CRUISE REPORT SS 02/94

February 17 – 25, 1994

CSIRO Division of Fisheries
Marine Laboratories
Headquarters
Telephone (03) 6232 5222
Facsimile (03) 6232 5000
E-mail: pirrone@ml.csiro.au
GPO Box 1538
Hobart Tasmania 7001
Australia

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CSIRO
AUSTRALIA

DIVISION OF **FISHERIES**

ITINERARY

Departure: Hobart 0800 Thursday, 17 February 1994.
Return: Hobart 0900 Friday, 25 February 1994.

AREA OF OPERATION

Tasmanian, Victorian and New South Wales coastal and offshore waters bounded by 36°S – 43°S and 148°E – 152°E.

RESEARCH BACKGROUND

The cruise covered three main components of work that related to, and further integrated projects within, both the Pelagic and Temperate and Deep Water programs.

Firstly, a joint sampling exercise examining the physical and biological structure of offshore waters was conducted between Tasmania and southern NSW. These areas are important fishing grounds for various tuna species including southern bluefin tuna. Sampling targeted frontal zones to investigate the importance of such features in structuring the distribution of larval fish, zooplankton, phytoplankton and midwater fish species (including important prey species of tuna and other pelagics). Recent studies by the Division's Pelagic Program in waters off eastern Tasmania, have revealed the importance of such offshore frontal zones. Subsequent analysis of the samples collected has also indicated that these areas may play a major role in structuring larval fish communities. In particular, large numbers of larvae of the commercially important jackass morwong were recorded up to 250 km offshore. Previous sampling has been restricted to the autumn/winter period. This cruise provided a summer comparison to previous data sets.

Secondly, the distribution of larval fish was examined in shelf waters off southern NSW and eastern Victoria. Sampling followed a series of transects established during SS 05/93 (leg 4) and thereby providing summer/winter comparison of spawning activity of commercial species in the area.

Finally, aspects of the demersal fish and invertebrate communities on the continental shelf in southern NSW and eastern Victorian waters were examined to similarly provide a summer/winter comparison to data collected on SS 05/93 (legs 2 & 3). This section was part of an ongoing study by the Division of factors affecting the abundance, species composition and productivity of SEF commercial fish populations.

CRUISE OBJECTIVES

1. Describe the physical oceanography of coastal and offshore waters between Tasmania and southern NSW to provide a summer comparison to autumn and winter data previously collected on SS O2/92 and SS O4/93.

2. Describe the summer distribution of ichthyoplankton with respect to major water masses and frontal zones in offshore waters of the south Tasman Sea.

3. Investigate the biomass of zooplankton and micro nekton within the area.

4. Investigate the broad scale cross-shelf distribution of ichthyoplankton in southern NSW and eastern Victorian waters.

5. Describe the summer cross-shelf fish and invertebrate assemblages in the vicinity of Eden for comparison with information collected during winter 1993 (SS O5/93).

6. Collect stomach contents and muscle and liver samples from fish of all available trophic levels for trophodynamic analyses for comparison with similar collections made on SS O5/93.

7. Collect benthic sediment samples for analysis of phytoplankton pigments and breakdown products.

8. Continue benthic mapping of habitat types in the SEF using acoustic methods.

SECONDARY OBJECTIVES

1. Collect specimens of oreosomatids (oreos) from 400–1000 m off southern NSW for genetic and taxonomic analysis.

2. Collect jack mackerel (*Trachurus declivis*) and specimens of other *Trachurus* species for genetic analysis.

3. Collect specimens of other SEF species for taxonomic analysis.

4. Opportunistically rear commercial and non commercial fish species to confirm identifications of field collected eggs and larvae.

RESULTS

1. The position of East Australian Current (EAC), Sub-Antarctic Water (SAW) and the frontal zone separating the two water masses was determined from a composite NOAA 11 satellite image of sea surface temperature for the period immediately prior to the cruise (13–16 Feb). The EAC extended as a broad offshore band between southern NSW and off north eastern Tasmania. A major frontal zone running south-west from off eastern Bass Strait separated EAC from SAW. A warm water eddy was located east of Eden (Figure 1). Ten CTD casts, 10

drop net sets, 17 surface net tows and 6 MIDOC tows were completed along a 460 km NE transect commencing 80 km due east of Schouten Island and finishing 100 km SE of Gabo Island (Figure 1).

A total of 9223 fish including 97 species were sampled in MIDOC tows. Myctophids (41 species) accounted for 54.6% of total fish numbers (Table 1).

Larvae and pelagic juveniles of several tropical fish species were recorded in both bongo and MIDOC samples including labrids, acanthurids, chaetodontids, pomacentrids, holocentrids and synodontids.

2. Four of the five standard ichthyoplankton transects (16 stations) established on SS 05/93 were resampled. Larval fish numbers were notably less than that recorded during SS 05/93.

