CRUISE REPORT SS 8/95

18 August–9 September, 1995

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CSIRO
AUSTRALIA

DIVISION OF **FISHERIES**

ITINERARY

LEG 1

Departed Broome:	2200 h (WST) Friday, 18 August 1995
Arrived Dampier:	1500h (WST) Monday, 28 August 1995, refuel

LEG 2

Departed Dampier:	1400h (WST) Tuesday, 29 August 1995
Arrived Broome:	0800 h (WST) Sunday, 9 Sept. (Sat) 1995

AREA OF OPERATION

The North West Shelf study area, encompassing the three experimental management zones (see attached map).

CRUISE OBJECTIVES

1. Determine the composition of the demersal fish community and the distribution and abundance of demersal habitats (based on epibenthic fauna) in each of the three experimental management zones.

2. Collect data and samples from which the basic population parameters (recruitment, growth and mortality) can be measured.

3. Conduct hydrological transects—temperature, salinity and depth (see attached map)

4. To obtain taxonomic specimens and photos of N.W. Shelf fish and invertebrate species, particularly those required for the Fish Taxonomy section's *Handbook of Australian Seafood project.*

5. To carry out 'fish down' trawl experiments.

6. To conduct trawls in deeper water (~ 300m) to collect specimens of *Mustelus* species required for a genetic study, and other species of importance to the Fish Taxonomy section's research. These trawls were carried out overnight when time permitted.

PRELIMINARY

CSIRO Fisheries began studying the fisheries of the North West Shelf (NWS) in 1978, just prior to the declaration of the 200nm Australian fishing zone. Subsequent to this an intensive research program was conducted during 1982/83, followed by an experimental management program between 1986-91. This cruise (1995) was to continue the experimental management program

and measure changes in composition of the benthos and fish species abundance in the intervening years. The program was designed to:

- provide data on the changing structure of the North West Shelf fish and epibenthic community;
- improve the parameters required by existing methods of fisheries' analysis; and
- provide the ecological background for development of new concepts in tropical multi-species management.

RESULTS

OBJECTIVE 1

Was successfully completed, with 104 of the 105 random stations being trawled (one station was inadvertently omitted). Of these, two resulted in major net damage and weren't repeated, while one was repeated after net damage. Most of the net damage occurred in the western Barrow zone, with a fair amount of time spent mending and changing nets. Fish catches were identified and weighed by species with up to 90 species being caught per half hour trawl. Greatest diversity occurred at the shallower stations. Sponge was also weighed for each station.

A 35mm camera was mounted on the headline of every random trawl and used successfully on a total of 33 stations. Varying headline heights, turbid water and other factors were responsible for the unsuccessful shots.

OBJECTIVE 2.

Data for the length of fish and their frequency was successfully collected for 14 species of fish *(Saurida undosquamis, Saurida sp. 2, Epinephelus areolatus, E. multinotatus, Lutjanus vittus, L. sebae, L. malabaricus, Nemipterus furcosus, N. celebicus, Diagramma pictum, Lethrinus choerorynchus, L. nebulosus, L. genivittatus and Parupeneus heptacanthus).* For purposes of determining age, otoliths were collected for 4 of the major species *(L. sebae, L. choerorynchus, S. undosquamis and N. furcosus).*

All length frequency data was collected using either the new electronic measuring board (developed by the electronics section) or the existing Limnoterra board. All data was dumped directly onto personal computers and downloaded onto the central computer each evening.

TABLE 1. NUMBER OF FISH SAMPLED FOR OTOLITHS BY SPECIES AND MANAGEMENT ZONE

Zone	L. choerorynchus	S. undosquamis	N. furcosus	L. sebae
Barrow	135	113	137	40
Legendre	200	200	201	75
Pt. Hedland	201	178	203	104

OBJECTIVE 3.

Two of the three hydrographic transects were successfully completed (see chart) with submersible data logger (SDL) profiles carried out between 50 and 250 m. Unfortunately only the 50, 100 and 150m stations were completed for the Barrow transect as the SDL was lost overboard. A replacement SDL was used for the remaining transects on the second leg of the cruise.

OBJECTIVE 4.

Approximately 50 taxonomic voucher specimens and 100 other specimens were photographed and retained for the *Handbook of Australian Seafood*, while approximately another 80 specimens and 400 muscle samples were kept for the fillet analysis study. Another 80 - 90 unidentified taxonomic specimens were also retained, being mainly deep water species and samples of the ubiquitous lizard fish.

OBJECTIVE 5.

