllis sp. B	●	—	—	—	—	—	—	●	●	●	●	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	●	●
Syllis sp. C	—	—	●	—	—	—	●	●	●	●	●	●	—	—	—	●	—	—	●	—	●	—	—	—	—	—	—	—	●	●	●	●	—	●	●	●	●	●	●
Syllis sp. D	●	—	●	—	—	—	—	●	●	●	—	—	—	—	—	●	●	—	●	—	●	—	—	—	—	●	—	●	—	●	—	●	—	●	●	—	●	●	—
Syllis sp. E	—	—	●	—	—	—	—	●	●	—	●	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	●	●
Syllis sp. F	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	●	—
Syllis sp. H	—	●	—	—	—	—	—	—	●	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	●
Syllis sp. J	—	—	●	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—
Syllis sp. M	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Syllis juv.	●	—	●	—	—	—	—	●	●	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	●	●	●	●	●

Table A4.1 Presence / absence data for qualitative stations: Annelida

Taxonomic List / Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Trypanosyllis sp.	●	●	●	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●	●	●
Amblyosyllis sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–
Dioplosyllis cirrosa	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ehlersia ferrugina	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ehlersia sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	●	●	●	–
Eusyllis blomstrandi	●	●	●	–	●	●	●	●	●	●	●	●	●	–	●	●	●	●	●	–	●	●	–	–	–	●	–	●	●	●	●	●	●	●	●	●	●	●	●
Eusyllis lamelligera	●	–	–	–	–	–	●	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●	●	●
Odontosyllis fulgurans	–	–	●	–	–	–	●	–	–	●	●	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	●	●	●	●	–	●	●	–	●	●	●
Odontosyllis gibba	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Opisthodonta pterochaeta	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–
Pionosyllis lamelligera	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	–	–
Palposyllis prosostoma	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Streptosyllis bidentata	–	●	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–
Syllides sp. A	–	–	●	–	–	–	–	●	●	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	–	●	–	●
Syllides sp. B	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	●	–	–	–
EUSYLLINAE indet.	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Brania swedmarki	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Exogone furcifera	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Exogone hebes	–	●	●	●	●	–	–	●	●	–	●	●	●	●	●	–	●	●	●	–	–	●	–	–	–	●	–	●	–	●	–	●	–	–	●	●	●	–	●
Exogone naidina	●	–	●	–	–	–	●	●	●	●	●	●	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	●	●	●	–	●	●	●	●	–	●
Exogone verugera	●	●	●	–	–	–	–	●	●	–	●	–	–	–	–	–	●	●	●	–	●	●	–	–	–	●	–	●	–	●	–	●	–	●	●	●	●	–	●
Sphaerosyllis bulbosa	–	●	●	–	–	–	●	●	●	●	●	●	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	●	●	●	–	●	–	●	●	●	●	●	●
Sphaerosyllis hystrix	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sphaerosyllis taylori	●	●	●	–	–	–	●	●	●	●	●	●	–	–	–	●	–	–	●	–	–	–	–	–	–	●	–	●	●	●	●	●	–	●	●	●	●	●	●
Sphaerosyllis tetralix	●	●	●	–	–	–	●	●	●	–	●	●	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	●	●	●	–	●	–	●	●	●	●	●	●
Sphaerosyllis sp.	–	●	●	–	–	–	–	●	●	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	●	●	●	●
Autolytus alexandri	●	–	●	–	–	–	●	–	●	●	●	●	–	–	–	●	●	●	●	–	●	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	●
Autolytus inermis	●	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	–	●	–	●	–	–
Autolytus sp. A	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	●	●	●	●	–	–
Autolytus sp. B	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	●	●
Autolytus sp. C	–	–	●	–	●	–	●	●	●	●	●	●	–	–	●	●	●	–	–	–	–	–	–	–	–	●	–	–	●	●	–	●	–	–	●	●	●	●	●
Autolytus sp. D	●	–	●	–	–	●	●	●	●	–	●	●	–	–	–	●	●	–	–	–	–	–	–	–	–	●	–	–	●	●	●	●	–	●	●	●	–	●	●
Autolytus sp. E	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	–
Autolytus sp. F	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	●	●	–	●	●	–	●	●	●
Autolytus indet.	●	–	●	–	–	–	●	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	●	●	●
Proceraea sp. A	●	–	●	–	–	–	●	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	●	–	●	●	–
Proceraea sp. B	●	–	–	–	–	–	–	●	–	●	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–	–	–	–
Procerastea halleziana	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Procerastea nematodes	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–
AUTOLYTOID STOLON	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	–	●	–	●
Sphaerodoridae																																							
Commensodorum comm’	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Sphaerodoropsis sp.	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–	–	●	–	●	–	●
Sphaerodoridium claparedii	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Sphaerodorum gracilis	–	–	–	–	–	–	●	●	–	●	–	–	–	–	●	●	●	●	–	–	●	●	–	●	–	–	–	–	–	●	●	●	–	●	●	–	●	–	–
Ephesiella peripatus	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtyidae																																							
Aglaophamus rubella	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	●	–	–	●	●	●	–	●	–	●	●	●	–	–	–	–	–	–	–	–	–

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Nephtys cirrosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys caeca	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys longosetosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys assimilis	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys hombergii	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys kersivalensis	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–
Nephtys hystricis	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys incisa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys sp.	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nephtys juv.	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Glyceridae																																							
Glycera alba	–	–	–	●	●	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Glycera gigantea	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Glycera rouxii	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Glycera lapidum	–	●	●	–	–	–	●	●	●	●	●	●	–	–	–	●	●	–	●	–	–	–	–	–	–	●	–	●	●	●	●	●	–	●	●	●	●	●	●
Glycera oxycephala	–	●	–	–	–	–	–	●	●	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	●	–	●
Goniadidae																																							
Glycinde nordmanni	●	●	–	●	●	●	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	●	–	●	–	●	–	–	–	–	●	–	●
Goniadella gracilis	–	–	●	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	●
Goniada maculata	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Goniada norvegica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Goniada pallida	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lumbrineridae																																							
Lumbrineris gracilis	●	●	●	–	●	●	●	●	●	●	●	●	●	–	●	–	●	–	●	–	–	●	–	–	●	●	●	●	●	●	●	●	–	●	●	●	●	●	●
Lumbrineris agastos	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
Lumbrineris magnidentata	–	–	●	–	–	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	–	●	●	●	●	●	●
Lumbrineris scopa	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Arabellidae																																							
Haematocleptes terebellidis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Drilonereis sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Notocirrus scoticus	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	●	–	–	●	●	–	●	–	●	–	●	–	–	●	–	–	–	●
Eunicidae																																							
Eunice harassii	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Marphysa bellii	–	–	●	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Nematonereis unicornis	–	●	●	–	–	–	–	●	●	●	●	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	●	–	●	●	●	–	●	●	●	●	●	●
Onuphidae																																							
Hyalinoecia tubicola	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Nothria britannica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	●	–
Dorvilleidae																																							
Ophryotrocha spp.	–	–	–	–	●	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	●	–	–	–	–	–	–	–
Protodorvillea kefersteini	–	●	●	–	●	–	–	●	–	●	●	●	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	●	–	–	–	●	●
Schistomeringos rudolphi	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	●
Schistomeringos sp. B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ougia subaequalis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ougia sp.	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Parougia eliasoni	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Parougia sp. B	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	●	–
Parougia sp. C	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Parougia sp. D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Orbinidae																																							
Orbinia sertulata	–	–	–	–	●	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	●	–	●	–	●	●	–	●	–	–
Scoloplos armiger	–	–	–	–	●	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	●	–	●

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Paraonidae																																							
Aricidea catherinae	—	—	●	●	●	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—
Aricidea laubieri	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aricidea cf. philbinae	—	●	●	—	—	—	—	—	●	—	●	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	—	—	—	●	—	●
Aricidea cerrutii	—	●	●	—	—	—	—	—	●	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	—	●	●	—	●	—	●
Aricidea minuta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aricidea wassi	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cirrophorus branchiatus	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	—	●	—	—	—	—	—	—	—
Cirrophorus furcatus	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Paradoneis lyra	●	—	●	●	●	—	—	●	●	●	●	●	—	●	—	—	●	●	●	—	●	●	●	●	●	●	—	●	—	●	—	●	—	●	●	●	●	●	●
Paradoneis cf. ilvana	—	—	●	—	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	—	●
Paradoneis sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Levinsenia sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Apistobranchidae																																							
Apistobranchus spp.	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	●	—	●	—	—	—	—	—	—	●	—	—
Poecilochaetidae																																							
Poecilochaetus serpens	—	●	—	—	●	—	●	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Chaetopteridae																																							
Chaetopterus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—
Phyllochaetopterus socialis	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	●	—	●	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Spionidae																																							
Spiophanes bombyx	—	●	—	—	●	●	—	—	—	●	●	—	●	●	●	—	●	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—
Spiophanes kroyeri	—	●	—	●	●	●	●	—	—	—	●	—	—	●	—	●	●	●	●	—	●	●	●	●	—	●	—	●	●	●	—	●	—	—	●	—	●	—	●
Scolelepis bonnieri	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Parascolelepis sp.	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—
Laonice bahusiensis	—	●	●	—	●	—	●	●	●	●	●	●	—	—	—	●	●	●	●	—	●	●	—	—	—	●	—	●	●	●	●	●	—	●	●	●	●	●	●
Aonides oxycephala	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aonides paucibranchiata	—	●	●	—	●	—	—	●	●	●	●	●	—	—	—	—	●	●	—	—	—	—	—	—	—	●	—	●	●	●	—	●	—	●	●	●	●	●	●
Prionospio banyulensis	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	—	—	—	—	—	—	—	●	—	●	—	●	●	—	●	—	—
Prionospio cirrifera	—	—	—	●	●	●	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	●	—	—	●	—	●	●	●	—	●	—	●	●	—	●	—	●
Prionospio sp.	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prionospio dubia	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prionospio fallax	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Spio armata	—	—	●	—	—	—	—	—	●	●	●	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●
Spio sp. A	—	—	—	—	—	—	—	—	●	●	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Spio sp. B	—	●	—	—	—	—	—	—	—	●	●	—	●	—	●	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	●
Spio sp. C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Spio multioculata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—
Microspio sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Polydora caulleryi	●	●	●	—	—	—	—	●	●	●	●	●	●	—	●	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	●	●
Polydora cf. caeca	●	●	●	—	—	—	—	●	●	●	●	●	—	—	●	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	●	—	●	●	●
Polydora flava	—	●	●	—	●	—	—	●	●	●	—	●	—	—	—	●	●	●	—	—	●	—	—	—	—	●	—	●	●	●	●	●	●	●	●	—	●	●	●
Polydora giardi	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Polydora hermaphroditica	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Polydora quadrilobata	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pseudopolydora paucibr’	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	●	●	—	—	—	—	—	—	—	—	—	—
Pseudopolydora pulchra	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●
Pygospio elegans	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magelonidae																																							
Magelona alleni	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Magelona filiformis	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magelona minuta	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cirratulidae																																							
Aphelochaeta sp. A	—	—	—	—	—	—	—	●	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●
Aphelochaeta sp. B	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	—	●	●	●	—	●
Monticellina dorsobranchialis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	●	—	●	—	—	—	—	—	—	●	—	●
Tharyx killariensis	—	●	—	—	●	—	—	●	●	●	—	—	—	—	—	—	●	●	—	—	—	●	●	—	—	●	—	●	—	●	—	●	—	●	●	—	●	—	●
Caulleriella alata	—	●	—	—	—	—	—	●	●	●	●	—	—	●	●	—	●	●	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	●	●	●	●
Caulleriella bioculata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	●	—	—	—	—	—	—	—	—	—	—
Caulleriella zetlandica	—	—	●	—	—	—	—	●	●	●	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●
Chaetozone sp. A	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Chaetozone sp. B	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	—	●	●	—	—	—	—
Dodecaceria sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—
Cirratulidae sp. A	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—
CIRRATULIDAE indet.	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●
Cossuridae																																							
Cossura sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Acrocirridae																																							
Macrochaeta caroli	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●
Macrochaeta clavicornis	—	●	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	●	●	—	●
Flabelligeridae																																							
Diplocirrus glaucus	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diplocirrus sp.	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	—	—
Flabelligera affinis	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—
Pherusa juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Scalibregmatidae																																							
Scalibregma celticum	—	—	●	—	—	—	—	●	●	—	—	—	●	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	●	—	●	—	●
Scalibregma inflatum	—	●	—	—	●	—	—	●	—	●	●	●	●	●	●	—	●	—	—	—	—	●	—	—	—	●	—	●	—	●	—	●	—	●	—	—	●	●	●
Sclerocheilus minutus	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—
Asclerocheilus spp.	—	●	●	—	—	—	—	●	●	●	—	●	—	—	—	●	●	●	●	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●	●	●	●	—	●
Opheliidae																																							
Ophelia borealis	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—
Ophelia celtica	—	—	●	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ophelina acuminata	—	●	—	—	●	●	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	●	—	●	—	—	—	—	—	—	●	—	●
Ophelina cylindricaudata	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Ophelina modesta	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—
Capitellidae																																							
Capitella cf. capitata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mediomastus fragilis	●	—	●	●	●	—	—	●	●	●	●	●	●	●	●	—	●	—	—	—	—	●	●	—	—	●	—	●	●	●	—	●	—	●	●	●	●	—	●
Notomastus sp. B	—	—	●	—	●	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	—	—	—	●	—	●	●	—	●
Notomastus sp. C	—	●	●	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—
Notomastus sp. D	—	●	—	—	—	—	—	—	●	●	—	—	—	—	—	●	●	●	—	—	—	—	—	—	●	●	—	●	●	●	—	●	—	●	●	—	—	—	●
Notomastus sp. E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Notomastus indet.	—	—	●	—	—	—	—	●	●	●	●	—	—	●	●	—	●	●	—	—	—	—	—	—	—	●	—	●	●	●	—	●	—	●	—	—	●	●	●
Maldanidae																																							
Clymenura johnstoni	—	—	—	—	—	—	—	—	●	●	●	—	—	●	—	—	●	●	—	—	—	—	—	—	—	●	—	●	●	●	—	●	—	●	●	●	●	●	●
Clymenura sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	●	●	●	—	—	—	—	—	—	●	—	—
Euclymene sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	—	—	—	—	—	—	—	—	●
Heteroclymene robusta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Praxillella affinis	—	—	—	—	●	●	—	—	●	●	●	●	●	—	—	—	●	●	—	—	—	●	●	●	●	●	—	●	●	●	●	●	—	●	●	●	●	—	●
Nicomache trispinata	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Petaloproctus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—

Table A4.1 Presence / absence data for qualitative stations: Annelida

Taxonomic List / Station	1 AD	3 vv	5 AD	7 T	11 AD	11 T	14 T	30 vv	31 vv	35 D	36 D	37 D	40 vv	41 vv	44 vv	52 T	53 D	53 vv	56 D&T	57 T	58 T	59 T	62 D	62 S	63 T	64 D	64 T	65 D	65 T	66 D	66 T	67 D	67 T	68 D	69 D	70 D	71 D	72 D	73 D
Notoproctus sp.	–	–	●	–	–	–	–	●	●	–	–	●	–	–	–	●	●	●	–	–	●	–	–	–	–	–	–	–	–	●	●	●	–	–	●	●	●	●	–
Praxillura longissima	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
MALDANIDAE sp. A	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MALDANIDAE sp. B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
MALDANIDAE indet.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	●	–	–	●	–	–	–	–	–	–	–
Oweniidae																																							
Galathowenia sp. A	–	–	–	–	●	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	–	–	–	●	●	●	●	–	●
Galathowenia sp. B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	●	–	–	–
Myriochele danielsseni	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Owenia fusiformis	–	–	●	–	●	–	●	–	–	–	–	●	–	–	●	–	●	–	●	–	–	●	–	–	●	●	–	●	–	●	–	–	–	–	–	–	●	–	●
Pectinaridae																																							
Amphictene auricoma	–	–	–	–	●	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lagis koreni	–	–	–	●	●	●	–	–	–	●	–	–	●	●	●	–	●	–	–	–	–	●	–	●	–	–	–	–	●	–	–	–	–	–	–	–	●	–	●
Ampharetidae																																							
Melinna elisabethae	–	–	●	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	●	●	●	●
Eclysippe vanelli	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ampharete falcata	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	–	–	–	–	–	–	–	●	–	–	–	–
Ampharete sp. A	–	–	–	●	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ampharete sp. B	–	●	●	–	–	–	●	–	–	●	●	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●
Anobothrus gracilis	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	●	●	–	●	●	–	●	●	–	–	–	–	–	–	–	●	–	●
Sabellides octocirrata	–	–	–	–	–	–	●	–	–	●	●	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	●	●	●	●	●	–	●	●	●	●	●	●
Amphicteis gunneri	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Amphicteis midas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
AMPHARETINAE juv.	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	●	●	●	–	●
Terebellidae																																							
Thelepus cincinnatus	●	–	●	–	–	–	●	–	–	●	–	–	–	–	–	●	●	●	●	●	●	–	–	–	–	–	●	●	●	●	●	–	–	–	●	●	●	–	●
Thelepus setosus	●	–	●	–	–	–	–	●	●	●	–	●	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–
Parathelepus collaris	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Amphitritides gracilis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	●	–	–	–	–
Eupolymnia nesidensis	–	●	–	–	–	●	●	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	●
Lanice conchilega	●	–	●	–	●	●	–	–	●	●	●	●	–	●	–	●	●	–	–	–	–	–	–	–	●	●	●	●	●	●	–	●	–	–	●	●	●	●	●
Loimia sp.	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	●	●	–	–	–
Axionice maculata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	–	●	●	●	●	–	●
Pista cristata	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pista sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Nicolea venustula	–	–	●	–	–	–	●	–	–	●	●	–	–	–	–	●	–	–	●	–	–	●	–	–	●	–	–	–	●	●	●	●	–	●	●	●	●	●	●
Nicolea zostericola	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lanassa venusta	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	–
Phisidia aurea	–	–	●	–	–	–	–	●	–	–	●	–	–	–	●	–	●	–	●	–	●	–	–	–	–	–	–	●	●	●	●	●	–	●	●	–	–	●	●
Amaeana trilobata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	–	–	●	–	–	–	–
Lysilla nivea	–	–	●	–	–	–	–	●	●	●	●	●	–	●	–	–	●	●	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	●	●	●	–	–	●
Polycirrus sp. A	–	–	●	–	–	–	–	●	●	●	●	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	●	–	●	–	●
Polycirrus spp.	–	●	●	–	–	–	●	●	●	●	●	●	–	●	–	●	●	●	●	–	●	–	–	–	–	●	–	●	●	●	●	●	–	●	●	●	●	●	●
TEREBELLIDAE juv.	–	●	–	–	–	–	●	–	●	●	●	●	●	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	●	●	●	●	●	●
Trichobranchidae																																							
Terebellides stroemi	–	–	●	–	●	●	–	–	●	●	–	–	●	–	●	–	–	●	–	–	–	●	●	●	●	●	–	–	●	●	–	●	–	–	–	●	●	●	–
Trichobranchus glacialis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	●
Trichobranchus roseus	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sabellariidae																																							
Sabellaria spinulosa	●	–	●	–	–	–	●	●	●	●	●	●	●	–	●	●	●	●	●	–	●	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●

Table A4.1 Presence / absence data for qualitative stations: Annelida

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	53	56	57	58	59	62	62	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	S	T	D	T	D	T	D	T	D	T	D	D	D	D	D	D
Sabellidae																																							
Branchiomma bombyx	–	–	●	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	●	–
Demonax cambrensis	–	–	●	–	–	–	–	–	●	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sabella pavonina	●	–	–	–	●	●	●	–	–	●	●	–	–	–	–	●	●	–	●	–	–	●	–	●	–	●	●	●	●	–	–	–	–	●	●	●	●	●	●
Pseudopotamilla spp.	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●
Chone filicaudata	–	–	●	–	–	–	●	●	–	–	●	–	●	–	–	–	●	–	●	–	–	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●
Chone sp. B	–	–	●	–	–	–	●	–	●	–	●	●	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	●	●	●	●	●	–	–	–	–	–	–	●
Chone sp. C	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Euchone rubrocincta	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	–	–	●	●	●	–	●
Jasmineira caudata	–	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●
Jasmineira elegans	●	–	●	–	–	–	–	●	●	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	●	●
Oriopsis sp.	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pseudofabricia sp.	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–
SABELLIDAE indet.	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	●	●
Serpulidae																																							
Filograna implexa	●	–	–	–	–	–	●	–	●	–	–	–	–	–	–	●	–	●	●	–	–	–	–	–	–	–	–	–	●	●	●	–	–	●	●	●	●	●	●
Filogranula gracilis	●	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	–	–
Josephella marenzelleri	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	–	–
Protula tubularia	●	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	●	●	●	–	–	–	–	●	–	●	●	–	–	–	–	●	–	–	–	●	–
Metavermilia multicristata	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–
Hydroides norvegica	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	●	–	–	●	●	●	–	–	–	–	–	●	●	●	●	●	●	–	●	●	●	●	●	–
Serpula vermicularis	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●
Pomatoceros lamarckii	●	–	–	–	–	–	–	–	●	–	●	●	●	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pomatoceros triqueter	–	–	–	–	–	–	●	–	–	●	–	–	●	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	●
SERPULIDAE indet.	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Spirorbidae																																							
Spirorbis cuneatus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–
Circeis spirillum	–	–	–	–	–	–	●	–	–	●	–	●	–	–	–	–	–	–	●	–	–	●	–	–	–	–	●	–	●	●	●	–	●	●	–	●	●	–	●
Neodexiospira sp.	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Polygordiidae																																							
Polygordius spp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	●	–	–	–	●	–	–	–	–	–	–	–
OLIGOCHAETA																																							
Grania spp.	–	–	●	–	–	–	–	●	–	●	●	●	–	–	–	–	●	●	–	–	–	–	●	–	–	●	–	●	–	●	–	●	–	●	●	●	●	–	●
Tubificoides amplivasatus	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TUBIFICIDAE spp.	–	●	–	–	–	–	–	●	–	–	–	–	●	–	●	–	–	●	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	●	–	–	–	●
HIRUDINEA																																							
Pontobdella vosmaeri	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–
Total no. species (S)	48	52	103	25	74	33	65	95	92	82	101	68	41	23	58	46	89	38	56	4	30	53	45	19	27	85	10	115	79	119	55	131	9	114	133	96	155	89	130

Table A4.2 Presence / absence data for qualitative stations: Mollusca

Station	1	3	5	7	11	14	30	31	35	36	37	40	41	44	52	53	55	56	57	58	59	62	63	64	65	66	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	D&T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	T	D&T	D&T	D&T	D&T	D	D	D	D	D	D
APLACOPHORA																																	
Chaetoderma nitidulum	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Nematomenia banyulensis	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●
Neomenia carinata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	●
Eleutheromenia sierra	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●
Rhopalomenia aglaopheniae	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	●	–	–	–	–	–
Macellomenia cf. palifera	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tegulaherpia sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–
POLYPLACOPHORA																																	
Leptochiton asellus	●	–	●	–	–	●	●	●	–	●	●	●	–	●	–	●	–	●	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●
Hanleya hanleyi	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
GASTROPODA																																	
Emarginula crassa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Emarginula fissura	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	●	●	●	●	●	●	●	●	–
Diodora graeca	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	–	–
Jujubinus miliaris	–	●	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	●	●	●	–	●
Jujubinus montagui	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	●	–
Gibbula tumida	●	–	●	–	–	●	●	●	–	●	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●
Calliostoma formosum	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Calliostoma zizyphinum	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
Calliostoma granulatum	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dikoleps nitens	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	●	●	●	●	●	–	●
Skenea serpuloides	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–
Tricolia pullus	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●
Bittium reticulatum	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alvania punctura	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–
Alvania semistriata	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Obtusella alderi	–	–	–	–	●	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	–	–
Onoba semicostata	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	–	●
Pusillina inconspicua	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Ceratia proxima	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Caecum glabrum	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	●	●	–	●	–	–	–	–
Aporrhais pespelecani	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Capulus ungaricus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Trivia arctica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–
Velutina velutina	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Polinices fuscus	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Polinices polianus	–	–	–	–	●	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–
Cerithiopsis tubercularis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
Epitonium trevelyanum	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Epitonium clathratulum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Eulima bilineata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–
Eulima glabra	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pelseneeria stylifera	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
Vitreolina philippi	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	●	–	–	–	–
Boreotrophon truncatus	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Colus gracilis	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Colus jeffreysianus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
Buccinum undatum	–	–	●	–	–	●	–	●	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●

Table A4.2 Presence / absence data for qualitative stations: Mollusca

Station	1	3	5	7	11	14	30	31	35	36	37	40	41	44	52	53	55	56	57	58	59	62	63	64	65	66	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	D&T	T	vv	vv	D	D	D	vv	vv	vv	T	D	vv	D&T	T	T	T	D	T	D&T	D&T	D&T	D&T	D	D	D	D	D	D
Neptunea antiqua	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hinia incrassata	–	–	–	–	–	–	●	–	–	–	●	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Oenopota rufa	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Raphitoma linearis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
Raphitoma purpurea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Odostomia plicata	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Odostomia unidentata	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Jordaniella nivosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Ondina divisa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–
Partulida spiralis	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–
Acteon tornatilis	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Scaphander lignarius	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cylichna cylindracea	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Philine aperta	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Diaphana minuta	–	–	–	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–
Retusa truncatula	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Limacina retroversa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	●	●	●	●	●	●	–	–	–	–
Lomanotus marmoratus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–
Dendronotus frondosus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–	–
Doto fragilis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Goniodoris nodosa	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Onchdoris inconspicua	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eubranchus pallidus	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eubranchus tricolor	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SCAPHOPODA																																	
Pulsellum lofotense	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BIVALVIA																																	
Nucula hanleyi	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nucula nitidosa	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Nucula nucleus	–	●	●	–	–	–	●	●	●	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	●	●
Nucula sulcata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Nuculoma tenuis	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
Jupiteria minuta	–	–	●	–	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●
Glycymeris glycymeris	–	●	–	–	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●
Mytilus edulis	–	–	–	–	–	–	●	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Modiolus modiolus	●	–	●	–	–	●	●	●	–	–	●	–	–	–	●	●	●	●	–	–	●	–	–	●	●	●	●	●	●	●	●	●	●
Modiolarca tumida	–	–	●	–	–	–	●	●	–	●	–	●	–	●	–	●	–	●	–	●	–	–	●	–	●	●	●	●	●	●	●	●	●
Musculus discors	●	–	●	–	–	●	●	●	●	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	●	●	–	–
Limatula subauriculata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●
Chlamys varia	●	–	●	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Pecten maximus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–
Aequipecten opercularis	●	–	–	–	●	●	–	●	–	●	–	–	–	–	–	●	–	–	●	●	–	–	–	–	●	●	–	●	–	–	–	●	●
Palliolum tigerinum	●	–	–	–	–	●	–	–	–	●	–	–	–	–	–	●	–	●	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●
Heteronomia squamula	–	–	–	–	–	–	●	–	–	–	–	●	–	–	●	–	–	●	–	–	–	–	–	●	●	–	–	–	–	●	●	–	–
Pododesmus patelliformis	●	–	–	–	●	●	–	●	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	●
Lucinoma borealis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Thyasira flexuosa	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Kellia suborbicularis	–	–	●	–	–	●	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	●	●	–	●	●	–	●	–
Semierycina nitida	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	●	–	–	–	–	–	–	●	●	●	–	–	–	–	–	●	–	–

Table A4.2 Presence / absence data for qualitative stations: Mollusca

Taxonomic List / Station	1 AD	3 vv	5 AD	7 T	11 D&T	14 T	30 vv	31 vv	35 D	36 D	37 D	40 vv	41 vv	44 vv	52 T	53 D	55 vv	56 D&T	57 T	58 T	59 T	62 D	63 T	64 D&T	65 D&T	66 D&T	67 D&T	68 D	69 D	70 D	71 D	72 D	73 D
Montacuta substriata	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	–	–	–	–	–
Devonia perrieri	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tellimya ferruginosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	●	–	●	–	–	–	–	–	–	–
Mysella bidentata	–	–	–	–	●	●	–	●	–	●	–	–	●	●	–	–	–	●	–	–	–	●	–	●	●	●	●	–	–	–	–	–	–
Astarte sulcata	●	●	●	–	–	●	●	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●	●	●
Goodallia triangularis	–	●	–	–	–	–	●	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Acanthocardia echinata	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Parvicardium minimum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Parvicardium ovale	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–
Spisula elliptica	●	●	●	–	–	●	●	●	●	●	●	–	–	–	●	●	–	●	–	–	–	–	–	●	●	–	–	–	–	–	●	–	●
Lutraria lutraria	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ensis arcuatus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–
Ensis ensis	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Phaxus pellucidus	–	–	–	–	●	–	●	–	●	●	–	–	●	●	–	●	–	–	–	–	●	–	–	●	–	●	–	–	–	–	–	–	–
Moerella donacina	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
Moerella pygmaea	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	●	–	–	–	–	–	–	●	–	●	–	●	–	–	–	–
Gari tellinella	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Abra alba	●	●	●	●	●	–	●	–	●	●	–	●	●	●	–	●	–	●	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●
Abra nitida	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–
Abra prismatica	–	–	–	–	●	●	–	–	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	●	●	–	●	●	–	–	–	–
Arctica islandica	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–
Circomphalus casina	●	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●
Gouldia minima	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
Chamelea gallina	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Clausinella fasciata	–	–	–	–	–	●	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	–	–
Timoclea ovata	–	●	●	–	●	●	●	–	●	●	●	–	–	–	●	●	–	●	–	–	●	–	–	–	●	●	●	●	●	●	●	–	●
Tapes rhomboides	–	–	–	–	–	●	–	–	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	–	–	–
Dosinia lupinus	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dosinia exoleta	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mysia undata	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mya truncata	–	–	–	–	–	–	–	–	●	●	–	●	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Sphenia binghami	–	–	●	–	–	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
Corbula gibba	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hiatella arctica	●	–	●	–	●	●	●	●	–	●	●	●	●	●	●	●	–	●	–	–	●	–	●	●	●	●	●	●	●	●	●	●	●
Saxicavella jeffreysi	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Thracia convexa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
Thracia phaseolina	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	●	–	●
Thracia villosiuscula	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lyonsia norwegica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–
Pandora pinna	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–
Cuspidaria cuspidata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–
CEPHALOPODA																																	
Sepiola atlantica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	●	–	–	–	–	–	–	–	–
Eledone cirrhosa	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
Total no. species (S)	16	11	18	7	34	28	25	18	14	26	17	13	9	25	11	25	3	23	1	4	11	4	8	25	31	33	32	32	30	30	33	21	28

Table A4.3 Presence / absence data for qualitative stations: Arthropoda

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	56	57	58	59	62	63	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	D&T	T	T	T	D&S	T	D&T	T	D	T	D	T	D	D	D	D	D	D	D
PYCNOGONIDA																																				
Nymphon brevirostre	●	–	●	–	–	–	●	–	●	●	●	●	–	●	●	●	●	●	–	–	–	–	–	●	●	●	●	●	–	●	●	●	●	●	●	●
Nymphon brevitarse	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Nymphon hirtum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–
Achelia echinata	–	●	●	–	–	–	–	●	–	●	●	●	●	●	●	●	●	●	–	–	–	–	–	–	–	–	●	●	–	●	●	●	●	●	●	●
Endeis spinosa	–	–	–	–	–	–	●	●	–	●	●	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	●	●	–	●	●	●	●	●	●	●
Callipallene brevirostris	●	–	●	–	–	–	●	●	●	●	●	●	●	–	●	●	●	–	●	–	–	–	–	–	●	–	●	●	●	●	●	●	●	●	●	●
Anoplodactylus petiolatus	–	●	●	–	–	–	–	–	–	●	●	●	–	–	●	●	●	●	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	●	–	●
Phoxichilidium femoratum	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pycnogonium littorale	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	●	–	–	–	–	–	–	–	●	●	●	●	●	–	●	●	–	–	●	–	–
CIRRIPEDIA																																				
Verruca stroemia	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	●	●	●	–	●	–	–	–	–	–	–	●	–	●	●	●	●	–	●	●	–
Balanus sp.	–	–	●	–	●	–	–	–	–	●	–	●	●	●	●	●	–	●	–	●	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	–
MYSIDACEA																																				
MYSIDAE sp.	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
AMPHIPODA																																				
AMPHIPODA sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Apherusa bispinosa	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eusirus longipes	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	●	●	–	–	●	●
Epimeria sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Epimeria cornigera	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–
Perioculodes longimanus	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pontocrates sp.	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Syncelidium haplocheles	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Synchelidium maculatum	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Westwoodilla caecula	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Parapleustes assimilis	–	–	–	–	–	–	–	●	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Parapleustes bicuspis	–	–	–	–	–	–	–	●	●	●	●	●	–	–	–	●	●	●	–	●	–	–	–	–	–	–	●	–	–	–	●	●	●	●	–	●
Stenopleustes nodifer	–	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	●	●	–
Colomastix pusilla	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Amphilochus sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Amphilochus manudens	–	–	–	–	–	–	–	●	●	●	–	●	–	–	●	–	●	●	–	●	–	–	–	–	–	–	–	●	–	●	●	●	–	●	●	–
Amphilochus neapolitanus	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Gitana sarsi	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Peltocoxa brevirostris	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●	–	–	–	–
Leucothoe incisa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Leucothoe spinicarpa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Cressa dubia	–	●	●	–	–	–	●	●	●	●	–	●	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	●	●
Metopa sp.	–	–	–	–	–	–	–	–	–	●	●	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Metopa pusilla	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Stenothoe marina	–	●	●	–	●	●	–	●	●	–	●	●	–	●	●	●	●	●	–	–	–	–	–	●	●	–	–	●	–	–	●	●	●	●	●	●
Urothoe elegans	–	–	–	–	●	●	–	–	●	–	–	–	●	–	●	–	●	●	–	–	●	–	–	●	–	–	–	–	–	–	●	–	●	–	–	–
Urothoe marina	–	–	–	–	–	–	–	–	●	–	●	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Harpinia antennaria	–	–	–	●	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Harpinia crenulata	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Harpinia pectinata	–	●	–	–	–	–	–	●	–	–	–	–	–	–	●	–	●	●	–	–	–	●	–	–	–	–	–	●	–	●	●	●	–	●	–	●
Metaphoxus fultoni	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–
LYSIANASSIDAE juv.	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	●	–
Euonyx chelatus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–

Table A4.3 Presence / absence data for qualitative stations: Arthropoda

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	56	57	58	59	62	63	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	D&T	T	T	T	D&S	T	D&T	T	D	T	D	T	D	D	D	D	D	D	D
Hippomedon denticulatus	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—
Lysianassa ceratina	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—
Lysianassa plumosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	●	●	●	—	—	—
Scopelocheirus hopei	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●
Tmetonyx similis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—
Tryphosella sarsi	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tryphosites longipes	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Austrosyrrhoe sp.	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Argissa hamatipes	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ACANTHONOTOZOMATIDAE sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Iphimedia sp.	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Iphimedia eblanae	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	●	●	●	●	—
Iphimedia minuta	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Iphimedia obesa	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lilljeborgia pallida	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—
Listriella sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Atylus falcatus	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Atylus vedlomensis	—	—	—	—	—	—	●	●	●	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	●	—	—	●	—	—	—	●	—	—	—	—
Guernea coalita	—	—	●	—	—	—	—	●	—	●	●	●	—	—	—	—	●	●	—	—	—	—	—	—	●	—	●	—	—	●	—	●	—	●	—	—
Tritaeta gibbosa	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Ampelisca diadema	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Ampelisca macrocephala	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ampelisca spinipes	—	—	●	—	—	—	●	●	●	●	●	—	—	—	—	—	●	●	—	●	—	—	●	—	●	—	●	—	—	●	●	●	●	●	●	●
Ampelisca tenuicornis	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—
Ampelisca typica	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Haploops tubicola	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	●	●
Bathyporeia sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bathyporeia tenuipes?	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Megaluropus agilis	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Melphidippella macra	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ceradotus semiserratus	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—
Cheirocratus sp.	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Cheirocratus assimilis	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	●	●	—	●
Maera othonis	●	—	●	●	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	●	—	—	—	●	●	●	●	—	●
Maerella tenuimana	—	●	—	—	—	—	—	—	—	●	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—
Melita juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Melita obtusata	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Gammaropsis maculata	—	●	●	—	●	●	●	●	●	●	●	●	—	—	—	●	●	●	—	●	—	—	●	—	●	—	●	—	—	●	●	●	—	●	●	●
Gammaropsis nitida	—	—	●	—	—	—	—	—	—	—	●	—	—	—	—	●	—	—	●	●	—	—	—	●	●	—	—	—	—	—	—	—	●	—	—	—
Gammaropsis palmata	●	●	●	—	●	●	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	●	●	—	—
Gammaropsis sophiae	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Megamphopus cornutus	—	●	●	—	—	—	—	●	—	—	●	●	●	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—
Photis longicaudata	—	—	—	—	—	●	—	—	—	—	●	—	●	●	●	—	—	—	—	●	●	●	●	●	●	—	●	—	—	—	—	—	—	●	—	—
Ericthonius sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—
Ericthonius punctatus	—	—	—	●	—	●	—	—	—	—	—	—	—	●	●	—	—	●	—	—	●	—	●	●	—	—	—	—	—	●	—	—	—	—	●	—
Jassa sp.	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	●	—	●	—	●	●	—	●	—	—	—	—	—	—	—	—	—
Jassa pusilla	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—
Microjassa cumbrensis	●	●	●	—	●	●	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—

Table A4.3 Presence / absence data for qualitative stations: Arthropoda

Taxonomic List / Station	1 AD	3 vv	5 AD	7 T	11 AD	11 T	14 T	30 vv	31 vv	35 D	36 D	37 D	40 vv	41 vv	44 vv	52 T	53 D	56 D&T	57 T	58 T	59 T	62 D&S	63 T	64 D&T	65 T	65 D	66 T	66 D	67 T	67 D	68 D	69 D	70 D	71 D	72 D	73 D
AORIDAE sp.	—	—	—	—	●	●	●	●	●	●	—	—	●	●	●	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—
Aora gracilis	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Aora typica	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lembos longipes	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leptocheirus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—
Leptocheirus hirsutimanus	—	—	●	—	—	—	—	●	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—
Corophium sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unciola crenatipalma	—	—	—	—	—	—	—	●	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—
Unciola planipes	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	●	—	—	●	●	—	—	●	●	●	●	—	—	—	—	—	—	—	—	—	●
Dyopedos monacanthus	●	●	●	—	●	●	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Dyopedos porrectus	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CAPRELLIDEA																																				
CAPRELLIDAE sp.	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Caprella sp.	●	●	●	—	—	—	●	●	●	—	●	●	—	—	—	●	●	—	—	—	—	—	—	●	—	—	●	—	—	●	—	●	●	●	●	●
Pariambus typicus	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Phtisica marina	●	●	—	—	—	—	●	—	—	—	●	●	—	●	●	●	—	—	—	—	—	—	●	—	—	—	●	—	—	●	●	●	●	●	●	●
Pseudoprotella phasma	—	—	—	—	—	●	—	●	●	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	●
ISOPODA																																				
ISOPODA sp.	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	●	—	—	—	—	—	—	—
Gnathia juv.	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gnathia oxyuraea	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Anthura gracilis	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cirolana borealis	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	●	●	—	—	—	—	—
Eurydice sp.	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eurydice pulchra	—	—	●	—	—	—	—	—	●	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—
Sphaeroma indet.	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Janira maculosa	●	—	●	—	—	—	●	●	—	—	—	●	—	—	—	●	—	●	—	—	—	—	—	—	—	—	●	—	—	●	—	●	—	●	●	●
Munna sp.	—	—	●	—	—	—	—	—	—	●	—	●	●	—	—	●	—	—	—	●	●	—	—	—	—	—	●	—	—	●	●	—	—	●	●	—
Paramunna bilobata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—
Pleurogonium rubicundum	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pleurogonium spinosissimum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	●
Eugerda tenuimana?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pseudarachna hirsuta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Astacilla longicornis	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	●	●	—	—	—	—	●	●	—	—	●	—	—	—	—	●	—	—	—	—
TANAIDACEA																																				
TANAIDAE sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Araphura brevimana	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leptognathia gracilis	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Tanaopsis graciloides	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—
Typhlotanais sp.?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CUMACEA																																				
Vaunthompsonia cristata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Bodotria sp.	—	—	—	—	—	—	—	●	●	●	●	—	—	●	●	—	●	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—
Bodotria pulchella	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eudorella truncatula	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Eudorellopsis deformis	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leucon nasica	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Campylaspis sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Campylaspis legendrei?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	●	●	●	—	—
Cumella pygmaea	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Petalosarsia declivis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—

