

CSIRO MARINE LABORATORIES
Division of Fisheries Research

1991 Research Vessel Programme

F.R.V Southern Surveyor, Cruise SS 2/91 Leg 1

Staff:

- T. Koslow (Scientist-in-Charge)
- C. Bulman
- R. Kloser
- J. Young
- B. Griffiths
- P. Bonham
- D. McKenzie
- G. Critchley
- M. Sherlock
- A. Williams (Marmion)
- F. Boland (Division of Oceanography)
- P. Adams (Division of Oceanography)

Duration

- Leg 1: Depart Hobart 1000h 26 June 1991
- Leg 1: Arrive Hobart 1400h 16 July 1991

Locality

South and east coasts of Tasmania, around Maatsuyker Island, St. Patricks Head, and Flinders Island.

Leg 1 Objectives

1. To determine the vertical distribution throughout the diel cycle of zooplankton, midwater and demersal fishes at two sites in the midslope region off the Tasmanian coast using time series of demersal, midwater and plankton tows.
2. To examine the diet of the dominant fish and zooplankton species at the study sites through stomach content and stable isotope analyses, as the basis for determining the general trophic structure at mid-slope depths, the vertical distribution of feeding, and resulting vertical flux of material.
3. To carry out cross-slope CTD transects to determine water mass structure at the sites
4. To measure zooplankton biomass, primary productivity and the concentration of chlorophyll a at the sites and on the cross-shelf transects.
5. To investigate currents at one site by deploying moored current meters in the vicinity.

6. To investigate the flux of detritus through the water column using sediment traps on the current meter moorings.
7. To investigate the use of acoustics in conjunction with net sampling to estimate biomass fluxes through the water column.
8. To carry out measurements of acoustic absorption with depth.
9. To obtain qualitative samples of benthic macroinvertebrates at the two sites using a beam trawl.
10. To sample the vertical distribution of orange roughy eggs using the EZ net.

Cruise Plan

The cruise is designed to describe the food chain that supports orange roughy and other deepwater fisheries at midslope depths and to investigate mechanisms responsible for transporting production from near-surface to near-bottom layers. The investigations will be carried out at two sites off Tasmania: the southern (Maatsuyker) area, site of a major orange roughy feeding aggregation, and a site off the east coast (Flinders Island) which may be a major nursery ground.

Each study site will be located in about 1000 m water depth. At each site, five days will be devoted to sampling fish and plankton to determine their vertical distribution and to obtain samples for trophic analyses:

1. 48 hr sampling of the vertical distribution of zooplankton and small midwater fishes with the opening-closing EZ net (350 μ m mesh). The tows will sample 9 depth strata (at 100 m depth intervals between the surface and 900 m) with 0.33 hr tow-duration. Each tow will require about 4 hr, and the tows will be carried out every 6 hr throughout the 48 hr period.
2. 48 hr sampling of the depth distribution of midwater fishes. A pelagic Engels trawl will be used to sample the same depth strata as above, and the trawl duration at each stratum will be 0.75 hr. The full depth range will be sampled during each period of daylight and darkness.
3. 24 hr sampling of demersal fishes using an Engels high-rise trawl. Trawls will be of 0.75 hr duration and 3 will be carried out in daylight hours and 3 during the night.
4. Two trawls using the beam trawl will be made during dawn and dusk periods at each site to obtain samples of the benthic macrofauna. These will probably be done during the 48 hr midwater fish distribution study.

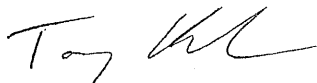
The EK 500 acoustic system will be used to estimate acoustically the distribution of biomass at these layers and the diurnal fluxes of biomass throughout the water column. Acoustic absorption will be measured by lowering a glass sphere and measuring the acoustic return with depth. This will be done opportunistically following a CTD cast.