3. Two demersal trawl transects were completed as part of the ecosystem study (Disaster Bay and Pt Hicks). Five demersal trawls were made on each transect, targeting depths of 25, 40, 80, 100 and 200 m. A total of 645.8 kg and 739.9 kg of fish were caught on each transect respectively. On the whole, total catches during this cruise were smaller than on the corresponding stations in SS 05/93. In particular, catches of jack mackerel (*Trachurus declivis*) and redfish (*Centroberyx affinis*) were much smaller than the previous winter. A total of 339 stomachs from 18 species were collected for feeding studies, 120 muscle samples (17 species) for stable isotope analysis and 315 otolith sets (15 species) and 40 vertebrae (2 species) for ageing studies.

4. A deep trawl was completed in 850–950 m off Disaster Bay for oreo dories. The shot caught 25 fish species, including 80 kg of the oreo *Neocyttus rhomboidalis*.

5. A low frequency hydrophone was trialed to monitor pulses from the seismic survey vessel Ross Seal in eastern Bass Strait. Three periods during seismic survey lines and one period between survey lines (the latter for background noise) were monitored. Distance to the survey vessel ranged from 20–40 nm. We were unable to detect any signal attributed to seismic survey pulses.

6. A variety of fish specimens were retained for taxonomic analyses and several benthic sediment samples were collected for pigment analyses. Rearing fish eggs was not attempted as no ripe fish were collected in demersal trawls.

CRUISE NARRATIVE

FRV *Southern Surveyor* departed Hobart at 0800, Thursday, 17 February 1994. The vessel headed north east to the start of a 460 km transect crossing SAW, EAC water masses. Work commenced at 1900. The transect consisted of both CTD stations and MIDOC stations. CTD stations comprised a CTD cast to 1000 m, a dropnet sample for microzooplankton and a surface plankton tow (1 m^2, 1000 micron net). The WOCE CTD was not operable due to noise and offset problems, so the CTD casts on this initial transect were completed using the standard CTD. Accordingly, it was necessary to deploy the SeaTech fluorometer with the SDL to obtain

Fluorescence profiles. Four litres of water were filtered from 4 depths at the first station to calibrate the fluorometer. MIDOC stations included a MIDOC tow that sampled surface–400 m oblique, 400 to 300, 300 to 200, 200 to 100 and 100 to 50 m from the surface, as well as two surface plankton tows. All stations were sampled successfully and the transect was completed at 0340, 20 February.

Southern Surveyor then steamed west to commence the southern most larval fish transect (transect 5 – Pt Hicks). Larval fish stations included a CTD cast to 1000 m or to within 10 m of the bottom and a double oblique tow with 70 cm bongo nets (500 micron mesh). Problems with the WOCE CTD were rectified after contacting General Oceanics and it was used at all remaining stations. Larval fish sampling commenced at 1430. Transect 5 was completed at 1830 whereupon *Southern Surveyor* steamed to the next transect (T4 Mallacoota) recommencing sampling at 2145. The 4 stations of the Mallacoota transect were completed by 0545, 21 February. We commenced sampling transect 3 (Disaster Bay) at 1620 and completed it by 1810. We then steamed to transect 2 (Merimbula) and commenced the first station at 2200. Transect 2 was completed by 0545, 22 February.

After the completion of transect 2, 6 hours were spent searching for trawlable ground in 400–1000 m of water to sample for oreo dories. No ground was found between Merimbula and Bermagui. We then steamed to Eden, arriving at 1530, to transfer scientific staff.

Southern Surveyor departed Eden at 1800, 22 February and steamed to the first demersal trawl transect at Disaster Bay. Each demersal trawl was preceded by a sediment sample collected with a small benthic grab. Sampling commenced at 2050. The trawl became fast at the third (75 m) station along the transect, shortly after reaching the bottom. The net was pulled free after some 15 minutes and sustained no damage. The station was successfully repeated 1 nm east of the designated position. The Disaster Bay transect was completed at 1450, 23 February. We then steamed south and across the slope in search of trawlable bottom in the range of 400–1000 m. An area was located just south of Disaster Bay in 850–950 m. Trawling commenced at 1915. Approximately 80 kg of oreo dories was captured.

Southern Surveyor then steamed to the Pt Hicks transect and commenced trawling at 0300, 24 February. The 5 stations were completed without incident by 1635. Three hours were then spent listening for the acoustic signals generated by the seismic survey vessel *Ross Seal*. The *Ross Seal* was contacted and three 20 minute monitoring periods were established to coincide with the times of survey lines. A monitoring period between survey lines was established to determine background noise levels. Monitoring involved turning off the *Southern Surveyor*'s main engine. The hydrophone experienced some minor interference from the radar which was also subsequently switched off. No signal attributable to the *Ross Seal*'s activities was detected.

