

CRUISE REPORT SS 01/97

January 20 – February 1, 1997

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M A R I N E R E S E A R C H

ITINERARY

Depart: Hobart 0900 Monday 20 January 1997
Return: Hobart 0700 Saturday 1 February 1997

AREA OF OPERATION

The cruise was carried out in waters off the south coast of Tasmania between latitudes 44°11'S – 44°26'S and longitudes 147°02'E – 147°23'E.

RESEARCH BACKGROUND

A recent CSIRO report to the Australian Nature Conservation Agency (ANCA) concluded that the seamounts fished by deepwater trawlers for orange roughy provide a distinct environment for a diverse sessile fauna, including several groups of deepwater corals, that appears to be extensively damaged by normal trawl operations and has extremely limited regenerative capacity. The invertebrate fauna is almost certainly characterised by a high degree of endemism, but details of its species composition, depth distribution and zoogeography are not known. A rare and distinct fish fauna also seems to be associated with this benthic environment.

Based in part on the recommendations of the CSIRO report, ANCA and AFMA recently agreed to establish an interim deepwater marine reserve to protect a group of newly-mapped and hitherto unfished seamounts south of Tasmania (Fig. 1). However because these seamounts peak at depths between 1200 and 1600 m and are therefore deeper than those that have been previously fished or sampled scientifically, the fauna associated with them is unknown. Consequently, their value in terms of conserving the fauna impacted by orange roughy trawling is not yet known.

The general aims of the cruise were, first, to assess in a preliminary manner the impact of trawling on the benthic community associated with southern Tasmanian seamounts based on photographic transects of fished, lightly fished, and unfished seamounts; and, second, to assess the conservation potential of the proposed marine reserve based on the species composition of the region's seamount fauna in relation to depth and position on the seamount.

CRUISE OBJECTIVES:

1. Conduct replicate photographic transects from the peak to the base of up to fourteen seamounts along a depth gradient of seamount peaks from 650 to >1600 m depth below the surface.
2. Conduct drop line and trap sampling to obtain samples of the motile invertebrate and fish fauna on these seamounts.
3. Conduct dredge sampling on the peaks, slopes and base of these seamounts to obtain faunal samples for species identification, particularly of the sessile macrofauna, and to assess qualitatively community composition.
4. Collect geological samples on an opportunistic basis, to aid in dating the seamounts (for a University of Tasmania project).

RESULTS

Cruise objectives were largely but not fully met, due to loss of a key equipment item, the deepwater photographic system, halfway through the cruise.

1. Replicate photographic transects were completed from the peak to the base of four seamounts — two outside the Interim Reserve, which have been heavily fished, and two in the Reserve, and presumably unfished. The camera system was then lost in 2300 m of water when the cable parted at the surface due to an unfortunate incident with the winch. Preliminary examination indicates that the fauna differs between the base of the hills and areas on the slopes and top. Areas of dense sessile fauna appear to be found only on the unfished hills.
2. Drop line fishing with 100 hooks on a line was carried out on four seamounts, at 724, 850, 1085 and 1511 m. Catch diversity was low, the fish caught comprising mainly black sharks (mostly *Etmopterus granulosus* and *Etmopterus* sp. B) and eels (*Diastobranchius capensis* and *Simenchelys parasiticus*). On all but one drop line set, samples of scavenging crustaceans were also obtained with a small-mesh crustacean trap set at the base of the drop line.
3. Epibenthic sled samples were obtained from the top, slope, and base of most of the fourteen seamounts selected for the survey (see Appendix 1 for list of stations). Eight of the seamounts have been trawled previously (approximately half being heavily fished). The remaining six were in the interim Reserve and presumably unfished. The peaks of the seamounts, which generally rose 300–500 m from the seafloor, were between 660 m and 1700 m beneath the sea surface. There were clear differences in faunal composition between the bases and other portions of the seamounts. Details of these differences should emerge from subsequent analysis.

The dominant members of the seamount faunal assemblages are the colonial stony coral *Solenosmilia variabilis* (whose mesh-like skeleton forms the substrate for many other organisms), several species of solitary corals, soft corals, several groups of gorgonacean corals including bamboo corals, gold and black corals, hydrocorals, bivalves, brachiopods, anemones, sponges, barnacles, polychaete and sipunculid worms, ophiuroids and galatheid crabs. Other more mobile invertebrates found in association with *Solenosmilia* include echinoids, asteroid, lithodid and brachyuran crabs, and a number of species of carid prawns. Significant quantities of other groups were also obtained, including several species of fish that appear to be characteristic of the seamount habitat. Large quantities of gooseneck barnacle plates were often obtained from the base of seamounts, but aggregations of living specimens were not obtained.

