R.V. FRANKLIN

NATIONAL FACILITY

OCEANOGRAPHIC RESEARCH VESSEL

RESEARCH CRUISE PLAN

R.V. FRANKLIN

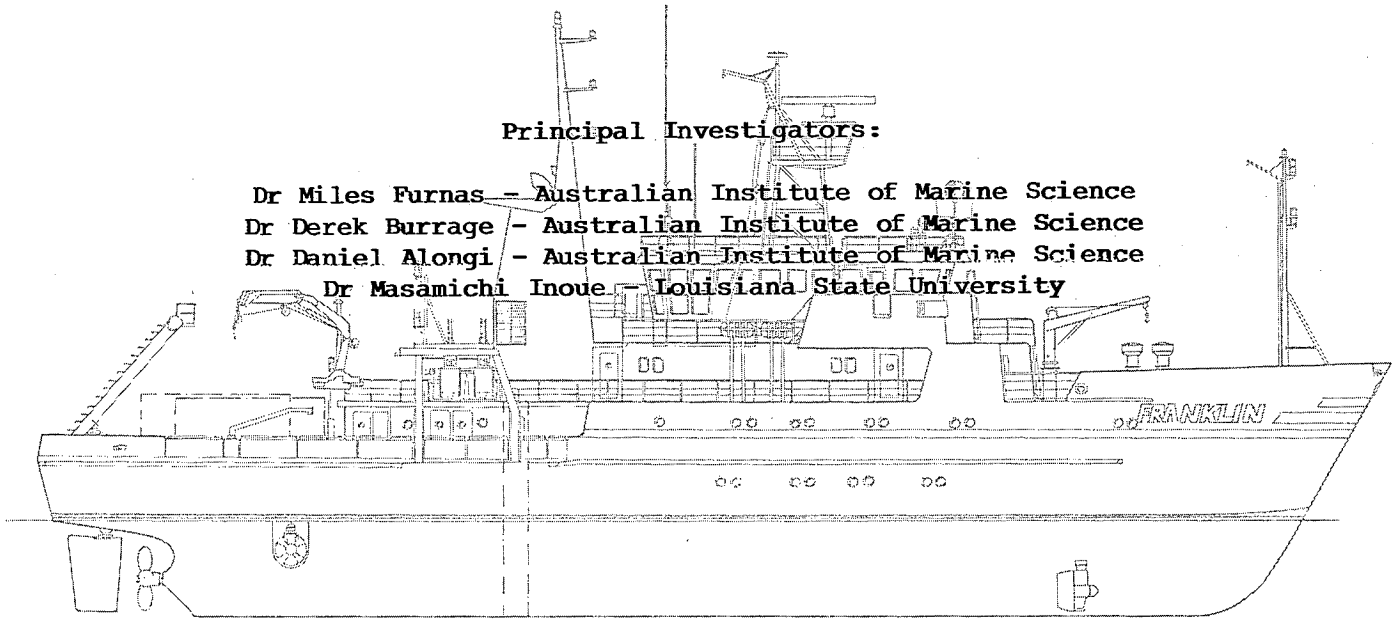
CRUISE FR 5/88

21 June 1988 - 18 July 1988

TOWNSVILLE - CAIRNS

Principal Investigators:

Dr Miles Furnas - Australian Institute of Marine Science
Dr Derek Burrage - Australian Institute of Marine Science
Dr Daniel Alongi - Australian Institute of Marine Science
Dr Masamichi Inoue - Louisiana State University



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AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

Cruise Plan - O.R.V. Franklin - FR 05/88

Itinerary:

Depart:	Townsville:	0600 hrs	Tuesday, 21 June 1988
Arrive:	Port Moresby, PNG:	1200 hrs	Thursday, 30 June 1988
	Refuel at Port Moresby		
Depart:	Port Moresby, PNG:	1200 hrs	Friday, 1 July 1988
Arrive:	Cairns:	0800 hrs	Monday, 18 July 1988

The itinerary and estimates of times were prepared with the CSIRO written GRUISEGEN.FOR computer program (October, 1985 version). Outputs from the program giving the nominal cruise schedule are attached. One day of cruise time is held in reserve for contingency steaming due to rough weather or gear breakdowns.