After the completion of the monitoring periods, *Southern Surveyor* steamed south to Hobart, arriving at 0900, Friday, 25 February.

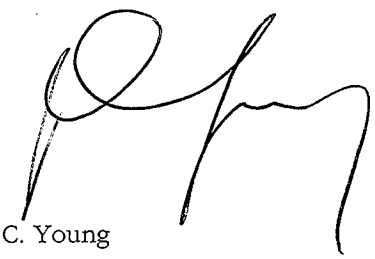
SUMMARY

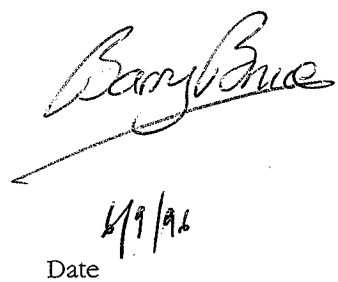
The cruise achieved all set objectives in good weather. A total of 27 CTD casts, 22 surface net tows, 6 depth stratified MIDOC tows, 36 bongo tows, 11 demersal trawls, 10 sediment grabs and 10 drop nets samples were collected over 60 different stations. Additional seismic monitoring trials were completed with the assistance of the seismic survey vessel Ross Seal.

PERSONNEL

Mr Barry Bruce	Cruise Leader
Ms Caroline Sutton	
Mr David Mills	
Mr Mark Lewis	
Mr Gary Critchley	
Mr Ron Plaschke	
Mr Jeff Cordell	
Mr M. Sherlock	
Mr Jock Young	(17-22 February)
Mr Tim Lamb	(17-22 February)
Mr Russell Bradford	(17-22 February)
Ms Sue Spinks	(17-22 February)
Dr Sebastian Rainer	(22-25 February)
Ms Stephanie Davenport	(22-25 February)
Mr Ross Daley	(22-25 February)

Barry Bruce
Cruise Leader Date





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

CONTACTS

For further information about this cruise contact:

Mr Barry Bruce
CSIRO Division of Fisheries
GPO Box 1538
Hobart, Tasmania 7001
Phone (03) 6232 5222
Fax (03) 6232 5000

Mr Clive Liron
Vessels Operations Manager
CSIRO Division of Fisheries
GPO Box 1538
Hobart, Tasmania 7001
Phone (03) 6232 5222
Fax (03) 6232 5000

FIGURE 1

Stations sampled on SS02/94. Dotted line indicates position of frontal zone between EAC and SAW water masses.

