The seamount fauna off southern Tasmania: Benthic communities, their conservation and impacts of trawling

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Final report to Environment Australia
&
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CSIRO
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Environment Australia
Department of the Environment

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Cover

Main photo: Seamount coral reef at ~1000m depth south of Tasmania showing colonial coral substrate (*Solenosmilia variabilis)* with sea urchins, gold coral, sea whips and sea fans, sponges and other species over it.

Inset photos of individual organisms collected from the seamounts. From top :
Squat lobster, *Gastroptychus* sp. (Chirostylidae), possible new species;
Sea urchin, *?Aporocidaris* sp. (Cidaridae) brooding young;
Colonial coral , dominant on reef substrate, *Solenosmilia variabilis* Duncan, 1873 (Caryophylliidae);
Unidentified pycnogonid;
Crinoid, *Diplocrinus sibogae* (Doderlein, 1907) (Pentacrinidae), new Australian record

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Non-technical Summary

In September 1995, the deepwater trawl fishing industry agreed not to trawl in an area of 370 km^2 on the continental slope south of Tasmania for three years, as stated in a Memorandum of Understanding between the former Australian Nature Conservation Agency (now Environment Australia) (EA) and the Australian Fisheries Management Authority (AFMA). The purpose of the moratorium was to allow time for CSIRO to conduct scientific investigations and provide Government with sufficient information to assess future management options. The primary objectives of the research were to assess 1) the uniqueness of the benthic seamount fauna in the region, 2) the potential impacts of the deepwater trawl fishery upon it, and 3) the measures required to conserve it.

In January 1997 CSIRO surveyed 14 seamounts in the region, both inside and outside the Interim Protected Area and over a range of depths and degrees of prior commercial trawling (from unfished to heavily fished). Species richness of the benthic seamount fauna is high in global terms: 262 species of invertebrates and 37 species of fish were recognized from the samples from this single cruise, compared with 598 species reported worldwide from all seamount studies conducted prior to 1987. On seamounts that peaked at depths < 1400 m and that had not been heavily fished, the invertebrate fauna on the slopes was dense and diverse. It was generally dominated by filter feeders, in particular a matrix-forming colonial hard coral, *Solenosmilia variabilis,* but including a variety of hard and soft (gorgonian and antipatharian) corals, hydroids, sponges and filter-feeding groups of ophiuroids and sea-stars. Many species were associated with *S. variabilis*, using it either as their point of attachment to the substrate or for shelter. This fauna has elements distinct from the fauna found elsewhere on the continental slope and at least 24-43% of the invertebrate species are new to science. Between 16 and 33% of the invertebrate species are believed to be restricted to the seamount environment. Many of the species appear to have restricted distributions and differ from species found on seamounts around New Zealand.

Trawl operations appear to have significantly impacted the most heavily fished seamounts, such as Main Pedra and Sister, where the reef aggregate has been mostly removed from the slopes or turned to rubble. The benthic biomass from heavily fished seamounts was 83% less than from lightly fished or unfished seamounts and the number of species per sample was 59% less. No significant differences in benthic biomass, species richness or species composition were found between lightly fished seamounts outside the reserve and seamounts in the reserve that peaked at depths < 1400 m.

In summary, seamounts in the region contain a diverse fauna characterized by a high proportion of species endemic to local seamounts, although the full extent of their distribution cannot be assessed without further exploration. The fauna is highly vulnerable to trawling and is likely to have limited resilience, as its slow growth and low natural mortality are adapted to an environment with little natural disturbance.

The report therefore recommends that the present Interim Protected Area be fully protected in a Marine Protected Area (MPA) that is permanently closed to all fishing or other activity that may potentially disturb the seamount benthic fauna and associated ecosystem. The seamount fauna within the Interim Protected Area meets the biogeographic, ecological, scientific and

naturalness criteria adopted by the International Maritime Organisation for designation of protected areas (Kelleher and Kenchington (IUCN), 1992). The proportion of seamount habitat within the Interim Protected Area is consistent with the proportion of a habitat generally recommended for inclusion in protected areas (between 10 and 20%).

Introduction

Approximately 70 seamounts arise from water depths of between 1000 and 2000 m on the continental slope, between ~50 and 100 km off southern Tasmania. These seamounts — the remnants of extinct volcanoes — are typically cone-shaped, 200-500 m high and several kilometres across at their base (Hill *et al.* 1997). This field of seamounts is a distinctive geological feature not known from elsewhere on the continental margin of Australia (pers. comm., N. Exon, AGSO).

Seamounts create a distinct deep-sea environment. The slow currents generally found in the deep sea (< 10 cm s^{-1}) are enhanced several-fold by seamount topography; consequently, little sediment is deposited and unique deep-sea benthic communities have evolved that are dominated by corals and other filter feeders (Genin *et al.* 1986). Fishes such as the orange roughy and some deepwater oreos also appear to be adapted to life in this environment, their substantial aggregations supported in the otherwise food-poor deep-sea by the enhanced flow of prey organisms past the seamounts (Koslow 1997). Although there are no studies of the physical oceanography of Tasmanian seamounts, fishers report that the set of their trawls is commonly changed by strong currents over these features.

Since 1989, about half of the South East Fishery orange roughy catch has been trawled on the south Tasmania seamounts at between 650 and 1300 m beneath the sea surface (Bax 1996). Much of the deepwater oreo fishery is also based upon trawling these seamounts. Orange roughy catches from this Southern Zone of the fishery peaked in 1990 at 32,241 t. Between 1993 and 1995 only about half of the Total Allowable Catches (TAC) for this zone was landed, despite the TAC being reduced from 10,000 to 5000 t over that period. In 1996 the quota for this zone was reduced to 4208 t but only 802 t were landed. The 1997 TAC for this zone was further reduced to 1813 t. Fishing effort in the Southern Zone has also declined over this period, though at a lesser rate than the decline in landings. The number of non-zero catch trawls for orange roughy on the southern seamounts peaked in 1990 at 4762, remained in the range of 2000 - 4000 trawls per year from 1991-1994 and has since declined to 1049 trawls in 1996, the last year for which data are available. Since 1988 there have been 21,536 non-zero catch trawls on the southern seamounts.

Because commercial orange roughy trawls generally operate on the bottom and have heavy bobbins along the foot rope, it is likely that epibenthic organisms are removed or damaged along the track of normal trawl operations. The authors have observed tonnes of coralline material hauled to the surface in a single trawl shot when a new area was fished. Although there are no data on overall coral by-catch, there was interest during the peak period of the orange roughy fishery in developing a precious coral industry based on the by-catch of bamboo, gold, red and black corals (Grigg and Brown 1991), and jewellery from these corals is still commercially available.

There are no published studies of the growth, productivity, or longevity of the corals found off southern Tasmania. However, studies elsewhere indicate that deepwater corals have low rates of recruitment and considerable longevity: 75 years for the pink coral, *Corallium*, and even longer for some black corals (Grigg 1993). Bamboo corals from the south Tasmanian seamounts appear to live to ~100 years (J.A. Koslow, unpublished data from C^{14} ageing). Enhanced longevity and reduced growth and productivity are characteristic of many deep sea organisms, such as fish, squids and crustaceans, including those found around seamounts, but whether this generalisation applies to benthic invertebrates is still subject to debate (Grigg 1993, Childress 1995, Koslow 1996).

To assess the uniqueness of the Tasmanian seamount fauna requires knowledge of the fauna of the continental slope and of seamounts in a wider regional context. Although the Tasmanian seamount fauna has not been previously studied, faunal groups have been surveyed on the continental slope off southeast Australia include the fishes (Koslow *et al.* 1994), isopods (Poore *et al.* 1994) and myodocopidan ostracods (Kornicker 1994, Kornicker 1995, Kornicker and Poore 1996). Unpublished information on identified decapod Crustacea and echinoderms from extensive but only partly sorted collections at Museum Victoria was used for the appendices by G.C.B. Poore and T. O'Hara (pers. comm.). Corals have been collected widely from New Zealand seamounts, enabling comparison of this group across the Tasman Sea. In general, the benthic fauna of seamounts contain a high proportion of endemic species: Wilson and Kaufmann (1987) estimated that 15% of invertebrates on seamounts worldwide were endemic to a particular seamount or local seamount group. However, this may be an underestimate because seamounts have been so little studied until recently. Although only 598 species were reported from the seamount environment by Wilson and Kaufmann (1987) in the most recent review of this literature, a recent unpublished study indicates there are over 1300 invertebrate species on seamounts in the Coral Sea, over 60% of which are new to science (B. Richer de Forges, ORSTOM, Noumea, pers. comm.). This study found that the overlap in species between seamounts along a ridge was typically 10-30%, and the species similarity between ridge systems in the Coral Sea was only 5-10%.

In early 1994, the Australian Geological Survey Organisation (AGSO) used broad-swath acoustic techniques to map the seabed from 300 to 4500 m depth off southern and western Tasmania. The resulting maps showed the precise location and heights of all seamount features in the region. The ready availability of these maps led to concern for the future of the seamount benthic fauna, if these features were systematically explored and developed. To address these concerns, the former Australian Nature Conservation Agency (now Environment Australia) commissioned CSIRO to assess the conservation and management requirements of the southern seamounts. This assessment was funded through the OR2000 Marine Protected Areas Program.

In September 1994, CSIRO provided its report, *Assessment of conservation and management requirements for southern seamounts* (Koslow 1994), which noted that:

- A unique and diverse fauna dominated by corals and other filter feeders is associated with seamounts, such as those trawled for orange roughy off southern Tasmania;
- This fauna appears to be extensively damaged by normal trawl operations;
- This fauna is likely to have a large endemic component and extremely limited regenerative capacity; and
- The composition, depth distribution, levels of endemism and biogeography of the benthic seamount fauna off Australia are unknown at this time.

The report recommended that:

- A substantial area of the newly-mapped seamounts should be set aside as an interim conservation measure; and
- The diversity and distribution of benthic communities on seamounts off southern Tasmania at depths between ~700 and 2000 m should be assessed to establish a biological basis for informed decisions on creating a marine reserve.

In September 1995 the Ministers for Resources and for Environment, Sport and Territories jointly announced a proposal for interim protection and assessment of the seamount fauna on a group of seamounts south of Tasmania. As part of a Memorandum of Understanding between the former Australian Nature Conservation Agency (now Environment Australia (EA)) and the Australian Fisheries Management Authority (AFMA), the fishing industry agreed not to trawl in a previously untrawled area covering 370 km^2 for three years (Figure 1). This allowed time for CSIRO to conduct scientific investigations of the area and provide Government with information to use when assessing management options.

With funding from the Fisheries Research Development Corporation (FRDC) and EA, CSIRO surveyed the benthic fauna of the seamounts south of Tasmania in January 1997. This report provides the results of that survey.

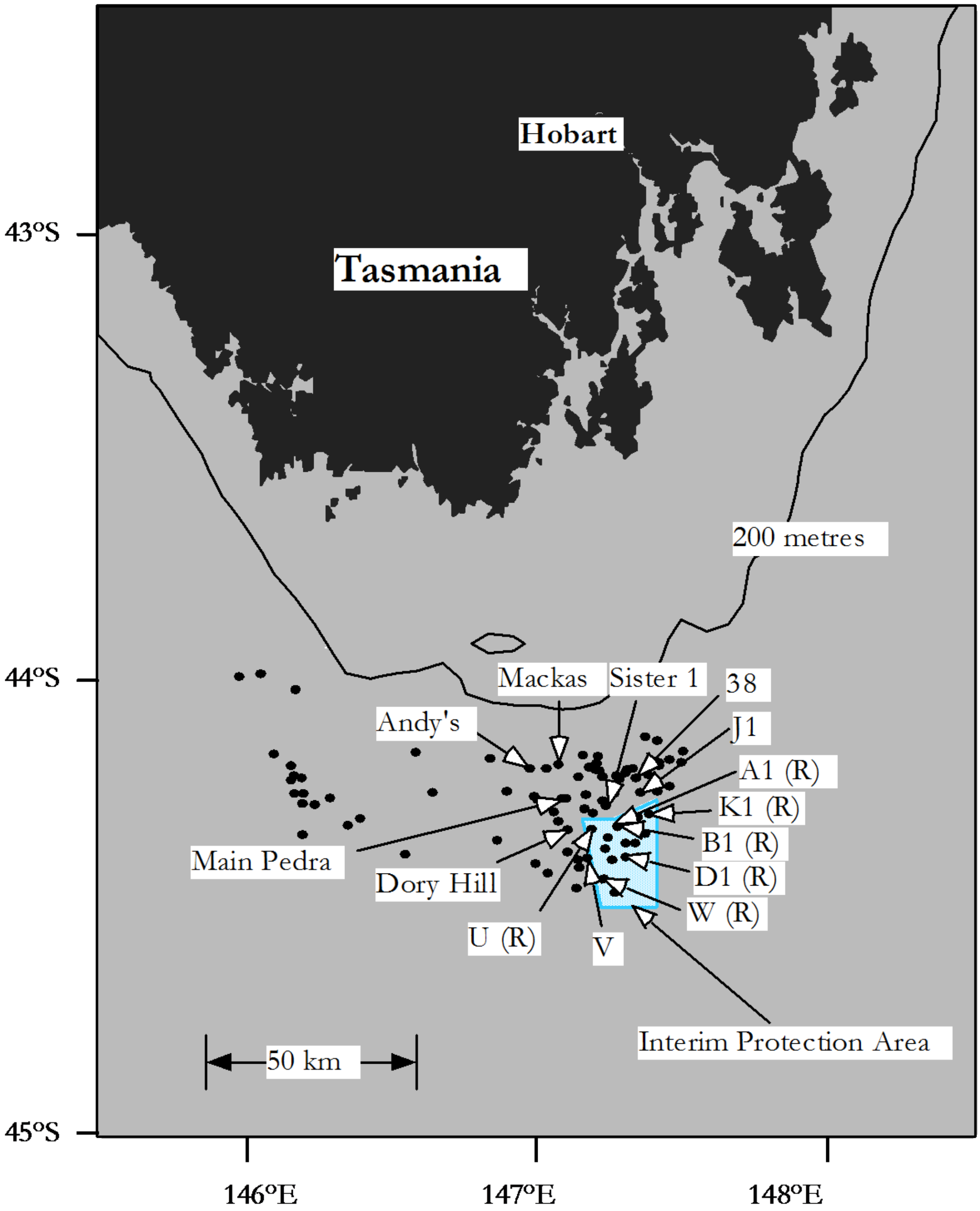

Figure 1. Map showing seamounts surveyed and Interim Protection Area. The area shown on the map is entirely within Australia's EEZ. (R) indicates the seamount is within the interim protection area.

Project objectives

- Assess the impact of trawling on the seamount fauna in the Southern Zone, based on photographic transects of fished and unfished seamounts in the Southern Zone;
- Assess the species composition of the seamount fauna in the Southern Zone in relation to depth and position on the seamount, based on photographic transects and dredging of seamounts peaking at depths between 600 and 1500 m; and
- Sample the motile fish and invertebrate species in the seamount coralline environment with baited traps to assess the role of this environment as a nursery ground for juvenile fish and as a source of prey species for commercially exploited fishes.

In addition, CSIRO agreed to provide EA with:

1. An assessment of the nature conservation significance of the seamounts in the Interim Protected Area;
2. To the extent practicable, a comparison of the nature conservation significance of the seamounts in the Interim Protected Area with other seamounts in the region and with comparable seamounts elsewher; and
3. Comment on the long-term management options for the Interim Protected Area..

Methodology

The seamount survey was carried out on *Southern Surveyor* from 20 January to 1 February 1997 (cruise SS 9701). The survey was designed to investigate the influence on community composition of depth, fishing history and position (i.e. top, slope and base) on the seamount. Seamounts selected for the survey therefore covered as wide a range of depths and fishing effort as possible in the general area of the seamount field south of Tasmania (Table 1). Andy's and Macka's are among the shallowest seamounts in the area and Hills D1 and W among the deepest; the base of these seamounts at ~2000 m is also at the limit of the research vessel's capability to obtain dredge samples. Main Pedra, Macka's and the Sister are among the most heavily fished seamounts in the area, and fishing effort varied between seamounts by several orders of magnitude.

Table 1. Fishing effort and dredge sample sites. (R) indicates site is within the Interim Protected Area; T: top; S: slope; B: base. Fishing effort is in number of non-zero catch trawls recorded in the AFMA database between 1988-96.

Seamount	Habitats sampled	Depth of peak (m)	Fishing effort (# trawls)	Position
Andy's	T, S, B	660	419	44°11.6'S 146°58.9'E
Macka's	T, S, B	670	968	44°11.8'S 147°02.5'E
Main Pedra	T, B	714	3069	44°15.5'S 147°05.8'E
Sister I	T, S, B	915	693	44°16.7'S 147°15.6'E
Dory Hill	T, S, B	1090	1	44°19.6'S 147°07.2'E
Hill U (R)	T, S	1155	0	44°19.5'S 147°10.8'E
Hill 38	T, S/B	1195	5	44°12.9'S 147°21.4'E
Hill J1	T, S, B	1235	42	44°15.4'S 147°20.9'E
Hill A1 (R)	T, S	1300	0	44°19.7'S 147°16.4'E
Hill B1 (R)	T, S, B	1300	16	44°18.5'S 147°16.8'E
Hill K1 (R)	T, B	1314	2	44°17.6'S 147°23.2'E
Hill V	T, S, B	1400	0	44°23.6'S 147°10.7'E
Hill D1 (R)	T, B	1580	0	44°23.2'S 147°18.8'E
Hill W (R)	T	1700	0	44°26.1'S 147°13.7'E

A necessary and inherent weakness of this survey program should be noted. The seamount benthic habitat in the area had not been previously sampled scientifically. Consequently the composition of the pre-fishery biological community can only be inferred from the composition on lightly fished hills, and the impact of the fishery can only be inferred by comparing heavily and lightly fished hills. Because the fishery is concentrated on the seamounts at shallower depths, the effects of depth and fishing are confounded in these inferences: all shallow hills surveyed were moderately to heavily fished and all deeper hills were little fished (Tables 1, 2).

Table 2. The distribution of sampling in relation to depth and fishing effort showing the number of seamounts surveyed with peaks at depths < 1000 or > 1000 m, and with > 400 or < 50 non-zero trawl shots recorded in the AFMA database between 1988-96.

		< 50 trawls	**> 400 trawls**
Depth	< 1000 m	0	4
	> 1000 m	10	0

Deepwater photography was originally envisaged as the primary sampling tool for the study, but the camera system was lost at sea after only four seamounts had been surveyed. Fortunately these four hills covered a wide range of depths (peaks from 714 to 1580 m depth) and fishing effort (0 to >3000 trawls) (Tables 1, 3).

Table 3. Seamounts surveyed photographically during cruise SS9701. Depth refers to metres below the sea surface of the photographic transects.

Seamount	# transects	Depth range (m)
Main Pedra	3	714-1320
Sister 1	2	915-1520
K1 (R)	3	1314-1799
D1 (R)	2	1580-2180

Two photographic transects were carried out on each hill that was surveyed. The transects extended from the base to the pinnacle of the seamount so that differences in seamount fauna could be examined within seamounts in relation to depth and bottom slope, as well as between seamounts. The transects were oriented orthogonally to each other in a generally east-west and north-south direction. An additional transect was carried out on two of the seamounts to replicate a previous transect. Mean transect length was 2652 m (range: 2213 - 3310 m). The direction of bottom currents in the region is not known. Data on the position of the seamounts are from the bathymetric chart of the area produced by the Australian Geological Survey Organisation and position fixes aboard *Southern Surveyor* made with the Global Positioning System, which is accurate to within ~100 m.

CSIRO's deepsea photographic system consists of a stereoscopic camera (a Photosea 2000), two strobes, and an acoustic pinger to ascertain height above bottom. The camera is activated from the surface. Photos were generally taken with the camera between one and four metres off bottom. The mean number of photos per transect was 106 (range: 67 - 150). The mean distance between photos on a transect (estimated from the total number of photos divided by the transect length) was 27 m (range: 16 - 38 m).

The photographs were assessed for percent cover by bottom type and for the numbers of each type of organism. For data analysis, photographic frames were grouped by ~100 m depth intervals on each seamount.

A robust dredge with several ‘weak links’ and capable of sampling either right-side-up or upside-down was constructed to obtain samples of the fauna that could be identified to species level (Lewis *in press*). The dredge mouth area was 0.72 m^2 (1.2 m wide x 0.6 m high) and the cod end had a stretched mesh length of 25 mm. The dredge had steel runners for towing along the bottom and weighed 860 kg overall. It was towed from a 25 mm trawl wire. A Furuno net sonde was mounted on the dredge to indicate depth above bottom, so that the time of contact with the bottom could be measured. The dredge was towed at 3 knots and tows were of ~5-10 minutes duration. However, due to the vagaries of sampling seamounts (the high incidence of coming stuck or coming clear of the bottom for part of the tow or of the cod end becoming full or plugged), the dredge samples are not considered quantitative in the sense that densities (numbers per unit area) could be determined.

Seamounts with peaks from ~600 to 1500 m below the surface were sampled with the dredge. In general sampling was directed at the summit, along the slope or at the base of the seamounts, and we attempted to sample these three environments at each seamount. However, full sampling did not always prove possible, particularly on some of the deepest seamounts, due to difficulties in monitoring the gear and successfully obtaining a sample in this extremely rugged environment. One sample (from Hill 38) extended across both the slope and base habitats. In all, there were 34 successful dredge samples obtained from 14 seamounts, 6 of which were in the Interim Protected Area (Fig. 1, Table 1).

The hard coral and rock seamount substrates were not considered suitable for sampling with a benthic grab, and no samples were collected for infaunal or sediment analysis.

The dredge samples were sorted at sea into major taxonomic group (e.g. sponges, crinoids, sea-stars, colonial corals, solitary corals, black corals, gold corals, hydroids), weighed and preserved. Specimens from as many species as could be recognized in the field were photographed on board the vessel while fresh. Preserved specimens were sent to taxonomic specialists in Australia, New Zealand, France and the USA for identification to species level. Most major groups captured by the gear were covered. Groups of invertebrates that comprise small individuals were not adequately sampled by the 25-mm mesh.

To examine patterns in community structure by depth and habitat type, and in relation to the impacts of fishing, the dredge data were analysed by cluster analysis, using the standard unweighted group mean average method of clustering based on the Bray-Curtis similarity index between samples using raw species weight (Legendre and Legendre 1983). Species with < 3 occurrences and a station with only one species sampled were removed from the data set before analysis. To check the robustness of the cluster output, the analyses were also carried out on log-transformed and binary-transformed (i.e. presence-absence) data, and the complete-linkage method of clustering was also used.

Droplines and traps were deployed for 2-7 hours at four seamounts to sample the motile fauna (fish, crustaceans, etc.) living within the benthic environment. Three trap-types were deployed: fish traps, crab pots and small hag-traps to sample small scavengers, such as amphipods. Cut or minced jack mackerel was used as bait in the traps and squid as bait for the drop-line hooks. About 100 hooks/dropline were deployed, and the lines were set so the first hook was 2 m above bottom. Two hook sizes were used: #6 and #4 kirbed Milward hooks, the sizes used by commercial long-line fishers for flathead and trevalla, respectively. Relatively few species were obtained with the trap and drop-line samplers, so the report focusses on results of the dredge sampling and photographic transects. However, the species obtained by these methods are included in the fauna lists for the region.

Fishing effort was assessed from the logbook records of the Southeast Fishery. All non-zero catch trawls were summed for the period 1988-96 within rectangles of dimensions 2’ lat x 2’ long (3.7 x 2.7 km) centred on each of the sampled seamounts. The fishing logbook data tend to be downwardly biased, since no entry is recorded if a shot is unsuccessful and lands no fish.

