

Porifera (sponges) of the Dampier Archipelago, Western Australia: habitats and distributions

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Abstract – This study reports on 221 species of sponges collected during two diving expeditions to the archipelago in 1998 and 1999. A further 32 species were collected from a dredge survey in 1999 and another 22 during a residential workshop in the region in 2000. The total number of species (275) reported here indicates a high sponge species richness in the Dampier Archipelago. Previously, only 14 species of Porifera have been reported from the Dampier Archipelago, north-western Australia.

INTRODUCTION

The Dampier Archipelago lies between 20°20'–20°45'S, 116°25'–117°05'E, in the north-west of Australia. Within the region are 42 islands, islets and rock outcrops that became remnant dry land 6000–8000 years ago when sea levels fell. The study area was shallow, defined by the 30 m depth contour with only one location, Madeleine Shoals, sampled to seaward of this. The climate is tropical but semi-arid with an unreliable, seasonal rainfall. No major river systems drain into the region. A wide range of exposures occur throughout the archipelago, with outer islands with clear waters most exposed to wave action, inshore bays moderately sheltered by islands, to protected waters that can become extremely turbid. Large tidal amplitudes occur in the archipelago with a maximum range of 5.1 m (Jones, 2004). The marine habitats of the islands are diverse consisting of mangrove, extensive intertidal flats, rocky shores and beaches, subtidal rocky reefs, coral reefs, silty plains and limestone pavements.

Prior to the fieldwork reported upon here, the documented sponge fauna of the region amounted to 14 species (Table 1). This lack of scientific knowledge about a prevalent sessile fauna and the availability of a sponge specialist, prompted the Western Australian Museum to include Porifera in collections during a series of expeditions to the region. This work constitutes part of a wider study to document the marine flora and fauna of the Dampier Archipelago.

Two of the expeditions (DA1/98 and DA3/99) and a workshop (DA4/00) included SCUBA diving and intertidal collections. There was one dredging expedition (DA2/99). The first diving expedition (DA1/98) was undertaken in October 1998, the

second (DA3/99) in August–September 1999 and the workshop (DA4/00) in July–August 2000. The dredging expedition (DA2/99) was undertaken in July 1999.

Three complementary publications have been produced on the sponge fauna of the archipelago. In this publication, detailed habitat descriptions and distributions of the sponges are provided. A second paper examines the taxonomic and biogeographical affinities of the sponge fauna and compares it to other tropical regions (Fromont, 2003) and species distributions and abundances are currently being analysed (Fromont *et al.* in prep.).

MATERIALS AND METHODS

A total of 34 stations was sampled for sponges in the northeastern region of the Dampier Archipelago from 17–29 October 1998 (DA1/98). Twelve of these stations were intertidal and 22 were subtidal at depths ranging between 0.8–22.0 m. A total of 35 stations was sampled in the southern region of the archipelago from 27 August to 8 September 1999 (DA3/99). Nine of these stations were intertidal and 26 were subtidal at depths ranging between 3.6–17.6 m. Seventeen stations were sampled for sponges throughout the archipelago from 25 July to 3 August 2000 during the workshop conducted in the region (DA4/00). Of these stations, three were intertidal and the remaining 14 were subtidal at depths ranging between 4–20 m. All 100 stations of the dredging expedition (DA2/99) were subtidal and many were at deeper depths than those targeted during the diving and workshop expeditions. Depths of dredging stations were between 5–43 m.

Methods of collection included reef walks at the

intertidal sites, a snorkel dive and all remaining dives on SCUBA. At the intertidal localities, sponges were collected by moving in a wide swathe from the water's edge to the top of the beach or *vice versa* depending on the phase of the tide. Subtidal stations were sampled by collecting into the current for the first half of the dive and collecting with the current for the last part of the dive but over different ground. At all diving and workshop stations, a specimen of each sponge species was collected if it had not already been sampled. Specimens were also taken of previously collected species if there were morphological or colour differences, or if the habitat was different from previous localities for that particular species.

Specimens were separated immediately *in situ* to avoid contamination by mucous exudation from other sponges, or possible spicule loss. After collection, records were made of natural colour, changes in coloration on exposure to air, mucous exudation and gross morphology and habitat, for each specimen collected. Specimens were stored individually in 70% ethanol. Many individuals were photographed *in situ* or on deck. All sponge collections on the diving fieldtrips and workshop were undertaken by the author.

Methods on the dredging expedition (DA2/99) differed from those on the diving expeditions and workshop, with collecting done by dredge or grab. Dredge tows were for 10 minutes at a speed of 2–3 knots. The dredge was 1200 x 330 cm and the mesh size 1 cm, except for eight stations where a finer mesh was added. Sponges were collected by Melissa Hewitt and Shirley Slack-Smith of the W.A. Museum. Deck photographs were taken where possible and sponges were preserved in ethanol as above. Because of time constraints only a subset of sponges collected during this expedition were retained.

Spicule preparations and skeletal slides were made for each specimen (Fromont, 1998). Final identifications, station details and collector have been entered onto the Marine Invertebrates database.

RESULTS

One hundred and seventy-two sponge species were collected from the 34 stations examined in the first diving expedition (DA1/98) and 132 sponge species were collected from the 35 stations examined in the second diving expedition (DA3/99) (Appendix 1). Forty-nine of these species had not been collected on the first diving expedition and 89 species collected on the first were not recollected on the second. Eighty-three species were common to both surveys. Latitudes and longitudes of each station and a map of their locations are provided in Appendices 2 and 3.

Seventy-six sponge species were collected from

31 stations on the dredging expedition DA2/99 (Appendix 4). No sponges were reported from 27 stations in this expedition and an additional six stations (DA2/99/11, 14, 80, 86, 97 and 100) specifically targeted soft sediments and the catch was not examined for sponges. Sponges were reported to be present at the remaining 26 stations but no specimens were collected. Thirty-two of the species collected on this expedition had not been collected on the diving surveys and a further 22, that had not been collected previously, were collected during the DA4/00 workshop expedition (Appendix 5). Latitudes and longitudes of each station and a map of their locations are given in Appendices 6–9.

Examination of the numbers of species collected from each station indicated that those with highest species numbers (> 20 per station) were four intertidal stations (DA1/98/17, 23, 28, 31) in the northeastern region of the archipelago, one subtidal station at 8 m depth in the north-east (DA1/98/33), and eight subtidal stations both in the north-east and south of the archipelago between 9.0–17.6 m depth (DA1/98 /04, 15, 27, 32; DA3/99/55, 56, 65; DA2/99/37). The most species rich station was DA3/99/65 at 14 m depth in the south of the archipelago with 43 species.

Comprehensive habitat descriptions were documented for all stations on the two diving expeditions and as many different habitat types as possible were sampled on these field trips, thus allowing for detailed comparisons of species richness and habitat type to be attempted. These results are outlined below. The dredging and workshop data are incorporated into the discussion.

DA1/98 and DA3/99 diving expeditions

Intertidal stations

Twenty-one intertidal stations were sampled during the two diving expeditions (DA1/98 and DA3/99). The intertidal stations most depauperate in sponge species (<5 species) were DA1/98/05 and DA3/99/62 (2 species), DA1/98/07 (3 species) and DA3/99/59 (4 species). Stations DA1/98/05 and DA3/99/62 were oyster dominated areas whilst stations DA1/98/07 and DA3/99/59 consisted predominantly of igneous boulders (Table 2).

Seven intertidal stations had between 5 and 10 species (Table 2). These were stations DA3/99/48 (6 species), DA3/99/66 (7 species), DA1/98/02, DA1/98/25 and DA3/99/45 (8 species), DA1/98/14 (9 species) and DA3/99/38 (10 species). These stations consisted of shallow channels, creeks or pools where a few sessile biota were found, or contained boulders or pieces of detached coral where small encrusting sponges occurred on the submerged undersides.

Six intertidal stations were moderately species rich with between 10 and 20 sponge species present (Table 2). These were stations DA3/99/42 and DA3/99/51 (11 species), DA1/98/20 and DA3/99/54 (17 species), DA1/98/11 (19 species) and DA1/98/10 (20 species). These stations comprised partly submerged boulders, or deep pools or channels with attachment surfaces for sessile biota.

The remaining four intertidal stations, DA1/98/28, 23, 31 and 17, were species rich with 22, 26, 27 and 29 species respectively (Table 2). All these stations were in the northeast of the archipelago and were either in large bays with good water movement or on the edges of channels such as Searipple and Flying Foam Passages.

Only three intertidal stations were sampled for sponges during the workshop and two of these stations had low species diversity, i.e. < five species present. The third station (DA4/00/18) was in Flying Foam Passage and had moderate species diversity i.e. 15 species present (Appendices 6 and 9).