Scientific Program:

1. Map 3-dimensional mesoscale motion in East Australian Current at 15°C with CTD/XBT sections, ADCP sections and radio-tracked drifters.

2. Survey hydrographic, nutrient and chlorophyll fields in the oceanic boundary zone along the Papuan Barrier Reef.

3. Obtain cross-basin hydrographic sections on transit legs between Australia and PNG.

4. Measure primary production rates of intact and size-fractionated phytoplankton populations in the EAC and the ocean boundary zone along the Papuan Barrier Reef.

5. Collect quantitative benthic infauna samples for community structure and biomass analysis from the continental slope along the Papuan Barrier Reef and in the Coral Sea Basin.

6. Measure sediment bacterial production rates in the ocean-reef boundary zone along the Papuan Barrier Reef.

Principle Investigators:

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Cruise Objectives:

Leg 1

1. Over 6 days, deploy and track radio-drifter buoys in the bifurcation zone of the East Australian current at 15°S.

2. While tracking drifters, make CTD and ADCP sections to map 3-dimensional hydrographic and current velocity structure in the bifurcation zone.

3. Make daily measurements of phytoplankton primary production and standing crop in the EAC to establish levels of spatial and temporal variability in winter trade-wind conditions.

Leg 2

1. Obtain longshore and cross-shelf (n=9) sections of hydrographic structure, nutrient distributions, chlorophyll concentrations and size structure along the SW PNG continental slope and around the periphery of the Louisiade Archipelago.

2. Measure primary production and nitrogen utilization by intact and size-fractionated phytoplankton assemblages from the Papuan Barrier Reef boundary zone using ^{14}C and ^{15}N isotopic methods, respectively.

3. Sample soft-bottom community structure and biomass (macrobenthos, meiobenthos and microbial) and bacterial production on two down-slope transects from the Papuan Barrier Reef into the deep Coral Sea (n=8 stations).

Transit Legs

1. Obtain cross-basin hydrographic, nutrient and phytoplankton biomass sections between PNG and Queensland.

2. Sample soft-bottom community structure (infaunal macrobenthos, meiobenthos and microbial) at deep water stations in the Coral Sea Basin (1 station, time permitting).

Cruise Track:

After departing Townsville, the Franklin will proceed to the planned EAC operations area between Cape Flattery and Osprey Reef (Figure 1). Tactical plans for deploying radio-tracked drifters and sampling CTD, ADCP transects will be made prior to arrival and during the ensuing 6 days on the basis of NOAA AVHRR imagery received and processed on board ORV Franklin via the INMARSAT data link. Following the EAC operations phase, Franklin will proceed to Port Moresby, PNG to refuel.

After refuelling the cruise track will consist of a sequence of alternating longshore transects adjacent to the Papuan Barrier Reef and offshore/onshore transects normal to the coast between Port Moresby and the Jomard Entrance. The Franklin will then transit through the Lousiade Archipelago and begin a series of offshore/onshore transects extending into the Woodlark Basin and central Coral Sea, finally returning to the Jomard Entrance. From the Jomard Entrance, the track proceeds directly to Grafton Passage and to port in Cairns.

O.R.V. Equipment:

Electronics

Navigation (Satnav and/or GPS)
CTD profiler and Rosette Sampler
Scientific Echo sounder
Meteorology station
Reference irradiance sensor (as part of met station)
Acoustic Doppler Current Profiler
VAX-750 and data logging micro-computer system
INMARSAT Data Link
Graphics terminal and plotter for satellite imagery (AVHRR)
XBT launcher and data logger
Thermosalinograph
Strip-chart recorder (as backup for data loggers)

Chemistry and Laboratory

Autoanalyzer (NH_4, NO_3, NO_2, $Si(OH)_4$, PO_4
Clean Freezer for nutrient samples
Scientific freezer for mud samples
Refrigerator for storage of microbial samples
Deionized/RO water system
Scintillation counter
Turner-Designs Model 10 fluorometer (backup for AIMS fluoro)
Biology Trailer

