

CSIRO DIVISION OF FISHERIES

October 1993

CRUISE PLAN SS 7/93

FRV SOUTHERN SURVEYOR

DARWIN TO CAIRNS

27 OCTOBER - 29 NOVEMBER 1993

ITINERARY

Leg 1

Departure: Darwin 18:00 h on Wednesday October 27, 1993.

Return: Weipa 12:00 h on Friday November 12, 1993.

Leg 2

Departure: Weipa 18:00 h on Friday November 12, 1993.

Return: Cairns 0900 h on Friday November 29, 1993.

AREA OF OPERATION

Leg 1

Northern Gulf of Carpentaria (Figure 1). The 10 x 10 nm blocks for the Environmentally Friendly Net (EFN) comparisons have been sited in areas of known commercial species abundance both in the western and eastern Gulf of Carpentaria.

Leg 2

Commercial prawn grounds around Princess Charlotte Bay on the Queensland east coast between 14° and 14°30'S (Figure 2).

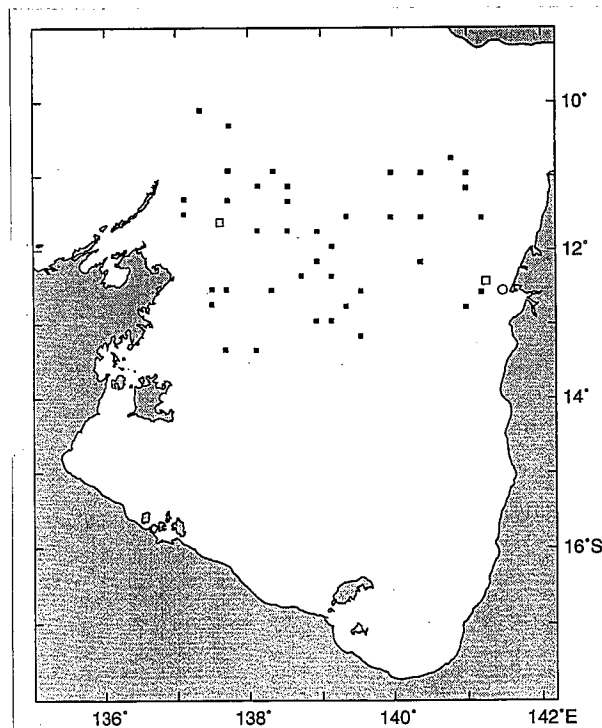


Figure 1. The sequence of stations planned for the commercial fish biomass survey during the first leg. Environmentally Friendly Net trials are planned at random locations within the EFN block in the north western Gulf of Carpentaria.

- fish biomass survey sites
- EFN trials locations
- MBT study site

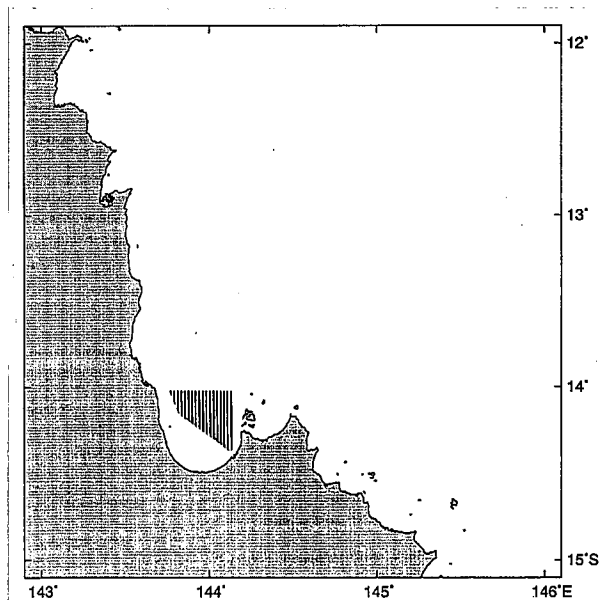


Figure 2. Location for the by-catch reduction prawn trawl trials to be conducted around Princess Charlotte Bay prawn grounds. Some EFN trials will be continued in this vicinity to assess the effectiveness of the EFN at reducing benthos in the fish trawls.