Subtidal stations <10 m

Thirty stations, 12 in the first (DA1/98) and 18 in the second (DA3/99) diving expeditions, occurred at depths of <10 m. Nineteen of these stations had 10 or fewer species of sponges present (Table 3). Stations DA1/98/09 and 16 had two species present, DA3/99/58 and 63 (4 species), DA1/98/24 (5 species), DA3/99/37 and 44 (6 species), DA1/98/19, 22, 35 and DA3/99/36 (7 species), DA3/99/49, 60 and 68 (8 species), DA3/99/41 and 47 (9 species) and DA1/98/29, DA3/99/46 and DA3/99/57 (10 species).

Habitats at these stations were either algal dominated with sand cover (two stations), or consisted largely of coral rubble (two stations). Some stations were either low relief reef (four stations) or consisted of angular igneous boulders (one station), where small encrusting sponges could attach. Ten stations were dominated by hard corals where few attachment sites were available for other sessile invertebrates, or the sponges were cryptic. Multi-layered coral habitats such as *Acropora* thickets required destructive sampling to reach the basal layers where sponges might occur. This type of sampling was not attempted so an under-estimation of sponge presence may have occurred at these sites.

Of the remaining 11 shallow water habitats sampled, 10 had moderate species richness with between 11 and 17 species present (Table 3). These were stations DA1/98/06 and DA3/99/61 (11 species), DA1/98/08 (12 species), DA1/98/03 and 12, and DA3/99/64 (13 species), DA3/99/40 and 53 (14 species) and DA1/98/01 and DA3/99/70 (17 species). These habitats consisted either of low relief reef or pavement

areas with algal or hard coral prevalent (4 stations), or hard coral and dissected reef (4 stations). Two stations were dominated by either soft corals or gorgonians.

The shallow subtidal station DA1/98/33 in Flying Foam Passage was richest in terms of sponge diversity (38 species). This was a pavement habitat dominated by sponges, soft corals and gorgonians. Station DA1/98/33 was the shallowest site examined in the archipelago to have the type of habitat referred to as "sponge garden".

Of the five shallow subtidal stations sampled for sponges on the workshop expedition (DA4/00/01, 04, 06, 08 and 23) all had low species diversity, i.e. <10 species per station. Twelve stations were <10 metres deep on the dredging expedition and six of these (DA2/99/01, 18, 19, 72, 91 and 95) had <10 sponge species present while a further three dredge hauls (DA2/99/15, 66 and 96) did not collect any sponges. These stations consisted principally of soft sediments or were dominated by algae. The remaining three shallow dredge stations (DA2/99/62, 68 and 70) had moderate species richness and dredge hauls were dominated by either sponges or corals, indicating that some hard substrata were available for attachment by sessile biota.

Subtidal stations >10 m

In the diving expeditions, only one subtidal station >10 m depth did not contain sponges. This was station DA3/99/69, the only non-natural habitat sampled during the surveys and consisting of blocks of igneous rock over a gas pipe-line. Station DA1/98/30 had only one sponge species present. This was an homogenous substratum of soft sediments and shell grit with little habitat diversity. All macro-biota was sparse at this site.

Apart from the above two stations, species numbers in the deeper habitats tended to be higher on average than the intertidal and shallow subtidal habitats. Only three stations >10 m depth had <10 sponge species. The remaining 13 stations had between 12 and 43 species present (Table 4).

The three stations with <10 species were stations DA3/99/39 and 43 (6 species) and 50 (7 species). These stations either consisted of angular blocks of igneous rock, pavement with occasional boulders and a few small or encrusting corals, soft corals and sponges, or hard corals on a dissected limestone reef (Table 4).

Six subtidal stations had between 12 and 18 sponge species. These were: station DA1/98/13 (12 species), DA3/99/52 (15 species), DA1/98/18 and DA3/99/67 (17 species) and DA1/98/21 and 26 (18 species). These were either dissected coral reef or pavement habitats and a single station (DA1/98/26) was a deep igneous outcrop (Table 4).

The remaining six stations had >20 species. Stations DA3/99/55 (22 species), DA1/98/15 (23

species), DA1/98/27 (24 species) and DA3/99/56 (30 species) were pavement areas. Stations DA1/98/32 (24 species) and DA1/98/04 (29 species) were low relief coral reefs. Station DA3/99/65 had the highest species richness with 43 species and the type of habitat referred to as "sponge garden".

Nine subtidal stations >10 m depth were sampled for sponges during the workshop expedition (DA4/00). Three of these had low species numbers (DA4/00/10, 12 and 22) and the remaining six (DA4/00/09, 14, 15, 16, 17 and 27) had moderate species richness (11–20 species). Fifty-four stations on the dredging expedition (DA2/99) were between 10–30 m in depth and the majority of these had low species diversity i.e. 28 stations had <10 species and 15 stations did not have sponges in the dredge hauls (Table 5). Stations where sponges were absent were often sand, mud, gravel or a combination of these substratum types. Those with few sponges were frequently dominated by either algae or hydroids. Of the remaining 11 stations, 10 had moderate species numbers (11–20 species) and one was species rich with more than 20 (Table 5). Dredge hauls from these stations were often dominated by sponges.

The dredging expedition (DA2/99) also sampled stations that were >30 m depth. At these depths, only one station (DA2/99/08) had moderate species diversity whilst 18 had <10 species and nine dredge haul stations had no sponges. Those stations without sponges were usually dominated by algae and hydroids and sometimes gorgonians; those with some sponges had rocks and a diversity of sessile biota in the hauls.

Station Summary

Most of the intertidal stations had between 6 and 20 species present (62%, Table 6), with four (19%) having between 21–30 species. In the shallow subtidal habitats (<10 m depth), the majority of the stations (50%) had low species numbers, between 6–10 species. Thirty-three percent had between 11 and 20 species and 13% had fewer than five species present. One shallow subtidal station had over 30 species present. Of the deep subtidal stations (>10 m depth), most (66%) had between 11 and 30 sponge species present and only three had between 6–10 species. One station at these depths had >30 species.

The results of the workshop expedition showed similar results (Table 7). Intertidal stations had <10 species except for one which had 15. The shallow subtidal habitats all had <10 species present, whereas the deeper subtidal stations consistently had more species present with 66% of these having between 11–20 species.

The majority of the dredge stations over all depths had <10 species present (52 out of 94 stations sampled for sponges) and another large

proportion (27 stations) did not have any sponges. Fifteen of the dredge stations had between 11 and 30 species (Table 5).

DISCUSSION

In the intertidal habitats, sponges were rarest in areas where there was a pronounced oyster/barnacle zone and little other hard substratum for attachment, or where moisture retention in pools or beneath substrata was limited to the extent that sponges would desiccate at low tide. Encrusting sponges were found under small rocks, boulders and coral that were unlikely to be disturbed by normal sea conditions. Highest diversity of large sponges was in areas with some basal pavement or coral cover that could act as attachment sites and that tended to remain partly submerged. Stations with channels, pools or lagoons had higher species numbers than those without these features. The majority of the intertidal stations had moderate species richness of between 6 and 20 species. Four had high species richness i.e. >21 species. These species rich stations were on the edges of channels with strong tidal movement, e.g. Flying Foam Passage and Searipple Passage, and one was in a large NNE facing bay on a silty intertidal flat.

Most of the subtidal stations <10 m depth had low species richness (6–10 species), whereas one third of them had moderate species richness (11–20 species). One station in Flying Foam Passage and a second near Mermaid Strait had high sponge diversity and were examples of "sponge garden" habitat. These areas are either low relief or pavement habitats, often with a sediment layer and always with a high diversity of sponges and sessile coelenterates such as gorgonians and soft corals. These environments had strong tidal currents and were difficult to survey. These areas are presently under-sampled for species richness because of the difficulties associated with diver safety.

In the shallow subtidal habitats the presence of coarse sand precluded high sponge diversity. Where the dominant coral type did not allow for attachment sites, sponges were also lower in diversity, e.g. stations with large *Porites* bommies. A few stations had high coral cover with a multi-layered (tiered) structure. Sponges may have been present in the basal layers but no destructive sampling was attempted to determine if they were present. Stations dominated by coral rubble offered few attachment sites for sponges. The shallow subtidal locations with reasonable sponge diversity were those with attachment sites such as plate or branching corals.

In the deeper subtidal habitats >10 m depth, although coral cover remained high, many of the sponges were large and occurred in full light. Numbers of species were consistently higher at

these stations than at the shallower subtidal stations and the intertidal areas. Of the 27 subtidal stations that were >10 m deep, 18 had high species richness with 11–30 species present. These habitats were either in exposed localities on the NE side of Legendre Island, off islands in the region of Mermaid Strait, and one workshop station in Mermaid Sound, an area not sampled in the diving expeditions. The majority of these stations were either of low relief coral reef or pavement areas of the sponge garden type, frequently with strong current flow. Station DA3/99/65 near Mermaid Strait, with the highest species richness of all stations, was also of this habitat type. Mermaid Strait is the type locality for four species of sponges described by Lendenfeld (1907). Only two of these were recollected during this study.

Deep subtidal stations that were species rich on the dredging expedition were in the same localities as the species rich stations from the diving and workshop expeditions, such as Flying Foam Passage and habitats around Mermaid Strait.