Oceanographic Sampling Gear

10-liter Niskin bottles (12 plus spares)
Reversing thermometers for above
Inductive salinometer
Deck rack for 30-liter Niskin bottles

Deck Machinery

Starboard A-frame and oceanographic winches
Stern A-frame and trawling winch (for benthic grabs to 4000 m)
Running seawater on aft deck for sediment washing and incubators

User-supplied Equipment:

Electronics

Receiver for radio-tracked drifters
Antenna for radio direction finder
U/W light profiler
Microcomputer and electronic interfaces for U/W light profiler
Microcomputer and electronic interfaces for underway fluorometer
DEC compatible terminals (e.g. VT-220's)
HP 7475A plotter

Chemistry

Spectrophotometer
Turner fluorometer (lab model)
Turner Designs fluoro - for underway logging
Inductive salinometer (as backup for ORV units)
Centrifuge
Labware for chemical analyses

Microscopy

Dissecting microscopes

Sampling and sample processing

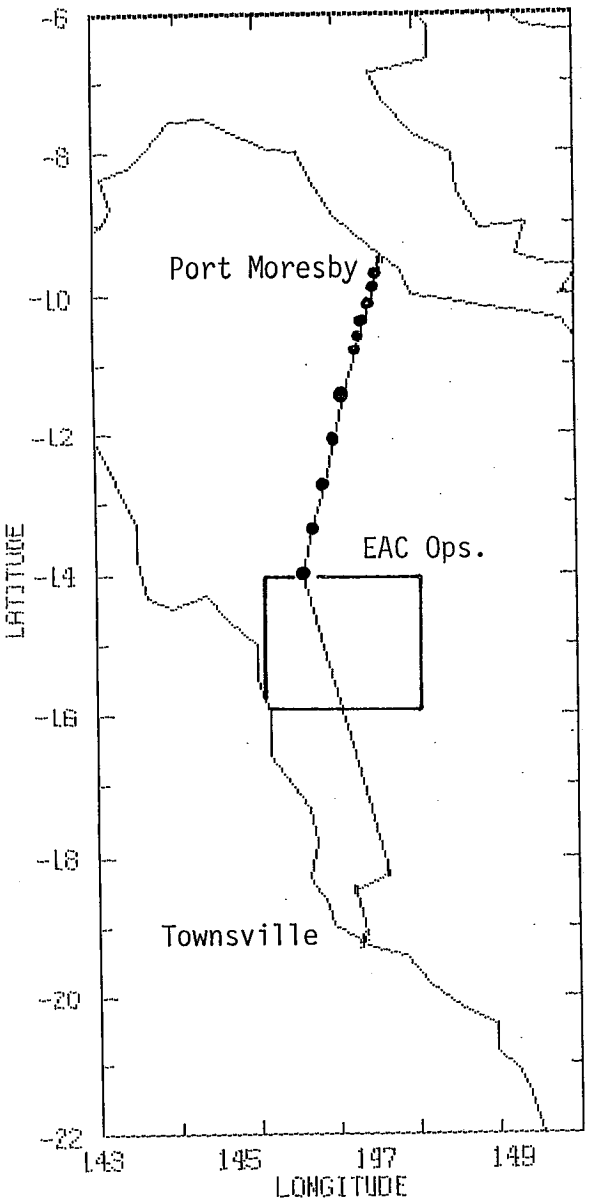
30 litre niskin bottles
Secchi disk
Zooplankton nets
Benthic grabs - frame supported (2)
Box corers (2)
Seives for processing benthic infaunal samples
Lab bench workstations for
    Radioisotope handling
    Water sample size fractionation
    General water sample filtration
    ^{15}N sample processing
Vacuum pumps for isotope and particulate filtrations
Pressure bomb for sediment bacterial production.

