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**CSIRO**

**DIVISION OF FISHERIES**

**CRUISE PLAN**

**SS3/93**

**HOBART TO HOBART**

**9 APRIL – 22 APRIL 1993**

**FRV  
SOUTHERN  
SURVEYOR**



## Itinerary

Depart Hobart: 0830 h Friday, 9 April 1993\*

Arrive Hobart: 1700 h Thursday, 22 April 1993\*

\* *Southern Surveyor* may arrive in Hobart from Darwin earlier than scheduled. If so, we will sail as soon as the vessel is loaded and refuelled.

## Area of Operation

South of Tasmania in the vicinity of Pedra Branca (see Figure 1).

## Research Background

This cruise will examine the productivity of the mid-slope region near Pedra Branca, southern Tasmania, and the processes supporting the rich fisheries of this area. In particular, the cruise will examine near-surface primary productivity, the flux of material from the near-surface to deep water, the vertical migrations of organisms in the water column, advection of material into the area, and the trophic pathways from primary producers to commercial fishes. This autumn cruise is the last in a series: the first three cruises (SS 2/91, SS 1/92, and SS 4/92) were completed in winter 1991 (SS 2/91), summer 1992 (SS 1/92), and spring 1992 (SS 4/92) respectively.

## Cruise Objectives

- 1 To determine the day/night vertical distribution of zooplankton, and midwater and demersal nekton using replicated, day/night demersal, midwater and plankton tows.
- 2 To examine the diet of the main fish and zooplankton species by analysing their stomach contents and stable isotopes, as the basis for determining the general trophic structure at mid-slope depths, the vertical distribution of feeding patterns, and the resulting vertical flux of material.
- 3 To determine water mass structure in the sampling area by making three cross-slope CTD transects.
- 4 To measure zooplankton biomass, primary productivity and the concentration of chlorophyll a at the trawl site and on the cross-slope transects.
- 5 To continue the study of currents at the Pedra Branca site (begun during SS2/91) by retrieving and redeploying a current meter mooring.

- 6 To investigate the flux of detritus through the water column by deploying moored and free-floating sediment traps.
- 7 To estimate the vertical biomass distribution and its daily vertical flux through the water column using acoustics and net sampling.
- 8 To test and calibrate the light towed body.

## Cruise Plan

The cruise is designed to describe the food chain that supports orange roughy and other deepwater fishes at mid-slope depths and to investigate the mechanisms that transport production from near-surface to near-bottom layers and from inshore or offshore onto the slope. The study will be made off southern Tasmania in the region of a large orange roughy fishery and presumed feeding aggregation. The site is in ~1000 m water depth.

The cruise will be divided approximately equally between 1) sampling of the fish and plankton to determine their vertical distribution and diurnal movements and to obtain samples for trophic analyses; and 2) sampling to determine the vertical and horizontal distribution of physical, chemical, and biological properties of the water column. The sampling regime will include the following:

- 1 There are two days of sampling allocated to determine the vertical distribution of zooplankton and small midwater fishes with the opening-closing EZ net (350 mm mesh). The tows will sample 9 depth strata (at 100 m depth strata between the surface and 900 m) with 20 min tow duration per stratum. Each series of tows will take about 4 hr, and the tows will be carried out during hours of full daylight (0740 - 1640) and darkness (1840 - 0540); periods of dawn (0540 - 0740) and dusk (1640 - 1840) will be avoided.
- 2 There are 4 days sampling allocated to determine the depth distribution of mid-water fishes. An IYGPT trawl with the MIDOC codend system will be used to sample 125 m depth strata from the near-surface to 900 m. Each stratum will be trawled for 30-45 min. The O/C net system will be deployed twice during each day and night period, and can sample 4 strata per cast.
- 3 The target strength distribution of the midwater and demersal strata will be sampled acoustically in conjunction with the net sampling in order to relate trawl and acoustic samples.

- 4 There are 28 hours allocated to sampling the demersal fishes using the Engels high-rise trawl. Seven trawls each of 30 min duration and will be carried out at 4 hourly intervals.
- 5 Three CTD transects will be run: one runs through the trawl site, and the others are at ~30 nm spacing on each side of the central transect. The 10 stations per transect will be at distances of ~3 and 6 nm inshore of the shelf break, at the shelf break, and 3, 6, 10, 15, 20, 25, and 30 nm offshore of the shelf break. Samples will be taken for salinity, oxygen, nutrients, chlorophyll, particle size analysis, and primary production at depths of 0, 25, 50, 75, and 100 m, with additional samples for salinity, temperature, oxygen, nutrients, and particle size analysis at 250, 500, 750, and 1000 m depth. Two additional stations will be occupied on the western transect at 45 and 60 nm offshore. Zooplankton biomass will be estimated from drop net samples. Fluorescence and light measurements will be made with the Seacat profiler. The spectral radiometer will be deployed at selected stations.
- 6 To estimate within-site variability in chlorophyll, nutrients, and primary production a 24 hour station will be occupied. A free-drifting sediment trap will be deployed at the beginning of the station and followed for 24 hr to compare the vertical flux of detritus and primary production. A 20 min CTD cast to 200 m will be made every 6 hr with samples taken for chlorophyll-a, nutrients, particle size analysis, and primary production. Drop net samples will be taken to examine diel variability of zooplankton biomass in the upper 100 m. The seacat profiler and fluorometer will be deployed after each CTD cast to give a light and fluorescence profile.
- 7 The current meter and sediment trap deployed in November, 1992 will be retrieved and redeployed until January 1994, providing data on long-term water movements and the vertical flux of detritus at mid-slope depths.
- 8 The light towed body will be tested when weather conditions permit.

