

CRUISE REPORT SS 7/93

27 October–29 November 1993

DARWIN TO CAIRNS

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DIVISION OF FISHERIES

ITINERARY

LEG 1

Departed Darwin: 1800 h Wednesday, 27 October 1993

Arrived Weipa: 0800 h Friday, 12 November 1993

LEG 2

Departed Weipa: 1800 h Friday, 12 November 1993

Arrived Cairns: 1900 h Sunday, 28 November 1993

CRUISE OBJECTIVES

LEG 1

1. To investigate the efficiency of "environmentally friendly trawls" by trawling in areas with bottom structure, using both a demersal Engels high-rise net and an environmentally friendly net.
2. To investigate fish habitats by characterising the benthic flora and fauna at each site, using a 3 m Church dredge.
3. To record the bottom structure and fish behaviour visually with a video camera mounted on the EFN.
4. To collect samples of *Lutjanus malabaricus* and *L. sebae* for population genetics studies.
5. To trawl at randomly selected sites in the Gulf of Carpentaria with a Frank and Bryce net in order to survey the abundance of commercial species of lutjanids and lethrinids.

LEG 2

1. To continue random trawls in areas with bottom structure, using both a demersal Engels high-rise net and an environmentally friendly net.
2. To document the benthic community at the trawl sites in order to compare the relative impact of each fish trawl net on the bottom structure.
3. To videotape the EFN at various heights above the bottom to show how it affects the bottom structure.
5. To collect samples of *Lutjanus malabaricus* and *L. sebae* for population genetics studies.

6. To collect specimens for the I. S. R. Munro Fish Collection in Hobart.
7. To compare commercial 1.75" knotted diamond mesh codends and codends of various sizes of knotless square mesh using twin Florida Flyer 14 fathom prawn trawl nets.

AREA OF OPERATION

LEG 1

The western Arafura Sea at approximately 10° 20'S and 134° 00'E and west of Duyfken Point at 141° 30'E between 12° 24' and 12° 38'E on a north-south trawl path for the prawn bycatch reduction trials (see Fig. 2). The commercial fish biomass survey with the Frank and Bryce net was restricted to the northern half of the GOC as in the previous cruise, SS193 (see Fig. 1).

LEG 2

The EFN trials continued in two 10 x 10 nm blocks centred at L/L for block A and L/L for block B. The prawn bycatch reduction trials continued in the same north-south pattern off Duyfken Point as in Leg 1 (see Fig. 2) while prawn net video taping and leiognathid collections were located on the east coast north of and in Shelburne Bay (Fig. 3).

RESULTS

LEG 1

1. The EFN work at the Arafura Sea location was abandoned after the EFN was completely destroyed during the first trawl. EFN work resumed several days later at the Weipa site (block A) after 2 Frank and Bryce nets were modified to fish as semi-pelagic trawls.
2. Dredge samples of bottom flora and fauna were obtained at the EFN sites with the 3m Church dredge until it was badly bent on station 74 and could no longer be used.
3. The commercial fishes biomass survey was completed at 40 Frank and Bryce trawl stations over three days with good catches of *L. malabaricus*.
4. Multi-level Beam Trawl (MBT) work was completed over 5 nights with 54 trawls.
5. Paired Florida Flyer prawn nets were calibrated during the last night of Leg 1, with net configuration of attachments to the trawl boards and skid altered each shot in order to prevent digging into mud. Prawn catches from each net were even. This work continued on the first night of Leg 2.

6. The footrope of the EFN was filmed from the wings of two trawls (stations 145, 146) and some useful images were obtained.
7. Tissue samples were taken from *L. malabaricus* and *L. sebae* catches throughout Leg 1.
8. Unusual or rare fish were retained for the fish collection in Hobart
9. Queensland Museum staff collected 75 species of sponge from 21 fish trawls. Little was obtained from the dredge which did not appear to represent the larger benthos (sponges, gorgonia etc) evident in the trawl nets.

LEG 2

1. The EFN trials continued with the modified Frank and Bryce nets with the second 10 x 10 nm block (B) adjacent to the first (A).
2. The benthic community was not sampled due to the damaged dredge, but any benthos (algae, sponges, gorgonia) on the footrope and in the trawl net was recorded as an indicator of bottom structure.
3. Video recordings of the Frank and Bryce EFN was successfully carried out with battery operated lights to improve visibility at depths around 45 m. Some images were obtained inside the net and fish and ray behaviour inside the codend was observed.
4. Whole fish and tissue samples of *L. malabaricus* and *L. sebae* were obtained during the fish (EFN) trawls.
5. Gordon Yearsley continued collecting specimens for the I. S. R. Munro fish collection as well as for a number of other requests both within and outside CSIRO Fisheries.
6. Comparisons were made between 1.75" and 1.5" square mesh and standard 1.75" diamond mesh codends on 14 fathom Florida Flyer prawn nets.

CRUISE NARRATIVE

LEG 1

Southern Surveyor departed Darwin on time at 1800 h on 27 October 1993. At a cruise debriefing meeting soon after departure, Leg 1 objectives were explained, shifts allocated and first time participants informed of ship safety and day to day house-keeping procedures. The Master, Mike Stanton, advised of a Muster and Fire drill the next day at 1300 h; this drill was successfully completed as anticipated. During the 24 h steam to the first EFN site in the Arafura sea, the fish laboratory was prepared for normal work and the *Southern Surveyor's* new SUN Oracle database system tested. Numerous software problems were revealed during data entry trials, with Jeff Cordell resolving most of these by phone to Peter Campbell in Hobart.

Southern Surveyor arrived at the first station at 1800 h on 28 October. During deployment of the first EFN trawl, the winches failed for 20 minutes, but the the trawl was completed normally. However, on retrieval, the EFN was found to be completely destroyed with sections of netting missing. After assessing the damage as irreparable, all EFN work was postponed and *Southern Surveyor* headed for the first fish biomass survey stations east of the Wessel Islands, about a 15 hour steam.

The biomass survey progressed smoothly, with commercial species occurring regularly, especially in the north west and north east stations. Station 21 in the south central study area (see Fig 1), surprisingly yielded 4 *Lutjanus. sebae*, 4 *L. malabaricus* and 8 *Diagramma pictum* in an area considered devoid of commercial species from previous biomass surveys.

The fish biomass survey was completed at 1700 h on 3 November. A trawl was carried out with the Frank and Bryce net which had no bottom gear and additional weights on the footrope to simulate the EFN. This proved successful with polishing towards the bottom of the chain holding the weights. This confirmed the feasibility of using the Frank and Bryce nets as EFN's at 0.4 and 0.8 metres off the bottom and the ground gear counting as the 0.0 m setting simulating hard on the bottom fishing. It should be noted however, that unlike the original "Julie Ann" EFN which kept all bridle and sweep wires off the bottom, the Frank and Bryce EFN simulation only kept the net off the bottom while bridles and sweeps maintained contact with the bottom.