Deck gear

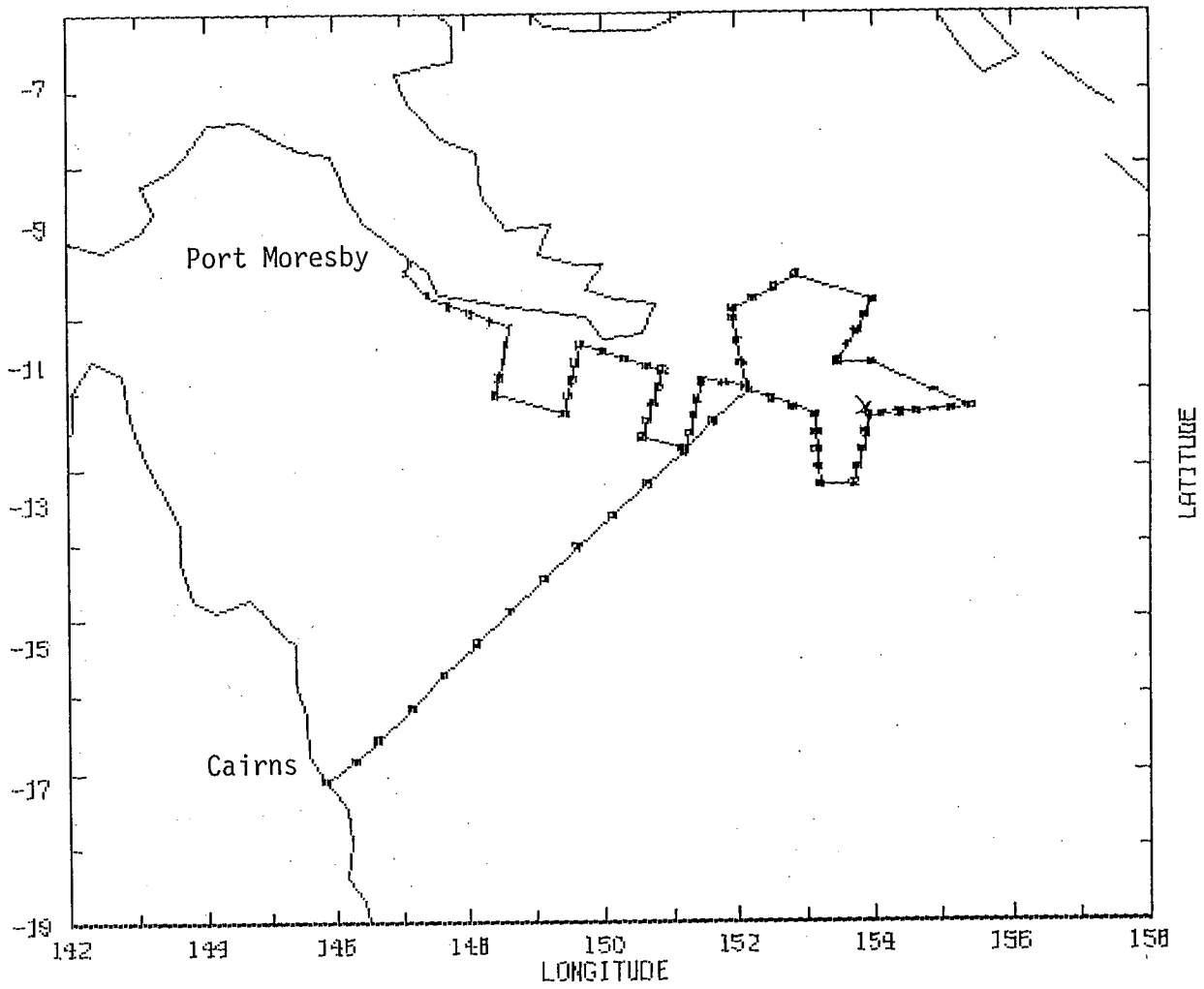
Mud corrals and boxes for sediment processing
Incubator baths for isotope experiments

Figure 1.