Results

Fishing effort

Cumulative fishing effort on the seamounts surveyed is shown in Table 1. A logarithmic scale is used to characterise broad categories of fishing effort, i.e. very heavily fished (> 1000 trawls), heavily fished (100-1000 trawls), lightly fished (10-100 trawls), and very lightly fished (1-10 trawls). The heavily and very heavily fished seamounts all peak at depths less than 1000 m. Fishing effort ranged from unfished to lightly fished on the deeper seamounts, regardless of whether they are within the Interim Protected Area.

Photographic survey

Several patterns were apparent when the photographic transects were analysed for percent cover by dominant substrate types (Figure 2). Examining first the unfished seamounts (D1 and K1) within the Interim Protected Area, the proportion of the bottom covered by mud was minimal at mid-depths and greatest near the base or summit, indicating greater deposition of finer sediment at the summit and base presumably due to decreased current velocity. Conversely, living and dead coral aggregate of *Solenosmilia variabilis* were greatest at intermediate depths along the slope of the seamount, indicating enhanced currents which enhance the growth of filter-feeding corals. The high proportion of the bottom covered by living and dead *S. variabilis* (> 50% in places) indicates the key importance of this reef-forming colonial coral to the seamount environment south of Tasmania. Other organisms in this habitat grow over it and live within its interstices. Of the four seamounts surveyed photographically, living coral was found only on the shallower seamount (K1) in the Interim Protected Area, but even there the proportion of dead coral aggregate far outweighed the proportion of living coral. The cause of the high proportion of dead coral aggregate even on unfished seamounts is not known but could be due to predation or long-term environmental variability that affects feeding conditions. The presence of only dead coral aggregate on the deepest seamounts in the area suggests poorer conditions for growth of this coral on deeper seamounts and, possibly, better growth conditions at some time in the past. The age of dead portions of the reef is not known.

The heavily fished seamounts, Pedra and Sister I, differed markedly from those in the Interim Protected Area. The substrate of Pedra (the most heavily fished seamount in the area) was predominantly bare rock (> 90% at most depths). The coral material on these seamounts was predominantly coral rubble or coral sand (i.e. coral aggregate that had been broken up more or less finely). Fishers report there was large coral bycatch in the early years of the fishery (pers. comm. to the authors). The degree of coral cover on these shallower seamounts before the fishery cannot be ascertained but the data suggest that virtually all coral aggregate, living or dead, has been removed, leaving behind bare rock and pulverized coral rubble. The increasing proportion of coral rubble and sand toward the base of the seamounts suggests that the trawling worked this material down the slope of the seamounts, since trawling is generally carried out in a downslope direction.

Other photographic evidence of the impact of fishing included the presence in a photo from Sister I of the broken base of a large bamboo coral lying on the bare rock substrate and several photos showing trawl tracks from the otter boards on the bare rock (Figure 3).

The lack of living coral observed on seamount D1 in the Interim Protected Area seems due to the considerable depth of this seamount. Virtually no living coral was found on seamounts whose peaks were at depths > 1300 m (see results of dredge sampling below). However, the presence of a high proportion of dead coral even on Hill K1, which is somewhat less deep and virtually unfished, may indicate long-term environmental and/or biological variability. Another possible indication of long-term change in the biological community is the presence of substantial quantities of the plates of large dead barnacles on the deepest seamounts, such as D1; no living material of this species was observed either in the photographs or dredge samples. The age of this material is not known.

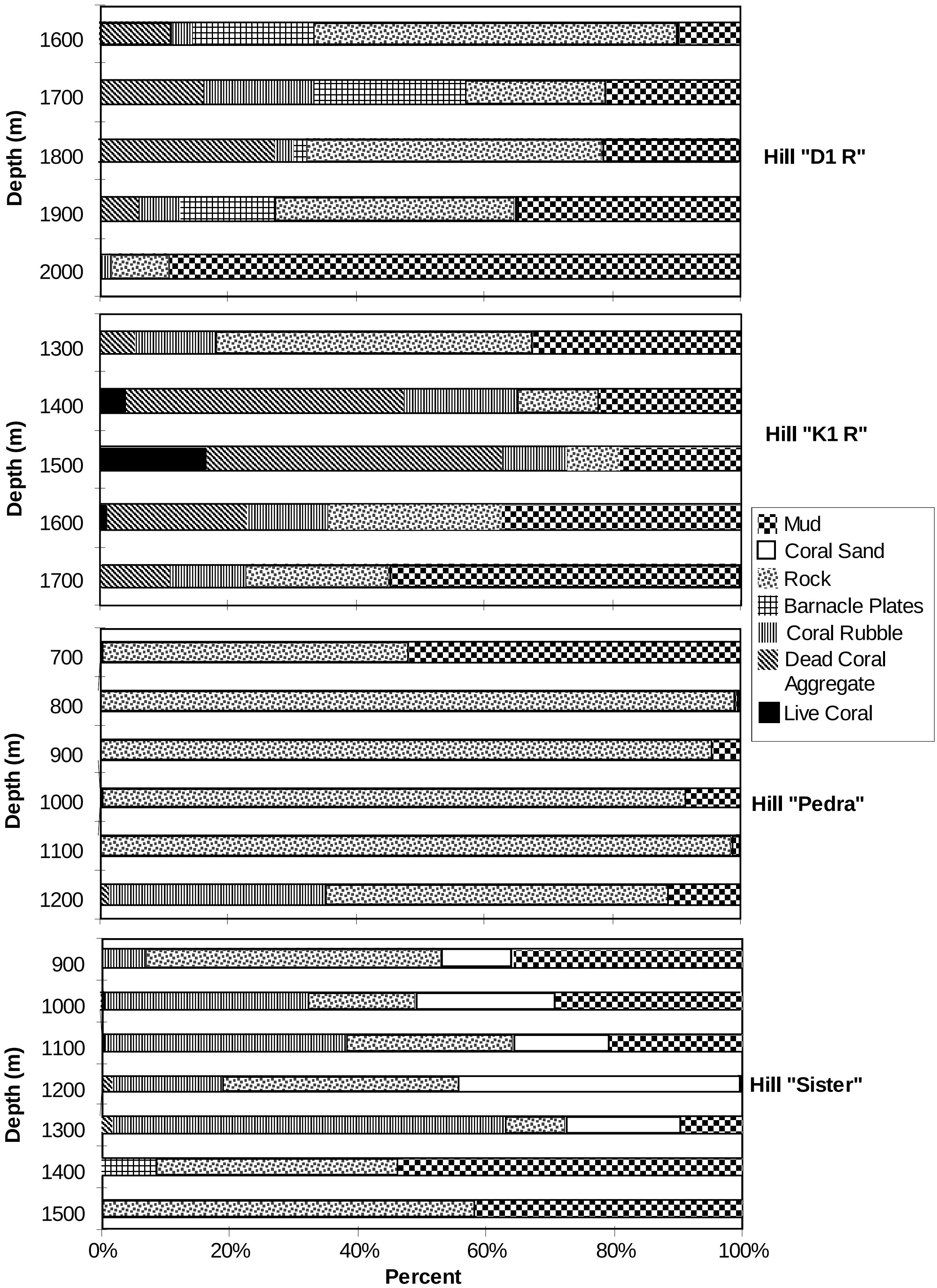

Figure 2. Percent cover by substrate type based on photographic transects over four seamounts. Hills D and K are within the Interim Protected Area; hills Pedra and Sister are heavily fished.

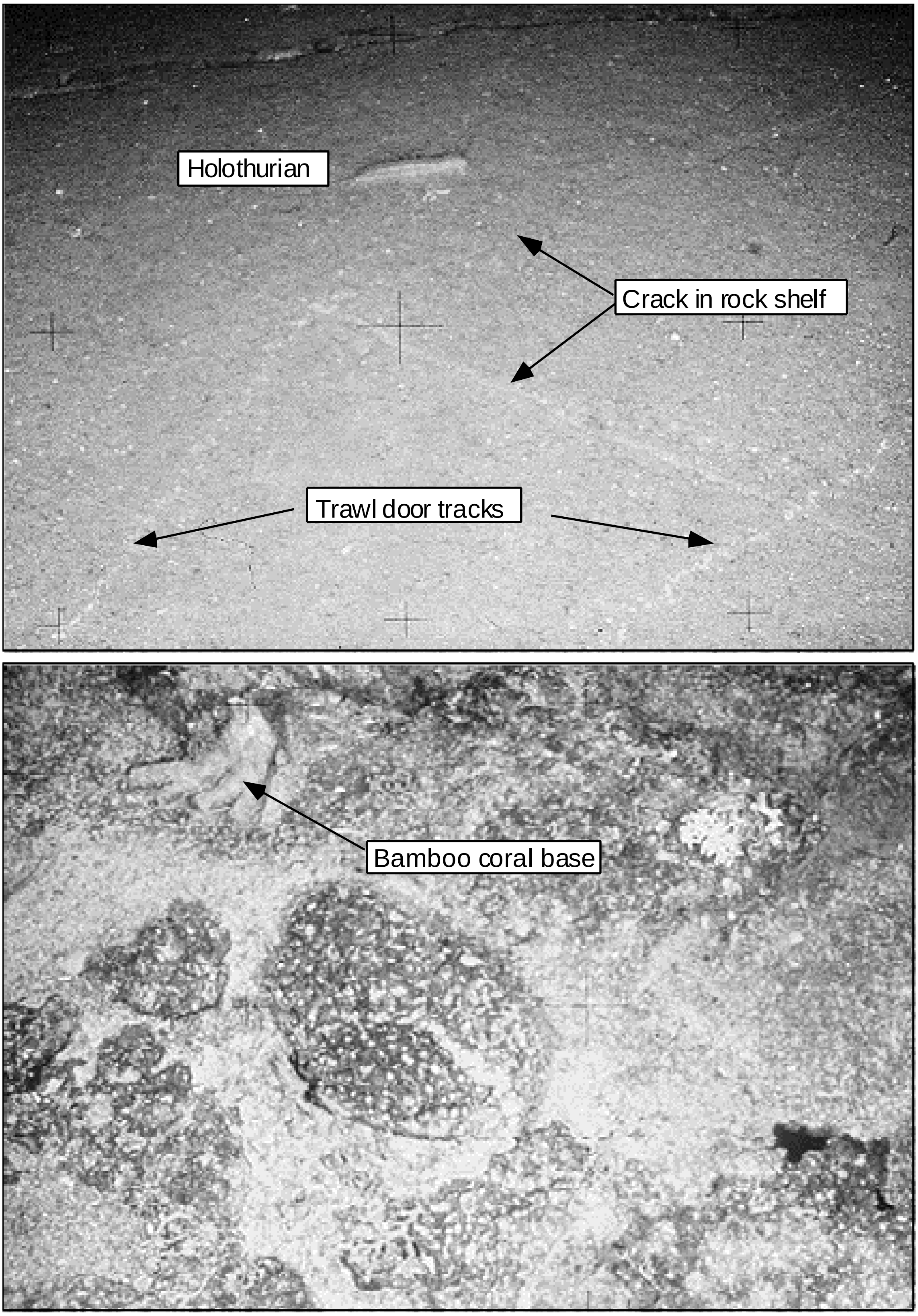

Figure 3. Photographs showing (upper) trawl tracks on bare rock substrate on Main Pedra seamount and (lower) a broken base of a bamboo coral from Sister I seamount.

Faunal collections

Fish

Approximately 37 species of fish were collected by longline, trap and sled. A provisional list of species is given in Appendix B. Although longline and trap catches accounted for most of the large fishes taken, relatively few species (8) were caught by these two methods. Squalid sharks comprised the majority of longline catches with *Etmopterus granulosus* and *Etmopterus* sp. B dominant. The eels *Diastobranchus capensis* and *Simenchelys parasiticus* (Synaphobranchidae) were the dominant fishes in trap catches.

Most fishes collected, and those of greatest interest in determining the fauna of the seamount habitat, came from benthic sled catches. The relatively large number of species obtained with the sled is notable, since it was not designed to sample the fish fauna and presumbly sampled only a fraction of the fauna present. Dominant but larger and more motile species, such as orange roughy and the oreosomatids, were caught in only small quantities. Despite being caught together with large quantities of coral debris, most specimens were in good condition.

Among the species provisionally identified were a number of rare species, including several that may prove to be undescribed. Examples include five specimens of two species of the Antarctic family Muranolepididae (moray cods), previously known from Australian continental waters from only two specimens. Also caught were a species from each of the notacanthiform families Polyacanthanotidae—previously unrecorded from Australian waters—and the monotypic Lipogenyidae, known from a single, unidentified specimen in Australian waters. Over 30 specimens were obtained of the poorly known genera *Cataetyx* (Bythitidae) and *Paralaemonema* (Moridae), each apparently consisting of several undescribed species. It is likely that these groups and others are largely restricted to the seamount habitat.

Overall, of the 37 species of fish collected, between 2 and 12 (5-32%) appear to be undescribed. After excluding wide-ranging continental slope species (those caught by trap and longline) and mesopelagic species probably caught during the descent and ascent of the sled (i.e. Bathylagidae, Phosichthyidae, Sternoptychidae and Myctophidae), new Australian records or undescribed species may account for 15 of 25 (60%) of near-bottom sled-caught species, indicating a high level of endemicity on temperate Australian seamounts.

The relatively sparse fish data were not subjected to detailed community analysis. However specimens of species comprising new Australian records or undescribed species were obtained on seamounts across the full range of depths and levels of fishing effort.

No juvenile fishes of commercially important species, such as orange roughy or the oreos, were caught. There was no evidence that the seamount habitat serves as a nursery ground for these species.

Invertebrates

The invertebrate fauna on the south Tasmanian seamounts appears highly diverse, with a high proportion that are both previously unknown to science and primarily restricted to the seamount habitat (and possibly to this region). Of the invertebrate species examined thus far, 242 species have been recognised, of which only 74 could be positively identified (Appendix C). Of the 74 identified species, 20 are new records for Australian waters and an additional 7 species are new records for Tasmanian waters.

Of the other 168 species, most (139) have been identified to genus level. At least 14 genera are new records for Australian waters, and another 3 are new records for Tasmanian waters. Of species identified to genus, 51 are believed to represent species previously unknown to science, and an additional 43 are suspected to be new to science but will require further study to confirm this. Many of the remainder belong to genera that are very poorly known and in need of taxonomic revision, so no sound judgment can be made, but it is likely that many of these also represent undescribed species. Taylor & Poore (1998) have already described two new species of carid shrimps on the basis of these collections and Y. Hanamura *et al. in press* have a paper submitted on another.

Of the 29 species not identified to genus, 8 represent new genera as well as new species, and at least 2 more probably do. Many of the remainder were damaged in collecting or were juveniles, so could not be identified. Additionally, there were at least 20 species belonging to groups that have yet to be examined in detail.

In summary, of the 242 invertebrate species recognised thus far, only 74 (31%) have been positively identified; between 58 and 103 species (24-43%) are believed to be new to science; and many of the remaining species are in poorly known groups and are also likely to be new. Approximately 31% to 48% are known only from this region, and 16% to 33% appear to be restricted to the seamount habitat.

The diversity of the south Tasmanian seamounts can be better appreciated in a global context. Wilson and Kaufmann (1987) noted that only 596 invertebrate species (cf 262 from the present study) were recorded from the 59 or more seamounts sampled throughout the world's oceans at depths ranging from 27 to 3800 m.

The identified seamount fauna of southern Tasmania appears to have affinities with several different regions. The 73 identified species include 24 species (33%) regarded as cosmopolitan or widespread, mainly occurring in deepwater. A smaller proportion (23%) — 17 described species —occur only in southern and eastern Australian waters, including Tasmania, mainly on the continental slope (at depths between 200 and 2000 m). Only 9 species could be regarded as trans-Tasman, occurring only in Australia and New Zealand (rather than more widely in the Southern Ocean/ southern Pacific). Twelve species occur predominantly in subantarctic and Antarctic waters, while 6 are known from the Indo-West Pacific area. Two species, one previously known only from the north Pacific area and one previously known only from the north Atlantic area, may be cosmopolitan but have yet to be found elsewhere. An interesting group is the 3 described species and 2 new species known only from deepwater on the southeast Tasmanian seamounts, the Kermadec and Norfolk Ridges and the New Caledonia area.

It is noteworthy that the two most frequently occurring decapod crustaceans from the survey had not been previously collected on the southeastern Australia continental slope (Poore, pers. comm.). These were two new species, a crab *Trichopeltarion* n. sp. and a galatheid crab, *Munida* n. sp. 1, which appear to be seamount endemics. The Museum Victoria and other Australian museums have extensive collections from the southeastern Australian continental slope, particularly of crustaceans and echinoderms, so were able to compare the seamount material with these collections.

Representative specimens of virtually all the crustacean, octocoral and echinoderm species collected from the seamount survey were taken to New Zealand in March 1997 for comparison with the large collections of deepwater slope and seamount species from New Zealand waters held in the collections of the National Institute for Water and Atmospheric Research (NIWA), and the Museum of New Zealand, in Wellington. While the species from either side of the Tasman were obviously closely related, very few were the same, indicating a very low number of trans-Tasman species. Because many of the crustacean and octocoral species can presently be identified only to genus, a more detailed comparison of the Tasmanian and New Zealand species may be warranted to help determine levels of endemism, and a re-examination of purported trans-Tasman species may be worth pursuing as well. It is significant that the dominant stony coral on the seamounts in New Zealand (*Goniocorella dumosa*) is a different species to that in Tasmania.

As Dr Tim O'Hara (Museum Victoria) noted in his report on the ophiuroid collection, "The collection is very significant, clearly representing a faunal assemblage that has not been discovered elsewhere around the continent of Australia."

Community structure

The material from the dredge samples aggregated by species groups provides the most extensive data set from the survey that can be used for community analysis.

Two principal community types can be seen in the samples: one dominated by living colonial coral, *Solenosmilia variabilis* (31-91% of sample biomass), and the second dominated by echinoids or sea urchins (25-95% of the biomass at these sites) (Figure 4, Tables 4, 5). Mean sample biomass at coral-dominated sites was more than three-fold higher than at sites dominated by sea urchins and contained a third more species groups (Table 4).

Coral-dominated community

Sites dominated by live colonial coral, *S. variabilis,* included the shallower seamounts within the Interim Protected Area and seamounts outside the Interim Protected Area that are only lightly fished, because they are somewhat deeper and less frequented by orange roughy than the heavily fished hills. There were no significant differences in mean sample size, species number or apparent community structure between coral-dominated seamounts in or outside the Interim Protected Area (Table 4). A sample site from the base of the heavily fished seamount Sister I also contained a diverse assemblage, including *S. variabilis,* and was associated with this cluster (Figure 4); this indicates that such seamounts probably supported this community prior to fishing.

The assemblage dominated by *S. variabilis* was diverse. Many species of solitary corals, hydrocorals, octocorals, brachiopods, sponges, and bivalves were found only in association with the coral matrix as their base of attachment, and the lattice framework provided shelter for crustaceans, ophiuroids and others (See notes, Table 5). A number of species in this assemblage appear to be seamount endemics (e.g. *Trichopeltarion* n. sp., *Munida* n.sp. 1*,* Paguridae n. gen. n. sp.), while others are known from the continental slope as well (Table 5) (Poore *et al.*, Appendix D, this report).

Urchin-dominated community

With the exception of Macka's Hill (a small shallow seamount), the sites dominated by sea urchins were the deeper seamounts. They had fewer species groups and lower benthic biomass (Table 4). The urchins at these sites were also common in the baited traps; they are widespread deep-sea scavengers and detritivores.

The urchin-dominated group had two subgroups:

- The first, (IIA in Figure 4) consisted of several sites where the samples were very small but contained sea urchins, and little else. Only one species was found only at these sites: a galatheid crab, *Munida* n. sp. 4, which is also known from the continental slope of southeast Australia.; and

- The second subgroup (IIB in Figure 4) consisted of all sites from the deepest seamounts (peaks at depths $\geq$ 1400 m), as well as two samples from Macka's, a shallow, heavily fished seamount. These sites had a predominance of sea urchins, a lack of live *S. variabilis* and a variety of other invertebrates. Some species were most abundant at these sites, but all species also occurred at coral-dominated sites (Group I). This is probably because these sites typically contained large quantities of dead *S. variabilis* that the fauna could use as substrate or shelter. Several species of crustaceans and ophiuroids most characteristic of these sites were new to science and appear to be seamount endemics, e.g. *Ophiomitrella* sp. 1 and *Ophiacantha* sp. 1 (Table 5) (O'Hara Appendix D, this report).

Shallow heavily fished sites

Several of the shallowest and most heavily fished sites from Andy's, Pedra, Sister I and Macka's were loosely associated with each other and little related to other sites, so are grouped together in a tentative third cluster (Figure 4). They were not dominated by either corals or urchins but contained several species that were not common elsewhere (Table 5). However, these species were either found also on deeper seamounts (e.g. *Michelopagurus* n. sp.) or are known from the continental slope (e.g. *Propagurus deprofundis, Lipkius holthuisi, Uroptychus australis*) (Poore *et al.*, Appendix D, this report). We found no species that occurred only on the shallow seamounts, which suggests that the fauna has affinities with both the surrounding slope and deeper seamounts and is not distinct in its own right. This cluster was not robust and tended to fragment depending on cluster method, although the sites continued to display little relationship to other sites.

These heavily fished sites were probably coral-covered before fishing and would then have been more clearly linked to the coral-dominated sites. Samples from Pedra and Sister I generally had no live colonial coral, *S. variabilis,* but all had filter-feeding groups indicative of a coralline environment (e.g. gorgonians, bryozoans, solitary corals). However, samples were considerably smaller (15-17% the mean weight of samples from lightly fished seamounts or seamounts in the

Interim Protected Area) and contained significantly fewer species groups (~60% reduction in species numbers per sample) (Table 6). These results imply that the removal of *S. variabilis* and associated fauna by heavy fishing significantly altered the benthic community of Pedra and Sister seamounts, resulting in reduced biomass and species richness. Reduced species richness may result from both the direct removal of species and changes to the seamount habitat. The coral rubble, coral sand, and bare rock predominantly found on heavily fished seamounts do not provide the three-dimensional habitat structure associated with *S. variabilis* reef on lightly fished seamounts.

The photographic transects indicated that the shallow, heavily fished seamounts, such as Main Pedra and Sister I, were often dominated by soft corals (e.g.gorgonians) (10 - 100/frame). Though present on the deeper seamounts in the Interim Protected Area, they were far less common (typically 0 - 1/frame). This difference in community composition between the shallow, heavily fished and deeper, less disturbed seamounts could arise from depth zonation in the distribution of these species or from the gorgonians' ability to rapidly colonise disturbed grounds and to withstand trawl disturbance due to greater pliability. These possibilities cannot be distinguished unambiguously with available data because no relatively unfished shallow seamounts or heavily fished deep seamounts were studied. However the sled data do not generally indicate distinct zonation in the fauna between shallower and deeper seamounts; the primary differences appear to arise from the impact of trawling on the reef-building colonial coral, *S. variabilis.*

Table 4. Means of sample characteristics from sites identified by cluster analysis as dominated by corals and sea urchins.

	Coral sites	Sea urchin sites
Depth (m)	1213	1522 (excluding Mackas)
Living biomass / sample (kg)	7.2	2.0
Number of species groups	20.1	15.3

Figure 4. Dendrogram based on cluster analysis of seamount dredge samples. Linkages indicate distance between samples based on Bray-Curtis measure of sample distance. Site locations shown in Figure 1. R: within Interim Protected Area.

