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**CSIRO MARINE LABORATORIES**  
**Division of Fisheries**

**1991 Research Vessel Program**

**FRV Southern Surveyor, Cruise 3/91, Transit Leg 1**

**Staff**

D. McKenzie (CSIRO Hobart) (Cruise Leader)  
M. Sherlock (CSIRO Hobart)

**Duration**

Depart Hobart 1005 23 August 1991  
Arrive Fremantle 1000 31 August 1991

**Locality**

Great Australian Bight. Transect south of Tasmania to Cape Leeuwin, W.A., then to Fremantle, W.A.

**Objectives**

1. To get the underway salinity, temperature and fluorescence system going and to establish operating, calibration and maintenance procedures for these instruments.
2. To measure surface salinity, temperature and fluorescence and to collect surface nutrients across the Sub-Tropical Convergence in late winter.
3. To drop XBT's at selected sites to determine the temperature structure in the upper 700 m of the water column.

**Cruise Narrative**

The vessel sailed from Hobart at 1005 on the 23 August into light seas and wind from the NNW at force 3. Liferaft and fire drills were held at 1300 after which the underway sampling system and the logging system were started. After a test of the portable XBT launching system the CSIRO crew began a 12-on/12-off watch to allow sampling to continue around the clock. As we crossed over the shelf break the first XBT was dropped and from there to Cape Leeuwin we dropped XBT's at approximately 30 NM intervals with the assistance of a crew member.

By that evening we were pitching and rolling heavily in a steep swell with winds force 5/6.

From 24-29 August we steamed into rough seas and very heavy swells with winds ranging from force 7 to force 10. Conditions were very difficult and at times it was impossible to successfully launch XBT's due to the high winds.

An hourly log and plots of underway data were kept and nutrients collected at each XBT site. A range of samples for salinity and chlorophyll calibration was also collected.

The seawater inlet temperature sensor was found to have a crack in the probe which had allowed water to enter causing irreparable damage. The power supply to the met. station light sensor was also damaged by water when the wheelhouse became flooded. Matt Sherlock arranged for the replacement of these items, however we were unable to collect any data from these sensors during the XBT transect.

During the morning of 30 August (local time) we crossed the shelf break and dropped the last XBT for the transect, although we continued collecting chlorophyll calibration samples. The wind had at last dropped to force 5 from the NW and seas were slight to moderate.

We continued to Fremantle arriving at 1000 Saturday 31 August two days behind schedule.

## Results

During the transect 45 XBT's were dropped at approximately 30 NM intervals. At each XBT drop surface a seawater sample was collected and frozen for subsequent analysis for phosphate, nitrate and silicate. Thirty salinity samples were collected and twelve samples were filtered for estimation of chlorophyll a. The underway logging system recorded navigation data, meteorological station data and thermosalinograph and fluorometer data throughout the cruise.

Matt Sherlock installed a remote terminal in the chemistry laboratory which displayed the logging system data and a remote display duplicating the winch drivers display of CTD or EZ net depth. Both of these displays will lessen the problems of communication with the op's room identified during SS2/91.

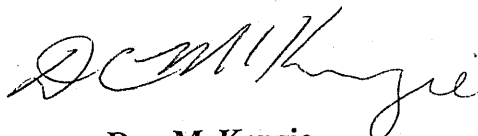
## Comments

This was an exploratory cruise using the Southern Surveyors transit to Fremantle. None of the tasks being carried out required stopping the ship and in fact for most of the transit it would have been impossible for instance to have deployed the CTD or Seacat profiler. Conditions were so difficult that even if only surface water had been collected the operation of equipment such as the Productivity Incubator System or PSA system would have been doubtful. However, with the underway system set up and monitored, surface temperature, salinity and fluorescence data were collected continuously. Surface nutrient samples were collected regularly and the borrowed portable XBT launching system allowed for the collection of temperature profile data under most conditions.

It would be useful to have a permanent XBT launching system on board if XBT's are to be used again.

Once the calibration samples are analysed a calibration procedure for the underway thermosalinograph and fluorometer system will be produced and the system can then be routinely calibrated on each cruise requiring these data.

The other cruise objectives were achieved and as usual the ships' officers and crew were helpful whenever needed and showed interest in the work being done.



**Don McKenzie**  
Date: 31 August 1991



Initialed: P C Young (Chief of Division)

**Distribuiton:**

Normal Distribution

D McKenzie

M Sherlock

A Pearce (Division of Oceanology)

R Bailey (Division of Oceanography)

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**CSIRO MARINE LABORATORIES  
Division of Fisheries**

**1991 Research Vessel Programme**

**F.R.V. Southern Surveyor, Cruise SS3/91 Leg 2**

**Cruise Title: The Ecology of the Phyllosoma and Puerulus Stage of the Western  
Rock Lobster and the Leeuwin Current**

**Staff**

- B Phillips (Scientist-in-Charge)
- S Braine
- D Wright
- J Garvey
- D McKenzie
- R Griffiths
- M Sherlock
- P Jolly
- A Pearce (Division of Oceanography)
- M Jessop-Jolly (Volunteer )

**Duration**

- Leg 2: Depart Fremantle 0800h Sunday 1 September 1991
- Leg 2: Arrive Geraldton 1800h Tuesday 10 September 1991

**Locality**

West Coast of Australia, Fremantle to Geraldton.