Southern Surveyor proceeded to the prawn site approximately 5 nm west of Duyfken Point for the MBT work. The MBT worked well in the depths selected for prawn work, ~20 m with seven trawls on the first night, but the MBT sled broke on the first trawl of the second night. This had been attempted in deeper water (~30 m) to save steaming time from the deeper fish trawl sites. The *Southern Surveyor* engineers re-assembled the MBT with nuts and bolts as no aluminium welding was available onboard and three nights later, MBT work resumed for a further four nights. This provided a total of 52 MBT trawls, the last three were an experiment with the trawl verandah set on the top of the bottom net to check the extent to which this reduced the prawn and bycatch catch in the upper two nets. The effect of this verandah height reduction (equivalent to the position of the headline of a prawn net) was substantial reduction in the prawn catch of the top two nets.

EFN work continued in block A and B with the three net settings of 0.0, 0.4 and 0.8 m off the bottom. This was daytime work, but it continued into the night for three nights when the MBT sled broke. In general, the 0.4 and 0.8 m EFN settings provided clean fish catches compared to the 0.0m settings which provided larger bags of mixed fish, sponges, rock and gorgonia.

Two Queensland Museum staff members collected sponges from the fish trawl during this leg. They obtained 75 different species of sponges, including examples of large mushroom sponges thought to be extinct in the GOC. Various Crustacea and fish specimens were retained as well as a range of invertebrates (gorgonia) for the museum's "marine reptiles" display.

Nick Elliott accumulated tissues for population genetic studies whenever appropriate catches of *L. malabaricus* and *L. sebae* were made.


Some inconsistencies in taring the microweigh scales were evident and it was relocated to a different bench to reduce the effects of ship vibration, but this was not effective. The unit was left for calibration in Weipa at the end of Leg 1.

A video camera was fitted to the EFN for two daytime trawls on the last day. After the first video fish trawl, some adjustments were required to the angle of the camera relative to the net footrope.

The last night was dedicated to calibrating the prawn nets so that they would catch prawns uniformly to allow the treatment comparisons to be carried out during the second leg. Standard diamond mesh codends were used for both nets at this stage. At first, the trawl boards were digging into the muddy substrate and required adjustments even though the prawn catches were almost identical in both nets. This work was not finalised and was to continue over the first night of Leg 2. The square mesh codend material for the trials had arrived in Weipa and this would be used to build the 1.75" and 1.5" square mesh codends.

LEG 2

The square mesh codend netting was collected from the CSIRO Marine Laboratories field station and after the exchange of scientific personel on the 12 November, *Southern Surveyor* left Weipa at 1800 h and headed for the prawn bycatch study site approximately 5 nm west of Duyfken Point. Prawn net calibrations continued throughout the night to ensure the two nets still caught similar numbers of prawns even after the 16 mm mesh codend cover was sewn on to the treatment net. Once all these calibrations were finalised, the port net was fitted with the 1.75" square mesh codend and its codend cover. Square vs. diamond mesh codend comparisons commenced on the second night (13 November) and continued for 12 nights, 7 nights with the 1.75" square mesh for 43 trawls and 5 nights with the 1.5" square mesh for 40 trawls. On 10 of the 12 nights, data on physical damage were collected on a selection of various shaped fishes that had passed through the diamond and square mesh codends. This assessment proved time consuming, and to enable trawling to continue, two people from the second shift assessed damage while normal catch processing continued. David Brewer and Margaret Farmer persisted in this task, well into alternate shifts for the first two nights that this was attempted. The square mesh codend gilled many more fishes than the diamond mesh codend and eventually the



square mesh codend had to be cleaned of gilled fish after every second trawl. This was necessary as the catch retained by the square mesh cover dropped noticeably after more than two or three trawls if the gilled fish were not cleared from the codend.

Little sorting of the fish component (bycatch) of these trawls was possible and an unexpected high number of subsamples were frozen for species composition in Cleveland.

During the day, EFN fish trawls continued in blocks A and B (Figure 2) with video cameras attached to the nets at all three net settings, 0.0, 0.4 and 0.8 m off the bottom.

On the morning of 25 November, *Southern Surveyor* left Duyfken Point to steam to the Orford Ness area (11°S, 143° 05'E) on the east coast for daytime video work on the dual rig prawn nets. The water was too turbid off Duyfken to allow this and so the work was relocated to known clearer waters. During the steam, a short trawl with the Frank and Bryce net was deployed in Endeavour Stait to collect sponges for Queensland Museum (stations 290, Fig. 1).

Most of the day on 26 November was occupied with deploying the AMC pan-and-tilt video remote controlled video camera, which pointed at 90° to the towing direction to allow views of the prawn net opening. The pan-and-tilt camera was tethered and so allowed real time images to be viewed at the joystick controls. Deploying the camera proved difficult as it was fouled in the starboard net bridle wires. Late in the day, the camera was dragged with its clear lens cover facing downwards and the cover was irretrievably scratched. No useful images were obtained from this exercise, but some valuable information obtained on modifications required for future *Southern Surveyor* work with this equipment. The pan-and-tilt camera had successfully worked off smaller vessels; the problem on this cruise appeared to be the physical location of the towing point, which was not far enough away from the prawn net bridles.

During the steam to Cairns, two prawn trawls were carried out to obtain samples of leiognathids for Jonathan Staunton Smith in Shelburne Bay. During the two days steaming to Cairns, about 30 boxes of prawn bycatch subsamples were sorted and processed, leaving about 200 boxes to be processed in Cleveland.

During the second leg, the Microweigh scales were not used at all as they locked-up during calibration in Weipa, both on the *Southern Surveyor* and on the wharf. The SUN Sparc station was prone to crashing daily, with the problem tracked to the EK500 data logging. Lyndsay MacDonald toiled with the SUN problems and data entry from the fish laboratory was able to continue uninterrupted for most of the leg. All the biological data were copied to a cassette tape for down loading to the Cleveland SUN Sparc station.

During the steam through the GBR, the Trimble GPS system failed completely and eventually Lyndsay traced the fault to a short circuit due to water entering the masthead amplifier in the antenna. This could not be repaired and the new Trimble NAV TRACK GPS previously installed during Leg 1 had to be engaged to supply data to the Furuno track plotter.

Southern Surveyor berthed in Cairns at 1900 h on Sunday 28 November 1993. All scientific samples and equipment was consigned to Cleveland by 1100 h on 29 November.

SUMMARY

The first field work of the FIRDC funded trawl bycatch reduction project was top priority for this cruise. Two square mesh sizes were compared with standard diamond mesh codends and the influence of net headline height off the bottom was investigated with the Multilevel Beam Trawl. Physical damage to trawled bycatch was also assessed. The EFN net comparisons in the Gulf of Carpentaria were the second stage of an assessment of the "environmentally friendly net" recommended for the Northern Trawl Fishery. The Tropical Fish Ecology group now has valuable practical information about the operation of the type of net envisaged for the fishery.

The fish biomass survey is the fourth data set CSIRO has provided for use in stock assessment in the Gulf of Carpentaria.

Tissue samples from *L. malabaricus*, *L. sebae* and other species were obtained for population genetic studies in the Hobart genetics laboratory.

The fish collection in Hobart obtained large numbers of specimens, including valuable additions to the sharks and ray collection.