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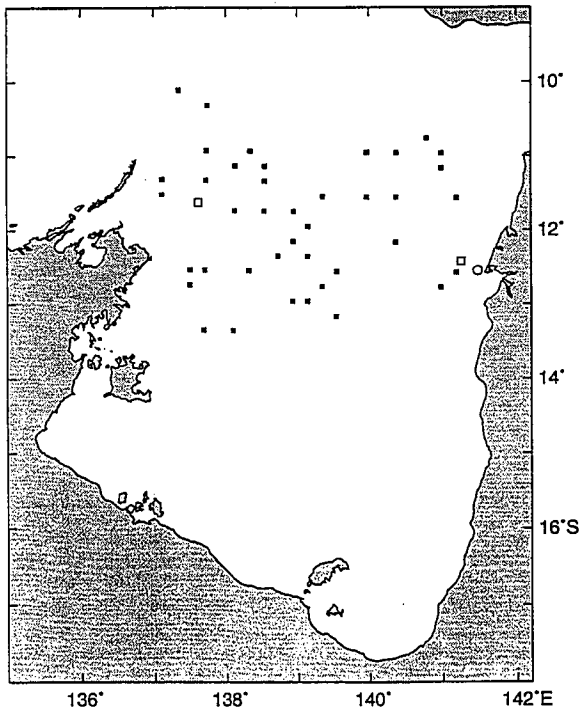


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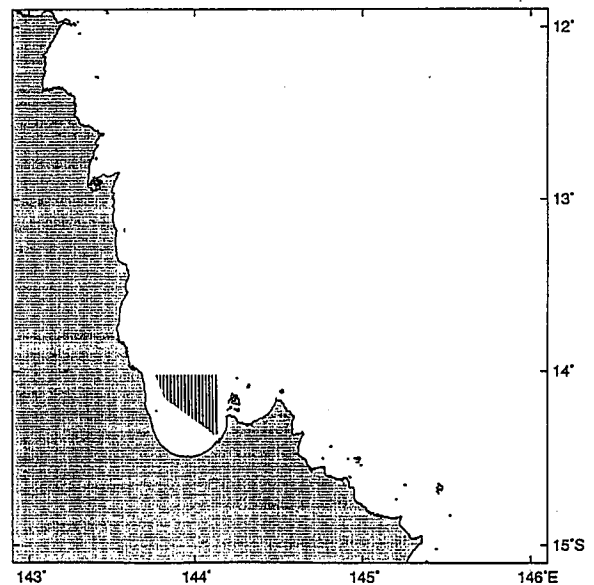


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RESEARCH BACKGROUND

Leg 1

Leg 1 of the cruise contains three discrete components. The first component is the continuation of the EFN trials initiated on Leg 2 of cruise SS 1/93. The EFN has been extensively modified by the Australian Maritime College (AMC) and Northern Territory Fisheries Research and Development Branch after problems with stresses in the net and towing geometry were encountered during SS 1/93. Again, this net will be towed at different heights off the bottom and its impact on bottom structure and fish catch compared to a standard demersal fish trawl (Engels high-rise). The EFN is the recommended net for the Gulf of Carpentaria Fish Trawl Fishery.

The second component of Leg 1 is the Lutjanid and Lethrinid biomass survey across the northern GOC using a Frank and Bryce net. This is a continuation of fish stock assessments carried out in the GOC in three other cruises, SS 3/90, SS 5/91 and SS 1/93. The information, together with the results of similar work carried out by NT Fisheries in the Arafura Sea, will be used by the Australian Fisheries Management Authority to assess total allowable catches (TAC's).

The third component of Leg 1 is the night trawl with the multi-level beam trawl. (MBT) This net is used to determine how high off the bottom the prawns are entering the net. If an insignificant number are caught in the top level net, then it may be possible to further reduce by-catch by reducing the head-rope opening height of prawn nets. Trawls will be done at night in prawn grounds adjacent to the second EFN location in the north eastern GOC.

Leg 2

Leg 2 is mainly dedicated to work on the Fisheries Research and Development Corporation (FR&DC) funded project on by-catch reduction in prawn (and fish) trawls in northern Australia. It is a joint project with the AMC and NT Fisheries and is the first cruise for the project. The AMC and NT Fisheries have developed the various codends for the Florida Flyer prawn nets and a standard net will be pair-towed with the trial net. Nets to be tested have square mesh codends rather than standard diamond mesh with the intention of enabling fish by-catch to escape the codend, but still retain the target prawn species. To this end, various sizes of square mesh will be used. Both standard and trial nets will have codend covers fitted to retain by-catch escapees which will be examined for physical damage which may affect their survival. In addition, a multi-level beam trawl (MBT) (4 m) will be used to determine the height off the bottom that non-target fish species and target prawn species enter the MBT net. Some day EFN trawls will be carried out over sites with sufficient benthos for comparisons of bottom structure retention.