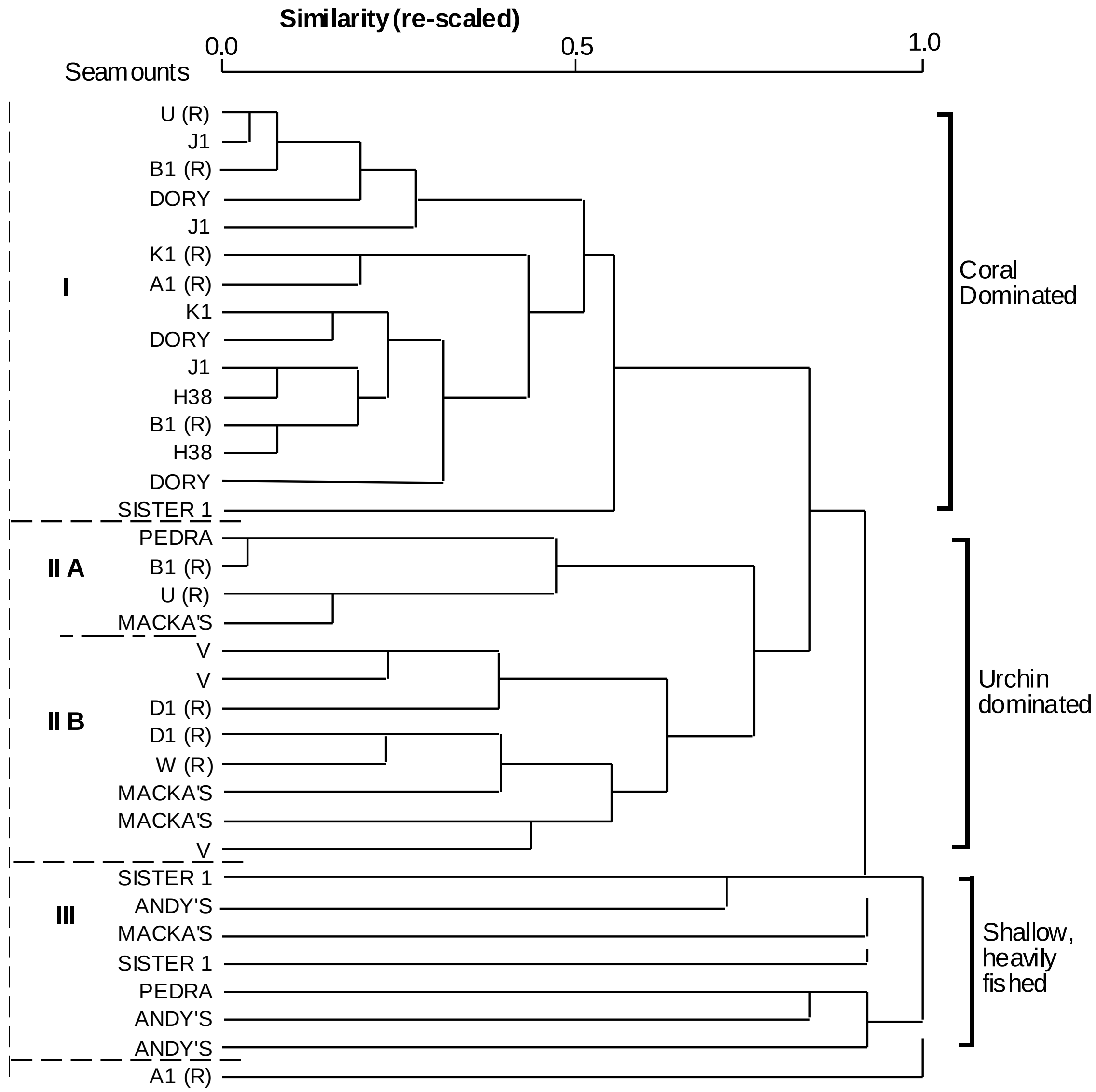

Table 5. Dominant species associated with cluster groups defined in Figure 4. Species notes in Appendix A.

	Group 1															Group 2A				Group 2B								Group 3							
	U R	J1	B1 R	DORY	J1	K1 R	A1 R	K1 R	DORY	J1	H38	B1 R	H38	DORY	SISTER1	PEDRA	B1 R	U R	MACKAS	V	V	D1 R	D1 R	W R	MACKAS	MACKAS	V	SISTER1	ANDYS	MACKAS	SISTER1	PEDRA	ANDYS	ANDYS	A1 R
1. *Solen. var.*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						x				x									x	
2. Sol. Corals	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x	x	x	x	x	x			x		x	
3. *Styl. eg.*	x	x	x	x	x	x	x	x	x			x	x		x				x	x	x		x		x		x		x	x			x	x	
4. Antipath.	x	x	x	x	x	x		x	x		x		x		x			x		x	x	x					x	x	x		x				
5. Brachiop.	x	x	x	x	x	x	x	x	x	x	x	x	x		x						x	x	x		x	x	x		x				x	x	
6. *Del. fost.*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x	x								x						
7. *Trich.* n sp	x	x	x	x	x		x	x	x	x	x	x	x	x	x					x	x		x		x		x		x		x				
8. *Munida* 1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x				x	x	x	x	x			x		x	
9. *Munida* 2	x	x			x	x	x	x			x	x	x		x					x	x						x		x						
10. *Munida* 3		x			x	x	x					x			x					x	x		x												
11. Pagurid	x	x	x		x		x	x			x		x		x	x									x							x		x	
12. *Eualus* sp	x		x	x	x			x	x		x		x		x					x	x								x						
13. Ophiura	x		x		x	x	x	x		x	x	x	x		x		x			x	x	x	x												
14. *Ophi. ros.*	x	x	x	x	x	x	x	x	x		x	x	x	x	x					x	x	x	x	x		x	x								

	Group 1															**Group 2A**				**Group 2B**								**Group 3**							
	UR	J1	B1R	DORY	J1	K1R	A1R	K1R	DORY	J1	H38	B1R	H38	DORY	SISTER1	PEDRA	B1R	UR	MACKAS	V	V	D1R	D1R	WR	MACKAS	MACKAS	V	SISTER1	ANDYS	MACKAS	SISTER1	PEDRA	ANDYS	ANDYS	A1R
15. *Ophi. viv***.**	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x	x						x								
16. *Ophi.den*.	x	x	x	x	x		x	x	x	x	x	x	x	x	x					x	x	x	x				x		x						
17. *Oph.spe***.**	x	x		x	x			x				x	x		x					x	x						x								
18. *Ophi.yal***.**	x		x		x			x					x		x					x	x	x				x			x					x	
19. *Ophi.vep*.	x				x		x				x	x	x		x					x	x						x								
20. *Ophi*. 2	x			x	x	x		x					x		x						x														
21. *Munida* 4																x	x																		
22. *Anthom*.	x		x		x			x				x			x			x	x	x	x	x					x								
23. *Ophiol*.	x	x	x	x	x			x				x	x		x		x			x	x	x	x				x								
24. *Ophiom*.1		x	x		x	x														x	x	x	x				x								
25. *Ophi.* 1		x	x	x				x	x		x									x	x	x	x				x		x						
26. *Ophi.has*.							x					x								x	x	x					x								
27. *Uro. aust***.**										x				x										x	x				x		x			x	
28. *Lip. hol*.	x							x							x	x							x		x	x		x	x		x	x	x	x	
29. *Prop.dep***.**																													x			x		x	
30. *Michelop***.**		x								x		x														x			x			x	x	x	

Table 6. Comparison of mean sample weight and number of species per sample ±95% confidence limits from the top and slopes of heavily-fished, lightly-fished and unfished (Interim Protected Area [IPA]) seamounts dominated by filter feeders (i.e. excluding urchin-dominated seamounts).

	Heavily fished (n = 11)	**Lightly fished (n = 11)**	**IPA (n = 12)**
Biomass (kg)	1.1	7.0	6.1
	± 3.4	± 5.8	± 3.8
Number species	8.7	20.1	22.2
	± 6.3	± 3.6	± 4.6

Discussion

Our finding of 299 species of macro-invertebrates and fish from a single cruise indicates the fauna is highly diverse, although comparison with other studies is difficult. Only 598 species were recorded from seamounts worldwide during the 100 years of deep-sea exploration from the *Challenger* Expedition of 1872-76 to the most recent review (Wilson and Kaufmann 1987). From even such well-studied seamounts as Vema (S Atlantic) (11 published studies) or Great Meteor (N Atlantic) (15 published studies), only 197 and 108 species were recorded, respectively. However, most previous studies were by specialists working on single groups of organisms rather than on the fauna as a whole, so these comparisons could be misleading. On the other hand, French researchers working during the past decade on the fauna of seamounts and ridges in the Coral Sea have thus far recorded over 1300 species from 23 research expeditions and >1200 samples (B. Richer de Forges, ORSTOM, Noumea, pers. comm.). Again a simple comparison of species numbers between this study and our own would not be meaningful. Differences in sampling gears can also make detailed comparisons between studies difficult, such as between the present study, based on relatively coarse-meshed gear used to sample the rugged seamount environment, and previous studies of the southeast Australian slope that used fine-meshed sleds and quantitatively sampled many small crustaceans, such as bentic isopods (Poore *et al.* 1994) and ostracods (Kornicker and Poore 1997).

A substantial proportion of the seamount fauna appears to be endemic to the region and limited to the seamount habitat. The fauna of the south Tasmanian seamounts thus appears unique in a global sense, although its full distribution and diversity cannot be considered fully known from the present survey. However, preliminary comparison with seamount collections from New Zealand indicates that the distribution of many species is localized to Australian waters. This is consistent with the results of the French study of the fauna of seamounts and ridges around New Caledonia. The French study, the most intensive to date of a regional seamount fauna, has found 60% of species were new to science, with low levels of species similarity from one ridge system to another: i.e. 5-10% within an ambit of hundreds of kilometres (Richer de Forges, ORSTOM, Noumea, pers. comm.). The seamount field south of Tasmania is a unique feature in the region and although there are other seamounts off southeastern Austalia (e.g. the South Tasman Rise and East Tasman Plateau, the spawning hill off St. Helens, Tasmania), there are no benthic samples from these seamounts and the relationship of their benthic faunas to that of the south Tasmanian seamounts is not known. Most other seamounts in the region at the appropriate depth are also subject to orange roughy trawling.

The life history of most seamount species is unknown, but those studies that have been carried out, such as for precious corals, indicate that these species are generally long-lived, slow-growing. and easily depleted (Rogers 1994). The fauna must therefore be considered exceptionally vulnerable to trawling, given their limited distribution and life-history characteristics.

No juveniles of any commercial species were obtained from sampling in the coralline habitat, negative evidence that this seamount habitat does not provide a nursery ground for juvenile commercial fishes. In general, however, there is litle understanding of the role that this habitat plays in the ecology of benthopelagic fishes, such as orange roughy and oreos, commonly associated with seamounts.

The three variables examined as part of this study — depth, position on the seamount, and fishing — all influence seamount benthic communities south of Tasmania. The main depth-related change in the benthic community appears to lie between seamounts peaking at depths > 1400 m depth and shallower seamounts, due to the increasing predominance of urchins and decline in living *S. variabilis* with increasing depth. The loose clustering of several shallow, heavily-fished sites appeared to be due more to the impact of fishing, which has removed most of the colonial coral and associated fauna rather than to the presence of a distinct shallow seamount assemblage.

The relative influence of depth and fishing could not be established rigorously because of the lack of baseline data and the confounding of these variables (all shallow hills were heavily fished and all deeper hills virtually unfished). However the substrate of all heavily fished seamounts in the area now consists predominantly of either bare rock or coral rubble and sand, and this was not seen on any seamount that was lightly fished or unfished. Also the abundance and species richness in heavily fished seamounts was consistently and significantly less than on unfished seamounts. In the absence of survey information on the biological community on seamounts before fishing, the impact of fishing on the heavily fished seamounts cannot be concluded definitively. However, anecdotal information from the fishing industry (pers. comm.) is that during the early period of the fishery on now heavily fished seamounts, such as Main Pedra and Sister I, trawl catches included significant quantities of live coral and coral aggregate. This bycatch disappeared as the fishery developed and is now rarely seen on the heavily fished seamounts; this is consistent with our observation that coral and aggregate were virtually absent on these seamounts. There can be little doubt that trawling has significantly impacted the benthic community on heavily fished seamounts, substantially reducing the abundance and species richness of the benthic community and altering the species composition.

Given the limitations of this initial survey of the seamount fauna south of Tasmania, further research is required to better establish the impact of trawling, to obtain improved baseline data, to monitor the impacts of both continued fishing and changes in fishing practice, and to determine the distributional range and population structure of species apparently endemic to seamounts in this region.

Conservation Significance

The conservation significance of the benthic fauna found on seamounts south of Tasmania may be summarised as follows:

- The field of ~70 seamounts at upper to mid-slope depths (400-2000 m) south of Tasmania is a geological feature unique within Australia.;

- There is a distinct benthic community on the seamounts with a high proportion of species new to science (24-43%) and a comparable proportion that have been found only in the seamount environment and are endemic to the region, although their precise distributional range is not known;

- Many species exhibited a broad depth distribution on the seamounts. They appear to live in association with coral substrate formed by the colonial coral, *S. variabilis.* Living coral was not found on the deepest seamounts in the survey area (peaks ≥ 1400 m depth) and there was a corresponding decline in living biomass and species richness on those seamounts;

- The seamounts of the Interim Protected Area appear to be representative of the seamount fauna of the southern Tasmanian region. The fauna on seamounts in the depth range 1000-1400m within the Interim Protected Area is very similar to that on lightly fished seamounts in the same depth range outside of the Interim Protected Area, and the available evidence strongly suggests that a similar fauna originally occurred on the shallower (600-1000m) heavily fished seamounts outside of the Interim Protected Area. Similarly, there is very little difference in the fauna on the seamounts deeper than 1400m inside and outside the Interim Protected Area, although these seamounts have much lower biomass and fewer species per sample than the shallower ones;

- At least 8 genera new to science were discovered. They are of considerable scientific interest in understanding the taxonomy and evolution of major groups of marine taxa. They are a unique aspect to Australia's biodiversity not known to be replicated elsewhere;

- The benthic environment of Australia's seamounts has never previously been studied, although the potential scientific benefits are considerable. Much still remains to be learned about the taxonomy and community structure of the fauna, and its connection with the seamount fauna of the western Pacific and Southern Ocean. The ecology and potential of the fauna for development of marine biotechnology and pharmaceuticals are unknown;

- The impact of fishing on the seamount benthic fauna appears to be substantial, although it cannot be assessed precisely. A number of shallow, heavily-fished sites, from which both living and dead colonial coral aggregate appear to have been removed, were markedly depauperate in both species richness and biomass. Photographic transects across several seamounts indicated that trawling has removed nearly all the reef habitat from heavily-fished seamounts, which is confirmed by fishers' reports of substantial coral bycatch in the early period of the fishery. The long-term ecological implications of this habitat alteration cannot be assessed, since the role of these reefs in the ecology of the deep sea is not known. The recovery time of this habitat is not known but must be reckoned on the order of decades to centuries, given the longevity of deep-sea corals; and

- The continued existence of elements of the seamount fauna must be considered to be threatened if all, or even a very high proportion, of seamounts in the region were intensively trawled. This is due to the high levels of endemism among seamount benthic species, their longevity and uncertain recruitment, susceptibility to trawl damage and the only moderate overlap in species composition from one area to another.

In summary, the coralline-based fauna on the seamounts south of Tasmania is a unique fauna with limited distributional range, high levels of endemism and a number of rare faunistic elements of scientific value. It is highly vulnerable to trawling and may be severely impacted by trawl activity. Conservation of seamount benthic communities within the South East Fishery region must therefore be given high priority.

Management Implications

The assessment of the conservation significance of the coralline-based seamount fauna indicates that it conforms to the criteria used to identify priority areas for protection in marine systems, as developed by Kelleher and Kenchington (1992) in the IUCN report, *Guidelines for Establishing Marine Protected Areas*, which was adopted by the International Maritime Organisation:

- *Biogeographic: presence of rare biogeographic qualities;*
- *Ecological*: *rare or unique habitat for any species; presence of habitat for rare or endangered species; and*
- *Naturalness*: *extent to which the areas has not been subject to human-induced change Scientific: value for research and monitoring.*

It is recommended that the present Interim Protected Area be permanently preserved as a Marine Protected Area (MPA). Options for protection include

- A Category I or strict nature reserve that is managed mainly for science or wilderness and would preserve the seamounts and associated ecosystem from all forms of exploitive activity; and

- A Category IV or habitat/species management area that would restrict all activity that might affect the benthic habitat, such as bottom trawling or other forms of fishing that involve a significant risk of bottom contact, but would permit fishing in the upper waters

In considering the management options, a key issue is to define the system to be protected. For the seamounts this system could be taken to be:

- The benthic community *sensu stricto;*

- The seamount community, which includes seamount associated benthopelagic fishes such as cardinalfish, oreos and orange roughy (Koslow 1997); or

- The seamount-associated ecosystem, which could be defined either as extending throughout the water column or including only the waters below 500m (the upper limit of Antarctic Intermediate Water which directly impinges on the seamount biota).

It is recommended that the entirety of the present Interim Protected Area be protected as a permanent MPA. The area within the Interim Protected Area is of approximately the size generally recommended for protection. The IVth World Congress on National Parks and Protected Areas recommended that 10% of each biome in the world be placed within protected areas (Kelleher *et al.* 1995). However leading ecologists have argued that this figure should be closer to 20% (Soulé and Sanjayan 1998). The Interim Protected Area contains 15 of the about 70 seamounts (i.e. about 20%) that were mapped in the seamount field south of Tasmania (Hill *et al.* 1997), and 10 seamounts (i.e. about 15%) in the depth range where significant amounts of living coral is likely to occur. The area of living coral habitat on each seamount is relatively small as each seamount is only about 2km diameter at its base and living coral occurs mainly mid-slope. Adequate protection of this habitat, which contains the greatest biomass and species richness, and its ability to be self sustaining, are critical to the maintenance of the conservation values of the seamount environment.

The requirements of the seamount species and habitats to be self sustaining are unknown. Indeed, for most species even the range of their distribution – how far they extend, if at all, beyond the southern Tasmanian seamounts – is very poorly known. Similarly, the interactions and dependencies between the seabed fauna and the water column fauna are unknown. We therefore recommend that a precautionary approach to conservation of biodiversity and ecosystem integrity be adopted, and that the seamount-associated ecosystem within the Interim Protected Area be given a high level of protection through a permanent MPA.

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APPENDIX A. NOTES TO TABLE 5.

Group 1 – Coral Group.

Group 1 stations had the largest amounts of live stony coral *Solenosmilia variabilis*, which was rare or absent from the other stations. Many of the species found associated with this coral are also present in stations in group 2B, and to a lesser extent in group 3, where they appear to be associated with the dead coral matrix.

1. ***Solenosmilia variabilis*** – meshwork stony coral. Only live coral was recorded. The dead, black, parts of the colony are the basis of attachment for many other invertebrates, including solitary corals, hydrocorals, octocorals, brachiopods, sponges, bivalves, etc, and provides shelter for many other, more mobile, invertebrates and for fish. Distribution – worldwide in deep water, except for off continental Antarctica and the North and East Pacific (Cairns, 1995).

2. **Solitary Corals** - The two species of solitary corals, *Caryophyllia diomedeae* and *Desmophyllum dianthus,* were both only found alive attached to dead parts of the colonial lattice coral *Solenosmilia variabilis*. Distribution of both species is similar to that of *S. variabilis* (Cairns, 1995).

3. ***Stylaster eguchii*** – Hydrozoan coral. Only found attached to dead parts of the colonial lattice coral *Solenosmilia variabilis*. Distribution – deep water off New Zealand, Tasman Sea, sub antarctic Islands and continental Antarctica (Cairns, 1991).

4. **Antipatheria** – Black Corals – At least 4 species of black corals were collected, usually attached to dead parts of the colonial lattice coral *Solenosmilia variabilis*. As the species could not be identified, their distributions are unknown, but as at least some are likely to be new species, they could also be seamount endemics.

5. **Brachiopoda - *?Jaffaia jaffaensis*** – Also known from the continental shelf and slope of southern Australia. (Richardson, 1997).

6. **Delectopecten fosterianum** - Only found attached to dead parts of the colonial lattice coral *Solenosmilia variabilis*. Distribution – deepwater off New Zealand, continental slope off SE Australia. (Boyd, Appendix D, this report).

7. **Trichopeltarion n. sp.** (MoV2683) – Probable seamount endemic. (Poore et al, Appendix D, this report).

8. ***Munida* n. sp.** 1(MoV2672) – Probable seamount endemic. (Poore et al, Appendix D, this report).

9. ***Munida* n. sp. 2**(MoV2673) – Also known from the continental slope of SE Australia. (Poore et al, Appendix D, this report).

10. ***Munida* n. sp. 3**(MoV2674) – Also known from the continental slope of SE Australia. (Poore et al, Appendix D, this report).

11. **Paguridae n. gen. n. sp.** (MoV2683) – Probable seamount endemic, providing extremely important phylogenetic information. "…I have never seen anything quite like it, and I have seen lots and lots of hermit crabs" (P. McLaughlin, pers.comm.).

12. ***Eualus* sp.** (MoV2681) – First record of the genus from Australian waters, could not be identified at this stage, so distribution is unknown. (Poore et al, Appendix D, this report).

13. ***Ophiura* n. sp.** (MoV2728) – Possible seamount endemic. A filter feeder, which is very unusual for the group (O'Hara, Appendix D, this report).

14. ***Ophiacantha rosea***- Also known from the continental slope of SE Australia. (O'Hara, Appendix D, this report).

15. ***Ophiacantha vivipara***- First record from Australian waters, previously recorded from the subantarctic and Antarctic (O'Hara, Appendix D, this report).

16. ***Ophiacantha denuispina*** - First record from Australian waters, previously recorded from the Falkland Islands (O'Hara, Appendix D, this report).

17. ***Ophiacantha spectabilis*** - First record from Australian waters, previously recorded from the North Atlantic (O'Hara, Appendix D, this report).

18. ***Ophiacantha yaldwyni*** – Also known from other deepwater areas in Australia and New Zealand (O'Hara, Appendix D, this report).

19. ***Ophiacantha vepractica*** – Also known from other deepwater areas in Australia and New Zealand (O'Hara, Appendix D, this report).

20. ***Ophiacantha* n. sp.** 2(MoV2731) – Possible new species, so is possible seamount endemic (O'Hara, Appendix D, this report).

Group 2A

This group is characterized by very low diversity and very low abundance. Few species were collected from these stations, and only one species was found only in this group of stations. Urchins dominate this group.

21. ***Munida* n. sp. 4** (MoV2766) - Also known from the continental slope of SE Australia. (Poore et al, Appendix D, this report).

Group 2B

Most species collected on this group of stations were also collected in group 1, and to a lesser extent in group 3 stations, but were most abundant in group 2B and 2C stations. The major difference between these stations and group 1 is the lack of live *Solenosmilia variabilis* coral. Urchins dominate this group.

22. ***Anthomastus* sp** – Alcyonarian or soft coral. This species could not be identified, and its distribution is therefore unknown.

23. ***Ophiolimna* sp.** (MoV2726) – This species could not be identified with certainty, but does not appear to have been recorded from Australian waters previously (O'Hara, Appendix D, this report).

24. ***Ophiomitrella* sp. 1** (MoV2732) - Possible new species, so is possible seamount endemic (O'Hara, Appendix D, this report).