REPORTING OF RESULTS

The results will be analysed and reported in the scientific literature where appropriate. The fish biomass survey data will be used to help set total allowable fish trawl catches for the Gulf of Carpentaria.

PERSONNEL

(Note: unless otherwise stated, all personnel are staff of the CSIRO Division of Fisheries or students based at CSIRO Cleveland.)

LEG 1

Mr John Salini (Cruise leader)
Mr David Brewer (second shift leader)
Mr Jonathan Staunton Smith
Mr Jeff Cordell
Mr Clive Liron
Dr Nick Elliott
Mr Steve Cook (Q Museum)
Mr John Kennedy (Q Museum)
Mr Steve Eayrs (AMC)
Mr Marcus Strauss (AMC)
Mr Richard Mounsey (NT Fisheries)
Mr Graham Baulch (NT Fisheries)

LEG 2

Mr John Salini (Cruise Leader)
Mr David Brewer (second shift leader)
Mr Steve Eayrs (AMC)
Mr Marcus Strauss (AMC)
Mr Neville Gill (NT Fisheries)
Ms Stephanie Boubaris (NT Fisheries)
Dr Yougan Wang
Mr Carlos Souris
Mr Gordon Yearsley
Ms Pat Graham
Ms Margaret Farmer
Mr Lyndsay MacDonald

ACKNOWLEDGMENTS

We thank the Master, Mike Stanton; the Fishing Masters, Roger Pepper, Rudi Sondemeyer and Ross Davies and the crew of *Southern Surveyor* for their skills during the cruise. Steve Eayrs, Marcus Strauss (AMC), Richard Mounsey, Graham Baulch and Neville Gill (NT Fisheries) contributed many extra hours of duty setting-up and testing the original "Julie Ann" EFN and the substitute Frank and Bryce EFN as well as managing the video taping from both the fish and prawn nets.

John Salini
Cruise Leader

P. C. Young Date: May 1994
Chief, CSIRO Division of Fisheries

CONTACTS

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This report may not be cited without reference to the author(s).

DISTRIBUTION

Normal circulation
Cruise participants

FIGURE CAPTIONS

Figure 1. The sequence of stations, 1-40, occupied during the fish biomass survey (Frank and Bryce trawls) and the Queensland Museum sponge collecting trawl in Torres Strait on the first leg.

Figure 2. Locations of the; i) EFN study Blocks A and B, 110 stations ii) MBT, 53 stations iii) Prawn Bycatch, 83 stations vi) Video, 5 stations.

Figure 3. East coast video stations (3) and leiognathid stations (3).

APPENDIX I

Stations occupied by *Southern Surveyor* during Cruise SS7/93.

F&B: Frank & Bryce trawl set at 0.0, 0.4 or 0.8 m off the bottom, FF: Florida Flyer trawl with 1.75" and 1.5" square mesh codends, set at 0.0, 0.4 or 0.8 m off the bottom.

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
1	29-OCT-93	46	F/B_BIOM	15.33	10° 6.8'	137° 21.2'	10° 7.6'	137° 22.6'
2	29-OCT-93	47	F/B_BIOM	18.41	10° 19.7'	137° 45'	10° 20.9'	137° 45.9'
3	29-OCT-93	49	F/B_BIOM	22.08	10° 55.9'	137° 45.9'	10° 57'	137° 41.9'
4	30-OCT-93	47	F/B_BIOM	02.33	11° 19.7'	137° 7'	11° 8'	137° 21.1'
5	30-OCT-93	47	F/B_BIOM	04.00	11° 25.9'	137° 9.7'	11° 6.8'	137° 8'
6	30-OCT-93	49	F/B_BIOM	08.75	11° 19.3'	137° 44.7'	11° 8.3'	137° 45.3'
7	30-OCT-93	50	F/B_BIOM	11.75	11° 7.6'	138° 8.9'	11° 6.7'	138° 10.1'
8	30-OCT-93	51	F/B_BIOM	14.16	10° 56.7'	138° 21.1'	10° 25'	138° 22.1'
9	30-OCT-93	51	F/B_BIOM	16.41	11° 8.5'	138° 35.5'	11° 11'	138° 31.8'
10	30-OCT-93	50	F/B_BIOM	18.13	11° 20.4'	138° 32.5'	11° 07'	138° 32'
11	30-OCT-93	50	F/B_BIOM	21.71	11° 4.01'	138° 7.5'	11° 36'	138° 10'
12	31-OCT-93	52	F/B_BIOM	00.33	11° 45.3'	138° 32'	11° 47'	138° 32.1'
13	31-OCT-93	54	F/B_BIOM	04.17	12° 21.6'	138° 43.3'	12° 3.1'	138° 42.4'
14	31-OCT-93	50	F/B_BIOM	07.00	12° 32'	138° 18.7'	12° 0.4'	138° 17.2'
15	31-OCT-93	48	F/B_BIOM	11.28	12° 31.7'	137° 42.1'	12° 0.1'	137° 42.1'
16	31-OCT-93	47	F/B_BIOM	13.16	12° 32.1'	137° 29.8'	12° 4.9'	137° 29.6'
17	31-OCT-93	46	F/B_BIOM	14.63	12° 44.2'	137° 29.6'	12° 6.3'	137° 29.5'
18	31-OCT-93	48	F/B_BIOM	18.41	13° 20.6'	137° 41.3'	13° 3.2'	137° 41.1'
19	31-OCT-93	52	F/B_BIOM	21.53	13° 21.1'	138° 6'	13° 1.2'	138° 7.6'
20	01-NOV-93	55	F/B_BIOM	02.75	12° 57.5'	139° 56.6'	12° 7.5'	138° 58.6'
21	01-NOV-93	56	F/B_BIOM	04.25	12° 57.9'	139° 6.6'	12° 8.4'	139° 10.1'
22	01-NOV-93	58	F/B_BIOM	07.08	13° 9.1'	139° 32.1'	13° 7.4'	139° 31.8'
23	01-NOV-93	57	F/B_BIOM	09.92	12° 45.3'	139° 21.6'	12° 4.9'	139° 23.3'
24	01-NOV-93	57	F/B_BIOM	11.91	12° 33.7'	139° 32.5'	12° 2.6'	139° 31.3'
25	01-NOV-93	55	F/B_BIOM	14.75	12° 21.2'	139° 8.9'	12° 9.5'	139° 8.4'
26	01-NOV-93	52	F/B_BIOM	16.91	12° 8.3'	138° 56.3'	12° 6.9'	138° 56.6'
27	01-NOV-93	54	F/B_BIOM	19.11	11° 56.6'	139° 8.4'	11° 5.6'	139° 7.2'
28	01-NOV-93	52	F/B_BIOM	21.20	11° 44.9'	138° 57.7'	11° 4.5'	138° 59.1'
29	02-NOV-93	47	F/B_BIOM	00.33	11° 33.3'	139° 21.9'	11° 3.4'	139° 23.8'
30	02-NOV-93	57	F/B_BIOM	04.08	11° 32.8'	139° 58.2'	11° 4.4'	139° 58.3'
31	02-NOV-93	58	F/B_BIOM	08.00	10° 59'	139° 58.2'	11° 3'	139° 59.1'
32	02-NOV-93	54	F/B_BIOM	11.83	10° 58'	140° 23.3'	10° 8.4'	140° 24.5'
33	02-NOV-93	42	F/B_BIOM	14.83	10° 46'	140° 46.7'	10° 6.9'	140° 45.4'
34	02-NOV-93	39	F/B_BIOM	18.55	10° 58.2'	140° 59.4'	11° 1'	140° 58.2'
35	02-NOV-93	42	F/B_BIOM	20.83	11° 11.4'	140° 56.9'	11° 12'	140° 55.3'
36	03-NOV-93	38	F/B_BIOM	00.42	11° 34.3'	141° 10.6'	11° 34'	141° 8.9'
37	02-NOV-93	59	F/B_BIOM	05.33	11° 33.7'	140° 21.9'	11° 3.5'	140° 20.4'