A total of 6 replicate 'fish down' trawls were successfully completed, a 7th was also completed (Stn 103) but was deemed to deviate too much from the intended trawl path so was not included in the experiment. All fish were identified, counted and weighed by species with 30 stomachs collected from *Lethrinus genivittatus, L. choerorynchus, Nemipterus furcosus* and *Saurida undosquamis* for each station (where in sufficient numbers). All sponges caught in the trawl were identified and weighed by type.

A video camera was mounted on the trawl net during a number of the trawls to help ascertain the effects of the trawl on the benthos. This was quite successful, though vision was impeded on a number of occasions by sponge getting hooked up on the video frame. The 35mm camera was deployed on 4 of the 7 fish down trawls.

OBJECTIVE 6.

Three deeper trawls were carried out at night, one during the first leg which resulted in a ripped net and two during the second leg which were successful. A number of *Mustelus* species were collected from these stations and from some of the deeper random trawls. Many taxonomic specimens were also collected from these stations.

FURTHER ACCOMPLISHMENTS AND OBSERVATIONS

The Scanmar equipment was operational for most of the trawls and this data was recorded on the ship's logging system. Work was carried out during the first leg on interfacing the new fisheries data acquisition system (which is under development) with the ship's underway-data logging system. A program was also developed which can load underway-data (GPS, environmental, *etc.*) directly onto the Oracle database.

A whale watcher from the WA Museum observed whales during the first leg of the cruise. This was very successful with 125 individual humpback whales as well as 8 unidentified cetaceans and approximately 120 dolphins *(Tursiops and Delphinus)* sighted during this time. There were several occasions when numbers of whales came alongside the vessel.

Over 195 species of sponges were collected from 39 trawls for taxonomic studies by the Queensland Museum

VESSEL AND GEAR OPERATIONS

Generally, the vessel worked well for the duration of the cruise. However, there was a potentially dangerous problem when the port side net drum wound on because of an electronic malfunction. The interuption to trawling was overcome by isolating the port side net drum and using the starboard net drum manually. The engineers and electronics personnel are to be commended for isolating the fault.

Routine running repairs were required for the cameras and strobes during the cruise.

CRUISE NARRATIVE

LEG 1

The departure from Broome was delayed due to having to replace the 2nd cook because of illness. Eventually we departed Broome at 2200 h on 18 August and steamed southwest to the beginning of our study area. The weather was near-perfect, as it was to remain during the rest of the cruise. During this time the laboratories were set up and all the equipment readied for the impending trawling.

We commenced trawling in the Port Hedland zone at 1500h on 19 August, two stations were completed this day with trawling only during daylight hours. During the night of August 19 we steamed approximately 60 miles to the west in readiness for fishing the next day. Our general aim was to steam at night to the most western stations so that we could slowly work our way back to Dampier for refuelling and to change over some of the scientists in preparation for leg two.

Along the way we were also looking for a suitable site to carry out the 'fish down' experiment, which required a fair amount of sponge, appropriate fish species diversity and numbers, as well as clear water for the video camera.

By Monday 21 August we had reached our most western stations and so commenced sampling our random stations in the Barrow zone. This is the zone which has had the least amount of commercial fish trawling over recent years, evidenced by the high numbers of tears and rips that occurred in the nets. Some time was spent repairing and changing nets for the next few days' work.

Sponge catches, and fish species diversity and numbers, were higher in this zone than remembered from previous cruises. We had a few productive catches of the larger Lutjanids and Lethrinids. We attempted a deep water shot on the 21st but this resulted in a torn net and minimal sample.

On the evening of the 22nd of August we commenced the Barrow hydro transect. Unfortunately we only managed to complete the 50, 100 and 150m stations. At the 200m station, when

retrieving the submersible data logger (SDL), it hit the gantry block and the attachment to the SDL parted and was lost overboard. Random trawls continued in the Barrow and Legendre zones until we berthed in Dampier at 1500h on 28 August. During this time we averaged slightly over 5 random trawls per day.

LEG 2

At Dampier we changed some of the scientific staff and the cook, and a journalist was taken on-board. The journalist disembarked on the evening of 31 August via a pilot boat from Dampier. We departed Dampier at 1400h on Tuesday 29th August and proceeded to carry out a random trawl to the east of Dampier. The Legendre hydro transect was carried out on the evening of August 31.