Table A4.3 Presence / absence data for qualitative stations: Arthropoda

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	56	57	58	59	62	63	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	D&T	T	T	T	D&S	T	D&T	T	D	T	D	T	D	D	D	D	D	D	D
Pseudocuma longicornis	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Pseudocuma similis	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Hemilamprops rosea	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diastylis sp.	—	—	—	—	●	●	—	●	—	●	—	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diastyloides biplicata	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
EUPHAUSIACEA																																				
EUPHAUSIIDAE sp.	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DECAPODA																																				
Pasiphaea sivado	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hippolytidae sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●
Caridion gordoni	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eualus pusiolus	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—
Processa sp.	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dichelopandalus bonnieri	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—
Pandalina brevirostris	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	●	●	—	—	—	●	—
Pandalus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Pandalus montagui	—	—	—	—	—	—	●	—	—	●	●	●	—	—	—	—	—	●	—	●	—	—	—	—	—	—	●	—	●	—	●	●	●	—	●	●
Pandalus propinquus	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crangon allmanni	—	—	—	—	—	●	●	—	—	●	●	—	—	—	—	●	—	●	●	●	●	—	●	●	●	—	●	—	—	●	—	—	—	—	—	—
Pontophilus spinosus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	●	—	—	●	—	—	—	—	—	—	—	—
Nephrops juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Paguridae sp.	●	●	—	—	—	—	—	—	—	●	●	●	●	—	—	●	●	●	●	—	—	—	●	●	—	—	●	—	—	—	●	●	—	●	●	●
Eupagurus bernhardus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Galathea sp.	●	—	—	—	—	●	—	—	—	—	●	—	●	—	●	●	—	●	—	—	—	—	—	●	—	—	●	●	●	●	●	—	●	—	●	●
Pisidea longicornis	—	—	—	—	—	—	—	●	●	—	—	●	●	●	●	●	●	●	—	—	—	●	—	—	—	—	—	—	—	—	●	●	—	●	●	●
Porcellana juv.	—	●	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ebalia sp.	—	—	—	—	—	—	—	●	—	—	●	●	—	—	—	—	●	—	—	●	—	—	—	—	●	—	●	—	●	—	●	●	—	●	●	●
Ebalia tuberosa	●	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hyas juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Hyas coarctatus	●	—	●	—	—	●	●	—	—	●	●	●	—	—	—	●	●	●	—	●	—	—	—	●	●	—	●	—	●	—	●	—	—	●	—	●
Inachus sp.	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●
Inachus leptocheirus	●	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	●	—	●	—	—	—	—	—
Macropodia sp.	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	—	—	—	—	—	—	—	●	●	●	—	—	—	●	—	—	—	—	—	●	—
Macropodia tenuirostris	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eurynome sp.	—	—	—	—	—	—	—	—	●	—	●	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Corystes cassivelaunus	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—
Atelecyclus rotundatus	●	—	●	—	—	—	—	—	●	—	●	—	—	—	—	●	—	—	—	●	●	—	●	●	●	—	●	—	●	—	—	—	—	●	—	—
Liocarcinus juv.	—	—	●	—	●	—	—	—	—	●	●	●	●	●	●	●	—	—	●	●	●	●	—	●	●	—	—	●	●	—	—	—	—	—	—	●
Liocarcinus depurator	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Liocarcinus holsatus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Liocarcinus marmoreus	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Goneplax rhomboides	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Monodaeus couchi	●	—	—	—	—	—	●	—	—	—	—	●	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●	—	●	●	●	●	●	●	●	●
Munida rugosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	●	—	●	—	●	●	—	●	—	●
Pinnotheres sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total no. species (S)	18	19	30	6	26	25	29	33	30	34	49	39	20	26	34	30	35	34	6	24	18	18	21	39	25	9	38	22	13	29	37	38	28	39	39	38

Table A4.4 Presence / absence data for qualitative stations: Other Phyla

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	56	57	58	59	62	63	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	D&T	T	T	T	D	T	D&T	T	D	T	D	T	D	D	D	D	D	D	D
PROTOZOA																																				
Astrorhiza limicola	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
CNIDARIA																																				
Alcyonium digitatum	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alcyonium sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
PENNATULACEA juv.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Virgularia mirabilis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Paraphellia expansa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–
ATHENARIA indet.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
HALOCLAVIDAE indet.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDWARDSIIDAE sp.	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–
Epizoanthus incrustatus	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Actiniaria sp.	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	●	–
PLATYHELMINTHES																																				
TURBELLARIA indet.	–	–	–	–	●	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	●	●	●	–	●	●	–	–	●	●	–	●	●	–	●
NEMERTEA																																				
NEMERTEA spp.	●	–	●	–	●	●	●	●	●	●	●	●	●	–	●	●	●	●	–	–	●	●	●	●	–	●	●	●	–	●	●	●	●	●	●	●
SIPUNCULA																																				
Golfingia elongata	–	–	●	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Golfingia vulgaris	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	●	–	●	●
Golfingia juv.	–	–	–	–	–	–	●	–	–	●	●	●	●	–	–	●	–	●	–	●	●	●	–	●	●	●	●	–	–	●	●	●	●	●	●	●
Aspidosiphon muelleri	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	●	●	●	–	–	–	–	●	–	–	–	–
Phascolion strombi	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
PHORONIDA																																				
Phoronis ovalis?	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	●	●	–	–	–
Phoronis spp.	–	–	–	–	–	–	–	●	–	●	–	●	●	–	–	–	●	–	–	–	–	●	–	●	–	–	–	●	–	–	–	●	–	●	–	–
ENTOPROCTA																																				
ENTOPROCTA sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–
BRACHIOPODA																																				
Gwynia capsula	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ECHINODERMATA																																				
Crinoidea																																				
CRINOIDEA juv.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Antedon bifida	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
Asteroidea																																				
Marginaster capreensis	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Astropecten irregularis	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–
Luidia sarsi	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hippasteria phyrgiana	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Anseropoda placenta	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SOLASTERIDAE juv.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	●
Crossaster papposus	●	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Henricia oculata	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	●	–	–
Strichastrella rosea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	●	–	–	–	–	–	–	–
Asterias rubens	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–
Leptasterias muelleri	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ASTEROIDEA juv.	–	–	–	–	–	–	–	–	–	–	●	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Ophiuroidea																																				
Ophiothrix fragilis	–	–	●	–	–	–	–	–	–	●	–	●	–	–	●	●	●	–	–	–	–	–	–	–	–	–	●	●	–	●	●	●	●	●	●	●
Ophiactis balli	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	●	–	●	●	–	–	–	–	–	●	●	–	●	●	●	●	●	●	–
Amphiura filiformis	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	–	●	–	–	–	–	–	–	–	–	–	–
Amphiura chiajei	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table A4.4 Presence / absence data for qualitative stations: Other Phyla

Station	1	3	5	7	11	11	14	30	31	35	36	37	40	41	44	52	53	56	57	58	59	62	63	64	65	65	66	66	67	67	68	69	70	71	72	73
Taxonomic List	AD	vv	AD	T	AD	T	T	vv	vv	D	D	D	vv	vv	vv	T	D	D&T	T	T	T	D	T	D&T	T	D	T	D	T	D	D	D	D	D	D	D
Amphiura brachiata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Amphipholis squamata	—	—	●	—	—	—	—	—	—	●	●	—	●	—	●	●	●	●	—	—	—	—	●	—	●	●	—	●	—	●	●	●	●	●	●	●
Ophuira albida	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—	—	—	●	●	—	—	●	●	●	●	●	—	—	—	—	—	—	—	—	—
Ophuira affinis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	●	●	●	—	—	—	—	—	—	—	—	—	—
Ophuira ophuira	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	—
Ophuira juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—
OPHIUROIDEA juv.	—	—	—	—	●	●	●	—	—	●	●	●	●	●	●	●	●	●	—	●	●	●	●	●	●	●	●	●	—	●	●	●	●	●	●	●
Echinoidea																																				
Psammechinus miliaris	●	●	—	—	—	—	—	●	●	—	●	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	●	●
Echinus acutus	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Echinus esculentus	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	●	—	—	—	●	—	—	—	●	—
Echinocyamus pusillus	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	●	●	—	●	●	—	●	●	●	●	●	●	●	—	●	●	●	●	—	●
Spatangus purpureus	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	●	—	●	—	—	—	—	—
Echinocardium flavescens	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Echinocardium indet.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Brissopsis lyrifera	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPATANGIDAE juv.	—	●	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—
ECHINOIDEA juv.	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	—	●	●	—	—	●	●	—	●	●	—	●	—	—	—	—	—	—
Holothuroidea																																				
Paracucumaria hyndmani	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
CUCUMARIIDAE juv.	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	●	—	—
Thyone fusus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	●
Leptosynapta minuta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Leptosynapta inhaerens	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Labidoplax juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Labidoplax digitata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
SYNAPTIDAE sp.	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—
HOLOTHUROIDEA sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	●
HEMICHORDATA																																				
ENTEROPNEUSTA spp.	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	●	—	—	—	—	●	●	—	—	●	—	—	—	—	●	—	—	●	—	●
TUNICATA																																				
ASCIDIACEA indet.	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	●	—	—	—	—	●	—	—	—	—	●	●	—	—	—	●	—	—	—	—
POLYCLINIDAE indet.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sidnyum turbinatum	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corella parallelogramma	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ascidiella aspersa	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—
Ascidiella indet.	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Didemnum maculosum	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pleurogona sp.	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polycarpa fibrosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polycarpa sp.	—	—	—	—	●	●	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dendrodoa grossularia	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	●	●	—	—	—	—	—	—	●	—	●	●	—	●	●	●	●	●	—	●
Pyura microsmos	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pyura tesselata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—
MOGULIDAE sp.	—	—	●	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—
Mogula manhattensis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mogula juv.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	●	—	—	●	—	—	—	—	—	—
Total no. species (S)	8	2	8	1	9	11	12	8	6	13	17	7	7	3	14	7	14	13	1	11	16	12	15	21	16	17	22	14	4	13	15	14	12	14	12	18

Table A4.5 Presence / absence data for qualitative stations: Epifauna

Taxonomic List / Station	35	36	37	38	39	40	42	42	43	44	45	46	47	48	49	50	51	52	53	55	56	57	58	62	63	64	65	66	67	68	69	70	71	72	73
PORIFERA																																			
CALCAREA																																			
Clathrina coriacea	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	●	●	–	–	●	●	–	–	–	–	●	–
Scypha ciliata	–	–	●	–	–	–	●	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	●	–	●	–	–
DEMOSPONGIAE																																			
Oscarella lobularis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Suberites carnosus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	●	–	–	–	–	–	–	●	–
Laxosuberites sp.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Prosuberites epiphytum	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	●	–	●	●	–	●	●	●	–	–	●	–	●	–	●	●	●	●	●
Polymastia agglutinaris	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Polymastia robusta	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–
Polymastia mammilaris	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	●	–	–	●	–	–
Spirastrella minax	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Cliona celata	–	–	–	–	–	–	–	–	–	●	–	●	–	●	–	●	●	●	–	–	–	–	–	–	–	–	–	–	●	–	●	–	●	●	–
Cliona vastifica	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Cliona viridis	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●
Timea stellata	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Axinella infundibuliformis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Bubaris vermiculata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Halicnemia patera	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	●	●	–
Stelligera stuposa	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–	–	●
Paratimea constellata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Raspailia ramosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
Eurypon clavatum	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Eurypon coronula	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eurypon lacazei	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Hymerapia stellifera	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mycale macilenta	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
Biemna variantia	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Desmacella inornata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–
Amphilectus fucorum	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	●	–
Myxilla rosacea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–
Hymedesmia paupertas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	●	–
Stylopus dujardini	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●
Jophon hyndmani	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Jophon piceus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Microciona armata	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–
Microciona laevis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Plocamionida ambigua	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–
Haliclona fistulosa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Haliclona rosea	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
Pachychalina caulifera	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dysidea fragilis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	●	●
Aplysilla rosea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Aplysilla sulfurea	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
Halisarca dujardini	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–
HYDROIDEA																																			
ATHECATA																																			
Tubularia indivisa	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	–	–	–	●	–	–	–	–	–	–	–	–	–

Table A4.5 Presence / absence data for qualitative stations: Epifauna

Station Taxonomic List	35	36	37	38	39	40	42	42	43	44	45	46	47	48	49	50	51	52	53	55	56	57	58	62	63	64	65	66	67	68	69	70	71	72	73
Tubularia larynx	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Syncoryne gravata	—	—	—	—	●	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Syncoryne sarsii	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Perigonimus repens	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—
Eudendrium ramosum	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bougainvillia ramosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	●	—	—	—	—	—	—	—	—	—
Hydractinia echinata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
THECATA																																			
Cuspidella grandis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—
Cuspidella costata	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Calycella syringa	●	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	●	●	—	—	●	●	●	—	●	●	●	—	—	●	—	●
Campanulina acuminata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Opercularella lacerata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Filellum serpens	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Lafoea dumosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	●	—	—	●	●	●	●	—	—	—	●	●	●
Halecium beanii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Halecium halecinum	●	—	—	●	—	●	●	●	—	●	—	—	—	—	●	—	—	—	●	●	—	—	●	—	—	—	●	—	●	—	●	●	●	●	●
Halecium labrosum	—	—	●	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	●	—	●	—	●
Halecium muricatum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Halecium tenellum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aglaophenia tubulifera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—
Thecocarpus myriophyllum	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	●	—	●	—	—	—	—	—
Halopteris catharina	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	●	●	●	—	●	●	—
Kirchenpaueria pinnata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nemertesia antennina	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	●	—	—	—	●	—	—	—	●	—	●	—	—	●	●	●	●
Nemertesia ramosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	—
Plumularia setacea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—	●	●	—	—	—	—	—	—	●
Abietinaria abietina	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	●	●	—
Abietinaria filicula	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—
Amphisbetia operculata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—
Diphasia attenuata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●	—	●	●	—	●	●	—	●	—	●	—	—
Diphasia margareta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	●	—	—	—	—	—	—	—
Diphasia pinastrum	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—
Diphasia rosacea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	●	●	●	●	●
Hydrallmania falcata	●	—	●	●	—	—	●	●	—	—	—	—	—	●	●	—	—	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sertularella gayi	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—
Sertularella polyzonias	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	●	●	●	●	●	●	—	●	●	●	—	●
Sertularella rugosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	●	—	—	—	—	—	—	—	—	●	—	—	—
Sertularella tenella	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	●	●	—	—	—	—	●	—	—
Sertularia cupressina	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	●	●	●	—	●	●	●	●	●	●	●	●	—	—	—	●
Campanularia hincksii	—	—	●	—	●	●	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●	—	—	●	—	●	—	●	—	—	—	—	—	●	●
Rhizocaulus verticillatus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Clytia hemisphaerica	—	●	●	—	—	—	—	●	—	—	●	—	—	●	●	—	●	—	—	—	—	●	—	—	●	—	—	—	—	●	●	—	●	●	●
Laomedia angulata	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Laomedia flexuosa	—	●	●	●	—	—	●	●	—	—	—	—	—	●	●	—	—	●	●	●	●	—	●	●	●	●	—	—	●	●	●	●	●	●	●
KAMPTOZOA																																			
Pedicellina cernua	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	●	●	—	●	—	●	●

Table A4.5 Presence / absence data for qualitative stations: Epifauna

Taxonomic List / Station	35	36	37	38	39	40	42	42	43	44	45	46	47	48	49	50	51	52	53	55	56	57	58	62	63	64	65	66	67	68	69	70	71	72	73
ANTHOZOA																																			
OCTOCORALLIA																																			
Alcyonium digitatum	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	●	●	—	—	—	—	—	—	—	●
ACTINIARIA																																			
Aureliania heterocera	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aiptasiogeton pellucidus	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Metridium senile	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	●
Sagartiogeton undatus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Hormathia coronata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Paraphellia expansa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—
Amphianthus dohrnii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—
Masacmaea mitchelii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Edwardsia claparedii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Caryophyllia smithii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
BRYOZOANS																																			
ANASCA																																			
Aetea anguina	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—
Eucratea loricata	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Conopeum reticulum	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	●	●	—	—	●	—	—	—	—	—	—	—	●	●
Electra pilosa	●	●	●	●	●	●	●	●	—	—	●	—	—	●	●	—	—	●	●	●	●	●	●	●	●	●	●	●	●	—	●	●	●	●	●
Pyripora catenularia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	●	—	—	●	●	●	—	●	●	●	●	●
Flustra foliacea	●	—	●	●	—	●	●	●	—	●	—	—	—	—	—	—	—	—	●	●	●	●	●	—	●	●	●	●	●	●	●	●	●	—	●
Callopora dumerilii	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	●	—
Callopora aurita	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Alderina solidula	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alderina imbellis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—
Cauloramphus spiniferum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Amphiblestrum flemingii	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	●	●
Amphiblestrum solidum	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	●
Amphiblestrum minax	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Membraniporella nitida	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	—	—	—	●	—	—	●	—	—	—
Cellaria sinuosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	—	—	●
Cellaria fistulosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	●	●	●	●	—	●	—	—	—	—
Cellaria salicornioides	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—
Scrupocellaria scruposa	—	—	●	—	—	●	—	●	—	●	—	—	●	—	●	—	—	●	●	●	—	—	—	●	—	●	—	—	●	—	●	—	●	—	—
Bicellariella ciliata	●	—	—	—	—	—	●	—	—	●	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	●	●	●	●
Bugula avicularia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Bugula flabellata	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—
Bugula plumosa	—	—	—	—	—	●	—	—	—	●	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ASCOPHORA																																			
Puellina innominata	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—
Umbonula ovicellata	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Umbonula littoralis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Escharoides coccinea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	●	—	—	●	—	●	—
Hippoporina pertusa	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pentapora foliacea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—
Smittoidea reticulata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—
Parasmittina trispinosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—
Porella concinna	—	—	—	—	—	●	●	—	—	—	—	—	—	●	—	—	—	●	—	—	●	—	—	●	—	—	—	●	●	—	—	●	●	●	●
Escharella immersa	—	●	—	●	—	●	●	—	—	●	●	—	●	●	●	—	—	—	—	●	●	●	●	●	—	—	—	●	●	—	●	—	●	●	●

Table A4.5 Presence / absence data for qualitative stations: Epifauna

Station Taxonomic List	35	36	37	38	39	40	42	42	43	44	45	46	47	48	49	50	51	52	53	55	56	57	58	62	63	64	65	66	67	68	69	70	71	72	73
Escharella labiosa	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Escharella ventricosa	—	—	—	●	—	●	—	—	—	—	—	—	—	—	●	—	—	●	—	—	●	—	—	●	—	—	●	●	●	—	—	—	●	●	—
Escharella variolosa	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—	●
Phylactella labrosa	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—
Schizoporella longirostris	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—
Schizomavella auriculata	—	—	—	●	—	—	—	—	—	●	—	—	●	●	—	—	●	●	—	●	●	●	●	●	—	—	—	—	—	—	●	●	—	●	—
Schizomavella linearis	●	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	●	—	—	●	—	—	—	—	—	●	●	—	●	●	●	●	●
Escharina hyndmanni	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—
Microporella ciliata	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	●	●	—	●	—	—	—	●	●	—	●	●	—	●	●
Fenestrulina malusii	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	●	●	●	—	—	—	—	—	●	●	—	—	—	—	—	●
Chorizopora brongniartii	—	—	—	●	—	—	—	—	—	●	—	●	—	—	—	—	—	●	—	●	●	—	—	—	—	—	—	●	●	—	●	●	—	●	—
Hippothoa divaricata	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—
Hippothoa flagellum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	●	—
Scizotheca fissa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—
Cellepora pumicosa	●	●	●	●	—	●	—	—	—	—	—	—	—	●	●	—	—	●	●	●	●	●	●	●	—	●	●	●	●	●	●	●	●	●	●
Celleporina hassallii	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—
Turbicellepora avicularis	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—	—	●	●
Omalosecosa ramulosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
CYCLOSTOMATA																																			
Crisidia cornuta	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	●	—	●	●	●	●	—	—	—	—	—	—	—
Crisia eburnea	—	—	●	—	—	—	●	—	—	●	—	—	—	—	●	—	—	●	—	●	●	●	●	●	●	●	●	●	●	●	●	●	●	—	●
Crisia aculeata	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—
Crisia denticulata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crisia ramosa	—	—	—	—	—	—	—	—	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Oncousoecia dilatans	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Tubulipora liliacea	—	●	●	●	—	—	●	—	—	—	—	—	—	—	●	—	—	●	●	●	●	●	●	●	—	●	●	●	●	—	●	●	●	—	●
Eurystrotos compacta	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	—	—	—
Plagioecia patina	—	—	●	●	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	●	●	—	●	—	—	—	—	●	●	—	—	●	●	●	●
Plagioecia sarniensis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—
Diplosolen obelia	—	●	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	●	—	—	●	—	—	—	—	●	—	—	—	●	●	●
Annectocyma major	—	●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●	●	●	—	—	—	●	●	●	—	—	—	—	●	—
Entalophoroecia deflexa	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	●	●	—	—	—	—	●	—	—	—	—	—	—	●
Lichenopora radiata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—
Disporella hispida	—	●	—	●	—	●	●	—	—	—	—	●	●	—	—	—	—	—	—	—	●	●	—	●	—	—	—	●	●	—	●	●	●	●	●
CTENOSTOMATA																																			
Alcyonidium diaphanum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	—	—	—	●	—	—	—	—	—	—	—	—	—
Alcyonidium mytili	—	—	—	—	●	—	●	—	—	—	—	●	—	—	●	—	—	●	●	●	●	—	—	●	—	●	—	●	●	—	●	●	—	●	—
Nolella dilatata	—	●	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	●	—	●	—	—	—	—	—	—	—	—	—	—	—
Penetrantia concharum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	—	—	—	—	—	—	—
Vesicularia spinosa	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	●	●	●	●	●	●	—	—	●	—	●	●	—	—	—	●	●	●
Amathia lendigera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	●	●	—	—	—	●	●	—	●	●	●	—	—
Bowerbankia imbricata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bowerbankia gracilis	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TUNICATA																																			
Archidostoma aggregatum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Leptoclinides faeroensis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—
Perophora listeri	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corella parrallelograma	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	●	—	—	●	—	—	—	—
Ascidiella aspersa	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	—	—	—
Ascidiella scabra	—	●	—	—	—	—	—	—	—	—	●	●	—	—	—	—	—	●	●	●	—	—	—	—	—	—	—	—	—	—	●	—	—	●	—

Table A4.5 Presence / absence data for qualitative stations: Epifauna

Station Taxonomic List	35	36	37	38	39	40	42	42	43	44	45	46	47	48	49	50	51	52	53	55	56	57	58	62	63	64	65	66	67	68	69	70	71	72	73
Ascidia mentula	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—
Ascidia conchilega	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Polycarpa fibrosa	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dendrodoa grossularia	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	●	—	●	●	—	●	●	—	—	●	●	●	●	—	●	●	●	●	●
Botryllus schlosseri	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Botrylloides leachi	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Microcosmus claudicans	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Pyura tesselata	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	●	—	●	—	●	●	●
Pyura microcosmus	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pyura squamulosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—
Mogula oculata	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●
Mogula citrina	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	—	—	—	—
Total no. species (S)	11	20	23	24	6	14	18	9	2	23	5	8	11	18	28	4	7	41	33	36	38	37	44	30	20	30	25	56	59	17	41	32	51	71	51

Appendix 5
Number of taxa per sample method

Grp	Stn	VV	vv	AD	D	D+T	T	S	Total
A	7	34	-	-	-	-	25	-	41
	8	37	-	-	-	-	-	-	37
	9	30	-	-	-	-	-	-	30
	10	39	-	-	-	-	-	-	39
	63	62	-	-	-	-	27	-	73
	59	49	-	-	-	-	53	-	70
	60	57	-	-	-	-	-	-	57
	61	39	-	-	-	-	-	-	39
	62	42	-	-	45	-	-	19	58
	11	64	-	74	-	-	33	-	95
	64	-	-	-	85	-	10	-	90
	50	78	-	-	-	-	-	-	78
B	18	48	-	-	-	-	-	-	48
	19	37	-	-	-	-	-	-	37
	20	37	-	-	-	-	-	-	37
	24	25	-	-	-	-	-	-	25
	26	40	-	-	-	-	-	-	40
	47	41	-	-	-	-	-	-	41
	34	40	-	-	-	-	-	-	40
	27	51	-	-	-	-	-	-	51
	29	60	-	-	-	-	-	-	60
	12	34	-	-	-	-	-	-	34
	13	33	-	-	-	-	-	-	33
	43	39	-	-	-	-	-	-	39
	45	26	-	-	-	-	-	-	26
	28	34	-	-	-	-	-	-	34
	42	29	-	-	-	-	-	-	29
	32	47	-	-	-	-	-	-	47
	21	43	-	-	-	-	-	-	43
	22	33	-	-	-	-	-	-	33
	25	48	-	-	-	-	-	-	48
	23	37	-	-	-	-	-	-	37
C	67	-	-	-	131	-	9	-	134
	68	-	-	-	114	-	-	-	114
	69	-	-	-	133	-	-	-	133
	70	-	-	-	96	-	-	-	96
	71	-	-	-	155	-	-	-	155
	73	-	-	-	130	-	-	-	130
	6	119	-	-	-	-	-	-	119
	15	105	-	-	-	-	-	-	105
	66	-	-	-	119	-	55	-	128
	72	-	-	-	89	-	-	-	89
	36	-	-	-	101	-	-	-	101
	1	94	-	48	-	-	-	-	116
	2	98	-	-	-	-	-	-	98
	4	66	-	-	-	-	-	-	66
	14	98	-	-	-	-	65	-	126
	5	-	-	103	-	-	-	-	103
	31	-	92	-	-	-	-	-	92
	30	-	95	-	-	-	-	-	95
	35	-	-	-	82	-	-	-	82
	37	-	-	-	68	-	-	-	68
	57	70	-	-	-	-	4	-	71
	58	89	-	-	-	-	30	-	100
	65	-	-	-	115	-	79	-	142
	51	91	-	-	-	-	-	-	91
	52	77	-	-	-	-	46	-	96
	17	86	-	-	-	-	-	-	86
	33	91	-	-	-	-	-	-	91
	49	88	-	-	-	-	-	-	88
	55	98	-	-	-	-	-	-	98
	16	77	-	-	-	-	-	-	77
	53	-	38	-	89	-	-	-	95
	56	-	-	-	-	56	-	-	56
	39	79	-	-	-	-	-	-	79
	48	111	-	-	-	-	-	-	111
	46	85	-	-	-	-	-	-	85
	38	96	-	-	-	-	-	-	96
	3	-	52	-	-	-	-	-	52
D	40	-	41	-	-	-	-	-	41
	44	-	58	-	-	-	-	-	58
	41	-	23	-	-	-	-	-	23
	54	10	-	-	-	-	-	-	10

Table A5.1: Number of annelid taxa recorded for each sampling regime.

Grp	Stn	VV	vv	AD	D	D+T	T	S	Total
A	7	9	-	-	-	-	7	-	13
	8	7	-	-	-	-	-	-	7
	9	7	-	-	-	-	-	-	7
	10	12	-	-	-	-	-	-	12
	63	16	-	-	-	-	8	-	22
	59	17	-	-	-	-	11	-	22
	60	16	-	-	-	-	-	-	16
	61	7	-	-	-	-	-	-	7
	62	10	-	-	4	-	-	-	14
	11	23	-	-	-	34	-	-	41
	64	-	-	-	-	25	-	-	25
	50	18	-	-	-	-	-	-	18
B	18	16	-	-	-	-	-	-	16
	19	14	-	-	-	-	-	-	14
	20	13	-	-	-	-	-	-	13
	24	9	-	-	-	-	-	-	9
	26	15	-	-	-	-	-	-	15
	47	11	-	-	-	-	-	-	11
	34	16	-	-	-	-	-	-	16
	27	14	-	-	-	-	-	-	14
	29	22	-	-	-	-	-	-	22
	12	13	-	-	-	-	-	-	13
	13	12	-	-	-	-	-	-	12
	43	11	-	-	-	-	-	-	11
	45	17	-	-	-	-	-	-	17
	28	16	-	-	-	-	-	-	16
	42	23	-	-	-	-	-	-	23
	32	15	-	-	-	-	-	-	15
	21	26	-	-	-	-	-	-	26
	22	20	-	-	-	-	-	-	20
	25	21	-	-	-	-	-	-	21
	23	18	-	-	-	-	-	-	18
C	67	-	-	-	-	32	-	-	32
	68	-	-	-	32	-	-	-	32
	69	-	-	-	30	-	-	-	30
	70	-	-	-	30	-	-	-	30
	71	-	-	-	33	-	-	-	33
	73	-	-	-	28	-	-	-	28
	6	28	-	-	-	-	-	-	28
	15	37	-	-	-	-	-	-	37
	66	-	-	-	-	33	-	-	33
	72	-	-	-	21	-	-	-	21
	36	-	-	-	26	-	-	-	26
	1	20	-	16	-	-	-	-	24
	2	21	-	-	-	-	-	-	21
	4	9	-	-	-	-	-	-	9
	14	22	-	-	-	-	28	-	36
	5	-	-	18	-	-	-	-	18
	31	-	18	-	-	-	-	-	18
	30	-	24	-	-	-	-	-	24
	35	-	-	-	14	-	-	-	14
	37	-	-	-	17	-	-	-	17
	57	12	-	-	-	-	1	-	13
	58	15	-	-	-	-	4	-	19
	65	-	-	-	-	31	-	-	31
	51	11	-	-	-	-	-	-	11
	52	19	-	-	-	-	11	-	24
	17	16	-	-	-	-	-	-	16
	33	12	-	-	-	-	-	-	12
	49	14	-	-	-	-	-	-	14
	55	13	-	-	-	-	-	-	13
	16	20	-	-	-	-	-	-	20
	53	-	-	-	25	-	-	-	25
	56	-	-	-	-	23	-	-	23
	39	20	-	-	-	-	-	-	20
	48	21	-	-	-	-	-	-	21
	46	21	-	-	-	-	-	-	21
	38	21	-	-	-	-	-	-	21
	3	-	11	-	-	-	-	-	11
D	40	-	13	-	-	-	-	-	13
	44	-	25	-	-	-	-	-	25
	41	-	9	-	-	-	-	-	9
	54	8	-	-	-	-	-	-	8

Table A5.2: Number of molluscan taxa recorded for each sampling regime.

Grp	Stn	VV	vv	AD	D	D+T	T	S	Total
A	7	13	-	-	-	-	6	-	17
	8	11	-	-	-	-	-	-	11
	9	9	-	-	-	-	-	-	9
	10	10	-	-	-	-	-	-	10
	63	27	-	-	-	-	21	-	43
	59	17	-	-	-	-	18	-	28
	60	15	-	-	-	-	-	-	15
	61	10	-	-	-	-	-	-	10
	62	9	-	-	18*	-	-	*	21
	11	37	-	26	-	-	25	-	59
	64	-	-	-	-	39	-	-	39
	50	17	-	-	-	-	-	-	17
B	18	17	-	-	-	-	-	-	17
	19	11	-	-	-	-	-	-	11
	20	9	-	-	-	-	-	-	9
	24	12	-	-	-	-	-	-	12
	26	14	-	-	-	-	-	-	14
	47	12	-	-	-	-	-	-	12
	34	12	-	-	-	-	-	-	12
	27	22	-	-	-	-	-	-	22
	29	22	-	-	-	-	-	-	22
	12	10	-	-	-	-	-	-	10
	13	11	-	-	-	-	-	-	11
	43	17	-	-	-	-	-	-	17
	45	16	-	-	-	-	-	-	16
	28	18	-	-	-	-	-	-	18
	42	20	-	-	-	-	-	-	20
	32	21	-	-	-	-	-	-	21
	21	17	-	-	-	-	-	-	17
	22	14	-	-	-	-	-	-	14
	25	24	-	-	-	-	-	-	24
	23	14	-	-	-	-	-	-	14
C	67	-	-	-	29	-	13	-	38
	68	-	-	-	37	-	-	-	37
	69	-	-	-	38	-	-	-	38
	70	-	-	-	28	-	-	-	28
	71	-	-	-	39	-	-	-	39
	73	-	-	-	38	-	-	-	38
	6	37	-	-	-	-	-	-	37
	15	36	-	-	-	-	-	-	36
	66	-	-	-	22	-	38	-	53
	72	-	-	-	39	-	-	-	39
	36	-	-	-	49	-	-	-	49
	1	24	-	18	-	-	-	-	35
	2	29	-	-	-	-	-	-	29
	4	23	-	-	-	-	-	-	23
	14	32	-	-	-	-	29	-	54
	5	-	-	30	-	-	-	-	30
	31	-	30	-	-	-	-	-	30
	30	-	33	-	-	-	-	-	33
	35	-	-	-	34	-	-	-	34
	37	-	-	-	39	-	-	-	39
	57	17	-	-	-	-	6	-	21
	58	14	-	-	-	-	24	-	32
	65	-	-	-	9	-	25	-	31
	51	18	-	-	-	-	-	-	18
	52	28	-	-	-	-	30	-	48
	17	25	-	-	-	-	-	-	25
	33	22	-	-	-	-	-	-	22
	49	19	-	-	-	-	-	-	19
	55	31	-	-	-	-	-	-	31
	16	14	-	-	-	-	-	-	14
	53	-	-	-	35	-	-	-	35
	56	-	-	-	-	34	-	-	34
	39	25	-	-	-	-	-	-	25
	48	29	-	-	-	-	-	-	29
	46	23	-	-	-	-	-	-	23
	38	17	-	-	-	-	-	-	17
	3	-	19	-	-	-	-	-	19
D	40	-	20	-	-	-	-	-	20
	44	-	34	-	-	-	-	-	34
	41	-	26	-	-	-	-	-	26
	54	8	-	-	-	-	-	-	8

* Value for Sledge is combined with Dredge

Table A5.3: Number of arthropod taxa recorded for each sampling regime.

Grp	Stn	VV	vv	AD	D	D+T	T	S	Total
A	7	5	-	-	-	-	1	-	5
	8	6	-	-	-	-	-	-	6
	9	5	-	-	-	-	-	-	5
	10	9	-	-	-	-	-	-	9
	63	16	-	-	-	-	15	-	22
	59	11	-	-	-	-	16	-	19
	60	6	-	-	-	-	-	-	6
	61	7	-	-	-	-	-	-	7
	62	9	-	-	12	-	-	-	14
	11	17	-	9	-	-	11	-	25
	64	-	-	-	-	21	-	-	21
	50	14	-	-	-	-	-	-	14
B	18	10	-	-	-	-	-	-	10
	19	9	-	-	-	-	-	-	9
	20	11	-	-	-	-	-	-	11
	24	7	-	-	-	-	-	-	7
	26	8	-	-	-	-	-	-	8
	47	6	-	-	-	-	-	-	6
	34	12	-	-	-	-	-	-	12
	27	11	-	-	-	-	-	-	11
	29	12	-	-	-	-	-	-	12
	12	8	-	-	-	-	-	-	8
	13	8	-	-	-	-	-	-	8
	43	6	-	-	-	-	-	-	6
	45	9	-	-	-	-	-	-	9
	28	9	-	-	-	-	-	-	9
	42	4	-	-	-	-	-	-	4
	32	10	-	-	-	-	-	-	10
	21	9	-	-	-	-	-	-	9
	22	8	-	-	-	-	-	-	8
	25	9	-	-	-	-	-	-	9
	23	6	-	-	-	-	-	-	6
C	67	-	-	-	13	-	4	-	17
	68	-	-	-	15	-	-	-	15
	69	-	-	-	14	-	-	-	14
	70	-	-	-	12	-	-	-	12
	71	-	-	-	14	-	-	-	14
	73	-	-	-	18	-	-	-	18
	6	8	-	-	-	-	-	-	8
	15	16	-	-	-	-	-	-	16
	66	-	-	-	14	-	22	-	27
	72	-	-	-	12	-	-	-	12
	36	-	-	-	17	-	-	-	17
	1	7	-	8	-	-	-	-	13
	2	8	-	-	-	-	-	-	8
	4	9	-	-	-	-	-	-	9
	14	15	-	-	-	-	12	-	22
	5	-	-	8	-	-	-	-	8
	31	-	6	-	-	-	-	-	6
	30	-	8	-	-	-	-	-	8
	35	-	-	-	13	-	-	-	13
	37	-	-	-	7	-	-	-	7
	57	15	-	-	-	-	1	-	16
	58	16	-	-	-	-	11	-	20
	65	-	-	-	17	-	16	-	25
	51	10	-	-	-	-	-	-	10
	52	12	-	-	-	-	7	-	14
	17	10	-	-	-	-	-	-	10
	33	6	-	-	-	-	-	-	6
	49	12	-	-	-	-	-	-	12
	55	15	-	-	-	-	-	-	15
	16	14	-	-	-	-	-	-	14
	53	-	-	-	14	-	-	-	14
	56	-	-	-	-	13	-	-	13
	39	9	-	-	-	-	-	-	9
	48	21	-	-	-	-	-	-	21
	46	12	-	-	-	-	-	-	12
	38	10	-	-	-	-	-	-	10
	3	-	2	-	-	-	-	-	2
D	40	-	7	-	-	-	-	-	7
	44	-	14	-	-	-	-	-	14
	41	-	3	-	-	-	-	-	3
	54	3	-	-	-	-	-	-	3

Table A5.4: Number of 'Other Phyla' taxa recorded for each sampling regime.

Appendix 6
Classification analyses of the southern Irish Sea macrofauna

Figs. A6.1 & 2	Total fauna (binary)
Figs. A6.3 - 6	Annelida
Figs. A6.7 - 10	Mollusca
Figs. A6.11 - 14	Arthropoda
Figs. A6.15 - 18	Other phyla
Figs. A6.19	Epifauna (binary 1991)

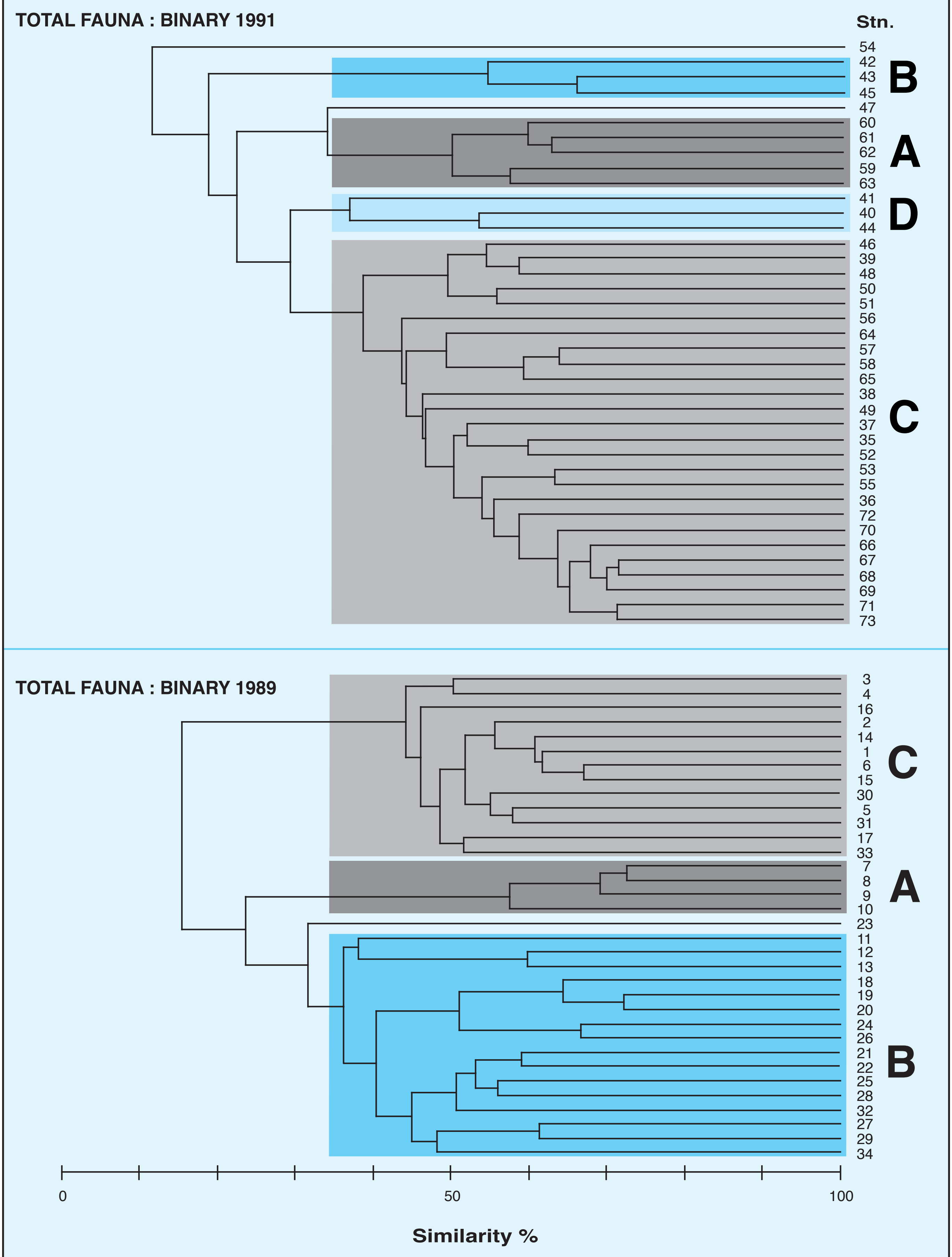

TOTAL FAUNA : BINARY 1991
Stn.
54
42
43
45
B
47
60
61
62
59
63
A
41
40
44
D
46
39
48
50
51
56
64
57
58
65
38
49
37
35
52
53
55
36
72
70
66
67
68
69
71
73
C
TOTAL FAUNA : BINARY 1989
3
4
16
2
14
1
6
15
30
5
31
17
33
C
7
8
9
10
A
23
11
12
13
18
19
20
24
26
21
22
25
28
32
27
29
34
B
0
50
100
Similarity %

Fig. A6.1.