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
38	03-NOV-93	60	F/B_BIOM	09.67	12° 10.4'	140° 23.2'	12° 0.7'	140° 24.8'
39	03-NOV-93	47	F/B_BIOM	14.42	12° 45.8'	140° 58.8'	12° 44'	140° 59.3'
40	03-NOV-93	42	F/B_BIOM	16.56	12° 34.6'	141° 12.3'	12° 5.1'	141° 14.9'
41	03-NOV-93	16	MBT	22.58	12° 34.5'	141° 30.1'	12° 33.8'	141° 30.0'
42	03-NOV-93	19	MBT	23.22	12° 33.3'	141° 29.8'	12° 34.8'	141° 29.7'
43	03-NOV-93	19	MBT	23.90	12° 35.3'	141° 29.7'	12° 36.6'	141° 29.9'
44	03-NOV-93	18	MBT	00.67	12° 37.2'	141° 29.8'	12° 38.3'	141° 29.9'
45	04-NOV-93	16	MBT	01.35	12° 38.1'	141° 29.7'	12° 36.1'	141° 29.6'
46	04-NOV-93	16	MBT	02.50	12° 34.3'	141° 29.5'	12° 32.4'	141° 29.7'
47	04-NOV-93	19	MBT	03.50	12° 33.3'	141° 30.3'	12° 29.4'	141° 30.2'
48	04-NOV-93	21	MBT	04.67	12° 28.5'	141° 29.8'	12° 29.8'	141° 30.2'
49	04-NOV-93	50	F/B_0.4	08.08	12° 30.1'	141° 2.2'	12° 28.6'	141° 2.3'
50	04-NOV-93	53	F/B_0.4	10.42	12° 28.4'	141° .6'	12° 26.5'	141° .6'
51	04-NOV-93	50	F/B_0.4	8.083	12° 30.1'	141° 2.2'	12° 8.6'	141° 2.3'
52	04-NOV-93	53	F/B_0.4	14.33	12° 28.4'	141° .6'	12° 6.5'	141° .6'
53	04-NOV-93	57	F/B_0.4	16.28	12° 25.2'	140° 56.5'	12° 4.6'	140° 56.5'
54	04-NOV-93	33	MBT	20.42	12° 31.0'	141° 25.3'	12° 31.8'	141° 25.2'
55	05-NOV-93	57	F/B_0.4	00.42	12° 25'	140° 54'	12° 6.6'	140° 54'
56	05-NOV-93	55	F/B_0.4	02.33	12° 23.9'	140° 58.8'	12° 2.8'	140° 57.2'
57	05-NOV-93	52	F/B_0.4	06.83	12° 27.4'	141° 2.3'	12° 5.2'	141° 2.4'
58	05-NOV-93	51	F/B_0.8	08.58	12° 31.1'	141° 2.4'	12° 9.1'	141° 2.3'
59	05-NOV-93	53	F/B_0.8	10.66	12° 28.7'	141° .8'	12° 7.1'	141° .7'
60	05-NOV-93	55	F/B_0.8	13.41	12° 31.3'	140° 58.9'	12° 9.5'	140° 58.4'
61	05-NOV-93	57	F/B_0.8	14.66	12° 29.1'	140° 56.7'	12° 7.2'	140° 56.8'
62	05-NOV-93	57	F/B_0.8	17.00	12° 25.2'	140° 56.5'	12° 23.7'	140° 56.7'
63	05-NOV-93	57	F/B_0.8	18.18	12° 23'	140° 54.3'	12° 1.7'	140° 54.3'
64	05-NOV-93	56	F/B_0.8	22.08	12° 23.7'	140° 58'	12° 1.8'	140° 58'
65	06-NOV-93	51	F/B_0.8	01.25	12° 23.7'	141° 2.5'	12° 1.8'	141° 2.1'
66	06-NOV-93	52	F/B_0.8	3.666	12° 28.3'	141° .8'	12° 9.7'	141° .8'
67	06-NOV-93	51	F/B_0.0	07.00	12° 27.4'	141° 2.6'	12° 9.7'	141° 2.6'
68	06-NOV-93	53	F/B_0.0	10.25	12° 28.4'	141° .8'	12° 6.8'	141° .9'
69	06-NOV-93	55	F/B_0.0	13.33	12° 31.6'	140° 56.6'	12° 9.8'	140° 56.7'
70	06-NOV-93	57	F/B_0.0	14.25	12° 29'	140° 57.1'	12° 7.2'	140° 57.3'
71	06-NOV-93	57	F/B_0.0	16.83	12° 25.6'	140° 56.6'	12° 4.3'	140° 56.8'
72	06-NOV-93	58	F/B_0.0	20.58	12° 23.1'	140° 54.6'	12° 1.5'	140° 54.6'
73	06-NOV-93	55	F/B_0.0	23.38	12° 23.3'	140° 58'	12° 1.6'	140° 58'
74	07-NOV-93	52	F/B_0.0	01.25	12° 22.9'	141° 2.5'	12° 1.1'	141° 2.7'
75	07-NOV-93	56	F/B_0.0	04.00	12° 30.6'	140° 56.6'	12° 8.7'	140° 56.8'
76	07-NOV-93	43	F/B_0.0	09.33	12° 29.4'	141° 2.3'	12° 28.1'	141° 2.1'
77	07-NOV-93	43	ABORT	09.33	12° 40.2'	141° 3.1'	12° 39'	141° 3.1'
78	07-NOV-93	49	F/B_0.0	10.67	12° 38.8'	141° .9'	12° 7.2'	141° 1'
79	07-NOV-93	47	F/B_0.0	12.75	12° 37.5'	141° 3.1'	12° 5.7'	141° 2.8'
80	07-NOV-93	47	F/B_0.0	14.16	12° 35.7'	141° 3.2'	12° 34'	141° 3.2'
81	07-NOV-93	46	F/B_0.0	16.33	12° 35.3'	141° 5'	12° 3.8'	141° 5.1'