Although dredging stations are not directly comparable with stations where sponges were collected by SCUBA or reef-walks because of major differences in sampling times (10 minute dredge tow compared to one to two hours SCUBA or reef walk), it is interesting that highest sponge diversity identified by this method was found in the same areas as on the diving and workshop expeditions.

Dredging stations with either no or few sponges were on the edge of the archipelago and at locations where the substrata were often fine silty sand and/or muddy sand with only occasional rocky patches for attachment. Dive sites of this bottom type, e.g. DA1/98/30, were also depauperate in sponges. Within the archipelago, small scale heterogeneity in terms of sponge distributions was clearly indicated by the results of the dredging expedition. Some stations with either few or no sponges were adjacent to others with moderate to high species richness.

Some dredging stations were located in Nickol Bay which was an area not sampled in the diving and workshop expeditions. The stations closest to the Burrup Peninsula did not have any sponges but further into the bay low numbers were found and station DA2/99/13, on the outer edge of the bay, was rich in sponges. Nickol Bay is the type locality for *Axos cliftoni*.

The two stations located where anthropogenic influences were detected were depauperate in terms of sponges. Stations DA3/99/63 and 64 were near the iron ore loading jetties and contained a fragment of sponge and no sponge, respectively, in the dredge hauls. No sponges were reported from the "artificial reef" protecting the subtidal pipe-line running through the archipelago, which was installed in 1983. This may in part be due to a lack

of nearby adult sessile benthos to supply recruits, and/or the igneous nature of the substratum which frequently has fewer sessile benthos than limestone. The pipe-line may also have been treated with an anti-fouling substance to prevent benthic recruitment but this has not been clarified.

In conclusion, the Dampier Archipelago marine environment provides a diversity of habitats for colonisation by sessile benthos. Sponges were recorded in large numbers from channels and straits and off islands in areas where there was good current flow. Throughout the archipelago, a fine scale mosaic of species rich and species poor areas is apparent.

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Table 1 Published records of sponge species from the Dampier Archipelago.

Species	Location	Depth (m)	Reference
<i>Cinachyra isis</i>	Mermaid Strait (TL)		Lendenfeld, 1907
<i>Stelletta nereis</i>	Mermaid Strait (TL)		Lendenfeld, 1907
<i>Corticium simplex</i>	Mermaid Strait (TL)		Lendenfeld, 1907
<i>Isops toxoteuches</i>	Mermaid Strait (TL)		Lendenfeld, 1907
<i>Axos cliftoni</i>	Nickol Bay (TL)		Hooper, 1986
<i>Axos flabelliformis</i>	NW of Dampier Arch.	26	Hooper, 1986
<i>Trikentrion flabelliforme</i>	NW of Dampier Arch.	35	Hooper, 1991
<i>Echinodictyum cancellatum</i>	NW of Dampier Arch.	108	Hooper, 1991
<i>Echinodictyum conulosum</i>	W end Lewis Island	8	Hooper, 1991
<i>Echinodictyum mesenterinum</i>	NW and N of Dampier Arch.	30–53	Hooper, 1991
<i>Myrmekeioderma granulata</i>	Enderby Island	14	Hooper, 1993
<i>Echinochalina (Echinochalina) intermedia</i>	NW of Dampier Arch.	29	Hooper, 1996
<i>Caulospongia amplexa</i>	NW Rosemary Island (TL)	70–71	Fromont, 1998
<i>Caulospongia plicata</i>	NNE Cape Lambert	37–39	Fromont, 1998

TL = Type locality.

Table 2 Total number of sponge species found at each of the intertidal stations and descriptions of habitats on the diving expeditions DA1/98 and DA3/99. Latitudes and longitudes of each station are given in Appendix 2 and a map of the localities in Appendix 3.

Station number	Total number species	Station Description
DA1/98/02	8	Bay – E side Dolphin I. <u>Habitat</u> : Mangrove. Oysters at edge of mudflat with small rocks, high silt, sponges thin encrusting.
DA1/98/05	2	Reef flat E tip Legendre I. <u>Habitat</u> : Oyster dominated walls, pavement with zoanthids, high silt, some pools and flowing water, <i>Goniastrea</i> bommies abundant on reef edge, rare sponges in pools.
DA1/98/07	3	W side, towards S end Gidley I. <u>Habitat</u> : Large igneous boulders with oysters and barnacles, shallow rock pools with algal mats at edges, shallow limestone platform with rare sponges.
DA1/98/10	20	N facing site – W side Angel I. <u>Habitat</u> : Edge of channel, mangrove and oyster on shoreline, beach rock with silt coating at edge of channel. In channel numerous small coral colonies, algae, sponges on and between pavement.
DA1/98/11	19	W side Dolphin I., towards S end. <u>Habitat</u> : Mangrove and oyster zone with sharp igneous rocks at headlands, silty flat between with some pavement, many hard corals, soft corals, ascidians (not noted at other sites) and sponges different from Stn.10.
DA1/98/14	9	S end Unnamed I. <u>Habitat</u> : (2 sites) 1. Igneous boulders with oyster and barnacle fringe, algae on submerged rock with sand cover. 2. Channel between two islands with deep sand gutters, small coral colonies and micro-atolls, low sponge diversity.
DA1/98/17	29	N end Wilcox I. <u>Habitat</u> : Sandy point and channel, silty sand, many hard corals, soft corals, gorgonians, sponge diversity high. Bioeroding sponges in silty mud at end of point.
DA1/98/20	17	SE side Collier Rocks. <u>Habitat</u> : Low relief reef edge with shallow lagoon inside, abundant <i>Fungia</i> , <i>Acropora</i> to shoreward, silty, sponges reasonably diverse.
DA1/98/23	26	NE facing bay E side Dolphin I. <u>Habitat</u> : Silty sand with isolated coral colonies, filamentous algae, very silty, sponges diverse.
DA1/98/25	8	SE end Keast I. <u>Habitat</u> : Sand mound with intertidal bank with coarse sandy sediment and coral rubble, large pieces of plate <i>Acropora</i> , some sponges beneath.
DA1/98/28	22	NW side Dolphin I. towards N end. <u>Habitat</u> : Thin mangrove fringe, sharp boulders with oysters and barnacles, silty to seaward, encrusting sponges under boulders at water line, most diverse in recess in bay where more water movement and less mud.
DA1/98/31	27	E end Searipple Passage. <u>Habitat</u> : Abundant hard coral, diverse sponges attached to coral plates, many bioeroding sponges in coral, sediment more silty towards mangrove.
DA3/99/38	10	N side Malus I. <u>Habitat</u> : Coarse sand beach grading into limestone boulders towards shoreline. Low relief. Sponges and corals rare.
DA3/99/42	11	Georgeff Reef. <u>Habitat</u> : Small limestone boulders towards waterline, numerous <i>Acropora</i> and faviid colonies. Holothurians and sponges present.
DA3/99/45	8	S side Rosemary I. east of Tish Point. <u>Habitat</u> : Small igneous rocks to low relief algal dominated rock, isolated coral colonies on outer edge grading into sand, some soft coral and sponges.
DA3/99/48	6	N side Goodwyn I. <u>Habitat</u> : Low relief. Some gutters with flowing water or pools with algae. Corals on outer edges mainly massive faviids and <i>Turbinaria</i> , few <i>Acropora</i> , low diversity. Low diversity of sponges, rare soft corals, one gorgonian.
DA3/99/51	11	N Enderby I. <u>Habitat</u> : Silty sand flat with fine sediment and algae and deep pools towards shoreline with coral around edges.
DA3/99/54	17	E side Enderby I., southern end of large bay. <u>Habitat</u> : Silty intertidal flat with sparse algae, some sponges, numerous holothurians.
DA3/99/59	4	N side West Lewis I. <u>Habitat</u> : Mangrove fringed bay with small igneous rocks, some larger boulders with oyster. Bay with more sandy towards entrance. Low incidence of sponges and corals where bay is slow draining.
DA3/99/62	2	S side East Lewis I. <u>Habitat</u> : Bays fringed by thick band of mangrove. Intertidal flat with oyster covered igneous boulders, some algae, coral and sponges rare.
DA3/99/66	7	S coast Enderby I. <u>Habitat</u> : Tidal creek with rocks and muddy sand. Some corals and sponges, mainly <i>Cyphastrea</i> , <i>Goniastrea</i> , <i>Galaxea</i> , <i>Tridacna maxima</i> present, most common sponge <i>Haliclona cymaeformis</i> .

Table 3 Total number of sponge species found at each of the subtidal stations (<10 metres) and descriptions of habitats on the diving expeditions DA1/98 and DA3/99. Latitudes and longitudes of each station are given in Appendix 2 and a map of the localities in Appendix 3.