ADDITIONAL CRUISE ACHIEVEMENTS

- 1) Samples of several species of corals, including *Solenosmilia variabilis*, were collected for biochemical genetic analysis.
- 2) Rock samples were obtained to determine the age of the seamounts for Dr Tony Crawford (Geology Department, University of Tasmania) and Dr Neville Exon (Australia Geological Survey Organisation).

CRUISE NARRATIVE

20 JANUARY 1997

The *Southern Surveyor* left dock at 0900 h as scheduled. Four sea-trials of the epibenthic sled were carried out on the shelf to determine the optimum placement of the towing bridles and towing points, and to test the operation of the Furuno transducer. There was initially no signal from the Furuno, which was modified by locking the transducer. On the fourth trial, the transducer worked successfully when it was placed in the water with the pressure-activated switch locked into the 'on' position, and the pulse rate altered to be more appropriate to the operating depth. In the evening, a camera transect was carried out across Pedra Branca (Station 1) from east to west, going both up the hill and down; weather conditions were calm which facilitated the manoeuvre. 100 shots were taken but the strobe did not fire on deck though it test fired OK. The film indicated a relatively featureless rock bottom, with the main fauna restricted to depressions in the rock.

21 JANUARY

The photo-transects were continued with a south to north transect (Station 2) from 1100 m to the top of the hill. A change in wind direction to westerly forced the remainder of the photo-transect around to the west, to overlap part of the east to west transect. 150 shots were taken.

A series of demersal sled tows followed, starting at the top of the hill and proceeding to greater depths. Each tow occupied 5 minutes bottom time. The first tow (Station 3) collected about 80 kg of coral rubble, with a variety of decapod shrimps and echinoderms, mainly asteroids. This tow also picked up two slabs of rock, of about 30 kg each; these remained in the body of the sled, and there was no damage to the sled or to the net. Two further tows (Stations 4, 5) were carried out at 840 m, across the slope. These produced very small samples, with no rock or sediment. Inspection of the sled runners showed that the sled was towing evenly, strongly suggesting that the small quantities collected were due to there being little or no large epifauna on the hill at this depth.

The Furuno net sounder clearly showed the path of the sled to the bottom over the final 80–100 m of its descent, and the path of the sled at its departure, enabling accurate timing of time spent sampling on the bottom.

The fourth tow was at approximately 1140 m near the base of the seamount. The catch was small, consisting of a few urchins, rubble consisting largely of large barnacle plates, several fish and crabs.

The drop line was set over the top of the hill at 724 m, using 100 hooks. It fished from 1330–1600 h. The catch consisted entirely of sharks. A trap line was then set across Main Pedra at 1900 h. The set was good, the ground line being set directly over the crest of the hill. The traps were left to soak while the vessel proceeded to Sister 1 Hill.

The wind increased to 30–40 kt. Two camera drops were aborted due to the high drift speed causing excessive wire angle, such that the acoustic pinger saw no bottom even when sufficient wire was out that it should have been very close to bottom; also, changes in wind direction led to variable drift paths so the hill was missed both times. It was decided to switch to sled sampling.

22 JANUARY

The vessel remained hove to until about 2200 h when the wind dropped abruptly from 30–35 kt to 15–20 kt. Two camera drifts across Sister 1 was carried out but the pinger failed to indicate bottom and the drifts were aborted.

23 JANUARY

Three sled tows were then carried out on Sister 1, one near the top at about 820 m (Station 12), one at mid-depth at about 1000 m (Station 14) and one near the base of Sister 1, at about 1120 m (Station 15). Tow times were between 7 and 10 minutes. The tow in Station 12 was halted when a transient increase in wire tension occurred. On return to the surface, a broken foot chain and dented skid indicated that the sled had hit a subsurface rock; the weak-link securing chain was also broken on that side. The chains were then replaced. The remaining two tows on Sister 1 were made without incident.

Station 12 returned a small sample, mainly comprising a medium-size rock (about 10 kg) with some encrusting fauna, a few crustaceans and several fish, including an orange roughy. A small amount of coral rubble was taken with the catch. Station 14 consisted mainly of echinoderms and a few fish, again including an orange roughy. The sample from Station 15 was a large haul of coral rubble, including many live branching corals, decapod crustaceans and tubicolous polychaetes, with a few echinoids and crinoids.

At about 0600 h, the wind picked up rapidly to Force 8, from the west. A drop line was placed at the top of Sister 1 (Station 16), and we returned to Main Pedra to attempt to locate the markers for the traps placed there on 21 January. This was unsuccessful, and at 1145 h we proceeded to an unfished seamount (K1). We passed Sister 1 on the way, but did not locate the drop line markers.

The wind abated after 2000 h, and the sled was deployed on Hill K1. No signal was received from the Furuno but a sample of about 6 boxes was obtained. The species composition was similar to the last sled sample from Sister 1: mainly coral rubble, with some live corals, etc. mixed in. The sled was aimed at the summit, and the fishing master (R. Pepper) estimated that it had sampled from 1600 m depth. The sounder was working, but only a weak or even no signal is received by the vessel at warp lengths exceeding 3000 m.