25. ***Ophiacantha* sp. 1** (MoV2780) - Possible new species, so is possible seamount endemic (O'Hara, Appendix D, this report).

26. ***Ophiocten hastatum*** - Also known from the continental slope of SE Australia. (O'Hara, Appendix D, this report).

Group 3

This group of stations also has fairly low diversity and abundance. The few species found mainly in this group of stations are mobile crustaceans. This group of stations includes many of the shallow, most heavily fished seamounts.

27. ***U.roptychus australis*** - Also known from the continental slope of SE Australia. (Poore et al, Appendix D, this report).

28. ***Lipkius holthuisi*** - Also known from the continental slope of SE Australia and New Zealand. (Poore et al, Appendix D, this report).

29. ***Propagurus deprofundis* -** Also known from the continental slope of SE Australia. (Poore et al, Appendix D, this report).

30. ***Michelopagurus* n. sp.** (MoV2684) – Possible seamount endemic (Poore et al, Appendix D, this report).

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Appendix B. Provisional list of fish species collected on the January seamount cruise. From a post-cruise report by Dr. Alan Williams, CSIRO Division of Marine Research.

Family	Provisional species	Sled	Trap	Long-line	New record	New species
Squalidae	*Centroscymnus plunketi*			*		
	Etmopterus granulosus		*	*		
	Etmopterus sp. B			*		
Synaphobranchidae	*Diastobranchus capensis*		*	*		
	Simenchelys parasiticus		*			
Lipogenyidae	*Lipogenys gillii*	*			*	
Polyacanthanotidae	*Polyacanthanotus* cf *rissoanus*	*			*	
Bathylagidae	*Melanolagus berycoides*	*				
Phosichthyidae	*Cyclothone* sp.	*				
Sternopthychidae	*Sternoptyx* sp.	*				
Myctophidae	*Lampanyctus australis*	*				
Muraenolepididae	*Muraenolepis* cf *marmoratus*	*			*	?
	Muraenolepis sp. B		*		*	?
Moridae	*Antimora* cf *rostrata*		*			
	Lepidion schmidti	*				
	Lepidion microcephalus	*				
	Laemonema cf *globiceps*	*				
	Paralaemonema nudirostre	*			*	
	Paralaemonema sp. (Last & Gomon M/S)	*			*	*
	Paralaemonema sp. A	*			*	?
	Paralaemonema sp. C	*			*	?
	Paralaemonema sp. D (elongate)	*			*	?
Bythitidae	*Cataetyx* sp. B (brown)	*			*	?
	Cataetyx sp. C	*			*	?
	Cataetyx sp. D	*			*	?
	Cataetyx sp. E	*			*	?

Family	Provisional species	Sled	Trap	Long-line	New record	New species
Macrouridae	*Caelorinchus fasciatus*	*				
	Caelorinchus kaiyomaru	*				
	Caelorinchus matamua	*				
	Coryphaenoides subserrulatus	*				
	Macrurus carinatus			*		
	Hymenocephalus sp.	*				
	?*Nezumia* sp.	*				
	?*Ventrifossa* sp.	*			*	?
Trachichthyidae	*Hoplostethus atlanticus*	*				
Oreosomatidae	*Neocyttus* sp. A	*				*
Total	37 Species					

Appendix C: Provisional list of invertebrates collected from January 1997 survey of the south Tasmania seamounts.

The invertebrate identifications are based on post-cruise reports (see Appendix D) as follows:-

Hydroids (other than the Stylasteridae) - Jeanette Watson, Marine Science & Ecology Pty Ltd, Melbourne.
Octocorallia - Phil Alderslade, Museum and Art Gallery of the Northern Territory, Darwin.
Polychaetes - Anna Murray & Kate Attwood, Australian Museum, Sydney.
Bryozoa - Dennis Gordon, National Institute of Water and Atmospheric Research, Wellington, New Zealand.
Bivalve Molluscs (Pectinidae & Propeamussiidae) - Sue Boyd, Museum Victoria, Melbourne.
Bivalve Molluscs (Limidae & Pulvinitdae) - Bruce Marshall, Museum of New Zealand, Wellington.
Cephalopod Molluscs - Tim Stranks, Museum Victoria, Melbourne.
Barnacles - Di Jones, Western Australian Museum, Perth.
Isopod (except Serolidae), **Ostracod & Amphipod Crustaceans** - Jim Lowry, Steven Keable & Rick Johnson, Australian Museum, Sydney.
Isopod Crustaceans (Serolidae) - Gary Poore, Museum Victoria, Melbourne.
Decapod Crustaceans (except Paguridae and Atelecyclidae) - Gary Poore, Simon Hart, Joanne Taylor & Christopher Tudge, Museum Victoria, Melbourne.
Decapod Crustaceans (Paguridae) – Patsy McLaughlin, Western Washington University, USA.
Decapod Crustaceans (Atelecyclidae) - Peter Davie, Queensland Museum, Brisbane.
Crinoids (stalked)- Nadia Améziane, Museum Nationale d'Histoire Naturelle, Paris.
Asteroids (seastars) - Don McKnight & Helen Clark, National Institute of Water and Atmospheric Research, Wellington, New Zealand, and Tim O'Hara, Museum Victoria, Melbourne.
Asteroids (seastars, brisingoids) - Chris Mah, California Academy of Sciences, San Francisco.
Ophiuroids - Tim O'Hara, Museum Victoria, Melbourne.
Echinoids - Don McKnight, National Institute of Water and Atmospheric Research, Wellington, New Zealand.
Holothurians – Mark O'Loughlin, Museum Victoria, Melbourne
Cnidaria-Hydrozoa (Stylasteridae), **Scleractinia** (stony corals); **Brachiopoda; Chitons, Gastropod Molluscs; Mysid Crustaceans** - Karen Gowlett-Holmes, CSIRO Division of Marine Research, Hobart.

We are currently awaiting more detailed reports and additional information on the following groups:-
Octocorallia - Phil Alderslade, Museum and Art Gallery of the Northern Territory, Darwin.
Gastropod Molluscs - Winston Ponder, Australian Museum, Sydney.
Crinoids (non-stalked) - Nadia Améziane, Museum Nationale d'Histoire Naturelle, Paris.
Asteroids (seastars, except brisingoids) - Tim O'Hara, Museum Victoria, Melbourne.

Groups yet to be examined:-
Porifera - at least 5 species
Cnidaria - Antipatheria - at least 4 species
Cnidaria - Cerianthidae - 1 species
Cnidaria - Anthozoa - Actiniaria & Zoantharia - at least 4 species
Sipuncula - at least 1 species
Nemertea - at least 1 species

Mollusca - Aplacophora - at least 2 species
Pycnogonida - at least 2 species

Table 1: Invertebrates by phylum and major group: numbers of species & number & proportion likely to be new to science.

Phylum/group	Number of species	Species positively identified	Species likely to be new to science
Cnidaria – Hydrozoa	14	5 (36%)	9 (64%)
Cnidaria – Octocorallia	33	2 (6%)	9 (27%)
Cnidaria – other	3	3 (100%)	0
Annelida	29	7 (24%)	8 (28%)
Brachiopoda	1	1 (100%)	0
Bryozoa	14	4 (29%)	8 (57%)
Mollusca	10	4 (40%)	3 (30%)
Crustacea - other	32	2 (6%)	28 (88%)
Crustacea – Decapoda	37	12 (32%)	23 (62%)
Echinodermata – Asteroidea	22	7 (32%)	2 (9%)
Echinodermata – Ophiuroidea	36	23 (64%)	11 (31%)
Echinodermata – other	11	4 (36%)	5 (45%)

Table 2: Biogeography of invertebrates - affinities of identified species and species likely to be new to science.

Bioregion	Number of species	Identified species	New species	Possibly new species
Seamount endemics	79	0	37 (47%)	42 (53%)
Southern & eastern Australia, including Tasmania, but not seamount endemics	35	15 (43%)	17 (49%)	3 (8%)
Trans-Tasman - Australia & New Zealand, but not more widely in Southern Ocean	13	12 (92%)	1 (8%)	0
Indo-West Pacific (tropical-temperate)	8	8 (100%)	0	0
Southern Ocean - subantarctic and antarctic waters	17	16 (94%)	1 (6%)	0
New Caledonia area, Kermadec & Norfolk Ridges	5	3 (60%)	2 (40%)	0
Widespread, cosmopolitan	20	20 (100%)	0	0

Interim Invertebrate Species List

CNIDARIA - HYDROZOA

Tiarannidae
Stegolaria irregularis Totton, 1930 (**new Aust. record**)
Stegolaria **new species**

Lafoeidae
Acryptolaria arboriformis (Ritchie, 1911)
Zygophylax **new species**

Haleciidae
Halecium ?beanii (Johnston, 1838)
Halecium "ralphi" **new species**
Halecium **new species 2**

Sertulariidae
Symplectoscyphus commensalis Vervoort, 1993 (**new Aust. record**)
Symplectoscyphus **new species**
Sertularia **new species 1**
Sertularia **new species 2**

Aglaopheniidae
Lytocarpia **new species**
Gymnangium **new species**

Stylasteridae
Stylaster eguchii (Boschma, 1966) (**new Aust. record**)

CNIDARIA - OCTOCORALLIA

Acanthogorgiidae
Acanthogorgia sp

Alcyoniidae
Anthomastus sp

Anthothelidae
Anthothela sp (**genus is new Aust. record, possible new species**)

Coralliidae
Corallium sp. (**genus is new Aust. record, possible new species**)

Chrysogorgiidae
Chrysogorgia octagonus Versluys, 1902 (**new Aust. record**)
Chrysogorgia sp 1
Chrysogorgia sp 2
Chrysogorgia sp 3
Chrysogorgia sp 4

Pleurogorgia **new species**

Isididae
Isidella **new species 1**
Isidella **new species 2**
Lepidisis sp
Primnoisis s.s. cf *antarctica* Studer [& Wright], 1887
Primnoisis sp 2
New genus, new species, cf *Chathamisis*

Paragorgiidae
Paragorgia sp

Plexauridae
Austromuricea(?) sp (**genus is new Tas. record or possibly new genus, possible new species**)
Paramuricea sp

Primnoidae
Callozostron sp
Calyptrophora sp 1
Calyptrophora sp 2
Narella sp 1
Narella sp 2
Narella sp 3
Narella sp 4
Paracalyptrophora sp
Parastenella sp 1
Parastenella sp 2
Thouarella sp 1
Thouarella sp 2
Tokoprymno maia Bayer, 1996 (**new Aust. record**)
Unidentified genus & species (**probably new genus & species**)

CNIDARIA - ANTHOZOA
Scleractinia
Caryophylliidae
Caryophyllia diomedeae Marenzeller, 1904
Desmophyllum dianthus (Esper, 1794)
Solenosmilia variabilis Duncan, 1873

ANNELIDA - POLYCHAETA
Aphroditidae
Laetmonice cf. producta Grube, 1878

Eunicidae
Eunice cf *prognatha* McIntosh, 1885 (**new Aust. record or new species**)
Eunice sp.2 (may be juveniles of sp. 1)
Eunice cf. antarctica Baird, 1869

Euphrosinidae
Euphrosine cf. setosissima Ehlers, 1901 (**new Aust. record or new species**)

Glyceridae
Glycerella magellanica (McIntosh, 1885) (**new Aust. record**)
Glycera tesselata Grube, 1868

Hesionidae
Gyptis (Oxydromus) pacificus (Hessle, 1925) (**new Aust. record**)

Phyllodocidae
Eulalia (Notalia) sp. (**genus is new Aust. record, possible new species**)

Nereididae
Nicon maculata Kinberg, 1866

Polynoidae
Hololepida oculata Hartman, 1967 (**new Aust. record**)
?Hermadion sp.
?Harmothoe cf globulosa Pettibone, 1990
Unidentified genus & species 2
Unidentified genus & species 4
Unidentified genus & species 5
Unidentified genus & species 6
Unidentified genus & species 7
Unidentified genus & species 8
Unidentified genus & species 9
Unidentified genus & species 10
Unidentified genus & species 11

Serpulidae
Unidentified genus & species

Syllidae
Autolytus maclearanus McIntosh 1885 (**new Aust. record**)
Eusyllis kerguelensis McIntosh, 1885 (**new Aust. record**)
Typosyllis sp.

Terebellidae
Thelepus sp.
Nicolea cf. maxima Augener, 1923
?Eupolymnia sp. (**probable new species**)

BRACHIOPODA - ARTICULATA

Terebratellidae
?Jaffaia jaffaensis (Blochmann, 1913)

BRYOZOA - CYCLOSTOMATA
Annectocymidae
Entalophoroecia sp.

BRYOZOA - CHEILOSTOMATA
Bitectiporidae
?Parkermavella **new species**

Catenicellidae
Costaticella solida (Levinsen, 1909)
Pterocella scutella (Hutton, 1891)

Celleporidae
New genus, new species

Calloporidae
Corbulella cf translucens (Harmer, 1926) (**new Aust. record or new species**)

Farciminariidae
Didymozoum simplex (Busk, 1852)

Flustridae
Gregarinidra **new species**.

Microporellidae
Fenestrulina **new species**

Phidoloporidae
Reteporella **new species**

Porinidae
Haswelliporina multiaviculata (Gordon, 1984) (**new Aust. record**)

Romancheinidae
Escharella **new species**

Schizoporellidae
Unidentified genus & species

Smittinidae
Smittoidea cf magna Gordon, 1984 (**new Aust. record or new species**)

MOLLUSCA - POLYPLACOPHORA
Mopaliidae
Placiphorella **new species (genus is new Aust. Record)**

MOLLUSCA - GASTROPODA
Calliostomatidae

Unidentified genus & species

Capulidae
Unidentified genus & species

Ranellidae
Fusitriton magellanicus retiolus (Hedley, 1914)

Buccinidae
Unidentified genus & species

MOLLUSCA - BIVALVIA

Limidae
Acesta **new species (genus is new Tas. record)**

Pectinidae
Chalmys famigerator Iredale, 1925

Propeamussidae
Delectopecten fosterianum (Powell, 1933)

Pulvinitidae
Pulvinites exempla Hedley, 1914 (**new Tas. record**)

MOLLUSCA - CEPHALOPODA

Octopodidae
Benthoctopus **new species (genus is new Aust. Record)**

CRUSTACEA - CIRRIPEDIA

Calanticidae
Scillaelepas **new species**

Pachylasmatidae
Hexelasma **new species**

Poecilasmatidae
Poecilasma **new species**

Verrucidae
Altiverruca sp (**possible new species**)

CRUSTACEA - MYSIDACEA

Lophogastridae
Gnathophausia sp

CRUSTACEA - OSTRACODA

Cypridinidae
Doloria **new species 1**
Doloria **new species 2**

Doloria **new species 3**

CRUSTACEA - ISOPODA

Aegidae
Aega sp 1 (**possible new species**)
Aega sp 2 (**possible new species**)
Aega cf *beni* Bruce, 1983 (**new Aust. record or new species**)
Aega sp 4 (**possible new species**)
Rocinela sp. (**possible new species**)

Cirolanidae
Cirolana **new species**
Natatolana **new species 1**
Natatolana **new species 2**

Cymothoidae
Ceratothoa sp

Serolidae
Acutiserolis **new species**

CRUSTACEA - AMPHIPODA

Amathillopsidae
New genus, new species

Hirondelleidae
Hirondellea **new species 1**
Hirondellea **new species 2**

Lysianassidae
Orchomella gerulicorbis (Schulengerger & Barnard, 1976) (**new Aust. Record**)
Parschisturella **new species**
Schisturella **new species**
Tryphosella **new species 1**
Tryphosella **new species 2**
New genus, new species 1
New genus, new species 2

Scopelocheiridae
Paracallisoma **new species**

Stegocephalidae
Parandania **new species**

Uristidae
Koroga megalops Holmes, 1908 (**new Aust. Record**)
Stephonyx **new species**

CRUSTACEA -
DECAPODA - Stenopodidea
Spongicolidae
Spongicaris **new species (genus is new Aust. record)**

CRUSTACEA -
DECAPODA - Caridea
Campylonotidae
Campylonotus rathbunae Schmitt, 1926

Crangonidae
Paracrangon **new species (genus is new Aust. record)**

Hippolytidae
Eualus sp. (**genus is new Aust. record, possible new species**)
Lebbeus sp. 1 (**new species or new Aust. record**)
Lebbeus sp. 2 (**new species or new Aust. record**)
Leontocaris amplectipes Bruce, 1990 (**new Tas. record**)
Leontocaris bulga Taylor & Poore, 1998 (**new species)**
Leontocaris yarramundi Taylor & Poore, 1998 **(new species)**
Merhippolyte chacei Kensley, Tranter & Griffin, 1987 (**new Tas. record**)
Thoralus sp. (**genus is new Aust. record, possibly new species**)

Nematocarcinidae
Lipkius holthuisi Yaldwyn, 1960
Nematocarcinus sigmoides Macpherson, 1984

Oplophoridae
Acanthephyra quadrispinosa Kemp, 1939

CRUSTACEA -
DECAPODA - Palinura
Polychelidae
Polycheles sp.

CRUSTACEA -
DECAPODA - Anomura
Chirostylidae
Gastroptychus sp. (**possible new species**)
Uroptychus australis (Henderson, 1888)
Uroptychus sp. 1 (**possible new species**)
Uroptychus sp. 2 (**possible new species**)

Galatheidae
Munida **new species 1**
Munida **new species 2**
Munida **new species 3**

Munida **new species 4**
Munidopsis sp. 1 (**possible new species**)
Munidopsis sp. 2 (**possible new species**)

Paguridae
Michelopagurus **new species**
Propagurus profundis (Stebbing, 1924)
New genus, new species

Parapaguridae
Parapagurus sp. (**possible new species**)
Sympagurus dimorphus (Studer, 1883)
Sympagurus villosus Lemaitre, 1996 (**new Tas. record**)

Lithodidae
Lithodes longispina Sakai, 1971
Neolithodes brodei Dawson & Yaldwyn, 1970
Paralomis cf. *birsteini* Macpherson, 1988 (**new Aust. record or new species**)
Paralomis cf. *phrixa* Macpherson, 1992 (**new Aust. record or new species**)

CRUSTACEA -
DECAPODA - Brachyura
Goneplacidae
Carcinoplax meridionalis Rathbun, 1923

Atelecyclidae
Trichopeltarion(?) **new species**

ECHINODERMATA - CRINOIDEA
Bourgueticrinidae
Phrynocrinus nudus A.H.Clark, 1907 (**new Aust. record**)
Porphyrocrinus sp (**genus is new Aust. record, possible new species**)

Hyocrinidae
Anachalpsycrinus **new species (genus is new Aust. record**)

Pentacrinidae
Diplocrinus sibogae (Doderlein, 1907) (**new Aust. record**)
Unidentified genus & species (**probably new genus & species**)

ECHINODERMATA - ASTEROIDEA
Asteriidae
Australiaster dubia (HL Clark, 1909)
Cosmasterias dyscrita HL Clark, 1916
Smilasterias clarkailsa O'Loughin & O'Hara, 1990 (**new Aust. record**)

Asterinidae

Anseropoda sp

Benthopectinidae
Benthopecten sp 1
Benthopecten sp 2

Brisingasteridae
Novodinia cf australis HL Clark, 1916
Novodinia sp 2 (juveniles)

Brisingidae
Brisinga sp (**genus is new Aust. Record**)

Ctenodiscididae
Ctenodiscus orientalis Fisher, 1913

Echinasteridae
Henricia sp. 1
Henricia sp. 2

Freyellidae
Freyella sp. (**genus is new Aust. Record**)

Goniasteridae
Ceramaster patagonicus (Sladen, 1889) (**new Tas. record**)
Hippasteria trojana Fell, 1958 (**new Tas. record**)
Unidentified genus & species 1
Unidentified genus & species 2

Hymenodiscidae
New genus, new species

Odonasteridae?
Unidentified genus & species.

Pterasteridae
Pteraster sp.

Solasteridae
Crossaster multispinus HL Clark, 1916
Lophaster sp.

ECHINODERMATA - OPHIUROIDEA

Asteronychidae
Asteronyx loveni Müller & Troschel, 1842

Asteroschematidae
Ophiocreas sibogae Koehler, 1904

Gorgonocephalidae

Astrothorax waitei (Benham, 1909)
Gorgonocephalus cf *pustulatum* (Clark, 1916)

Ophiomyxidae
Ophiomyxa australis Lütken, 1869
Ophioscolex sp (**genus is new Tas. record, possible new species**)

Ophiuridae
Ophiocten hastatum Lyman, 1878
Ophiomisidium irene Fell, 1952 (**new Aust. record**)
Ophiura (O.) flagellata (Lyman, 1978)
Ophiura (O.) sp (**possible new species**)
Ophiura (*Ophiuroglypha*) *irrorata* (Lyman, 1878)
Ophiura (*Ophiuroglypha*) *jejuna* (Lyman, 1878)
Ophiurolepis accomodata Koehler, 1922 (**first record since original description**)
New genus, new species

Ophiolepididae
Ophiomusium lymani Thomson, 1873

Ophiacanthidae
Ophiacantha denuispina Mortensen, 1936 (**new Aust. record**) (brooding species)
Ophiacantha rosea Lyman, 1878
Ophiacantha spectabilis Sars, 1871 (**new Aust. record**)
Ophiacantha cf *vepractica* Lyman, 1878 (**new Aust. record or possible new species**)
Ophiacantha vivipara Ljungman, 1870 (**new Aust. record**)
Ophiacantha yaldwyni Fell, 1958
Ophiacantha sp 1 (**possible new species**)
Ophiacantha sp 2 (**new species or new Aust. record**)
Ophiacantha spp (possibly juveniles of more than 1 species).
Ophiocamax applicatus Koehler, 1922 (**first record since original description**)
Ophiolimna cf *bardii* (Lyman, 1883) (**new Aust. record or possible new species**)
Ophiomitrella conferta Koehler, 1922
Ophiomitrella sp 1 (**new Aust. record or new species**)
Ophiomitrella sp 2.
Ophioplinthaca incisa (Lyman, 1883)
Ophioplinthaca **new species**
Ophiurothamnus stultus (Koehler, 1904)

Ophiactidae
Ophiactis abyssicola Sars, 1861
Ophiactis plana Lyman, 1869

Amphiuridae
Amphioplus sp (**possible new species**)

Ophiotrichidae
Ophiothrix aristulata Lyman, 1879

ECHINODERMATA - ECHINOIDEA

Cidaridae
?*Aporocidaris* sp

Echinidae
Dermechinus horridus (A. Agassiz, 1879)
Gracilechinus cf *multidentatus* (HL Clark, 1925).

Pedinidae
?*Caenopedina* sp

ECHINODERMATA - HOLOTHUROIDEA

Laetmogonidae
Laetmogone **new species**

Synallactidae
Synallactes challengeri (Theel, 1886) (**new Tas. record**)

APPENDIX D. SEAMOUNT FAUNA DESCRIPTIONS

Most of the taxonomic experts who examined the seamount invertebrates wrote detailed reports on their groups. Reports on the hydroids, bivalves (Pectinidae & Propeamussidae), cephalopods, scavenging crustaceans, decapod crustaceans, brisingoid asteroids, ophiuroids and holothurians are attached.

Some, however, sent only a species list which was later annotated from further communications and from previously published records. These are summarised below.

Hydrocorals & stony corals (Karen Gowlett-Holmes, CSIRO)

The hydrocoral *Stylaster eguchii* is widespread in Antarctic and subantarctic waters, but this is the first record of this species from Australia. The three species of stony corals (*Caryophyllia diomedeae*, *Desmophyllum dianthus*, *Solenosmilia variabilis*) are all widespread, deepwater species, all three have been previously recorded from Tasmania.