Stn	Date	Depth	Gear	Start	SLATMIN	SOLONMIN	ELATMIN	ELONMIN
82	07-NOV-93	19	MBT	20.35	12° 34.1'	141° 29.1'	12° 35.6'	141° 29.5'
83	07-NOV-93	18	MBT	21.17	12° 35.7'	141° 30.0'	12° 34.6'	141° 29.9'
84	07-NOV-93	17	MBT	22.12	12° 33.5'	141° 30.5'	12° 32.4'	141° 30.5'
85	07-NOV-93	17	MBT	22.92	12° 32.5'	141° 30.8'	12° 33.9'	141° 30.7'
86	08-NOV-93	16	MBT	00.10	12° 35.1'	141° 30.6'	12° 36.2'	141° 30.5'
87	08-NOV-93	15	MBT	01.33	12° 36.5'	141° 30.3'	12° 35.5'	141° 30.3'
88	08-NOV-93	17	MBT	02.13	12° 34.4'	141° 30.2'	12° 32.9'	141° 30.4'
89	08-NOV-93	18	MBT	02.83	12° 32.5'	141° 30.5'	12° 31.1'	141° 31.0'
90	08-NOV-93	17	MBT	03.75	12° 31.2'	141° 31.2'	12° 32.0'	141° 31.0'
91	08-NOV-93	17	MBT	04.50	12° 32.4'	141° 30.8'	12° 33.3'	141° 30.5'
92	08-NOV-93	42	F/B_0.8	08.33	12° 41.8'	141° 3'	12° 9.5'	141° 3'
93	08-NOV-93	47	F/B_0.8	10.16	12° 39.3'	141° 9'	12° 6.9'	141° 1'
94	08-NOV-93	47	F/B_0.8	12.67	12° 37.8'	141° 2.8'	12° 5.9'	141° 2.8'
95	08-NOV-93	47	F/B_0.8	14.16	12° 35.5'	141° 3.1'	12° 3.7'	141° 3.1'
96	08-NOV-93	46	F/B_0.8	16.20	12° 35.1'	141° 5.1'	12° 3.5'	141° 5'
97	08-NOV-93	16	MBT	19.47	12° 34.3'	141° 30.8'	12° 35.7'	141° 30.8'
98	08-NOV-93	15	MBT	20.32	12° 35.7'	141° 31.0'	12° 34.4'	141° 31.0'
99	08-NOV-93	15	MBT	21.02	12° 34.2'	141° 31.0'	12° 32.8'	141° 31.0'
100	08-NOV-93	18	MBT	22.10	12° 31.9'	141° 31.2'	12° 33.3'	141° 31.5'
101	08-NOV-93	14	MBT	23.07	12° 34.4'	141° 31.3'	12° 35.9'	141° 31.3'
102	09-NOV-93	15	MBT	00.33	12° 36.7'	141° 30.6'	12° 35.3'	141° 30.6'
103	09-NOV-93	16	MBT	01.17	12° 34.7'	141° 30.7'	12° 33.4'	141° 30.6'
104	09-NOV-93	17	MBT	01.92	12° 32.7'	141° 30.7'	12° 31.3'	141° 30.9'
105	09-NOV-93	18	MBT	02.67	12° 31.3'	141° 31.0'	12° 32.5'	141° 31.0'
106	09-NOV-93	16	MBT	03.42	12° 32.9'	141° 30.9'	12° 34.3'	141° 30.8'
107	09-NOV-93	15	MBT	04.17	12° 34.6'	141° 30.8'	12° 35.6'	141° 30.6'
108	09-NOV-93	43	F/B_0.4	08.17	12° 40.9'	141° 3.3'	12° 8.8'	141° 3.4'
109	09-NOV-93	47	F/B_0.4	10.16	12° 37.1'	141° 1.1'	12° 7.5'	141° 1.2'
110	09-NOV-93	47	F/B_0.4	12.83	12° 37.1'	141° 3.4'	12° 5.1'	141° 3.4'
111	09-NOV-93	47	F/B_0.4	14.16	12° 35.7'	141° 3.2'	12° 3.7'	141° 3.3'
112	09-NOV-93	46	F/B_0.4	16.30	12° 35.1'	141° 5'	12° 3.3'	141° 5.2'
113	09-NOV-93	18	MBT	19.42	12° 31.1'	141° 31.0'	12° 32.4'	141° 33.4'
114	09-NOV-93	16	MBT	20.00	12° 32.8'	141° 34.7'	12° 34.3'	141° 31.1'
115	09-NOV-93	14	MBT	20.75	12° 34.6'	141° 31.2'	12° 35.7'	141° 31.2'
116	09-NOV-93	14	MBT	21.33	12° 35.8'	141° 31.1'	12° 34.5'	141° 31.1'
117	09-NOV-93	14	MBT	22.00	12° 34.2'	141° 31.2'	12° 32.7'	141° 31.3'
118	09-NOV-93	17	MBT	23.07	12° 31.7'	141° 31.1'	12° 33.2'	141° 31.0'
119	10-NOV-93	15	MBT	00.33	12° 34.6'	141° 30.9'	12° 36.8'	141° 30.6'
120	10-NOV-93	16	MBT	01.08	12° 35.9'	141° 30.4'	12° 34.4'	141° 30.4'
121	10-NOV-93	17	MBT	01.75	12° 34.0'	141° 30.4'	12° 32.7'	141° 30.7'
122	10-NOV-93	17	MBT	02.42	12° 32.4'	141° 30.8'	12° 31.1'	141° 31.2'
123	10-NOV-93	17	MBT	03.25	12° 31.2'	141° 31.2'	12° 32.4'	141° 31.0'
124	10-NOV-93	16	MBT	04.00	12° 32.9'	141° 30.9'	12° 34.1'	141° 30.6'
125	10-NOV-93	16	MBT	04.67	12° 34.5'	141° 30.5'	12° 35.6'	141° 30.4'