The night was clear, so the vessel then returned to Sister 1 to find the drop line but without success. It then continued to Main Pedra to retrieve the traps.

24 JANUARY

The traps were found at about 0100 h. It required until about 0700 h to bring them in due to weight/catching on the bottom. The ground line had been cut in two by fishing activity, although the fishing vessel in the vicinity had been informed that we were setting traps across the hill. The trap contained 2 crinoids from 2 different families; the first time that our crinoid expert, Nadia Ameziane, had seen crinoids in a trap. There were substantial and diverse collections of scavengers (amphipods, isopods, ostracods). Several species of eel-like fishes were caught, including a muraenolepid that may be new to Australia and possibly new to science. There were also some interesting *Paralithodes* king crabs.

The vessel then proceeded into Recherche Bay to let off Nick Albers and pick up Damien Heran. The exchange was completed by 1300 h and the vessel then proceeded back to the ground. The weather had considerably ameliorated and good weather was forecast for the next few days. The original intention was to proceed to Sister 1 to carry out the camera transects and to pick up the drop line at night. However, two fishing boats were working on the hill so we returned to K1, where we carried out a good camera transect from the southwest to northeast, drifting at about 1 kt. The transect took us part way up the southwest slope, across the top, and down to the base. 140 shots were fired, generally at 2.5–2.1 m above bottom. The hill peaked at 1280 m and the base was at 1730 m. Over 2000 m of wire were required to reach bottom.

A second transect was attempted from north to south. However there was a strong current running to the west such that the vessel drifted off track slightly and the camera was pulled even further so it passed along the base of the seamount, and the run was aborted. It was decided to take advantage of the excellent weather conditions and the vessel proceeded to the next seamount, Hill D1.

25 JANUARY

By 1030 h, three sled samples had been obtained from D1, from the top (~1600–1700 m), middle (1800–1900 m) and near the base (2000–2100 m). These included only small samples of corals (particularly no soft corals). Three unusual predatory chitons were found. The deep tow led to a pin-up after 10 minutes towing and loss of the string of five floats.

Two photo-transects were completed, both starting near the top of the hill and going to the base, one going west and the other north. The vessel then returned to Hill K1, where a second photo-transect was completed, starting from near the top of the hill or just over the top and then proceeding to the base. The direction was down the westnorthwest slope.

At the end of the day, a second sled haul was carried out on K1, aimed at the summit (Station 28).

26 JANUARY

The summit haul on K1 produced a large sample (50% full net), dominated by *Solenosmilia*, with smaller quantities of solitary corals, and relatively large echinoderms. These included asteroids, ophiuroids and crinoids (with one large stalked crinoid). Small numbers of decapods, brachiopods and the bivalve *Propeamusium* were found.

A deep sled station at K1 (Station 29) was then carried out, flying the sled over the summit and the touching down to sample between 1600 and ~1725 m. Although a relatively large sample (~25% full net) was collected, this comprised almost entirely dead *Solenosmilia*. The only live animal found was a polychaete worm.

We then returned to Sister 1 to carry out photo-transects, picking up the buoys from the drop line left there on 23 January. They were found undamaged, 1.3 n mile from their original position; the rope end from the drop line appeared to have been cleanly severed. Two fishing boats had been operating in the vicinity.

A photo-transect of Sister 1 was made, drifting from north to south, down to a depth of 1600 m at the south end of the transect (Station 30, 101 frames taken). A second photo-transect was carried out under power, mostly following the 900–1000 m depth contour from southeast to northwest (Station 31).

A further photo-transect was carried out on Main Pedra, where there was probably only half a good transect (Station 32). The transect proceeded north to south over the top and 150 photos were obtained going up to the crest, over the top and down the south side.

The vessel then proceeded to Hill W¹ at 1800 m depth. A photo-transect was attempted (Station 33) but the pinger did not show bottom and the camera was raised to the surface. While bringing the gear on board, after control had passed to the winch by the A-frame, the system slammed into the block, the CTD cable broke, and the system was lost in 2300 m.

27 JANUARY

The vessel then proceeded to Hill U¹ and a sled tow was undertaken, aiming for the top of the hill, at about 1100 m (Station 34). This tow provided a large and diverse sample, dominated by *Solenosmilia*. The secondary dominants were solitary corals, sea fans, regular echinoids, ophiuroids and asteroids. A feature of this sample was a 13.4 kg cod, *Lepidion schmidti*. A second tow on Hill U¹ was made, at around 1250 m (Station 35). The sled became fast in mud, and required over 30 minutes to free. The sample was mainly soft mud and dead solitary coral, with a few shrimps and a large pancake echinoid, indicating a relatively level soft bottom. A third, deeper, tow was therefore not taken on this hill.