Station number	Total number species	Station Description
DA1/98/01	17	NE end Dolphin I. Maximum depth: 6.0 m. <u>Habitat</u> : Shallow hard coral habitat, mainly small colonies, low relief, silty sand between reef, sponges generally small and cryptic.
DA1/98/03	13	W side Legendre I. Maximum depth: 9.0 m. <u>Habitat</u> : Abundant small hard coral colonies, high cover, low relief, silty sand in deep gutters between bommies, sponges small, cryptic, some species large in full light.
DA1/98/06	11	NW end Haüy I. Maximum depth: 3.0 m. <u>Habitat</u> : Flat pavement, algal growth, small coral colonies, low relief, silty sand cover, encrusting and erect sponges.
DA1/98/08	12	W side Angel I. Maximum depth: 7.0 m. <u>Habitat</u> : Coral reef, many shallow gullies and overhangs, small coral colonies, many plate corals mainly <i>Acropora</i> , sponges mainly under overhangs and plates.
DA1/98/09	2	NW facing bay W side Angel I. Maximum depth: 4.6 m. <u>Habitat</u> : Fragmented pavement, algae and sand cover, no coral, sponges rare.
DA1/98/12	13	Bay – W side Angel I. Maximum depth: 5.8 m. <u>Habitat</u> : Coral reef with <i>Porites</i> bommies and many dead massive and <i>Acropora</i> colonies, attachment sites for corals and sponges, silt covered.
DA1/98/16	2	W side Hamersley Shoal. Maximum depth: 3.3 m. <u>Habitat</u> : Coral rubble, low relief, silt cover, sponges rare.
DA1/98/19	7	SE tip Haüy I. Maximum depth: 2.7 m. <u>Habitat</u> : Coral rubble, small live corals, thin silt layer, sponges encrusting.
DA1/98/22	7	NNW edge Delambre I. Maximum depth: 5.4 m. <u>Habitat</u> : Abundant plate and branching <i>Acropora</i> , one area bleached? coral (living tips), sponges under or between plates.
DA1/98/24	5	E side Dolphin I. Maximum depth: 7.0 m. <u>Habitat</u> : Hard corals and silt cover, sponges encrusting.
DA1/98/29	10	S side Legendre I. Maximum depth: 4.4 m. <u>Habitat</u> : High hard coral cover, large staghorns, large vertical depth, sponges encrusting on live coral vertical plates.
DA1/98/33	38	NNE tip Angel I. Maximum depth: 8.2 m. <u>Habitat</u> : reef pavement, coarse shelly grit and silt, sponges abundant.
DA1/98/35	7	SW facing side – Legendre I. Snorkel dive. Maximum depth: 1.0 m. <u>Habitat</u> : Small bommies and micro-atolls, flattened dead tops on coarse sand. Sponges rare.
DA3/99/36	7	N side Malus I. – eastern end. Maximum depth: 9.8 m. <u>Habitat</u> : Low relief, slight slope, good coral diversity, common corals <i>Acropora</i> , <i>Turbinaria</i> , <i>Porites</i> , some sponges and soft corals.
DA3/99/37	6	W side Malus I. Maximum depth: 3.8 m. <u>Habitat</u> : Sand and algal covered broken pavement, rubble. Lots of <i>Turbinaria</i> .
DA3/99/40	14	W of Brigadier I. Maximum depth: 9.4 m. <u>Habitat</u> : Low relief dropping to sand, clefts, gulleys. Dominated by soft corals, some hard corals <i>Acropora</i> , <i>Porites</i> , <i>Galaxea</i> , faviids, low diversity of sponges.
DA3/99/41	9	S of Georgeff Reef. Maximum depth: 4.9 m. <u>Habitat</u> : Coarse coralline sand, low relief, occasional gorgonians, sea whips.
DA3/99/44	6	S of Gordon Point, Rosemary I. Maximum depth: 6.0 m. <u>Habitat</u> : Large <i>Porites</i> bommies, coarse sand, some limestone reef between with siltier sand and some soft corals, hydroids, ascidians and sponges.
DA3/99/46	10	NW side Kendrew I. Maximum depth: 7.4 m. <u>Habitat</u> : Coral on dissected limestone reef.
DA3/99/47	9	SE side Kendrew I. Maximum depth: 4.8 m. <u>Habitat</u> : Low relief pavement, small coral colonies mainly <i>Turbinaria</i> , some <i>Acropora</i> , small faviids, and algae.
DA3/99/49	8	S side Goodwyn I. Maximum depth: 5.0 m. <u>Habitat</u> : Large <i>Porites</i> bommies on sand, robust corals, some sponges.
DA3/99/53	14	NE end Enderby I. Maximum depth: 5.3 m. <u>Habitat</u> : Silty sand, high diversity sponges, also soft corals and gorgonians, diverse <i>Acropora</i> .
DA3/99/57	10	NE of North-west reef. Maximum depth: 9.4 m. <u>Habitat</u> : Igneous angular boulders covered with fine sediment, few encrusting sponges and small soft corals, few hard corals.
DA3/99/58	4	Large bay E end of N coast, Enderby I. Maximum depth: 3.6 m. <u>Habitat</u> : Coral over coarse sand, rubble, high diversity of coral, many fragile colonies, <i>Acropora</i> common, sponges uncommon.
DA3/99/60	8	N side West Lewis I. Maximum depth: 4.1 m. <u>Habitat</u> : Extensive coral reef particularly <i>Pavona decussata</i> .
DA3/99/61	11	E coast West Lewis I. Maximum depth: 5.0 m. <u>Habitat</u> : Low relief, fine sand some rubble, abundant algae, some large <i>Pavona</i> but mainly small coral colonies, some sponges, all beneath algae.

Table 3 (cont.)

Station number	Total number species	Station Description
DA3/99/63	4	SW end East Lewis I. Maximum depth: 4.4 m. <u>Habitat</u> : Diverse coral, some encrusting, abundant <i>Echinopora</i> , high <i>Porites</i> columns with silty sediment cover, substrate grades into sandy silt.
DA3/99/64	13	West Lewis I., off S coast. Maximum depth: 5.3 m. <u>Habitat</u> : Low relief, fine sand, patchy small bommies and clusters of coral, mostly <i>Pavona</i> , <i>Porites</i> and <i>Acropora</i> .
DA3/99/68	8	SE Nelson rocks. Maximum depth: 6.5 m. <u>Habitat</u> : Low relief, coarse sand, sparse worm tubes with some sponges and ascidians, algae most dominant.
DA3/99/70	17	NE Nelson rocks. Maximum depth: 5.0 m. <u>Habitat</u> : Macroalgae on pavement, some coral and sponge.

Table 4 Total number of sponge species found at each of the subtidal stations (>10 metres) and descriptions of habitats on the diving expeditions DA1/98 and DA3/99. Latitudes and longitudes of each station are given in Appendix 2 and a map of the localities in Appendix 3.

Station number	Total number species	Station Description
DA1/98/04	29	N side Legendre I. Maximum depth: 11.2 m. <u>Habitat</u> : Abundant small hard coral colonies, high % cover, low relief, silty sand with few gutters between bommies, sponges high diversity and cover.
DA1/98/13	12	W side Hamersley Shoal. Maximum depth: 15.3 m. <u>Habitat</u> : Coral reef, shallow sand gutters at right angles to reef crest, low relief with silt cover, sponges sparse.
DA1/98/15	23	N side Legendre I. towards NW end. Maximum depth: 16.4 m. <u>Habitat</u> : Pavement with some silt, soft corals dominant, some <i>Porites</i> bommies, many large sponges, diverse.
DA1/98/18	17	N side Haüy I. towards NE end. Maximum depth: 12.1 m. <u>Habitat</u> : Massive <i>Porites</i> bommies on sand, sponges in full light or under plates.
DA1/98/21	18	N end Delambre I. Maximum depth: 13.9 m. <u>Habitat</u> : Coral reef with abundant plates, branching and massive corals, narrow gutters between, sponges large in full light or encrusting sides of coral, also encrusting ascidians.
DA1/98/26	18	Madeleine Shoals. Maximum depth: 21.9 m. <u>Habitat</u> : Deep outcrop, mainly encrusting hard corals, faviids and plates, many small <i>Dendronephthya</i> sponges either large mounds or cups and extensive encrustations.
DA1/98/27	24	N side Legendre I. Maximum depth: 16.0 m. <u>Habitat</u> : Flat limestone pavement with silt, gorgonians and sponges, some outcrops as flat rocks, low relief.
DA1/98/30	1	NE end Burrup Peninsula. Maximum depth: 11.1 m. <u>Habitat</u> : Shell grit and silt substratum. One species of sponge, <i>Dendronephthya</i> , solitary ascidian, sparse biota.
DA1/98/32	24	N side Legendre I. Maximum depth: 13.6 m. <u>Habitat</u> : Abundant hard coral plates, massive and branching colonies on reef slope, large gutters with sand, some high coral outcrops off reef edge with sponges.
DA3/99/39	6	NNE of Brigadier I. Maximum depth: 15.0–17.0 m. <u>Habitat</u> : Igneous spur, angular blocks, spreading soft corals, sparse encrusting corals and sponges.
DA3/99/43	6	Sailfish Reef. Maximum depth: 12.2 m. <u>Habitat</u> : Flat pavement with occasional boulders, corals encrusting or very small, some soft corals, few sponges.
DA3/99/50	7	SE Bare Rock. Maximum depth: 16.4 m. <u>Habitat</u> : Coral on dissected limestone reef, small <i>Porites</i> bommies, plate corals and many <i>Acropora</i> .
DA3/99/52	15	NW of Roly Rock. Maximum depth: 16.1 m. <u>Habitat</u> : Flat pavement with large soft corals and gorgonians.
DA3/99/55	22	Channel between Enderby and West Lewis Is. Maximum depth: 17.6 m. <u>Habitat</u> : Flat silt covered pavement with high diversity of sponges, sea whips, and octocorals. Strong current area, turbid.
DA3/99/56	30	N of NW point Eaglehawk Is. Maximum depth: 11.5 m. <u>Habitat</u> : Low relief pavement, sponge garden, some hard corals, soft corals, gorgonians and sea whips.
DA3/99/65	43	SW Rocky Head. Maximum depth: 14.3 m. <u>Habitat</u> : Sponge garden with sea whips.
DA3/99/67	17	N of Nelson Rocks. Maximum depth: 17.0 m. <u>Habitat</u> : Low relief pavement with fine silt cover, small sponges and soft corals, encrusting corals and some plate coral, large <i>Porites</i> bommies in shallower water.
DA3/99/69	0	Igneous rock on pipeline. Maximum depth: 16.1 m. Few ascidians and encrusting sponges. Few encrusting corals, some <i>Turbinaria</i> .