On Friday the 1st of September a cruise record of 8 random stations were occupied. The next day saw 6 shots completed, but at the end of the day we had some difficulties with the port side net drum when it unexpectedly wound on with all the net and camera frame. During the 3rd of September the engineers and electronics technician identified the fault, reporting that it could not be repaired. Consequently the port side net drum was isolated and fishing continued using the starboard side net drum operated manually from the fishing deck with other safeguards in place. To make up time it was decided to carry out the Pt. Hedland hydro transect during the afternoon and night. This was successfully completed.

Monday the 4th of September saw us continuing the random trawl survey in the Pt. Hedland zone. Six stations were completed using the manually operated net drum.

Tuesday the 5th we conducted the 'fish down' experiment with 6 successful trawls completed. All the sponge, fish and stinging things (sponge, hydroids, *etc.*) were sorted and weighed with every fish counted. The video camera on the net worked well with a lot of interesting footage obtained.

Random stations continued till we berthed in Broome at 0800h on the 10th of September with an additional 2 deeper shots carried out on the evening of the 8th of September.

The cruise was successful with considerable new information having been gathered relevant to the benthos and fish species abundance on the North West Shelf. It was a job well done.

PERSONNEL

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

W. Whitelaw (Cruise leader)	leg 1	leg 2
C. Stanley	leg 1	leg 2
G.Yearsley	leg 1	leg 2
T.Wassenberg	leg 1	leg 2
A.Graham	leg 1	leg 2
C.Liron	leg 1	
C.Burton (WA Museum)	leg 1	
M.Ryba	leg 1	
T.Fisher	leg 1	
J.Cordell	leg 1	
T.Hay (NT Fish)	leg 1	
G.Dews		leg 2
T.Lamb		leg 2
L.McDonald		leg 2
D.Shaw		leg 2
S. Cook (QLD Museum)		leg 2
journalist (part leg)		leg 2

SHIPS CREW

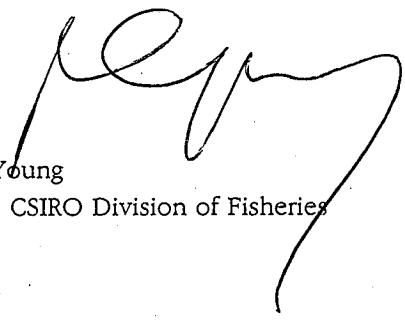
Bruce Wallis	Master
Roger Pepper	1st Mate
John Boyes	2nd Mate
Pat Gibbons	Chief Engineer
Rick Miller	1st Engineer
John Hinchliffe	Electrical Engineer
Noel Anderson	Chief Steward
Alan Smith	Chief Cook
Don Collins	2nd Cook
Len Darling	Bosun
Tony Hearne	A.B.
Lou Jacomos	A.B.
Alan Brownlie	A.B.
Mal McDougall	A.B.
Chris Williams	A.B.
Graham McDougall	A.B.
Mick Devine	A.B.

ACKNOWLEDGEMENTS

I would like to thank the skipper Bruce Wallis, fishing masters Roger Pepper and John Boyes and the crew of FRV *Southern Surveyor* for their efforts during the cruise. I would also like to thank the CSIRO and other scientific personnel on this cruise, not only for their efforts but also for their continued good humour and esprit de corp.

Wade Whitelaw
Cruise Leader

Date
Initialed



P.C. Young
Chief, CSIRO Division of Fisheries
Date:

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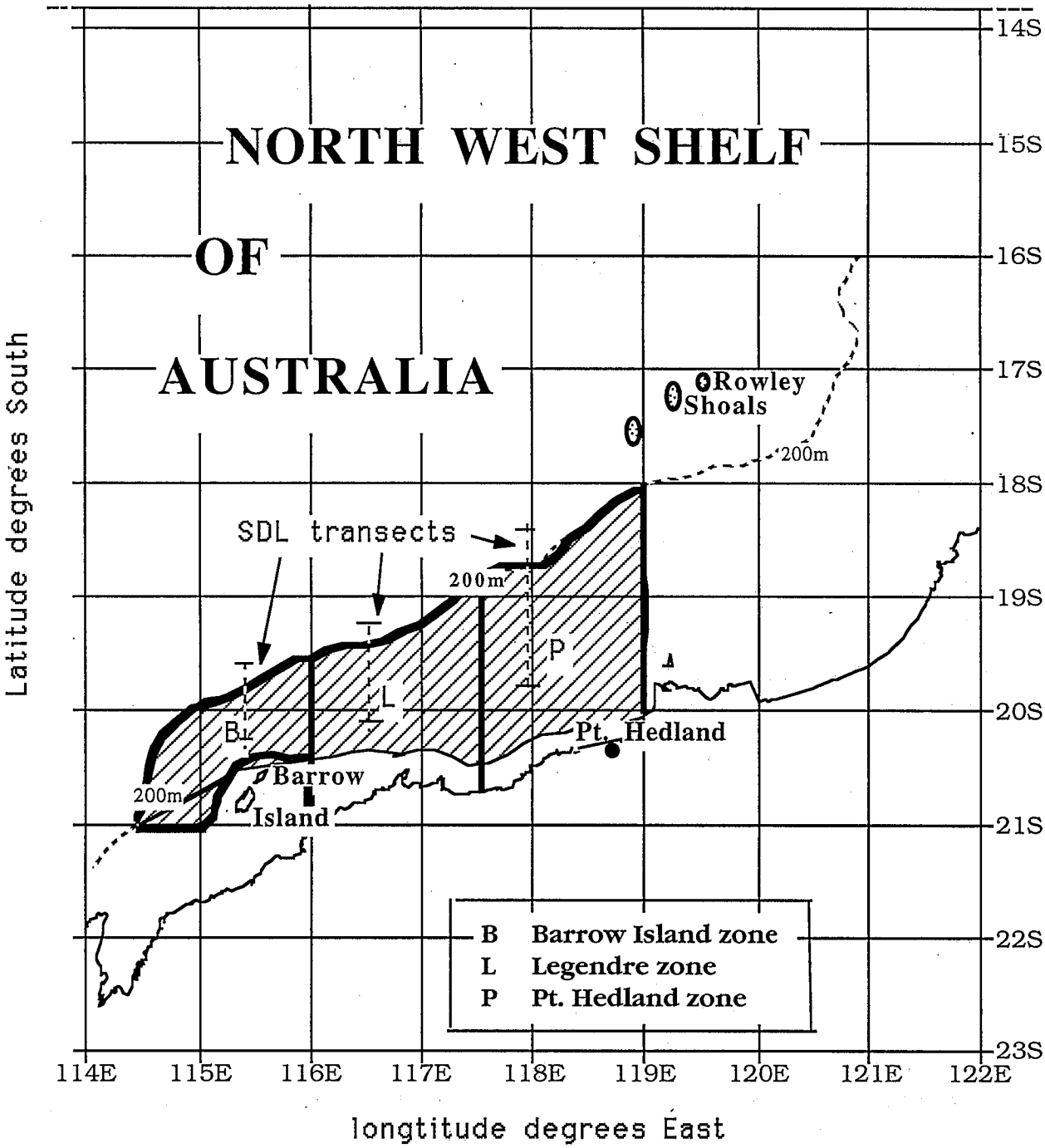
NORTH WEST SHELF
OF
AUSTRALIA
Rowley
Shoals
200m
SDL transects
200m
P
L
B
Pt. Hedland
Barrow
Island
200m
B Barrow Island zone
L Legendre zone
P Pt. Hedland zone
14S
15S
16S
17S
18S
19S
20S
21S
22S
23S
114E
115E
116E
117E
118E
119E
120E
121E
122E
Latitude degrees South
longtitude degrees East

APPENDIX 1:

STATION POSITIONS, LOCATION METHOD*, % OF CATCH SAMPLED AND TOTAL WEIGHT OF SAMPLE.

* 2 = random, 1 = aimed.