Leg 1: 21 June - 30 June



Leg 2: 1 July - 18 July



Franklin Cruise 05/88

ASSUMPTIONS: SHIP SPEED = 11.0 KNOTS;

POS NO.	LATITUDE DEG:MIN	LONGITUDE DEG:MIN	HDNG. DEG	TRANS. HOURS	DIST. NM.	SCIENCE HOURS	DAY NO.	TIME EST	DATE	
1	19:16 S	146:50 E					1	0:00	21 JUN	Alongside Townsville
1	19:16 S	146:50 E	=	0.0	0.0	8.0	1	8:00	21 JUN	stalling for 0800 start
2	19:09 S	146:54 E	28.4	0.7	8.0	0.0	1	8:45	21 JUN	Townsville Pilot
3	18:30 S	146:45 E	347.7	3.6	39.9	0.0	1	12:15	21 JUN	Palm Passage
4	18:15 S	147:15 E	62.2	2.9	32.2	0.0	1	15:15	21 JUN	Myrmidon Reef - Start
5	14:00 S	146:00 E	344.2	24.1	265.0	0.0	2	15:15	22 JUN	Cape Flattery
5	14:00 S	146:00 E	=	0.0	0.0	143.0	8	14:15	28 JUN	EAC current mapping experiments
5	14:00 S	146:00 E	=	0.0	0.0	2.0	8	16:15	28 JUN	CTD
6	13:21 S	146:10 E	13.9	3.6	40.0	2.0	8	22:00	28 JUN	CTD
7	12:42 S	146:20 E	13.9	3.6	40.0	2.0	9	3:45	29 JUN	CTD
8	12:04 S	146:30 E	13.9	3.6	40.0	3.5	9	10:45	29 JUN	CTD
9	11:25 S	146:39 E	13.9	3.6	40.0	2.0	9	16:30	29 JUN	CTD
10	10:46 S	146:49 E	13.9	3.6	40.0	2.0	9	22:00	29 JUN	CTD
11	10:35 S	146:52 E	13.9	1.0	11.2	0.0	9	23:00	29 JUN	Waypoint A
11	10:35 S	146:52 E	=	0.0	0.0	1.3	10	0:15	30 JUN	CTD
12	10:21 S	146:56 E	15.0	1.4	15.0	1.3	10	3:00	30 JUN	CTD
13	10:06 S	147:00 E	15.0	1.4	15.0	2.8	10	7:15	30 JUN	CTD
14	9:52 S	147:04 E	15.0	1.4	15.0	1.3	10	9:45	30 JUN	CTD
15	9:40 S	147:07 E	15.0	1.1	11.9	0.0	10	11:00	30 JUN	Port Moresby - Transit leg
16	9:30 S	147:10 E	16.5	0.9	10.4	0.0	10	12:00	30 JUN	Alongside Port Moresby - fuel stop
16	9:30 S	147:10 E	=	0.0	0.0	24.0	11	12:00	1 JUL	Depart Port Moresby
17	9:40 S	147:07 E	196.5	0.9	10.4	0.0	11	12:45	1 JUL	Return to cruise track
18	10:00 S	147:25 E	138.4	2.4	26.7	0.0	11	15:15	1 JUL	Waypoint 1
19	10:09 S	147:44 E	115.7	1.9	20.8	0.0	11	17:15	1 JUL	Waypoint 2
19	10:09 S	147:44 E	=	0.0	0.0	1.3	11	18:30	1 JUL	CTD
20	10:16 S	148:03 E	109.0	1.8	20.0	1.3	11	21:30	1 JUL	CTD
21	10:22 S	148:22 E	109.0	1.8	20.0	1.3	12	0:45	2 JUL	CTD
22	10:28 S	148:40 E	109.0	1.7	18.3	0.0	12	2:15	2 JUL	Waypoint 3
22	10:28 S	148:40 E	=	0.0	0.0	1.3	12	3:45	2 JUL	CTD
23	10:43 S	148:37 E	193.1	1.4	15.0	2.8	12	7:45	2 JUL	CTD
24	10:57 S	148:33 E	193.1	1.4	15.0	1.3	12	10:30	2 JUL	CTD
25	11:12 S	148:30 E	193.1	1.4	15.0	1.3	12	13:15	2 JUL	CTD
26	11:26 S	148:26 E	193.1	1.4	15.0	1.3	12	15:45	2 JUL	CTD
27	11:27 S	148:26 E	193.1	0.1	0.6	0.0	12	15:45	2 JUL	Waypoint 4
28	11:43 S	149:26 E	105.2	5.5	60.9	0.0	12	21:30	2 JUL	Waypoint 5
28	11:43 S	149:26 E	=	0.0	0.0	1.3	12	22:45	2 JUL	CTD