## Personnel

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

Brian Griffiths (Cruise Leader)	R Griffiths (from 14 April)
A Williams (until 14 April)	S Garland
R Kloser	C Bulman
M Sherlock	C Rathbone
M Lewis	A Terauds (University of Tasmania)
D McKenzie	Q Nguyen
R Plaschke (from 14 April, Division of Oceanography)	C Sutton (until 14 April)

## Contacts

For further information about this cruise contact:

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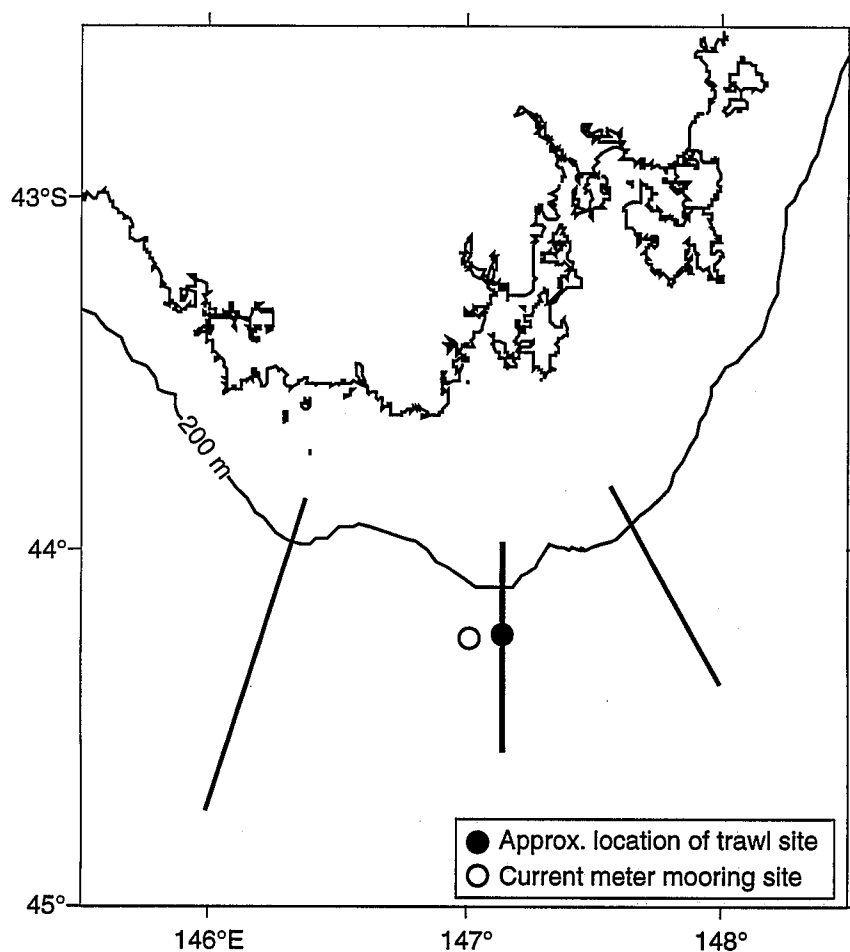
**Date: 29 March 1993**

## Distribution:

Normal distribution  
Cruise participants

Appendix 1: Cruise Time Estimates

Activity	Time (hours)
<b>Biological oceanography</b>	
<i>(Total time: 7.5 d = 180 h)</i>	
Complete western transect	33
Travel to central transect	6
Complete central transect	25
Travel to eastern transect	5
Complete eastern transect	25
Spectral radiometer deployments (4 h/transect)	12
Steam to Hobart	6
Weather allowance	24
Trawl site jobs:	
Find mooring	6
Recover and redeploy mooring	10
24 hour production station; deploy and recover free-floating sediment traps	28
<b>Fisheries oceanography</b>	
<i>(Total time: 7.5 d = 180 h)</i>	
On trawl site:	
Zooplankton sampling (EZ net)	48
Demersal trawling	28
Midwater trawling (MIDOC net)	
+ acoustic measurements of midwater layers	84
Steam from Hobart	8
Weather allowance	8



**Figure 1.** Area of operations for Leg 1, SS 3/93 showing the location of CTD transects. CTD stations are at 6 nm and 3 nm inshore of the shelf break, at the shelf break, and 3, 6, 10, 15, 20, 25, and 30 nm offshore of the shelf break. On the western transect, additional stations at 37 and 45 nm offshore of the shelf break will be sampled.