Stat No	Date	Time	Lat	Long	*Loc. Method	Depth	Head Height	% catch sampl.	Total catch Wt.
1	190895	1455	18°58'	118°51'	2	89	1.6	100	27.4
2	190895	1710	19°14'	118°45'	2	75		100	73.6
3	200895	0650	20°03'	117°30'	2	42		100	57.13
4	200895	0900	20°17'	117°24'	2	27		100	11.39
5	200895	1045	20°09'	117°12'	2	39		100	303.38
6	200895	1210	20°07'	117°06'	2	43		100	81.2
7	200895	1350	20°13'	117°07'	2	36	1.5	100	125.74
8	200895	1650	20°17'	116°57'	2	35	1.7	100	279.74
9	210895	0705	20°53'	114°59'	2	90	1.6	100	27.13
10	210895	0950	20°41'	115°14'	2	45	2.4	100	42.51
11	210895	1150	20°36'	115°00'	2	83	1.9	100	256.87
12	210895	1420	20°22'	115°16'	2	46	1.8	100	117.05
13	210895	1650	20°24'	114°56'	2	120		100	54.3
14	210895	1930	20°27'	114°46'	1	358		100	1
15	220895	0705	21°08'	115°00'	2	113	2.5	100	142.03
16	220895	825	20°12'	115°01'	2	146	3.9	100	72.24
17	220895	1015	20°10'	115°12'	2	79	3.2	100	258.06
18	220895	1250	29°09'	115°37'	2	65	3.2	100	292.95
19	220895	1410	20°09'	115°46'	2	61	3	100	1483
20	220895	1615	20°01'	115°41'	2	70	3.2	100	374.43
21	220895	1845	20°16'	115°32'	1	50			
22	220895		19°41'	115°30'	1	100			
23	220895	2210	19°40'	115°30'	1	150			
24	220895	2239	19°39'	115°30'	1	200			
25	230895	0700	19°43'	115°34'	2	86	2.4	0	
26	230895	1030	19°37'	115°20'	2	137	3.7	100	41.34
27	230895	1210	19°46'	115°51'	2	105	3.5	100	94.22
28	230895	1540	19v57'	115°46'	2	74	2.7	100	606.8
29	240895	0700	20°43'	115°42'	2	20	2.1	0	
30	240895	0915	20°45'	115°49'	2	20	2.4	100	106.38
31	240895	1115	20°44'	115°58'	2	20	2.6	100	118.58
32	240895	1340	20°29'	115°57'	2	35	3.1	100	464.78
33	240895	1540	20°25'	116°07'	2	33.7	2.8	100	19.5
34	240895	1705	20°20'	116°12'	2	40	3.8	100	245.48
35	250895	0705	20°21'	116°07'	2	41	4	100	505.96
36	250895	1010	20°14'	115°56'	2	49	2.8	100	625.13
37	250895	1135	20°08'	116°03'	2	55	2.8	100	504.96
38	250895	1440	19°56'	116°00'	2	67	2.5	100	387.26
39	250895	1710	20°01'	116°03'	2	59	2.6	100	44.52
40	260895	0705	12°30'	116°11'	2	120	2.4	100	5.69
41	260895	0925	19°42'	116°28'	2	62	2.7	100	276.82
42	260895	1025	19°43'	116°30'	2	60	2.8	100	755.95
43	260895	1130	19°40'	116°34'	2	56	2.4	100	236.05
44	260895	1310	19°31'	116°40'	2	64	2.6	100	62.72

Stat No	Date	Time	Lat	Long	*Loc. Method	Depth	Head Height	% catch sampl.	Total catch Wt.
45	260895	1455	19°41'	116°42'	2	46	1.9	100	265.38
46	260895	1655	19°42'	116°56'	2	65	2.4	100	14.67
47	270895	0700	19°47'	116°46'	2	65	1.8	100	103.07
48	270895	0910	20°03'	116°45'	2	52	1.4	100	98.45
49	270895	1050	20°03'	116°33'	2	56	2.9	100	197.04
50	270895	1210	19°57'	116°33'	2	59	1.7	100	86.38
51	270895	1430	20°09'	116°18'	2	51	2.9	100	181.01
52	270895	1645	20°30'	116°21'	2	27	3	100	208.21
53	280895	0700	20°18'	116°25'	2	40	3.2	100	307.21
54	280895	0820	20°18'	116°30'	2	40	3.8	100	228.94
55	280895	0935	20°21'	116°31'	2	39	3.2	100	20.96
56	280895	1055	20°25'	116°31'	2	38	3	100	35.66
57	290895	1655	20°12'	116°51'	2	41	3.1	100	169.99
58	300895	0700	19°16'	117°08'	2	108	3.4	100	45.97
59	300895	0920	18°58'	117°12'	2	253	3.8	100	91.29
60	300895	1135	18°53'	117°29'	2	208	2.8	100	144.29
61	300895	1340	19°01'	117°23'	2	165	2.2	100	30.27
62	300895	1540	19°03'	117°22'	2	154	3.2	100	45.19
63	300895	1650	19°04'	117°25'	2	136	2.9	100	31.74
64	310895	0700	19°28'	117°20'	2	86	3.8	100	40.94
65	310895	0825	19°34'	117°15'	2	74	3.2	100	229.72
66	310895	1020	19°46'	117°09'	2	64	3.8	100	115.62
67	310895	1320	19°55'	117°12'	2	58	2.9	100	65.69
68	310895	1500	20°01'	117°03'	2	52	2.9	100	280.78
69	310895	1945	20°08'	116°30'	1	47			
70	310895	1233	19°29'	116°30'	1	102			
71	310895	0050	19°17'	116°31'	1	145			
72	010995	0140	19°12'	116°31'	1	200			
73	010995	0215	19°09'	116°30'	1	238			
74	010995	0700	19°10'	117°27'	2	121	2.6	100	19.88
75	010995	0825	19°09'	117°36'	2	123	2.8	100	23.03
76	010995	0950	19°09'	117°41'	2	115	3.1	100	17.79
77	010995	1100	19°09'	117°42'	2	114	2.6	100	10.92
78	010995	1225	19°15'	117°37'	2	98	2.9	100	93.24
79	010995	1335	19°18'	117°37'	2	88	2.7	100	25.55
80	010995	1520	19°28'	117°34'	2	80	3	100	268.99
81	010995	1650	19°34'	117°41'	2	65	2.8	100	56.1
82	020995	0655	19°46'	117°58'	2	46	3.6	100	86.32
83	020995	0915	19°43'	118°06'	2	50	3.3	100	162.59
84	020995	1035	19°42'	118°06'	2	52	3.4	100	362.41
85	020995	1145	19°40'	118°08'	2	51	3.4	100	46.61
86	020995	1325	19°37'	118°10'	2	56	2.9	100	25.39
87	020995	1505	19°44'	118°13'	2	35	2.9	100	74.92
88	030995	1340	19°46'	117°50'	1	49			
89	030995	1715	19°03'	117°58'	1	101			
90	030995	1905	18°44'	117°59'	1	148			
91	030995	2033	18°36'	118°00'	1	200			
92	030995	2133	18°30'	118°00'	1	250			
93	040995	0715	19°57'	118°03'	2	33	3.6	100	59.94
94	040995	0925	20°10'	117°56'	2	25	2.3	100	117.79