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
126	10-NOV-93	50	F/B_0.4	08.33	12° 29.5'	141° 2.6'	12° 7.4'	141° 2.8'
127	10-NOV-93	50	F/B_0.4	09.67	12° 28.6'	141° 2.3'	12° 7.4'	141° 2.5'
128	10-NOV-93	53	F/B_0.4	10.83	12° 28.4'	141° .6'	12° 6.3'	141° .6'
129	10-NOV-93	53	FB.4VIDEO	11.75	12° 27.3'	141° .4'	12° 9.3'	141° .4'
130	10-NOV-93	55	F/B_0.4	13.25	12° 31.1'	140° 58.6'	12° 9.3'	140° 58.8'
131	10-NOV-93	55	F/B_0.4	14.33	12° 28.5'	140° 56.9'	12° 6.9'	140° 57'
132	10-NOV-93	56	F/B_0.4	16.20	12° 25.8'	140° 56'	12° 3.9'	140° 56.3'
133	10-NOV-93	18	MBT	20.08	12° 32.2'	141° 30.7'	12° 33.6'	141° 29.1'
134	10-NOV-93	16	MBT	20.80	12° 34.1'	141° 30.6'	12° 35.4'	141° 30.7'
135	10-NOV-93	15	MBT	21.47	12° 35.9'	141° 30.7'	12° 37.1'	141° 30.6'
136	10-NOV-93	14	MBT	22.17	12° 37.2'	141° 30.8'	12° 35.7'	141° 30.8'
137	10-NOV-93	15	MBT	22.92	12° 35.1'	141° 30.9'	12° 33.5'	141° 30.9'
138	11-NOV-93	17	MBT	00.50	12° 32.6'	141° 31.1'	12° 33.9'	141° 30.9'
139	11-NOV-93	16	MBT	01.17	12° 34.5'	141° 30.8'	12° 35.6'	141° 30.6'
140	11-NOV-93	16	MBT	01.92	12° 35.6'	141° 30.6'	12° 34.1'	141° 30.7'
141	11-NOV-93	17	MBT	02.92	12° 33.4'	141° 30.7'	12° 32.2'	141° 31.0'
142	11-NOV-93	16	MBT	03.67	12° 32.1'	141° 31.1'	12° 33.2'	141° 31.0'
143	11-NOV-93	16	MBT	04.33	12° 33.3'	141° 31.2'	12° 34.9'	141° 30.6'
144	11-NOV-93	42	F/B_0.0	08.08	12° 41.3'	141° 3'	12° 9.3'	141° 3.2'
145	11-NOV-93	53	F/BOVIDEO	10.00	12° 29.5'	141° .8'	12° 8.4'	141° .9'
146	11-NOV-93	53	F/BOVIDEO	10.83	12° 27.2'	141° .5'	12° 25.2'	141° .7'
147	13-NOV-93	55	F/B_0.0	08.83	12° 29'	141° 59.1'	12° 27.4'	141° 59.4'
148	13-NOV-93	55	F/B_0.0	10.27	12° 26.9'	141° 58'	12° 5.4'	141° 58.1'
149	13-NOV-93	53	F/B_0.0	13.16	12° 27.8'	141° .9'	12° 6.3'	141° 1'
150	13-NOV-93	54	F/B_0.0	14.23	12° 25.7'	141° 1.2'	12° 3.8'	141° 1.1'
151	13-NOV-93	53	F/B_0.0	16.33	12° 23.9'	141° 1.1'	12° 22'	141° 1.2'
152	13-NOV-93	18	FF_1.75	20.91	12° 28.6'	141° 31.6'	12° 7.3'	141° 32.7'
153	13-NOV-93	18	FF_1.75	22.08	12° 25.8'	141° 34.2'	12° 27'	141° 32.4'
154	13-NOV-93	18	FF_1.75	23.58	12° 29.5'	141° 31'	12° 7.6'	141° 32'
155	14-NOV-93	16	FF_1.75	01.17	12° 26.2'	141° 33.4'	12° 7.5'	141° 32.9'
156	14-NOV-93	16	FF_1.75	02.28	12° 28.2'	141° 32.3'	12° 9.6'	141° 31.7'
157	14-NOV-93	18	FF_1.75	03.70	12° 28.5'	141° 31.6'	12° 7.1'	141° 32.5'
158	14-NOV-93	54	F/B_0.4	09.25	12° 29.8'	140° 59.6'	12° 7.8'	140° 59.6'
159	14-NOV-93	55	F/B_0.4	10.42	12° 27.2'	140° 58.5'	12° 5.4'	140° 58.9'
160	14-NOV-93	53	F/B_0.4	13.41	12° 27.7'	141° .9'	12° 6.1'	141° 1.1'
161	14-NOV-93	54	F/B_0.4	14.58	12° 24.7'	141° 1'	12° 2.9'	141° 1.1'
162	14-NOV-93	54	F/B_0.4	16.08	12° 23'	141° 1'	12° 1.3'	141° 1.1'
163	14-NOV-93	17	FF_1.75	20.56	12° 27.4'	141° 32.3'	12° 8.7'	141° 31.5'
164	14-NOV-93	18	FF_1.75	23.33	12° 28.9'	141° 31.3'	12° 7.4'	141° 32.5'
165	15-NOV-93	17	FF_1.75	01.42	12° 25.9'	141° 32.9'	12° 7.1'	141° 32.3'
166	15-NOV-93	18	FF_1.75	03.08	12° 28.7'	141° 31.6'	12° 6.7'	141° 32.6'
167	15-NOV-93	18	FF_1.75	04.17	12° 25.6'	141° 32.9'	12° 6.8'	141° 32.3'
168	15-NOV-93	55	F/B_0.8	08.42	12° 28.4'	140° 59.1'	12° 6.9'	140° 59.1'
169	15-NOV-93	55	F/B_0.8	10.25	12° 27.4'	140° 58.2'	12° 5.9'	140° 59'