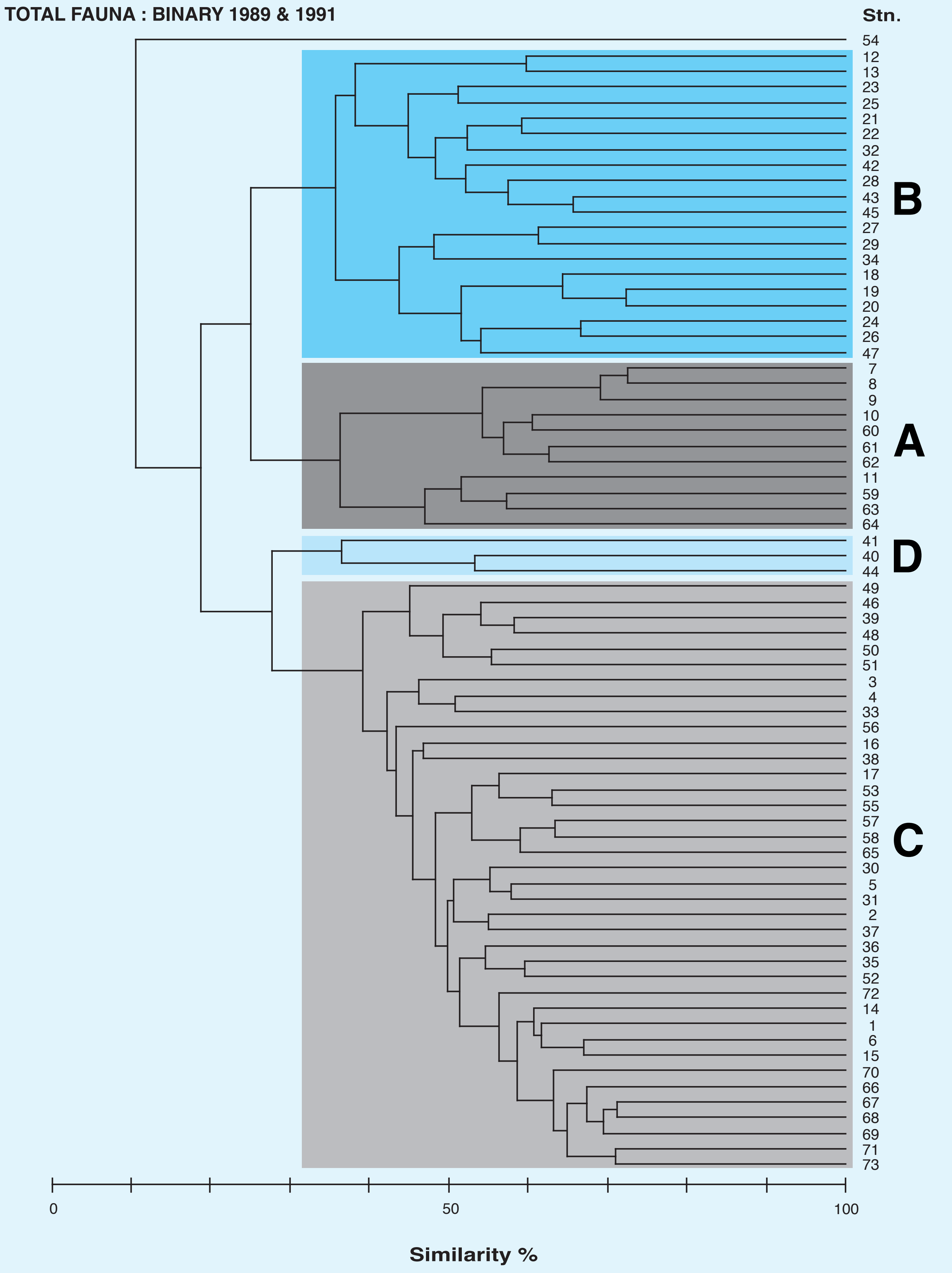

TOTAL FAUNA : BINARY 1989 & 1991
Stn.
54
12
13
23
25
21
22
32
42
28
43
45
27
29
34
18
19
20
24
26
47
7
8
9
10
60
61
62
11
59
63
64
41
40
44
49
46
39
48
50
51
3
4
33
56
16
38
17
53
55
57
58
65
30
5
31
2
37
36
35
52
72
14
1
6
15
70
66
67
68
69
71
73
B
A
D
C
0
50
100
Similarity %

Fig. A6.2.

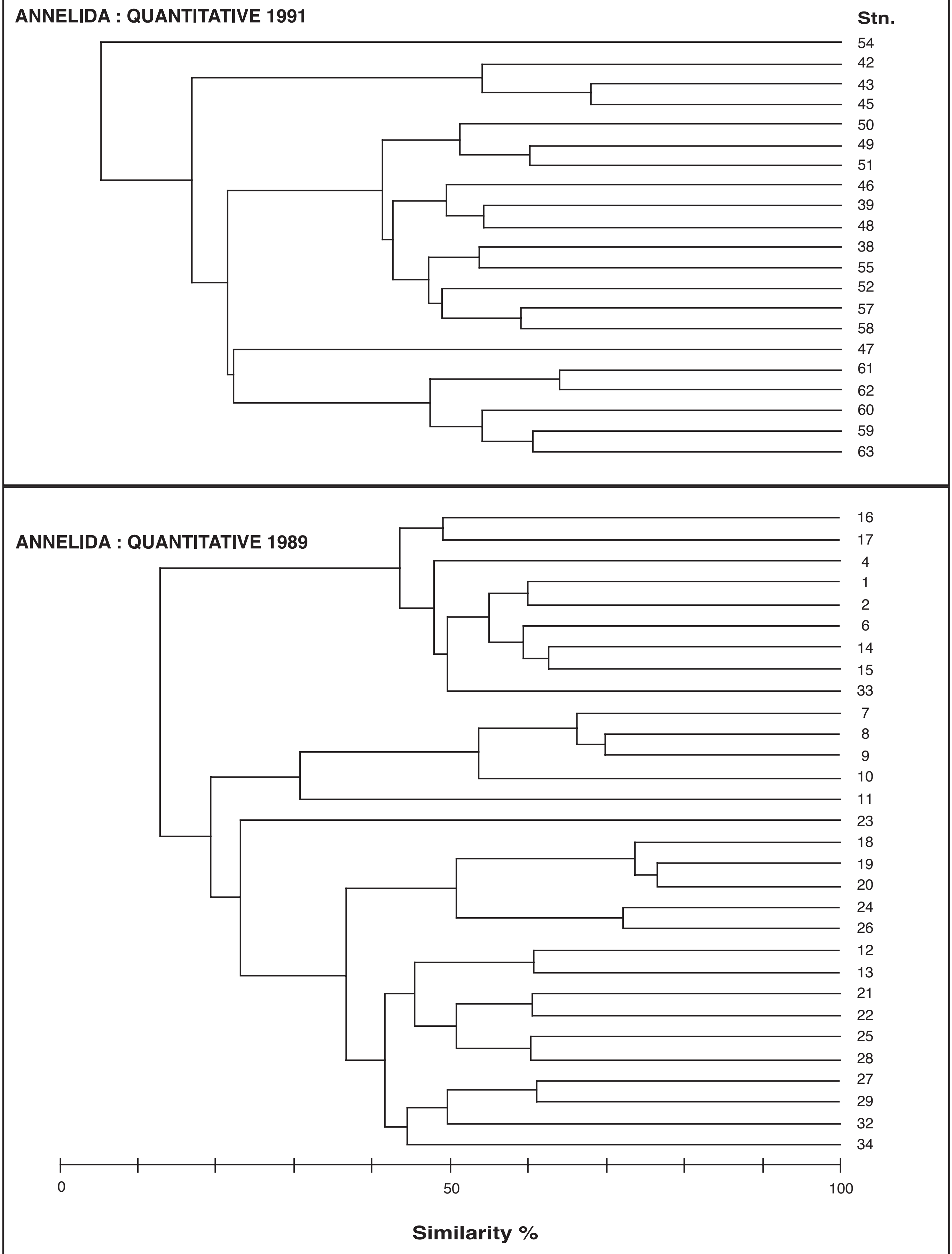

ANNELIDA : QUANTITATIVE 1991
Stn.
54
42
43
45
50
49
51
46
39
48
38
55
52
57
58
47
61
62
60
59
63
ANNELIDA : QUANTITATIVE 1989
16
17
4
1
2
6
14
15
33
7
8
9
10
11
23
18
19
20
24
26
12
13
21
22
25
28
27
29
32
34
0
50
100
Similarity %

Fig. A6.3.

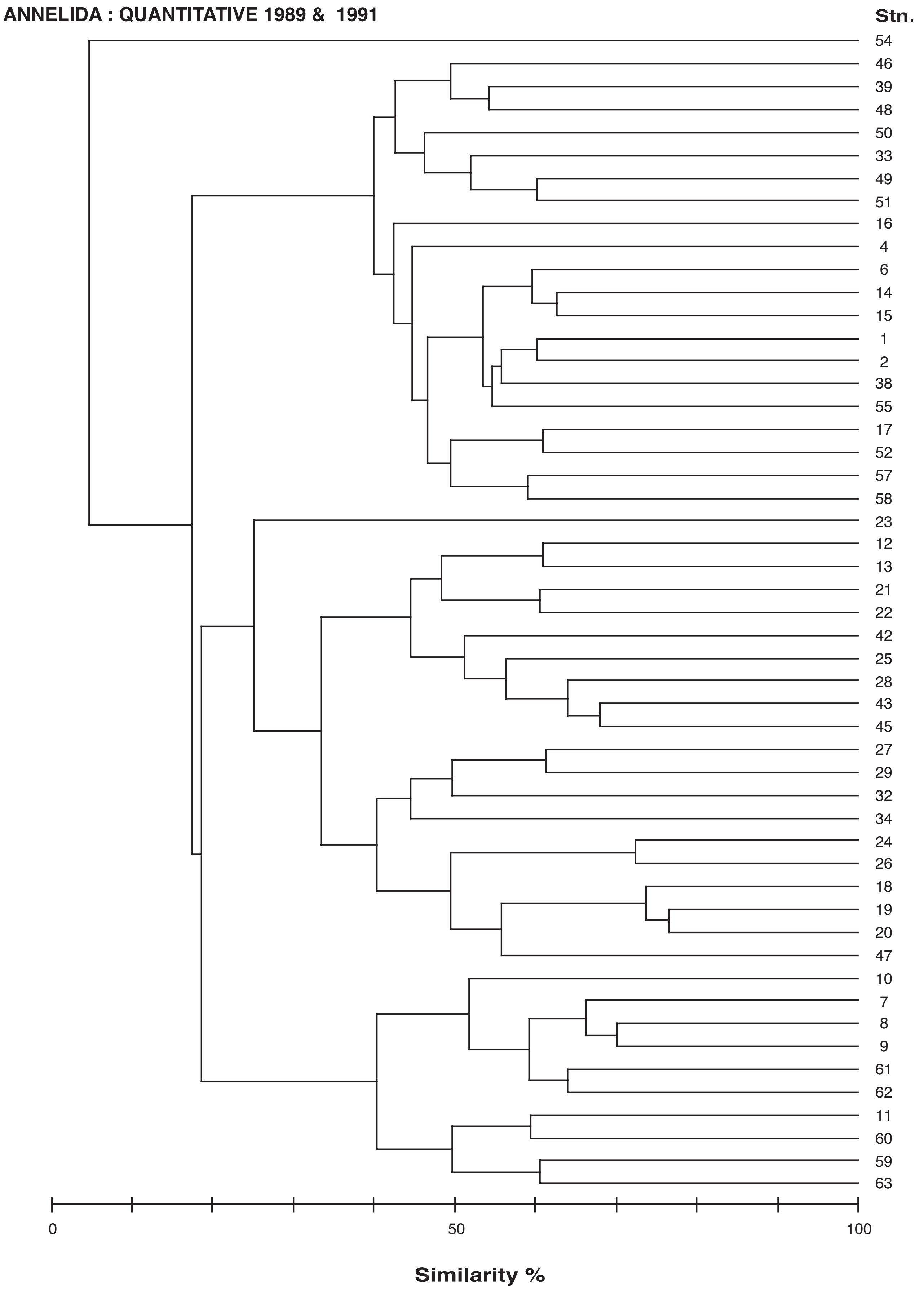

ANNELIDA : QUANTITATIVE 1989 & 1991
Stn.
54
46
39
48
50
33
49
51
16
4
6
14
15
1
2
38
55
17
52
57
58
23
12
13
21
22
42
25
28
43
45
27
29
32
34
24
26
18
19
20
47
10
7
8
9
61
62
11
60
59
63
0
50
100
Similarity %

Fig. A6.4.

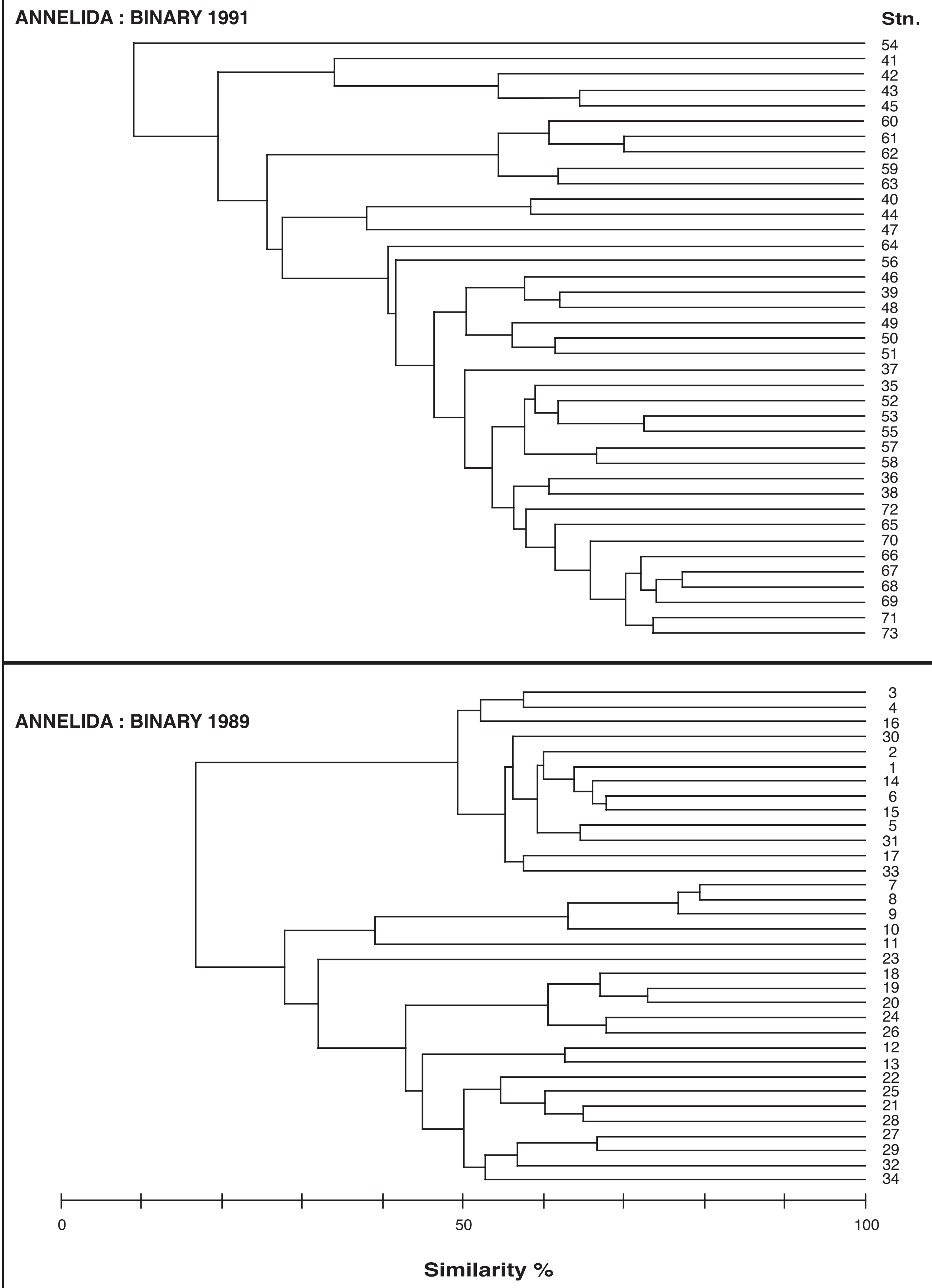

ANNELIDA : BINARY 1991
Stn.
54
41
42
43
45
60
61
62
59
63
40
44
47
64
56
46
39
48
49
50
51
37
35
52
53
55
57
58
36
38
72
65
70
66
67
68
69
71
73
ANNELIDA : BINARY 1989
3
4
16
30
2
1
14
6
15
5
31
17
33
7
8
9
10
11
23
18
19
20
24
26
12
13
22
25
21
28
27
29
32
34
0
50
100
Similarity %

Fig. A6.5.

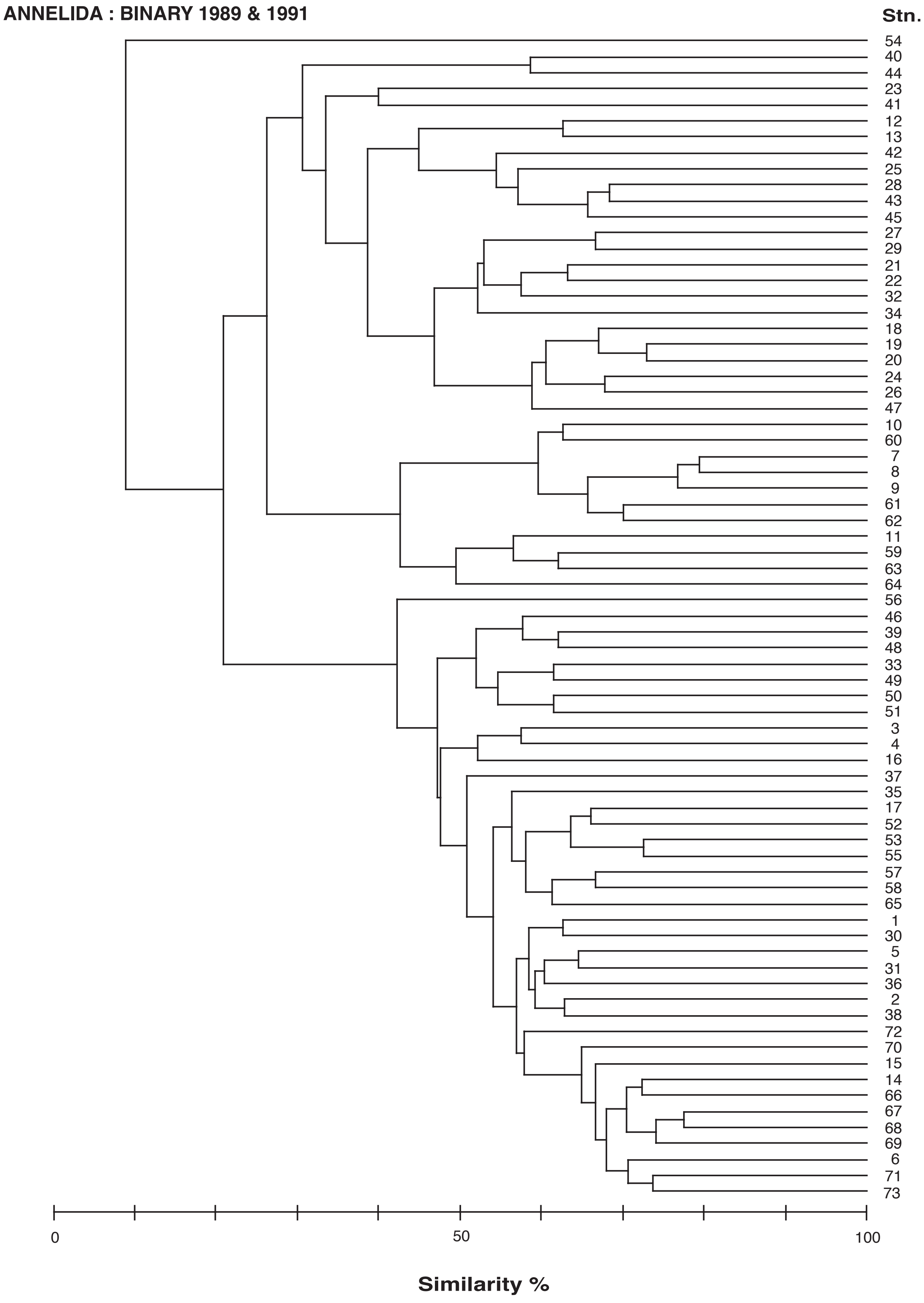
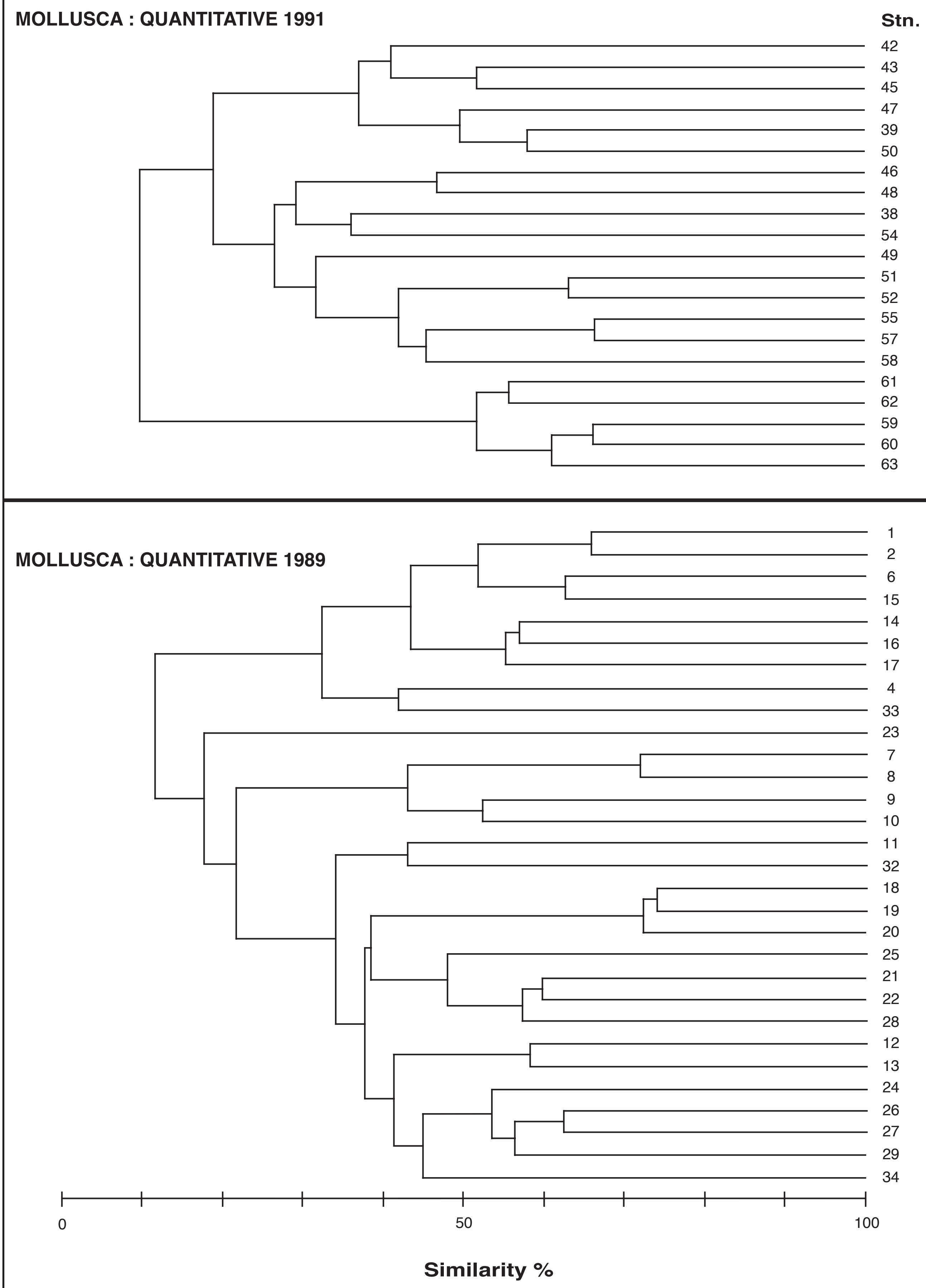

ANNELIDA : BINARY 1989 & 1991
Stn.
54
40
44
23
41
12
13
42
25
28
43
45
27
29
21
22
32
34
18
19
20
24
26
47
10
60
7
8
9
61
62
11
59
63
64
56
46
39
48
33
49
50
51
3
4
16
37
35
17
52
53
55
57
58
65
1
30
5
31
36
2
38
72
70
15
14
66
67
68
69
6
71
73
0
50
100
Similarity %

Fig. A6.6.


MOLLUSCA : QUANTITATIVE 1991

MOLLUSCA : QUANTITATIVE 1989

Fig. A6.7.

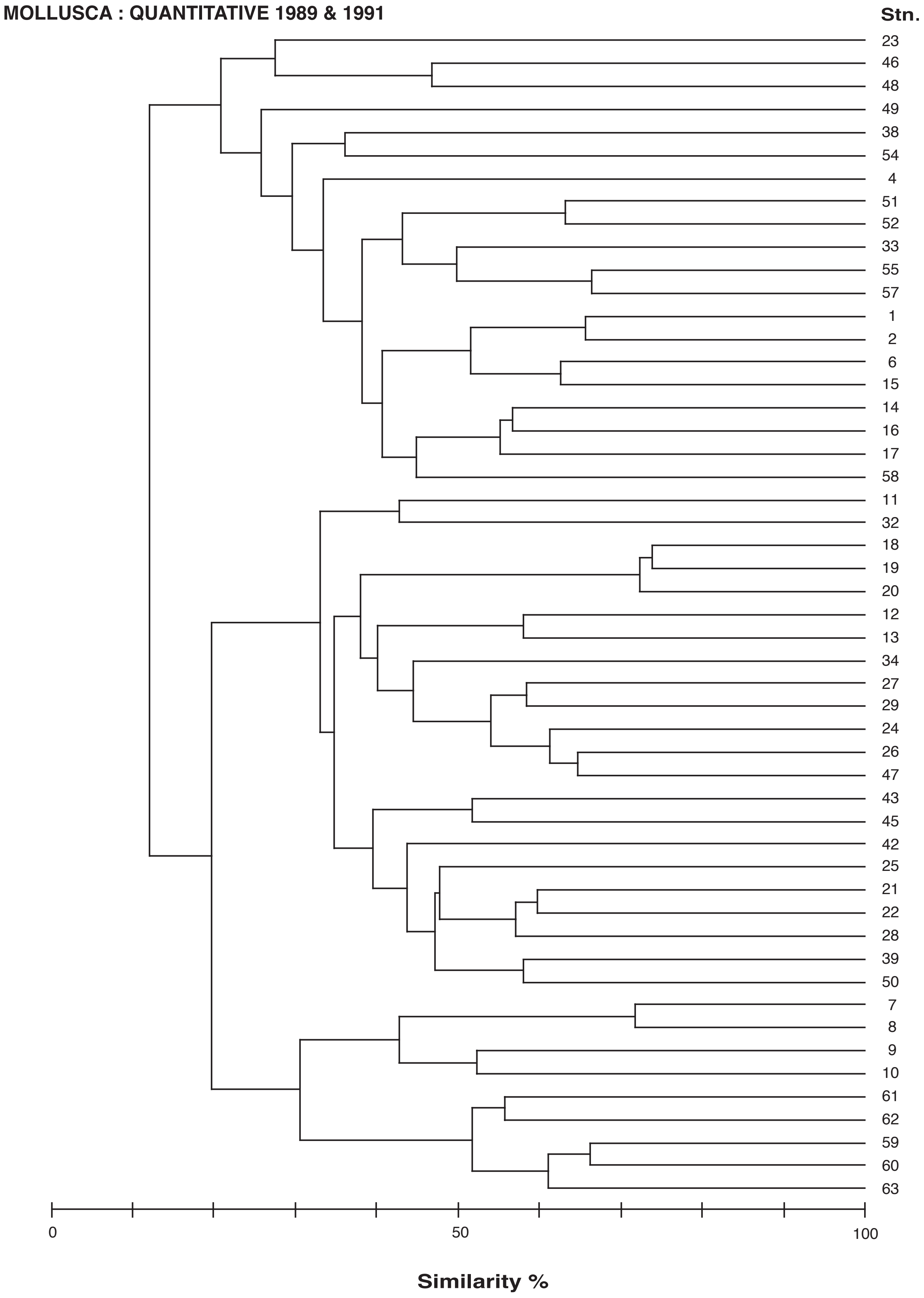

MOLLUSCA : QUANTITATIVE 1989 & 1991
Stn.
23
46
48
49
38
54
4
51
52
33
55
57
1
2
6
15
14
16
17
58
11
32
18
19
20
12
13
34
27
29
24
26
47
43
45
42
25
21
22
28
39
50
7
8
9
10
61
62
59
60
63
0
50
100
Similarity %

Fig. A6.8.

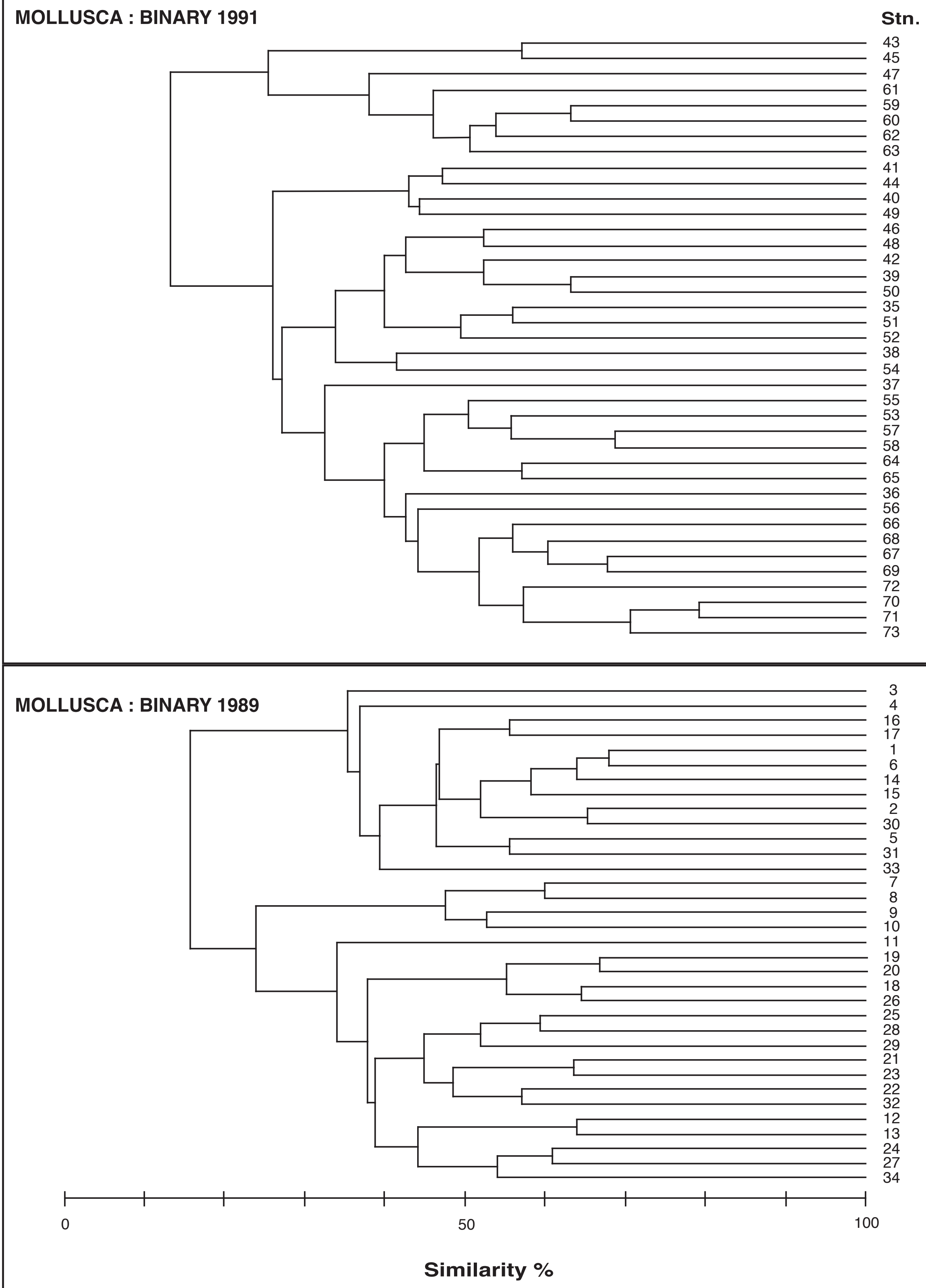

MOLLUSCA : BINARY 1991
Stn.
43
45
47
61
59
60
62
63
41
44
40
49
46
48
42
39
50
35
51
52
38
54
37
55
53
57
58
64
65
36
56
66
68
67
69
72
70
71
73
MOLLUSCA : BINARY 1989
3
4
16
17
1
6
14
15
2
30
5
31
33
7
8
9
10
11
19
20
18
26
25
28
29
21
23
22
32
12
13
24
27
34
0
50
100
Similarity %

Fig. A6.9.

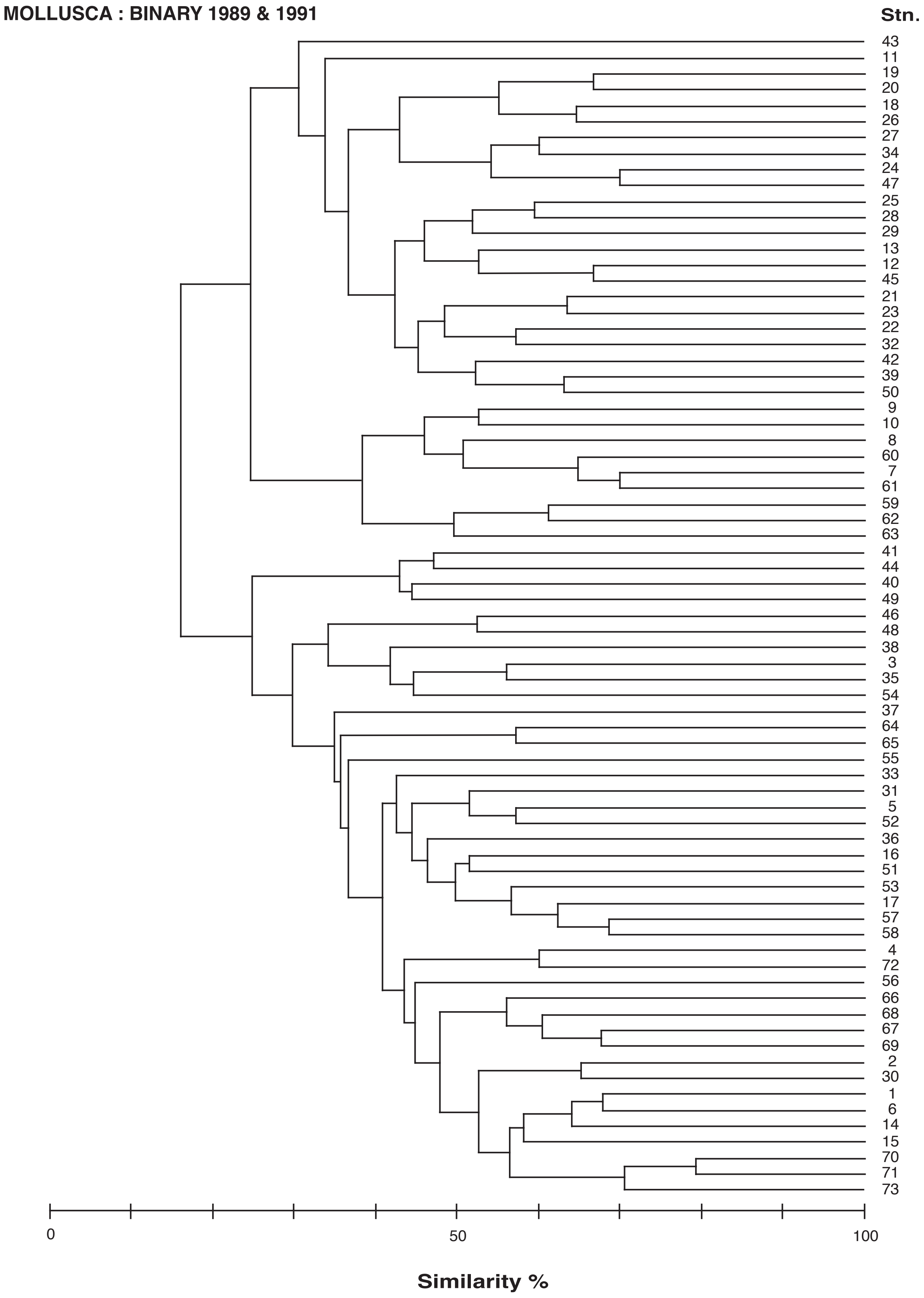

MOLLUSCA : BINARY 1989 & 1991
Stn.
43
11
19
20
18
26
27
34
24
47
25
28
29
13
12
45
21
23
22
32
42
39
50
9
10
8
60
7
61
59
62
63
41
44
40
49
46
48
38
3
35
54
37
64
65
55
33
31
5
52
36
16
51
53
17
57
58
4
72
56
66
68
67
69
2
30
1
6
14
15
70
71
73
0
50
100
Similarity %

Fig. A6.10.

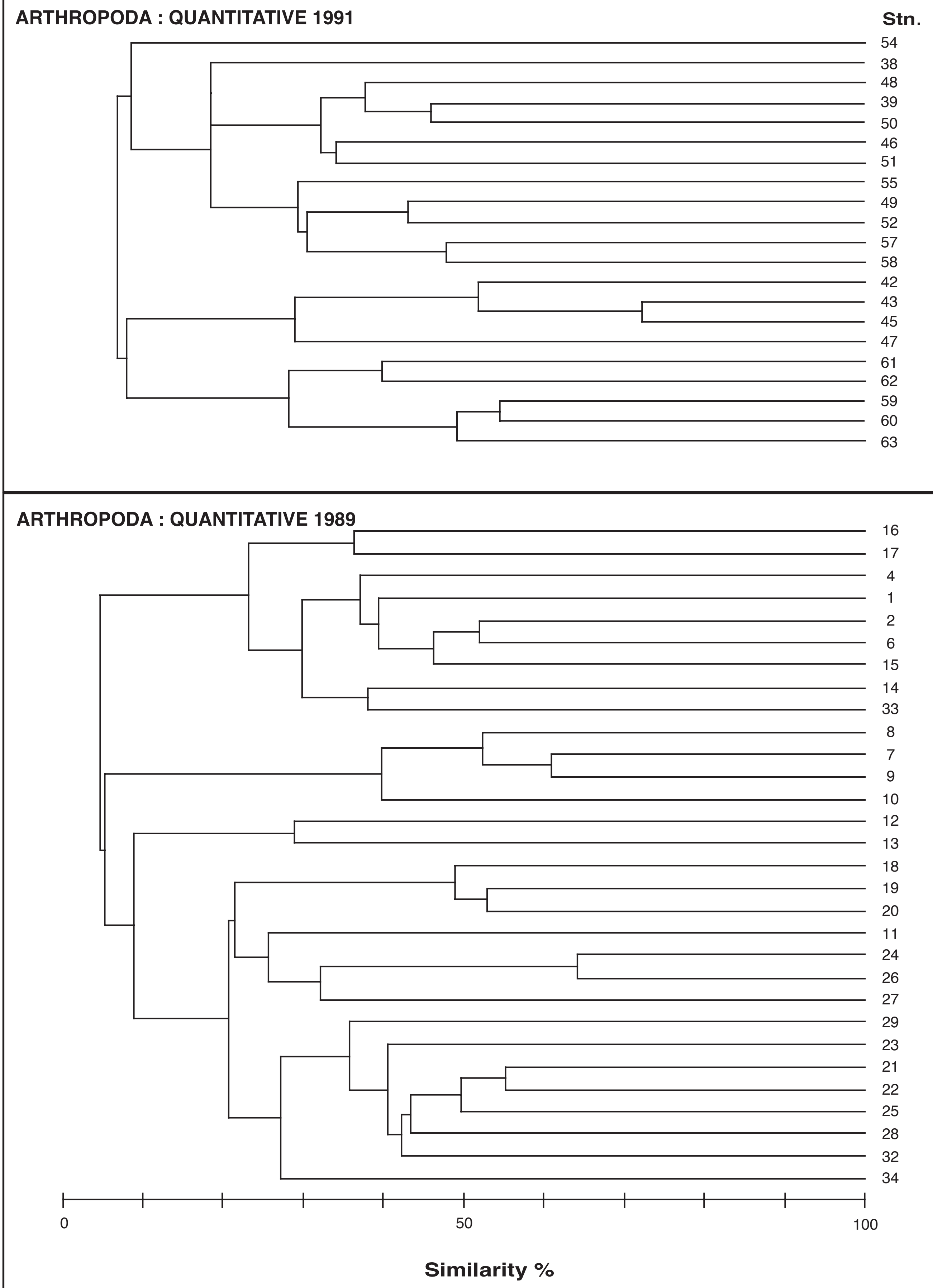

ARTHROPODA : QUANTITATIVE 1991
Stn.
54
38
48
39
50
46
51
55
49
52
57
58
42
43
45
47
61
62
59
60
63
ARTHROPODA : QUANTITATIVE 1989
16
17
4
1
2
6
15
14
33
8
7
9
10
12
13
18
19
20
11
24
26
27
29
23
21
22
25
28
32
34
0
50
100
Similarity %

Fig. A6.11.

