

DIVISION OF FISHERIES

1995 RESEARCH VESSEL PROGRAM

CRUISE PLAN

**FRV SOUTHERN SURVEYOR
CRUISE SS5/95**

4 JUNE - 11 JUNE 1995

CSIRO DIVISION OF FISHERIES
MARINE LABORATORIES
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ITINERARY

LEG 1

DEPART: WEIPA 16:00 HRS SUNDAY, 4 JUNE 1995

RETURN: WEIPA 12:00 HRS SUNDAY, 11 JUNE 1995

AREA OF OPERATION

Return transect west of Weipa, across the Gulf of Carpentaria (GOC) between 12°S - 13° 30'S, and 136° 50'E and 141° 35'E.

RESEARCH BACKGROUND

PRIMARY PRODUCTIVITY

In December 1988 the primary productivity and phytoplankton biomass of the GOC was examined on a *Franklin* cruise and represented a snapshot of the summer phytoplankton dynamics. This June cruise allows a winter comparison with the 1988 summer cruise.

AUSTED PRAWN TRAWL NET

The AusTED prawn trawl net has been developed by NT Fisheries, Darwin and QDPI Fisheries, Deception Bay, Queensland as a turtle and bycatch excluder for the east coast prawn fishing fleets (*Development and application of AusTED in the Australian trawl industry* project, FRDC 93/231.07). After mixed results in Moreton Bay and Bundaberg, AusTED was re-designed and tested at the AMC flume tank in Launceston during 1994. This is the net that will be used on this cruise, as part of a collaborative effort between the CSIRO Division of Fisheries, Cleveland, QDPI and NT Fisheries. These collaborators have agreed on the design of trials to test AusTED. This cruise provides an opportunity to directly compare the reduction in bycatch by the AusTED net with a standard prawn trawl net in a different geographical area.

PENAEUS SEMISULCATUS DISTRIBUTION AND ABUNDANCE ACROSS THE GOC

Recent studies in both the north-eastern and north-western Gulf indicate an offshore migration of *P. semisulcatus* beyond the commercial fishing grounds at some times of the year. In the Albatross Bay region of the north-eastern Gulf, subadult *P. semisulcatus* recruit to the inshore areas through the summer months until February, after which numbers begin to decline rapidly even though the area is closed to commercial fishing until April. To test the hypothesis that the prawns moved further offshore than the traditional fishing grounds after February, sampling was done in May, July, November and February to 70 nm offshore at depths over 60m - well beyond the extent of the commercial fishery. *P. semisulcatus* were caught at most offshore stations in May and July, with highest catches at the deepest stations (50-60m), indicating an offshore distribution of the population by winter. The population returns to shallower water (25-35m) during spring; seemingly in response to the formation of a thermocline forming between 30 and 40m. These returning

prawns form a major component of the spring spawning population. By November there are very few *P. semisulcatus* beyond 40m.

Similarly, in the Groote Eylandt region of the western Gulf, *P. semisulcatus* move offshore from coastal nursery areas through the summer, with highest catches in depths greater than 40m by June and July, with substantial abundances at the limit of the sampled area (55m). A return movement to shallower water was observed during spring, with *P. semisulcatus* being absent from depths greater than 40m by November.

These studies have identified a seasonal offshore and return movement pattern and the existence of a population of prawns in winter beyond the traditional fishing grounds. However, the extent of the movement beyond the areas sampled to date (within 60-70 nm of the coast) is unknown. This study would establish the limits of the offshore migration and serve to test several hypotheses: whether offshore movement is limited by depth or substrate type, or whether the two populations actually mix in the Gulf.

CRUISE OBJECTIVES

1. To monitor *Penaeus semisulcatus* prawn distribution and abundance across the Gulf of Carpentaria in a roughly east-west transect from Weipa to north of Groote Eylandt using 14 fathom Florida Flyer prawn nets.
2. To compare an AusTED codend and a standard diamond mesh codend for bycatch reduction.
3. To collect frozen *P. semisulcatus* for isotope and genetic analysis of population structure.
4. To collect sediment samples each dawn and dusk before completion and commencement of night time trawling.
5. To collect stratified water samples with the CTD each morning and analyse the samples for primary productivity.
6. To streamline the Oracle data entry from the fish laboratory and resolve other onboard computing problems as they arise.