**Leg 2 Objectives**

1. Sample puerulus and phyllosoma distributions of the western rock lobster with depth over the outer continental shelf and slope in the vicinity of the Abrolhos Islands, in relation to the Leeuwin Current. Samples will be taken with both the EZ net system and simultaneously with a side mounted surface net.
2. Obtain hydrographic sections across the Leeuwin Current, to examine the structure and dynamics of the flow. Samples will be taken through the water column in the upper 500 m off the continental shelf and from surface to the bottom on the shelf, and will be processed for temperature/salinity/nutrients.

**Cruise Narrative**

The vessel departed from Fremantle at 0800 on Sunday 1 September after two days delay caused by severe weather conditions encountered by the vessel during the trip across the Great Australian Bight.

A fire and muster drill was conducted at 1030 h on 1 September.

After examination of a satellite image clearly showing the position of the Leeuwin Current, obtained on 30 August, it was decided to steam to a position at 30 30 S and 114 20 E. On arrival at this station at 1845 a CTD station was conducted, and the vessel then made a transect along 30 30 S using the EZ net and a surface net operated from a boom on the starboard side. The plan called for trawls for both phyllosomata and puerulus to be made at stations offshore of the Leeuwin Current, within the Current, and inshore of the Current. Unfortunately the surface net had bridle troubles and only fished on two out of five occasions, and the EZ net failed completely and none of the nets opened. The EZ net worked correctly on the second launching.

A transect using CTD casts was made across the Leeuwin Current back along 30 30 S extending some 50 km beyond the outer boundary of the Current. The vessel then steamed north east on a line to intersect the Current to an inshore point near Knobby Head. Ten CTD casts were made along this line. The vessel then steamed west along 29 45 S, again making CTD casts.

On the night of 3 September seven XBTs were launched across the edge of the continental shelf as the vessel steamed along 29 45 S. Two hauls were also made with the EZ net and surface net as we crossed the Current. On the first of these, the EZ net did not operate. The vessel then continued steaming along 29 45 S making CTD casts out to 113 30 E.

A series of plankton stations were then made travelling westward back along 29 45 S. Four sites were selected. The starting positions of the transects are given:

- i) Beyond the Current influence. ( 29 40 S 113 30 E)
- ii) On the outer edge of the Current (29 40S 114 05 E)
- iii) Within the Current ( 29 39 S 114 09 E)
- iv) On the shelf, not in the Current ( 29 39 S 114 27 E)

Day and night net hauls were made using both surface net and the EZ sampling system to examine the vertical movement of the phyllosoma larvae and puerulus. A CTD cast was made at the beginning of each sampling transect and then after every two net hauls along the transect.

EZ hauls were initially made at depths from 500m to the surface in daylight and from 200m to the surface at night. Additional samples were then taken at night between 100m and the surface beyond the shelf, and between 45 m and the surface on the shelf.

Large catches of phyllosoma larvae were made at the surface during the night at both the station beyond the Leeuwin Current and the station within the Leeuwin Current on the nights of the 3rd to the 5th of September. Sampling at the station on the shelf on the night of 6th September showed that the phyllosoma larvae were not present on the shelf. No puerulus were caught on the shelf and only three in the earlier sampling off the shelf.

On the 7th September a series of offshore to inshore transects was commenced. Initially in daylight to define the day time distribution, they were then used to define the distribution of the phyllosoma larvae in the upper 30m and also the inner boundary of the Leeuwin Current.

An intense storm on 8th September forced us to shelter in the lee of the southern group of the Abrolhos Islands for 24 hours.

During the day of 8th a series of daylight samples were taken offshore to further delineate the daytime distribution of the phyllosoma. Sampling on the nights of the 9th and 10th September was directed to defining the distribution of the puerulus stage on the shelf. On the 9th, samples were taken travelling inshore along 29 20 S and on 10th, inshore of the Abrolhos Islands.

On 10th September at 1300h, there was a meeting of all scientific staff to plan the arrangements for the conclusion of the cruise and the completion of all documentation. As a result of an unfortunate accident to Dr Phillips later that afternoon, the vessel had to head for Geraldton immediately for medical treatment, and came alongside at 1800h. The scientists stayed aboard overnight, and as planned, there was an official inspection of all cabins and laboratories at 0700h on the 11th September.

Overall the cruise was extremely successful. All the scientific staff worked hard and performed their duties with diligence. This was in large part due to the professionalism of the Master, officers and crew of the vessel who were at all times cooperative and enthusiastic to see that optimum results were achieved, regardless of the weather.

B Phillips (Scientist-in-Charge)  
Date: 11 September 1991

*pcy* 12/9/91  
Initialled P C Young (Chief of Division)

**Distribution:**

## Normal Distribution:

B Phillips (Scientist-in-Charge)

S Braine

D Wright

J Garvey

D McKenzie

R Griffiths

M Sherlock

P Jolly

A Pearce (Division of Oceanography)

M Jessop-Jolly (Volunteer)