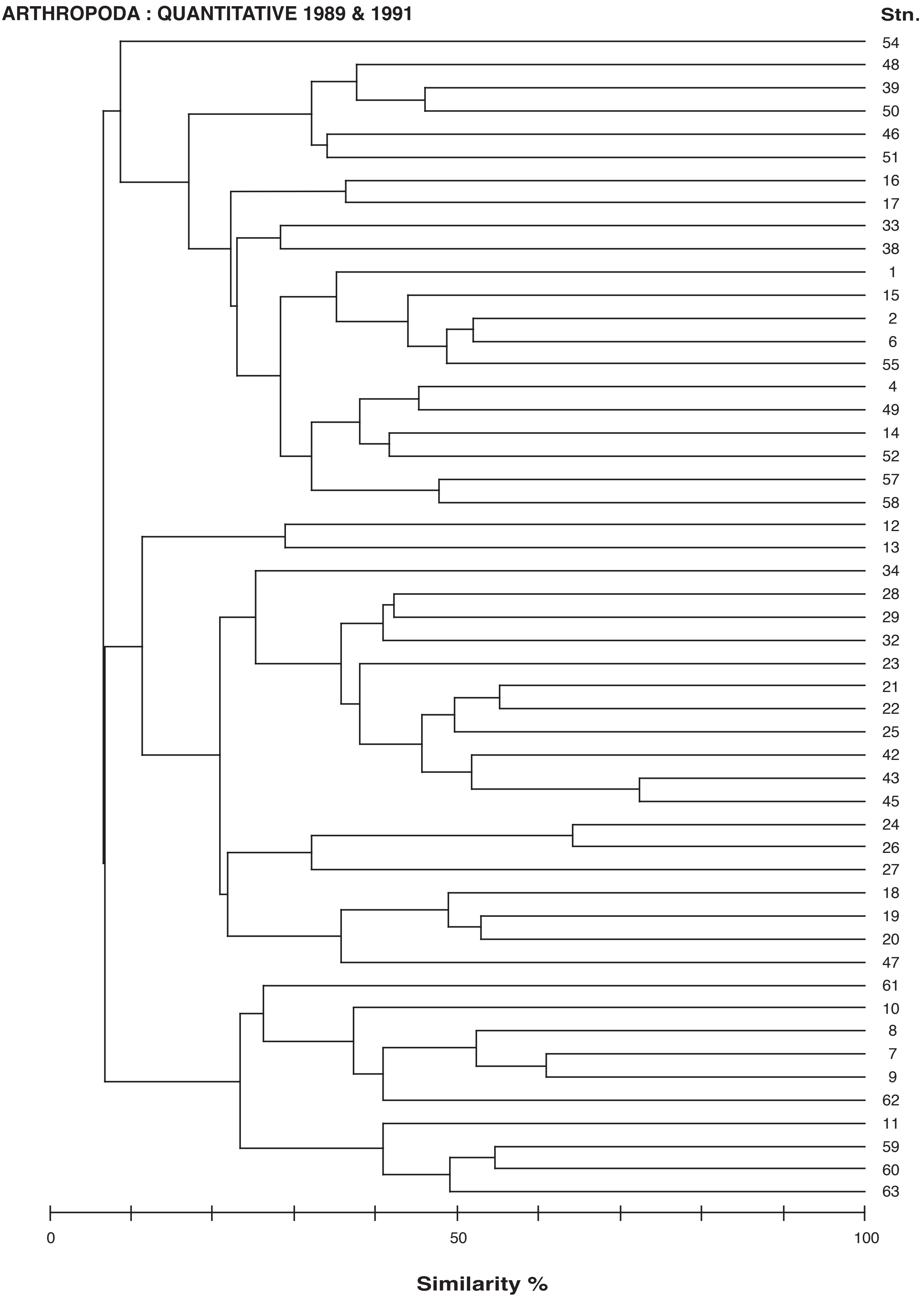
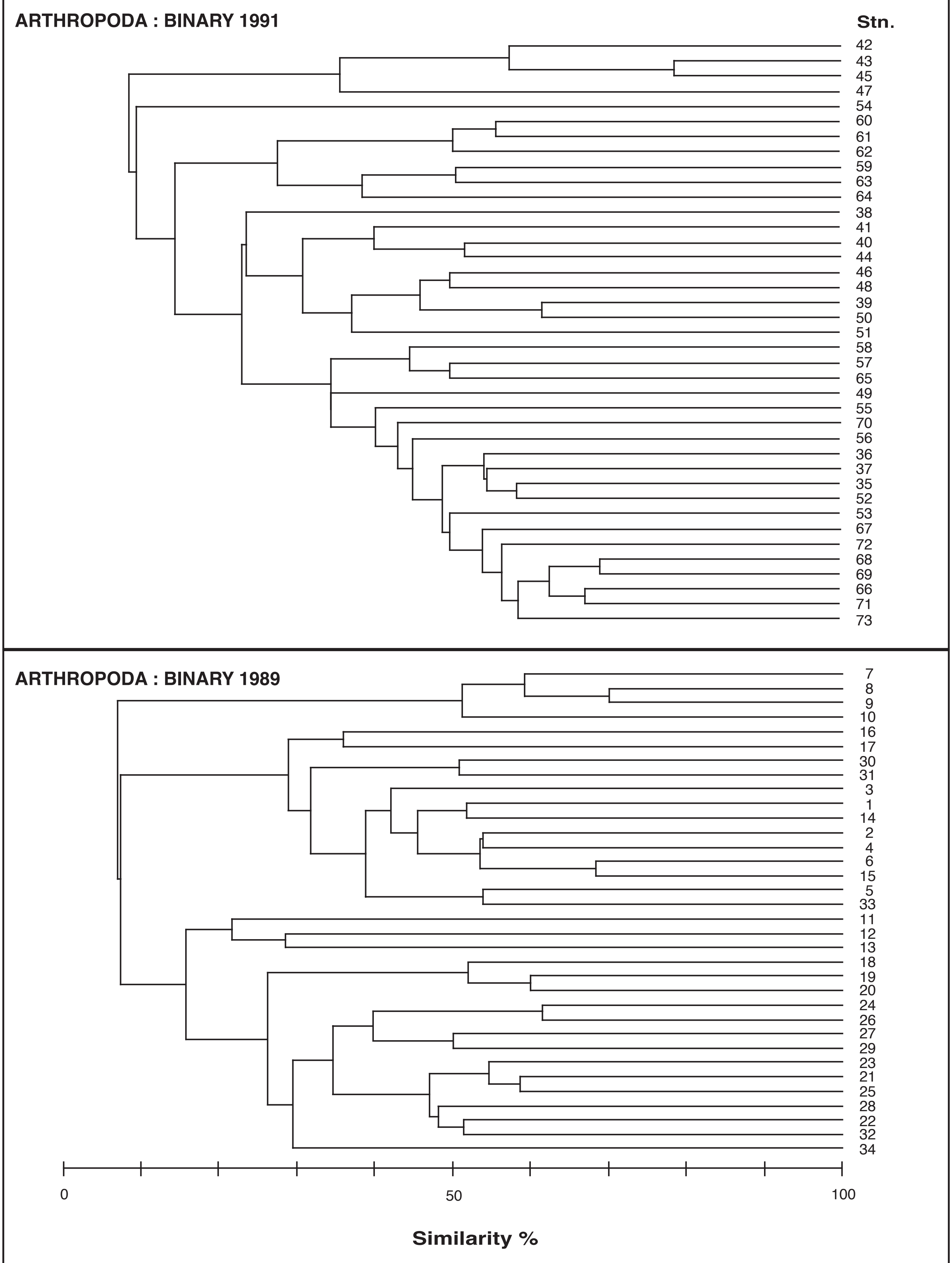

ARTHROPODA : QUANTITATIVE 1989 & 1991
Stn.
54
48
39
50
46
51
16
17
33
38
1
15
2
6
55
4
49
14
52
57
58
12
13
34
28
29
32
23
21
22
25
42
43
45
24
26
27
18
19
20
47
61
10
8
7
9
62
11
59
60
63
0
50
100
Similarity %

Fig. A6.12.



ARTHROPODA : BINARY 1991

ARTHROPODA : BINARY 1989

Fig. A6.13.

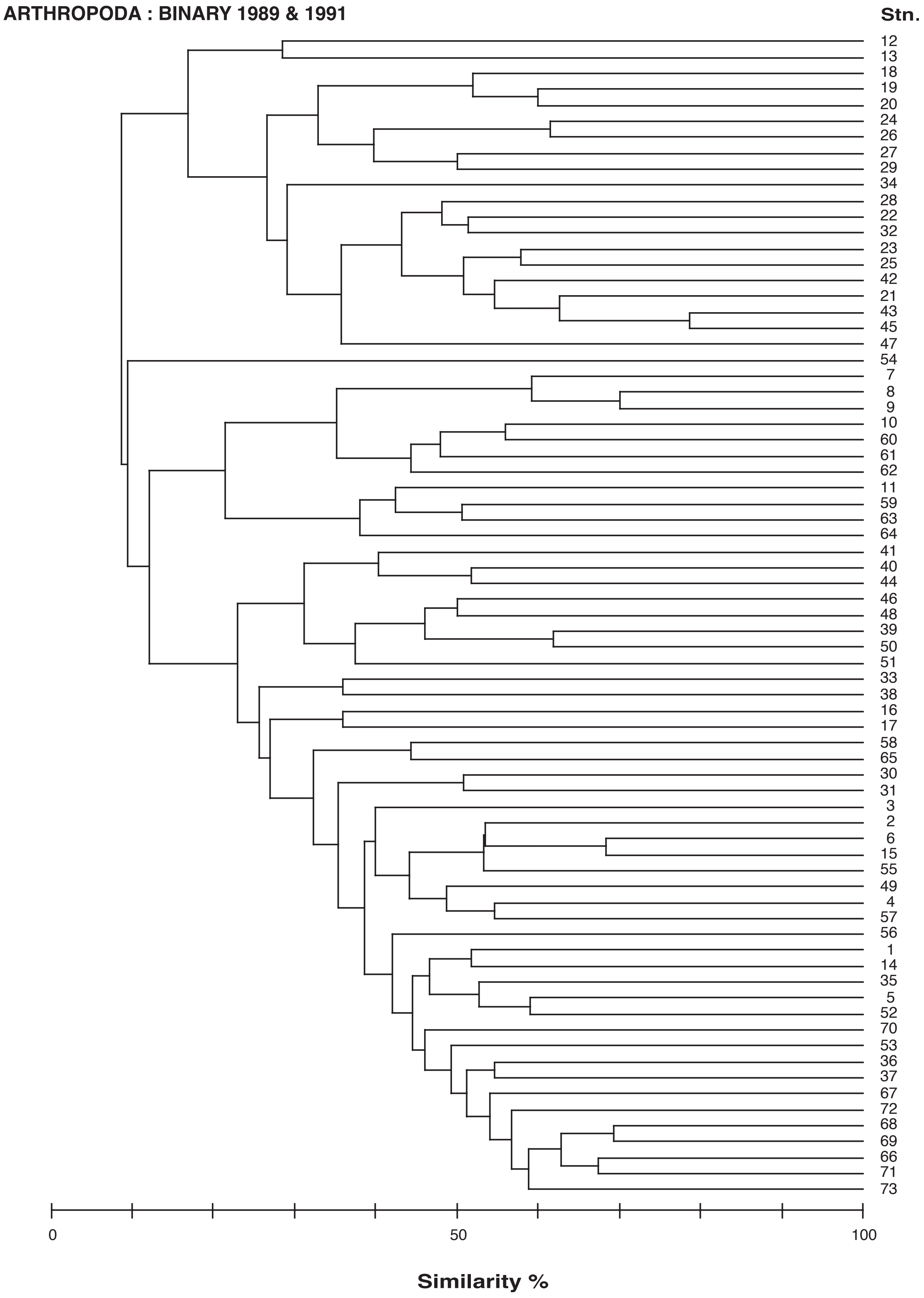

ARTHROPODA : BINARY 1989 & 1991

Fig. A6.14.

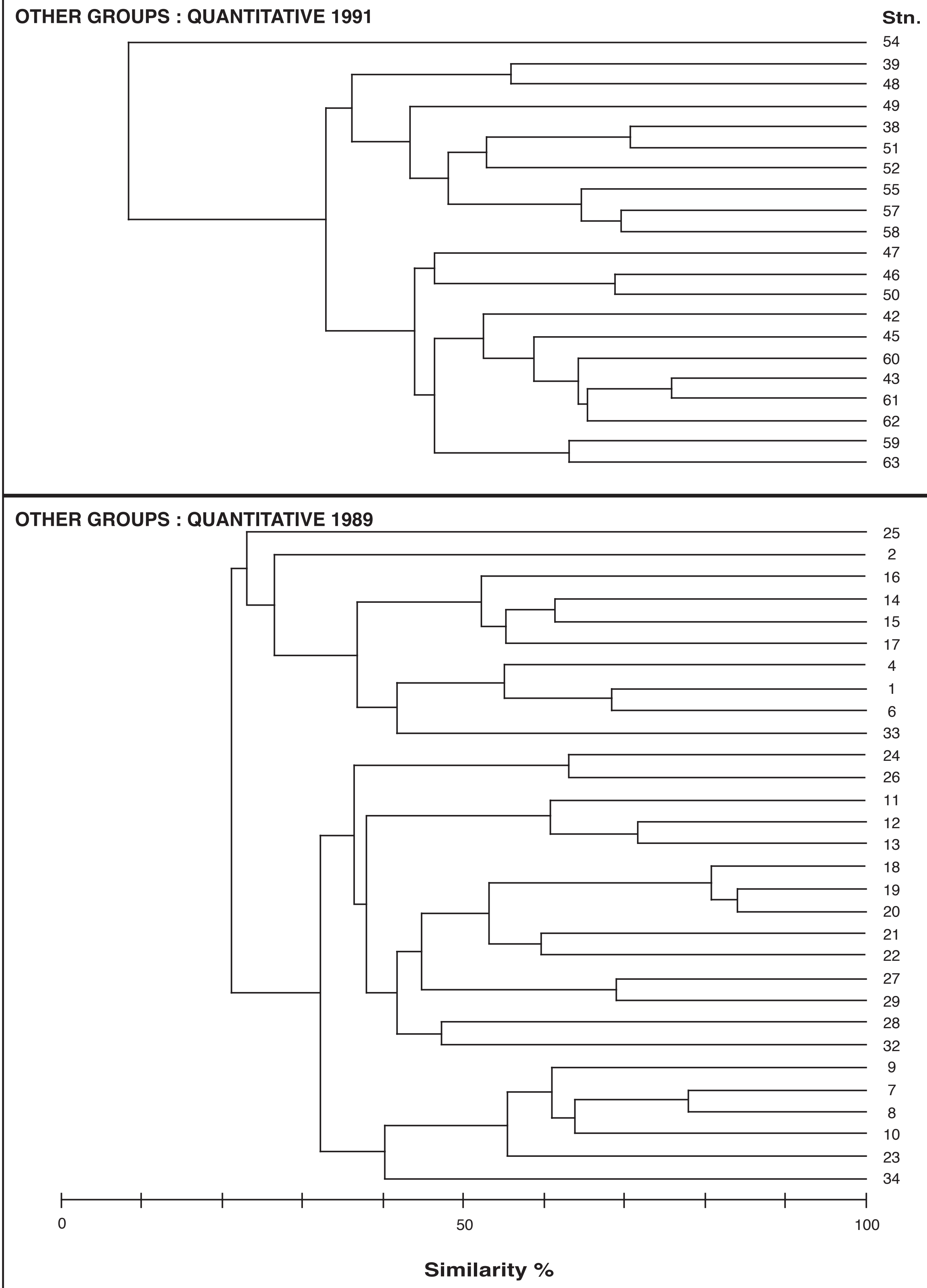

OTHER GROUPS : QUANTITATIVE 1991
Stn.
54
39
48
49
38
51
52
55
57
58
47
46
50
42
45
60
43
61
62
59
63
OTHER GROUPS : QUANTITATIVE 1989
25
2
16
14
15
17
4
1
6
33
24
26
11
12
13
18
19
20
21
22
27
29
28
32
9
7
8
10
23
34
0
50
100
Similarity %

Fig. A6.15.

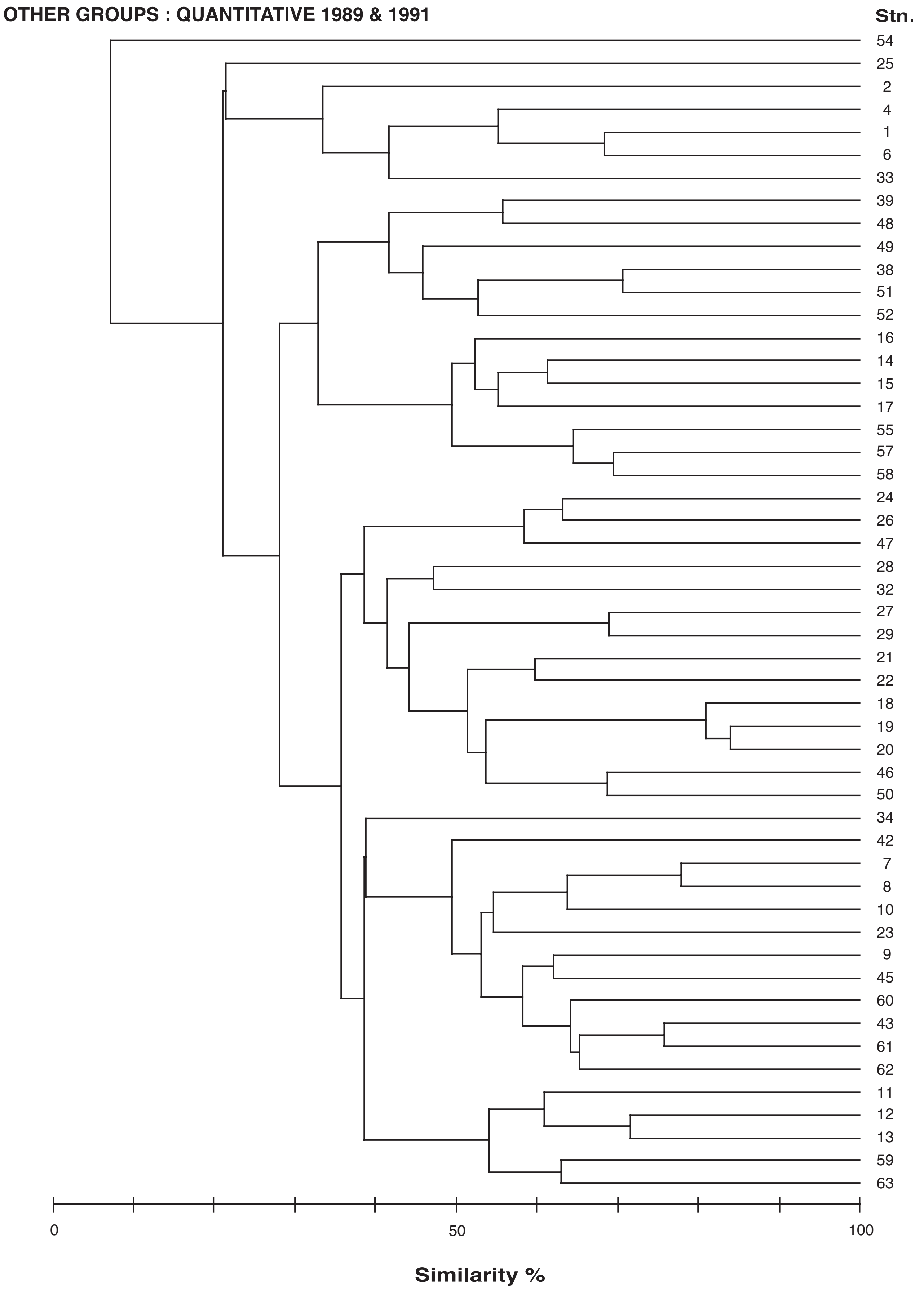
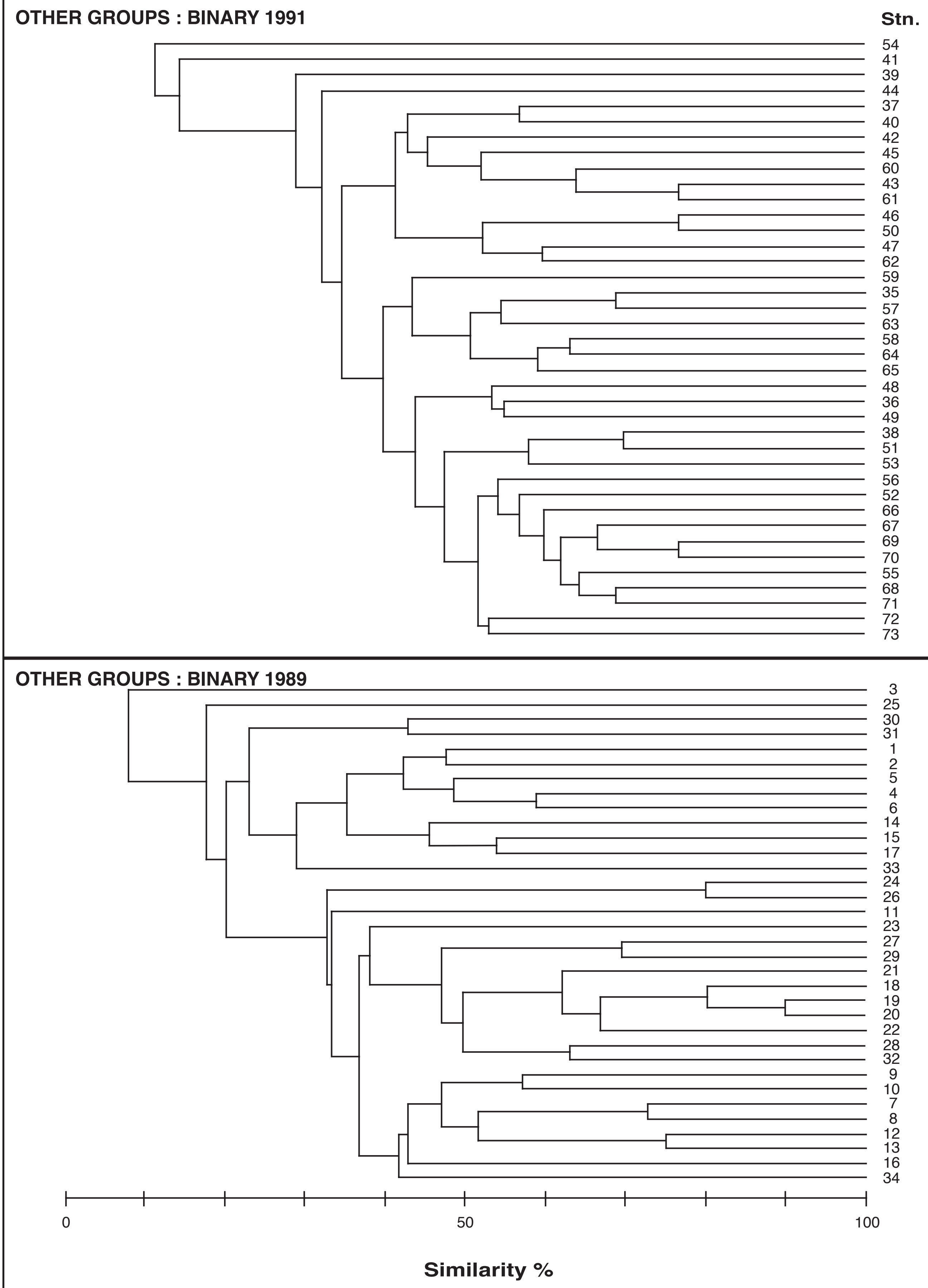

OTHER GROUPS : QUANTITATIVE 1989 & 1991
Stn.
54
25
2
4
1
6
33
39
48
49
38
51
52
16
14
15
17
55
57
58
24
26
47
28
32
27
29
21
22
18
19
20
46
50
34
42
7
8
10
23
9
45
60
43
61
62
11
12
13
59
63
0
50
100
Similarity %

Fig. A6.16.


OTHER GROUPS : BINARY 1991

OTHER GROUPS : BINARY 1989

Fig. A6.17.

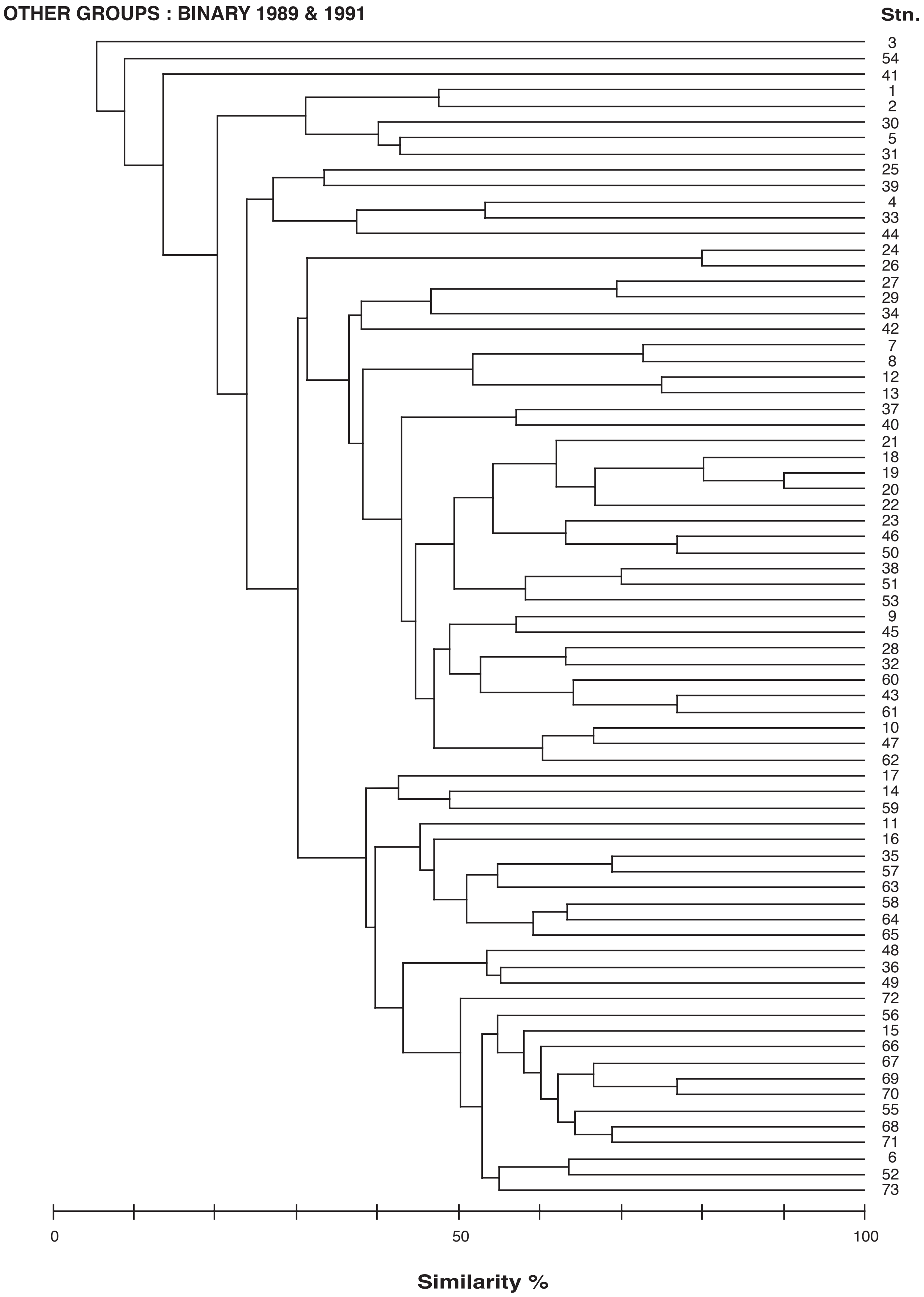

OTHER GROUPS : BINARY 1989 & 1991
Stn.
3
54
41
1
2
30
5
31
25
39
4
33
44
24
26
27
29
34
42
7
8
12
13
37
40
21
18
19
20
22
23
46
50
38
51
53
9
45
28
32
60
43
61
10
47
62
17
14
59
11
16
35
57
63
58
64
65
48
36
49
72
56
15
66
67
69
70
55
68
71
6
52
73
0
50
100
Similarity %

Fig. A6.18.

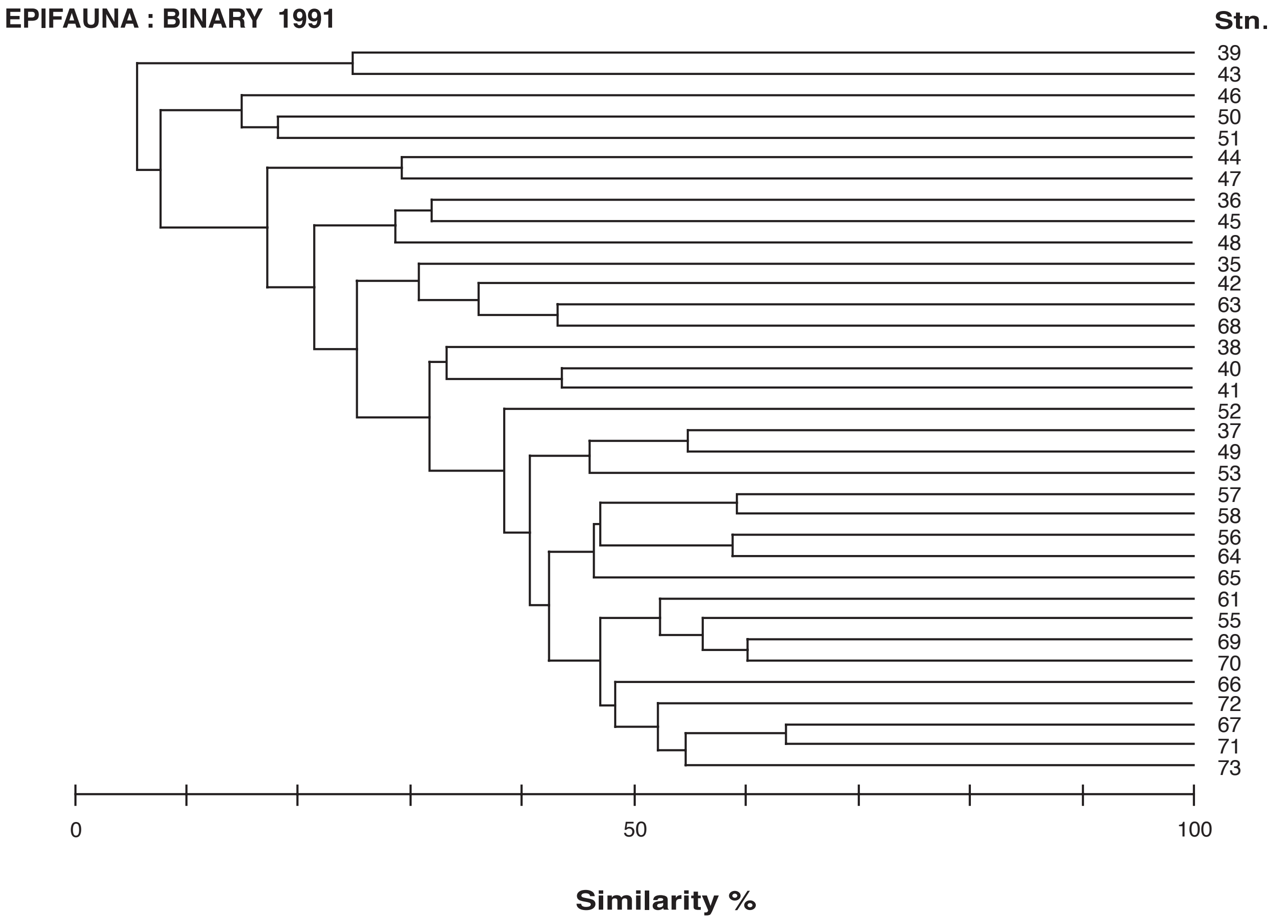
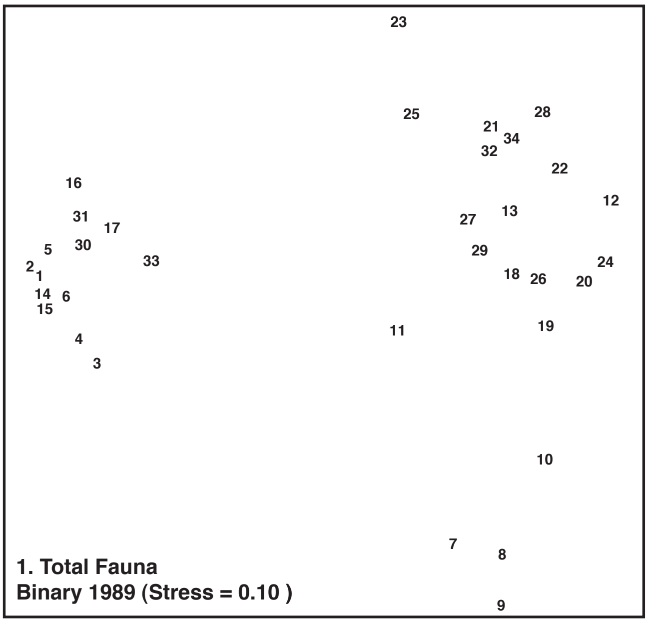

EPIFAUNA : BINARY 1991
Stn.
39
43
46
50
51
44
47
36
45
48
35
42
63
68
38
40
41
52
37
49
53
57
58
56
64
65
61
55
69
70
66
72
67
71
73
0
50
100
Similarity %

Fig. A6.19.

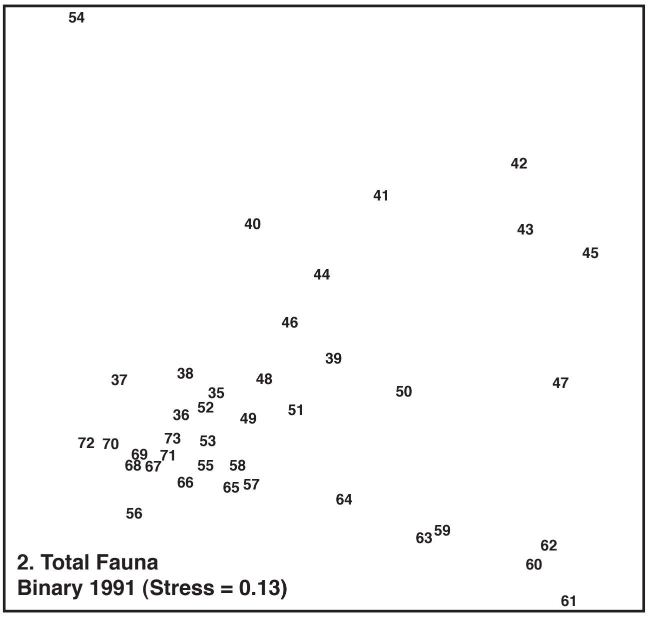
Appendix 7
Non-metric multidimensional scaling (MDS) ordinations of the southern Irish Sea macrofauna

Figs. A7.1 - 3	*Total fauna (binary)*
Fig. A7.4	*Epifauna (binary)*
Figs. A7.5 - 10	*Annelida*
Figs. A7.11 - 16	*Mollusca*
Figs. A7.17 - 22	*Arthropoda*
Figs. A7.23 - 28	*Other Phyla*

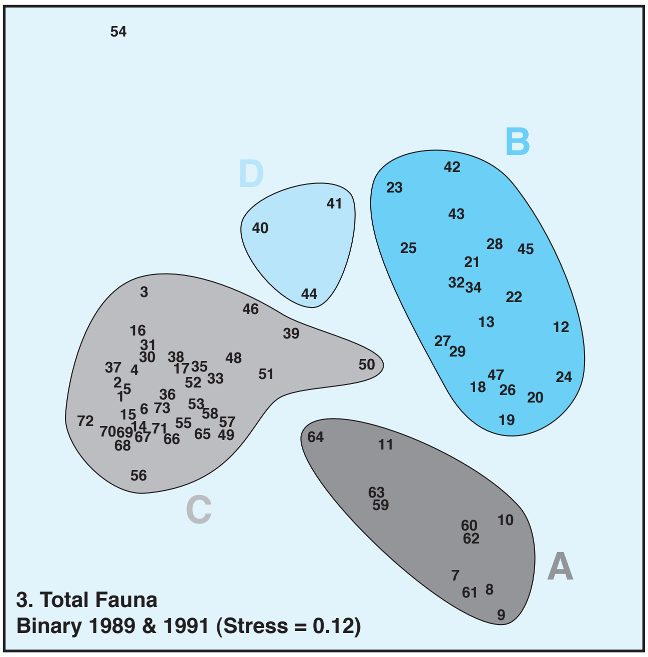
Figs. A7.1 - 4: Non-metric multidimensional scaling (MDS) ordinations using presence - absence data.



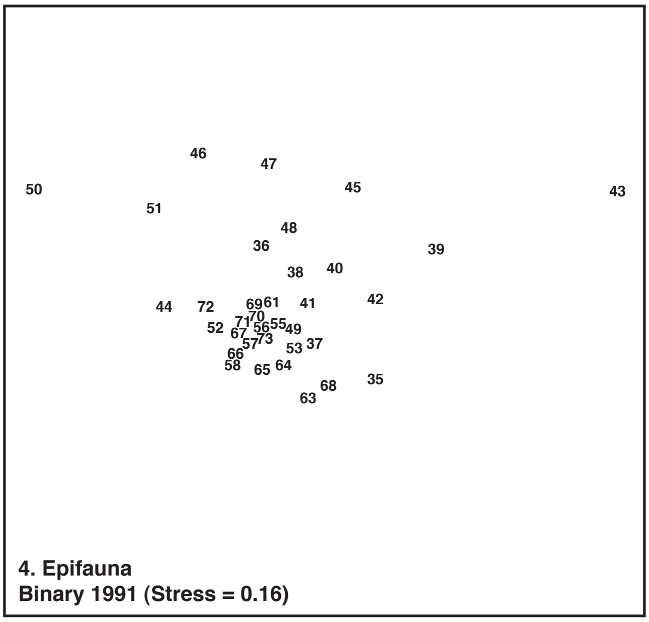
1. Total Fauna
Binary 1989 (Stress = 0.10)



2. Total Fauna
Binary 1991 (Stress = 0.13)

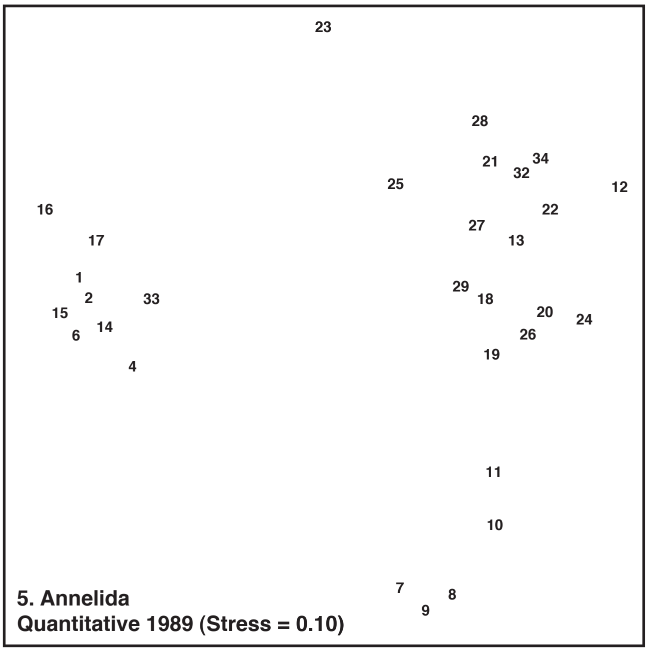


3. Total Fauna
Binary 1989 & 1991 (Stress = 0.12)

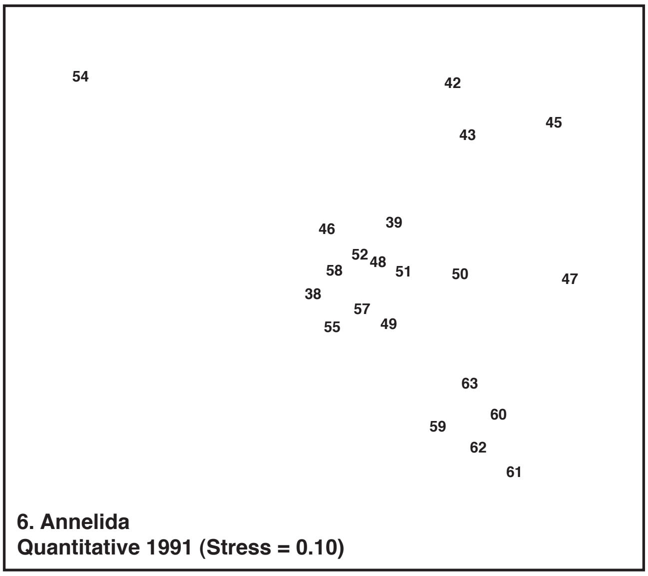


4. Epifauna
Binary 1991 (Stress = 0.16)

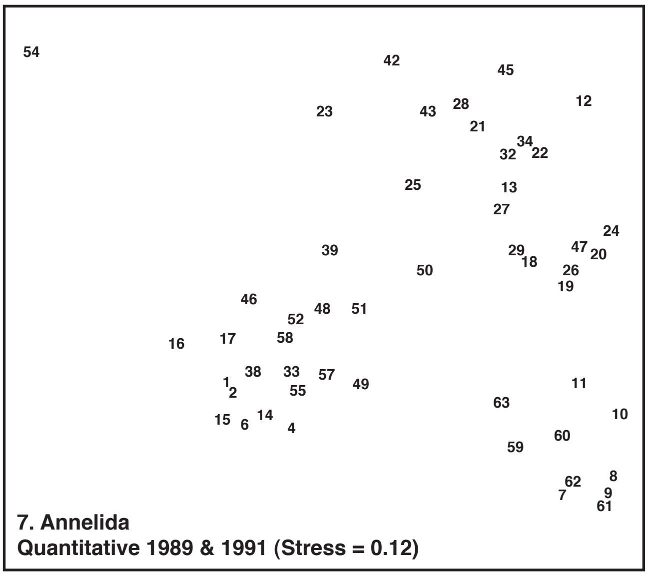
Figs. A7.5-7: Non - metric multidimensional scaling (MDS) ordinations using log transformed abundances.