Stat No	Date	Time	Lat	Long	*Loc. Method	Depth	Head Height	% catch sampl.	Total catch Wt.
95	040995	1115	20°14'	117°48'	2	23	3.1	100	95.51
96	040995	1230	20°12'	117°50'	2	27.5	2.4	100	16.89
97	040995	1523	20°05'	118°11'	2	23	2.8	100	155.85
98	040995	1655	20°01'	118°13'	2	27	2.8	100	440.07
99	050995	0720	19°46'	118°13'	1	37	2.9	100	79.97
100	050995	0848	19°46'	118°13'	1	37	2.9	100	67.37
101	050995	1015	19°46'	118°13'	1	37	2.9	100	31.63
102	050995	1135	19°46'	118°13'	1	37	2.9	100	154.52
103	050995	1310	19°46'	118°13'	1	37	2.9	100	0
104	050995	1435	19°46'	118°13'	1	37		100	31.54
105	050995	1610	19°46'	118°13'	1	37	2.9	100	36.6
106	060995	0700	19°54'	118°35'	2	20	3.5	100	357.63
107	060995	0835	19°53'	118°37'	2	22	3.5	100	75.65
108	060995	1050	19°43'	118°28'	2	33	3.4	100	218.22
109	060995	1210	19°36'	118°26'	2	36	3.6	100	143.07
110	060995	1505	19°25'	118°03'	2	68		100	170.24
111	060995	1630	19°24'	118°00'	2	69		100	237.03
112	070995	0715	19°27'	118°37'	2	51	3.6	100	160.76
113	070995	0845	19°23'	118°32'	2	67	3	100	196.57
114	070995	1020	19°17'	118°36'	2	71	3.2	100	198
115	070995	1140	19°12'	118°39'	2	79	3.6	100	46.4
116	070995	1545	19°14'	118°01'	2	85	2.8	100	179.98
117	080995	0700	19°01'	118°10'	2	100	4.1	100	13.28
118	080995	0815	19°01'	118°10'	2	101	3.4	100	27.32
119	080995	0930	18°58'	118°10'	2	117	4.2	100	37.6
120	080995	1210	18°54'	117°49'	2	133	2.8	100	147.13
121	080995	1350	18°51'	117°57'	2	134	2.1	100	35.92
122	080995	1610	18°39'	118°07'	2	150	3.1	100	171.92
123	080995	2000	18°14'	118°11'	1	266	3.4	0	
124	080995	2310	18°06'	118°11'	1	388	3.5	0	
125	090995	0705	18°31'	118°30'	2	123	2.8	100	51.47
126	090995	0850	18°31'	118°44'	2	145	3.6	100	96.17
127	090995	1010	18°33'	118°48'	2	136	4	100	92.5
128	090995	1150	18°39'	118°44'	2	135	3.2	100	20.39