The colonial coral *Solenosmilia variabilis* dominated the summits of the unfished seamounts, colonies were thick, but mostly dead, only patches of the outer layer was alive. This coral forms lattice-structure colonies, with individual corallites elongating with growth, dividing and also anastomosing to form the lattice structure. Live polyps have a bright orange animal and a white corallite, but the dead parts of the colony were black on the outside, probably from manganese deposits. The dead parts of the skeleton were extensively bored by what appeared to be sipunculan worms. These burrows were completely within the skeleton, and not apparent externally unless the coral was broken. However, these burrows appeared to significantly reduce the structural strength of the coral colony. The dead, black, parts of the colony are the basis of attachment for many other invertebrates, including solitary corals, hydrocorals, octocorals, brachiopods, sponges, bivalves, etc, and provides shelter for many other, more mobile, invertebrates and for fish. Extensive areas of coral rubble formed from broken colonies of this species were seen in photographs and dredged, both in loose drifts and embedded in mud. Much of the coral rubble was worn, probably rolled, and appeared to be old.

This coral was collected on some of the fished seamounts, but in small quantities, and mostly dead, broken, rubble from the slopes. This coral was, however, a significant bycatch of trawling on these hills in the early history of the fishery.

The two species of solitary corals, *Caryophyllia diomedeae* and *Desmophyllum dianthus,* were both only found alive attached to dead parts of the colonial lattice coral *Solenosmilia variabilis*. Both species showed considerable variability in corallite form, particularly the degree of development of the vanes. Although both species of solitary coral were found in the dredged coral rubble, sometimes forming a significant component, particularly *Desmophyllum dianthus*, neither were found alive in this situation.

Octocorals (Phil Alderslade, Northern Territory Museum of Arts and Sciences)

A total of 33 species of octocorals have been recognised so far. Of these, only 2 species, *Chrysogorgia octagonus* and *Tokoprymno maia,* could be definitely identified to species level, neither of which had previously been recorded from Australian waters. It is also the first record of *Anthothela* and *Corallium* (precious coral) from Australian waters. Of the two species which could not be identified to genus, one at least is definitely a previously undescribed genus and species. It is possible that the species tentatively identified to the genus *Austromuricea*, an otherwise tropical group, may also represent a new genus. Due to the poor state of knowledge of many of these groups, it is currently impossible to identify many to species, but it is highly likely that many of the currently unidentified species actually represent new species.

Polychaetes (Anna Murray & Kate Attwood, Australian Museum)

A total of 29 species of polychaete worms were recognised, 7 of which were identified as previously described species, and 5 were very similar to previously described species but probably distinct. Of the remainder, one species is most probably new, and several of the others may be new, and one is in a genus previously only recorded from the Falkland Islands. Many of the unidentified species, however, are incomplete or damaged specimens, and cannot currently be identified further.

Of the 7 previously described species identified, 5 (*Glycerella magellanica* (subantarctic), *Gyptis (Oxydromus) pacificus* (Japan), *Hololepida oculata* (Pacific Antarctic ridge), *Autolytus maclearanus* and *Eusyllis kerguelensis* (both Kerguelen)) are new records for Australian waters, of the remaining 2 species, *Nicon maculata* is widespread in Antarctic and subantarctic waters and previously recorded from Tasmania, and *Glycera tesselata* is a cosmopolitan species that may in fact be a species complex.

Brachiopoda (karen Gowlett-Holmes, CSIRO)

A single species of brachiopod was collected, which has been tentatively identified as *Jaffaia jaffaensis*, a species previously recorded from southern Australian waters. This brachiopod was collected live attached to dead parts of the skeleton of the coral *Solenosmilia variabilis*, but only on intact sections of the colony lattice, not on broken rubble, and was in much deeper water than it has been recorded from previously.

Bryozoa (Dennis Gordon, NIWA)

Bryozoans were present as very small encrusting colonies, mainly on the dead, black parts of the skeleton of *Solenosmilia variabilis*, and on coral, shell, and barnacle plate rubble. A total of 14 species from two stations were identified. Of the 14 species recognised, only 4 species could be identified to species. Two species (*Costaticella solida & Pterocella scutella*) are known from southeastern Australia and New Zealand, one species (*Didymozoum simplex*) was previously known only from Bass Strait, and one species (*Haswelliporina multiaviculata*) was previously known only from New Caledonia and the Kermadec Islands. Of the remaining 10 species, 6 species are believed to be new, including one which also represents a new genus, and 2 are possibly new species, but require further study to determine their identity. The unidentified cyclostome species belongs to a very poorly known group, and may also represent a new species when this group is studied in more detail. The collected material of the other species was in very poor condition, and could not be determined further.

Mollusca

The diversity of molluscs was generally low. At least two species of aplacophoran were collected, but these have yet to be examined in detail.

Chitons (Karen Gowlett-Holmes, CSIRO)

A single species of chiton was collected, an undescribed member of the carnivorous genus *Placiphorella*. This new species is also known from deep water off New Zealand and several subantarctic localities.

Bivalves (Limidae & Pulvinitidae) (Bruce Marshall, Museum of New Zealand)

Several single valves of dead *Pulvinites exempla* were collected, this species was previously known only from deep water off New South Wales. Several live specimens of a new species of *Acesta* were collected, but they were not attached to any substrate, although one had a cap limpet attached to it. This undescribed *Acesta* is possibly the same species as is found in New Caledonia, the Norfolk Ridge and the Kermadec Ridge, but is different to species occurring off Queensland, New Zealand and South America.

Gastropods (Karen Gowlett-Holmes, CSIRO)

Only preliminary identifications are available for the gastropods at present. Four species have been recognised, only one, *Fusitriton magellanicus retiolus*, a species known from the continental slope of southeastern Australia, could be identified at this time.

Crustacea

Barnacles (Di Jones, Western Australian Museum)

Four species of barnacles were recognised, from four different suborders of barnacles. Three species are definitely new, one of which (*Hexelasma* n.sp) is also known from the New Caledonia region. The other species (*Altiverruca* sp.) may be new, but requires further study.

Mysids (Karen Gowlett-Holmes, CSIRO)

A single species of the widespread giant deepsea mysid genus *Gnathophausia* was collected, but could not be identified to species at this time.

Serolid Isopods (Gary Poore, Museum of Victoria)

A single species of serolid isopod was collected, a new species of *Acutiserolis*.

Echinodermata

Crinoidea (Nadia Amazienne, Paris Museum)

Of the considerable quantity of crinoids collected, only the stalked crinoids have been examined in detail so far. Five species of stalked crinoids were collected all of which are previously unknown from Australian waters and only two of which (*Phrynocrinus nudus & Diplocrinus sibogae*) could be identified to species. The species that could not even be assigned to a genus has some very unusual characters, and may represent a new genus as well as a new species.

Asteroidea (other than brisingoids) (Don McKnight & Helen Clark, NIWA, & Tim O'Hara, Museum of Victoria)

Only preliminary identifications are available for the asteroids (seastars) and echinoids at this time. The main item of note in the asteroids was the presence of *Smilasterias clarkailsa*, a recently described species previously known only from Macquarie Island.

Echinoidea (Don McKnight, NIWA)

Of the four species of echinoid collected, only one could be identified to species, *Dermechinus horridus*, a widespread species previously known from the region.

TASMANIAN SEAMOUNT HYDROIDS
PRELIMINARY REPORT

Jeanette E. Watson, 16/4/97

Collection of hydroids sent by CSIRO Division of Fisheries, Hobart, collected from the slopes of a benthic seamount SSE of SE Cape, Tasmania in January 1997. Depths 620-1100m. Sampling by benthic sled.

The samples of 16 lots yielded 13 species, 9 of which are presumed new. With one exception, the known species are rare and formerly recorded from deep water in the New Zealand-Chatham region and from the New South Wales and Tasmanian coast.

It is most unusual to find so many new species in such a small collection.

Family Tiarannidae Russell, 1940

Stegolaria irregularis Totton, 1930

Record

Stn 56, 44.18°S, 147.00°E to 44.20°S, 146.96°E, depth 800m, 65.5 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4533. Colony on worm tube.

Remarks

Known from deep water, North Cape and Chatham Rise, New Zealand.

Stegolaria n. sp.

Record

Stn 57, 44.18°S, 146.99°E to 44.21°S, 146.95°E, depth 900-1100m, 65.1 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4540. Several fertile colonies on calcareous bryozoan.

Family Lafoeidae A. Aggassiz, 1865

Acryptolaria arboriformis (Ritchie, 1911)

Record

Stn 53, 44.19°S, 147.02°E to 44.22°S, 147.05°E, depth 936-1018m, 67.4 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4532. One infertile colony without substrate.

Remarks

Known only from deep water NSW and Tasmania. Rare species.

Zygophylax n. sp.

Record

Stn 55, 44.19°S, 146.95°E to 44.19°S, 147.01°E, depth 620-800m, 66.5 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4536. One delicate infertile colony. No substrate.

Remarks

Affinities with a rare species from deep water at the Three Kings Islands New Zealand.

Family Haleciidae Hincks, 1868

Halecium ?beanii (Johnston, 1838)

Record

Stn 56, 44.18°S, 147.00°E to 44.20°S, 146.96°E, depth 800m, 65.5 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4534. Colony on worm? tube.

Remarks
Microscopic characters identify with a cosmopolitan species. However, colony form does not agree.

Halecium "ralphii" n. sp.

Record
Stn 36, 44.27°S, 147.33°E to 44.24°S, 147.36°E, depth 987m, 83.8 km SSE of Southeast Cape, Tasmania. Benthic sled, 27/01/97

Material
JEW 4546. Large fascicled, fertile colony. No substrate.

Remarks
Gonothecae identical with species from the Chatham Islands identified by Ralph as Halecium beanii. I believe it to be an undescribed species.

Halecium n. sp.

Record
Stn 06, 44.27°S, 147.07°E to 44.27°S, 147.11°E, depth 1110m, 76.7 km SSE of Southeast Cape, Tasmania. Benthic sled, 21/01/97

Material
JEW 4547. Tiny infertile stems on *Sertularella* sp. 4544.

Family Sertulariidae Lamouroux, 1812

Symplectoscyphus commensalis Vervoort, 1993

Record
Stn 57, 44.18°S, 146.99°E to 44.21°S, 146.95°E, depth 900-1100m, 65.1 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material
JEW 4537. Fine tangled, fertile colony. Delicate stems. No substrate.

Remarks
Recorded from the New Caledonia region by Vervoort. However, could be one of several species with Antarctic affinities which are in need of systematic review.

Symplectoscyphus n.sp.

Record

Stn 57, 44.18°S, 146.99°E to 44.21°S, 146.95°E, depth 900-1100m, 65.1 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Stn 06, 44.27°S, 147.07°E to 44.27°S, 147.11°E, depth 1110m, 76.7 km SSE of Southeast Cape, Tasmania. Benthic sled, 21/01/97

Material

JEW 4539, 4544. Large plumose colonies without substrate.

Sertularella n. sp. 1

Record

Stn 57, 44.18°S, 146.99°E to 44.21°S, 146.95°E, depth 900-1100m, 65.1 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Stn 33, 44.42°S, 147.23°E to 44.44°S, 147.23°E, no depth, 96.6 km SSE of Southeast Cape, Tasmania. Benthic sled, 26/01/97

Stn 37, 44.27°S, 147.33°E to 44.22°S, 147.40°E, depth 1300-1450m, 84 km SSE of Southeast Cape, Tasmania. Benthic sled, 27/01/97

Material

JEW 4538, 4541, 4543. Large, very brittle, woody colonies, one fertile (Stn 57). No substrate.

Remarks

Unusual and distinctive gonothecae confirms undescribed species.

Sertularella n. sp. 2

Record

Stn 36, 44.27°S, 147.33°E to 44.24°S, 147.36°E, depth 987m, 83.8 km SSE of Southeast Cape, Tasmania. Benthic sled, 27/01/97

Material

JEW 4545. Two branched, infertile colonies.

Family Aglaopheniidae L. Agassiz, 1862

Lytocarpia n. sp.

Record

Stn 06, 44.27°S, 147.07°E to 44.27°S, 147.11°E, depth 1110m, 76.7 km SSE of Southeast Cape, Tasmania. Benthic sled, 21/01/97

Material

JEW 4535. A single, simple, fertile, plumose stem.

Gymnangium n. sp.

Record

Stn 52, 44.21°S, 147.05°E to 44.22°S, 147.05°E, depth 750-900m, 70 km SSE of Southeast Cape, Tasmania. Benthic sled, 29/01/97

Material

JEW 4542. Four graceful plumose stems on pebbles.

Report on MOLLUSCA (BIVALVIA) collected during the SS01/97 cruise to seamounts off southern Tasmania

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The south-eastern Australian bathyal bivalve fauna is poorly known. Limited collections are held in the Museum of Victoria and the Australian Museum, Sydney, but there is no comprehensive published account of the fauna.

The SS01/97 collection of bivalves was restricted to two species of the family Pectinidae, one represented by only a single worn , dead valve. This appears to be considerably less than has been collected at slope localities of similar depth, though as yet, this is not supported by systematic data.

The identifications of the specimens were based on the literature and on previously identified material held in the Museum of Victoria, including specimens identified by Henk H.Dijkstra of Amsterdam, an authority on the family Pectinidae who has published on the group .

Family Pectinidae

Delectopecten fosterianum **(Powell, 1933)**

Palliolum fosterianum **Powell, 1933**

Type locality: 400 miles west of New Plymouth, North Island, New Zealand, 600-700 fathoms.

Powell (1979) reported this species only from the type locality. The Sea Mount study collected specimens at a total of 17 stations, at depths ranging from 900-1600m. The Museum of Victoria and the Australian Museum collections also hold specimens, from various offshore localities between Sydney and Point Hicks, Victoria, at depths ranging from 1000-1500m.

Powell (1979) reports the genus *Delectopecten* as widely distributed in deep water. Grau (1959) reports on a number of species of the group from the Eastern Pacific region, all with very broad bathymetric distributions, some ranging from 5 to over 2,000 fathoms.

The only other species of this genus recorded from the Australasian area is *Delectopecten musorstomi* Poutiers 1981, with a distribution across the Philippines, Indonesia, New Caledonia and Norfolk Island, collected at depths from 150 to 495 m, but found living at depths from 150 to 250 m (Dijkstra and Marshall, 1997).

The relationship of this species with the broadly distributed *D.vitreus* (Gmelin, 1791), needs clarification.

In the original description of *fosterianum*, Powell states “the new species is very like the deep-water Atlantic *Chlamys (Palliolum) chaperi* Dautzenberg and Fischer 1897”, a species placed in the synonymy of *Cyclopecten (Delectopecten) vitreus* (Gmelin, 1791) by Grau (1959). *D.vitreus* is the most widely distributed species of Pectinidae*,* with records extending from throughout both the Atlantic and Pacific Oceans at depths from 15 to 2327 fathoms (Grau,1959).

Sea Mount Station details and number of specimens are outlined below.

MV F 82048 Stn. SS01/97/49 83.2 km SSE of SE Cape, "Dory Hill" seamount, Tasmania. 1280-1400m

From Lat 44 19.2 S Long 147 07.2 E To Lat 44 20.4 S Long 147 04.2 E

NO. SPECIMENS 4

MV F 82049 Stn. SS01/97/28 89.5 km SSE of SE Cape, "K1" seamount, Tasmania 1225m

From Lat 44 17.4 S Long 147 24.6 E To Lat 44 18.0 S Long 147 20.4 E

NO. SPECIMENS 10

MV F 82050 Stn. SS01/97/48 82.9 km SSE of SE Cape, "Dory Hill" seamount, Tasmania 1100-1200m

From Lat 44 18.6 S Long 147 08.4 E To Lat 44 20.4 S Long 147 04.2 E

NO. SPECIMENS 2

MV F 82051 Stn. SS01/97/36 83.8 km SSE of SE Cape, "J1" seamount, Tasmania 987m

From Lat 44 16.2 S Long 147 19.8 E To Lat 44 14.4 S Long 147 21.6 E

NO. SPECIMENS 4

MV F 82052 Stn. SS01/97/40 82.6 km SSE of SE Cape, "J1" seamount, Tasmania 1200-1450m

From Lat 44 14.4 S Long 147 21.6 E To Lat 44 16.2 S Long 147 19.2 E

NO. SPECIMENS many

MV F 82053 Stn. SS01/97/67 94.2 km SSE of SE Cape, "V" seamount, Tasmania 1310-1320m

From Lat 44 23.4 S Long 147 09.0 E To Lat 44 23.4 S Long 147 13.8 E

NO. SPECIMENS 1

MV F 82054 Stn. SS01/97/69 94.5 km SSE of SE Cape, "V" seamount, Tasmania 1400-1650m

From Lat 44 24.0 S Long 147 09.0 E To Lat 44 24.0 S Long 147 10.8 E

NO. SPECIMENS 1

MV F 82055 Stn. SS01/97/57 65.1 km SSE of SE Cape, "Andys" seamount, Tasmania 900-1100m

From Lat 44 10.8 S Long 146 59.4 E To Lat 44 12.6 S Long 146 57.0 E

NO. SPECIMENS 1

MV F 82056 Stn. SS01/97/59 81.6 km SSE of SE Cape, "38" seamount, Tasmania 1200-1400m

From Lat 44 13.8 S Long 147 22.8 E To Lat 44 11.4 S Long 147 17.4 E

NO. SPECIMENS 9

MV F 82057 Stn. SS01/97/62 87.8 km SSE of SE Cape, "A1" seamount, Tasmania 1200-1300m

From Lat 44 19.8 S Long 147 16.2 E To Lat 44 19.2 S Long 147 19.8 E

NO. SPECIMENS 4

MV F 82058 Stn. SS01/97/17 88.5 km SSE of SE Cape, "K1" seamount, Tasmania 1600m

From Lat 44 16.8 S Long 147 25.2 E

NO. SPECIMENS 2

MV F 82059 Stn. SS01/97/37 84.0 km SSE of SE Cape, "J1" seamount, Tasmania 1300-1450m

From Lat 44 16.2 S Long 147 19.8 E To Lat 44 13.2 S Long 147 24.0 E

NO. SPECIMENS 1

MV F 82060 Stn. SS01/97/15 82.9 km SSE of SE Cape, "Sister 1" seamount, Tasmania 1100-1122m

From Lat 44 16.2 S Long 147 17.4 E To Lat 44 18.0 S Long 147 13.8 E

NO. SPECIMENS many

MV F 82061 Stn. SS01/97/58 81.3 km SSE of SE Cape, "38" seamount, Tasmania 1140m

From Lat 44 13.2 S Long 147 22.8 E To Lat 44 11.4 S Long 147 18.0 E

NO. SPECIMENS 6

MV F 82062 Stn. SS01/97/43 85.8 km SSE of SE Cape, "B1" seamount, Tasmania 1150-1550m

From Lat 44 18.6 S Long 147 16.2 E To Lat 44 18.0 S Long 147 20.4 E

NO. SPECIMENS 7

MV F 82063 Stn. SS01/97/47 84.3 km SSE of SE Cape, "Dory Hill" seamount, Tasmania 1000m

From Lat 44 19.8 S Long 147 06.6 E To Lat 44 19.2 S Long 147 10.2 E

NO. SPECIMENS 7

MV F 82064 Stn. SS01/97/41 82.8 km SSE of SE Cape, "U" seamount, Tasmania

From Lat 44 19.2 S Long 147 07.2 E To Lat 44 19.2 S Long 147 07.2 E

NO. SPECIMENS many

***Chlamys famigerator* Iredale, 1925**

***Chlamys famigerator* Iredale 1925**

Type locality: off Bateman's Bay, NSW, 75 fathoms.

This species has been recorded by authors from localities across southern Australia, from southern NSW to south Western Australia, at depths from 40 to 200 fathoms. Museum of Victoria collections include Bass Strait specimens to 200m.

A single worn, dead valve was collected by SS01/97.

MV F 82047 Stn. SS01/97/52 70.0 km SSE of SE Cape, "Mackas" seamount, Tasmania

From Lat 44 12.6 S Long 147 03.0 E To Lat 44 13.2 S Long 147 03.0 E 750-900m

NO. SPECIMENS 1 valve

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Report on *Benthoctopus* sp. (Mollusca: Cephalopoda: Octopodidae) collected during the SS01/97 cruise to seamounts off southern Tasmania

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Summary

A small series of *Benthoctopus* specimens was captured during the SS01/97 cruise to seamounts off southern Tasmania. The material was compared with previously described species of *Benthoctopus* (particularly *B. levis* and *B. thielei* from the Heard-Kerguelen plateau), but could not be assigned to any known taxa. The seamount specimens of *Benthoctopus* likely represent a species new to science.

Introduction

The octopus fauna of the Australian continental slope is poorly known. A modern systematic revision of the continental slope octopods is lacking, and museum collections of these animals are relatively small. Based on preliminary studies, several described and undescribed species of the following octopodid genera are known to occur on the sea floor of the continental slope off south-eastern Australian: *Octopus, Benthoctopus, Eledone* and *Graneledone* (unpublished data).

Seamount octopuses:

The only cephalopod molluscs captured during the SS01/97 seamount cruise were four octopus specimens from depths of 1083-1300 m (stations 15, 28, 34 and 62), plus part of an octopod egg-brood (with well-developed embryos close to hatching) (from station 28).

The octopuses belong to one species of *Benthoctopus* that can be characterised as follows: small sized animals (up to 30 mm mantle length); body muscular; skin smooth and loose; eyes moderately large; funnel organ VV-shaped; ink sac absent; arm order usually 1=2.3=4; arms 2.9-3.3 times longer than mantle; biserial suckers; sucker diameter 7-9% of mantle length; web depth about 18-24% of longest arm length; web sector between dorsal arms is deepest; ligula length about 8-11% of hectocotylised arm length; 50-54 suckers on the hectocotylised arm; 6-7 gill lamellae; and uniform pinkish-purple in colour.

Species	Sex	Mantle Length (mm)	SS01/97 Station No.	Seamount	Depth (m)	Museum Reg. No.
Benthoctopus sp.	1 mature male	30.0	34	"U"	1083-1083	NMV F 82179
Benthoctopus sp.	1 immature male	20.5	62	"A1"	1200-1300	NMV F 82180
Benthoctopus sp.	1 submature female	11.1	15	"Sister 1"	1100-1122	TM
Benthoctopus sp.	1 submature female	10.0	28	"K1"	1225-1225	NMV F 82181

The morphology of the eggs and unhatched embryos is consistent with that known for the *Benthoctopus* genus (and the species mentioned above), and is as follows: egg capsule length 28-30 mm; capsule width 10-12 mm; egg stalk length 5.5-7.5 mm; eggs attached singly to substrate; dissected embryos ~4.5-5.5 mm mantle length and ~10.5-11.0 mm longest arm length.

Discussion:

Benthoctopus is a typical bottom-dwelling octopus found in the bathyal zone (200-4000 m depth). Five species of *Benthoctopus* have been described from southern hemisphere waters: *B. berryi* (Robson, 1924); *B. eureka* (Robson, 1929); *B. levis* (Hoyle, 1885); *B. magellanicus* Robson, 1930; and, *B. thielei* Robson, 1932. The systematics of these taxa are poorly known, and no detailed descriptions are available. There are no previously published records of *Benthoctopus* from Australian waters, and the closest known species in the southern hemisphere are *B. levis* from off Heard Island, and *B. thielei* from Kerguelen Island.