29	11:28 S	149:29 E	12.9	1.4	15.0	1.3	13	1:15	3 JUL	CTD	
30	11:14 S	149:33 E	12.9	1.4	15.0	1.3	13	4:00	3 JUL	CTD	
31	10:59 S	149:36 E	12.9	1.4	15.0	2.8	13	8:15	3 JUL	CTD	
32	10:45 S	149:40 E	12.9	1.4	15.0	1.3	13	10:45	3 JUL	CTD	
33	10:43 S	149:40 E	12.9	0.1	1.6	0.0	13	11:00	3 JUL		Waypoint 6
33	10:43 S	149:40 E	=	0.0	0.0	1.3	13	12:15	3 JUL	CTD	
34	10:49 S	149:59 E	108.0	1.8	20.0	1.3	13	15:30	3 JUL	CTD	
35	10:55 S	150:19 E	108.0	1.8	20.0	1.3	13	18:30	3 JUL	CTD	
36	11:02 S	150:38 E	108.0	1.8	20.0	1.3	13	21:45	3 JUL	CTD	
37	11:06 S	150:52 E	108.0	1.3	14.3	0.0	13	23:00	3 JUL		Waypoint 7
37	11:06 S	150:52 E	=	0.0	0.0	4.0	14	3:00	4 JUL		Benthic sampling 500 m + CTD
38	11:20 S	150:48 E	195.7	1.3	14.5	10.5	14	14:45	4 JUL		Benthic sampling 1500 m + CTD
39	11:35 S	150:44 E	194.6	1.4	15.5	11.5	15	3:45	5 JUL		Benthic sampling 2000 m + CTD
40	11:49 S	150:39 E	199.3	1.3	14.8	18.0	15	23:00	5 JUL		Benthic sampling 3000 m + CTD
41	12:04 S	150:35 E	194.6	1.4	15.5	23.0	16	23:30	6 JUL		Benthic sampling 4000 m + CTD
41	12:04 S	150:35 E	=	0.0	0.0	1.3	17	0:45	7 JUL	CTD	Waypoint 8
42	12:14 S	151:11 E	105.9	3.3	36.6	0.0	17	4:00	7 JUL		Waypoint 9
42	12:14 S	151:11 E	=	0.0	0.0	2.8	17	6:45	7 JUL	CTD	
43	12:00 S	151:15 E	15.5	1.4	15.0	1.3	17	9:30	7 JUL	CTD	
44	11:45 S	151:19 E	15.5	1.4	15.0	1.3	17	12:15	7 JUL	CTD	
45	11:31 S	151:23 E	15.5	1.4	15.0	1.3	17	14:45	7 JUL	CTD	
46	11:16 S	151:27 E	15.5	1.4	15.0	1.3	17	17:30	7 JUL	CTD	
47	11:14 S	151:28 E	15.5	0.2	2.3	0.0	17	17:45	7 JUL		Waypoint 10
47	11:14 S	151:28 E	=	0.0	0.0	1.3	17	19:00	7 JUL	CTD	
48	11:17 S	151:48 E	99.1	1.8	20.0	1.3	17	22:15	7 JUL	CTD	
49	11:20 S	152:06 E	99.1	1.6	17.7	0.0	17	23:45	7 JUL		Jomard Entrance
49	11:20 S	152:06 E	=	0.0	0.0	1.3	18	1:00	8 JUL	CTD	
50	11:00 S	152:03 E	350.8	1.8	20.0	1.3	18	4:15	8 JUL	CTD	
51	10:41 S	151:59 E	350.8	1.8	20.0	3.8	18	9:45	8 JUL	CTD	
52	10:21 S	151:56 E	350.8	1.8	20.0	1.3	18	13:00	8 JUL	CTD	
53	10:13 S	151:55 E	350.8	0.7	7.9	0.0	18	13:45	8 JUL		Bonvouloir Islands
53	10:13 S	151:55 E	=	0.0	0.0	1.3	18	15:00	8 JUL	CTD	
54	10:03 S	152:13 E	61.0	1.8	20.0	1.3	18	18:00	8 JUL	CTD	
55	9:54 S	152:31 E	61.0	1.8	20.0	1.3	18	21:15	8 JUL	CTD	
56	9:44 S	152:48 E	61.0	1.8	20.0	1.3	19	0:15	9 JUL	CTD	
57	9:43 S	152:50 E	61.0	0.2	1.9	0.0	19	0:30	9 JUL		Waypoint 13
58	10:05 S	153:57 E	108.4	6.3	69.6	1.5	19	8:15	9 JUL		Waypoint 14
58	10:05 S	153:57 E	=	0.0	0.0	1.3	19	9:30	9 JUL	CTD	
59	10:18 S	153:49 E	209.9	1.4	15.0	1.3	19	12:15	9 JUL	CTD	
60	10:31 S	153:42 E	209.9	1.4	15.0	1.3	19	15:00	9 JUL	CTD	
61	10:44 S	153:34 E	209.9	1.4	15.0	1.3	19	17:30	9 JUL	CTD	
62	10:57 S	153:27 E	209.9	1.4	15.0	1.3	19	20:15	9 JUL	CTD	
63	10:58 S	153:26 E	209.9	0.1	1.1	0.0	19	20:15	9 JUL		Waypoint 14A
63	10:58 S	153:26 E	=	0.0	0.0	1.3	19	21:45	9 JUL	CTD	