The vessel then proceeded to Hill J1, where three shots were carried out with the sled (Stations 36–38). Station 36 was aimed at the top of the hill, at about 1000 m. This provided a very large sample, dominated by *Solenosmilia*, but with moderate quantities of solitary corals and galatheids. A feature of this sample was the presence of a second species of colonial coral, and small numbers of four species of fish. Station 37 was taken on the southwest slope near the base of the hill, at 1350–1450 m. This provided a moderate sample, similar to Station 37 but with a greater quantity of sponges and asteroids as secondary dominants; small numbers of five species of fish were taken. Station 38, on the northeast slope of the hill at 1150–1400 m, provided a very small sample (this station was repeated subsequently — see Station 40).

The vessel then returned to Hill U¹ to shoot the drop line (1085 m). While this soaked, the vessel returned to Hill J1 to repeat the tow at mid-depth on the hill; the previous shot there had caught only about 3 specimens, although the shot on top of the hill had proved very rich. The repeat tow provided a large sample. The drop line was then retrieved following about a 4 h soak. The trap line was then set across Hill J1 at 2105 h (Station 41). The vessel then proceeded to Hill B1¹, and the sled shot was aimed for the top of the hill, at 1073 m (Station 42).

¹ The symbol ¹ denotes stations located in the Interim Protection Area.

28 JANUARY

Station 42 was dominated by colonial and solitary corals, but included a diverse mixture of ophiuroids, crabs and polychaetes. The sample also contained significant numbers of antipatharians, gorgonaceans, molluscs (both bivalves and gastropods), as well as brachiopods, asteroids and crinoids. Much of the colonial coral material contained sipunculids.

Two sled shots were then targeted at mid-depth and near the base of Hill B1®, at 1150–1550 m and 1400–1650 m, respectively. These collected a basically similar fauna, but progressively smaller and depauperate with greater depth. A small number of fish were caught at all three stations.

A sled shot was then carried out on top of Hill W®, the deepest hill on the station plan, peaking at ~ 1700 m (Station 45). A small sample was obtained, mainly of solitary corals and urchins. However, all but one pair of lead weights were lost and the sled probably did not sample properly.

After lunch, the vessel retrieved the traps from Hill J1, set on Station 41. Although the winds had increased to about 30 kt, the traps were retrieved without incident in under 3 hours. The catch consisted mainly of basketwork eels (*Diastobranchus capensis*) and urchins, which were aggregated in only a couple of traps.

Weights were welded in to replace the lost weights and the vessel proceeded to resample the top of Hill W® (Station 47). The sled caught on the bottom and was apparently towed backwards after the weak links were broken, severely denting the rear skids. The weights came undone because they were made of cast iron, which does not weld to steel. A cage was welded around the weights and the cod end replaced. The floats had broken off and were replaced with trawl floats rated to 1500 m.

29 JANUARY

Three sled tows were made on Dory Hill, at the top, mid-depth and bottom of the hill (Station 47 at 1000 m, Station 48 at 1100–1200 m and Station 49 at 1280–1400 m). Five sled tows were then made on Mackas Hill. Two shots were taken at or near the top, one at mid-depth and two near the base (Stations 53–54, at 936–1022 m). Station 50 was aimed at the top of the hill, at 665–800 m. The main part of the sample from this station comprised a few regular echinoids and a large, flat, fairly soft, rock that had been previously moved or overturned, presumably by commercial trawling. The rock had a moderate number of soft corals attached to one side, the other having some balanoid barnacles and galatheids burrowing in holes in the rock. This station was repeated, to check how typical the hill-top sample was, sampling from the top down the south side of the hill, at 665–900 m (Station 51). Station 52 was made at 750–900 m: it yielded mainly dead shell, with a few shrimp and solitary corals. The shots at the base (Stations 53–54, at 950–1025 m) were on the bottom for over 5 minutes but both yielded very little: the first, a handful of sponges; the second, dead barnacle shell and a few bits of coral, sponge, and starfish.

At 1630 h, the vessel proceeded to Andys hill. Three tows were carried out on the top (600–800 m), mid-slope (800 m) and at the base (900–1100 m). The samples from the two upper depths were small, containing almost no dead coral or other dead material. The samples were notable for their numbers of prawns, black and gold corals, and crinoids. The deep sample was mainly of dead colonial coral, notable for the complete lack of any living specimens, indicating that it was deposited there, either from the action of trawling or naturally. There were also several fish and several good specimens of bamboo and black corals.

30 JANUARY

The vessel steamed to Hill 38, a relatively low, fished hill at moderate depth, peaking at 1140 m from a base at about 1450 m. Only two sled hauls were made (Stations 58, 59). Station 58, at the top of the hill, collected 10 boxes of material with only 4.5 minutes bottom time, mainly *Solenosmilia* (mostly dead), accompanied by moderate quantities of sponges, solitary corals, sea fans, black corals and polychaetes, as well as other associated invertebrate fauna. Station 59, aimed at 1200–1400 m depth, collected a similar fauna, but with moderate quantities of solitary corals, polychaetes and regular echinoids. A feature of this sample was the occurrence of two specimens of *Cerianthus*.