Animals in the genus *Benthoctopus* typically produce very large eggs. The size of the present eggs (28-30 mm capsule length) is amongst the largest reported for any octopuses. The large hatchlings (4.5-5.5 mm mantle length) are likely to adopt a benthic existence immediately upon hatching (with no planktonic stage), and have limited means for wide dispersal via oceanic currents. In all probability, *Benthoctopus* species have restricted and local distributions, and exhibit high levels of endemicity.

The seamount *Benthoctopus* species is well characterised, and closest in general morphology to both *B. levis* and *B. thielei*, but it cannot be assigned to either species (or any of the other recognised *Benthoctopus* species). The present species differs from both *B. levis and B. thielei* by not having the web sector between dorsal arms shortest, and being outside the known distributional ranges of these species (the subantarctic Heard-Kerguelen Plateau). It also differs from *B. levis* by having shallower webs (i.e., less than 33-40% reported for *B. levis*) and longer arms (i.e., longer than 1.9-2.2 times mantle length reported *for B. levis*), and from *B. thielei* by having a shorter ligula (i.e., less than 13% reported *for B. thielei*). The geographical distance between the Heard-Kerguelen region and Australia also indicates it is most unlikely that young or adult *B. levis* or *B. thielei* could disperse to Australia (via West Wind Drift currents or across the Indian Ocean seafloor), and therefore that the present species is geographically and genetically isolated from *B. levis* or *B. thielei*.

The present species of *Benthoctopus* does not fit with any previously described species of the genus, and likely represents a new species.

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Scavenging crustaceans from CSIRO Seamount Cruise SS 01/97

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Based on 12 trap samples from 5 sites there were 19 crustacean species representing three groups: 13 species of lysianassoid and stegocephaloid amphipods; 3 species of cirolanid isopods and 3 species of cypridinid ostracods. Two genera and seventeen of the 19 species are new to science.

Lysianassoid amphipods dominate (in diversity and in numbers) the crustaceans of the seamounts south of Tasmania. Two species, *Paracallisoma* nsp 178 and *Parschisturella* nsp 126 are the overwhelmingly dominant species.

Ten species occurred at Site 8 (Main Pedra). The lysianassoid *Parschisturella* nsp 26 dominated this site with more than 12,000 specimens. Other species which occurred in significant numbers were Tryphosine nsp 479 (about 1,900 specimens), *Cirolana* nsp 4 (about 980 specimens), *Doloria* nsp (about 950 specimens), *Schisturella* nsp 33 (about 700 specimens), *Doloria* nsp TS (about 400 specimens).

Only 3 species of scavengers occurred in the trap at Site 39 (Hill U) dominated by *Tryphosella* nsp (pout 1) (about 96 specimens).

Twelve species occurred in the traps at Site 41 (Hill U) which was dominated by the scopelocheirid amphipod *Paracallisoma* nsp 168 (about 19,200 specimens).

Only 6 species occurred in the traps at Site 61 (Hill V). *Tryphosella* nsp (pout 1) (about 2400 specimens) and *Doloria* nsp (about 1890 specimens) dominated the scavenging fauna.

Eleven species occurred in the trap at Site 65 (Hill D1). *Koroga megalops* dominated the scavengers (about 570 specimens).

Several years ago we identified an undescribed species of the lysianassoid amphipod *Eurythenes* as the main item in orange roughy fish stomachs from various deep water sites around the Tasmanian coast. But although the seamounts are in the right depth range and *Eurythenes* are known from seamounts in the Pacific Ocean none appear to occur on the seamounts sampled on this cruise.

Non-Scavengers

Among the few non-scavenging amphipods is a new genus and species of amathillopsid amphipod which is currently being described.

List of Species	Distribution
AMPHIPODA	
Amathillopsidae	
New genus, New species	Seamount Endemic
Hirondelleidae	
Hirondellea nsp 29b	Deep water, south-eastern Australia
Hirondellea nsp X	Deep water endemic
Lysianassidae	
Abyssorchomene gerulicorbis	Deep water South Pacific
Parschisturella nsp 26	Deep water, east coast north to Sydney
Schisturella nsp 33	Deep water to Sydney
Tryphosella nsp (pout 1)	Seamount Endemic
Tryphosella nsp (pout 2)	Seamount Endemic
Tryphosine ngen nsp 28c	Deep water Tasmania
Tryphosine ngen nsp 479	Deep water Tasmania
Scopelocheiridae	
Paracallisoma nsp 178	East coast to Coffs Habour
Stegocephalidae	
Parandania nsp	Deepwater, east coast to Cairns
Uristidae	
Koroga megalops	Deep water Pacific Ocean
Stephonyx nsp 177	Deep water, east coast to Cairns

List of Species	Distribution
ISOPODA	
Aegidae	
Aega sp	
Cirolanidae	
Cirolana nsp 4	Deep water, eastern Tasmania
Natatolana nsp 37	Deep water, eastern Tasmania
Natatolana nsp 43	Deep water, eastern Tasmania

List of Species	Distribution
Cymothoidae	
Ceratothoa sp	
OSTRACODA	**Specimens**
Cypridinidae	
Doloria nsp	Seamount Endemic
Doloria nsp TS	Deep water Tasmania
Doloria nsp (subrectangulata)	Seamount Endemic

Relative Abundances

AMPHIPODA	Specimens
Paracallisoma nsp 178	19566
Parschisturella nsp 26	12572
Tryphosella nsp (pout 1)	3697
Tryphosine nsp 479	1907
Koroga megalops	1606
Schisturella nsp 33	707
Tryphosella nsp (pout 2)	256
Abyssorchomene gerulicorbis	121
Stephonyx nsp 177	75
Hirondellea nsp 29b	45

Hirondellea nsp X	50
Tryphosine nsp 28c	32
Parandania nsp	35

ISOPODA	**Specimens**
Cirolana nsp 4	986
Natatolana nsp 37	14
Natatolana nsp 43	2

OSTRACODA	**Specimens**
Doloria nsp	3037
Doloria nsp TS	1154
Doloria nsp (subrectangulata)	33

List of Species

AMPHIPODA, NON-SCAVENGERS

Amathillopsid ngen, nsp

ISOPODA, NON-SCAVENGERS

Aega sp 1

Aega sp 2

Aega ? *beri* Bruce, 1983

Aega sp 4

Ceratothoa sp

Rocinella sp

Decapod crustaceans from Tasmanian seamounts

Gary C. B. Poore, Simon Hart, Joanne Taylor and Christopher Tudge

Museum of Victoria

Introduction

The collection of decapod crustaceans from seamounts comprised many thousands of individuals which were sorted to species level. The species were compared with collections in the Museum of Victoria made during cruises on the continental slope of southeastern Australia in 1984, 1986 and 1994. Poore et al. (1994) outlined the methods used on these occasions and analysed the diversity of Crustacea Isopoda.

Five of the eight orders of Decapoda were represented. No Dendrobranchiata (prawns), Thalassinidea (mud shrimps) or Astacidea (scampi) were taken although all could be expected in these habitats. The first deepwater stenopodidean shrimp from Australia is reported although others are known from New Zealand. Some new species of caridean shrimps were identified while others already known from the Australian slope were also taken. Anomurans were the most diverse group and the distribution of taxa was typical of slope depths. Some, but not all the species are known from the nearby continental slope. The collection was notable for the paucity of brachyuran crab species, only one, a previously unreported species being common. The only palinuran was a single specimen of polychelid, a family known only from these depths.

The relative proportions of taxa were much as would be expected from these habitats. It is perhaps surprising that as many as a third, 12 out of 36 species, could be identified as described species (Table 1) since these depths have been rarely sampled in the past. Rogers (1994), citing Wilson & Kaufmann (1987), concluded that seamount faunas tended to be dominated by species inhabiting the nearest continental areas and this is true of this decapod collection. Worldwide seamount faunas are significantly endemic with about 15% of species being new but a greater percentage in relatively unexplored southern Australia is expected.

Many of the species had been previously collected on the southeastern Australian slope but the two most frequently-occurring had not. These are the crab, *Trichopeltarion* sp. MoV2678 and one of the squat lobsters, *Munida* sp. MoV2672, and could be interpreted as seamount endemics. Most of the others not previously recorded occurred in very few samples. Given the high proportion of known species shared with the continental slope and the dispersive reproductive strategies of decapods, chances of the occurrence of the rare species on the nearby continental slope cannot be discounted.

In the following report each species has been given a MoV number, a unique specific code on the Museum of Victoria TAXA database. The code is used by the Museum in all ecological studies requiring consistent identifications. It is used as species epithet for undescribed (or unidentifiable) species. We discuss for each species or higher taxon its known distribution and give some important references for its identification. In an appendix all species are listed with the station numbers, counts and museum registration numbers. Most material has been retained in the Museum of Victoria but representative specimens are returned to the Tasmanian Museum.

Table 1. Taxonomic arrangement of 36 species from seamount samples.

Order	Family	Species	No. of stations
Stenopodidea	Spongicolidae	*Spongicaris* sp. MoV2682	3
Caridea	Crangonidae	*Paracrangon* sp. MoV2713	1
	Hippolytidae	*Eualus* sp. MoV2681	12
		Lebbeus sp. MoV2679	1
		Lebbeus sp. MoV2680	1
		Leontocaris amplectipes Bruce, 1990	9
		Leontocaris bulga Taylor & Poore, 1998	1
		Leontocaris yarramundi Taylor & Poore, 1998	3
		Merhippolyte chacei Kensley, Tranter & Griffin, 1987	6
		Thoralus sp. MoV2769	1
	Nematocarcinidae	*Lipkius holthuisi* Yaldwyn, 1960	11
		Nematocarcinus sigmoides Macpherson, 1984	7
	Oplophoridae	*Acanthephyra quadrispinosa* Kemp, 1939	2
Anomura	Chirostylidae	*Gastrotychus* sp. MoV2714	1
		Uroptychus australis (Henderson, 1888)	7
		Uroptychus sp. MoV2676	2
		Uroptychus sp. MoV2720	2
	Galatheidae	*Munida* sp. MoV2672	28
		Munida sp. MoV2673	14
		Munida sp. MoV2674	9
		Munida sp. MoV2721	2
		Munidopsis sp. MoV2715	1
		Munidopsis sp. MoV2677	3
	Paguridae	*Michelopagurus* sp. MoV2684	9
		Propagurus deprofundis (Stebbing, 1924)	3
		pagurid sp. MoV2683	13
	Parapaguridae	*Parapagurus* sp. MoV2686	1
		Sympagurus dimorphus (Studer, 1883)	2
		Sympagurus villosus Lemaitre, 1996	1
	Lithodidae	*Lithodes longispina* Sakai, 1971	2
		Neolithodes brodei Dawson & Yaldwyn, 1970	?
		Paralomis sp. MoV2716	6
		Paralomis sp. MoV2717	1
Brachyura	Goneplacidae	*Carcinoplax meridionalis* Rathbun, 1923	1
	Atelecyclidae	*Trichopeltarion* sp. MoV2678	19
Palinura	Polychelidae	*Polycheles* sp. MoV2719	1

ORDER STENOPODIDEA

Family Spongicolidae

Spongicaris sp. MoV 2682

The genus was identified using Holthuis (1993). Only two species of this deep-water genus are known, one from New Zealand and one from South Africa (Bruce & Baba, 1973). The three specimens belong to neither described species. Deep-water spongicolids are believed to be associated with hexactinellid sponges but there is no indication of where these specimens lived.

ORDER CARIDEA

All families and genera were identified using Holthuis (1993) and species were compared with those in Gary C. B. Poore's manuscript on the decapods of southern Australia.

Family Crangonidae

Paracrangon sp. MoV2713

Only five species of this genus are known, all from the northern Pacific Ocean (De Man, 1920; Kubo, 1937; Ohe & Takeda, 1986). The two specimens belong to a new species close to the Japanese *P. okutanii* Ohe & Takeda, 1986 and is being described by Hanamura et al. (in press).

Family Hippolytidae

Eualus sp. MoV2681

Although there are more than 40 species of this genus described from the Pacific Ocean, this is the first recorded from Australian waters (Holthuis, 1947). No species exist in Museum of Victoria collections. It was not compared with known species.

Lebbeus sp. MoV2679

In this, the first of two species in the seamount collections, there is an epipod on the basis of pereopod 1 only. The only Australian species is *L. yaldwyni* Kensley, Tranter & Griffin, 1987 which is very different from this and the following species. Holthuis (1947) listed 15 world species.

Lebbeus sp. MoV2680

The second species of the genus has an epipod on the basis of pereopods 1–3.

Leontocaris Stebbing, 1905

Prior to this survey only four species were known, three from the northern hemisphere and a single specimen from Victorian waters (Bruce, 1990; Taylor & Poore, 1998). This material has uncovered further specimens of the Victorian species *Leontocaris amplectipes* Bruce, 1990 and two new species (Taylor & Poore, 1998).

Leontocaris amplectipes Bruce, 1990

Leontocaris amplectipes is the most common of the three species and its distribution now includes both the continental slope and Tasmanian seamounts.

Leontocaris bulga Taylor & Poore, 1998

Only the carapace and pereopods of one specimen was taken and the species has now been described as new. It is characterised by more than 19 dorsal teeth on the rostrum (Taylor & Poore, 1998).

Leontocaris yarramundi Taylor & Poore, 1998

Five specimens were taken and the species has now been described as new. It is characterised by three posterior teeth on abdominal somite 5 (Taylor & Poore, 1998).

Merhippolyte chacei Kensley, Tranter & Griffin, 1987

This species is one of five belonging to the genus *Merhippolyte*. It was previously known to occur off NSW at depths of 550–690 m. These specimens extend the known geographic range to include Tasmania and depth range to 1000 m.

Thoralus sp. MoV2769

A single specimen of shrimp was tentatively identified to *Thoralus*, a genus not previously recorded from this region.

Family Nematocarcinidae

The Nematocarcinidae are a diverse family of deepwater shrimps but are represented in these collections by only two species.

Lipkius holthuisi Yaldwyn, 1960

This species is the single representative of the monotypic genus *Lipkius.* It is recorded from depths of 400–1000 m in waters off NSW, Tas. and New Zealand. These specimens extend the known depth range to 1700 m.

Nematocarcinus sigmoides Macpherson, 1984

This southern species has been described and recorded in Australia previously by Hanamura (1989). It is common in Museum of Victoria collections from the continental slope.

Family Oplophoridae

The Oplophoridae are a diverse family of deepwater shrimps but are poorly represented in these collections.

Acanthephyra quadrispinosa Kemp, 1939

Only two specimens of this commonly recorded species were taken in the seamount samples. Kensley et al. (1987) reported on abundant material and briefly diagnosed the species.

ORDER ANOMURA

Family Chirostylidae

Baba (1988) provided a key to genera and many species from the western Pacific.

Gastroptychus sp. MoV2714

The unique specimen could not be identified using Baba (1988, 1991). It falls into a group of about five species from the South Pacific and Indian Oceans with a spinose abdomen but is none of those described. Another specimen has been collected from continental slope depths.

Uroptychus Henderson, 1888

Baba (1988) noted that there are 62 described species from the Indo-West Pacific. Only one of the three species found in the seamount collections could be identified.

Uroptychus australis (Henderson, 1888)

Uroptychus australis is the most common species of the genus in southern Australia at slope depths.

Uroptychus sp. MoV2676

The species keys in Baba (1988) to *U. nanophyes* McArdle, 1901 from Japan and Indonesia but differs in being broader and more spinose (Baba, 1981). The species also occurs on the Australian continental slope.

Uroptychus sp. MoV2720

The two specimens could not be identified using Baba's (1988) key to species from the Phillipines and vicinity. The carapace is as broad as long and smooth. The species also occurs on the Australian continental slope.

Family Galatheidae

Baba (1988) provided a key to genera and many species from the western Pacific.

Munida Leach, 1820

The genus *Munida* is exceptionally abundant at slope depths and with numerous species. Baba and colleagues have described dozens of very similar species, especially from the western Pacific, but none seems exactly the same as these seamount species.

Munida sp. MoV2672

This abundant new species belongs to the *Munida japonica* group of species but could not be identified using Baba (1988) or Macpherson & Baba (1993). It keys to *M. dispar* on the basis of the inner distal spine on the peduncle or antenna 1 being shorter than the outer but the carapace is very different. It appears not to be present on the Australian continental slope.

Munida sp. MoV2673

Like the previous species, this one belongs to the *Munida japonica* group of species but could not be identified using Baba (1988) or Macpherson & Baba (1993). It too keys to *M. dispar* on the basis of the inner distal spine on the peduncle or antenna 1 being shorter than the outer. It differs from *M.* sp. MoV2672 in the shape of the anterolateral corner of the carapace, the upturned rostrum, and the much shorter chelae. The same species occurs in Museum of Victoria continental slope material.

Munida sp. MoV2674

Like the previous two species, this one belongs to the *Munida japonica* group of species but could not be identified using Baba (1988) or Macpherson & Baba (1993). It has stout and setose chelipeds, lacks spines on abdominal somite 2 and has a short stout rostrum. The same species occurs in Museum of Victoria continental slope material.

Munida sp. MoV2766

This is another species of the *Munida japonica* group of species but could not be identified. It has setose chelipeds and spines on abdominal somite 2. The same species occurs in Museum of Victoria continental slope material.

Munidopsis Whiteaves, 1874

The four specimens collected belong to two different species, neither previous collected from the Australian slope. Only four species have been recorded from the slope until now by the Museum of Victoria but each is known from only one or two specimens. Although Baba (1988) stated there were 153 species world-wide, none is common probably because of the depths inhabited.

Munidopsis sp. MoV2715

Munidopsis sp. MoV2677

Family Paguridae

The taxonomy of hermit crabs of the family Paguridae is notoriously difficult and we have sent specimens to Dr P. McLaughlin who is working on other material from this region and from New Zealand. Her identifications and comments are included.

Michelopagurus sp. MoV2684

The new species belongs to a genus described by McLaughlin (1997) for four species from slope and abyssal depths of the southwest Pacific and Atlantic Oceans.

Propagurus profundis (Stebbing, 1924)

The species has been previously recorded on the southern Australian slope.

Pagurid sp. MoV2683

The new species belongs to a new genus of considerable phylogenetic interest.

Family Parapaguridae

Systematics of the Australian Parapaguridae, a deepwater family of hermit crabs, has been studied by Lemaitre (1989, 1996). More than 21 species are known.

Parapagurus sp. MoV2686

The species could not be identified and will be sent to R. Lemaitre.

Sympagurus dimorphus (Studer, 1883)

The species is widespread in the southern hemisphere from 22°S to 57°S and from 91 m to 1995 m (Lemaitre, 1996). It has been reported many times from southern Australia.

Sympagurus villosus Lemaitre, 1996

This species was previously known from only three specimens from Queensland at 490–695 m depth (Lemaitre, 1996).

Family Lithodidae

Genera of Lithodidae can be identified using Dawson & Yaldwyn (1985) or Macpherson (1988a).

Lithodes longispina Sakai, 1971

Lithodes longispina was described from Japan but has been reported from New Zealand and southeastern Australia (Dawson, 1989).

Neolithodes brodei Dawson & Yaldwyn, 1970

No material was received by the Museum of Victoria the species but an unmistakable photograph of the species appeared in Johnson (1997). The species occurs around 1000 m in New Zealand, Tas. and the central Great Australian Bight.

Paralomis sp. MoV2716

Paralomis birsteini was described on the basis of four specimens from the Antarctic south of New Zealand by Macpherson (1988b). The seamount material may belong to the same species but there are small differences in armature of the rostrum, scaphocerite and walking legs that suggest another species. Comparison with type material would be necessary to guarantee identification.

Paralomis sp. MoV2717

Paralomis phrixa was described on the basis of three females from the southeastern Pacific by Macpherson (1992). The seamount material may belong to the same species but there are small differences in armature of the rostrum, scaphocerite and walking legs that suggest another species. Comparison with type material would be necessary to guarantee identification.

ORDER BRACHYURA

Richer de Forges (1992, 1993) recorded 12 species of crabs from seamounts in the northern Tasman Sea. Most belong to the family Majidae with one species each in Homolidae, Hymenosomatidae and Geryonidae. They are typical deepwater taxa and some also occur on the southern Australian slope. Only two species were found on the Tasmanian seamounts and belong to other families.

Family Goneplacidae

Carcinoplax meridionalis Rathbun, 1923

Carcinoplax meridionalis is a relatively rare deep-water crab from southeastern Australia. It was figured by Hale (1927). Only a single specimen was collected.

Family Atelecyclidae

The Atelecyclidae is a rarely encountered family. Sakai (1976) provided a convenient definition and key to some genera.

Trichopeltarion sp. MoV2678

One species of *Trichopeltarion, T. wardi,* was described from Australia by Dell (1968) but this species differs in many features. The species is the only common crab in the seamount collections. Representative specimens are with Peter Davie, Queensland Museum, Brisbane.

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Appendix: Species records

Records for each taxon are cruise SS01/97 station number, museum, registration number, and number of specimens in brackets. NMV is Museum of Victoria and TM, Tasmanian Museum.

Order Stenopodidea

Family Spongicolidae

Spongicaris sp. MoV2682. Stn 15, TM G3600 (1); stn 40 (NMV, J41275 (1); stn 58 (NMV (J41276 (2)

Order Caridea

Family Crangonidae

Paracrangon sp. MoV2713. Stn 37, NMV J41279 (2).

Family Hippolytidae

Eualus sp. MoV2681. Stn 15, NMV J41269 (20); stn 28, NMV J41270 (6); stn 34, NMV J44793 (2); stn 40, NMV J41271 (8); stn 41, NMV J41261 (4); stn 47, NMV J41262 (6); stn 49, NMV J41263 (3); stn 57, NMV J41264 (1); stn 58, NMV J41265 (4); stn 59, NMV J41266 (4); stn 67, NMV J41267 (7); stn 69, NMV J41268 (15).

Lebbeus sp. MoV2679. Stn 15, NMV J41253 (1).

Lebbeus sp. MoV2680. Stn 37, NMV J41252 (1).

Leontocaris amplectipes Bruce, 1990). Stn 15, NMV J41251 (1); stn 34, NMV J44790 (4); stn 40, NMV J41247 (5); stn 40, TM G3952 (4); stn 50, NMV J39937 (1); stn 52, NMV J41248 (1); stn 57, NMV J41249 (2); stn 58, NMV J41250 (1).

Leontocaris bulga Taylor & Poore, 1998. Stn 69, NMV J39938 (1).

Leontocaris yarramundi Taylor & Poore, 1998. Stn 40, NMV J41273 (1); stn 41, NMV J41272 (1); stn 57, NMV J41274 (1); stn 57, TM G3951 (2).

Merhippolyte chacei Kensley, Tranter & Griffin, 1987. Stn 03, NMV J41259 (3); stn 36, NMV J41258 (6); stn 47, NMV J41255 (1); stn 50, NMV J41260 (3); stn 52, NMV J41257 (5); stn 56, NMV J41256 (6).

Thoralus sp. MoV2769. Stn 37, NMV J41659 (1).

Family Nematocarcinidae

Lipkius holthuisi Yaldwyn, 1960. Stn 03, NMV J44753 (24); stn 06, NMV J44756 (3); stn 15, NMV J44751 (4); stn 23, NMV J44755 (1); stn 28, NMV J44754 (2); stn 34, NMV J44792 (5); stn 50, NMV J44750 (3); stn 52, NMV J44749 (27); stn 55, NMV J44747 (135); stn 56, NMV J44748 (105); stn 57, NMV J44752 (10).