CRUISE OBJECTIVES

Leg 1

- 1 To make random trawls of areas known to support commercial fish species, using both a demersal Engels high-rise net (Engels) and an EFN. These should continue for 10 days, half in the north western GOC and half in the north eastern GOC.
- 2 To document the benthic community at these comparison trawl sites with a 3 m Church dredge to compare the relative impact of each fish trawl net on the bottom structure.
- 3 To record the EFN opening and distance from the bottom visually with a video camera mounted on the wings of the net.
- 4 To trawl at randomly selected sites in the Gulf of Carpentaria with a Frank and Bryce net to survey the abundance of commercial species of Lutjanids and Lethrinids.
- 5 To complete as many multi-level beam trawls as possible at night during the last days of EFN trials in the eastern GOC near Albatross Bay.
- 6 To measure the salinity, temperature and turbidity at the surface and bottom.
- 7 To test proposed fish damage assessment routines for use in the second leg to quantify visible injuries on fish that have passed through prawn trawl codends (escapees).
- 8 To collect tissues from commercial fish species for population genetics studies.

Leg 2

- 1 To test alternative codends and the escapement of non-target fish species using standard Florida Flyer prawn nets with codend covers to collect escaping non-target fish.
- 2 To assess the height of prawns and by-catch species off the bottom when trawled by means of a multi-level beam trawl.
- 3 To assess damage to by-catch escapees retained by the codend covers on the prawn nets.
- 4 To obtain daytime video images of the prawn by-catch while trawling by attaching video cameras to the net.
- 5 To continue daytime EFN trials where suitable benthos can be found near the prawn grounds.
- 6 To obtain video images of EFN opening and relation of foot-rope to the bottom.
- 7 To collect samples of *Lutjanus malabaricus* and *Lutjanus sebae* for population genetics studies.
- 8 To collect specimens for the I. S. R. Munro Fish Collection in Hobart.

CRUISE PLAN

Leg 1

This leg has two components:

A. Comparison of Environmentally Friendly Net:

This component of the work was initiated on SS 1/93 and should be completed during this leg. The sampling strategy will be similar to that on SS 1/93 with eight sites (2x2 nm grids) selected at random from 25 such sites in the 10 x 10 nm EFN block (Figure 1). Each of the four treatments (net conformations) is used over the same eight sites in a 24 hour period and the same sites are sampled at the same time of day to avoid diurnal effects. The EFN will be towed on the bottom, 0.5 and 1.5 m off the bottom. The Church dredge will be used to indicate the relative abundance of benthos (bottom structure). The intention is to compare the effects of the EFN and the Engels high-rise trawl nets on the bottom structure (degree of perturbation and retention) and their relative efficiencies at catching fish.

The north western and north eastern areas of the GOC have been chosen because of the likelihood of finding lethrinids and lutjanids as well as some benthos such as sponges and algae. At each site the following operations will be carried out:

- 30 minute fish trawl (Engels or EFN)
- 15 minute Church dredge for bottom structure
- video taping of EFN opening and height off bottom, subject to turbidity.

The fish will be identified, counted and weighed. Length frequencies of the commercial species will be recorded. Benthos from both the trawl nets and the dredge will be sorted into broad categories, counted and weighed.

B. Fish Biomass Estimates:

Frank and Bryce fish trawls (30 minutes) at 40 randomly chosen stations to obtain estimates of the biomass of commercial species of lethrinids and lutjanids in the fishing zone of the GOC. This study is the continuation of an ongoing biomass survey and involves trawling only and should take four to five days.

C. Multi-level Beam Trawl:

The multi-level beam trawl (MBT) will be used at night on prawn grounds adjacent to the second EFN trial location in the north eastern GOC. Trawls will be for 30 minutes, but if prawn catches are too low, this may be extended to 60 minutes. This is part of the by-catch study and is designed to show if prawns enter the net at significantly different heights off the bottom. The only limitation on this operation is that the MBT will operate reliably in depths up to 20 m.

Leg 2

This is the first cruise of the FR & DC funded by-catch reduction project. The first priority is to describe the non-target species that escape from the codend of a normal prawn net and compare it to those that escape from various codends with square meshes. The focus will be on the tiger prawn fishery (*Penaeus esculentus*) around Princess Charlotte Bay between 14° and 14°30'S. Up to seven (time permitting) treatments are planned for the comparisons using 30 minute, paired tows with a standard Florida Flyer configuration. All this work will be conducted at night.

During the days three other aspects of fish and prawn trawls will be investigated:

- effectiveness of the EFN at reducing benthos by-catch, including some video footage
- video of fish by-catch in prawn trawls
- assessment of damage to escaped by-catch caught in the prawn codend covers.