Table 5 Summary of species numbers at dredging stations (DA2/99) determined from counts of collected specimens and from notes on number of species recorded by collectors in the field (*absolute number of species not recorded in field).

Species richness and proportion of stations with that number of species								
Depth	0 species	< 5 species	6-10 species	11-20 species	21-30 species	>30 species	Total no. stations	
<10 m	15	1	18	62				
	66	19	*72	68				
	96	91		*70				
		95						
	total no. stations	3	4	2	3	0	0	12
	%	25%	33%	17%	25%			
	>10 m	16	2	10	13	37		
		17	21	32	*39			
		20	29	33	49			
		30	31	41	50			
		35	34	58	59			
		45	36		60			
46		38		*65				
47		40		*75				
61		42		*84				
64		43		*99				
71		44						
76		48						
89		63						
93		67						
94		69						
		73						
		74						
		77						
		78						
		83						
		85						
	92							
	98							
total no. stations	15	23	5	10	1	0	54	
%	28%	42%	9%	19%	2%			
>30 m	23	3	4	8				
	27	5	9					
	28	6	*82					
	52	7						
	54	12						
	57	22						
	81	24						
	87	25						
	88	26						
		51						
		53						
		55						
		56						
		79						
		90						
total no. stations	9	15	3	1	0	0	28	
%	32%	54%	11%	3%				

Station numbers/depth profile

Table 6 Summary of species numbers found at stations from the two diving expeditions (DA1/98, DA3/99) categorised into intertidal, <10 metres depth and >10 metres depth.

Species richness and proportion of stations with that number of species								
Depth	0 species	< 5 species	6-10 species	11-20 species	21-30 species	>30 species	Total no. stations	
Intertidal		5	2	10	17			
		7	14	11	23			
		59	25	20	28			
		62	38	42	31			
			45	51				
			48	54				
			66					
	total no. stations	0	4	7	6	4	0	21
	%		19%	33%	29%	19%		
	<10 m		9	19	1		33	
			16	22	3			
			58	24	6			
			63	29	8			
			35	12				
			36	40				
			37	53				
			41	61				
			44	64				
			46	70				
			47					
			49					
			57					
		60						
		68						
total no. stations	0	4	15	10	0	1	30	
%		13%	50%	33%		3%		
>10 m	69	30	39	13	4	65		
			43	18	15			
			50	21	27			
				26	32			
				52	55			
				67	56			
	total no. stations	1	1	3	6	6	1	18
	%	5%	5%	17%	33%	33%	5%	

Table 7 Summary of species numbers at workshop stations (DA4/00) categorised into intertidal, <10 metres depth and >10 metres depth.

		Species richness and proportion of stations with that number of species					
Depth		0 species	< 5 species	6-10 species	11-20 species	21-30 species	>30 species
Station numbers/depth profile	Inter tidal		3		18		
			19				
	total no. stations	0	2	0	1	0	0
	%		66%		33%		
	< 10 m		1	4			
				6			
				8			
				23			
	total no. stations	0	1	4	0	0	0
	%		20%	80%			
> 10 m			10	9			
			12	14			
			22	15			
				16			
				17			
				27			
total no. stations	0	0	3	6	0	0	
%			33%	66%			

Species	Station #																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
* <i>Scalarispongia</i> sp. 1																													
* <i>Taonura</i> sp. 1										1													1						
* <i>Taonura</i> sp. 2																				1									
* <i>Thorectandra</i> sp. 1																													
* <i>Aplysilla</i> sp. 1				1																									
* <i>Chelonaplysilla</i> cf. <i>aurea</i>																						1							
* <i>Dictyodendrilla</i> sp. 1																													1
* <i>Aplysina</i> sp. 1										1																			
* <i>Aplysina</i> sp. 2																	1												
** <i>Aplysina</i> sp. 3																													
** <i>Aplysina</i> sp. 4																													
* <i>Pseudoceratina</i> cf. <i>verrucosa</i>	1		1	1				1		1		1		1		1	1	1			1		1						
<i>Pseudoceratina</i> sp. 2											1							1											
<i>Ianthella basta</i>																		1											
<i>Ianthella flabelliformis</i>																													
** <i>Ianthella labyrinthus</i>																													
<i>Ianthella</i> cf. <i>reticulata</i>																			1										
* <i>Ianthella</i> sp. 1													1																
* <i>Calcarea</i> 1				1																									
** <i>Calcarea</i> 2																													
** <i>Calcarea</i> 3																													
** <i>Calcarea</i> 4																													
** <i>Calcarea</i> 5																													
Total species number per station:	17	8	13	29	2	11	3	12	2	20	19	13	12	9	23	2	29	17	7	17	18	7	26	5	8	18	24	22	10

Appendix 2 Locations, latitudes and longitudes of stations from diving expeditions DA1/98 and DA3/99.