Nematocarcinus sigmoides Macpherson, 1984. Stn 15, NMV J41658 (2); stn 35, NMV J41650 (2); stn 40, NMV J41651 (2); stn 43, NMV J41652 (14); stn 58, NMV J41653 (1); stn 62, NMV J41657 (1); stn 67, NMV J41654 (1); stn 69, TM — (1); stn 70, NMV J41655 (1).

Family Oplophoridae

Acanthephyra quadrispinosa Kemp, 1939. Stn 41, TM — (1); stn 59, NMV J44656 (1).

Order Anomura

Family Chirostylidae

Gastroptychus sp. MoV2714. Stn 14, TM G3589 (1).

Uroptychus australis (Henderson, 1888). Stn 14, TM G3592 (1); stn 15, NMV J44739 (2); stn 50, NMV J44741 (19); stn 52, TM G3668 (1); stn 56, NMV J44742 (25); stn 56, NMV J39631 (4); stn 57, NMV J44740 (3); stn 58, NMV J44738 (1).

Uroptychus sp. MoV2676. Stn 36, NMV J44743 (1); stn 36, NMV J39633 (2); stn 36, TM G3661 (1); stn 38, NMV J44744 (1).

Uroptychus sp. MoV2720. Stn 14, TM G3591 (1); stn 34, TM G3606 (1).

Family Galatheidae

Munida sp. MoV2672. Stn ?, NMV J41618 (105); stn 3, NMV J41606 (12); stn 3, TM G3578 (2); stn 6, NMV J41611 (1); stn 12, NMV J41607 (4); stn 15, NMV J41615 (135); stn 17, NMV J41602 (6); stn 28, NMV J41609 (170); stn 28, TM G3658 (2); stn 34, NMV J41608 (57); stn 35, NMV J41610 (5); stn 36, NMV J40601 (130); stn 37, NMV J41616 (35); stn 40, NMV J41593 (273); stn 41, NMV J41617 (233); stn 43, NMV J41592 (69); stn 47, NMV J41614 (126); stn 48, NMV J41599 (25); stn 49, NMV J41595 (34); stn 50, NMV J41600 (4); stn 51, NMV J41597 (18); stn 52, NMV J41612 (3); stn 56, NMV J41594 (5); stn 57, NMV J41605 (128); stn 58, NMV J41591 (67); stn 59, NMV J41598 (21); stn 62, NMV J41603 (116); stn 67, NMV J41596 (53); stn 69, NMV J41604 (148); stn 70, NMV J41613 (18).

Munida sp. MoV2673. Stn 15, NMV J41576 (7); stn 17, NMV J41581 (7); stn 28, NMV J41577 (7); stn 34, NMV J41575 (3); stn 37, NMV J41571 (8); stn 40, NMV J41572 (28); stn 43, NMV J41584 (9); stn 55, NMV J41583 (1); stn 58, NMV J41579 (3); stn 59, NMV J41573 (2); stn 62, NMV J41574 (2); stn 67, NMV J41580 (2); stn 69, NMV J41578 (5); stn 70, NMV J41582 (3).

Munida sp. MoV2674. Stn 15, NMV J41621 (2); stn 17, NMV J41585 (7); stn 23, NMV J41619 (4); stn 37, NMV J41588 (1); stn 40, NMV J41590 (2); stn 43, NMV J41589 (3); stn 62, NMV J41622 (2); stn 67, NMV J41586 (5); stn 69, NMV J41587 (1).

Munida sp. MoV2766. Stn 06, TM G3581 (1); stn 44, NMV J41620 (1).

Munidopsis sp. MoV2715. Stn 23, TM G3601 (1).

Munidopsis sp. MoV2677. Stn 12, NMV J44745 (1); stn 15, TM G3596 (1); stn 41, NMV J44746 (1).

Family Paguridae

Michelopagurus sp. MoV2684. Stn unknown, NMV J44810 (4); stn 03, NMV J44807 (5); stn 36, NMV J44805 (3); stn 36, TM G3665 (1); stn 37, NMV J44803 (5); stn 43, NMV J44802 (1); stn 50, NMV J44808 (1); stn 55, NMV J44806 (3); stn 56, NMV J44804 (7); stn 57, NMV J44809 (1).

Propagurus deprofundis (Stebbing, 1924). Stn 03, NMV J44812 (2); stn 56, NMV J44813 (4); stn 57, NMV J44811 (1).

Pagurid sp. MoV2683. Stn not known, NMV J44801 (1); stn 03, NMV J44767 (1); stn 06, NMV J44766 (1); stn 15, NMV J44760 (20); stn 15, TM G3595 (1); stn 28, NMV J44762 (4); stn 34, NMV J44759 (3); stn 37, NMV J44757 (3); stn 40, NMV J44758 (12); stn 41, NMV J44765 (9); stn 56, NMV J44764 (1); stn 58, NMV J44768 (1); stn 59, NMV J44763 (1); stn 62, NMV J44761 (1).

Family Parapaguridae

Parapagurus sp. MoV2686. Stn 55, NMV J44814 (1).

Sympagurus dimorphus (Studer, 1883). Stn 03, NMV J44816 (1); stn 55, NMV J44815 (1).

Sympagurus villosus Lemaitre, 1996. stn 57, NMV J44817 (1).

Family Lithodidae

Lithodes longispina Sakai, 1971. Stn 57, NMV J44009 (1 with bopyrid isopod parasite); stn 49, NMV J44011 (1).

Paralomis sp. MoV2716. Stn 15, NMV J44013 (2); stn 22, NMV J44020 (1); stn 35, NMV J44019 (1); stn 40, NMV J44018 (1); stn 49, NMV J44016 (1); stn 69, NMV J39632, J44017 (2).

Paralomis sp. MoV2717. Stn 36, NMV J44012 (1).

Order Brachyyura

Family Goneplacidae

Carcinoplax meridionalis Rathbun, 1923. Stn 2, TM G3714 (1).

Family Atelecyclidae

Trichopeltarion sp. MoV2678. Stn 14, TM G3590 (2); stn 15, TM G3593, G3594 (2); stn 15, NMV J41294, J41295 (33); stn 23, NMV J41283 (1); stn 28, NMV J41289 (16); stn 34, NMV J44791 (10); stn 36, TM G3663 (1); stn 36, NMV J41278 (2); stn 37, QM = NMVJ41293 (9); stn 37, NMV J41285 (15); stn 40, NMV J41292 (16); stn 41, NMV J41277 (9); stn 43, NMV J41291 (6); stn 47, NMV J41282 (7); stn 48, NMV J41298 (1); stn 57, NMV J41287 (2); stn 59, QM = NMV J41297 (13); stn 62, WAM = NMV J41290 (3); stn 67, NMV J41284 (20); stn 69, NMV J41286, J41288 (24); stn 70, NMV J41281, J41296 (14); stn 58, NMV J41280 (3).

Order Palinura

Family Polychelidae

Polycheles sp. MoV2719. stn 45, NMV J44032 (1).

EVALUATION OF TASMANIAN BRISINGIDANS FROM TASMANIAN SEAMOUNTS

Overall Summary of Taxa

The following names follow recent taxonomic changes established by Mah (1998). This list summarizes the taxa found in the collection of 26 lots sent on loan to me from the Museum of Victoria from a collection of Tasmanian Seamount invertebrates. Some of the counted lots below are from mixed lots of up to 3 different taxa.

Brisingasteridae

Novodinia cf. *australis* H.L. Clark, 1916 (2 lots)

Novodinia sp.juveniles (4 lots)

Identication of *Novodinia* spp. is tentative because taxonomy of several of the Pacific *Novodinia* has been neglected for decades. The original and only description of *N. australis* describes only plesiomorphic characters of the genus *Novodinia* and not many useful diagnostic characters for species. The only distinguishing character, 4 madreporites, seems unlikely. Thus positive id can only be made after the holotype has been examined.

The juveniles are barely recognizable only on the basis of the uniquely shaped Mouth Angle Plates that "block off" the ambulacral furrow from the actinostome. These are valuable specimens in that they provide valuable insight into a possible paedomorphic event in the Freyellidae.

Brisingidae

Brisinga sp. (1 lot)

Freyellidae

Freyella sp. (5 lots of arms only)

Many of the specimens tentatively ident. as *Freyella* appear to be made up only of arm fragments. None have been reliably connected with a disc. Thus positive id is uncertain.

Hymenodiscidae

n.gen. n. sp. (total 15 lots)

This species is a small hymenodiscid with skeletal arches on the arms bearing several minute spinlets. Skin is lacking between these arches on the arms. This does not seem to immediately correspond with any known genus or species of brisingidan. It is recognized as a species new to science and will be described as time and opportunity permits. Its inclusion into the phylogenetic investigation of the Brisingida is also forthcoming.

Of all the specimens, this species seems to be the most numerous of the brisingidans in the Tasmanian collection. Several excellent specimens with intact discs and arms are present.

OVERALL SUMMARY:

It is only within the last decade that the study of deep-sea biology has become well understood. Biodiversity in this, the largest of ALL the habitats on Earth, is thought to rival if not exceed that of the terrestrial tropical rain forest.

Novodinia australis is not known to have been collected anytime since its original description by H.L. Clark. This makes it among the most rare of deep-sea asteroids. Juvenile specimens of *Novodinia* are also seldom seen. Different ontogenetic stages can help us to understand the evolution of the Brisingida and deep-sea asteroidea.

The new genus and species are also VERY significant because there is no evidence that this species lives anywhere else BUT on Tasmanian seamounts. No known previous records exist for brisingidans that even resemble this species outside of this collection.

It is hoped that extensive resources and a maximum effort will go into conservation of this unique marine habitat. It is imperative that we treat preservation of the pristine nature of the deep-sea and its unexplored and wonderful biodiversity as crucial priortity.

Respectfully Submitted,

Christopher L. Mah

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Ophiuroids from the Tasmanian seamounts

Tim O'Hara

Museum of Victoria

Introduction

The large collection of ophiuroids from the Tasmanian seamounts contains 3327 individuals in 306 species lots. The condition of the material is average to poor, many specimens having been macerated presumably by the action of moving coral and rocks in the epibenthic sleds. Nevertheless the collection is very significant, clearly representing a faunal assemblage that has not been discovered elsewhere around the continent of Australia.

The material has been sorted and identified to species level. This was a difficult process due to the condition of the material and the presence of numerous closely related species. Each specimen has been examined at least once with the aid of a dissecting microscope. The material was then compared to specimens collected from around the continental slope of southern Australia, Australia's subantarctic Islands, the Australian Antarctic Territory and throughout the Tasman Sea. Several forms could not be identified with currently known species and may be new to science. The bulk of the material has been registered and added to the Museum of Victoria's collection. A representative sample has been placed aside for the Tasmanian Museum.

The deep-water ophiuroid fauna is relatively well known compared to other taxonomic groups. In contrast to other taxonomic groups, the trend is recent echinoderm systematics has been to synonymise regional forms into cosmopolitan species. This reflects the slow rate of evolutionary change within echinoderms and their conservative body plan. Many regional forms cannot be distinguished from each other using traditional qualitative characters. However, it is debatable whether these are cosmopolitan species or a series of sibling species that require differentiation by statistical comparison of large samples from each population, or differentiation using molecular or life history data. Many of the current species brood their young increasing the likelihood of reproductive isolation.

Two factors set this fauna apart from those that occur elsewhere in Australia.

- It is dominated by filter-feeding species of the family Ophiacanthidae. Ophiacanthids are common in the deep sea, however, the abundance and diversity that occurs in these samples is at least an order of magnitude greater that other Australian slope samples I have examined. Many of the species from the other families represented also appear to be filter feeders. Conversely the diversity of infaunal species is low.
- The Tasmanian seamount fauna has a significant subantarctic component. This is not surprising given that the subantarctic convergence runs through the area. Several species have not been previously reported from Australia.

Some other facts are worth noting.

- There is some indication that the fauna on the shallow seamounts is different from the deeper seamounts. There is not much material from the shallow fished seamounts but the species that were collected (eg *Ophiothrix aristulata*) are similar to those collected on the upper slope along eastern Bass Strait and Tasmania at similar depths.
- Different ophiuroids dominate on different seamounts even among those from similar depth strata. Dory Hill could be named "spectabilis" hill because of the numbers of *Ophiacantha spectabilis* that occur in sample 47. Seamount "V" has large numbers of *Ophiomitrella* sp MoV 2726 and *Ophiura* sp MoV 2728 (stns 67, 69 & 70)
- A number of species are found epizoically on sessile invertebrates (eg corals, gorgonians). This includes *Astrothorax waitei*, *Ophiocreas sibogae*, *Ophiacantha yaldwyni*, *Ophiomitrella conferta*, and *Ophiurothamnus stultus*. *A. waitei* is also found regularly on crinoids (see specimen TM 2369). In common with the Southern Ocean, there are few euryalids (basket stars) in the collection.
- There are not many small specimens in the collection. There have been numerous juveniles in other deep sea samples I have identified. Presumably the lack of smaller specimens is an artefact of the collection and sorting methods.
- There were many ophiuroids supposedly from stn "41" (a trapline). This seems unlikely. It is more likely that these specimens are from stn "42" which is described as having ophiuroids in the cruise report. In this report they are listed under station 42.
- There were many brisingid (asteroid) arms and discs amongst the ophiuroid material. Interpretation of the wet weight measured on the cruise will have to be qualified in this regard.

Class OPHIUROIDEA

Order EURYALIDA

Family Asteronychidae

Asteronyx loveni Müller & Troschel, 1842 MoV 1967

This is a common epizoic cosmopolitan species, known from depths of 100-4700 m. In Australia it is known right around the southern Australia slope.

Scientific name	Station	Registration number	Number collected
Asteronyx loveni	57	TM	1
Asteronyx loveni	67	MoV F82609	1

Family Asteroschematidae

Ophiocreas sibogae Koehler, 1904 MoV 1974

A common deep sea epizoic species around Australia, New Zealand and Indonesia, 90-1089 m

Scientific name	Station	Registration number	Number collected
Ophiocreas sibogae	15	TM	1
Ophiocreas sibogae	69	MoV F82608	1

Family Gorgonocephalidae

Astrothorax waitei (Benham, 1909) MoV 1997

A simple-armed basket star known from eastern Australia, New Zealand, and South Africa, 73-1005 m.

Scientific name	Station	Registration number	Number collected
Astrothorax waitei	40	TM H2349	1
Astrothorax waitei	42	MoV F82604	1
Astrothorax waitei	50	MoV F82606	1
Astrothorax waitei	52	TM H2369	1
Astrothorax waitei	52	MoV F82607	1
Astrothorax waitei	56	TM H2358	1
Astrothorax waitei	56	MoV F82605	4

Gorgonocephalus cf *pustulatum* (Clark, 1916) MoV 2534

A basket star with branched arms known from deep water off SE Australia, New Zealand, South Africa and New Zealand, 180-751 m. The seamount specimen does not exactly match the description of this species and appears intermediate between it and *G. dolichodactylus* Doderlein, 1911 known from eastern Australia and the SW Pacific.

Scientific name	Station	Registration number	Number collected
Gorgonocephalus pustulatum	69	TM H2375	1

Order OPHIURIDA

Family Ophiomyxidae

Ophiomyxa australis Lütken, 1869 MoV 2549

A common Indo-Pacific species known from littoral depths to 1006 m.

Scientific name	Station	Registration number	Number collected
Ophiomyxa australis	3	TM	3
Ophiomyxa australis	15	MoV F82612	1
Ophiomyxa australis	28	MoV F82613	4
Ophiomyxa australis	28	TM H2363	1
Ophiomyxa australis	34	MoV F82614	2
Ophiomyxa australis	36	MoV F82615	6
Ophiomyxa australis	37	MoV F82616	5
Ophiomyxa australis	43	MoV F82617	2
Ophiomyxa australis	47	MoV F82618	1
Ophiomyxa australis	48	MoV F82619	2
Ophiomyxa australis	51	MoV F82620	3
Ophiomyxa australis	52	MoV F82621	1
Ophiomyxa australis	57	MoV F82622	7
Ophiomyxa australis	58	MoV F82623	1

Ophioscolex sp MoV 2721 MoV 2721

The genus *Ophioscolex* was previously known in Australia from one specimen off the South Australian Gulfs without a definite locality label. The material from station 55 is possibly a different species from that from station 57. More research is required to fully identify the species involved

Scientific name	Station	Registration number	Number collected
Ophioscolex sp. MoV 2721	55	MoV F82610	1
Ophioscolex sp. MoV 2721	57	MoV F82611	6
Ophioscolex sp. MoV 2721	57	TM	1

Family Ophiuridae

Ophiura flagellata (Lyman, 1978) MoV 1930

O. flagellata is a cosmopolitan species known from depths of 100-2330 m. In Australia it has been collected from the SE slope (800-1200 m). *O. flagellata* has been photographed swimming. *O. flagellata* is probably indicative of muddy sediments.

Scientific name	Station	Registration number	Number collected
Ophiura flagellata	47	MoV F82579	1
Ophiura flagellata	57	TM H2350	1
Ophiura flagellata	57	MoV F82580	8

Ophiura sp MoV 2728 MoV 2728

The seamount collection includes many examples of this species. It has not been recorded from the Tasman region previously and may be new to science. However, there are over 60 species of *Ophiura* and a detailed taxonomic search is required before its status can be confirmed. The long arms of this species possibly indicate a filter feeding habit which is unusual for this family.

Scientific name	Station	Registration number	Number collected
Ophiura sp MoV 2728	15	MoV F82582	26
Ophiura sp MoV 2728	17	MoV F82583	5
Ophiura sp MoV 2728	22	MoV F82584	2
Ophiura sp MoV 2728	23	MoV F82585	2
Ophiura sp MoV 2728	28	TM H2365	3
Ophiura sp MoV 2728	28	MoV F82586	18
Ophiura sp MoV 2728	34	MoV F82587	13
Ophiura sp MoV 2728	36	MoV F82588	1
Ophiura sp MoV 2728	40	MoV F82040	3
Ophiura sp MoV 2728	42	MoV F82589	5
Ophiura sp MoV 2728	43	MoV F82590	2
Ophiura sp MoV 2728	44	MoV F82591	2
Ophiura sp MoV 2728	58	MoV F82592	4
Ophiura sp MoV 2728	59	MoV F82593	15
Ophiura sp MoV 2728	62	MoV F82594	2
Ophiura sp MoV 2728	67	MoV F82595	99
Ophiura sp MoV 2728	69	MoV F82596	72

Ophiura (*Ophiuroglypha*) *jejuna* (Lyman, 1878) MoV 1931

O. jejuna is known from the Tasman Sea and the Atlantic at depths of 770-1860 m. In Australia it occurs on the SE slope in 770-1130 m. It has not been recorded from New Zealand or the Southern Ocean. A species of muddy substrates.

Scientific name	Station	Registration number	Number collected
Ophiura (Ophiuroglypha) jejuna	57	TM	2
Ophiura (Ophiuroglypha) jejuna	57	MoV F82665	5
Ophiura (Ophiuroglypha) jejuna	67	MoV F82666	1

Ophiura (*Ophiuroglypha*) *irrorata* (Lyman, 1878) MoV 2727

O. irrorata is a cosmopolitan species known from depths of 403-5870 m. It has been recorded from the SE Australian slope (930-2584 m), Macquarie Island, and New Zealand. A species of muddy substrates.

Scientific name	Station	Registration number	Number collected
Ophiura (Ophiuroglypha) irrorata	15	TM	1
Ophiura (Ophiuroglypha) irrorata	15	MoV F82667	3
Ophiura (Ophiuroglypha) irrorata	28	MoV F???	2
Ophiura (Ophiuroglypha) irrorata	34	MoV F82668	1
Ophiura (Ophiuroglypha) irrorata	36	MoV F82669	3
Ophiura (Ophiuroglypha) irrorata	47	MoV F82670	3

Ophiocten hastatum Lyman, 1878 MoV 1908

O. hastatum is another cosmopolitan species known from 1500-4700 m. In Australia it has been found from the SE slope at depths of 1500-2900 m.

Scientific name	Station	Registration number	Number collected
Ophiocten hastatum	22	MoV F82573	1
Ophiocten hastatum	43	MoV F82581	1
Ophiocten hastatum	62	MoV F82574	1
Ophiocten hastatum	65	MoV F82575	3
Ophiocten hastatum	67	MoV F82576	4
Ophiocten hastatum	67	TM	2
Ophiocten hastatum	69	MoV F82577	1
Ophiocten hastatum	70	MoV F82578	3

Ophiomisidium irene Fell, 1952 MoV 2729

O. irene is a species previously recorded only from New Zealand at depths of 238-1000 m. It has also been found on the SE Australian slope at depths of 1277-2900 m. *O. speciosum* Koehler, 1914 known from the Atlantic (547-1472 m) and the Southern Ocean is very similar and possibly synonymous.

Scientific name	Station	Registration number	Number collected
Ophiomisidium irene	28	MoV F82569	1
Ophiomisidium irene	28	TM	1
Ophiomisidium irene	40	MoV F82039	1
Ophiomisidium irene	58	MoV F82570	1
Ophiomisidium irene	67	MoV F82571	1
Ophiomisidium irene	69	MoV F82572	1

Ophiurolepis accomodata Koehler, 1922 MoV 2730

There has been no reported finding of *O. accomodata* since the holotype was collected off Maria Island in 2420 m. There is also one specimen in the Museum of Victoria from the mid-slope off NSW (1650-1750 m).

Scientific name	Station	Registration number	Number collected
Ophiurolepis accomodata	44	TM	1
Ophiurolepis accomodata	65	MoV F82673	2

Ophiurid sp MoV 2733 MoV 2733

This highly distinctive species does not appear to belong to a known genus. Unusually for this family, the dorsal disc surface is covered in large tubercules.

Scientific name	Station	Registration number	Number collected
Ophiurid sp MoV 2733	15	MoV F82598	4
Ophiurid sp MoV 2733	28	MoV F82599	2
Ophiurid sp MoV 2733	34	MoV F82600	3
Ophiurid sp MoV 2733	57	MoV F82601	1
Ophiurid sp MoV 2733	67	MoV F82602	1
Ophiurid sp MoV 2733	69	TM	1
Ophiurid sp MoV 2733	69	MoV F82603	2

Family Ophiolepididae

Ophiomusium lymani Thomson, 1873 MoV 1920

O. lymani is a cosmopolitan species known from 130-4000 m. It appears to feed by scavenging. It is one of the few species that prefers muddy substrata in the seamount collection.

Scientific name	Station	Registration number	Number collected
Ophiomusium lymani	63	TM	1

Family Ophiacanthidae

Subfamily Ophiacanthinae

Ophiacantha rosea Lyman, 1878 MoV 1944

Ophiacantha rosea has been reported from Australia, the Southern Ocean, Japan and the North Atlantic, from 270-1700 m. In Australia it is common on the SE slope. The seamount material is very diverse morphologically and may represent several species.

Scientific name	Station	Registration number	Number collected
Ophiacantha rosea	15	MoV F82392	96
Ophiacantha rosea	17	MoV F82393	10
Ophiacantha rosea	22	MoV F82394	2
Ophiacantha rosea	23	MoV F82395	6
Ophiacantha rosea	28	MoV F82396	18
Ophiacantha rosea	28	TM H2362	1
Ophiacantha rosea	34	MoV F82397	57
Ophiacantha rosea	37	MoV F82398	10
Ophiacantha rosea	40	MoV F82031	9
Ophiacantha rosea	42	MoV F82399	12
Ophiacantha rosea	43	MoV F82400	7
Ophiacantha rosea	45	MoV F82401	6
Ophiacantha rosea	47	MoV F82402	28
Ophiacantha rosea	48	MoV F82403	1
Ophiacantha rosea	49	MoV F82404	3
Ophiacantha rosea	50	MoV F82405	1
Ophiacantha rosea	58	MoV F82406	2
Ophiacantha rosea	59	MoV F82407	6
Ophiacantha rosea	62	MoV F82408	4
Ophiacantha rosea	67	MoV F82409	32
Ophiacantha rosea	69	MoV F82410	58
Ophiacantha rosea	70	MoV F82411	17

Ophiacantha vivipara Ljungman, 1870 MoV 2379

O. vivipara is a distinctive ophiacanthid previously known from Antarctic and subantarctic locations throughout the Southern Ocean. It can be recognised by its six arms and the tendency for juveniles to cling to the disk of the adult. This is the first record of this species from Australia.