64	11:17 S	154:24 E	108.2	5.5	60.0	1.3	20	4:30	10 JUL	CTD	
65	11:35 S	155:22 E	108.2	5.5	60.0	2.8	20	12:45	10 JUL	CTD	
66	11:36 S	155:24 E	108.2	0.2	1.8	0.0	20	12:45	10 JUL		Waypoint 15
66	11:36 S	155:24 E	=	0.0	0.0	1.3	20	14:00	10 JUL	CTD	
67	11:38 S	155:09 E	264.0	1.4	15.0	1.3	20	16:45	10 JUL	CTD	
68	11:39 S	154:54 E	264.0	1.4	15.0	1.3	20	19:30	10 JUL	CTD	
69	11:41 S	154:38 E	264.0	1.4	15.0	1.3	20	22:00	10 JUL	CTD	
70	11:42 S	154:23 E	264.0	1.4	15.0	1.3	21	0:45	11 JUL	CTD	
71	11:44 S	154:08 E	264.0	1.4	15.0	1.3	21	3:30	11 JUL	CTD	
72	11:45 S	153:56 E	264.0	1.1	11.6	0.0	21	4:30	11 JUL		Lawik Reef
72	11:45 S	153:56 E	=	0.0	0.0	5.5	21	10:00	11 JUL		Benthic sampling 500 m + CTD
73	12:00 S	153:52 E	194.6	1.4	15.5	9.0	21	20:30	11 JUL		Benthic sampling 1500 m + CTD
74	12:14 S	153:49 E	191.8	1.3	14.3	13.0	22	10:45	12 JUL		Benthic sampling 2000 m + CTD
74	12:14 S	153:49 E	=	0.0	0.0	1.3	22	12:00	12 JUL	CTD	
75	12:29 S	153:45 E	193.3	1.4	15.0	1.3	22	14:45	12 JUL	CTD	
76	12:43 S	153:42 E	193.3	1.3	14.8	0.0	22	16:00	12 JUL		Waypoint 17
77	12:44 S	153:12 E	268.0	2.7	29.3	0.0	22	18:45	12 JUL		Waypoint 18
77	12:44 S	153:12 E	=	0.0	0.0	1.3	22	20:00	12 JUL	CTD	
78	12:29 S	153:11 E	355.3	1.4	15.0	1.3	22	22:45	12 JUL	CTD	
79	12:14 S	153:09 E	355.3	1.4	15.0	1.3	23	1:15	13 JUL	CTD	
80	11:59 S	153:08 E	355.3	1.4	15.0	1.3	23	4:00	13 JUL	CTD	
81	11:44 S	153:07 E	355.3	1.4	15.0	2.8	23	8:15	13 JUL	CTD	
82	11:44 S	153:07 E	355.3	0.0	0.2	0.0	23	8:15	13 JUL		Waypoint 19
82	11:44 S	153:07 E	=	0.0	0.0	1.3	23	9:30	13 JUL	CTD	
83	11:37 S	152:48 E	290.3	1.8	20.0	1.3	23	12:30	13 JUL	CTD	
84	11:30 S	152:29 E	290.3	1.8	20.0	1.3	23	15:45	13 JUL	CTD	
85	11:23 S	152:10 E	290.3	1.8	20.0	1.3	23	18:45	13 JUL	CTD	
86	11:23 S	152:09 E	290.3	0.1	0.6	0.0	23	18:45	13 JUL		Jomard Entrance