CRUISE PLAN

Southern Surveyor will leave Weipa at 1600 hrs and prepare to commence paired prawn trawling during the 2.5 hour steam to the prawn grounds 5 nm west of Duyfken Point. Trials are anticipated in order to calibrate the two nets for even catches. Once this is achieved, one codend will be replaced with the AusTED codend and the paired comparisons will then begin. Sampling will follow a simple latin square design (two trawl stations per block) with the codends on each net alternated between an AusTED and a standard diamond mesh after each trawl. Up to eight trawls will be completed each night with the total catches for each net sorted to species, counted, measured, weighed and recorded directly onto the Oracle database on board. One night will be dedicated to intensive trawling where *Penaeus semisulcatus* abundances are highest. The Information Technology group of the CSIRO Division of Fisheries has provided a staff member on this cruise to resolve any software problems with the onboard data entry and manipulation.

Sediment samples for particle size analysis will be collected with a Smith-MacIntyre grab each evening before trawling commences and each morning after the completion of trawling. Most of the daytime will be steaming time to the next night's trawl stations (Fig. 1). Whenever possible during the day, three-hour trawls will be attempted to duplicate commercial trawl duration times and observe any changes in the performance of the AusTED net.

Depth profiles and six water samples from different depths will be taken each morning with the CTD and the water analysed on board for nutrients, chlorophyll, primary productivity and nutrient uptake rates. HPLC pigment analysis of the phytoplankton will be carried out in Cleveland.

Southern Surveyor will berth in Weipa at 1200 hrs on Sunday, 11 June. Some primary productivity incubations may need to continue on board until 1600 hrs on Sunday, 11 June, after which time *Southern Surveyor* will be free to sail to Darwin.

PERSONNEL

John Salini
Nick Rawlinson
Peter Rothlisberg
Michele Burford
Ron Plaschke (OMS Hbt) CTD
Matt Sherlock
John Wallace (Hbt OIC)
Mick Haywood
Don Heales
Richard Mounsey
Jason McGilvray (QDPI)
Miroslaw Ryba

Cruise Leader/Fish/Prawns/Data
Fish/Gear/Data
Primary Productivity
Primary Productivity
Primary Productivity
Electronics
Fish
Prawns
Prawns
Gear
Gear
Computing

NIGHT SHIFT (1900-0700)

John Salini
Mick Haywood
Don Heales
John Wallace
Miroslaw Ryba
Nick Rawlinson
Richard Mounsey
Jason McGilvray

DAY SHIFT (0700-1900)

Peter Rothlisberg
Michele Burford
Ron Plaschke
Matt Sherlock

ACCOMMODATION

John Salini
Michele Burford
Peter Rothlisberg & Ron Plaschke
Mick Haywood & Don Heales
John Wallace & Matt Sherlock
Nick Rawlinson & Richard Mounsey
Miroslaw Ryba & Jason McGilvray


CABINS

Cruise Leader
1
2 & 3
4 & 5
6 & 7
8 & 9
10 & 11

CONTACTS

For further information about this cruise contact:

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 ACTING CHIEF

for **P. C. Young**
Chief, CSIRO Division of Fisheries

17 May 1995

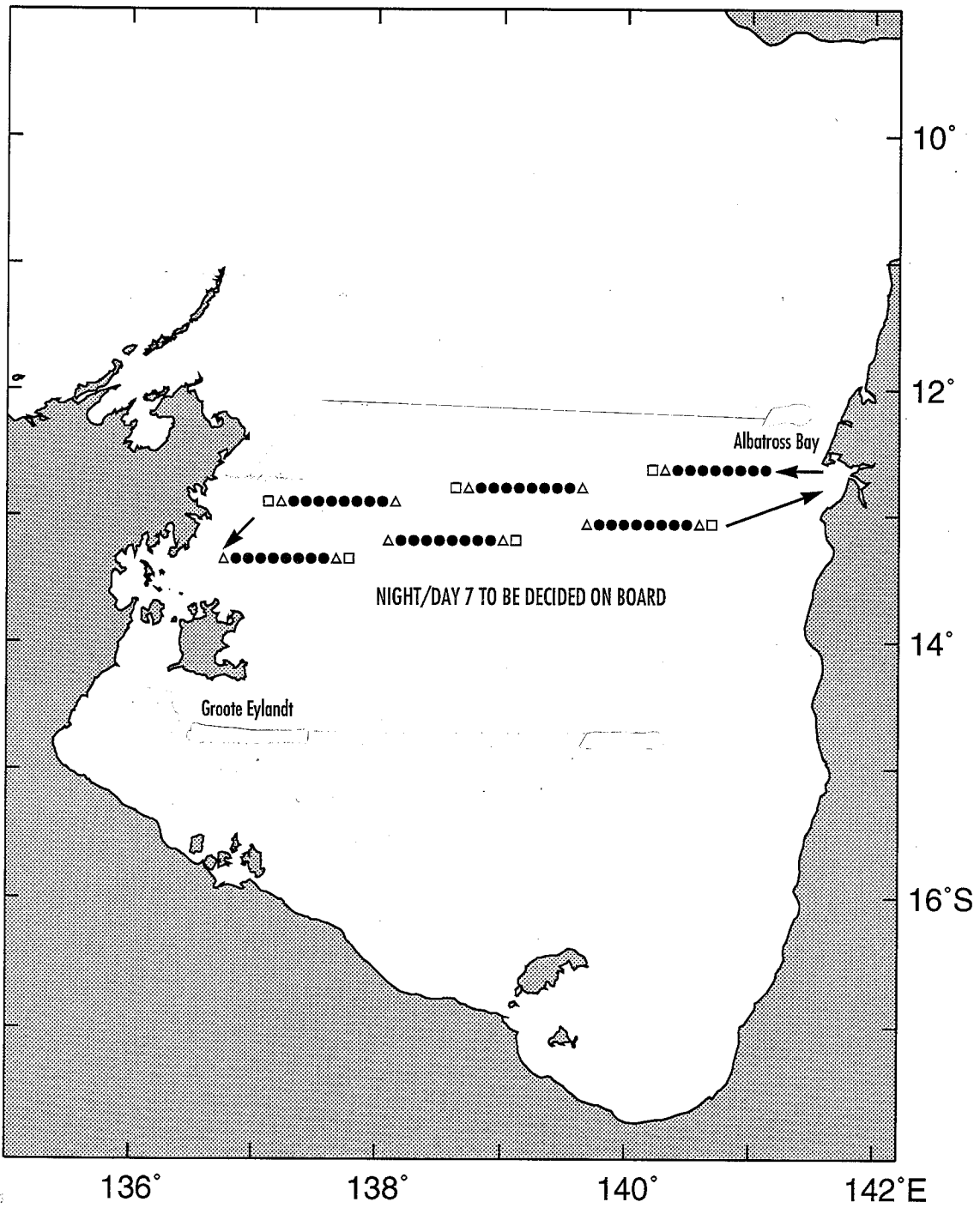


FIGURE 1. THE CRUISE TRACK AND TRAWL SITES (●) FOR THE PAIRED FLORIDA FLYER PRAWN NETS FOR SS5/95. Δ = SEDIMENT SAMPLES; □ = CTD WATER SAMPLES.

APPENDIX A

TABLE 1. STARTING COORDINATES FOR EACH TRAWL STATION. NPF = NORTHERN PRAWN FISHERY. "NIGHT 7" WILL BE CHOSEN DURING THE CRUISE ON THE BASIS OF WHEREVER MAXIMUM CATCHES OF *PENAEUS SEMISULCATUS* OCCUR.

	NPF Log Book Grid no.	LATITUDE	LONGITUDE
night 1	2610	12° 39'	141° 03'
	2609	12° 39'	140° 57'
	2608	12° 39'	140° 51'
	2607	12° 39'	140° 45'
	2606	12° 39'	140° 39'
	2605	12° 39'	140° 33'
	2604	12° 39'	140° 27'
	2603	12° 39'	140° 21'
night 2	2795	12° 45'	139° 33'
	2794	12° 45'	139° 27'
	2793	12° 45'	139° 21'
	2792	12° 45'	139° 15'
	2791	12° 45'	139° 09'
	2790	12° 45'	139° 03'
	2789	12° 45'	138° 57'
	2788	12° 45'	138° 51'
night 3	2880	12° 51'	138° 03'
	2879	12° 51'	137° 57'
	2878	12° 51'	137° 51'
	2877	12° 51'	137° 45'
	2876	12° 51'	137° 39'
	2875	12° 51'	137° 33'
	2874	12° 51'	137° 27'
	2873	12° 51'	137° 21'
night 4	3368	13° 21'	136° 51'
	3369	13° 21'	136° 57'
	3370	13° 21'	137° 03'
	3371	13° 21'	137° 09'
	3372	13° 21'	137° 15'
	3373	13° 21'	137° 21'
	3374	13° 21'	137° 27'
	3375	13° 21'	137° 33'
night 5	3281	13° 15'	138° 09'
	3282	13° 15'	138° 15'
	3283	13° 15'	138° 21'
	3284	13° 15'	138° 27'
	3285	13° 15'	138° 33'
	3286	13° 15'	138° 39'
	3287	13° 15'	138° 45'
	3288	13° 15'	138° 51'
night 6	3196	13° 09'	139° 39'
	3197	13° 09'	139° 45'
	3198	13° 09'	139° 51'
	3199	13° 09'	139° 57'
	3100	13° 09'	140° 03'
	3101	13° 09'	140° 09'
	3102	13° 09'	140° 15'
	3103	13° 09'	140° 21'
Night 7	extra trawls	in area of highest prawn abundance	