Overnight, drop lines were set at Hill 38 (Station 60, 1140 m) and Hill V (Station 61, 1511 m). The vessel then steamed to Hill A1®, where two tows were completed on top (Station 62, 1200–1300 m) and mid-depth (Station 63, 1350–1500 m). The shallow tow contained many large blocks of colonial coral, evidence of the hill not having been fished. The mid-depth tow was aborted, however. The sled apparently flipped and only a very small sample was obtained. The vessel then proceeded to Hill V, where the drop line was retrieved. It contained only about a dozen *Diastobranchus capensis*. The vessel then steamed to Hill 38 to retrieve the other drop line, but it could not be found. After about 1.5 hours, the search was postponed until after dark, and the vessel returned to Hill A1, where a second attempt was made to trawl at mid-depths (Station 64). The ground was very rough and undulating. The sled hooked up in less than 5 minutes and was retrieved after having been towed sideways over the bottom. There was no sample other than a single anemone. The station was abandoned as too rough to be sampled. The vessel then returned to Hill 38 to search for the drop line.

31 JANUARY

Weather conditions were good (low seas, overcast to broken cloud), and the strobe attached to the buoys should have been visible for up to 5 miles. The search for the drop line was called off at 0200 h, after several passes over the hill and to the west, where the prevailing drift would have carried the line, concluding that the line was unlikely to be still near the hill.

The vessel then proceeded to Hill D1, a deep hill, to place the final set of traps (Station 65). These were dropped between 0400–0440 h, without incident, using a light line at one end to replace the heavy line lost at Hill 38. The position of the up-current end of the trap line was confirmed before departure from Hill D1.

Sled sampling then began on the final hill for the cruise, Hill V. Three sled stations were carried out (Stations 66–70), starting at 0600 h.

Two stations were aborted: Station 66 missed the hill and Station 68 was pinned up and returned without a significant sample. Generally the catches were substantial, although the sample from the bottom of the hill (Station 70) consisted largely of dead colonial coral plus a very few live corals. The last sample came on board at 1730 h.

The trap buoys over Hill D1 were observed from the end of the last dredge haul at Hill V, so no search time was required. The traps contained little but sea urchins with a few brittle stars and just three fish: a large *Centroscymnus plunketi* in a crab trap and a *Diastobranchus capensis* and *Antimora rostrata* in one of the large fish traps. The traps and lines were retrieved between 1800 and 2100 h.

NOTE TO THE CRUISE NARRATIVE:

The buoy from the drop line set on Hill 38 on 30 January was subsequently recovered at Safety Cove, Tasman Peninsula, about 100 n mile northeast of where it had been set. We assume that the drop line had been run over by a passing vessel.

SUMMARY

Despite the unfortunate loss of the photographic system midway through the cruise, sufficient photographic and dredge samples were obtained to characterise the habitats and assemblages on the seamounts south of Tasmania and to assess the impacts of fishing and changes in species composition with depth. Based on this information it should be possible to assess the conservation value of the proposed interim deepwater marine reserve (Map 1). A number of new records of both invertebrates and fish are likely to result from the samples; a provisional list of the fish species collected is included (Table 2).

PERSONNEL

(Note: unless otherwise indicated, all personnel are staff of the CSIRO Division of Fisheries.)

Scientific Crew

Dr Tony Koslow (Cruise Leader)
Dr Sebastian Rainer (Assistant Cruise Leader)
Mr Mark Lewis
Ms Karen Gowlett-Holmes
Dr Alan Williams
Mr Jeff Cordell
Dr Nadia Ameziane (Paris Museum)
Ms Kate Dempsey (Australia Museum)
Dr Tim Stranks (Victoria Museum)
Mr Kim Larsen (Australia Museum)
Mr Simon Talbot (Australian Fisheries Management Authority)
Mr Nick Albers (Fisherman) (20–24 January)
Mr Damien Heran (24 January–1 February)

Ship's Crew

Mr Bruce Wallis, Master
Mr Roger Pepper, First Mate
Mr John Boyes, 2nd Mate
Mr Pat Gibbons, Chief Engineer
Mr Ian Murray, 2nd Engineer
Mr John Hinchcliffe, Electrical Engineer
Mr Don Collins
Mr Wayne Hatton
Mr Kooka Darling
Mr Mal McDougall
Mr Graeme McDougall
Mr Alan Brownlie
Mr Alan Litton
Mr Victor Thomas
Mr Michael Devine
Mr Bill Weetman

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We thank the Master, Bruce Wallis, the Mates Roger Pepper and John Boyes, and the crew of *Southern Surveyor* for their skills and help during the cruise. Thanks are also extended to staff from the CSIRO Workshop for their assistance with gear preparation. Lastly, sincere thanks to all cruise participants for their effort before and during the time at sea. Your efforts and company combined to make SS 01/97 a successful and pleasant scientific cruise.