Station	Location	Depth (m)	Latitude	Longitude
DA1/98/01	Dolphin Island	5.9	20°25.85'S	116°52.95'E
DA1/98/02	Dolphin Island	Intertidal	20°28.09'S	116°51.91'E
DA1/98/03	Legendre Island	9.1	20°24.32'S	116°56.11'E
DA1/98/04	Legendre Island	9.0-11.0	20°24.32'S	116°56.11'E
DA1/98/05	Legendre Island	Intertidal	20°25.38'S	116°57.51'E
DA1/98/06	Hauy Island	2.0-3.0	20°25.72'S	116°57.58'E
DA1/98/07	Gidley Island	Intertidal	20°28.01'S	116°47.72'E
DA1/98/08	Angel Island	2.0-2.4	20°29.18'S	116°47.71'E
DA1/98/09	Angel Island	4.6	20°28.69'S	116°47.95'E
DA1/98/10	Angel Island	Intertidal	20°28.41'S	116°48.48'E
DA1/98/11	Dolphin Island	Intertidal	20°30.25'S	116°49.33'E
DA1/98/12	Angel Island	4.0-5.0	20°30.20'S	116°47.25'E
DA1/98/13	Hammersley Shoal	7.0-8.0	20°23.20'S	116°46.69'E
DA1/98/14	Unnamed Island	Intertidal	20°26.58'S	116°48.79'E
DA1/98/15	Legendre Island	15.0-16.0	20°21.14'S	116°50.58'E
DA1/98/16	Hammersley Shoal	16.4	20°23.24'S	116°47.08'E
DA1/98/17	Wilcox Island	Intertidal	20°27.09'S	116°50.44'E
DA1/98/18	Haiüy Island	9.0-10.0	20°26.40'S	116°58.63'E
DA1/98/19	Haiüy Island	2.7	20°26.62'S	116°58.39'E
DA1/98/20	Collier Rocks	Intertidal	20°24.81'S	116°50.68'E
DA1/98/21	Delambre Island	11.0-13.0	20°25.70'S	117°04.22'E
DA1/98/22	Delambre Island	3.0-4.0	20°25.91'S	117°03.65'E
DA1/98/23	Dolphin Island	Intertidal	20°29.10'S	116°52.22'E
DA1/98/24	Dolphin Island	5.0	20°28.87'S	116°52.38'E
DA1/98/25	Keast Island	Intertidal	20°23.97'S	116°49.52'E
DA1/98/26	Madeleine Shoals	19.0-22.0	20°19.34'S	116°50.45'E
DA1/98/27	Legendre Island	13.0-16.0	20°24.04'S	116°55.04'E
DA1/98/28	Dolphin Island	Intertidal	20°25.77'S	116°52.68'E
DA1/98/29	Legendre Island	3.0-4.0	20°24.57'S	116°53.71'E
DA1/98/30	Burru Peninsula	11.0	20°31.59'S	116°51.09'E
DA1/98/31	Searipple Passage	Intertidal	20°31.23'S	116°51.18'E
DA1/98/32	Legendre Island	9.0-11.0	20°23.52'S	116°54.11'E
DA1/98/33	Angel Island	7.0-8.0	20°27.96'S	116°49.69'E
DA1/98/35	Legendre Island	Intertidal	20°23.62'S	116°51.96'E
DA3/99/36	N Malus Island	8.5	20°30.63'S	116°38.79'E
DA3/99/37	NW Malus Island	3.5	20°30.63'S	116°38.79'E
DA3/99/38	N Malus Island	Intertidal	20°30.90'S	116°40.22'E
DA3/99/39	NNE Brigadier Island	Intertidal	20°25.41'S	116°37.58'E
DA3/99/40	W Brigadier Island	8.0	20°26.66'S	116°36.51'E
DA3/99/41	S Georgeff Reef	8.0	20°29'34"S	116°36.80'E
DA3/99/42	Georgeff Reef	Intertidal	20°29.34'S	116°36.80'E
DA3/99/43	Sailfish Reef, NW Rosemary Island	11.0	20°27.76'S	116°34.19'E
DA3/99/44	SE Gordon Point, Rosemary Island	5.0-6.0	20°29.59'S	116°34.45'E
DA3/99/45	E Tish Point, Rosemary Island	Intertidal	20°29.67'S	116°35.89'E
DA3/99/46	NW Kendrew Island	5.0	20°28.60'S	116°31.98'E
DA3/99/47	NW Kendrew Island	4.0	20°28.94'S	116°32.52'E
DA3/99/48	N Goodwyn Island	Intertidal	20°32.00'S	116°32.42'E
DA3/99/49	S Goodwyn Island	5.0	20°32.40"S	116°32.61'E
DA3/99/50	SE Bare Rock	15.0	20°32.84'S	116°26.73'E
DA3/99/51	N Enderby Island	Intertidal	20°35.20'S	116°30.91'E
DA3/99/52	NW Roly Rock	15.0	20°29.70'S	116°30.17'E
DA3/99/53	NE Enderby Island	5.0	20°34.54'S	116°34.58'E
DA3/99/54	E Enderby Island	Intertidal	20°36.22'S	116°33.06'E
DA3/99/55	Between Enderby & West Lewis Islands	17.0-18.0	20°35.15'S	116°35.62'E
DA3/99/56	NW Eaglehawk Island	9.0	20°38.99'S	116°26.21'E
DA3/99/57	NE North West Reefs	9.0	20°37.70'S	116°25.09'E
DA3/99/58	Bay NNE of Enderby Island	3.5	20°34.40'S	116°33.44'E
DA3/99/59	Bay NNW of Enderby Island	Intertidal	20°33.95'S	116°38.33'E
DA3/99/60	Bay N West Lewis Island	2.5	20°32.88'S	116°39.52'E
DA3/99/61	E West Lewis Island	5.0	20°34.69'S	116°39.70'E
DA3/99/62	Bay S East Lewis Island	Intertidal	20°37.50'S	116°39.18'E
DA3/99/63	Bay SW end of East Lewis Island	Intertidal	20°37.47'S	116°38.25'E
DA3/99/64	S West Lewis Island	5.0-5.3	20°36.65'S	116°37.95'E
DA3/99/65	SW Rocky Head, Enderby Island	14.0	20°37.11'S	116°26.78'E
DA3/99/66	Mangrove Creek, S Enderby Island	Intertidal	20°36.70'S	116°31.29'E
DA3/99/67	N Nelson Rocks	17.0	20°26'51"S	116°40.26'E
DA3/99/68	NE Nelson Rocks	6.5	20°28.00'S	116°39.71'E
DA3/99/69	Pipeline	14.0-19.0	20°24.48'S	116°46.31'E
DA3/99/70	NE Nelson Rocks	6.0	20°27.44'S	116°39.59'E

Appendix 4 Species collected on dredging expedition DA2/99: 1 = species present at station; * = species found on dredging expedition not seen on diving expeditions; v = image only.

Species	Stn																														
	1	2	3	4	5	6	7	8	9	10	13	18	22	24	31	32	36	37	39	44	50	62	65	67	68	70	73	75	78	84	99
<i>*Corticium simplex</i>																		1													
<i>*Disyringa cf. nodosa</i>	1													1									1								
<i>Penares sp. 1</i>				1																											
<i>*Jaspis sp. 2</i>																							1								
<i>*Geodia sp. 5</i>																		1													
<i>Myriastrra cf. clavosa</i>																							1								
<i>Cinachyra cf. isis</i>						1																									
<i>Cinachyrella sp. 2</i>										1																					
<i>Spirastrella cf. vagabunda</i>									1																						
<i>*Caulospongia plicata</i>				1																											
<i>Laxotethya dampierensis</i>				1																											
<i>*Tethya sp. 1</i>								1																							
<i>*Tethya sp. 2</i>													1																		
<i>*Xenospongia patelliformis</i>					1				v			v																	1		
<i>*Polymastia sp. 4</i>																1															
<i>Amorphinopsis cf. sacciformis</i>																							1								
<i>Axinella cf. aruensis</i>														1																	
<i>Axinella cf. carteri</i>																		1													
<i>*Axinella sp. 3</i>					1																										
<i>*Axinella sp. 4</i>								1																							
<i>Reniochalina stalagmites</i>								1	1																	1					
<i>Reniochalina sp. 1</i>				1					1																						
<i>Reniochalina? sp. 2</i>								1																							1
<i>Topsentia halichondroides</i>																														1	
<i>Higginsia cf. scabra</i>				1																											
<i>Myrmekioderma granulata</i>												1						1									1	1			
<i>Amphinomia sulphurea</i>												1																			
<i>Ceratopsion axifera</i>								1																							
<i>Echinodictyum cancellatum</i>								1	1	v																					
<i>Echinodictyum clathrioides</i>				1		1				1																					
<i>*Echinodictyum conulosum</i>												1																			
<i>Echinodictyum mesenterinum</i>									1																						
<i>Ectyoplasia tabula</i>										1												v	v								1
<i>Raspailia (Raspailia) cf. phakellopsis</i>																									1						
<i>Raspailia (Raspailia) vestigifera</i>								1																							
<i>Thrinacophora cervicornis</i>								1																							
<i>Trikenrion flabelliforme</i>						1	1																								1
<i>*Coelosphaera sp. 1</i>																								1							
<i>*Ectyodoryx sp. 1</i>						1																									
<i>*Desmacidon sp. 1</i>												1																			
<i>Iotrochota sp. 1</i>																		1													
<i>*Iotrochota sp. 2</i>												1																			