Scientific name	Station	Registration number	Number collected
Ophiacantha vivipara	15	MoV F82356	164
Ophiacantha vivipara	17	MoV F82357	21
Ophiacantha vivipara	28	TM H2364	1
Ophiacantha vivipara	28	MoV F82358	77
Ophiacantha vivipara	34	MoV F82360	46
Ophiacantha vivipara	36	MoV F82359	7
Ophiacantha vivipara	37	MoV F82351	5
Ophiacantha vivipara	40	MoV F82029	93
Ophiacantha vivipara	42	MoV F823632	35
Ophiacantha vivipara	43	MoV F82363	9
Ophiacantha vivipara	47	MoV F82364	43
Ophiacantha vivipara	48	MoV F82372	7
Ophiacantha vivipara	49	MoV F82365	33
Ophiacantha vivipara	49	TM H2368	3
Ophiacantha vivipara	58	MoV F82366	13
Ophiacantha vivipara	59	MoV F82367	12
Ophiacantha vivipara	62	MoV F82368	18
Ophiacantha vivipara	67	MoV F82369	61
Ophiacantha vivipara	69	MoV F82370	119
Ophiacantha vivipara	70	MoV F82371	29

Ophiacantha denuispina Mortensen, 1936 MoV 2724

O. denuispina was described from off the Falkland Islands. The seamount specimens are the first to be found from Australia. The seamount material is quite diverse and could represent two species. Some specimens are obviously brooding their young.

Scientific name	**Station**	**Registration number**	**Number collected**
Ophiacantha denuispina	15	MoV F82373	33
Ophiacantha denuispina	22	MoV F82374	2
Ophiacantha denuispina	23	MoV F82375	2
Ophiacantha denuispina	28	MoV F82376	19
Ophiacantha denuispina	34	MoV F82377	12
Ophiacantha denuispina	36	MoV F82378	3
Ophiacantha denuispina	37	MoV F82379	5
Ophiacantha denuispina	40	MoV F82042	17
Ophiacantha denuispina	42	MoV F82380	9
Ophiacantha denuispina	43	MoV F82381	7
Ophiacantha denuispina	47	MoV F82382	23
Ophiacantha denuispina	48	MoV F82384	3
Ophiacantha denuispina	49	MoV F82383	11
Ophiacantha denuispina	57	MoV F82385	5
Ophiacantha denuispina	58	MoV F82386	5
Ophiacantha denuispina	59	MoV F82387	27
Ophiacantha denuispina	62	MoV F82388	30
Ophiacantha denuispina	67	MoV F82289	6
Ophiacantha denuispina	69	MoV F82390	13
Ophiacantha denuispina	70	MoV F82391	4

Ophiacantha spectabilis Sars, 1871 MoV 2723

O. spectabilis is a large distinctive ophiacanthid previously known from the North Atlantic, 145-1700 m. The seamount specimens are identical to published descriptions of the species.

Scientific name	Station	Registration number	Number collected
Ophiacantha spectabilis	15	MoV F82187	54
Ophiacantha spectabilis	28	MoV F82188	21
Ophiacantha spectabilis	34	MoV F82189	20
Ophiacantha spectabilis	37	MoV F82505	1
Ophiacantha spectabilis	40	MoV F82035	5
Ophiacantha spectabilis	43	MoV F82190	6
Ophiacantha spectabilis	47	TM	10
Ophiacantha spectabilis	47	MoV F82509	283
Ophiacantha spectabilis	59	MoV F82191	9
Ophiacantha spectabilis	67	MoV F82192	17
Ophiacantha spectabilis	69	MoV F82193	2
Ophiacantha spectabilis	70	MoV F82194	1

Ophiacantha sp MoV 2780 MoV 2780

This material is similar but not identical to *O. brachygnatha*, a common ophiuroid from the upper slope of southern Australia and New Zealand (200-1000 m). The disc spines tend to be larger with long thorny tips. *O. sollicita* known from 2420 m off Maria Island is also closely related. More research is required to fully identify the seamount specimens.

Scientific name	Station	Registration number	Number collected
Ophiacantha sp MoV 2780	22	MoV F82556	3
Ophiacantha sp MoV 2780	23	MoV F82557	1
Ophiacantha sp MoV 2780	28	MoV F82558	4
Ophiacantha sp MoV 2780	37	MoV F82559	1
Ophiacantha sp MoV 2780	42	MoV F82560	22
Ophiacantha sp MoV 2780	47	MoV F82561	1
Ophiacantha sp MoV 2780	49	MoV F82562	11
Ophiacantha sp MoV 2780	57	MoV F82563	1
Ophiacantha sp MoV 2780	58	MoV F82564	3
Ophiacantha sp MoV 2780	67	MoV F82566	5
Ophiacantha sp MoV 2780	69	MoV F82567	12
Ophiacantha sp MoV 2780	70	MoV F82568	1

Ophiacantha yaldwyni Fell, 1958 MoV 1949

O. yaldwyni is an epizoic ophiacanthid that is found rarely around SE Australia and New Zealand.

Scientific name	**Station**	**Registration number**	**Number collected**
Ophiacantha yaldwini	15	MoV F82510	2
Ophiacantha yaldwini	22	MoV F82511	2
Ophiacantha yaldwini	28	MoV F82512	2
Ophiacantha yaldwini	34	MoV F82513	1
Ophiacantha yaldwini	40	MoV F82043	1
Ophiacantha yaldwini	42	MoV F82514	2
Ophiacantha yaldwini	50	MoV F82515	1
Ophiacantha yaldwini	56	MoV F82516	3
Ophiacantha yaldwini	57	TM H2351*	3
Ophiacantha yaldwini	57	MoV F82517	1
Ophiacantha yaldwini	59	MoV F82518	1
Ophiacantha yaldwini	67	MoV F82519	1
Ophiacantha yaldwini	69	MoV F82520	2

Ophiacantha vepractica Lyman, 1878 MoV 2725

There are some seamount specimens that have the diagnostic characters of this species known from deep water off New Zealand. However, final determination requires direct comparison with type material.

Scientific name	Station	Registration number	Number collected
Ophiacantha vepratica	15	MoV F82521	3
Ophiacantha vepratica	34	MoV F82522	5
Ophiacantha vepratica	34	TM	2
Ophiacantha vepratica	40	MoV F82045	1
Ophiacantha vepratica	43	MoV F82523	1
Ophiacantha vepratica	58	MoV F82524	1
Ophiacantha vepratica	59	MoV F82525	1
Ophiacantha vepratica	62	MoV F82526	1
Ophiacantha vepratica	67	MoV F82527	4
Ophiacantha vepratica	69	MoV F82528	26
Ophiacantha vepratica	70	MoV F82529	3

Ophiacantha sp MoV 2731 MoV 2731

This material while clearly belong to the genus *Ophiacantha*, is unlike any species currently known from Australia, New Zealand or the Southern Ocean. It is characterised by the minute granules on the disc surface. It may be undescribed. However, there are approximately 140 known species and the material has not been checked as yet against all deep water Pacific or Indian Ocean species.

Scientific name	Station	Registration number	Number collected
Ophiacantha sp MoV 2731	15	MoV F82500	12
Ophiacantha sp MoV 2731	17	MoV F82506	2
Ophiacantha sp MoV 2731	28	MoV F82501	1
Ophiacantha sp MoV 2731	34	MoV F82502	3
Ophiacantha sp MoV 2731	40	MoV F82044	7
Ophiacantha sp MoV 2731	47	MoV F82507	2
Ophiacantha sp MoV 2731	59	MoV F82503	1
Ophiacantha sp MoV 2731	69	MoV F82508	2

Ophiacantha spp

Several ophiacanthids cannot be positively identified as they are juevniles or are in poor condition. They appear to fall into three groups.

Scientific name	Station	Registration number	Number collected
Ophiacantha sp seamount 1	25		2
Ophiacantha sp seamount 2	34		2
Ophiacantha sp seamount 2	70		1
Ophiacantha sp seamount 3	36		16
Ophiacantha sp seamount 3	58		1
Ophiacantha sp seamount 3	58		9

Subfamily Ophioplinthacinae

Ophioplinthaca incisa (Lyman, 1883) MoV 1958

O. incisa is a common species of the SE Australian upper slope. It has also been recorded from the Caribbean and probably from the Pacific Ocean. It is clearly distinguished by the deep "incision" into the disc at each interradius.

Scientific name	Station	Registration number	Number collected
Ophioplinthaca incisa	15	MoV F82420	13
Ophioplinthaca incisa	22	TM H2343	1
Ophioplinthaca incisa	28	MoV F82421	2
Ophioplinthaca incisa	35	TM	2
Ophioplinthaca incisa	37	MoV F82426	1
Ophioplinthaca incisa	40	MoV F82033	3
Ophioplinthaca incisa	42	MoV F82422	1
Ophioplinthaca incisa	43	MoV F82423	1
Ophioplinthaca incisa	50	MoV F82424	3
Ophioplinthaca incisa	50	TM	1
Ophioplinthaca incisa	57	MoV F82427	2
Ophioplinthaca incisa	57	TM H2351*	4

Ophioplinthaca sp MoV 2778 MoV 2778

Two specimens differ from *O. incisa* in having large smooth disc stumps and regular flattened oral papillae. They appear to represent an undescribed species.

Scientific name	Station	Registration number	Number collected
Ophioplinthaca sp MoV 2778	40	MoV F82034	1
Ophioplinthaca sp MoV 2778	67	MoV F82425	1

Ophiomitrella conferta Koehler, 1922 MoV 1954

A common epizoic ophiuroid known from southern Australia, throughout the Southern Ocean to the Falkland Islands, 40-2430 m. Found at Macquarie Island but not yet from New Zealand.

Scientific name	Station	Registration number	Number collected
Ophiomitrella conferta	14	TM	1
Ophiomitrella conferta	15	MoV F82488	2
Ophiomitrella conferta	28	MoV F82485	8
Ophiomitrella conferta	40	MoV F82030	9
Ophiomitrella conferta	42	MoV F82487	2
Ophiomitrella conferta	50	MoV F82491	3
Ophiomitrella conferta	56	MoV F82489	6
Ophiomitrella conferta	58	MoV F82486	5
Ophiomitrella conferta	69	MoV F82490	1

Ophiomitrella sp MoV 2732 MoV 2732

A species of *Ophiomitrella* that has not been previously reported from Australia, New Zealand, the Southern Ocean or the Northern Atlantic. Possibly undescribed.

Scientific name	Station	Registration number	Number collected
Ophiomitrella sp MoV 2732	17	MoV F82674	7
Ophiomitrella sp MoV 2732	22	MoV F82675	9
Ophiomitrella sp MoV 2732	23	MoV F82676	19
Ophiomitrella sp MoV 2732	37	MoV F82551	6
Ophiomitrella sp MoV 2732	40	MoV F82032	5
Ophiomitrella sp MoV 2732	42	MoV F82552	2
Ophiomitrella sp MoV 2732	67	MoV F82553	90
Ophiomitrella sp MoV 2732	69	MoV F82554	104
Ophiomitrella sp MoV 2732	70	MoV F82555	35

Ophiomitrella sp MoV 2779 MoV 2779

Scientific name	Station	Registration number	Number collected
Ophiomitrella sp MoV 2779	47	MoV F82499	1
Ophiomitrella sp MoV 2779	50		1

Ophiocamax applicatus Koehler, 1922 MoV 1951

O. applicatus was previously known only from the type series found off Maria Island in 2420 m. It is the largest ophiuroid in the collection.

Scientific name	Station	Registration number	Number collected
Ophiocamax applicatus	23	MoV F82413	1
Ophiocamax applicatus	37	MoV F82028	1
Ophiocamax applicatus	37	MoV F82414	1
Ophiocamax applicatus	43	MoV F82415	1
Ophiocamax applicatus	59	MoV F82416	1
Ophiocamax applicatus	67	MoV F82417	2
Ophiocamax applicatus	69	TM	1
Ophiocamax applicatus	69	MoV F82418	1
Ophiocamax applicatus	70	MoV F82419	1

Ophiurothamnus stultus (Koehler, 1904) MoV 1966

A common epizoic ophiacanthid known from the Philippines, Malaysia, the Northern Tasman Sea and off SE Australia from 742-1705 m.

Scientific name	Station	Registration number	Number collected
Ophiurothamnus stultus	15	MoV F82428	17
Ophiurothamnus stultus	15	TM	4
Ophiurothamnus stultus	34	MoV F82429	3
Ophiurothamnus stultus	40	MoV F82036	1
Ophiurothamnus stultus	42	MoV F82430	9
Ophiurothamnus stultus	49	MoV F82481	2
Ophiurothamnus stultus	57	MoV F82482	2
Ophiurothamnus stultus	69	MoV F82483	2
Ophiurothamnus stultus	70	MoV F82484	1

Subfamily Ophiotominae

Ophiolimna sp cf *bardii* (Lyman, 1883) MoV 2726

There is some uncertainty regrading the identify of these specimens. They are very similar to descriptions of *O. bardii* (Lyman, 1883) from the North Atlantic and North Pacific. However they are also similar to *Torpokovia antarctica* Lyman, 1879 from the Antarctic, New Zealand and Arctic, 180-1000 m, which is generally placed in the Ophiodermatidae. Further research may find all these forms to be conspecific. However, direct comparisons with other material will be necessary to confirm identifications. *Ophiolimna* has priority as a generic name.

Scientific name	Station	Registration number	Number collected
Ophiolimna sp cf bardii	15	MoV F82537	10
Ophiolimna sp cf bardii	22	MoV F82538	2
Ophiolimna sp cf bardii	23	MoV F82539	5
Ophiolimna sp cf bardii	28	MoV F82540	1
Ophiolimna sp cf bardii	34	MoV F82541	11
Ophiolimna sp cf bardii	37	MoV F82504	1
Ophiolimna sp cf bardii	40	MoV F82037	11
Ophiolimna sp cf bardii	42	MoV F82542	2
Ophiolimna sp cf bardii	43	MoV F82543	6
Ophiolimna sp cf bardii	44	MoV F82544	2
Ophiolimna sp cf bardii	47	MoV F82545	1
Ophiolimna sp cf bardii	59	MoV F82546	3
Ophiolimna sp cf bardii	65	MoV F82547	2
Ophiolimna sp cf bardii	67	MoV F82548	54
Ophiolimna sp cf bardii	69	MoV F82549	137
Ophiolimna sp cf bardii	70	MoV F82550	13

Family Ophiactidae

Ophiactis plana Lyman, 1869 MoV 2537

O. plana is widespread in temperate and tropical seas at depths of 100-1000 m. It has six arms and divides by asexually by fission. It is a common animal on the upper slope of SE Australia and is known from New Zealand.

Scientific name	Station	Registration number	Number collected
Ophiactis plana	42	MoV F82624	1

Ophiactis abyssicola Sars, 1861 MoV 2535

O. abyssicola is a cosmopolitan species known from depths of 125-4720 m. It is common on the slope off SE Australia (500-2900 m) and has been recorded from New Zealand and Antarctica.

Scientific name	Station	Registration number	Number collected
Ophiactis abyssicola	3	TM	1
Ophiactis abyssicola	15	MoV F82625	10
Ophiactis abyssicola	17	MoV F82626	1
Ophiactis abyssicola	28	MoV F82627	24
Ophiactis abyssicola	34	MoV F82633	15
Ophiactis abyssicola	36	MoV F82628	3
Ophiactis abyssicola	37	MoV F82629	7
Ophiactis abyssicola	40	MoV F82038	15
Ophiactis abyssicola	42	MoV F82630	40
Ophiactis abyssicola	43	MoV F82631	6
Ophiactis abyssicola	47	MoV F82632	36
Ophiactis abyssicola	49	MoV F82634	1
Ophiactis abyssicola	50	MoV F82635	5
Ophiactis abyssicola	51	MoV F82636	2
Ophiactis abyssicola	56	MoV F82638	2
Ophiactis abyssicola	57	MoV F82639	7
Ophiactis abyssicola	58	MoV F82637	3
Ophiactis abyssicola	59	MoV F82640	3
Ophiactis abyssicola	62	MoV F82661	3
Ophiactis abyssicola	67	MoV F82662	3
Ophiactis abyssicola	69	MoV F82663	7
Ophiactis abyssicola	70	MoV F82664	1

Family Amphiuridae

Amphioplus sp MoV 2722 MoV 2722

The*Amphioplus* material is similar but not identical to *A. pegasus* Baker, 1977 known from New Zealand. It is possibly a new species.

Scientific name	Station	Registration number	Number collected
Amphioplus sp MoV 2722	43	MoV F82530	1
Amphioplus sp MoV 2722	58	MoV F82531	1
Amphioplus sp MoV 2722	59	MoV F82532	1
Amphioplus sp MoV 2722	62	MoV F82533	2
Amphioplus sp MoV 2722	67	MoV F82536	1
Amphioplus sp MoV 2722	69	MoV F82534	5
Amphioplus sp MoV 2722	70	MoV F82535	1

Family Ophiotrichidae

Ophiothrix aristulata Lyman, 1879 MoV 2554

O. aristulata is known from Indo-West Pacific locations at depths of 65-650 m. In Australia it has been found from the upper SE slope. It can aggregate in very large numbers. In the current study it was only found on the shallow "Main Pedra" seamount.

Scientific name	Station	Registration number	Number collected
Ophiothrix aristulata	3	TM	5

Seamount Cruise (SS01/97), FRV *Southern Surveyor*, January 1997

Report on the Holothuroidea (Echinodermata)

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Knowledge of Australian Bathyal Holothurian Fauna

The eastern and south-eastern Australian bathyal holothurian fauna is moderately well known. The Australian Museum (AM) and the Museum of Victoria (MoV) hold extensive collections of holothurians from the eastern and south-eastern continental slope. Dr F.W.E. Rowe summarised the knowledge of the Australian holothurian fauna in the *Zoological Catalogue of Australia* (Volume 33, 1995). Dr Rowe reported six elasipod and 13 synallactid species for the continental slope. Subsequently this author has completed the determination of AM and MoV slope material. There are now 21 elasipod and 22 synallactid species known for the slope. The elasipod fauna is reported on by this author (O'Loughlin *in press*. Elasipod holothurians from the continental slope of Australia. *Echinoderms: San Francisco. Proceedings of the 9th International Echinoderm Conference*. Rotterdam: Balkema). A report on the synallactids is in preparation.

Holothurians collected by Seamount Cruise SS01/97

1. One specimen; Sta. 23; MoV F 80940

   Determination: Elasipodida Theel, 1882

   Laetmogonidae Ekman, 1926

   Laetmogone sp. nov.

   Remarks: Six *Laetmogone* species have been determined for the Australian slope. This specimen is in relatively good condition, and does not represent one of these six species. It has clearly recognisable characteristics which distinguish it from known *Laetmogone* species.

2. One specimen; Sta. 57; MoV F 80939

   Determination: Aspidochirotida Grube, 1840

   Synallactidae Ludwig, 1894

   Synallactes challengeri (Theel, 1886)

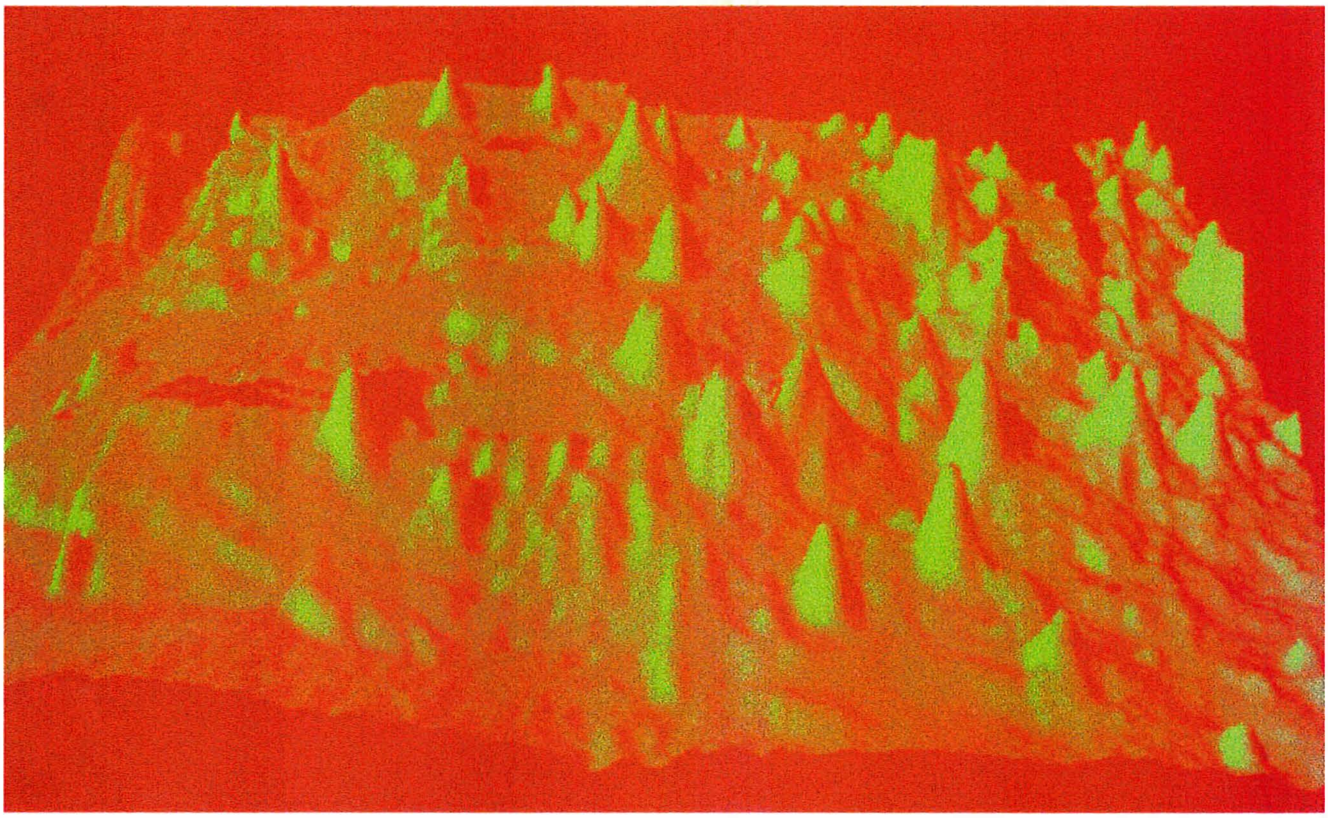
   Remarks: This specimen is in good condition. The species is known from Crozet, Marion and Prince Edward Islands, and from five stations off the New South Wales coast at depths of 820-1115 m.

Discussion

Three facts are worthy of note:

1. Only two specimens were taken from depths where bathyal holothurians would normally be abundant.
2. Only one of the 43 species of elasipod and synallactid holothurians known from the eastern continental slope of Australia was taken from the seamounts.

3. A new species of the relatively well known bathyal elasipod genus *Laetmogone* was found on the seamounts.



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