5. Annelida
Quantitative 1989 (Stress = 0.10)

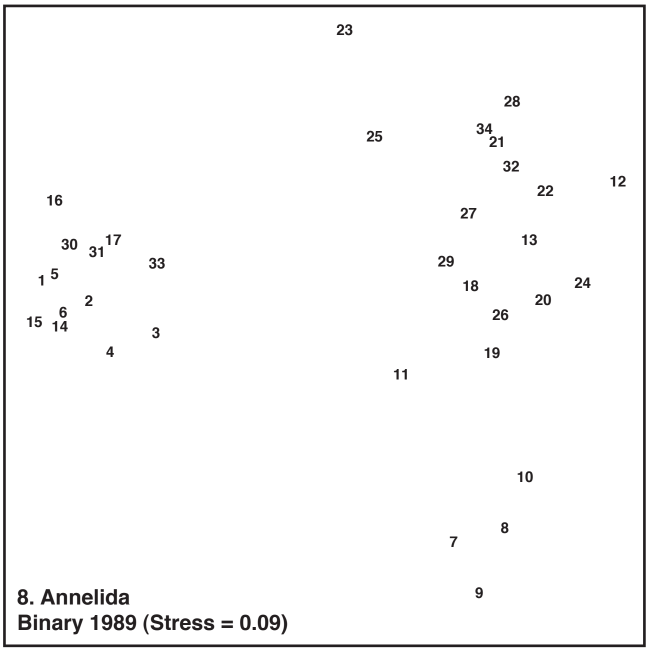


6. Annelida
Quantitative 1991 (Stress = 0.10)

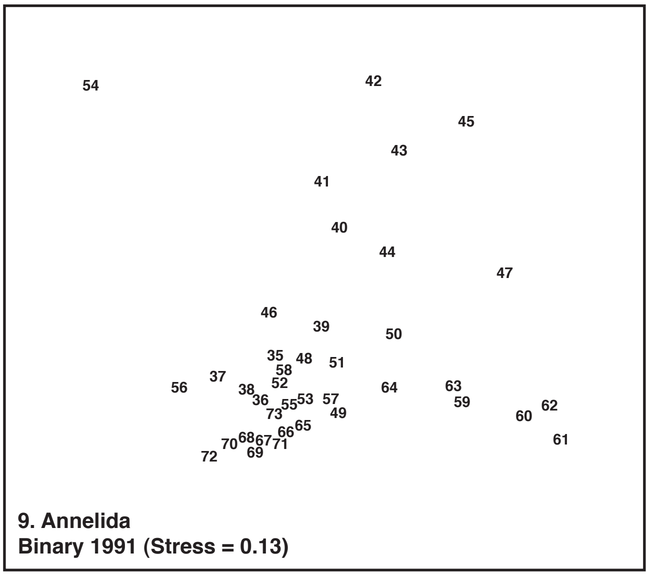


7. Annelida
Quantitative 1989 & 1991 (Stress = 0.12)

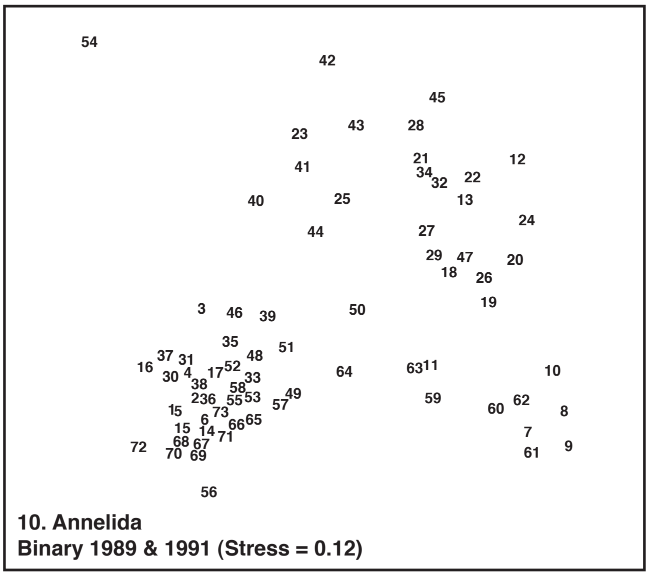
Figs. A7.8-10: Non - metric multidimensional scaling (MDS) ordinations using presence - absence data.



8. Annelida
Binary 1989 (Stress = 0.09)



9. Annelida
Binary 1991 (Stress = 0.13)

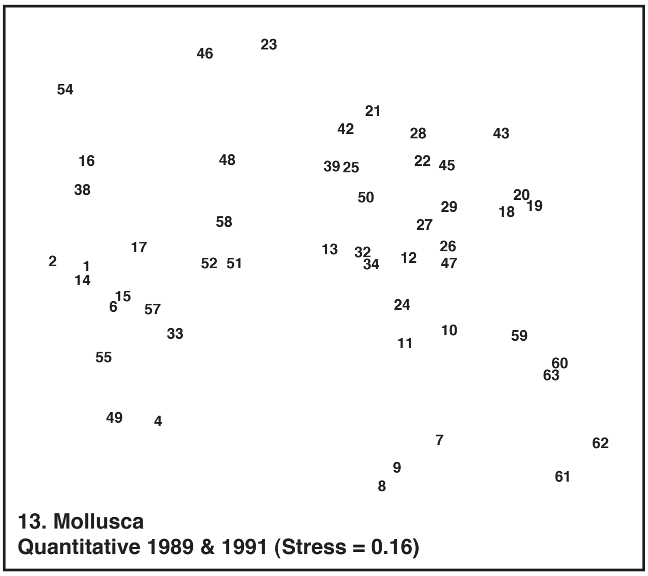


10. Annelida
Binary 1989 & 1991 (Stress = 0.12)

Figs. A7.11-13: Non - metric multidimensional scaling (MDS) ordinations using log transformed abundances.

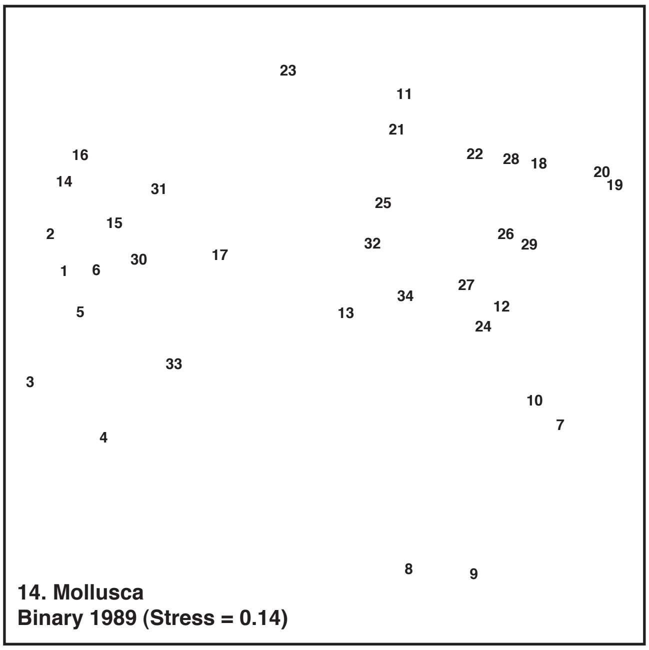
11. Mollusca
Quantitative 1989 (Stress = 0.13)

12. Mollusca
Quantitative 1991 (Stress = 0.13)

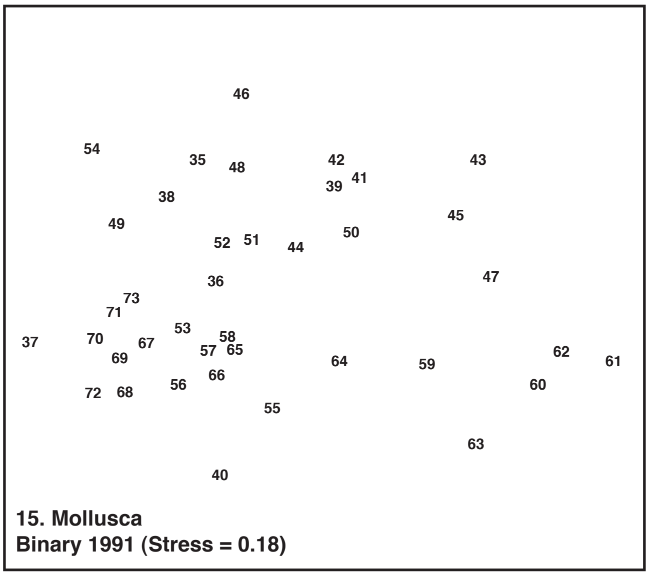


13. Mollusca
Quantitative 1989 & 1991 (Stress = 0.16)

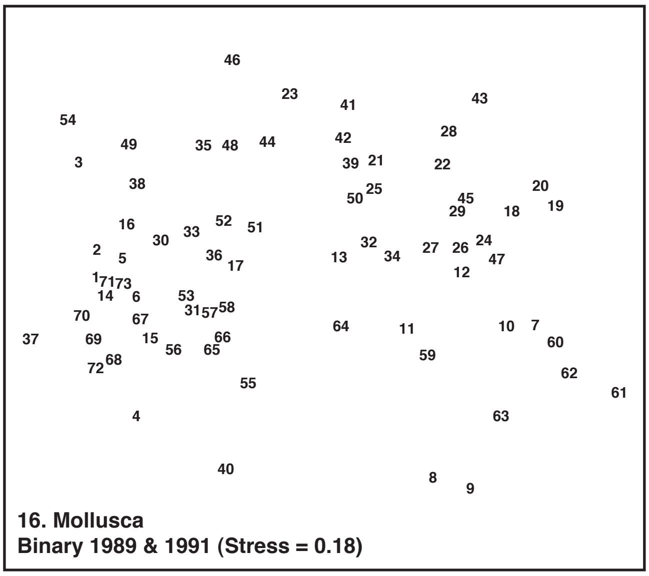
Figs. A7.14-16: Non - metric multidimensional scaling (MDS) ordinations using presence - absence data.



14. Mollusca
Binary 1989 (Stress = 0.14)

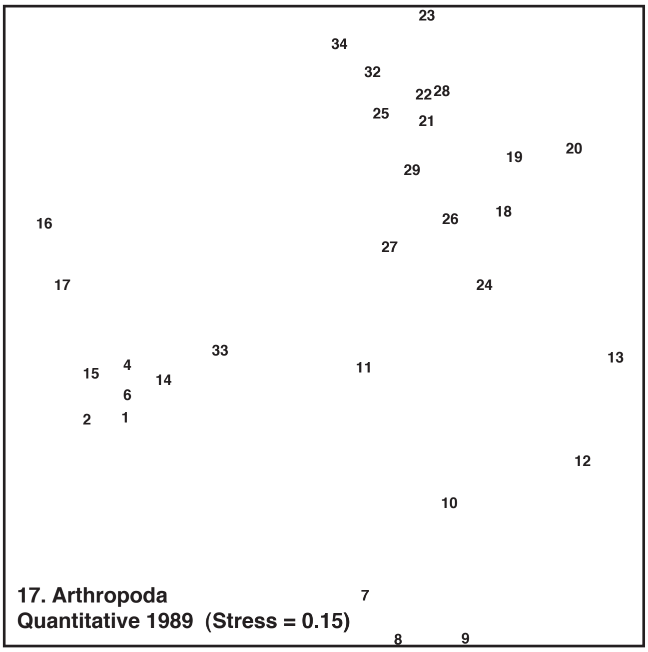


15. Mollusca
Binary 1991 (Stress = 0.18)

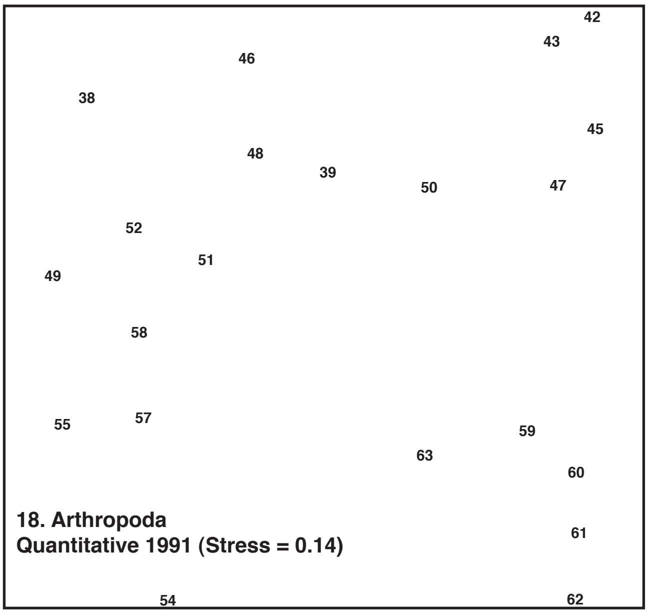


16. Mollusca
Binary 1989 & 1991 (Stress = 0.18)

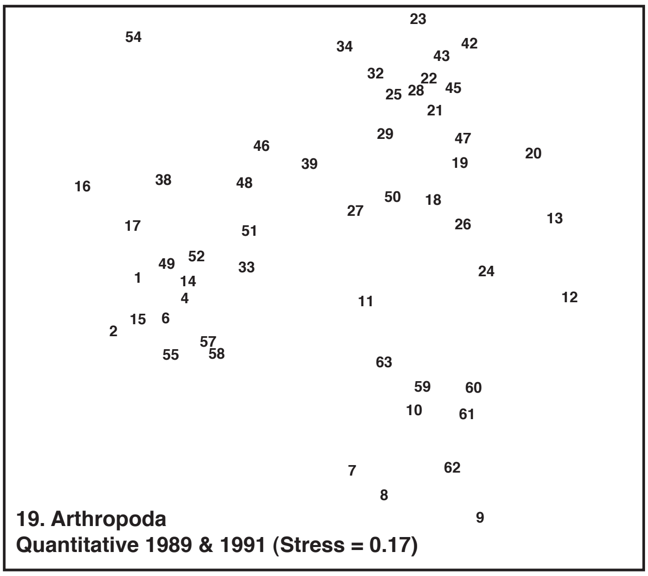
Figs. A17-19: Non - metric multidimensional scaling (MDS) ordinations using log transformed abundances.



17. Arthropoda
Quantitative 1989 (Stress = 0.15)

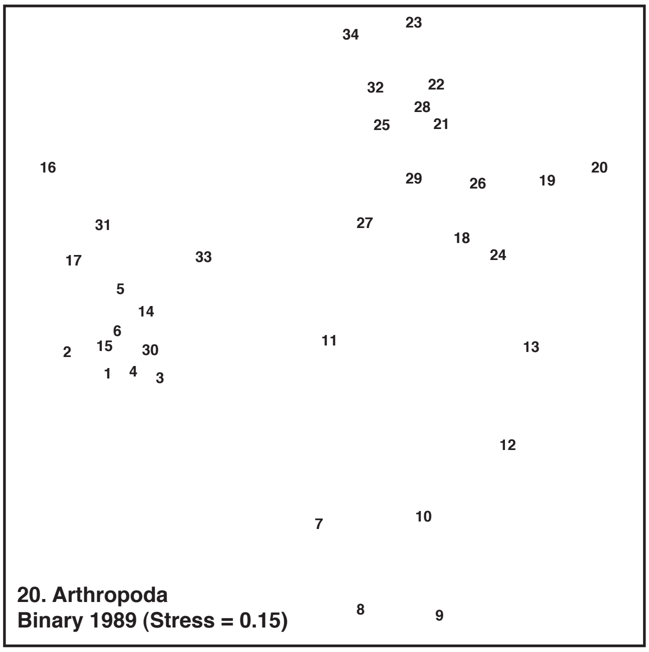


18. Arthropoda
Quantitative 1991 (Stress = 0.14)

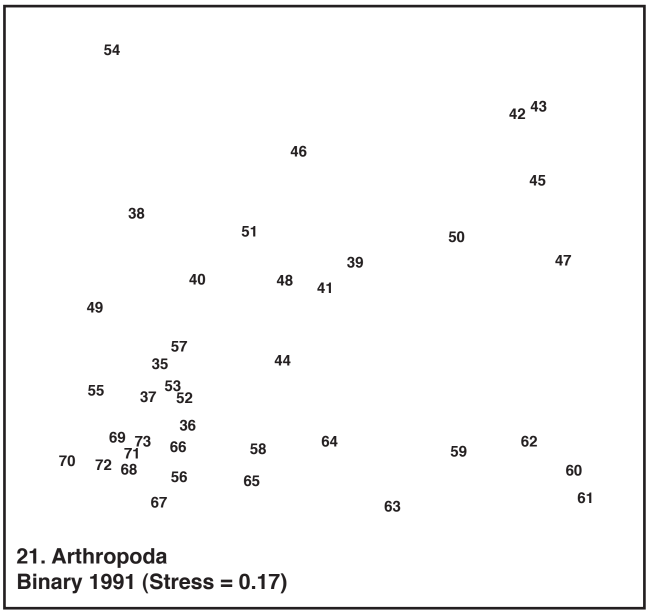


19. Arthropoda
Quantitative 1989 & 1991 (Stress = 0.17)

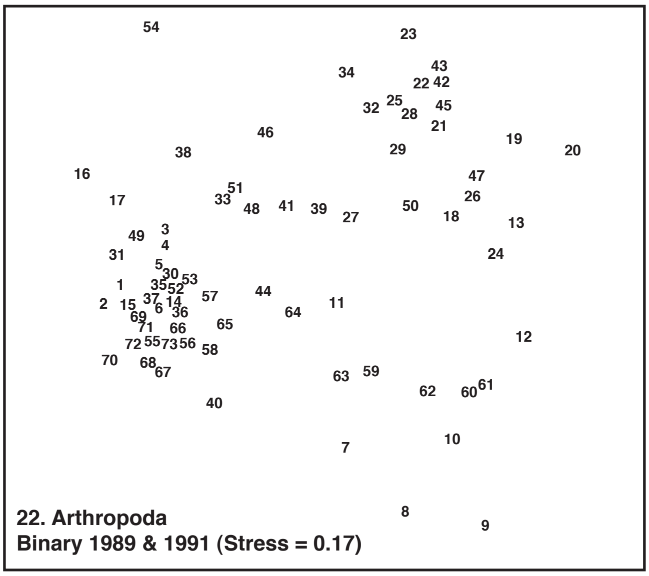
Figs. A7.20-22: Non - metric multidimensional scaling (MDS) ordinations using presence - absence data.



20. Arthropoda
Binary 1989 (Stress = 0.15)

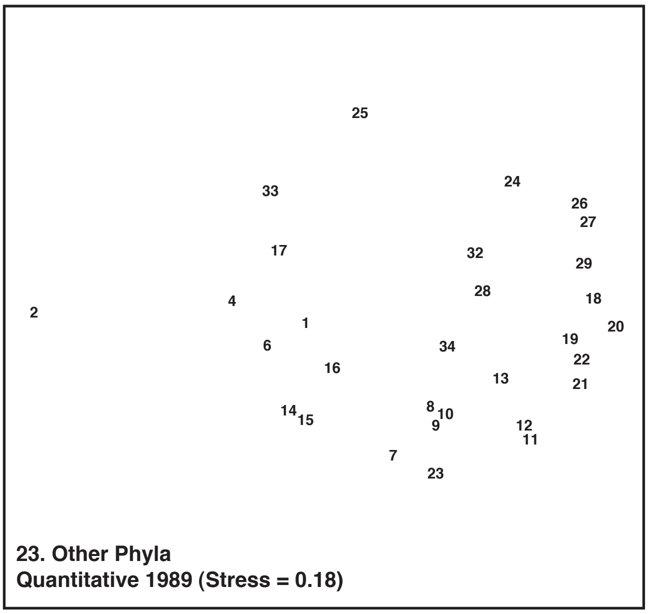


21. Arthropoda
Binary 1991 (Stress = 0.17)

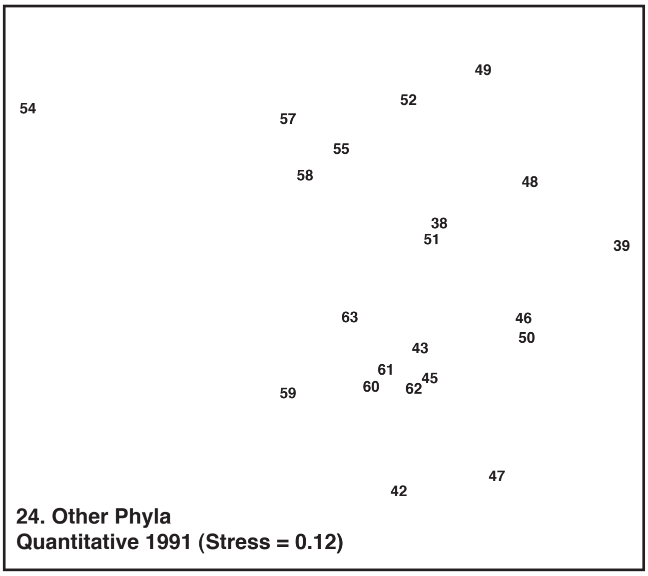


22. Arthropoda
Binary 1989 & 1991 (Stress = 0.17)

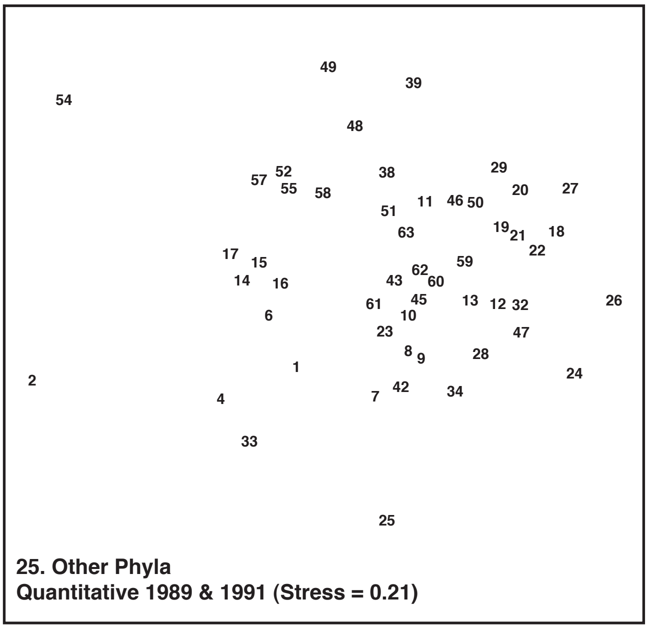
Figs. A7.23-25: Non - metric multidimensional scaling (MDS) ordinations using log transformed abundances.



23. Other Phyla
Quantitative 1989 (Stress = 0.18)

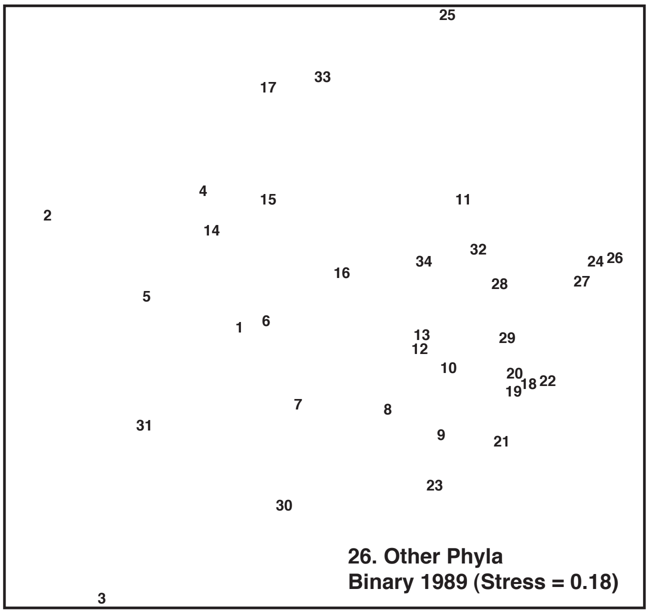


24. Other Phyla
Quantitative 1991 (Stress = 0.12)

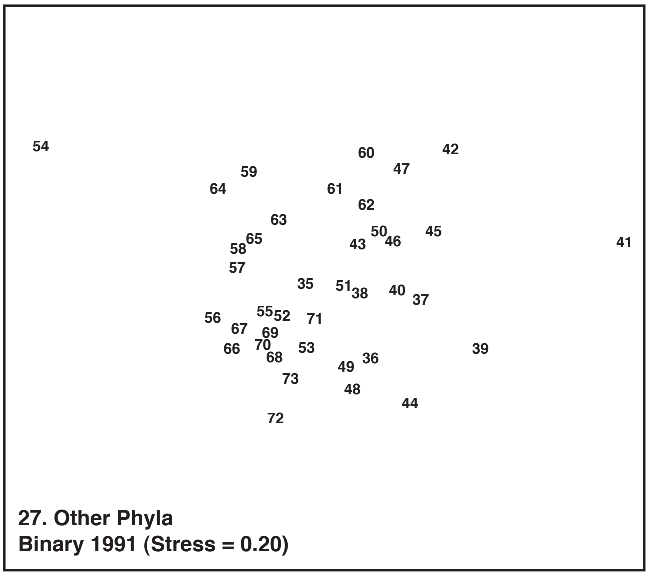


25. Other Phyla
Quantitative 1989 & 1991 (Stress = 0.21)

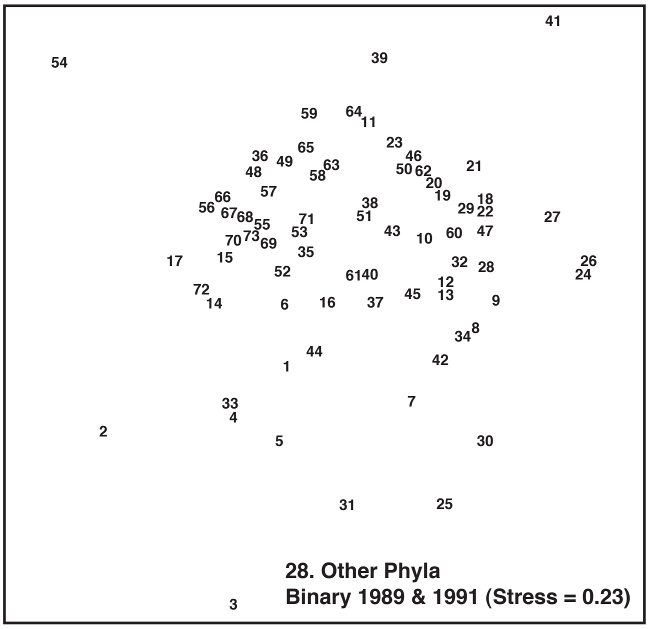
Figs. A7.26-28: Non - metric multidimensional scaling (MDS) ordinations using presence - absence data.



26. Other Phyla
Binary 1989 (Stress = 0.18)



27. Other Phyla
Binary 1991 (Stress = 0.20)



28. Other Phyla
Binary 1989 & 1991 (Stress = 0.23)

Appendix 8
Top ranked species for each station

Assemblage Group A1	*Stns. 7, 8, 9, 10, 61, 62*
Assemblage Group A2	*Stns. 11, 59, 60, 63*
Assemblage Group B1	*Stns. 18, 19, 20, 24, 26, 27, 29, 47*
Assemblage Group B2	*Stns. 12, 13*
Assemblage Group B3	*Stns. 32, 34, 50*
Assemblage Group B4	*Stns. 21, 22, 25, 28, 42, 43, 45*
Ungrouped	*Stn. 23*
Assemblage Group C1	*Stns. 1, 2, 4, 6, 14, 15, 16, 17, 33, 38, 49, 51, 52, 55, 57, 58*
Assemblage Group C2	*Stns. 39, 46, 48*
Ungrouped	*Stn. 54*

Station 7. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Atherospio disticha	29	10.55	10.55
2	Levinsenia sp.	17	6.18	16.73
3	Exogone hebes	15	5.45	22.18
4	Apistobranchus spp.	13	4.73	26.91
5	Lumbrineris scopa	12	4.36	31.27
-	Mediomastus fragilis	12	4.36	35.64
-	OPHIUROIDEA juv.	12	4.36	40.00
8	Spiophanes kroyeri	10	3.64	43.64
-	Diastylis lucifera	10	3.64	47.27
-	Abra alba	10	3.64	50.91
-	SPATANGIDAE juv.	10	3.64	54.55
12	Nephtys hystricis	9	3.27	57.82
13	Pseudarachna hirsuta	8	2.91	60.73
-	Leucon nasica	8	2.91	63.64
-	Nucula sulcata	8	2.91	66.55
16	Magelona minuta	7	2.55	69.09
-	Tubificoides amplivasatus	7	2.55	71.64
18	Glyphohesione klatti	6	2.18	73.82
-	Glycera alba	6	2.18	76.00
20	NEMERTEA spp.	5	1.82	77.82
21	Lagis koreni	4	1.45	79.27
22	Praxillella affinis	3	1.09	80.36
-	Terebellides stroemi	3	1.09	81.45
-	Saxicavella jeffreysi	3	1.09	82.55

Station 8. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Levinsenia sp.	35	11.29	11.29
2	Praxillella affinis	22	7.10	18.39
3	Spiophanes kroyeri	21	6.77	25.16
4	Tubificoides amplivasatus	18	5.81	30.97
5	Nucula sulcata	17	5.48	36.45
6	Lumbrineris scopa	14	4.52	40.97
-	Apistobranchus spp.	14	4.52	45.48
-	OPHIUROIDEA juv.	14	4.52	50.00
9	Mediomastus fragilis	12	3.87	53.87
-	NEMERTEA spp.	12	3.87	57.74
11	Abra alba	10	3.23	60.97
12	Gyptis rosea	6	1.94	62.90
-	Glyphohesione klatti	6	1.94	64.84
-	Nephtys hystricis	6	1.94	66.77
-	Prionospio sp.	6	1.94	68.71
-	Galathowenia sp.A	6	1.94	70.65
17	Exogone hebes	5	1.61	72.26
-	Glycera alba	5	1.61	73.87
-	Parougia eliasoni	5	1.61	75.48
-	Aricidea catherinae	5	1.61	77.10
-	Prionospio cirrifera	5	1.61	78.71
22	Magelona minuta	4	1.29	80.00
-	Eriopisa elongata	4	1.29	81.29
-	Leucon nasica	4	1.29	82.58
-	SPATANGIDAE juv.	4	1.29	83.87

Station 9. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Abra alba	28	9.49	9.49
2	Praxillella affinis	27	9.15	18.64
3	Leucon nasica	24	8.14	26.78
4	Magelona minuta	21	7.12	33.90
5	Levinsenia sp.	20	6.78	40.68
6	Lumbrineris scopa	16	5.42	46.10
7	Nuculoma tenuis	13	4.41	50.51
8	Aricidea catherinae	12	4.07	54.58
9	Prionospio sp.	10	3.39	57.97
-	OPHIUROIDEA juv.	10	3.39	61.36
11	Exogone hebes	9	3.05	64.41
-	Tubificoides amplivasatus	9	3.05	67.46
-	NEMERTEA spp.	9	3.05	70.51
14	Pseudarachna hirsuta	8	2.71	73.22
15	Mediomastus fragilis	7	2.37	75.59
16	Glyphohesione klatti	6	2.03	77.63
-	Harpinia antennaria	6	2.03	79.66
-	Cylichna cylindracea	6	2.03	81.69
19	Apistobranchus spp.	5	1.69	83.39
20	Nucula sulcata	4	1.36	84.75
21	HARMOTHOINAE indet.	3	1.02	85.76
-	Galathowenia sp.A	3	1.02	86.78
-	Lagis koreni	3	1.02	87.80
-	Diastylis lucifera	3	1.02	88.81

Station 61. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Levinsenia sp.	92	21.60	21.60
2	Abra nitida	37	8.69	30.28
3	Tubificoides amplivasatus	29	6.81	37.09
4	Prionospio sp.	22	5.16	42.25
5	NEMERTEA spp.	18	4.23	46.48
6	Nuculoma tenuis	15	3.52	50.00
7	Magelona minuta	14	3.29	53.29
-	Ampharete falcata	14	3.29	56.57
9	Glyphohesione klatti	12	2.82	59.39
-	Lumbrineris scopa	12	2.82	62.21
11	Nucula sulcata	11	2.58	64.79
12	Praxillella affinis	10	2.35	67.14
13	Mediomastus fragilis	9	2.11	69.25
-	OPHIUROIDEA juv.	9	2.11	71.36
15	Apistobranchus spp.	8	1.88	73.24
-	Terebellides stroemi	8	1.88	75.12
17	Gyptis rosea	7	1.64	76.76
-	Spiophanes kroyeri	7	1.64	78.40
19	Aricidea catherinae	6	1.41	79.81
-	Atherospio disticha	6	1.41	81.22
-	Sabella pavonina	6	1.41	82.63
22	Ancistrosyllis groenlandica	5	1.17	83.80
-	Leucon nasica	5	1.17	84.98
24	Galathowenia sp.A.	4	0.94	85.92
-	Araphura brevimana	4	0.94	86.85
-	Pulsellum lofotense	4	0.94	87.79

Station 62. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Abra nitida	181	27.14	27.14
2	Ampharete falcata	60	9.00	36.13
3	NEMERTEA spp.	45	6.75	42.88
4	Corbula gibba	39	5.85	48.73
5	Levinsenia sp.	25	3.75	52.47
-	Spiophanes kroyeri	25	3.75	56.22
-	Tubificoides amplivasatus	25	3.75	59.97
8	Lumbrineris scopa	18	2.70	62.67
9	Prionospio sp.	16	2.40	65.07
10	Paradoneis lyra	14	2.10	67.17
11	OPHIUROIDEA juv.	13	1.95	69.12
12	Praxillella affinis	12	1.80	70.91
-	Pulsellum lofotense	12	1.80	72.71
-	Nucula sulcata	12	1.80	74.51
15	Pseudomystides spinachia	11	1.65	76.16
-	Gyptis rosea	11	1.65	77.81
-	Parvicardium minimum	11	1.65	79.46
18	Galathowenia sp.A	10	1.50	80.96
19	Grania sp.	9	1.35	82.31
20	Nephtys hystricis	7	1.05	83.36
-	Tharyx killariensis	7	1.05	84.41
-	Diplocirrus glaucus	7	1.05	85.46
-	Mediomastus fragilis	7	1.05	86.51
24	Glyphohesione klatti	5	0.75	87.26
-	Magelona minuta	5	0.75	88.01
-	Pseudarachna hirsuta	5	0.75	88.76

Station 10. (Assemblage Group A1)

Rank	Species	Number	%	Cum.%
1	Abra alba	251	36.01	36.01
2	Cylichna cylindracea	71	10.19	46.20
3	Mysella bidentata	49	7.03	53.23
4	Nuculoma tenuis	44	6.31	59.54
5	OPHIUROIDEA juv.	24	3.44	62.98
6	Prionospio dubia	15	2.15	65.14
7	Levinsenia sp.	14	2.01	67.14
8	Harpinia antennaria	13	1.87	69.01
9	Mediomastus fragilis	12	1.72	70.73
10	Lumbrineris scopa	11	1.58	72.31
11	Aricidea catherinae	10	1.43	73.74
-	Aricidea laubieri	10	1.43	75.18
13	Chaetozone sp.A	9	1.29	76.47
-	Diplocirrus glaucus	9	1.29	77.76
15	Spiophanes kroyeri	8	1.15	78.91
16	Prionospio cirrifera	7	1.00	79.91
-	Ophelina acuminata	7	1.00	80.92
-	Nucula sulcata	7	1.00	81.92
-	Phaxas pellucidus	7	1.00	82.93
-	NEMERTEA spp.	7	1.00	83.93
21	Magelona minuta	6	0.86	84.79
22	Galathowenia sp.A	5	0.72	85.51
-	Ampharete falcata	5	0.72	86.23
-	Harpinia pectinata	5	0.72	86.94
-	Ampelisca spinipes	5	0.72	87.66

Station 59. (Assemblage Group A2)

Rank	Species	Number	%	Cum.%
1	OPHIUROIDEA juv.	148	14.95	14.95
2	Ampharete falcata	106	10.71	25.66
3	Araphura brevimana	44	4.44	30.10
4	Abra nitida	43	4.34	34.44
5	Galathowenia sp.A	35	3.54	37.98
-	Nuculoma tenuis	35	3.54	41.52
-	Phaxas pellucidus	35	3.54	45.05
-	Amphiura filiformis	35	3.54	48.59
9	Pholoe tuberculata	29	2.93	51.52
10	Paradoneis lyra	25	2.53	54.04
-	Spiophanes kroyeri	25	2.53	56.57
-	Leptognathia gracilis	25	2.53	59.09
-	NEMERTEA spp.	25	2.53	61.62
14	Diplocirrus glaucus	22	2.22	63.84
15	Pulsellum lofotense	21	2.12	65.96
16	Ophelina modesta	20	2.02	67.98
-	Pseudarachna hirsuta	20	2.02	70.00
18	Terebellides stroemi	18	1.82	71.82
19	Praxillella affinis	14	1.41	73.23
20	Vitreolina philippi	13	1.31	74.55
21	Ophelina acuminata	12	1.21	75.76
22	AMPHARETINAE juv.	11	1.11	76.87
23	Ophelina cylindricaudata	10	1.01	77.88
-	Tubificoides amplivasatus	10	1.01	78.89
-	Eriopisa elongata	10	1.01	79.90
-	Amphiura chiajei	10	1.01	80.91

Station 60. (Assemblage Group A2)

Rank	Species	Number	%	Cum.%
1	Abra nitida	137	10.51	10.51
2	Scalibregma inflatum	110	8.44	18.96
3	Praxillella affinis	93	7.14	26.09
4	Terebellides stroemi	62	4.76	30.85
5	Nuculoma tenuis	50	3.84	34.69
6	Magelona minuta	48	3.68	38.37
-	Diplocirrus glaucus	48	3.68	42.06
-	OPHIUROIDEA juv.	48	3.68	45.74
9	NEMERTEA spp.	46	3.53	49.27
10	Pulsellum lofotense	40	3.07	52.34
11	Chaetozone sp.A	39	2.99	55.33
12	Aricidea catherinae	38	2.92	58.25
13	Harpinia pectinata	35	2.69	60.94
-	Cylichna cylindracea	35	2.69	63.62
15	Tharyx killariensis	30	2.30	65.92
16	Araphura brevimana	24	1.84	67.77
17	Galathowenia sp.A	23	1.77	69.53
18	Ophelina acuminata	22	1.69	71.22
-	Nucula sulcata	22	1.69	72.91
20	Harpinia antennaria	20	1.53	74.44
21	Limacina retroversa	19	1.46	75.90
22	Urothoe elegans	18	1.38	77.28
-	Leptognathia gracilis	18	1.38	78.66
24	Ampharete falcata	16	1.23	79.89
25	Cirrophorus furcatus	15	1.15	81.04