Tony Koslow
Cruise Leader


per

Sebastian Rainer
Assistant Cruise Leader



Chris Fandry
Acting Chief, CSIRO Marine Research

Date

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Table 1. Station data for Stations 1–66 occupied during Cruise SS 01/97.

Stn No.	Hill	Start date time (h)	End date	End time (h)	Start lat.	long.	End lat.	long.	Min. depth (m)	Max. depth (m)	Km SSE of SE Cape	Sample type
1	Main Pedra	20/01/97 20:30	20/01/97	22:55	44.26°S	147.11°W	44.26°S	147.08°W	800	1115	76.0	Photo transect
2	Main Pedra	21/01/97 00:30	21/01/97	03:28	44.27°S	147.09°W	44.26°S	147.11°W	778	1110	77.4	Photo transect
3	Main Pedra	21/01/97 04:35	21/01/97	04:58	44.26°S	147.10°W	44.27°S	147.13°W	741	840	85.4	Benthic sled
4	Main Pedra	21/01/97 06:20	21/01/97	06:48	44.26°S	147.07°W	44.27°S	147.11°W	840	840	76.1	Benthic sled
5	Main Pedra	21/01/97 08:15	21/01/97	08:42	44.26°S	147.07°W	44.27°S	147.13°W	840	840	76.1	Benthic sled
6	Main Pedra	21/01/97 10:30	21/01/97	11:05	44.27°S	147.07°W	44.27°S	147.11°W	1110	1110	76.7	Benthic sled
7	Main Pedra	21/01/97 14:00	21/01/97	16:00	44.26°S	147.09°W	44.26°S	147.07°W	724	724	75.9	Drop line
8	Main Pedra	21/01/97 18:40	24/01/97	07:00	44.26°S	147.13°W	44.26°S	147.13°W	1312	1312	76.8	Drop line
9	Sister 1	21/01/97 21:19	aborted		44.29°S	147.24°W						
10	Sister 1	21/01/97 22:40	21/01/97	23:16	44.29°S	147.25°W	44.28°S	147.23°W	1138	1298	82.9	Photo transect
11	Sister 1	22/01/97 23:10	22/01/97	23:40	44.28°S	147.26°W	44.28°S	147.30°W	760	116	83.1	Photo transect
12	Sister 1	23/01/97 00:40	23/01/97	01:08	44.28°S	147.26°W	44.29°S	147.21°W	820	835	82.2	Benthic sled
13	Sister 1	23/01/97 03:15	23/01/97	03:23	44.28°S	147.30°W	44.28°S	147.30°W	1346	1409	82.1	Benthic sled
14	Sister 1	23/01/97 05:05	23/01/97	05:12	44.28°S	147.27°W	44.29°S	147.21°W	1000	1000	84.0	Benthic sled
15	Sister 1	23/01/97 06:41	23/01/97	06:51	44.27°S	147.29°W	44.29°S	147.23°W	1100	1122	82.6	Benthic sled
16	Big Sister	23/01/97 10:00	26/01/97	05:44	44.27°S	147.22°W	44.30°S	147.23°W	850	850	82.9	Drop line
17	K1	23/01/97 19:23	23/01/97	20:20	44.28°S	147.42°W	44.27°S	147.24°W	1600	1600	80.7	Benthic sled
18	K1	24/01/97 18:56	24/01/97	21:00	44.29°S	147.38°W	44.29°S	147.39°W	1434	1720	88.5	Photo transect
19	K1	24/01/97 22:32	aborted		44.29°S	147.38°W			1360		88.1	Photo transect
21	D1	25/01/97 02:15	25/01/97	02:23	44.37°S	147.29°W	44.41°S	147.33°W	1900	1997	87.5	Benthic sled
22	D1	25/01/97 05:15	25/01/97	05:19	44.40°S	147.32°W	44.36°S	147.27°W	1900	2003	92.4	Benthic sled
23	D1	25/01/97 09:00	25/01/97	09:10	44.37°S	147.30°W	44.43°S	147.34°W	1580	1700	97.4	Benthic sled
24	D1	25/01/97 11:40	25/01/97	13:05	44.38°S	147.32°W	44.38°S	147.32°W	1650	2180	92.6	Benthic sled
25	D1	25/01/97 15:27	25/01/97	15:38	44.35°S	147.30°W	44.38°S	147.32°W	2000	2100	95.1	Photo transect
26	D1	25/01/97 18:36	25/01/97	19:23	44.39°S	147.31°W	44.37°S	147.28°W	1650	2020	90.8	Benthic sled
27	K1	25/01/97 21:09	25/01/97	22:25	44.30°S	147.39°W	44.29°S	147.35°W	1477	1624	94.9	Photo transect
28	K1	25/01/97 23:42	25/01/97	24:31	44.29°S	147.41°W	44.30°S	147.34°W	1225	1225	88.6	Photo transect
29	K1	26/01/97 02:57	26/01/97	04:03	44.31°S	147.35°W	44.29°S	147.41°W	1600	1800	89.5	Benthic sled
30	Sister 1	26/01/97 08:00	26/01/97	10:50	44.27°S	147.25°W	44.29°S	147.41°W	1089	1542	88.1	Benthic sled
31	Sister 1	26/01/97 12:51	26/01/97	14:28	44.28°S	147.25°W	44.31°S	147.22°W	926	1261	81.0	Photo transect
32	Main Pedra	26/01/97 16:02	26/01/97	17:39	44.25°S	147.10°W	44.28°S	147.08°W	778	1335	82.4	Photo transect
33	W	26/01/97 23:30	26/01/97	23:35	44.42°S	147.23°W	44.44°S	147.23°W	camera lost		75.1	Photo transect
34	U	27/01/97 00:05	27/01/97	00:12	44.33°S	147.17°W	44.41°S	147.23°W	1083	1083	96.6	Photo transect
35	U	27/01/97 02:04	27/01/97	02:10	44.34°S	147.16°W	44.31°S	147.19°W	1250	1250	85.4	Benthic sled
36	J1	27/01/97 06:55	27/01/97	07:00	44.27°S	147.33°W	44.31°S	147.18°W	987	987	86.4	Benthic sled
37	J1	27/01/97 09:15	27/01/97	09:25	44.27°S	147.33°W	44.24°S	147.36°W	1300	1450	83.8	Benthic sled
38	J1	27/01/97 12:54	27/01/97	13:02	44.24°S	147.36°W	44.22°S	147.40°W	1200	1450	84.0	Benthic sled
					44.24°S	147.36°W	44.32°S	147.28°W			82.5	Benthic sled