86	11:23 S	152:09 E	=	0.0	0.0	2.0	23	20:45	13 JUL	CTD	
87	11:51 S	151:40 E	225.7	3.6	40.0	2.0	24	2:30	14 JUL	CTD	
88	12:19 S	151:10 E	225.7	3.6	40.0	3.5	24	9:45	14 JUL	CTD	
89	12:47 S	150:41 E	225.7	3.6	40.0	2.0	24	15:15	14 JUL	CTD	
90	13:15 S	150:12 E	225.7	3.6	40.0	2.0	24	21:00	14 JUL	CTD	
91	13:43 S	149:42 E	225.7	3.6	40.0	2.0	25	2:30	15 JUL	CTD	
92	14:11 S	149:13 E	225.7	3.6	40.0	3.5	25	9:45	15 JUL	CTD	
93	14:23 S	149:00 E	225.7	1.6	17.5	0.0	25	11:15	15 JUL		Deep-water site on cross basin transect
93	14:23 S	149:00 E	=	0.0	0.0	15.0	26	2:15	16 JUL		Deep benthic sampling in mid-Coral Sea
93	14:23 S	149:00 E	=	0.0	0.0	2.0	26	4:15	16 JUL	CTD	
94	14:49 S	148:28 E	229.5	3.6	40.0	3.5	26	11:30	16 JUL	CTD	
95	15:15 S	147:57 E	229.5	3.6	40.0	2.0	26	17:00	16 JUL	CTD	
96	15:41 S	147:25 E	229.5	3.6	40.0	2.0	26	22:45	16 JUL	CTD	
97	16:07 S	146:54 E	229.5	3.6	40.0	2.0	27	4:15	17 JUL	CTD	
98	16:33 S	146:22 E	229.5	3.6	40.0	3.5	27	11:30	17 JUL	CTD	
99	16:38 S	146:16 E	229.5	0.7	7.8	0.0	27	12:15	17 JUL		Grafton passage

99	16:38 S	146:16 E	=	0.0	0.0	18.0	28	6:15	18 JUL	Contingency time for bad weather
100	16:56 S	145:47 E	237.0	3.0	33.1	0.0	28	9:15	18 JUL	Alongside Cairns
		TIME TOTALS:		215.6	441.6	657.2				

Personnel

Australian Institute of Marine Science
Miles Furnas (Chief Scientist)
Derek Burrage
Daniel Alongi
Alan Mitchell
Craig Steinberg
(2 additional to be named)

Louisiana State University
Masamichi Inoue

CSIRO ORV Staff
Bob Beattie (Cruise Manager)
Eric Madsen
Ron Plaschke
Mark Rayner

This cruise plan is in accordance with the directions of the National Facility Steering Committee for the oceanographic research vessel RV *Franklin.*

A.D. McEwan
CSIRO Division of Oceanography

D.H.Green
National Facility Steering Committee

January 1988