Station 19. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Amphictene auricoma	181	13.71	13.71
2	Mysella bidentata	166	12.58	26.29
3	Magelona minuta	83	6.29	32.58
4	Phaxas pellucidus	79	5.98	38.56
5	Tharyx killariensis	63	4.77	43.33
6	Lumbrineris gracilis	62	4.70	48.03
7	Prionospio fallax	59	4.47	52.50
8	Phoronis spp.	58	4.39	56.89
9	Lagis koreni	50	3.79	60.68
-	NEMERTEA spp.	50	3.79	64.47
11	Semierycina nitida	40	3.03	67.50
12	Magelona alleni	38	2.88	70.38
13	Melinna palmata	36	2.73	73.11
-	Amphiura filiformis	36	2.73	75.83
15	Mediomastus fragilis	35	2.65	78.48
16	Abra nitida	30	2.27	80.76
17	Monticellina dorsobranchialis	24	1.82	82.58
18	Phoronis pallida	22	1.67	84.24
19	Pholoe tuberculata	17	1.29	85.53
20	OPHIUROIDEA juv.	14	1.06	86.59
21	Nephtys incisa	12	0.91	87.50
-	Ampharete sp.A	12	0.91	88.41
-	Terebellides stroemi	12	0.91	89.32
24	Podarkeopsis capensis	11	0.83	90.15
-	Lumbrineris scopa	11	0.83	90.98
-	Owenia fusiformis	11	0.83	91.82

Station 63. (Assemblage Group A2)

Rank	Species	Number	%	Cum.%
1	Abra nitida	115	9.10	9.10
2	OPHIUROIDEA juv.	99	7.83	16.93
3	Terebellides stroemi	74	5.85	22.78
4	Ampharete falcata	69	5.46	28.24
5	Galathowenia sp.A	67	5.30	33.54
6	Spiophanes kroyeri	52	4.11	37.66
-	Araphura brevimana	52	4.11	41.77
8	Paradoneis lyra	49	3.88	45.65
9	Ophelina cylindricaudata	39	3.09	48.73
10	Praxillella affinis	37	2.93	51.66
-	Phtisica marina	37	2.93	54.59
12	Harpinia pectinata	36	2.85	57.44
13	Tubificoides amplivasatus	34	2.69	60.13
14	Phaxas pellucidus	27	2.14	62.26
15	Cylichna cylindracea	25	1.98	64.24
-	Pulsellum lofotense	25	1.98	66.22
17	NEMERTEA spp.	23	1.82	68.04
18	Hiatella arctica	18	1.42	69.46
19	Diplocirrus glaucus	16	1.27	70.73
20	Pholoe tuberculata	15	1.19	71.91
-	Thyasira flexuosa	15	1.19	73.10
22	Ophelina modesta	14	1.11	74.21
23	Aglaophamus rubella	13	1.03	75.24
-	Prionospio cirrifera	13	1.03	76.27
25	Myriochele danielsseni	12	0.95	77.22

Station 11. (Assemblage Group A2)

Rank	Species	Number	%	Cum.%
1	OPHIUROIDEA juv.	198	9.29	9.29
2	Galathowenia sp.A	156	7.32	16.60
3	Praxillella affinis	130	6.10	22.70
4	SPATANGIDAE juv.	126	5.91	28.61
5	Abra alba	105	4.93	33.54
6	Urothoe elegans	102	4.78	38.32
7	Gammaropsis palmata	92	4.32	42.64
8	Araphura brevimana	64	3.00	45.64
9	Chaetozone sp.A	59	2.77	48.41
10	ASTRORHIZIDAE sp.	56	2.63	51.03
11	Prionospio banyulensis	51	2.39	53.42
12	Prionospio cirrifera	48	2.25	55.68
13	Pseudarachna hirsuta	38	1.78	57.46
14	Spiophanes kroyeri	37	1.74	59.19
15	Amphictene auricoma	34	1.59	60.79
16	MALDANIDAE indet.	33	1.55	62.34
17	Lagis koreni	32	1.50	63.84
-	Ampharete falcata	32	1.50	65.34
19	NEMERTEA spp.	31	1.45	66.79
20	Euclymene sp.	30	1.41	68.20
-	Microjassa cumbrensis	30	1.41	69.61
22	Myriochele danielsseni	27	1.27	70.87
23	Aricidea wassi	25	1.17	72.04
24	Tharyx killariensis	24	1.13	73.17
-	Clymenura sp.	24	1.13	74.30
-	Vitreolina philippi	24	1.13	75.42

Station 20. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Mysella bidentata	578	30.81	30.81
2	Magelona minuta	188	10.02	40.83
3	Amphiura filiformis	144	7.68	48.51
4	Prionospio fallax	103	5.49	54.00
5	Amphictene auricoma	84	4.48	58.48
6	Phoronis spp.	75	4.00	62.47
7	NEMERTEA spp.	68	3.62	66.10
8	Lagis koreni	51	2.72	68.82
9	Lumbrineris gracilis	50	2.6	771.48
10	Tharyx killariensis	48	2.56	74.04
11	Semierycina nitida	47	2.51	76.55
12	Pholoe tuberculata	43	2.29	78.84
13	Phoronis pallida	40	2.13	80.97
14	Phaxas pellucidus	34	1.81	82.78
15	Tubificoides amplivasatus	31	1.65	84.43
16	Scalibregma inflatum	30	1.60	86.03
17	Abra nitida	26	1.39	87.42
18	Nephtys incisa	18	0.96	88.38
-	Monticellina dorsobranchiali	18	0.96	89.34
20	Owenia fusiformis	12	0.64	89.98
21	Podarkeopsis capensis	11	0.59	90.57
-	Magelona alleni	11	0.59	91.15
-	Melinna palmata	11	0.59	91.74
-	Labidoplax digitata	11	0.59	92.32
25	Mediomastus fragilis	10	0.53	92.86

Station 18. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Mysella bidentata	853	34.02	34.02
2	Magelona minuta	300	11.97	45.99
3	Amphictene auricoma	157	6.26	52.25
4	Prionospio fallax	113	4.51	56.76
5	Lagis koreni	104	4.15	60.91
6	Phaxas pellucidus	103	4.11	65.02
7	Amphiura filiformis	98	3.91	68.93
8	Pholoe tuberculata	69	2.75	71.68
9	Melinna palmata	68	2.71	74.39
-	Phoronis spp.	68	2.71	77.10
11	NEMERTEA spp.	66	2.63	79.74
12	Semierycina nitida	50	1.99	81.73
13	Lumbrineris gracilis	43	1.72	83.45
14	Magelona alleni	36	1.44	84.88
15	Abra nitida	35	1.40	86.28
16	Podarkeopsis capensis	25	1.00	87.28
17	Terebellides stroemi	22	0.88	88.15
18	Phoronis pallida	20	0.80	88.95
19	Monticellina dorsobranchiali	19	0.76	89.71
-	Tharyx killariensis	19	0.76	90.47
21	Owenia fusiformis	17	0.68	91.14
22	Exogone hebes	14	0.56	91.70
23	Nephtys hombergii	13	0.52	92.22
24	Scalibregma inflatum	12	0.48	92.70
-	Mediomastus fragilis	12	0.48	93.18
-	Ampharete sp.	12	0.48	93.66
-	Melita obtusata	12	0.48	94.14

Station 24. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Tubificoides amplivasatus	160	26.19	26.19
2	Abra alba	61	9.98	36.17
3	Levinsenia gracilis	57	9.33	45.50
4	Mytilus edulis	54	8.84	54.34
5	Lagis koreni	32	5.24	59.57
6	Spiophanes bombyx	29	4.75	64.32
7	Pholoe tuberculata	22	3.60	67.92
8	Nephtys incisa	20	3.27	71.19
-	Harpinia pectinata	20	3.27	74.47
10	Magelona minuta	11	1.80	76.27
-	Galathowenia sp.A	11	1.80	78.07
12	Tharyx killariensis	9	1.47	79.54
-	Mysella bidentata	9	1.47	81.01
14	Diastylis rugosa	8	1.31	82.32
-	Nucula nitidosa	8	1.31	83.63
16	Scalibregma inflatum	7	1.15	84.78
-	NEMERTEA spp.	7	1.15	85.92
18	Mediomastus fragilis	6	0.98	86.91
-	Owenia fusiformis	6	0.98	87.89
-	Phoronis spp.	6	0.98	88.87
21	Prionospio sp.	5	0.82	89.69
-	Prionospio fallax	5	0.82	90.51
23	Diastylis laevis	4	0.65	91.16
-	Thyasira flexuosa	4	0.65	91.82
-	Leptosynapta juv.	4	0.65	92.47

Station 27. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Phaxas pellucidus	392	21.89	21.89
2	Mysella bidentata	301	16.81	38.69
3	Mediomastus fragilis	181	10.11	48.80
4	Spiophanes bombyx	140	7.82	56.62
5	Spio sp.A	91	5.08	61.70
6	Lumbrineris gracilis	82	4.58	66.28
7	Chaetozone sp.A	66	3.69	69.96
8	Prionospio fallax	56	3.13	73.09
9	Dendrodoa grossularia	45	2.51	75.60
10	Diplocirrus glaucus	37	2.07	77.67
11	Euclymene oerstedii	31	1.73	79.40
12	Scalibregma inflatum	29	1.62	81.02
13	Pholoe tuberculata	26	1.45	82.47
-	Abra alba	26	1.45	83.92
15	Amphiura filiformis	18	1.00	84.92
16	Lanice conchilega	15	0.84	85.76
-	Phoronis spp.	15	0.84	86.60
18	Glycera tridactyla	12	0.67	87.27
19	Poecilochaetus serpens	11	0.61	87.88
-	Nucula nitidosa	11	0.61	88.50
21	NEMERTEA spp.	9	0.50	89.00
22	Owenia fusiformis	8	0.45	89.45
23	Notomastus sp.D	7	0.39	89.84
-	Lagis koreni	7	0.39	90.23
-	Ampharete sp.A	7	0.39	90.62
-	Ericthonius punctatus	7	0.39	91.01
-	Processa nouveli	7	0.39	91.40
-	Thyasira flexuosa	7	0.39	91.79

Station 47. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Magelona minuta	153	15.69	15.69
2	Phaxas pellucidus	143	14.67	30.36
3	Abra alba	142	14.56	44.92
4	Melinna palmata	141	14.46	59.38
5	Tharyx killariensis	38	3.90	63.28
6	Nephtys hombergii	32	3.28	66.56
-	Ampharete sp.A	32	3.28	69.85
8	Spio sp.A	27	2.77	72.62
9	Pariambus typicus	22	2.26	74.87
10	Diastylis sp.	21	2.15	77.03
11	Magelona alleni	16	1.64	78.67
12	Prionospio fallax	15	1.54	80.21
13	Mediomastus fragilis	12	1.23	81.44
14	Argissa hamatipes	10	1.03	82.46
15	Monticellina dorsobranchiali	9	0.92	83.38
16	Eudorella truncatula	8	0.82	84.21
-	Golfingia procera	8	0.82	85.03
18	Pholoe tuberculata	7	0.72	85.74
-	Caulleriella zetlandica	7	0.72	86.46
-	Thyasira flexuosa	7	0.72	87.18
21	Mysella bidentata	6	0.62	87.79
-	NEMERTEA spp.	6	0.62	88.41
-	Phoronis spp.	6	0.62	89.03

Station 26. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Mysella bidentata	536	25.92	25.92
2	Tubificoides amplivasatus	365	17.65	43.57
3	Abra alba	337	16.30	59.86
4	Galathowenia sp.A	100	4.84	64.70
5	Prionospio fallax	98	4.74	69.44
6	Levinsenia gracilis	63	3.05	72.49
7	Harpinia pectinata	51	2.47	74.95
8	Pholoe tuberculata	43	2.08	77.03
9	Spiophanes bombyx	38	1.84	78.87
10	Magelona minuta	34	1.64	80.51
11	Nephtys incisa	32	1.55	82.06
12	Lagis koreni	31	1.50	83.56
13	Prionospio sp.	29	1.40	84.96
14	Amphiura filiformis	28	1.35	86.32
15	Tharyx killariensis	21	1.02	87.33
16	Scalibregma inflatum	18	0.87	88.20
-	Phaxas pellucidus	18	0.87	89.07
18	Thyasira flexuosa	17	0.82	89.89
-	Phoronis spp.	17	0.82	90.72
20	Mediomastus fragilis	16	0.77	91.49
-	Owenia fusiformis	16	0.77	92.26
22	Mytilus edulis	12	0.58	92.84
23	TUBIFICIDAE spp.	11	0.53	93.38
24	Semierycina nitida	10	0.48	93.86
-	Abra nitida	10	0.48	94.34

Station 29. (Assemblage Group B1)

Rank	Species	Number	%	Cum.%
1	Tubificoides amplivasatus	435	17.29	17.29
2	Mysella bidentata	323	12.84	30.13
3	Prionospio fallax	174	6.92	37.04
4	Pariambus typicus	102	4.05	41.10
5	Spiophanes bombyx	92	3.66	44.75
6	Lumbrineris gracilis	83	3.30	48.05
7	Dendrodoa grossularia	82	3.26	51.31
8	Mediomastus fragilis	72	2.86	54.17
9	Phaxas pellucidus	70	2.78	56.96
10	Melinna palmata	67	2.66	59.62
11	Pholoe tuberculata	43	1.71	61.33
12	Mytilus edulis	42	1.67	63.00
-	Phoronis spp.	42	1.67	64.67
14	Glycera tridactyla	38	1.51	66.18
-	Magelona filiformis	38	1.51	67.69
16	Euclymene oerstedii	37	1.47	69.16
17	Diastylis rugosa	36	1.43	70.59
18	NEMERTEA spp.	34	1.35	71.94
19	Owenia fusiformis	32	1.27	73.21
20	Mya truncata	30	1.19	74.40
21	Abra alba	28	1.11	75.52
22	Chaetozone sp.A	26	1.03	76.55
23	Aricidea catherinae	25	0.99	77.54
-	Monticellina dorsobranchiali	25	0.99	78.54
25	Cylichna cylindracea	24	0.95	79.49

Station 12. (Assemblage Group B2)

Rank	Species	Number	%	Cum.%
1	Lagis koreni	576	35.23	35.23
2	OPHIUROIDEA juv.	198	12.11	47.34
3	Cylichna cylindracea	89	5.44	52.78
4	Poecilochaetus serpens	73	4.46	57.25
5	SPATANGIDAE juv.	58	3.55	60.80
6	Spiophanes bombyx	55	3.36	64.16
-	Eudorellopsis deformis	55	3.36	67.52
8	Echinocyamus pusillus	51	3.12	70.64
9	Mysella bidentata	50	3.06	73.70
10	Scalibregma inflatum	45	2.75	76.45
11	Chaetozone sp.A	39	2.39	78.84
12	Amphictene auricoma	34	2.08	80.92
13	Magelona sp.A	30	1.83	82.75
14	Bathyporeia sp.	27	1.65	84.40
15	Magelona filiformis	24	1.47	85.87
16	Scoloplos armiger	23	1.41	87.28
17	Abra prismatica	22	1.35	88.62
-	Amphiura filiformis	22	1.35	89.97
19	Harpinia antennaria	21	1.28	91.25
20	Abra alba	13	0.80	92.05
21	Phaxas pellucidus	11	0.67	92.72
22	Tellimya ferruginosa	9	0.55	93.27
23	Ophelina acuminata	8	0.49	93.76
-	Owenia fusiformis	8	0.49	94.25
-	Bathyporeia tenuipes	8	0.49	94.74

Station 13. (Assemblage Group B2)

Rank	Species	Number	%	Cum.%
1	Mysella bidentata	1966	61.53	61.53
2	Scalibregma inflatum	486	15.21	76.74
3	Amphiura filiformis	140	4.38	81.13
4	Lagis koreni	132	4.13	85.26
5	OPHIUROIDEA juv.	55	1.72	86.98
6	Spiophanes bombyx	47	1.47	88.45
7	Scoloplos armiger	34	1.06	89.51
8	Exogone hebes	28	0.88	90.39
9	Lanice conchilega	21	0.66	91.05
10	Tharyx killariensis	17	0.53	91.58
-	Mediomastus fragilis	17	0.53	92.11
-	Owenia fusiformis	17	0.53	92.64
13	Cylichna cylindracea	15	0.47	93.11
14	Pholoe tuberculata	14	0.44	93.55
-	Poecilochaetus serpens	14	0.44	93.99
-	Amphictene auricoma	14	0.44	94.43
-	NEMERTEA spp.	14	0.44	94.87
-	SPATANGIDAE juv.	14	0.44	95.31
19	Phaxas pellucidus	13	0.41	95.71
20	TUBIFICIDAE spp.	9	0.28	95.99
21	Magelona sp.A	8	0.25	96.24
22	Bathyporeia sp.	7	0.22	96.46
23	Aglaophamus rubella	6	0.19	96.65
-	Goniada maculata	6	0.19	96.84
-	Lumbrineris gracilis	6	0.19	97.03
-	Echinocyamus pusillus	6	0.19	97.21

Station 32. (Assemblage Group B3)

Rank	Species	Number	%	Cum.%
1	Chaetozone sp.A	294	18.03	18.03
2	Spiophanes bombyx	231	14.16	32.19
3	Pariambus typicus	120	7.36	39.55
4	Nephtys juv.	101	6.19	45.74
5	Poecilochaetus serpens	88	5.40	51.13
6	TUBIFICIDAE spp.	79	4.84	55.98
7	Scalibregma inflatum	78	4.78	60.76
8	Spio sp.A	49	3.00	63.76
9	Ampharete sp.A	46	2.82	66.58
-	Nucula nitidosa	46	2.82	69.41
11	Lanice conchilega	39	2.39	71.80
12	Glycera tridactyla	35	2.15	73.94
13	Argissa hamatipes	33	2.02	75.97
14	Eumida bahusiensis	28	1.72	77.68
15	Phaxas pellucidus	27	1.66	79.34
-	Phoronis spp.	27	1.66	80.99
17	Lagis koreni	26	1.59	82.59
18	Fabulina fabula	19	1.16	83.75
19	Eteone longa	13	0.80	84.55
20	Leucothoe incisa	12	0.74	85.29
21	Aricidea minuta	11	0.67	85.96
-	Galathowenia sp.A	11	0.67	86.63
-	Terebellides stroemi	11	0.67	87.31
-	Pseudocuma longicornis	11	0.67	87.98
25	Eteone flava	10	0.61	88.60

Station 50. (Assemblage Group B3)

Rank	Species	Number	%	Cum.%
1	Abra alba	670	23.32	23.32
2	Phaxas pellucidus	578	20.12	43.44
3	Scalibregma inflatum	336	11.70	55.13
4	Spiophanes bombyx	196	6.82	61.96
5	Spio sp.A	104	3.62	65.58
6	Ampharete sp.A	76	2.65	68.22
7	AMPHARETINAE juv.	61	2.12	70.34
8	Lagis koreni	59	2.05	72.40
9	NEMERTEA spp.	57	1.98	74.38
10	Eumida bahusiensis	34	1.18	75.57
-	Lanice conchilega	34	1.18	76.75
12	Clymenura sp.	31	1.08	77.83
13	Caulleriella zetlandica	30	1.04	78.87
14	Aricidea minuta	27	0.94	79.81
15	Poecilochaetus serpens	25	0.87	80.68
16	Aphrodita aculeata	24	0.84	81.52
-	Pseudopolydora pulchra	24	0.84	82.35
18	Lumbrineris gracilis	23	0.80	83.15
19	Phoronis spp.	21	0.73	83.88
20	Ophelina acuminata	20	0.70	84.58
21	Harpinia antennaria	19	0.66	85.24
22	Spiophanes kroyeri	16	0.56	85.80
-	Praxillella affinis	16	0.56	86.36
-	AORIDAE sp.	16	0.56	86.91
25	Euclymene sp.	15	0.52	87.43

Station 34. (Assemblage Group B3)

Rank	Species	Number	%	Cum.%
1	Lagis koreni	1265	32.55	32.55
2	Abra alba	744	19.15	51.70
3	Lanice conchilega	459	11.81	63.51
4	Spiophanes bombyx	354	9.11	72.62
5	Mediomastus fragilis	172	4.43	77.05
6	Pariambus typicus	82	2.11	79.16
7	Nucula nitidosa	78	2.01	81.16
8	Eumida bahusiensis	58	1.49	82.66
9	Pholoe tuberculata	56	1.44	84.10
10	Amphiura brachiata	47	1.21	85.31
11	Pseudopolydora pulchra	41	1.06	86.36
-	Tellimya ferruginosa	41	1.06	87.42
13	Mysella bidentata	38	0.98	88.39
14	Spio sp.A	36	0.93	89.32
15	Podarkeopsis capensis	34	0.87	90.20
16	Fabulina fabula	32	0.82	91.02
17	Malmgrenia andreapolis	28	0.72	91.74
-	Spisula subtruncata	28	0.72	92.46
19	Malmgrenia spp.	18	0.46	92.92
-	Nereis longissima	18	0.46	93.39
21	Phyllodoce mucosa	16	0.41	93.80
-	Nephtys hombergii	16	0.41	94.21
-	NEMERTEA spp.	16	0.41	94.62
24	Capitella cf. capitata	14	0.36	94.98
25	Scalibregma inflatum	13	0.33	95.32

Station 43. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Spiophanes bombyx	480	37.18	37.18
2	Phaxas pellucidus	180	13.94	51.12
3	Lagis koreni	83	6.43	57.55
4	Pseudocuma longicornis	49	3.80	61.35
5	Siphonoecetes kroyeranus	37	2.87	64.21
6	Mediomastus fragilis	33	2.56	66.77
7	NEMERTEA spp.	32	2.48	69.25
8	Pariambus typicus	28	2.17	71.42
9	Eteone longa	26	2.01	73.43
10	Lanice conchilega	21	1.63	75.06
-	Abra nitida	21	1.63	76.68
12	Bathyporeia sp.	20	1.55	78.23
13	Ophelia borealis	19	1.47	79.71
14	Chaetozone sp.A	18	1.39	81.10
15	Grania sp.	13	1.01	82.11
16	Sthenelais limicola	12	0.93	83.04
17	Nephtys cirrosa	11	0.85	83.89
18	Magelona filiformis	10	0.77	84.66
-	Synchelidium maculatum	10	0.77	85.44
-	Thracia phaseolina	10	0.77	86.21
21	Scalibregma inflatum	9	0.70	86.91
-	Bodotria pulchella	9	0.70	87.61
23	Phyllodoce rosea	8	0.62	88.23
-	Hesionura elongata	8	0.62	88.85
-	Streptosyllis bidentata	8	0.62	89.47
-	Spio sp.A	8	0.62	90.09
-	Microprotopus maculatus	8	0.62	90.70

Station 45. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Spiophanes bombyx	509	43.50	43.50
2	Pseudocuma longicornis	114	9.74	53.25
3	Phaxas pellucidus	56	4.79	58.03
4	Philine aperta	43	3.68	61.71
5	Ophelia borealis	31	2.65	64.36
-	Arctica islandica	31	2.65	67.01
-	Thracia phaseolina	31	2.65	69.66
8	NEMERTEA spp.	25	2.14	71.79
9	Magelona filiformis	23	1.97	73.76
-	Bathyporeia sp.	23	1.97	75.73
11	Magelona sp.A	22	1.88	77.61
-	Siphonoecetes kroyeranus	22	1.88	79.49
13	Pariambus typicus	16	1.37	80.85
14	Nephtys cirrosa	15	1.28	82.14
-	Lagis koreni	15	1.28	83.42
16	Chaetozone sp.A	14	1.20	84.62
17	Sthenelais limicola	11	0.94	85.56
-	Abra alba	11	0.94	86.50
19	Mediomastus fragilis	8	0.68	87.18
-	Ampelisca brevicornis	8	0.68	87.86
-	Fabulina fabula	8	0.68	88.55
-	OPHIUROIDEA juv.	8	0.68	89.23
23	Nucula nitidosa	7	0.60	89.83
24	Glycera tridactyla	6	0.51	90.34
-	Lumbrineris gracilis	6	0.51	90.85
-	Spio sp.A	6	0.51	91.37

Station 21. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Lagis koreni	549	26.16	26.16
2	Phaxas pellucidus	491	23.39	49.55
3	OPHIUROIDEA juv.	160	7.62	57.17
4	Amphictene auricoma	82	3.91	61.08
5	Spiophanes bombyx	77	3.67	64.75
6	Thracia phaseolina	68	3.24	67.98
7	Owenia fusiformis	43	2.05	70.03
-	Ensis ensis	43	2.05	72.08
9	SYNAPTIDAE sp.	40	1.91	73.99
10	NEMERTEA spp.	35	1.67	75.66
11	Pseudocuma longicornis	33	1.57	77.23
12	Lumbrineris gracilis	32	1.52	78.75
13	Nephtys cirrosa	27	1.29	80.04
-	Spio sp.A	27	1.29	81.32
15	Lanice conchilega	23	1.10	82.42
-	Phoronis spp.	23	1.10	83.52
17	Semierycina nitida	20	0.95	84.47
-	Abra alba	20	0.95	85.42
19	Ophelia borealis	18	0.86	86.28
20	Mediomastus fragilis	16	0.76	87.04
-	Acanthocardia echinata	16	0.76	87.80
22	Bodotria pulchella	15	0.71	88.52
23	Chamelea gallina	11	0.52	89.04
24	Aricidea minuta	10	0.48	89.52
-	Ampharete sp.A	10	0.48	90.00
-	Arctica islandica	10	0.48	90.47
-	Cochlodesma praetenue	10	0.48	90.95

Station 25. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Mysella bidentata	139	14.21	14.21
2	Spiophanes bombyx	114	11.66	25.87
3	Phaxas pellucidus	97	9.92	35.79
4	Lagis koreni	52	5.32	41.10
5	Mediomastus fragilis	44	4.50	45.60
6	Spio sp.A	40	4.09	49.69
7	Ophelia borealis	30	3.07	52.76
-	Pariambus typicus	30	3.07	55.83
9	Exogone hebes	25	2.56	58.38
10	Polycirrus spp.	18	1.84	60.22
11	Siphonoecetes kroyeranus	17	1.74	61.96
12	Mytilus edulis	16	1.64	63.60
13	Lumbrineris gracilis	15	1.53	65.13
-	Pseudocuma longicornis	15	1.53	66.67
15	Ophuira juv.	14	1.43	68.10
16	Bodotria scorpiodes	12	1.23	69.33
-	Goodallia triangularis	12	1.23	70.55
18	Thracia villosiuscula	11	1.12	71.68
-	NEMERTEA spp.	11	1.12	72.80
20	Sphaerosyllis taylori	10	1.02	73.82
-	Scoloplos armiger	10	1.02	74.85
-	Ensis ensis	10	1.02	75.87
23	Diastylis rugosa	9	0.92	76.79
-	Pleurogona sp.	9	0.92	77.71
25	Bodotria pulchella	8	0.82	78.53
-	Abra alba	8	0.82	79.35

Station 28. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Phaxas pellucidus	352	26.91	26.91
2	Spiophanes bombyx	228	17.43	44.34
3	Magelona filiformis	91	6.96	51.30
4	Ophelia borealis	89	6.80	58.10
5	Magelona sp.A	59	4.51	62.61
6	Glycera tridactyla	40	3.06	65.67
7	OPHIUROIDEA juv.	35	2.68	68.35
8	Ensis ensis	29	2.22	70.57
9	Spio sp.A	26	1.99	72.55
10	Pariambus typicus	25	1.91	74.46
11	Mediomastus fragilis	21	1.61	76.07
12	Polycirrus spp.	19	1.45	77.52
13	Lumbrineris gracilis	18	1.38	78.90
-	Abra alba	18	1.38	80.28
15	Chaetozone sp.A	17	1.30	81.57
-	Lagis koreni	17	1.30	82.87
17	Thracia phaseolina	15	1.15	84.02
18	NEMERTEA spp.	13	0.99	85.02
19	Owenia fusiformis	12	0.92	85.93
20	Eteone longa	10	0.76	86.70
-	Ampelisca brevicornis	10	0.76	87.46
-	Fabulina fabula	10	0.76	88.23
-	Ophuira juv.	10	0.76	88.99
-	Labidoplax juv.	10	0.76	89.76
25	Aricidea minuta	8	0.61	90.37

Station 22. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Amphictene auricoma	795	23.06	23.06
2	Phaxas pellucidus	728	21.12	44.18
3	Spiophanes bombyx	328	9.52	53.70
4	Lagis koreni	224	6.50	60.20
-	OPHIUROIDEA juv.	224	6.50	66.70
6	NEMERTEA spp.	181	5.25	71.95
7	Owenia fusiformis	169	4.90	76.85
8	Phoronis spp.	133	3.86	80.71
9	Lumbrineris gracilis	71	2.06	82.77
10	Fabulina fabula	55	1.60	84.36
11	Mysella bidentata	51	1.48	85.84
12	Ampharete sp.A	39	1.13	86.97
13	Scalibregma inflatum	36	1.04	88.02
-	Thracia phaseolina	36	1.04	89.06
15	Pseudocuma longicornis	31	0.90	89.96
16	Acanthocardia echinata	28	0.81	90.77
17	Semierycina nitida	27	0.78	91.56
-	Abra alba	27	0.78	92.34
-	Amphiura brachiata	27	0.78	93.12
20	Podarkeopsis capensis	22	0.64	93.76
21	Pholoe tuberculata	19	0.55	94.31
-	Mediomastus fragilis	19	0.55	94.87
23	Spio sp.A	17	0.49	95.36
24	Chaetozone sp.A	14	0.41	95.76
25	Prionospio fallax	12	0.35	96.11
-	Nucula nitidosa	12	0.35	96.46

Station 42. (Assemblage Group B4)

Rank	Species	Number	%	Cum.%
1	Mya truncata	209	24.68	24.68
2	Pseudocuma longicornis	94	11.10	35.77
3	Spiophanes bombyx	74	8.74	44.51
4	Nephtys cirrosa	41	4.84	49.35
5	Mytilus edulis	28	3.31	52.66
6	Mysella bidentata	27	3.19	55.84
7	Lagis koreni	22	2.60	58.44
-	Phaxas pellucidus	22	2.60	61.04
9	Abra alba	19	2.24	63.28
10	Ophelia borealis	18	2.13	65.41
-	Ensis ensis	18	2.13	67.53
12	NEMERTEA spp.	15	1.77	69.30
13	Siphonoecetes kroyeranus	14	1.65	70.96
14	Thracia phaseolina	13	1.53	72.49
15	Moerella pygmaea	12	1.42	73.91
16	Hesionura elongata	11	1.30	75.21
-	Grania sp.	11	1.30	76.51
-	Bathyporeia tenuipes	11	1.30	77.80
-	Iphinoe trispinosa	11	1.30	79.10
-	Diaphana minuta	11	1.30	80.40
-	Cochlodesma praetenue	11	1.30	81.70
22	Exogone hebes	9	1.06	82.76
-	Pseudocuma similis	9	1.06	83.83
24	Diastylis bradyi	7	0.83	84.65
25	Spisula elliptica	6	0.71	85.36

Station 23.

Rank	Species	Number	%	Cum.%
1	Ensis ensis	136	26.56	26.56
2	Moerella pygmaea	118	23.05	49.61
3	Thracia villosiuscula	30	5.86	55.47
4	OPHIUROIDEA juv.	15	2.93	58.40
5	Hesionura elongata	11	2.15	60.55
6	Spiophanes bombyx	10	1.95	62.50
-	Spio sp.A	10	1.95	64.45
8	Nephtys cirrosa	9	1.76	66.21
9	Aonides paucibranchiata	8	1.56	67.77
-	Ophelia borealis	8	1.56	69.34
-	Spisula elliptica	8	1.56	70.90
12	Notomastus indet.	7	1.37	72.27
-	Protodriloides chaetifer	7	1.37	73.63
-	Phaxas pellucidus	7	1.37	75.00
15	Lagis koreni	6	1.17	76.17
-	Grania sp.	6	1.17	77.34
-	Dosinia lupinus	6	1.17	78.52
-	NEMERTEA spp.	6	1.17	79.69
19	Argissa hamatipes	5	0.98	80.66
20	Pisione remota	4	0.78	81.45
-	Sphaerosyllis taylori	4	0.78	82.23
-	Owenia fusiformis	4	0.78	83.01
-	Polycirrus sp.A	4	0.78	83.79

Station 15. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Modiolus modiolus	284	16.44	16.44
2	Josephella marenzelleri	155	8.97	25.41
3	Filogranula gracilis	87	5.03	30.44
4	Sphaerosyllis bulbosa	71	4.11	34.55
5	Verruca stroemia	49	2.84	37.38
6	Leptochiton asellus	41	2.37	39.76
7	Mediomastus fragilis	40	2.31	42.07
8	HARMOTHOINAE indet.	31	1.79	43.87
-	Ophiactis balli	31	1.79	45.66
10	Pholoe tuberculata	30	1.74	47.40
11	Palliolum tigerinum	29	1.68	49.07
-	Hiatella arctica	29	1.68	50.75
-	Echinocyamus pusillus	29	1.68	52.43
14	Timoclea ovata	27	1.56	53.99
15	Gammaropsis maculata	26	1.50	55.50
16	Glycera lapidum	24	1.39	56.89
17	Eulalia mustela	23	1.33	58.22
18	Glycymeris glycymeris	21	1.22	59.43
19	Laonice bahusiensis	19	1.10	60.53
-	Mysella bidentata	19	1.10	61.63
-	OPHIUROIDEA juv.	19	1.10	62.73
22	Polycirrus spp.	17	0.98	63.72
23	Exogone hebes	14	0.81	64.53
24	Eusyllis blomstrandi	13	0.75	65.28
-	Chaetozone sp.B	13	0.75	66.03
-	Hydroides norvegica	13	0.75	66.78

Station 1. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Mediomastus fragilis	167	14.31	14.31
2	Sphaerosyllis bulbosa	121	10.37	24.68
3	Exogone verugera	52	4.46	29.13
4	Modiolus modiolus	51	4.37	33.50
5	Sphaerosyllis taylori	46	3.94	37.45
6	Paradoneis lyra	43	3.68	41.13
7	Aonides paucibranchiata	42	3.60	44.73
8	Guernea coalita	39	3.34	48.07
9	Astarte sulcata	32	2.74	50.81
10	Spisula elliptica	24	2.06	52.87
11	Leptochiton asellus	23	1.97	54.84
12	Clymenura johnstoni	22	1.89	56.73
13	Polycirrus sp.A	19	1.63	58.35
14	Macrochaeta caroli	18	1.54	59.90
15	Sphaerosyllis tetralix	17	1.46	61.35
16	Exogone naidina	16	1.37	62.72
17	Polycirrus spp.	15	1.29	64.01
18	Lysilla nivea	14	1.20	65.21
19	Amphipholis squamata	13	1.11	66.32
20	Laonice bahusiensis	11	0.94	67.27
-	Aphelochaeta sp.B	11	0.94	68.21
22	Eulalia mustela	10	0.86	69.07
-	Pseudomystides limbata	10	0.86	69.92
-	Exogone hebes	10	0.86	70.78
-	Protodorvillea kefersteini	10	0.86	71.64
-	Janira maculosa	10	0.86	72.49

Station 6. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Filogranula gracilis	319	16.05	16.05
2	Ampharete sp.B	138	6.95	23.00
3	Mediomastus fragilis	84	4.23	27.23
4	Josephella marenzelleri	71	3.57	30.80
5	Amphipholis squamata	70	3.52	34.32
6	Aonides paucibranchiata	60	3.02	37.34
7	Sphaerosyllis bulbosa	55	2.77	40.11
8	Leptochiton asellus	49	2.47	42.58
9	Notomastus sp.D	39	1.96	44.54
10	Modiolus modiolus	32	1.61	46.15
-	Astarte sulcata	32	1.61	47.76
12	Pholoe tuberculata	29	1.46	49.22
-	Nucula nucleus	29	1.46	50.68
14	Paradoneis cf. ilvana	28	1.41	52.09
15	Glycera lapidum	27	1.36	53.45
16	Laonice bahusiensis	26	1.31	54.76
17	Guernea coalita	24	1.21	55.96
-	Microjassa cumbrensis	24	1.21	57.17
19	NEMERTEA spp.	21	1.06	58.23
20	Sphaerosyllis sp.	19	0.96	59.18
21	Caprella linearis	18	0.91	60.09
22	Eulalia mustela	17	0.86	60.95
-	Eusyllis blomstrandi	17	0.86	61.80
-	Verruca stroemia	17	0.86	62.66

Station 14. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Mediomastus fragilis	65	6.62	6.62
2	Chaetozone sp.B	43	4.38	11.00
3	Nereis zonata	41	4.18	15.17
4	Modiolus modiolus	35	3.56	18.74
-	Echinocyamus pusillus	35	3.56	22.30
6	Spiophanes kroyeri	31	3.16	25.46
7	Glycera lapidum	30	3.06	28.51
8	Laonice bahusiensis	28	2.85	31.36
9	Abra prismatica	26	2.65	34.01
10	Aonides paucibranchiata	24	2.44	36.46
-	Prionospio cirrifera	24	2.44	38.90
12	Prionospio banyulensis	20	2.04	40.94
13	Polycirrus spp.	19	1.93	42.87
14	Ophiactis balli	17	1.73	44.60
15	Guernea coalita	16	1.63	46.23
-	Palliolum tigerinum	16	1.63	47.86
17	Sphaerosyllis bulbosa	15	1.53	49.39
-	Lumbrineris gracilis	15	1.53	50.92
-	Chone sp.B	15	1.53	52.44
20	Eulalia mustela	14	1.43	53.87
21	HARMOTHOINAE indet.	13	1.32	55.19
-	Aphelochaeta sp.B	13	1.32	56.52
23	Paradoneis lyra	12	1.22	57.74
-	Ampharete sp.B	12	1.22	58.96
-	Leptochiton asellus	12	1.22	60.18

Station 2. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Modiolus modiolus	302	14.50	14.50
2	Mediomastus fragilis	209	10.03	24.53
3	Sphaerosyllis bulbosa	205	9.84	34.37
4	Autolytus alexandri	102	4.90	39.27
5	Sphaerosyllis taylori	75	3.60	42.87
6	Aonides paucibranchiata	65	3.12	45.99
7	Lumbrineris gracilis	52	2.50	48.49
-	Cressa dubia	52	2.50	50.98
9	Circeis spirillum	41	1.97	52.95
10	Melinna elisabethae	40	1.92	54.87
11	Exogone verugera	38	1.82	56.70
12	Guernea coalita	36	1.73	58.43
13	Ophiothrix fragilis	35	1.68	60.11
14	Pholoe sp.	33	1.58	61.69
-	Polycirrus spp.	33	1.58	63.27
16	Leptochiton asellus	28	1.34	64.62
17	Astarte sulcata	27	1.30	65.91
18	Pholoe tuberculata	25	1.20	67.11
19	Gammaropsis maculata	24	1.15	68.27
-	Musculus discors	24	1.15	69.42
21	Paradoneis lyra	19	0.91	70.33
-	Metopa pusilla	19	0.91	71.24
23	Eulalia mustela	16	0.77	72.01
-	Amphipholis squamata	16	0.77	72.78
25	Lepidonotus squamatus	15	0.72	73.50
-	Parapleustes assimilis	15	0.72	74.22
-	Amphilochus manudens	15	0.72	74.94

Station 38. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Dendrodoa grossularia	67	6.44	6.44
2	Sphaerosyllis taylori	62	5.96	12.40
3	Sphaerosyllis sp.	53	5.10	17.50
4	Polycirrus spp.	48	4.62	22.12
5	HARMOTHOINAE indet.	44	4.23	26.35
6	Caecum glabrum	37	3.56	29.90
7	Aonides paucibranchiata	36	3.46	33.37
8	Mediomastus fragilis	33	3.17	36.54
9	NEMERTEA spp.	29	2.79	39.33
10	Scalibregma celticum	27	2.60	41.92
11	Golfingia juv.	26	2.50	44.42
12	Sphaerosyllis bulbosa	25	2.40	46.83
-	Laonice bahusiensis	25	2.40	49.23
14	Caulleriella alata	20	1.92	51.15
15	Modiolus modiolus	17	1.63	52.79
16	Scalibregma inflatum	16	1.54	54.33
-	Spisula elliptica	16	1.54	55.87
18	Pholoe tuberculata	15	1.44	57.31
-	Lumbrineris gracilis	15	1.44	58.75
-	Glycymeris glycymeris	15	1.44	60.19
21	Grania sp.	14	1.35	61.54
-	Guernea coalita	14	1.35	62.88
23	Polydora caulleryi	13	1.25	64.13
24	Syllis sp.H	12	1.15	65.29
25	Polycirrus sp.A	11	1.06	66.35
-	Pomatoceros lamarckii	11	1.06	67.40