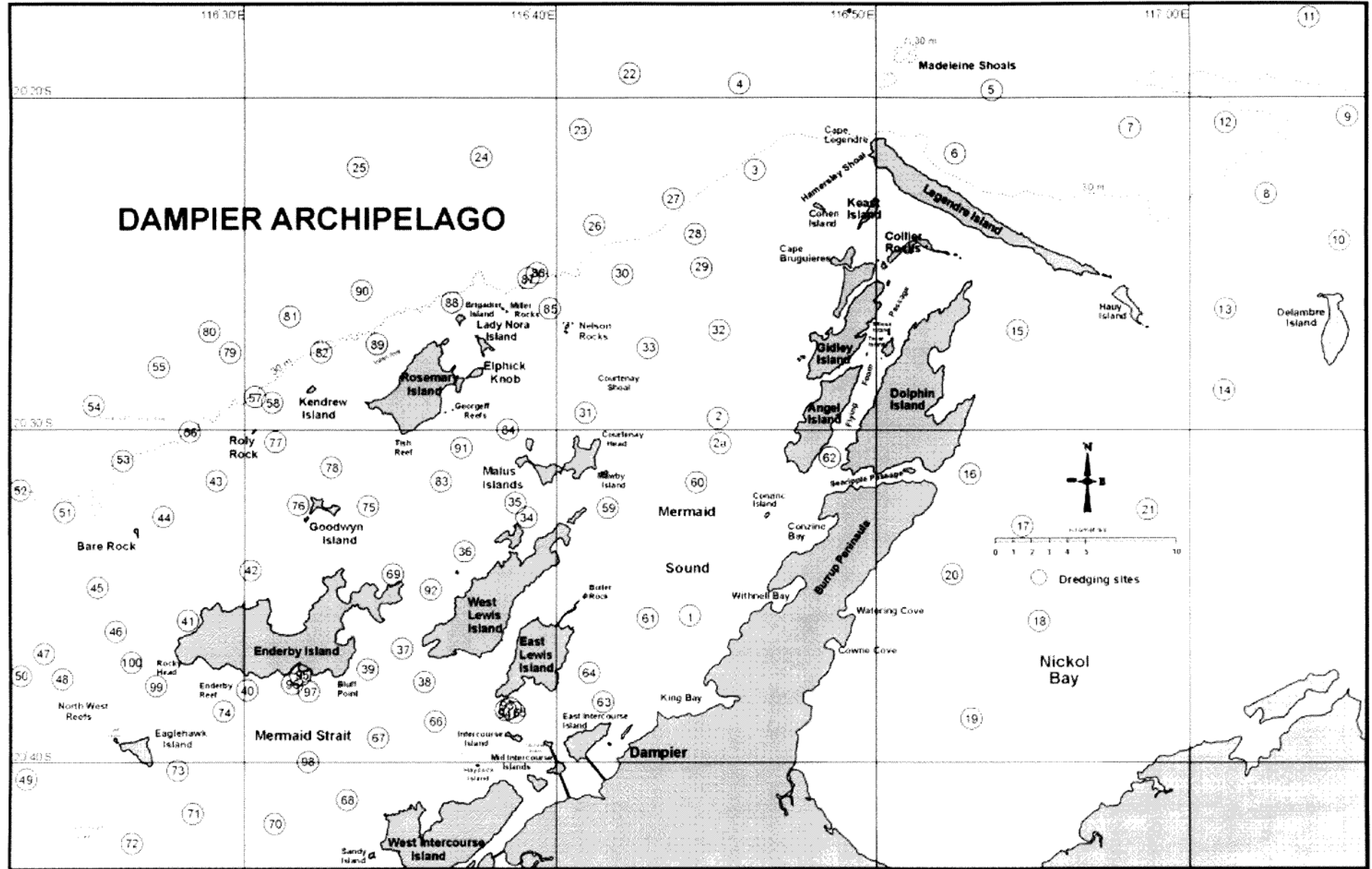
Species	Station #																		
	1	3	4	6	8	9	10	12	14	15	16	17	18	19	22	23	27	39	41
<i>Mycale</i> sp. 3				1		1					1								
<i>Mycale</i> sp. 4											1								
<i>Haliclona amboinensis</i>								1											
<i>Haliclona</i> sp. 4													1						
<i>Haliclona</i> sp. 8										1									
<i>Haliclona</i> sp. 10												1							
<i>Haliclona</i> sp. 11										1						1			
* <i>Haliclona</i> sp. 14											1								
<i>Haliclona</i> sp. 15												1							
<i>Haliclona</i> sp. 19														1					
<i>Adocia</i> sp. 1													1		1				
<i>Adocia</i> sp. 2													1						
<i>Adocia</i> sp. 3		1																	
* <i>Adocia</i> sp. 5													1						
<i>Toxadocia</i> sp. 1										1							1		
<i>Aka</i> sp. 2													1						
<i>Aka</i> sp. 5													1						
<i>Amphimedon lamellata</i>												1							
<i>Amphimedon</i> cf. <i>paraviridis</i>			1	1	1		1	1	1	1									
* <i>Amphimedon</i> sp. 3							1												
<i>Niphates</i> cf. <i>nitida</i>		1																	
<i>Niphates</i> sp. 1												1							
<i>Gelliodes fibulata</i>										1									
<i>Arenosclera</i> sp. 1													1						
<i>Callyspongia</i> sp. 7													1	1					
<i>Callyspongia</i> sp. 9																1			
<i>Toxochalina</i> sp. 1								1											
<i>Toxochalina</i> sp. 2	1			1	1						1		1						
* <i>Toxochalina</i> sp. 3													1						
<i>Petrosia</i> sp. 1			1				1												
<i>Petrosia</i> sp. 4			1																
* <i>Strongylophora</i> sp. 1																	1		
<i>Xestospongia</i> cf. <i>testudinaria</i>											1								
<i>Xestospongia</i> sp. 1						1													
<i>Xestospongia</i> sp. 4										1									
<i>Oceanapia macrotoxa</i>							1												
<i>Oceanapia</i> sp. 7													1						
* <i>Oceanapia</i> sp. 8															1				
<i>Coscinoderma mathewsi</i>										1									
<i>Coscinoderma</i> sp. 1										1									
<i>Carteriospongia</i> sp. 2												1						1	
<i>Dysidea</i> sp. 1											1								
<i>Dysidea</i> sp. 2										1									
<i>Dysidea</i> sp. 3																1	1		
* <i>Dysidea</i> sp. 4																		1	
* <i>Dysidea</i> sp. 5												1							
<i>Ircinia</i> sp. 1				1												1			
<i>Psammocinia</i> cf. <i>bulbosa</i>							1												
<i>Sarcotragus</i> sp. 2							1												
<i>Pseudoceratina</i> cf. <i>verrucosa</i>							1			1									
<i>Pseudoceratina</i> sp. 2													1						
<i>Ianthella basta</i>				1												1			
<i>Ianthella flabelliformis</i>				1															
*Class Calcarea 6								1											
Class Calcarea 7																			1
Total species number per station:	1	4	7	10	9	14	8	8	11	14	19	14	15	4	8	6	15	1	1

Appendix 6 Locations, latitudes and longitudes of stations from dredging expedition DA2/99.

Station	Location	Depth (m)	Latitude	Longitude
DA2/99/01	N of Phillip Point, Burrup Peninsula	10.0	20°35.32'S	116°43.88'E
DA2/99/02	E of Courtenay Head Light, Malus Island	18.0	20°29.84'S	116°45.04'E
DA2/99/03	NW of Cohen Island	32.0-35.0 Dredge	20°22.14'S	116°46.13'E
DA2/99/04	NNW of Cohen Island	42.0-43.0 Dredge	20°19.64'S	116°45.75'E
DA2/99/05	NE of Cape Legendre	38.0	20°19.64'S	116°53.85'E
DA2/99/06	ESE of Cape Legendre	33.0-36.0	20°21.69'S	116°52.40'E
DA2/99/07	E of Cape Legendre	37.0	20°20.90'S	116°57.04'E
DA2/99/08	NNE of NW tip of Delambre Island	30.0-31.0	20°22.76'S	117°02.23'E
DA2/99/09	N of NE corner of Delambre Island	31.0-34.5	20°20.38'S	117°05.22'E
DA2/99/10	N of NE corner of Delambre Island	29.0	20°23.97'S	117°04.82'E
DA2/99/12	NNW of NW point, Delambre Island	32-34	20°20.75'S	117°01.16'E
DA2/99/13	E of Haüy Island	19.5	20°26.52'S	117°00.50'E
DA2/99/15	SW of S tip of Legendre Island	9.5	20°27.27'S	116°54.20'E
DA2/99/16	E of Sloping Point, Burrup Peninsula	11.5	20°31.41'S	116°52.83'E
DA2/99/17	ESE of Sloping Point, Burrup Peninsula	16.5-17.0	20°32.99'S	116°54.17'E
DA2/99/18	SE of Sloping Point, Burrup Peninsula	10.0-10.5	20°35.67'S	116°54.97'E
DA2/99/19	E of Hearson Cove, Burrup Peninsula	10.0-10.2	20°38.41'S	116°52.86'E
DA2/99/20	S of Sloping Point, Burrup Peninsula	11.0	20°34.30'S	116°52.50'E
DA2/99/21	E of Sloping Point, Burrup Peninsula	16.4-18.0	20°32.25'S	116°58.48'E
DA2/99/22	WNW of Cape Legendre	37.0-38.0	20°19.43'S	116°42.61'E
DA2/99/23	W of Cape Legendre	37.0	20°21.00'S	116°40.39'E
DA2/99/24	N of Lady Nora Island	38.5	20°21.79'S	116°38.05'E
DA2/99/25	N of Rosemary Island	39.0	20°22.29'S	116°35.56'E
DA2/99/26	NE of Rosemary Island	34.0	20°24.01'S	116°41.28'E
DA2/99/27	WSW of Cape Legendre	33.5-34.0	20°23.29'S	116°43.64'E
DA2/99/28	WNW of Cape Bruguieres	30.0-30.5	20°24.07'S	116°43.90'E
DA2/99/29	W of Cape Bruguieres	27.0-28.0	20°24.64'S	116°44.05'E
DA2/99/30	W of Cape Bruguieres	29.0-30.0	20°25.20'S	116°41.74'E
DA2/99/31	NW of Courtenay Head Light, Malus Island	11.5	20°29.49'S	116°40.61'E
DA2/99/32	NE of Courtenay Head Light, Malus Island	15.0-16.0	20°26.95'S	116°44.86'E
DA2/99/33	NNE of Courtenay Head Light, Malus Island	18.0-22.0	20°27.41'S	116°42.57'E
DA2/99/34	WSW High Point on is NE of West Lewis Island	9.0-13.0	20°32.65'S	116°39.14'E
DA2/99/35	W High Point on is NE of West Lewis Island	13.0-15.0	20°32.15'S	116°38.86'E
DA2/99/36	WSW High Point on is NE of West Lewis Island	13.0	20°33.58'S	116°36.87'E
DA2/99/37	WNW of Marks Point, West Lewis Island	14.0-15.0	20°36.54'S	116°34.98'E
DA2/99/38	WSW of Marks Point, West Lewis Island	11.0-13.0	20°37.47'S	116°35.37'E
DA2/99/39	ENE of Bluff Point, Enderby Island	13.0-14.0	20°37.05'S	116°33.86'E
DA2/99/40	WSW of Bluff Point, Enderby Island	10.5-11.0	20°37.74'S	116°31.05'E
DA2/99/41	N of Rocky Head, Enderby Island	16.0-17.4	20°35.63'S	116°28.07'E
DA2/99/42	SW of SW Point of Goodwyn Island	14.0-16.0	20°34.16'S	116°30.11'E
DA2/99/43	WNW of SW Point of Goodwyn Island	21.0-22.0	20°31.60'S	116°29.03'E
DA2/99/44	W of SW lip of Goodwyn Island	22.0-23.0	20°32.71'S	116°27.57'E
DA2/99/45	WSW of SW lip of Goodwyn Island	22.0-27.0	20°34.35'S	116°25.27'E
DA2/99/46	WNW of Rocky Head, Enderby Island	17.5-18.0	20°35.90'S	116°24.60'E
DA2/99/47	N of W of Rocky Head, Enderby Island	20.0-22.5	20°36.58'S	116°23.66'E
DA2/99/48	S of W of Rocky Head, Enderby Island	20.5-21.0	20°37.43'S	116°24.08'E
DA2/99/49	S of W of W tip of Eaglehawk Island	15.5-16.0	20°40.30'S	116°22.59'E
DA2/99/50	W of Rocky Head, Enderby Island	24.0-25.0	20°37.10'S	116°20.99'E
DA2/99/51	W of SW point of Goodwyn Island	31.4-31.5	20°32.40'S	116°24.19'E
DA2/99/52	W of SW tip of Goodwyn Island	31.2-32.3	20°31.85'S	116°21.48'E
DA2/99/53	WNW of NW point of Goodwyn Island	32.0-34.0	20°30.90'S	116°26.05'E
DA2/99/54	WNW of NW point of Goodwyn Island	36.0-37.0	20°29.31'S	116°25.18'E
DA2/99/55	NW of Roly Rock	37.5-38.0	20°28.45'S	116°27.43'E
DA2/99/56	W of Roly Rock	34.5	20°30.10'S	116°28.27'E
DA2/99/57	N of Roly Rock	32.0-33.0	20°29.03'S	116°30.45'E
DA2/99/58	NNE of Roly Rock	25.0-25.5	20°29.11'S	116°30.78'E
DA2/99/59	S of Courtenay Head Light, Malus Island	17.0-19.0	20°32.23'S	116°41.63'E
DA2/99/60	ESE of Courtenay Head Light, Malus Island	16.0-17.0	20°31.38'S	116°44.24'E
DA2/99/61	NW of Philip Point, Burrup Peninsula	11.0	20°35.33'S	116°42.78'E
DA2/99/62	Flying Foam Passage, NE of S tip of Angel Island	7.0-9.0	20°30.69'S	116°48.58'E
DA2/99/63	NNE of light on East Intercourse Island	11.5-12.0	20°38.35'S	116°41.23'E
DA2/99/64	N of light on East Intercourse Island	12.0-14.0	20°37.43'S	116°40.77'E
DA2/99/65	NW of light on East intercourse Island	10.0-15.0	20°38.31'S	116°38.46'E