Three CTD transects will be run in each area at thirty nautical mile spacing centred around the trawl site. There will be about 10 stations per transect, at distances of approximately 3 and 6 miles inshore of the shelf break, at the shelf break, and 3, 6, 10, 15, 20, 25, and 30 nautical miles 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, 100m, with additional samples at 250, 500, 750, 1000, the salinity minimum, 1500, and 2000m. Zooplankton biomass will be estimated from drop net samples. One transect will be run at Cape Bruny and Maria Island to link the two areas. Each transect will take about 18 hours. A CTD transect may be run at the spawning site near St. Patricks' Head in conjunction with the EZ net/orange roughy egg vertical distribution study.

A 24 hour productivity station will be run at each site to estimate the within-site variability in chlorophyll, nutrients, and primary production. This will be done during the 48 hour period set aside for midwater fish sampling. It will require one 20 minute dip with the CTD to 200 m every 4 hours, with samples being taken for chlorophyll, nutrients and primary production, as well as monitoring the degree of short-term, water-mass variability at each site. Drop net samples will be taken to examine the diel variability of zooplankton biomass in the upper 100 m of the water column.

Current meters and sediment traps will be deployed at the Maatsuyker site and retrieved later in the year. These will provide data on long-term water movements and the vertical flux of detritus at mid-slope depths.

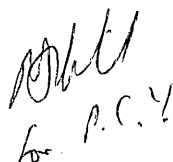
It is intended to sample the Maatsuyker site first, weather permitting, and then move north to Flinders Island. If the weather is poor, the east coast site will be sampled first.



T. Koslow (Scientist-in-Charge)

Date: 7/5/91

Initialled: P. C.. Young (Chief of Division)



Distribution:

Normal Distribution

T. Koslow

C. Bulman

R. Kloser

J. Young

M. Lewis

B. Griffiths

P. Bonham

D. McKenzie

G. Critchley

M. Sherlock

F. Boland (Division of Oceanography)

D. Edwards (Division of Oceanography)

A. Williams (Marmion)

D. Moriarity (Cleveland)

G. Gorrie (Director, Australian Fisheries Service)

Dr. M. Williams (Executive Director, Bureau of Rural Resources)

CSIRO MARINE LABORATORIES
Division of Fisheries Research

1991 Research Vessel Programme

FRV Southern Surveyor, Cruise SS2/91-Leg 2

Staff:

T. Koslow (Scientist-in-charge)
R. Kloser (Assistant cruise leader)
C. Bulman
C. Stanley
M. Sherlock
A. Williams
C. Crossley (U. Sydney)

Duration

Depart Hobart 1400 17 July 1991
Arrive Hobart 1000 6 August 1991

Location

Orange roughy spawning ground off St. Helens, NE Tasmania

Cruise objectives:

- 1) Conduct echo-integration acoustic surveys of the St. Helen's spawning aggregation of orange roughy.
- 2) Obtain in-situ target strength (TS) measurements of orange roughy using the split-beam transducer.
- 3) Determine the composition of demersal and mid-water acoustic marks around the spawning area using photography, trawling, and in-situ TS measurements.
- 4) Calibrate the hull-mounted and towed transducers, including a calibration of the towed transducer at depth.
- 5) Conduct preliminary experiments to measure the absorption of sound in sea water at 38 kHz.
- 6) Establish the dead zone height and density of fish within the dead zone by comparing hull-mounted and towed transducer returns.
- 7) Incubate orange roughy eggs at sea-level and mid-water pressures to determine development rate.
- 8) Examine the feasibility of tagging orange roughy.
- 9) Assess the sex ratio of orange roughy on the spawning ground in relation to depth and height above the sea floor.
- 10) Calibrate the deepwater camera with depth.
- 11) Compare packing density estimates obtained with the camera and acoustics.
- 12) Determine the buoyancy of orange roughy eggs through use of a graded density series of Ficoll solutions (C. Crossley, U. Sydney).

Cruise plan

The vessel will depart from Hobart and proceed to the orange roughy spawning area off St. Helens, Tasmania. At the beginning and end of the cruise, the vessel will anchor for ~12 hr in calm water off Port Arthur or Maria Is. to calibrate the hull-mounted echo sounders.