Station 58. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Unciola planipes	184	17.10	17.10
2	Dendrodoa grossularia	68	6.32	23.42
3	Prionospio banyulensis	44	4.09	27.51
4	Modiolus modiolus	38	3.53	31.04
5	Echinocyamus pusillus	33	3.07	34.11
6	Ophiactis balli	28	2.60	36.71
7	Abra alba	26	2.42	39.13
8	Mysella bidentata	25	2.32	41.45
9	Grania sp.	22	2.04	43.49
10	Polycirrus spp.	21	1.95	45.45
11	Aonides paucibranchiata	20	1.86	47.30
12	Mediomastus fragilis	19	1.77	49.07
13	Myriochele danielsseni	17	1.58	50.65
14	Asclerocheilus spp.	16	1.49	52.14
-	Clymenura sp.	16	1.49	53.62
16	Pisione remota	15	1.39	55.02
-	Glycera lapidum	15	1.39	56.41
-	Spiophanes bombyx	15	1.39	57.81
19	Polydora flava	14	1.30	59.11
-	OPHIUROIDEA juv.	14	1.30	60.41
21	Hesionura elongata	13	1.21	61.62
-	Sphaerosyllis bulbosa	13	1.21	62.83
-	Ampelisca spinipes	13	1.21	64.03
24	Exogone verugera	12	1.12	65.15
-	Thracia phaseolina	12	1.12	66.26

Station 52. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Aonides paucibranchiata	92	10.07	10.07
2	Dendrodoa grossularia	55	6.02	16.08
3	Exogone verugera	48	5.25	21.33
4	Clymenura johnstoni	32	3.50	24.84
5	Abra alba	29	3.17	28.01
6	Exogone hebes	28	3.06	31.07
-	Hydroides norvegica	28	3.06	34.14
8	Sabellaria spinulosa	27	2.95	37.09
9	Paradoneis lyra	21	2.30	39.39
-	Spiophanes bombyx	21	2.30	41.68
11	Polydora caulleryi	20	2.19	43.87
12	Glycera oxycephala	19	2.08	45.95
13	Golfingia juv.	17	1.86	47.81
14	Glycera lapidum	14	1.53	49.34
15	HARMOTHOINAE indet.	13	1.42	50.77
-	Polydora cf. caeca	13	1.42	52.19
-	Spisula elliptica	13	1.42	53.61
18	Syllis sp.H	12	1.31	54.92
-	Anoplodactylus petiolatus	12	1.31	56.24
-	Echinocyamus pusillus	12	1.31	57.55
21	Syllis sp.E	11	1.20	58.75
-	Asclerocheilus spp.	11	1.20	59.96
-	NEMERTEA spp.	11	1.20	61.16
24	Lumbrineris gracilis	10	1.09	62.25
-	Praxillella affinis	10	1.09	63.35
-	Notoproctus sp.	10	1.09	64.44
-	Lanice conchilega	10	1.09	65.54
-	Ampelisca spinipes	10	1.09	66.63
-	Modiolus modiolus	10	1.09	67.72

Station 57. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Dendrodoa grossularia	256	29.91	29.91
2	Echinocyamus pusillus	62	7.24	37.15
3	Exogone verugera	59	6.89	44.04
4	Leptochiton asellus	47	5.49	49.53
5	Paradoneis lyra	40	4.67	54.21
6	Grania sp.	25	2.92	57.13
7	Exogone hebes	20	2.34	59.46
8	Modiolus modiolus	15	1.75	61.22
9	Glycera lapidum	14	1.64	62.85
10	Praxillella affinis	13	1.52	64.37
11	Eulalia mustela	12	1.40	65.77
12	Spiophanes kroyeri	11	1.28	67.06
-	Notomastus sp.D	11	1.28	68.34
14	Mediomastus fragilis	10	1.17	69.51
-	Timoclea ovata	10	1.17	70.68
-	NEMERTEA spp.	10	1.17	71.85
17	Prionospio banyulensis	9	1.05	72.90
-	Verruca stroemia	9	1.05	73.95
-	ECHINOIDEA juv.	9	1.05	75.00
20	Lumbrineris gracilis	8	0.93	75.93
-	Ampharete sp.B	8	0.93	76.87
-	Polycirrus spp.	8	0.93	77.80
23	Aonides paucibranchiata	7	0.82	78.62
-	Clymenura johnstoni	7	0.82	79.44
-	Aspidosiphon muelleri	7	0.82	80.26

Station 55. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Dendrodoa grossularia	326	19.77	19.77
2	Mediomastus fragilis	91	5.52	25.29
3	Exogone verugera	77	4.67	29.96
4	Leptochiton asellus	64	3.88	33.84
5	Modiolus modiolus	54	3.27	37.11
-	Echinocyamus pusillus	54	3.27	40.39
7	Lumbrineris gracilis	49	2.97	43.36
8	Paradoneis lyra	45	2.73	46.09
9	HARMOTHOINAE indet.	40	2.43	48.51
10	Ophiactis balli	39	2.37	50.88
11	Polycirrus spp.	35	2.12	53.00
12	Grania sp.	33	2.00	55.00
13	NEMERTEA spp.	31	1.88	56.88
14	Jassa sp.	30	1.82	58.70
15	Scalibregma inflatum	29	1.76	60.46
16	Laonice bahusiensis	24	1.46	61.92
17	Pholoe tuberculata	22	1.33	63.25
18	Amphipholis squamata	19	1.15	64.40
19	Polydora flava	18	1.09	65.49
20	Cressa dubia	17	1.03	66.53
-	OPHIUROIDEA juv.	17	1.03	67.56
22	Spiophanes kroyeri	15	0.91	68.47
-	Pomatoceros lamarckii	15	0.91	69.38
24	Sabellaria spinulosa	14	0.85	70.22
25	Eusyllis blomstrandi	13	0.79	71.01
-	Autolytus alexandri	13	0.79	71.80
-	Callipallene brevirostris	13	0.79	72.59

Station 17. (Assemblage Group C1)

Rank	Species	Number	%	Cum%
1	Sabellaria spinulosa	79	8.08	8.08
2	Modiolus modiolus	75	7.67	15.75
3	Echinocyamus pusillus	50	5.11	20.86
4	Exogone verugera	49	5.01	25.87
5	Abra prismatica	38	3.89	29.75
6	Exogone hebes	37	3.78	33.54
-	Aonides paucibranchiata	37	3.78	37.32
8	Polydora flava	31	3.17	40.49
9	Polycirrus spp.	29	2.97	43.46
10	Sphaerosyllis taylori	23	2.35	45.81
-	Clymenura johnstoni	23	2.35	48.16
12	Spisula elliptica	22	2.25	50.41
13	NEMERTEA spp.	20	2.05	52.45
14	MELITIDAE sp.	19	1.94	54.40
15	Balanus sp.	18	1.84	56.24
16	Asclerocheilus spp.	16	1.64	57.87
-	Lanice conchilega	16	1.64	59.51
18	Notoproctus sp.	14	1.43	60.94
19	Eulalia mustela	13	1.33	62.27
-	Laonice bahusiensis	13	1.33	63.60
21	Syllis sp.H	12	1.23	64.83
-	Streptosyllis bidentata	12	1.23	66.05
23	Glycera lapidum	11	1.12	67.18
-	Parapleustes bicuspis	11	1.12	68.30
25	HARMOTHOINAE indet.	10	1.02	69.33
-	Nereis zonata	10	1.02	70.35

Station 16. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Balanus sp.	60	8.32	8.32
2	Echinocyamus pusillus	55	7.63	15.95
3	Pisione remota	45	6.24	22.19
4	Polygordius spp	37	5.13	27.32
5	Exogone hebes	32	4.44	31.76
6	Abra prismatica	29	4.02	35.78
7	Modiolus modiolus	27	3.74	39.53
8	Aonides paucibranchiata	24	3.33	42.86
9	Hesionura elongata	19	2.64	45.49
10	Filograna implexa	18	2.50	47.99
-	Spisula elliptica	18	2.50	50.49
12	Eusyllis blomstrandi	17	2.36	52.84
-	Glycera lapidum	17	2.36	55.20
-	Laonice bahusiensis	17	2.36	57.56
15	SERPULIDAE indet.	16	2.22	59.78
16	Syllis sp.	12	1.66	61.44
17	Moerella pygmaea	11	1.53	62.97
-	Thracia villosiuscula	11	1.53	64.49
19	Metavermilia multicristata	10	1.39	65.88
20	Protodorvillea kefersteini	9	1.25	67.13
21	HARMOTHOINAE indet.	8	1.11	68.24
-	Protodrilus spp.	8	1.11	69.35
-	Goodallia triangularis	8	1.11	70.46
24	Streptosyllis bidentata	7	0.97	71.43
-	Prionospio banyulensis	7	0.97	72.40
-	NEMERTEA spp.	7	0.97	73.37

Station 51. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Abra alba	99	10.42	10.42
2	Scalibregma inflatum	73	7.68	18.11
3	Aonides paucibranchiata	55	5.79	23.89
4	Ophelina acuminata	28	2.95	26.84
5	Spiophanes bombyx	27	2.84	29.68
6	Aricidea minuta	26	2.74	32.42
-	Caulleriella zetlandica	26	2.74	35.16
8	Scoloplos armiger	24	2.53	37.68
9	Lagis koreni	20	2.11	39.79
10	Tharyx killariensis	19	2.00	41.79
11	Spiophanes kroyeri	18	1.89	43.68
12	Pseudopolydora pulchra	17	1.79	45.47
13	Terebellides stroemi	16	1.68	47.16
-	Sabellaria spinulosa	16	1.68	48.84
-	Spisula elliptica	16	1.68	50.53
16	Pisione remota	15	1.58	52.11
-	Lumbrineris gracilis	15	1.58	53.68
-	Caulleriella alata	15	1.58	55.26
-	Grania sp.	15	1.58	56.84
-	Dendrodoa grossularia	15	1.58	58.42
21	Polydora caulleryi	14	1.47	59.89
-	Mediomastus fragilis	14	1.47	61.37
-	Goodallia triangularis	14	1.47	62.84
24	NEMERTEA spp.	13	1.37	64.21
25	TUBIFICIDAE spp.	12	1.26	65.47

Station 33. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Aonides paucibranchiata	74	11.67	11.67
2	Laonice bahusiensis	38	5.99	17.67
3	Chone sp.B	37	5.84	23.50
4	Praxillella affinis	30	4.73	28.23
5	Nematonereis unicornis	18	2.84	31.07
6	Caulleriella zetlandica	16	2.52	33.60
-	Mediomastus fragilis	16	2.52	36.12
8	Exogone hebes	15	2.37	38.49
9	Gammaropsis nitida	14	2.21	40.69
10	Ampharete sp.B	12	1.89	42.59
11	Lanice conchilega	11	1.74	44.32
-	Sabellaria spinulosa	11	1.74	46.06
13	Sphaerosyllis taylori	10	1.58	47.63
-	Leptochiton asellus	10	1.58	49.21
15	Aricidea cerrutii	9	1.42	50.63
-	Paradoneis cf. ilvana	9	1.42	52.05
-	Megamphopus cornutus	9	1.42	53.47
18	Protodorvillea kefersteini	8	1.26	54.73
-	Timoclea ovata	8	1.26	55.99
20	Clymenura johnstoni	7	1.10	57.10
-	Grania sp.	7	1.10	58.20
-	Harpinia pectinata	7	1.10	59.31
-	Ophuira juv.	7	1.10	60.41

Station 49. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Dendrodoa grossularia	77	10.16	10.16
2	Scalibregma inflatum	71	9.37	19.53
3	Caulleriella zetlandica	31	4.09	23.61
-	Mediomastus fragilis	31	4.09	27.70
5	Lumbrineris gracilis	27	3.56	31.27
6	Aonides paucibranchiata	26	3.43	34.70
-	Sabellaria spinulosa	26	3.43	38.13
8	Aricidea catherinae	25	3.30	41.42
9	Polydora caulleryi	22	2.90	44.33
10	Sagartia sp.	19	2.51	46.83
-	ASCIDIACEA indet.	19	2.51	49.34
12	Ophelina acuminata	16	2.11	51.45
13	TUBIFICIDAE spp.	14	1.85	53.30
14	HARMOTHOINAE indet.	13	1.72	55.01
15	Caulleriella alata	12	1.58	56.60
16	Tharyx killariensis	11	1.45	58.05
17	Laonice bahusiensis	10	1.32	59.37
18	Sabellides octocirrata	9	1.19	60.55
-	Hydroides norvegica	9	1.19	61.74
-	Pomatoceros lamarckii	9	1.19	62.93
21	Exogone hebes	8	1.06	63.98
-	Aricidea cerrutii	8	1.06	65.04
-	Pseudopolydora pulchra	8	1.06	66.10
-	Terebellides stroemi	8	1.06	67.15
25	Nematonereis unicornis	7	0.92	68.07
-	Callipallene brevirostris	7	0.92	69.00

Station 4. (Assemblage Group C1)

Rank	Species	Number	%	Cum.%
1	Aonides paucibranchiata	20	5.39	5.39
2	Glycymeris glycymeris	18	4.85	10.24
3	AORIDAE sp.	16	4.31	14.56
4	Mediomastus fragilis	12	3.23	17.79
-	Praxillella affinis	12	3.23	21.02
-	Caprella linearis	12	3.23	24.26
-	Leptochiton asellus	12	3.23	27.49
-	Amphipholis squamata	12	3.23	30.73
9	TUBIFICIDAE spp.	10	2.70	33.42
10	Pholoe tuberculata	9	2.43	35.85
-	Laonice bahusiensis	9	2.43	38.27
-	Spio armata	9	2.43	40.70
13	Exogone hebes	8	2.16	42.86
-	Polycirrus spp.	8	2.16	45.01
15	Abra alba	7	1.89	46.90
16	Eulalia mustela	6	1.62	48.52
17	HARMOTHOINAE indet.	5	1.35	49.87
-	Sphaerosyllis bulbosa	5	1.35	51.21
-	Glycera oxycephala	5	1.35	52.56
-	Paradoneis cf. ilvana	5	1.35	53.91
-	Spiophanes kroyeri	5	1.35	55.26
-	Monticellina dorsobranchiali	5	1.35	56.60
-	Ampharete sp.B	5	1.35	57.95
-	Lysilla nivea	5	1.35	59.30
-	Polycirrus sp.A	5	1.35	60.65
-	Hiatella arctica	5	1.35	61.99
-	NEMERTEA spp.	5	1.35	63.34

Station 39. (Assemblage Group C2)

Rank	Species	Number	%	Cum.%
1	Abra alba	202	13.76	13.76
2	Phaxas pellucidus	133	9.06	22.82
3	Goodallia triangularis	110	7.49	30.31
4	Spiophanes bombyx	79	5.38	35.69
5	Spio sp.A	64	4.36	40.05
6	Ampelisca tenuicornis	45	3.07	43.12
7	Pariambus typicus	42	2.86	45.98
8	Scalibregma inflatum	40	2.72	48.71
-	Ampharete sp.A	40	2.72	51.43
-	Unciola planipes	40	2.72	54.16
11	Lagis koreni	37	2.52	56.68
12	NEMERTEA spp.	35	2.38	59.06
13	Sphaerosyllis taylori	31	2.11	61.17
14	Golfingia juv.	28	1.91	63.08
15	Pisione remota	24	1.63	64.71
16	Streptosyllis bidentata	23	1.57	66.28
17	Megamphopus cornutus	22	1.50	67.78
18	Syllis sp.H	21	1.43	69.21
-	Spisula elliptica	21	1.43	70.64
20	Diastylis sp.	18	1.23	71.87
21	Bodotria sp.	17	1.16	73.02
22	Opisthodonta pterochaeta	16	1.09	74.11
23	Sphaerosyllis bulbosa	14	0.95	75.07
24	Protodorvillea kefersteini	13	0.89	75.95
-	CUCUMARIIDAE juv.	13	0.89	76.84

Station 48. (Assemblage Group C2)

Rank	Species	Number	%	Cum.%
1	Mediomastus fragilis	384	20.62	20.62
2	Aonides paucibranchiata	175	9.40	30.02
3	Lagis koreni	67	3.60	33.62
4	AMPHARETINAE juv.	55	2.95	36.57
5	Lumbrineris gracilis	54	2.90	39.47
6	Pholoe sp.	53	2.85	42.32
7	NEMERTEA spp.	50	2.69	45.01
8	Caulleriella zetlandica	42	2.26	47.26
9	Pholoe tuberculata	40	2.15	49.41
10	Sphaerosyllis taylori	33	1.77	51.18
-	Ampelisca tenuicornis	33	1.77	52.95
12	Scalibregma inflatum	30	1.61	54.56
13	Caecum glabrum	28	1.50	56.07
14	Laonice bahusiensis	27	1.45	57.52
15	Spio sp.A	26	1.40	58.92
-	Goodallia triangularis	26	1.40	60.31
17	Abra alba	25	1.34	61.65
18	Golfingia juv.	24	1.29	62.94
19	Syllis sp.J	22	1.18	64.12
20	CUCUMARIIDAE juv.	21	1.13	65.25
21	Ampharete sp.A	20	1.07	66.33
22	Streptosyllis bidentata	19	1.02	67.35
-	Goniadella gracilis	19	1.02	68.37
24	Spiophanes bombyx	18	0.97	69.33
-	Photis longicaudata	18	0.97	70.30

Station 46. (Assemblage Group C2)

Rank	Species	Number	%	Cum.%
1	Syllis sp.E	82	7.52	7.52
2	Sphaerosyllis taylori	61	5.59	13.11
3	Mediomastus fragilis	58	5.32	18.42
4	Aonides paucibranchiata	37	3.39	21.81
5	Polycirrus spp.	35	3.21	25.02
-	NEMERTEA spp.	35	3.21	28.23
7	HARMOTHOINAE indet.	32	2.93	31.16
8	Pista cristata	29	2.66	33.82
9	Eurydice pulchra	28	2.57	36.39
10	Notomastus sp.D	24	2.20	38.59
11	Harmothoe zetlandica	22	2.02	40.60
-	Pisione remota	22	2.02	42.62
-	Streptosyllis bidentata	22	2.02	44.64
-	Goniadella gracilis	22	2.02	46.65
15	Syllis sp.H	21	1.92	48.58
16	Sphaerosyllis hystrix	20	1.83	50.41
17	Eumida sanguinea	19	1.74	52.15
18	Polydora caulleryi	18	1.65	53.80
-	Thracia villosiuscula	18	1.65	55.45
20	Nereis elitoralis	15	1.37	56.83
-	Megamphopus cornutus	15	1.37	58.20
-	EDWARDSIIDAE sp.	15	1.37	59.58
23	Eulalia mustela	14	1.28	60.86
-	Pariambus typicus	14	1.28	62.14
25	Guernea coalita	13	1.19	63.34
-	Nucula hanleyi	13	1.19	64.53
-	OPHIUROIDEA juv.	13	1.19	65.72

Station 54.

Rank	Species	Number	%	Cum.%
1	Goodallia triangularis	30	29.41	29.41
2	Spisula elliptica	16	15.69	45.10
3	Echinocyamus pusillus	11	10.78	55.88
4	ECHINOIDEA juv.	6	5.88	61.76
5	Moerella pygmaea	4	3.92	65.69
6	Glycera oxycephala	3	2.94	68.63
-	Unciola planipes	3	2.94	71.57
8	Paradoneis lyra	2	1.96	73.53
-	Paradoneis sp.	2	1.96	75.49
-	Travisia forbesii	2	1.96	77.45
-	Jassa sp.	2	1.96	79.41
-	Limacina retroversa	2	1.96	81.37
-	Modiolus modiolus	2	1.96	83.33
-	Timoclea ovata	2	1.96	85.29
15	Syllis sp.H	1	0.98	86.27
-	Eusyllis blomstrandi	1	0.98	87.25
-	Exogone hebes	1	0.98	88.24
-	Sphaerosyllis taylori	1	0.98	89.22
-	Spio sp.C	1	0.98	90.20
-	Ophelia borealis	1	0.98	91.18
-	Callipallene brevirostris	1	0.98	92.16
-	Amphilochus manudens	1	0.98	93.14
-	Atylus falcatus	1	0.98	94.12
-	Dyopedos porrectus	1	0.98	95.10
-	CAPRELLIDAE sp.	1	0.98	96.08
-	Pariambus typicus	1	0.98	97.06
-	Glycymeris glycymeris	1	0.98	98.04
-	Astarte sulcata	1	0.98	99.02
-	Aspidosiphon muelleri	1	0.98	100.00

Appendix 9

Diagrammatic representations of number of taxa per station (grab or dredge data only)

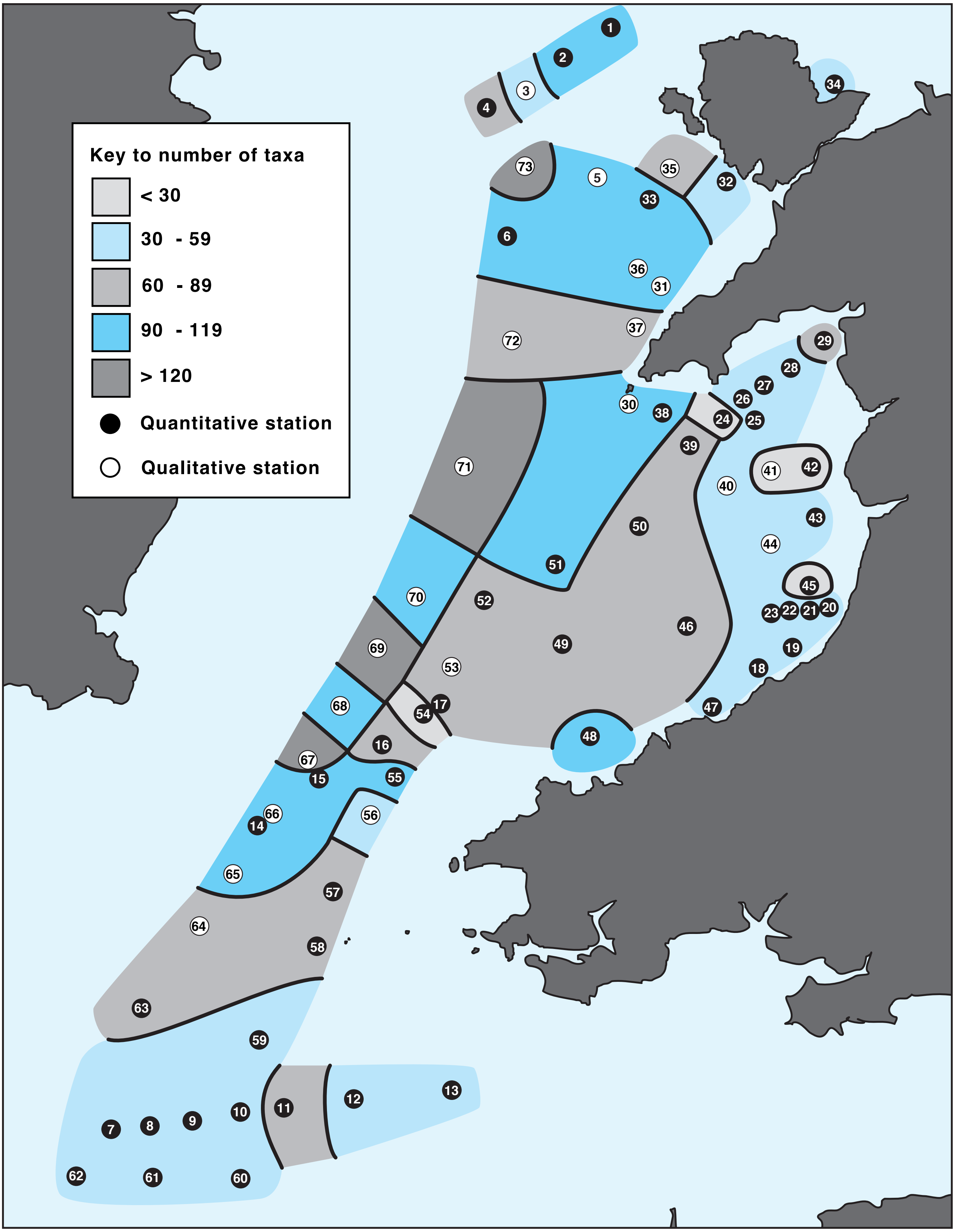


Fig. A9.1: Diagrammatic representation of the number of annelid taxa per station (grab or dredge data only).

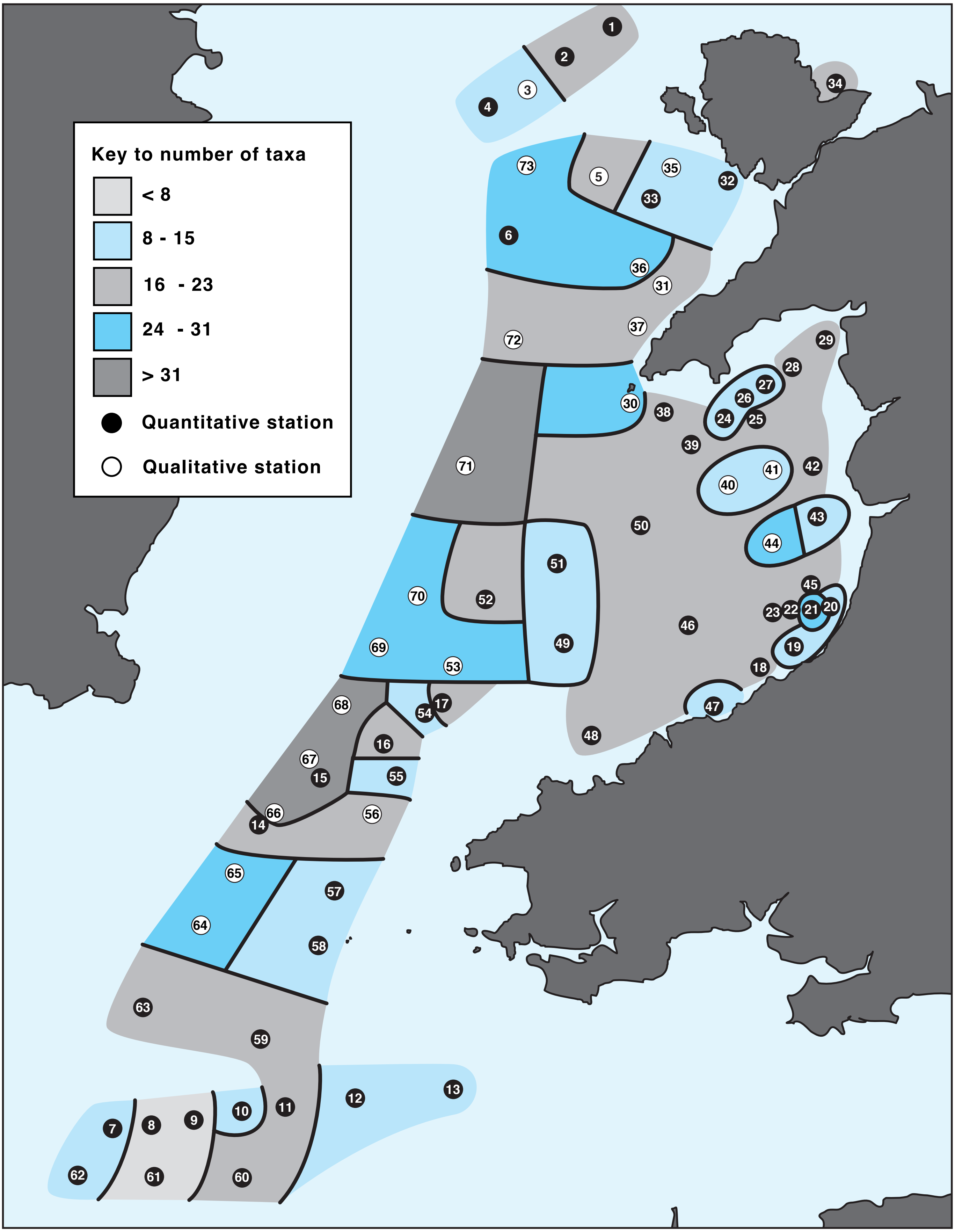


Fig. A9.2: Diagrammatic representation of the number of mollusc taxa per station (grab or dredge data only).

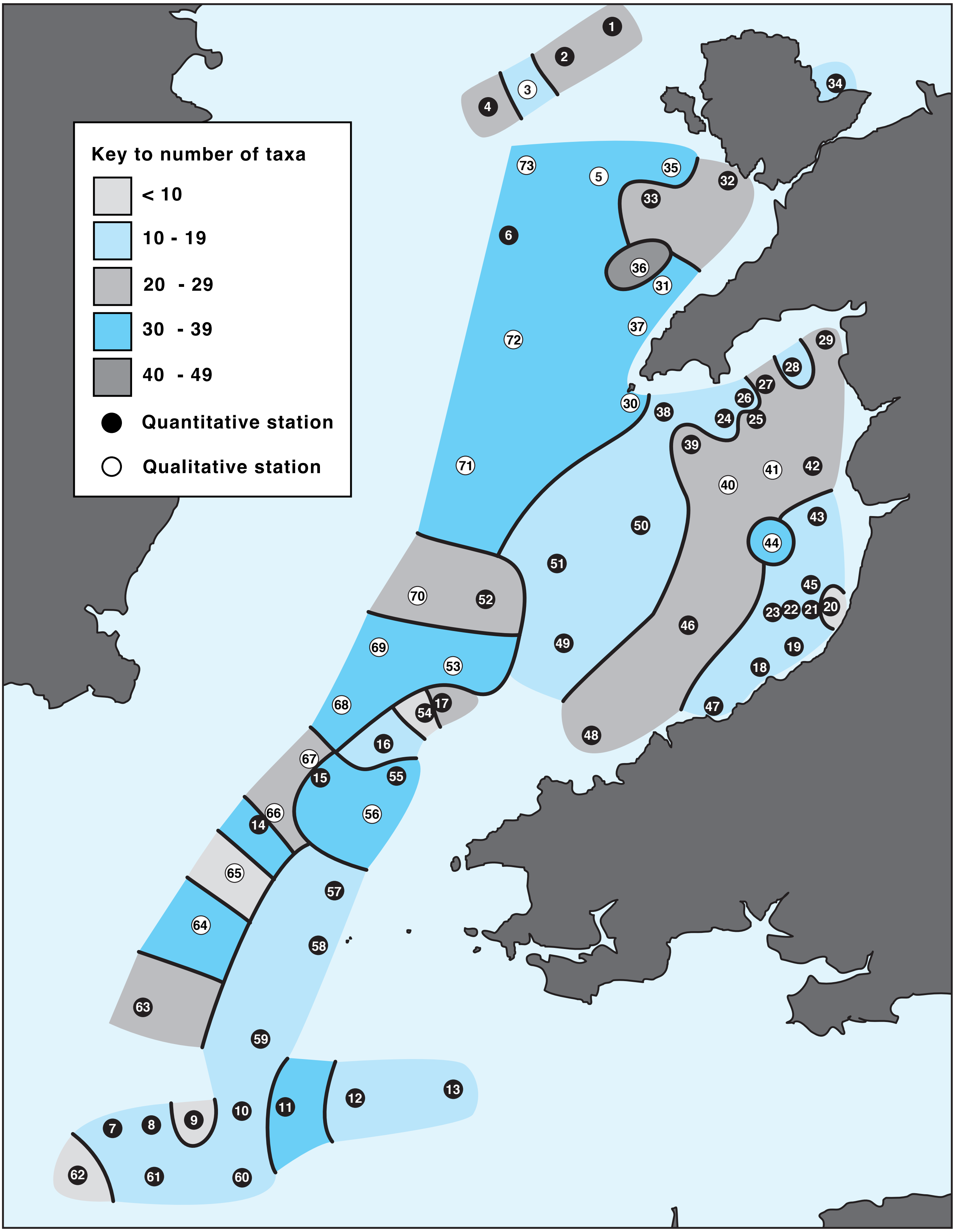


Fig. A9.3: Diagrammatic representation of the number of arthropod taxa per station (grab or dredge data only).

Appendix 10
Diversity and evenness values for each BIOMÔR station

Table A10.1	*Annelida*
Table A10.2	*Mollusca*
Table A10.3	*Arthropoda*
Table A10.4	*Other Phyla*

Group	Stn.	S	N	∝	d	D	H	H’	J	E
A1	7	34	180	12.40	6.35	0.94	2.74	4.33	0.85	0.58
	8	37	221	12.71	6.67	0.94	2.79	4.38	0.84	0.55
	9	30	170	10.57	5.65	0.92	2.56	4.05	0.83	0.54
	61	39	303	11.91	6.65	0.88	2.61	4.05	0.77	0.41
	62	42	317	12.98	7.12	0.93	2.88	4.45	0.83	0.51
	10	39	177	15.47	7.34	0.96	3.01	4.80	0.91	0.71
A2	59	49	435	14.18	7.90	0.91	2.87	4.40	0.78	0.42
	63	62	639	16.96	9.44	0.94	3.04	4.61	0.77	0.38
	60	57	699	14.67	8.55	0.93	2.95	4.44	0.76	0.37
	11	64	1001	15.24	9.12	0.94	3.18	4.75	0.79	0.41
B1	19	37	766	8.12	5.42	0.90	2.64	3.93	0.75	0.40
	20	37	787	8.06	5.40	0.90	2.61	3.89	0.75	0.38
	18	48	1135	10.16	6.68	0.88	2.59	3.84	0.69	0.28
	47	41	556	10.21	6.33	0.84	2.35	3.56	0.66	0.27
	24	25	402	5.90	4.00	0.80	2.11	3.20	0.69	0.34
	26	40	972	8.40	5.67	0.83	2.33	3.47	0.65	0.26
	27	51	886	11.77	7.37	0.90	2.66	3.98	0.70	0.30
	29	60	1466	12.59	8.09	0.88	2.80	4.14	0.70	0.28
B2	12	34	957	6.88	4.81	0.62	1.64	2.44	0.48	0.13
	13	33	916	6.70	4.69	0.69	1.87	2.79	0.55	0.18
B3	32	47	1243	9.66	6.46	0.88	2.59	3.84	0.69	0.29
	50	78	1369	17.94	10.66	0.90	2.96	4.41	0.70	0.26
	34	40	2689	6.66	4.94	0.73	1.85	2.71	0.51	0.14
B4	43	39	823	8.51	5.66	0.64	1.82	2.74	0.52	0.15
	45	26	697	5.33	3.82	0.46	1.26	1.91	0.41	0.11
	28	34	704	7.46	5.03	0.85	2.33	3.49	0.69	0.31
	21	43	995	9.15	6.08	0.68	1.88	2.82	0.52	0.14
	22	33	1805	5.73	4.27	0.75	1.82	2.67	0.53	0.17
	25	48	465	13.44	7.65	0.90	2.72	4.15	0.74	0.36
	42	29	249	8.50	5.07	0.87	2.37	3.67	0.76	0.42
	23	37	136	16.73	7.33	0.96	2.93	4.76	0.91	0.72
C1	6	119	1384	31.19	16.31	0.92	3.36	5.05	0.73	0.27
	15	105	917	30.58	15.25	0.95	3.54	5.37	0.80	0.39
	14	98	661	31.81	14.94	0.97	3.63	5.56	0.84	0.47
	1	94	870	26.77	13.74	0.93	3.26	4.94	0.75	0.32
	2	98	1292	24.63	13.54	0.93	3.23	4.83	0.73	0.28
	38	96	715	29.84	14.45	0.97	3.59	5.47	0.83	0.46
	57	70	369	25.59	11.67	0.95	3.22	5.03	0.82	0.46
	58	89	526	30.72	14.05	0.98	3.73	5.75	0.89	0.60
	55	98	833	28.85	14.42	0.96	3.59	5.44	0.82	0.44
	17	86	626	26.99	13.20	0.96	3.47	5.30	0.82	0.45
	52	77	604	23.42	11.87	0.95	3.38	5.16	0.82	0.46
	16	77	426	27.46	12.55	0.96	3.37	5.23	0.83	0.48
	49	88	542	29.78	13.82	0.96	3.49	5.38	0.83	0.47
	51	91	678	28.28	13.81	0.97	3.61	5.50	0.85	0.49
	4	66	234	30.59	11.91	0.97	3.44	5.52	0.91	0.69
	33	91	504	32.43	14.46	0.96	3.48	5.39	0.83	0.45
C2	39	79	622	23.99	12.13	0.95	3.33	5.08	0.81	0.42
	48	111	1406	28.27	15.18	0.90	3.12	4.68	0.69	0.22
	46	85	784	24.24	12.60	0.96	3.52	5.32	0.83	0.47
	54	10	15	13.11	3.32	0.94	1.60	3.19	0.96	0.90

Table A10.1: Annelid diversity and evenness values for each BIOMÔR station.

Group	Stn.	S	N	∝	d	D	H	H’	J	E
A1	7	9	29	4.47	2.38	0.81	1.46	2.58	0.81	0.62
	8	7	34	2.67	1.70	0.67	1,13	1.95	0.69	0.48
	9	7	54	2.14	1.50	0.67	1.19	1.94	0.69	0.47
	61	7	72	1.92	1.40	0.67	1.25	1.98	0.71	0.49
	62	10	262	2.06	1.62	0.50	1.04	1.58	0.47	0.22
	10	12	440	2.28	1.81	0.63	1.31	1.95	0.55	0.26
A2	59	17	190	4.52	3.05	0.86	2.09	3.22	0.79	0.52
	63	16	269	3.73	2.68	0.78	1.90	2.89	0.72	0.43
	60	16	346	3.47	2.57	0.79	1.88	2.83	0.71	0.41
	11	23	247	6.20	3.99	0.79	1.99	3.06	0.68	0.33
B1	19	14	335	2.95	2.24	0.68	1.39	2.09	0.55	0.25
	20	13	710	2.26	1.83	0.33	0.77	1.16	0.31	0.10
	18	16	1061	2.67	2.15	0.34	0.76	1.12	0.28	0.08
	47	11	314	2.22	1.74	0.59	1.07	1.61	0.47	0.21
	24	9	142	2.14	1.61	0.67	1.27	1.96	0.62	0.36
	26	15	953	2.53	2.04	0.56	1.05	1.55	0.40	0.14
	27	14	754	2.44	1.96	0.57	1.03	1.53	0.40	0.15
	29	22	589	4.51	3.29	0.67	1.67	2.49	0.56	0.22
B2	12	13	209	3.07	2.25	0.74	1.63	2.48	0.67	0.38
	13	12	2015	1.69	1.45	0.05	0.15	0.23	0.07	0.02
B3	32	15	128	4.41	2.89	0.80	1.80	2.83	0.73	0.44
	50	18	1296	2.96	2.37	0.53	0.90	1.32	0.32	0.09
	34	16	993	2.71	2.17	0.43	1.03	1.53	0.38	0.13
B4	43	11	239	2.38	1.83	0.42	0.97	1.49	0.43	0.18
	45	17	214	4.34	2.98	0.85	2.03	3.11	0.76	0.48
	28	16	459	3.22	2.45	0.41	1.01	1.54	0.39	0.13
	21	26	753	5.22	3.77	0.56	1.48	2.23	0.47	0.15
	22	20	998	3.54	2.75	0.46	1.17	1.73	0.40	0.12
	25	21	324	5.02	3.46	0.72	1.67	2.55	0.58	0.24
	42	23	405	5.29	3.66	0.71	1.88	2.85	0.63	0.28
	23	18	322	4.12	2.94	0.68	1.41	2.14	0.51	0.20
C1	6	28	249	8.10	4.89	0.90	2.48	3.82	0.79	0.48
	15	37	534	9.03	5.73	0.70	1.91	2.90	0.56	0.18
	14	22	133	7.51	4.29	0.87	2.17	3.45	0.77	0.47
	1	20	169	5.90	3.70	0.83	1.99	3.11	0.72	0.40
	2	21	464	4.53	3.26	0.56	1.44	2.19	0.50	0.18
	38	21	127	7.17	4.13	0.87	2.16	3.45	0.78	0.49
	57	12	94	3.65	2.42	0.71	1.53	2.45	0.68	0.41
	58	15	136	4.31	2.85	0.84	1.94	3.03	0.78	0.51
	55	11	138	2.81	2.03	0.63	1.18	1.84	0.53	0.26
	17	16	168	4.35	2.93	0.73	1.61	2.51	0.63	0.31
	52	19	87	7.50	4.03	0.84	1.99	3.26	0.77	0.48
	16	20	133	6.53	3.89	0.88	2.17	3.43	0.79	0.52
	49	14	33	9.18	3.72	0.93	1.99	3.56	0.93	0.83
	51	11	164	2.66	1.96	0.61	1.36	2.10	0.61	0.33
	4	9	49	3.24	2.06	0.79	1.50	2.49	0.78	0.58
	33	12	39	5.92	3.00	0.87	1.79	3.09	0.86	0.68
C2	39	20	517	4.14	3.04	0.73	1.58	2.37	0.55	0.22
	48	21	160	6.46	3.94	0.90	2.30	3.60	0.82	0.56
	46	21	104	7.93	4.31	0.92	2.41	3.88	0.88	0.69
	54	8	58	2.52	1.72	0.66	1.20	1.98	0.66	0.42

Table A10.2: Mollusc diversity and evenness values for each BIOMÔR station.