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
170	15-NOV-93	53	F/B_0.8	14.00	12° 27'	141° 1.1'	12° 6.2'	141° 1.1'
171	15-NOV-93	55	F/B_0.8	15.00	12° 25.8'	141° .7'	12° 4.2'	141° .7'
172	15-NOV-93	54	F/B_0.8	16.20	12° 23.4'	141° 1.1'	12° 1.7'	141° 1.2'
173	15-NOV-93	18	FF_1.75	21.08	12° 28'	141° 31.7'	12° 6.4'	141° 32.5'
174	15-NOV-93	17	FF_1.75	22.93	12° 26.4'	141° 32.3'	12° 7.9'	141° 31.8'
175	16-NOV-93	17	FF_1.75	1.166	12° 26.7'	141° 32.3'	12° 7.8'	141° 34'
176	16-NOV-93	18	FF_1.75	02.50	14° 28.6'	141° 31.7'	12° 6.4'	141° 32.7'
177	16-NOV-93	17	FF_1.75	03.58	12° 25.7'	141° 33'	12° 6.7'	141° 32.6'
178	16-NOV-93	18	FF_1.75	04.42	12° 27.4'	141° 32.3'	12° 8.3'	141° 31.6'
179	16-NOV-93	41	F/B_0.8	08.33	12° 39.1'	141° 7.1'	12° 7.5'	141° 7.2'
180	16-NOV-93	44	F/B_0.8	10.00	12° 37.3'	141° 4.8'	12° 5.3'	141° 4.8'
181	16-NOV-93	48	F/B_0.8	12.58	12° 35.4'	141° 1.4'	12° 4.1'	141° 1.2'
182	16-NOV-93	50	F/B_0.8	14.16	12° 33.6'	141° 1.4'	12° 1.8'	141° 1.5'
183	16-NOV-93	49	F/B_0.8	16.08	12° 32.8'	141° 3.3'	12° 1.1'	141° 3.3'
184	16-NOV-93	18	FF_1.75	20.10	12° 28.4'	141° 31.2'	12° 0.1'	141° 31'
185	16-NOV-93	19	FF_1.75	21.58	12° 29.9'	141° 31'	12° 8.7'	141° 31.8'
186	16-NOV-93	17	FF_1.75	23.00	12° 27'	141° 32.5'	12° 8.4'	141° 31.9'
187	17-NOV-93	18	FF_1.75	00.58	12° 30.1'	141° 30.7'	12° 8.6'	141° 31.4'
188	17-NOV-93	18	FF_1.75	04.50	12° 29.1'	141° 31.4'	12° 7.3'	141° 32'
189	17-NOV-93	44	F/B_0.0	08.50	12° 39.3'	141° 7'	12° 7.5'	141° 7'
190	17-NOV-93	45	F/B_0.0	10.16	12° 38'	141° 4.7'	12° 6.5'	141° 4.7'
191	17-NOV-93	49	F/B_0.0	12.91	12° 35.5'	141° .9'	12° 4.2'	141° 1'
192	17-NOV-93	50	F/B_0.0	14.16	12° 34'	141° .9'	12° 2.4'	141° 1'
193	17-NOV-93	48	F/B_0.0	16.16	12° 33.6'	141° 3.1'	12° 1.9'	141° 3.3'
194	17-NOV-93	18	FF_1.75	19.92	12° 27.1'	141° 32.5'	12° 8.8'	141° 31.9'
195	17-NOV-93	19	FF_1.75	21.66	12° 30.1'	141° 30.9'	12° 8.7'	141° 31.6'
196	17-NOV-93	18	FF_1.75	22.92	12° 26.7'	141° 32.5'	12° 8.1'	141° 31.8'
197	18-NOV-93	18	FF_1.75	00.72	12° 28.4'	141° 31.4'	12° 6.8'	141° 32.2'
198	18-NOV-93	17	FF_1.75	01.80	12° 26'	141° 32.4'	12° 27.5'	141° 32.1'
199	18-NOV-93	17	FF_1.75	02.75	12° 28.5'	141° 31.8'	12° 9.6'	141° 31.7'
200	18-NOV-93	17	FF_1.75	03.83	12° 29.1'	141° 31.5'	12° 6.8'	141° 32.5'
201	18-NOV-93	18	FF_1.75	04.75	17° 141'	141° 32.7'	12° 6.8'	141° 32.5'
202	18-NOV-93	44	F/B_0.4	09.00	12° 39'	141° 7'	12° 7.2'	141° 7'
203	18-NOV-93	45	F/B_0.4	10.16	12° 37.4'	141° 4.8'	12° 5.7'	141° 4.8'
204	18-NOV-93	48	F/B_0.4	12.58	12° 35.6'	141° .7'	12° 4.2'	141° .7'
205	18-NOV-93	50	F/B_0.4	14.08	12° 33.5'	141° .8'	12° 1.8'	141° .9'
206	18-NOV-93	50	F/B_0.4	16.16	12° 33.1'	141° 2.5'	12° 1.5'	141° 3.2'
207	18-NOV-93	20	FF_1.75	20.16	12° 29.9'	141° 30.7'	12° 8.9'	141° 31.4'
208	18-NOV-93	19	FF_1.75	22.16	12° 28.3'	141° 31.7'	12° 30'	141° 31.1'
209	18-NOV-93	19	FF_1.75	23.41	12° 29.6'	141° 31.5'	12° 7.2'	141° 32.6'
210	19-NOV-93	18	FF_1.75	01.42	12° 28.3'	141° 31.7'	12° 9.6'	141° 31.2'
211	19-NOV-93	18	FF_1.75	02.33	12° 29.7'	141° 31.2'	12° 7.8'	141° 31.8'
212	19-NOV-93	16	FF_1.75	03.42	12° 26.4'	141° 32.6'	12° 7.5'	141° 31.9'
213	19-NOV-93	18	FF_1.75	04.42	12° 28.7'	141° 31.4'	12° 6.7'	141° 32'

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
214	19-NOV-93	54	F/B_0.4	08.67	12° 30.8'	141° .5'	12° 28.6'	141° .6'
215	19-NOV-93	58	F/B_0.4	10.33	12° 29.4'	140° 54.3'	12° 7.5'	140° 54.4'
216	19-NOV-93	58	F/B_0.4	12.91	12° 27.4'	140° 54.7'	12° 5.5'	140° 54.5'
217	19-NOV-93	57	F/B_0.4	14.17	12° 23.4'	140° 56.5'	12° 1.4'	140° 56.6'
218	19-NOV-93	53	F/B_0.4	16.16	12° 25.5'	141° 1.6'	12° 24'	141° 1.8'
219	19-NOV-93	19	FF_1.75	20.00	12° 26.6'	141° 32.1'	12° 8.2'	141° 31.4'
220	19-NOV-93	19	FF_1.75	21.42	12° 29'	141° 31'	12° 7.6'	141° 31.9'
221	19-NOV-93	18	FF_1.75	23.16	12° 26.7'	141° 32.2'	12° 8.3'	141° 31.7'
222	20-NOV-93	17	FF_1.75	01.83	12° 25.9'	141° 32.9'	12° 4.3'	141° 33.1'
223	20-NOV-93	17	FF_1.75	02.83	12° 24.7'	141° 33.1'	12° 5.9'	141° 32.8'
224	20-NOV-93	17	FF_1.75	04.00	12° 27.7'	141° 32.5'	12° 29'	141° 32'
225	20-NOV-93	53	F/B_0.8	08.67	12° 31.2'	141° .3'	12° 9.5'	141° .3'
226	20-NOV-93	50	F/B_0.8	10.75	12° 27.8'	140° 54.6'	12° 5.8'	140° 54.7'
227	20-NOV-93	57	F/B_0.8	12.58	12° 27.4'	140° 55'	12° 5.6'	140° 55'
228	20-NOV-93	57	F/B_0.8	14.08	12° 23.2'	140° 56'	12° 1.1'	140° 56'
229	20-NOV-93	53	F/B_0.8	16.16	12° 24.9'	141° 2'	12° 2.2'	141° 2.2'
230	20-NOV-93	19	FF_1.5	20.33	12° 31.8'	141° 30.9'	12° 3.7'	141° 30.9'
231	20-NOV-93	15	FF_1.5	21.91	12° 35.2'	141° 31'	12° 3.8'	141° 31'
232	20-NOV-93	17	FF_1.5	23.41	12° 31.7'	141° 31.1'	12° 0.1'	141° 31.4'
233	21-NOV-93	18	FF_1.5	00.92	12° 27.9'	141° 31.9'	12° 9.6'	141° 31.3'
234	21-NOV-93	19	FF_1.5	01.83	12° 30.1'	141° 30.8'	12° 8.5'	141° 30.8'
235	21-NOV-93	17	FF_1.5	02.92	12° 27.4'	141° 32.3'	12° 8.3'	141° 31.7'
236	21-NOV-93	18	FF_1.5	03.83	12° 28.9'	141° 31.4'	12° 7.2'	141° 32'
237	21-NOV-93	53	F/B_0.0	08.75	12° 31.5'	141° .9'	12° 9.4'	141° 1.2'
238	21-NOV-93	57	F/B_0.0	11.41	12° 28.7'	140° 54.7'	12° 7.2'	140° 54.1'
239	21-NOV-93	58	F/B_0.0	13.16	12° 27.6'	140° 54.6'	12° 5.4'	140° 55.3'
240	21-NOV-93	57	F/B_0.0	14.50	12° 23.2'	140° 56.6'	12° 1.4'	140° 57.2'
241	21-NOV-93	52	F/B_0.0	16.33	12° 25.8'	141° 2.2'	12° 3.7'	141° 2.5'
242	21-NOV-93	19	FF_1.5	20.33	12° 27.4'	141° 31.8'	12° 5.9'	141° 32.8'
243	21-NOV-93	18	FF_1.5	21.91	12° 26.7'	141° 32.5'	12° 8.5'	141° 31.9'
244	21-NOV-93	18	FF_1.5	23.16	12° 31.3'	141° 30.9'	12° 33'	141° 30.7'
245	22-NOV-93	15	FF_1.5	00.25	12° 34.8'	141° 30.9'	12° 3.3'	141° 31'
246	22-NOV-93	17	FF_1.5	01.33	12° 31.7'	141° 31.1'	12° 0.2'	141° 31.5'
247	22-NOV-93	17	FF_1.5	02.25	12° 29.4'	141° 31.9'	12° 0.8'	141° 31.4'
248	22-NOV-93	16	FF_1.5	03.17	12° 32.1'	141° 31.2'	12° 3.4'	141° 31.1'
249	22-NOV-93	18	FF_1.5	04.17	12° 33.6'	141° 31'	12° 1.6'	141° 31'
250	22-NOV-93	42	F/B_0.0	08.33	12° 40.9'	141° 8.6'	12° 8.8'	141° 8.6'
251	22-NOV-93	46	F/B_0.0	10.16	12° 41.8'	141° .9'	12° 40'	141° .8'
252	22-NOV-93	44	F/B_0.0	12.58	12° 39.6'	141° 5.1'	12° 38'	141° 5.2'
253	22-NOV-93	42	F/B_0.0	14.16	12° 37.1'	141° 8.9'	12° 5.3'	141° 8.9'
254	22-NOV-93	44	F/B_0.0	16.08	12° 33.6'	141° 7'	12° 1.7'	141° 7.1'
255	22-NOV-93	16	FF_1.5	19.91	12° 32.9'	141° 31.2'	12° 5.3'	141° 31.2'
256	22-NOV-93	16	FF_1.5	21.83	12° 35.7'	141° 30.7'	12° 2.9'	141° 30.6'
257	22-NOV-93	17	FF_1.5	23.50	12° 32.1'	141° 31.1'	12° 3.7'	141° 31'