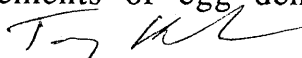
Over the spawning hill, an acoustic echo-integration survey will be carried out initially and twice more at ~5 d intervals. Surveys will consist of 6 transects, each 2.5 nm in length and arranged either in a rectangular grid or asterisk pattern. Surveys will be carried out with the towed body, which will be towed at ~5 kt. Expected time for completion of a survey: 6 hr.


The composition of acoustic marks will be examined following completion of the echo-integration surveys. This will be carried out through the use of the deepwater camera system, demersal and midwater trawl sampling, and examination of the target-strength distribution using the split-beam capability of the echo sounder. Examination of the target strength distribution would follow the echo-integration survey and would be carried out by repeating acoustic transects at 3 kt with the towed vehicle at varying heights above bottom so different acoustic layers may be examined. Target-strength sampling will be followed by trawl sampling, and by camera work where trawling is not feasible. These transects with the towed vehicle will enable us to satisfy several objectives: determine the target strength of orange roughy; assess the frequency composition of different target strengths (=species-groups?) within the main acoustic plume over the spawning hill; and assess the extent of the dead zone. The photographic sampling will enable us to compare acoustic and photographic estimates of packing density. Trawling will provide samples for determining the sex composition of the roughy and their reproductive condition; and will provide reproductively ripe-and-running individuals to carry out egg incubation and egg density experiments.

Several experiments will be conducted opportunistically that require a period of calm conditions. The tow-body transducer and camera will be calibrated at varying depths, and measurements taken of a standard acoustic target lowered through the water column to assess sound absorption.

Orange roughy obtained in good condition from a tow will be tagged, placed in a fish trap, returned to the bottom, and retrieved after 24-48 hours in order to assess the feasibility of tagging orange roughy in the future.

A plankton tow will be made to provide naturally-fertilized roughy eggs for further incubation and measurements of egg density.


Tony Koslow (Scientist-in-Charge)
7 May 1991


Initialled: P.C. Young (Chief of Division)

for

Distribution:

Normal distribution

T. Koslow

R. Kloser

C. Bulman

C. Stanley

M. Sherlock

A. Williams

C. Crossley (U. Sydney)

J. Bell (Fisheries Research Institute, NSW)

J. Lyle (Tasmania Department of Sea Fisheries, Tarooma)

J O'Regan
CSIRO Division of Fisheries
Hobart

CSIRO MARINE LABORATORIES
Division of Fisheries

1991 Research Vessel Program

F.R.V. Southern Surveyor, Cruise SS 2/91 Leg 3

Staff:

J. Young (Cruise leader)

T. Davis

V. Lyne

K. Sainsbury

C. Stanley

M. Sherlock

1 Biological Oceanography

1 OMS

Cruise Plan
SS 2/91
leg 3

Duration:

Depart Triabunna 1200 h 6 August 1991

Arrive Hobart 1200 h 10 August 1991

Location:

East of Tasmania in the area of the Japanese longline fishery

Objectives:

1. To make preliminary investigations of the hydrography of the area east of Tasmania in which the Japanese longline fishery is located.
2. To make preliminary investigations of the biological production in these waters in relation to the position of the longline fleet.

Cruise Plan:

This short cruise will make transects across the warm water filament in which the fishing fleet is located. Initially we will concentrate on mapping the physical structure (Temperature, Salinity) of the water column and the position of the scattering layer. We will also complete a number of midwater trawls at night above and below the thermocline to obtain a preliminary idea of the species composition of the fish and crustacean fauna present in the area.

Equipment Requirements:

To describe the physical and biological features of the area we will require the use of CTD casts, thermosalinograph, Seacat profiler, fluorometer, shipboard acoustics, bongo net and

midwater trawls (either Engel 308 or IYGPT).