Station	Location	Depth (m)	Latitude	Longitude
DA2/99/66	ESE of Bluff Point, Enderby Island	7.2-7.5	20°38.40'S	116°35.66'E
DA2/99/67	SSE of Bluff Point, Enderby Island	10.5	20°39.11'S	116°33.98'E
DA2/99/68	S of Bluff Point, Enderby Island	9.0-9.2	20°40.93'S	116°33.21'E
DA2/99/69	SE of SE point of Goodwyn Island	11.5-14.0	20°34.34'S	116°34.67'E
DA2/99/70	SSW of Bluff Point, Enderby Island	10.0	20°41.45'S	116°30.78'E
DA2/99/71	S of Rocky Head, Enderby Island	10.5	20°41.49'S	116°28.05'E
DA2/99/72	SSW of Rocky Head, Enderby Island	10.0	20°42.13'S	116°26.22'E
DA2/99/73	S of Rocky Head, Enderby Island	12.5	20°40.14'S	116°27.69'E
DA2/99/74	SE of Rocky Head, Enderby Island	10.5-11.5	20°38.34'S	116°29.18'E
DA2/99/75	E of NE Point of Goodwyn Island	14.0-19.0	20°32.16'S	116°33.70'E
DA2/99/76	W of NW point of Goodwyn Island	13.0-15.0	20°32.11'S	116°31.55'E
DA2/99/77	NW of NW point of Goodwyn Island	13.0-14.0	20°30.57'S	116°30.89'E
DA2/99/78	NE of NW Point of Goodwyn Island	14.0-15.0	20°31.09'S	116°33.04'E
DA2/99/79	WNW of W end of Kendrew Island	38.0	20°27.64'S	116°29.54'E
DA2/99/81	N of W end of Kendrew Island	38.0	20°26.51'S	116°31.57'E
DA2/99/82	N of N point of Kendrew Island	32.0-36.0	20°27.57'S	116°32.35'E
DA2/99/83	ENE of NE point of Goodwyn Island	11.5-11.7	20°31.60'S	116°36.19'E
DA2/99/84	E of Tish Point, Rosemary Island	12.5-15.0	20°29.94'S	116°38.11'E
DA2/99/85	E of E point of Brigadier Island	28.0-29.0	20°26.38'S	116°39.76'E
DA2/99/87	ENE of E point of Brigadier Island	33.0-33.5	20°25.48'S	116°39.07'E
DA2/99/88	N of W point of Brigadier Island	33.5-38.5	20°26.04'S	116°36.77'E
DA2/99/89	N of Gordon Point, Rosemary Island	27.0-28.0	20°27.33'S	116°34.39'E
DA2/99/90	N of Gordon Point, Rosemary Island	38.0	20°25.68'S	116°33.96'E
DA2/99/91	ESE of Tish Point, Rosemary Island	9.0-10.0	20°30.48'S	116°36.53'E
DA2/99/92	NE of Bluff Point, Enderby Island	17.0	20°34.64'S	116°35.74'E
DA2/99/93	SE of King Point, East Lewis Island	12.0-13.0	20°38.29'S	116°38.39'E
DA2/99/94	SE of King Point, East Lewis Island	14.5-16.0	20°38.37'S	116°38.41'E
DA2/99/95	W of Bluff Point, Enderby Island	5.0-7.0	20°37.37'S	116°31.69'E
DA2/99/96	W of Bluff Point, Enderby Island	9.0	20°37.50'S	116°31.56'E
DA2/99/98	SSW of Bluff Point, Enderby Island	10.5-11.0	20°39.81'S	116°31.92'E
DA2/99/99	WSW of Rocky Head, Enderby Island	17.0-19.0	20°37.36'S	116°26.85'E

Appendix 7 Locality map of stations from the dredging expedition DA2/99.



Appendix 8 Locations, latitudes and longitudes of stations from workshop expedition DA4/00.

Station	Location	Depth (m)	Latitude	Longitude
DA4/00/01	W side Angel Island	4.0	20°29.05'S	116°47.83'E
DA4/00/03	NW West Lewis Island	Intertidal	20°33.52'S	116°38.21'E
DA4/00/04	SW tip West Lewis Island	5.6	20°36.17'S	116°35.74'E
DA4/00/06	SW Lewis Island	8.6	20°26.25'S	116°35.71'E
DA4/00/08	SW Lewis Island	5.8	20°36.31'S	116°35.70'E
DA4/00/09	Between Enderby & West Lewis Islands	17.7	20°35.12'S	116°35.63'E
DA4/00/10	W side Enderby Island near Rocky Point	11.2	20°35.39'S	116°28.57'E
DA4/00/12	Nelson Rocks	20.1	20°26.51'S	116°40.26'E
DA4/00/14	NW end Legendre Island	12.3	20°21.21'S	116°50.44'E
DA4/00/15	NW end Legendre Island	16.0	20°21.21'S	116°50.44'E
DA4/00/16	Mid north shore Legendre Island	16.0	20°24.03'S	116°55.08'E
DA4/00/17	NW corner Conzinc Island	11.6	20°31.90'S	116°46.49'E
DA4/00/18	SW Dolphin Island in Sea Ripple Passage	Intertidal	20°31.01'S	116°48.95'E
DA4/00/19	Hearson's Cove	Intertidal	20°37.62'S	116°48.15'E
DA4/00/22	Between Enderby & West Lewis Islands	19.0	20°35.11'S	116°35.62'E
DA4/00/23	NW corner Roly Rocks	8.6	20°29.88'S	116°30.05'E
DA4/00/27	Enderby Island W of Rocky Head	15.5	20°37.10'S	116°26.72'E
DA4/00/39	NE Corner Delambre Island	Intertidal	20°25.71'S	117°05.11'E
DA4/00/41	SSW Rocky Head Enderby Island	11.0-13.0	20°37.30'S	116°27.38'E

Appendix 9 Locality map of stations from the workshop expedition DA4/00.