Stn	Date	Depth	Gear	Start	SLATMIN	SLONMIN	ELATMIN	ELONMIN
258	23-NOV-93	15	FF_1.5	01.08	12° 35.9'	141° 30.5'	12° 4.1'	141° 30.9'
259	23-NOV-93	17	FF_1.5	02.17	12° 32'	141° 30.9'	12° 0.1'	141° 31.2'
260	23-NOV-93	18	FF_1.5	03.17	12° 28.8'	141° 31.6'	12° 7.2'	141° 32.2'
261	23-NOV-93	18	FF_1.5	04.08	12° 26.6'	141° 32.7'	12° 28'	141° 32.1'
262	23-NOV-93	42	F/B_0.8	08.20	12° 41.5'	141° 9.2'	12° 40'	141° 9.4'
263	23-NOV-93	42	F/B_0.8	10.16	12° 41.2'	141° 1.4'	12° 9.3'	141° 1.7'
264	23-NOV-93	46	F/B_0.8	12.91	12° 39.5'	141° 4.9'	12° 7.6'	141° 5'
265	23-NOV-93	42	F/B_0.8	14.50	12° 36.6'	141° 9'	12° 4.7'	141° 9.1'
266	23-NOV-93	45	F/B_0.8	16.41	12° 33.3'	141° 6.8'	12° 1.3'	141° 7.1'
267	23-NOV-93	17	FF_1.5	19.75	12° 33.9'	141° 30.6'	12° 2.4'	141° 31'
268	23-NOV-93	18	FF_1.5	21.08	12° 29'	141° 31.7'	12° 7.4'	141° 32.4'
269	23-NOV-93	18	FF_1.5	22.08	12° 26.6'	141° 32.7'	12° 7.9'	141° 32.2'
270	23-NOV-93	17	FF_1.5	23.08	12° 29.7'	141° 31.6'	12° 1.4'	141° 31.2'
271	24-NOV-93	16	FF_1.5	00.17	12° 33.6'	141° 30.9'	12° 5.3'	141° 31'
272	24-NOV-93	15	FF_1.5	01.17	12° 35.8'	141° 30.7'	12° 4.3'	141° 30.7'
273	24-NOV-93	17	FF_1.5	02.42	12° 32.1'	141° 31'	12° 0.6'	141° 31.2'
274	24-NOV-93	17	FF_1.5	03.33	12° 29.3'	141° 31.7'	12° 7.8'	141° 32.4'
275	24-NOV-93	17	FF_1.5	04.42	12° 27.5'	141° 32.4'	12° 9.1'	141° 31.6'
276	24-NOV-93	42	F/B_0.4	08.67	12° 38.6'	141° 9.5'	12° 6.7'	141° 9.6'
277	24-NOV-93	50	F/B_0.4	10.41	12° 40.7'	141° 6'	12° 8.1'	141° 1.1'
278	24-NOV-93	45	F/B_0.4	12.67	12° 39.4'	141° 4.7'	12° 7.6'	141° 4.7'
279	24-NOV-93	43	F/B_0.4	14.16	12° 37.4'	141° 8.7'	12° 5.9'	141° 8.7'
280	24-NOV-93	37	F/B_0.4	16.33	12° 33'	141° 7'	12° 33'	141° 7'
281	24-NOV-93	16	FF_1.5	20.00	12° 33.8'	141° 30.7'	nd	nd
282	24-NOV-93	18	FF_1.5	21.58	12° 29.6'	141° 31.5'	12° 8.1'	141° 32.3'
283	24-NOV-93	18	FF_1.5	22.83	12° 28.8'	141° 32.5'	12° 9.2'	141° 31.8'
284	25-NOV-93	18	FF_1.5	00.00	12° 30.1'	141° 31.3'	12° 1.6'	141° 31'
285	25-NOV-93	18	FF_1.5	01.00	12° 32.5'	141° 30.7'	12° 0.5'	141° 30.9'
286	25-NOV-93	18	FF_1.5	02.00	12° 28.7'	141° 31.6'	12° 6.7'	141° 32.2'
287	25-NOV-93	17	FF_1.5	02.92	12° 26'	141° 32.8'	12° 7.5'	141° 32'
288	25-NOV-93	18	FF_1.5	03.83	12° 29.5'	141° 31.4'	12° 1.2'	141° 31.6'
289	25-NOV-93	18	FF_1.5	04.75	12° 31.6'	141° 30.8'	12° 9.9'	141° 31.2'
290	25-NOV-93	12	F/B_0.0	17.50	10° 34.0'	141° 59.0'	10° 34.0'	142° 00.0'
291	26-NOV-93	19	FF	12.00	10° 52.5'	142° 55.6'	10° 52.5'	142° 57.5'
292	26-NOV-93	20	FFCAMERA	12.92	10° 52.8'	142° 58.6'	10° 52.8'	142° 55.9'
293	26-NOV-93	20	FFCAMERA	15.57	10° 52.4'	142° 57.9'	nd	nd
294	26-NOV-93	30	FF	23.83	11° 52.4'	143° 12.3'	11° 50.5'	143° 10.7'
295	27-NOV-93	30	FF	00.58	11° 50.8'	143° 11.1'	11° 52.2'	143° 12.3'
296	27-NOV-93	32	FF	02.33	11° 52.4'	143° 12.4'	11° 50.7'	143° 10.8'