Stn No.	Hill	Start date time (h)	End date time (h)	Start lat.	Start long.	End lat.	End long.	Start depth (m)	End depth (m)	Km SSE of SE Cape	Sample type
39	U	27/01/97 14:45	27/01/97 18:45	44.32°S	147.18°W	44.32°S	147.16°W	1085	1085	84.6	Drop line
40	J1	27/01/97 17:00	27/01/97 17:07	44.24°S	147.36°W	44.27°S	147.32°W	1200	1450	82.6	Benthic sled
41	U	27/01/97 20:59	28/01/97 13:30	44.32°S	147.12°W	44.32°S	147.12°W	1083	1448	82.8	Trap line
42	B1	27/01/97 23:40	27/01/97 23:45	44.29°S	147.30°W	44.34°S	147.24°W	1073	1100	84.8	Benthic sled
43	B1	28/01/97 2:20	28/01/97 2:40	44.31°S	147.27°W	44.30°S	147.34°W	1150	1550	85.8	Benthic sled
44	B1	28/01/97 6:05	28/01/97 6:20	44.31°S	147.26°W	44.30°S	147.36°W	1400	1650	85.8	Benthic sled
45	W	28/01/97 10:27	28/01/97 10:33	44.42°S	147.24°W	44.46°S	147.20°W	1715	1815	96.8	Benthic sled
46	W	28/01/97 19:20	28/01/97 19:25	44.45°S	147.23°W	44.40°S	147.23°W	1715	1715	99.6	Benthic sled
47	Dory Hill	29/01/97 1:58	29/01/97 2:02	44.33°S	147.11°W	44.32°S	147.17°W	1000	1000	84.3	Benthic sled
48	Dory Hill	29/01/97 3:50	29/01/97 3:55	44.31°S	147.14°W	44.34°S	147.07°W	1100	1200	82.9	Benthic sled
49	Dory Hill	29/01/97 5:52	29/01/97 6:05	44.32°S	147.12°W	44.34°S	147.07°W	1280	1400	83.2	Benthic sled
50	Mackas	29/01/97 8:40	29/01/97 8:45	44.21°S	147.04°W	44.16°S	147.05°W	640	700	69.7	Benthic sled
51	Mackas	29/01/97 10:15	29/01/97 10:27	44.18°S	147.05°W	44.23°S	147.03°W	640	700	66.5	Benthic sled
52	Mackas	29/01/97 11:57	29/01/97 12:05	44.21°S	147.05°W	44.22°S	147.05°W	750	900	70.0	Benthic sled
53	Mackas	29/01/97 13:40	29/01/97 13:48	44.19°S	147.02°W	44.22°S	147.05°W	936	1018	67.4	Benthic sled
54	Mackas	29/01/97 15:35	29/01/97 15:48	44.19°S	147.02°W	44.22°S	147.06°W	936	1022	67.6	Benthic sled
55	Andys	29/01/97 18:50	29/01/97 18:57	44.19°S	146.95°W	44.19°S	147.01°W	620	800	66.5	Benthic sled
56	Andys	29/01/97 20:15	29/01/97 20:27	44.18°S	147.00°W	44.20°S	146.96°W	800	800	65.5	Benthic sled
57	Andys	29/01/97 22:02	29/01/97 22:10	44.18°S	146.99°W	44.21°S	146.95°W	900	1100	65.1	Benthic sled
58	38	30/01/97 2:22	30/01/97 2:29	44.22°S	147.38°W	44.19°S	147.30°W	1140	1140	81.3	Benthic sled
59	38	30/01/97 4:40	30/01/97 4:46	44.23°S	147.38°W	44.19°S	147.29°W	1200	1400	81.6	Benthic sled
60	38	30/01/97 6:22	not retrieved	44.22°S	147.36°W			1140		79.7	Drop line
61	V	30/01/97 8:55	30/01/97 15:23	44.39°S	147.18°W	44.40°S	147.13°W	1511	1511	92.2	Drop line
62	A1	30/01/97 11:25	30/01/97 11:34	44.33°S	147.27°W	44.32°S	147.33°W	1200	1300	87.8	Benthic sled
63	A1	30/01/97 13:14	30/01/97 13:47	44.31°S	147.27°W	44.35°S	147.27°W	1350	1450	85.6	Benthic sled
64	A1	30/01/97 22:40	30/01/97 22:46	44.31°S	147.27°W	44.34°S	147.27°W	1400	1400	86.2	Benthic sled
65	D1	31/01/97 3:50	31/01/97 18:30	44.39°S	147.27°W	44.40°S	147.27°W	1942	1942	93.9	Trap line
66	V	31/01/97 5:54	31/01/97 6:45	44.39°S	147.14°W	44.39°S	147.23°W	1294	1400	94.0	Benthic sled
67	V	31/01/97 8:55	31/01/97 9:00	44.39°S	147.15°W	44.39°S	147.23°W	1310	1320	94.2	Benthic sled
68	V	31/01/97 10:24	31/01/97 11:10	44.40°S	147.14°W	44.39°S	147.19°W	1380	1540	94.4	Benthic sled
69	V	31/01/97 14:06	31/01/97 14:13	44.40°S	147.15°W	44.40°S	147.18°W	1400	1650	94.5	Benthic sled
70	V	31/01/97 16:08	31/01/97 16:20	44.39°S	147.15°W	44.39°S	147.22°W	1688	1700	94.2	Benthic sled