PERSONNEL

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

Leg 1

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

Leg 2

Mr John Salini (Cruise Leader)
Mr David Brewer (second shift leader)
Mr Steve Eayrs (AMC)
Mr Graham Baulch (NT Fisheries)
Mr Lindsay MacDonald
Mr Marcus Strauss (AMC)
Ms Margaret Farmer
Ms Patricia Graham
Mr Carlos Souris
Mr Gordon Yearsley
Mr Rik Buckworth (NT Fisheries)
Dr Yougan Wang

CONTACTS

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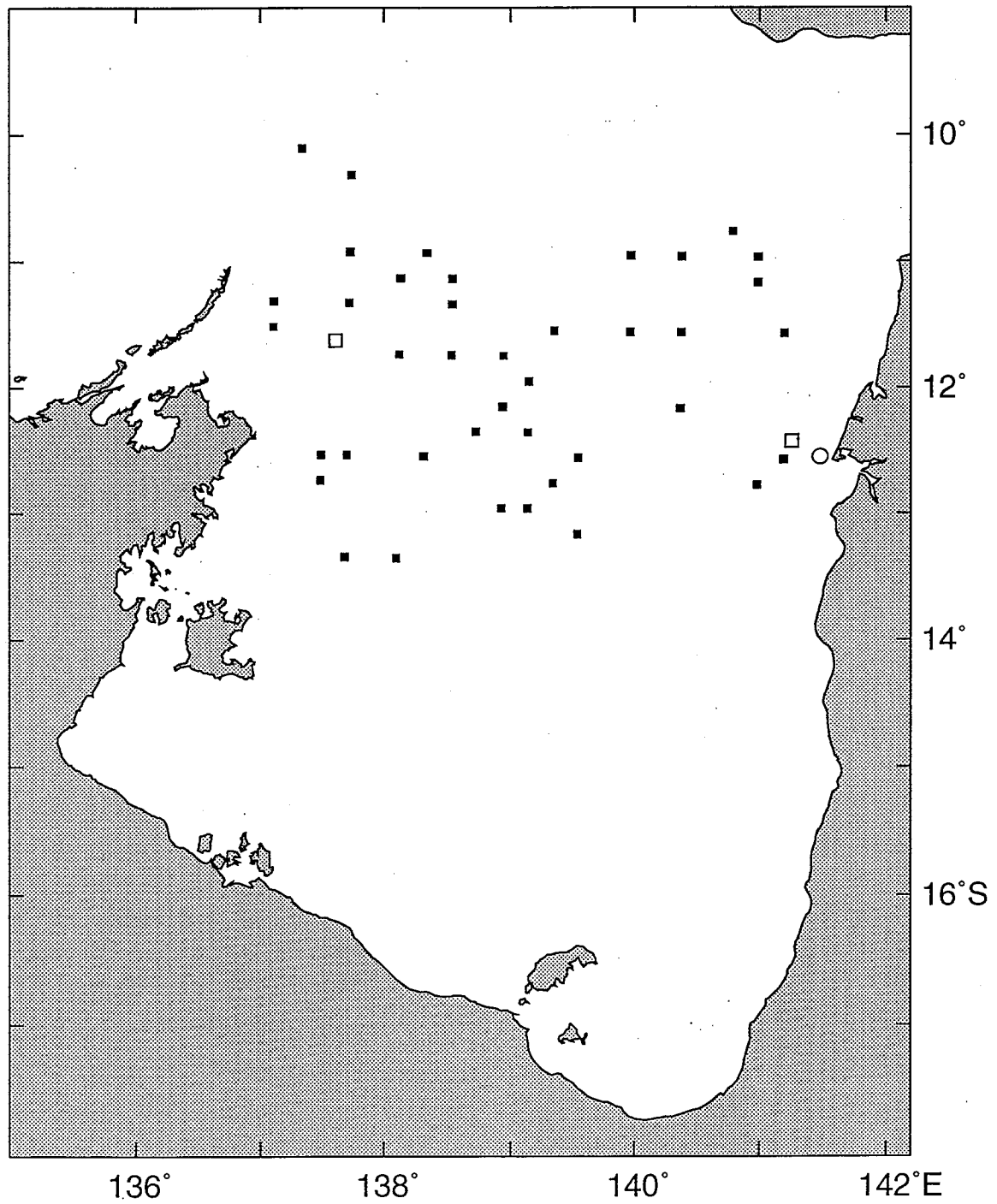
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P. C. Young Date:
Chief, CSIRO Division of Fisheries

DISTRIBUTION

Normal circulation
Cruise participants

SS793 Leg 1 Biomass and EFN Sites



SS793 Leg 2 Study Site