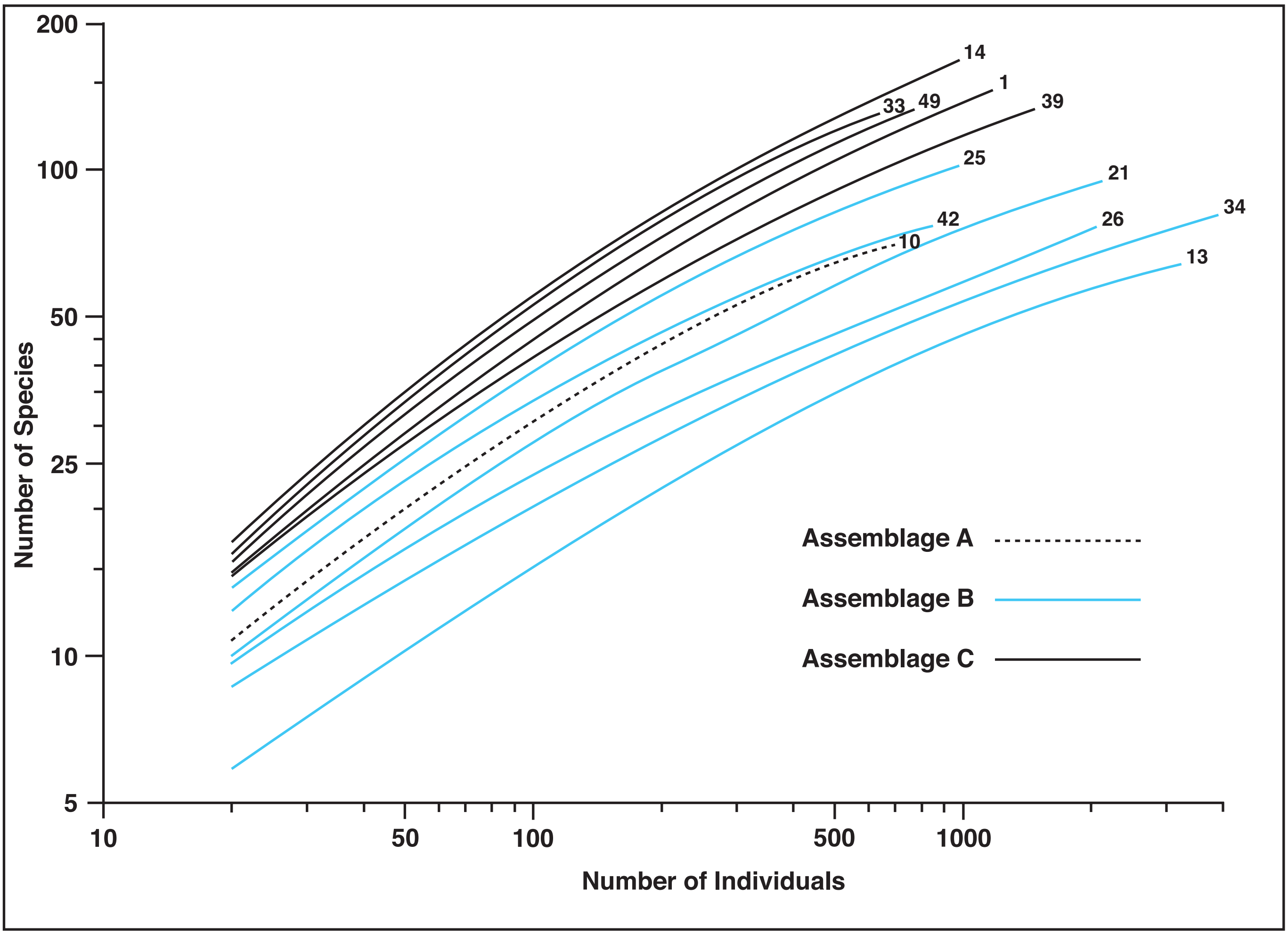
Group	Stn.	S	N	∝	d	D	H	H'	J	E
A1	7	13	37	7.13	3.32	0.85	1.68	2.96	0.80	0.57
	8	11	22	8.76	3.24	0.92	1.74	3.24	0.94	0.85
	9	9	48	3.27	2.07	0.71	1.37	2.29	0.72	0.49
	61	10	17	10.19	3.18	0.88	1.50	2.93	0.88	0.74
	62	9	20	6.30	2.67	0.88	1.52	2.84	0.90	0.77
	10	10	37	4.50	2.49	0.84	1.64	2.83	0.85	0.68
A2	59	17	130	5.23	3.29	0.82	1.91	3.01	0.74	0.44
	63	27	193	8.54	4.94	0.85	2.16	3.39	0.71	0.37
	60	15	155	4.10	2.78	0.88	2.10	3.25	0.83	0.61
	11	37	415	9.82	5.97	0.85	2.24	3.42	0.66	0.27
B1	19	11	31	6.09	2.91	0.88	1.71	3.02	0.87	0.71
	20	9	23	5.44	2.55	0.91	1.68	3.05	0.96	0.91
	18	17	47	9.57	4.16	0.90	2.03	3.52	0.86	0.66
	47	12	77	3.98	2.53	0.82	1.71	2.75	0.77	0.52
	24	12	44	5.44	2.91	0.76	1.52	2.61	0.73	0.47
	26	14	80	4.91	2.97	0.58	1.28	2.14	0.56	0.26
	27	22	50	15.01	5.37	0.94	2.31	4.05	0.91	0.74
	29	22	266	5.69	3.76	0.82	2.12	3.24	0.73	0.41
B2	12	10	125	2.56	1.86	0.73	1.48	2.30	0.69	0.44
	13	11	26	7.19	3.07	0.90	1.73	3.15	0.91	0.79
B3	32	21	207	5.84	3.75	0.63	1.48	2.33	0.53	0.20
	50	17	101	5.85	3.47	0.90	2.24	3.59	0.88	0.69
	34	12	108	3.45	2.35	0.42	0.92	1.52	0.42	0.17
B4	43	17	187	4.54	3.06	0.85	2.06	3.17	0.78	0.50
	45	16	211	4.02	2.80	0.68	1.58	2.45	0.61	0.30
	28	18	63	8.42	4.10	0.81	1.85	3.14	0.75	0.46
	21	17	81	6.56	3.64	0.79	1.76	2.91	0.71	0.41
	22	14	70	5.26	3.06	0.78	1.71	2.83	0.74	0.47
	25	24	146	8.17	4.62	0.92	2.49	3.95	0.86	0.63
	42	20	174	5.83	3.68	0.69	1.71	2.70	0.62	0.29
	23	14	28	11.14	3.90	0.94	1.98	3.62	0.95	0.87
C1	6	37	249	12.02	6.52	0.95	2.95	4.59	0.88	0.64
	15	36	170	13.96	6.81	0.88	2.47	3.97	0.77	0.42
	14	32	87	18.27	6.94	0.94	2.61	4.40	0.88	0.65
	1	24	94	10.41	5.06	0.81	1.98	3.29	0.72	0.38
	2	29	244	8.57	5.09	0.90	2.53	3.91	0.80	0.50
	38	17	50	9.08	4.09	0.88	1.99	3.43	0.84	0.61
	57	17	35	13.03	4.50	0.90	1.97	3.56	0.87	0.68
	58	14	232	3.28	2.39	0.37	0.87	1.37	0.36	0.12
	55	31	169	11.14	5.85	0.93	2.67	4.22	0.85	0.59
	17	25	97	10.91	5.25	0.90	3.31	3.80	0.82	0.54
	52	28	102	12.74	5.84	0.95	2.62	4.29	0.89	0.69
	16	14	81	4.88	2.96	0.45	1.03	1.76	0.46	0.18
	49	19	47	11.86	4.68	0.94	2.25	3.92	0.92	0.78
	51	18	45	11.12	4.47	0.92	2.14	3.74	0.90	0.73
	4	23	62	13.24	5.33	0.89	2.18	3.75	0.83	0.57
	33	22	67	11.42	4.99	0.92	2.29	3.87	0.87	0.65
C2	39	25	234	7.09	4.40	0.88	2.27	3.50	0.75	0.43
	48	29	158	10.42	5.53	0.92	2.57	4.08	0.84	0.57
	46	23	109	8.90	4.69	0.88	2.20	3.56	0.79	0.49
	54	8	11	13.19	2.92	0.93	1.37	2.85	0.95	0.88

Table A10.3: Arthropod diversity and evenness values for each BIOMÔR station.

Group	Stn.	S	N	∝	d	D	H	H’	J	E
A1	7	5	29	1.74	1.19	0.70	1.08	1.83	0.79	0.64
	8	6	33	2.15	1.43	0.69	1.11	1.88	0.73	0.54
	9	5	23	1.97	1.28	0.68	1.00	1.75	0.75	0.59
	61	7	34	2.67	1.70	0.66	1.12	1.92	0.69	0.47
	62	9	68	2.78	1.90	0.53	1.00	1.65	0.52	0.27
	10	9	43	3.47	2.13	0.66	1.25	2.13	0.67	0.42
A2	59	11	235	2.39	1.83	0.57	1.19	1.82	0.52	0.25
	63	16	163	4.40	2.94	0.61	1.35	2.13	0.53	0.22
	60	6	103	1.39	1.08	0.59	0.97	1.51	0.58	0.37
	11	17	469	3.46	2.60	0.73	1.60	2.39	0.58	0.26
B1	19	9	188	1.97	1.53	0.78	1.59	2.40	0.76	0.54
	20	11	356	2.15	1.70	0.74	1.54	2.30	0.67	0.39
	18	10	264	2.06	1.61	0.73	1.42	2.13	0.64	0.38
	47	6	28	2.35	1.50	0.82	1.40	2.39	0.92	0.85
	24	7	23	3.43	1.91	0.83	1.39	2.47	0.88	0.76
	26	8	63	2.43	1.69	0.72	1.34	2.17	0.72	0.50
	27	11	101	3.14	2.17	0.74	1.55	2.45	0.71	0.45
	29	12	195	2.82	2.09	0.74	1.57	2.40	0.67	0.39
B2	12	8	344	1.46	1.20	0.62	1.23	1.83	0.61	0.36
	13	8	238	1.60	1.28	0.59	1.18	1.78	0.59	0.35
B3	32	10	53	3.65	2.27	0.71	1.40	2.34	0.71	0.45
	50	14	107	4.30	2.78	0.68	1.47	2.37	0.62	0.32
	34	12	96	3.62	2.41	0.72	1.55	2.49	0.69	0.42
B4	43	6	42	1.92	1.34	0.41	0.73	1.26	0.49	0.28
	45	9	48	3.27	2.07	0.70	1.35	2.28	0.72	0.48
	28	9	82	2.58	1.82	0.76	1.56	2.48	0.78	0.57
	21	9	270	1.79	1.43	0.60	1.22	1.83	0.58	0.32
	22	8	574	1.32	1.10	0.69	1.27	1.87	0.62	0.40
	25	9	43	3.47	2.13	0.79	1.48	2.48	0.78	0.57
	42	4	19	1.55	1.02	0.38	0.57	1.06	0.53	0.36
	23	6	26	2.45	1.53	0.63	1.00	1.77	0.69	0.48
C1	6	8	105	2.01	1.50	0.52	0.98	1.54	0.51	0.27
	15	16	107	5.21	3.21	0.81	1.76	2.81	0.70	0.40
	14	15	101	4.87	3.03	0.83	1.93	3.08	0.79	0.53
	1	7	34	2.67	1.70	0.77	1.33	2.26	0.80	0.63
	2	8	83	2.18	1.58	0.75	1.45	2.28	0.76	0.55
	38	10	148	2.42	1.80	0.72	1.47	2.26	0.68	0.42
	57	15	358	3.17	2.38	0.46	0.97	1.48	0.38	0.13
	58	16	182	4.23	2.88	0.80	1.82	2.81	0.70	0.40
	55	15	509	2.90	2.25	0.57	1.31	1.96	0.50	0.21
	17	10	87	2.92	2.02	0.62	1.19	1.92	0.58	0.31
	52	12	121	3.31	2.29	0.75	1.66	2.60	0.73	0.46
	16	14	81	4.88	2.96	0.53	1.16	1.94	0.51	0.22
	49	12	136	3.17	2.24	0.64	1.36	2.14	0.60	0.31
	51	10	63	3.35	2.17	0.85	1.74	2.82	0.85	0.67
	4	9	26	4.88	2.46	0.76	1.33	2.42	0.76	0.54
	33	6	24	2.57	1.57	0.82	1.35	2.35	0.91	0.82
C2	39	9	95	2.44	1.76	0.76	1.51	2.38	0.75	0.53
	48	21	138	6.90	4.06	0.81	1.93	3.06	0.70	0.37
	46	12	94	3.65	2.42	0.81	1.79	2.85	0.79	0.56
	54	3	18	1.03	0.69	0.54	0.68	1.19	0.75	0.64

Table A10.4: 'Other phyla' diversity and evenness values for each BIOMÔR station.

Appendix 11
Hurlbert rarefaction curves for each BIOMÔR station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25
10
5
10
50
100
500
1000
Number of Individuals
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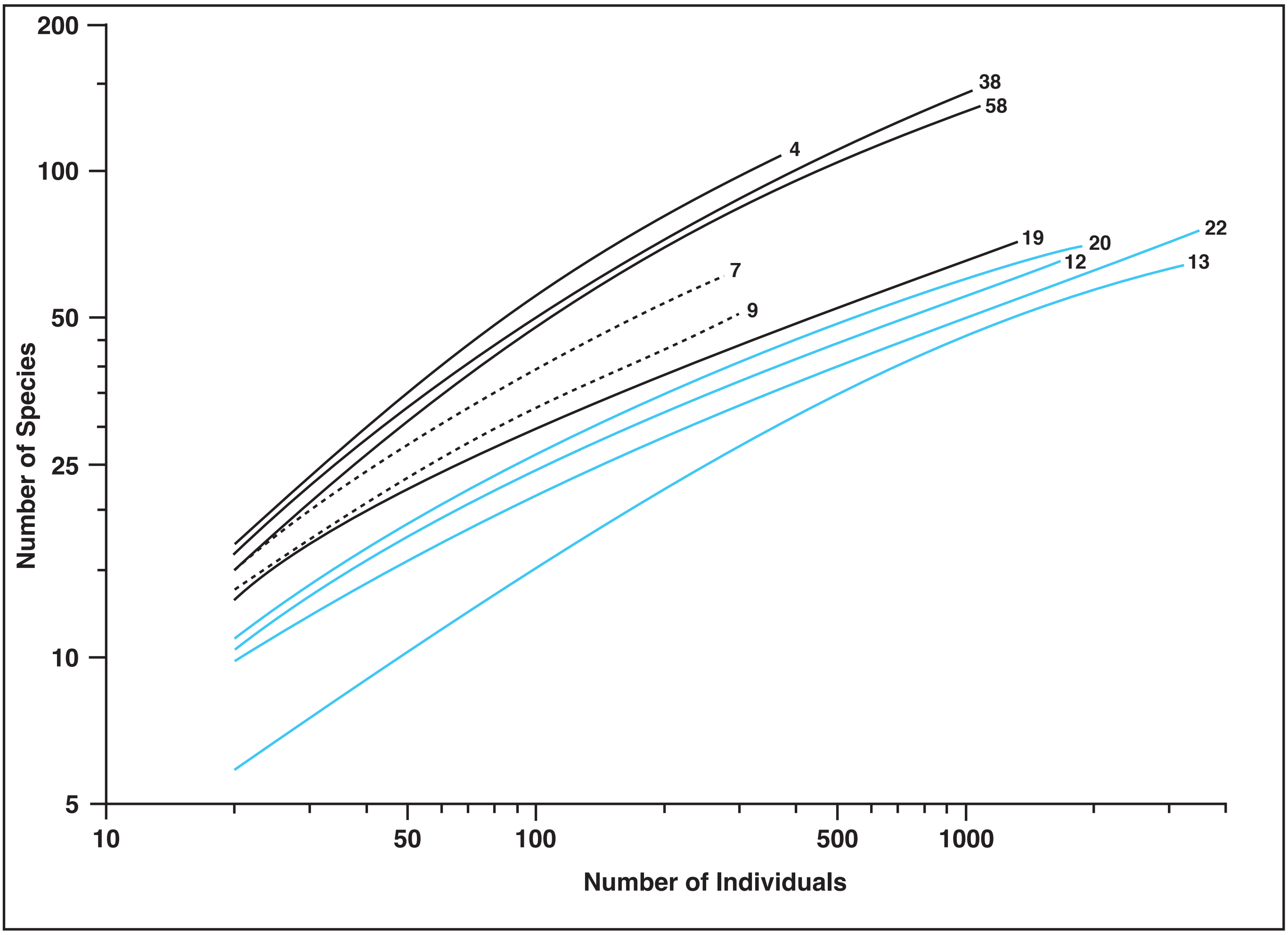
33
49
1
39
25
21
42
10
26
34
13
Assemblage A
Assemblage B
Assemblage C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10
50
100
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Number of Individuals
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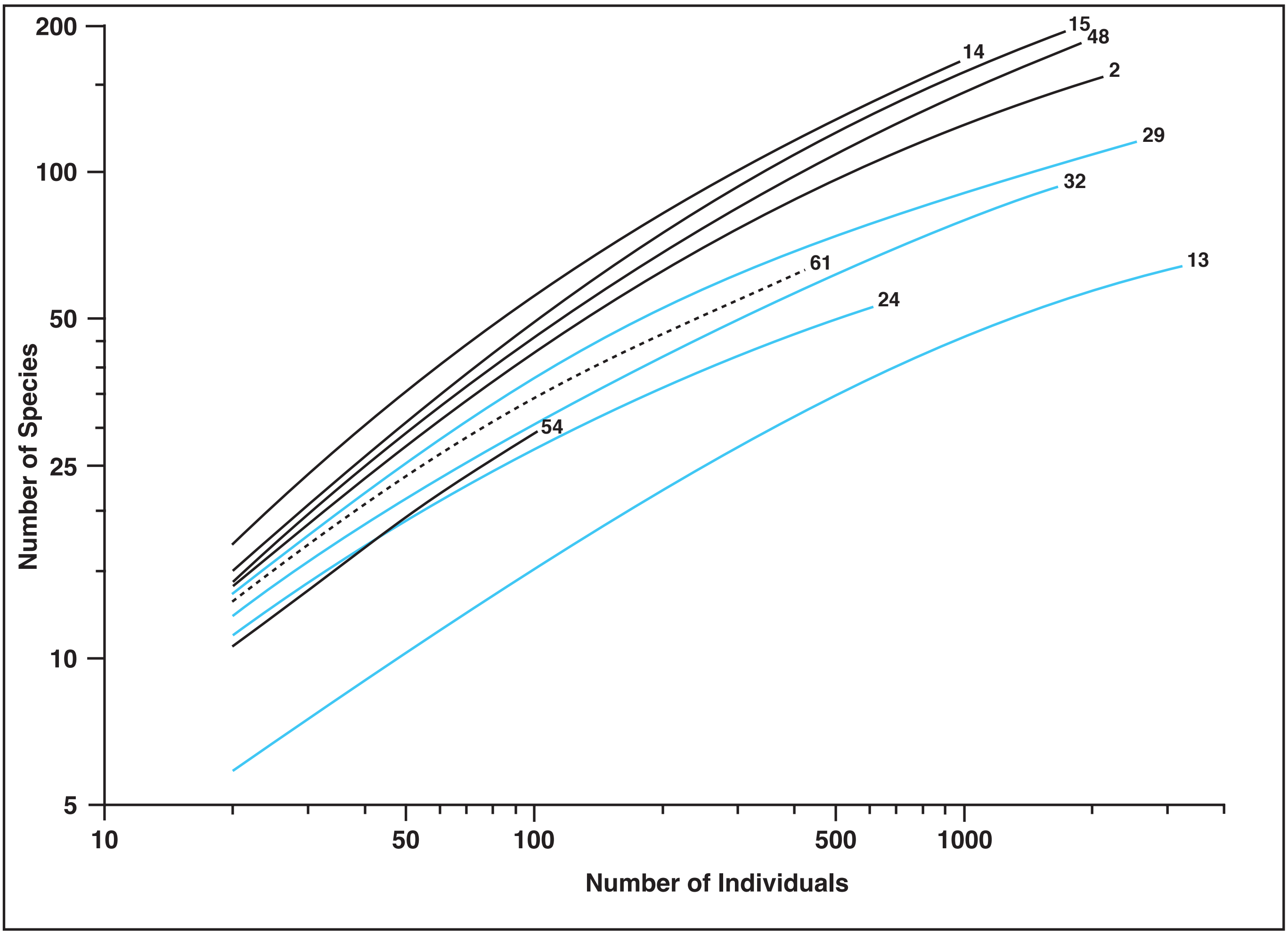
7
9
19
20
12
22
13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50
100
500
1000
Number of Individuals
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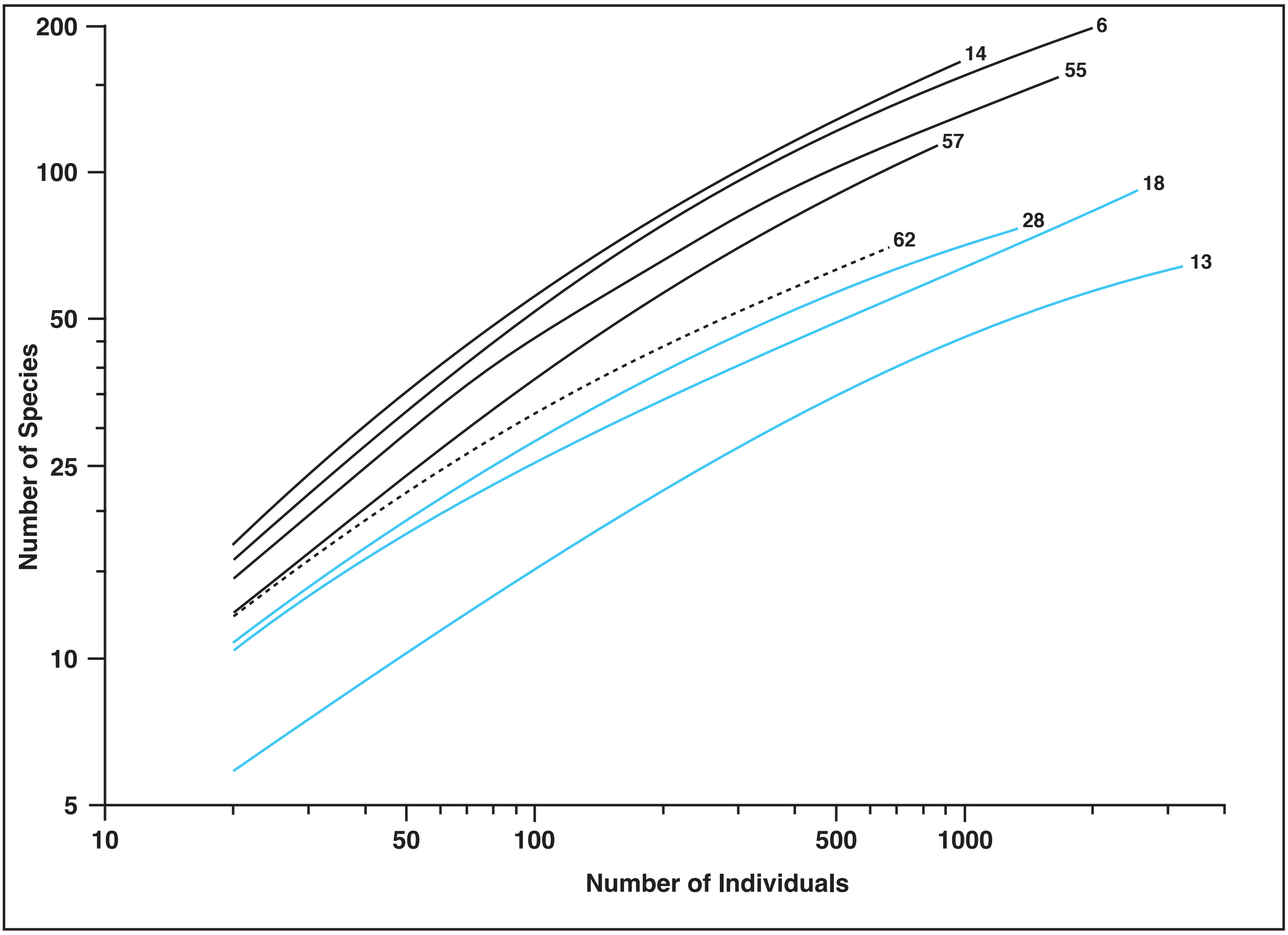
14
2
29
32
61
13
24
54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25
10
5
10
50
100
500
1000
Number of Individuals
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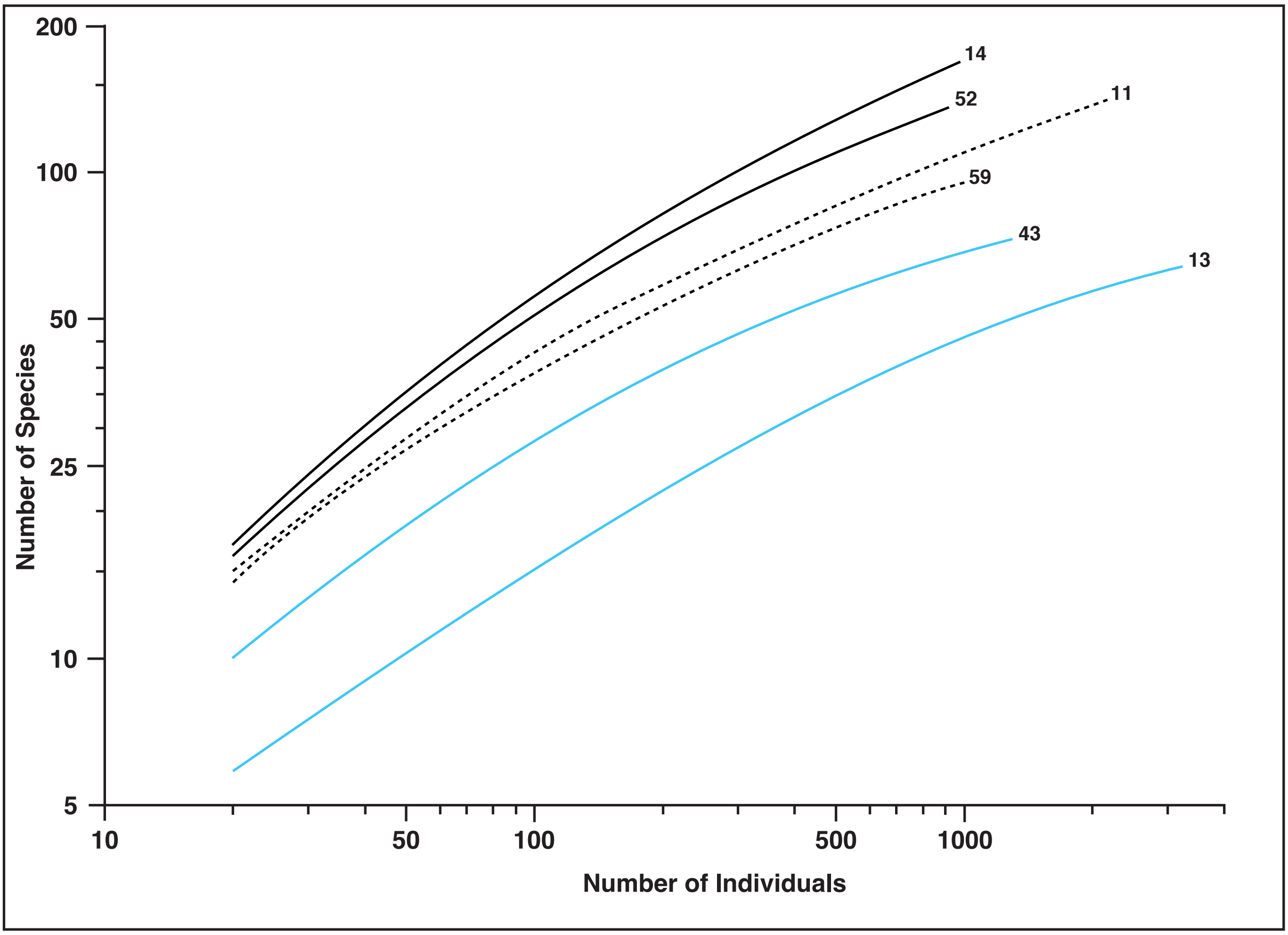
14
55
57
18
28
62
13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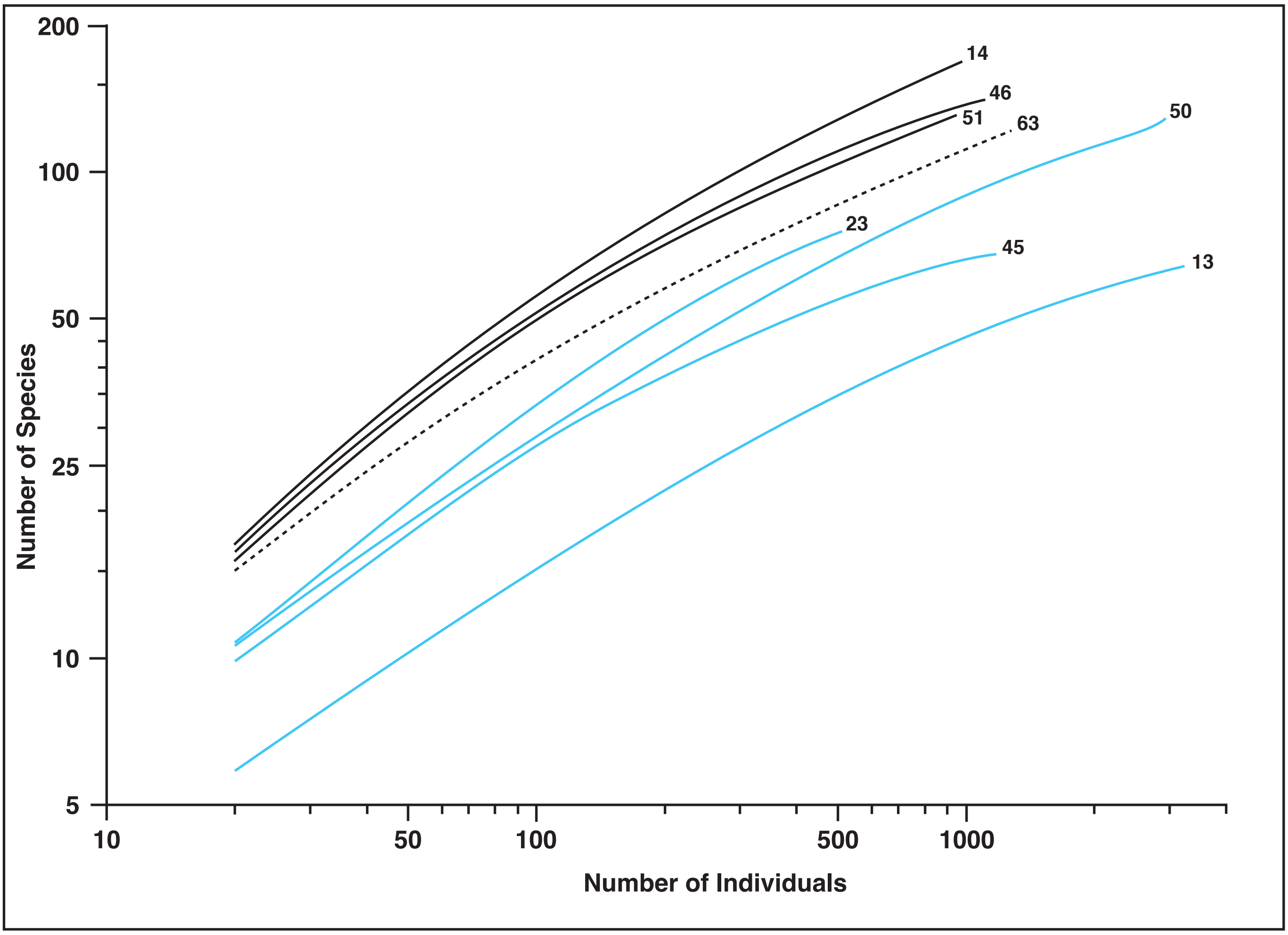
25
10
5
Number of Individuals
10
50
100
500
1000
14
52
11
59
43
13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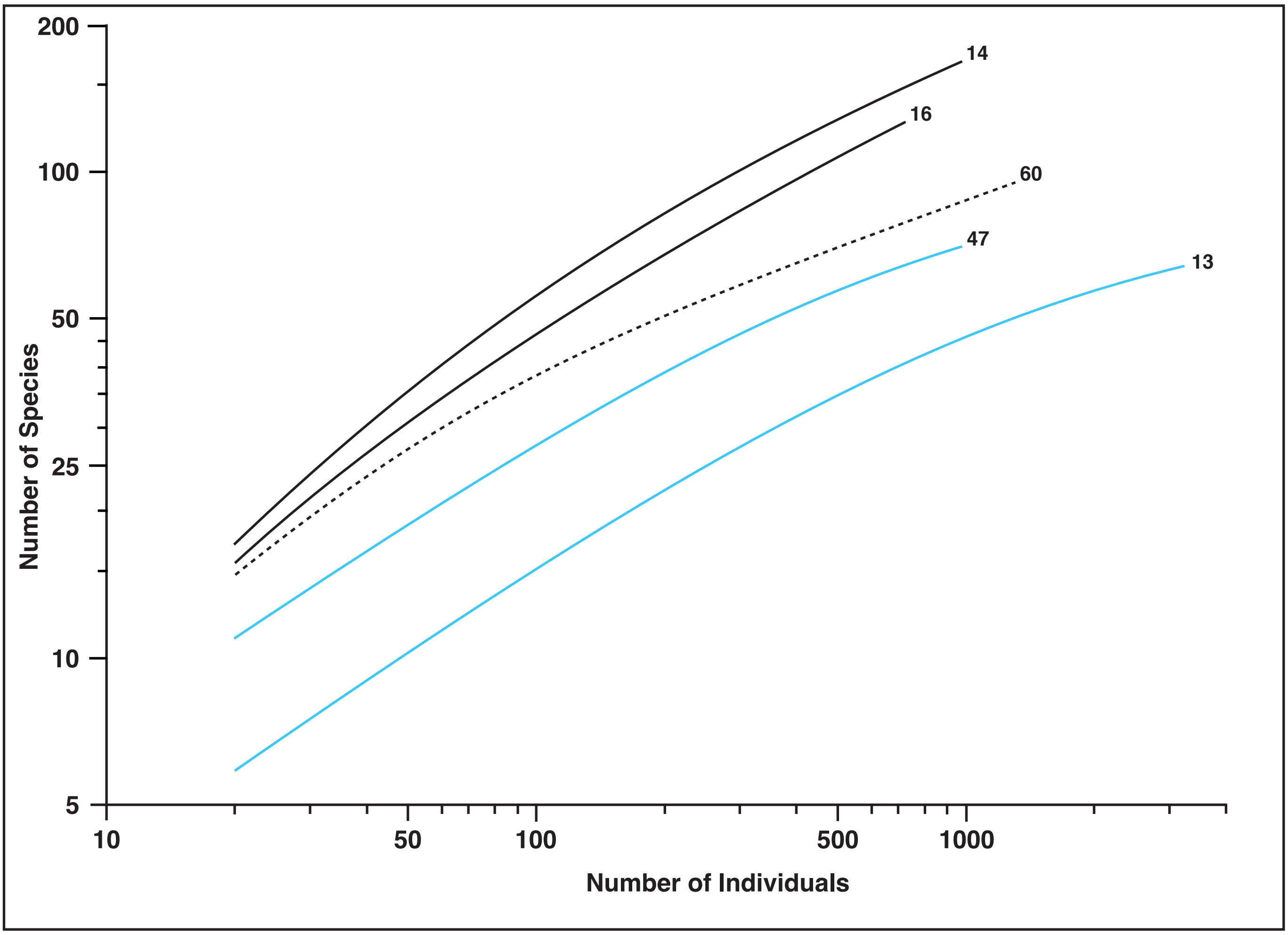
100
50
25
10
5
Number of Individuals
10
50
100
500
1000
14
46
51
63
50
23
45
13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25
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5
10
50
100
500
1000
Number of Individuals
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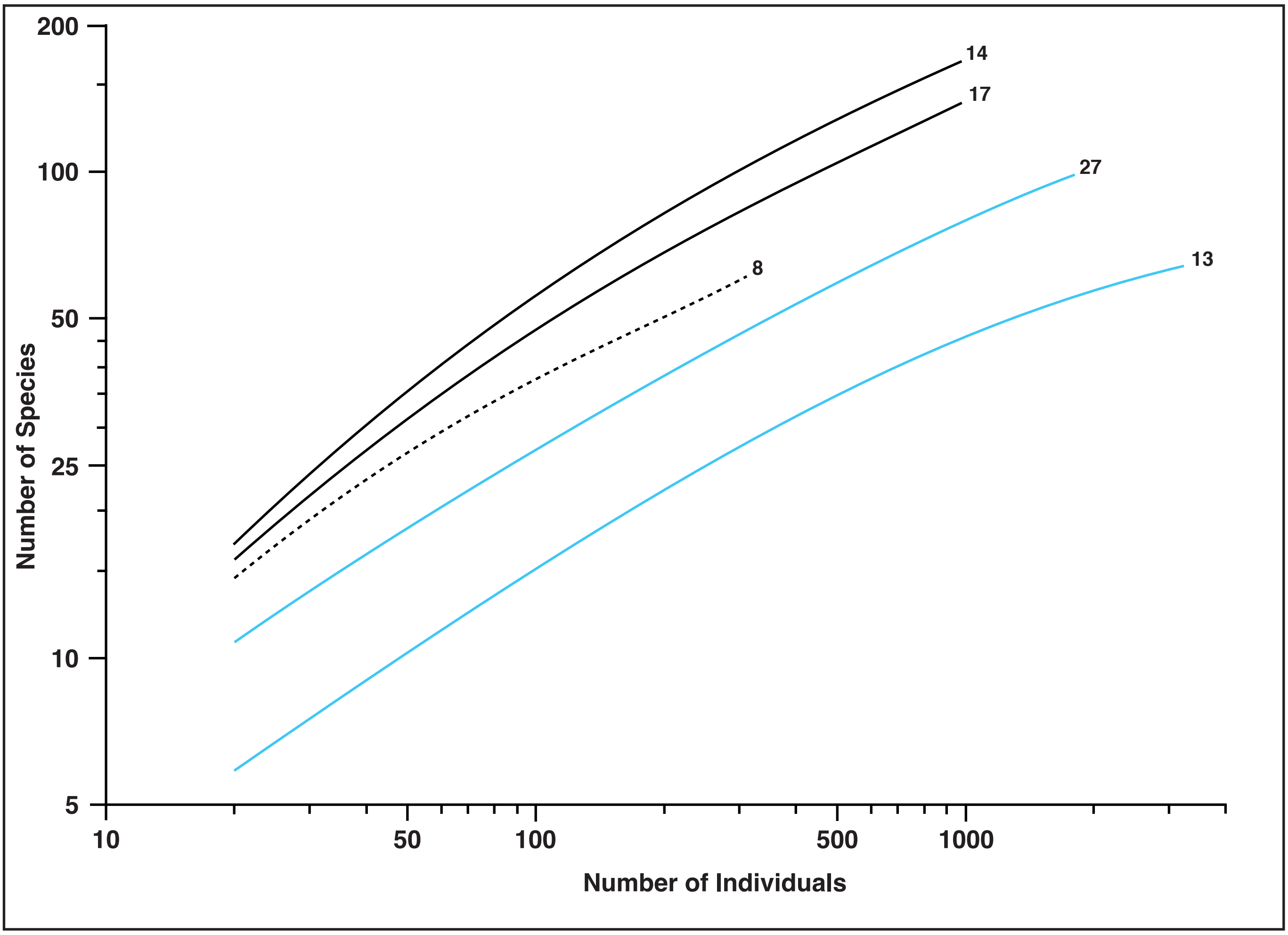
16
60
47
13


Number of Species
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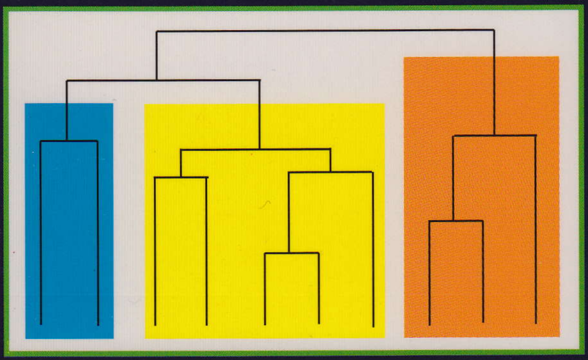
100
50
25
10
5
10
50
100
500
1000
Number of Individuals
14
17
8
27
13

The bottom-living animals of the southern Irish Sea are poorly known. Recognising this, the National Museum of Wales carried out two research cruises in the summers of 1989 and 1991. While the primary objective was to obtain specimens of invertebrates for taxonomic and biogeographic purposes, the subsequent licensing of hydrocarbon exploration blocks off southwest Wales has given added timeliness to the ecological aspects of the study.

Over 1000 species (some new to science) were identified from the 73 stations investigated. Cluster and ordination analyses revealed three main faunal assemblages associated with different sediments and depths. Species diversity estimates for the offshore gravels were very high, approaching those of the rich deep-sea.



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