Cruise Itinerary:

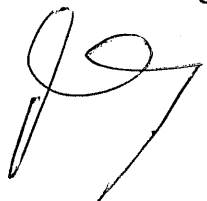
6 August 1991. After departing Triabunna we will steam eastward to the edge of the warm water filament, the position of which will be known from satellite imagery. We will make a transect from west to east through the filament concentrating in the area in which the fishing effort has been greatest. Underway we will make use of thermosalinograph and acoustics to map surface hydrography and the depth and strength of the scattering layer. Ten stations are planned at regular intervals. Each station will consist of a seacat profile cast with fluorometer. At the beginning, middle and end of the transect the seacat stations will be expanded to include bongo tows above and below the thermocline and a CTD cast (including chlorophyll) to 500m.

We will aim to be on the eastern side of the filament by the afternoon of 7 August. We will then return to the middle of the study area where, after completing a CTD cast, we will prepare for a night of midwater trawling. Midwater trawls will be made above and below the thermocline.

On the morning of August 8 we will steam south and repeat the sequence of the ten station transect followed by night-time midwater trawling. We aim to complete this work by about 0400 h, 10 August. We will then steam for Hobart to arrive by midday 10 August.

J. W. Young (Cruise Leader)
12 June 1991

Initialed: P. C. Young (Chief of Division)

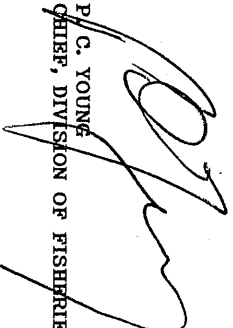
 17/6/91

17 June 1991

SCHEDULE, JUNE 1991 - JULY 1992

CRUISE NUMBER	PORTS	DATES 1991	SEA TIME,	TRANSIT TIME	TOTAL SEA TIME	PORT TIME	TOTAL PORT TIME	CHIEF SCIENTIST
	SEA AND PORT TIME FROM 1 SEPT 1990							
SS 1/91	DARWIN - ALBANY	17 JAN - 19 FEB	34		110		62	KOSLOW
SS 1/91	ALBANY - PORTLAND	19 FEB - 6 MARCH		15	125			
	REPAIRS - PORTLAND	7 MARCH - 29 APRIL				54	116	
SS 1/91	PORTLAND - HOBART	30 APRIL - 2 MAY	3		128			
	PORT PERIOD--HOBART	3 MAY - 25 JUN				54	170	
SS 2/91	HOBART - HOBART	26 JUN - 10 AUG 1991	46		174			KOSLOW
	PORT PERIOD--HOBART	11 AUG - 22 AUG 1991				12	182	
SS 3/91	HOBART - PERTH	23 AUG - 29 AUG		7	181			
	TOTALS, 1 SEPT 1990 - 29 AUG 1991				181		182	
SS 3/91	PERTH - GERALDTON	30 AUG - 11 SEPT	13		13			PHILLIPS
SS 4/91	GERALDTON - BROOME	11 SEPT - 10 OCT 1991	26	3	42			SAINSBURY
	PORT PERIOD-- BROOME	12 OCT - 13 NOV 1991				34	34	
SS 5/91	BROOME (GULF OF CARPENTARIA) BRISBANE-	14 NOV - 20 DEC 1991	28	9	79			BLABER
	PORT--BRISBANE	21 DEC 1991 - 15 JAN 1992				26	60	
SS 1/92	BRISBANE-HOBART	16 JAN - 20 JAN 1992	1	4	84			KLOSER
SS 2/92	HOBART - HOBART	20 JAN - 2 MARCH 1992	42		126			KOSLOW PARSLOW
	PORT--HOBART	3 MARCH -- 1 JUNE				91	151	
SS 3/92	HOBART--HOBART	2 JUNE - 12 JUNE 1992	11		137			DAVIS
	PORT--HOBART	13 JUNE - 6 JULY 1992				24	175	
SS 4/92	HOBART--HOBART	7 JULY - 27 JULY 1992	21		158			KOSLOW
	PORT--HOBART	28 JULY -						

P/C. YOUNG
CHIEF, DIVISION OF FISHERIES



18/6/91