Notes:

- station not completed

- no data

Table 2. Fishes collected by sled, traps and long lines during Cruise SS01/97. Identifications are provisional.

Family	Identification	Catch Method		
		Sled	Trap	Longline
Squalidae	<i>Centroscymnus plunketi</i>			*
	<i>Etmopterus granulosus</i>		*	*
	<i>Etmopterus</i> sp. D			*
Synphobranchidae	<i>Diastobranchus capensis</i>		*	*
	<i>Simenchelys parasiticus</i>		*	
Lipogenyidae	<i>Lipogenys gilli</i>	*		
Polyacanthonotidae	<i>Polyacanthanotus</i> cf. <i>rissoanus</i>	*		
Bathylagidae	<i>Melanolagus berycoides</i>	*		
Photichthyidae	<i>Cyclothone</i> sp.	*		
Sternopthyidae	<i>Sternoptyx</i> sp.	*		
Myctophidae	<i>Lampanyctus australis</i>	*		
Muraenolepididae	<i>Muraenolepis</i> cf. <i>marmoratus</i>	*		
	<i>Muraenolepis</i> sp.		*	
Moridae	<i>Antimora rostrata</i>		*	
	<i>Laemonema</i> sp.	*		
	<i>Lepidion schmidtii</i>	*		
	<i>Lepidion microcephalus</i>	*		
	<i>Laemonema</i> cf. <i>globiceps</i>	*		
	<i>Paralaemonema nudirostre</i>	*		
	<i>Paralaemonema</i> sp. A	*		
	<i>Paralaemonema</i> sp. D	*		
Bythitidae	<i>Cataetyx</i> sp. B	*		
	<i>Cataetyx</i> sp. C	*		
	<i>Cataetyx</i> sp. D	*		
	<i>Cataetyx</i> sp. E			
Zoarcidae	<i>Melanostigma gelatinosum</i>	*		
Macrouridae	<i>Hymenocephalus</i> sp.	*		
	<i>Nezumia</i> sp.	*		
	<i>Ventrifossa</i> sp.	*		
	<i>Caelorinchus kaiyomaru</i>	*		
	<i>Caelorinchus matamua</i>	*		
	<i>Macrurus carinatus</i>			*
Trachichthyidae	<i>Hoplostethus atlanticus</i>	*		
Oreosomatidae	<i>Neocyttus</i> sp. A	*		

Figure 1