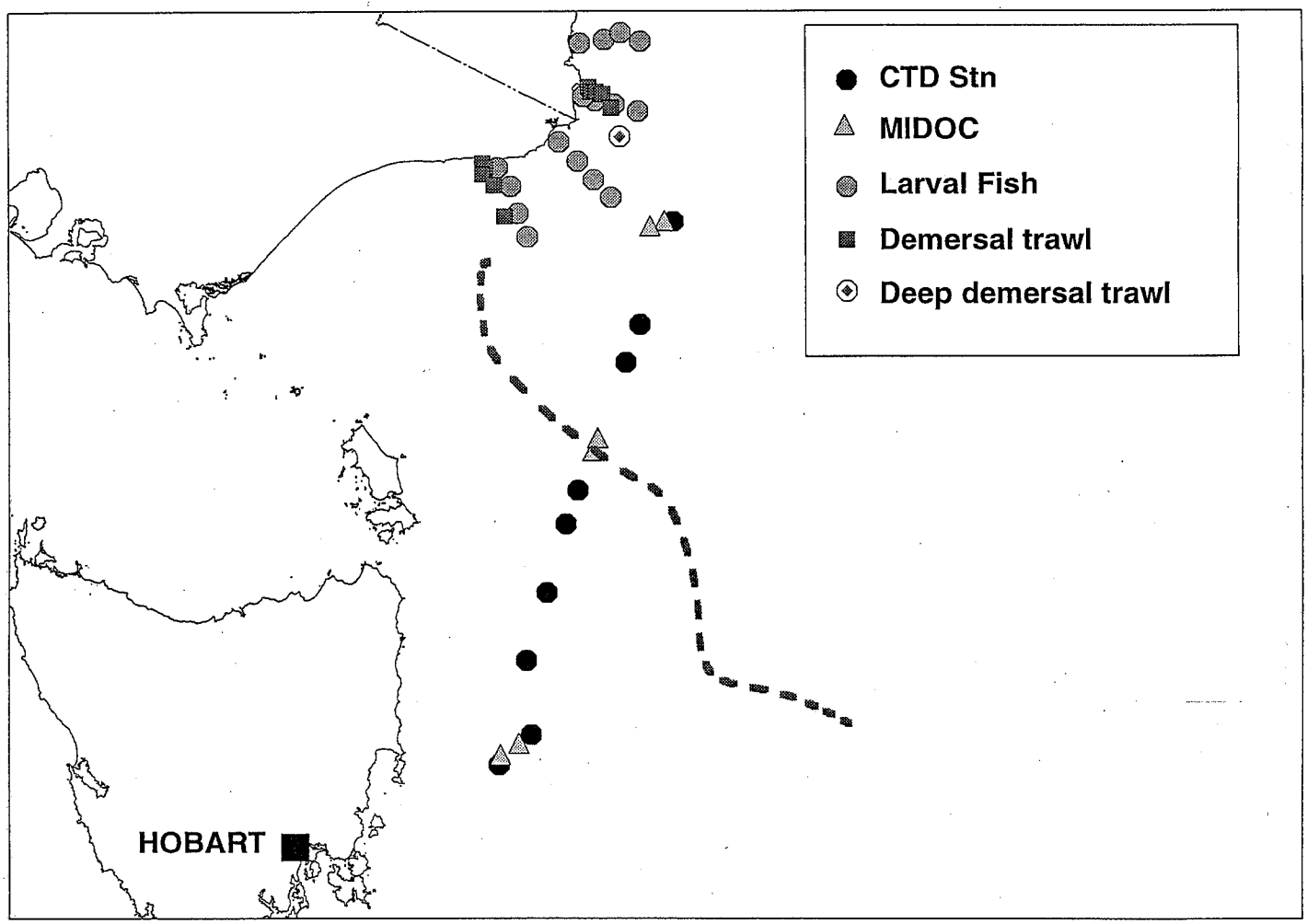


TABLE 1

Fish Taxa collected by the MIDOC net duringcruise SSO2/94

Myctophid species	Non - myctophid species	
B. nikolayi	A. cornuta	Polyipnus spp.
B. suborbital	Argyropelecus spp.	Polymetme spp.
C. warmingi	Astronesthes spp.	Pterycombus spp.
D. brachycephalus	Aulotrachichthys	Scopelarchidae
D. danae	Avocettina spp.	Scopelosaurus spp.
D. effulgens	B. brama	Sternoptyx spp.
D. hudsoni	Bassanago spp.	T. declivis
D. meadi	Bathophilus spp.	Tetragonurus spp.
D. mollis	Bathylagidae spp.	Tetraodontidae
D. ostenfeldi	Bregmaceros spp.	Trigonolampa spp.
D. termophilus	C. couseii	Tubbia spp.
E. paucirastra	C. sloani	UI anglerfish
E. risso	Cephalopoda	UI Centrolophidae
E. subaspera	Champsodon spp.	UI Fish
G. barnesi	D. argenteus	UI Gempylidae
G. piabilis	E. nitidus	UI Synodontidae
H. hanseni	Evermanellidae	UI Zeniontidae
L. alatus	Howella spp.	Valenciennelus
L. ater	I. brasiliensis	Vinciguerria spp.
L. australis	Ichthyococcus spp.	Woodsia spp.
L. dolfeini	Idiacanthus spp.	
L. festivus	Kali spp.	
L. hectoris	Larval fish	
L. interrupta	Leptocephalus	
L. intricarius	Leptostomias spp.	
L. lepidolychnus	Lyconus spp.	
L. luminosa	M. antipodum	
L. notialis	M. muelleri	
L. procerus	Macrorhamphosus	
L. pusillus	Melamphaidae	
L. rara	Melanocetus spp.	
Lampanyctus sp.	Melanonus spp.	
M. asperum	Melanostomias spp.	
M. phengodes	N. ingolfianus	
M. ventralis	Nemichthys spp.	
Myctophids No ID	Oneroididae	
N. resplendens	Opistoproctidae	
P. normani	P. argenteus	
P. subparallelum	P. braueri	
S. barnardi	P. kopua	
S. boops	Paralepididae	
S. multipunctatus	Platycephalus spp.	

APPENDIX 1

Summary of stations occupied, their positions and tasks completed

Stn No.	Date	Time	Latitude	Longitude	Activity
1	2/17/94	21:00	42° 11.9'	149° 14.5'	CTD,SDL,DN,S
2	2/18/94	0:30	42° 08.1'	149° 14.9'	MIDOC
3	2/18/94	2:55	42° 02.7'	149° 25.5'	MIDOC
4	2/18/94	4:20	41° 58.8'	149° 32.5'	CTD,SDL,DN,S
5	2/18/94	9:20	41° 27.0'	149° 30.1'	CTD,SDL,DN,S
6	2/18/94	13:50	40° 57.0'	149° 41.4'	CTD,SDL,DN,S
7	2/18/94	18:15	40° 27.0'	149° 51.9'	CTD,SDL,DN,S
8	2/18/94	21:25	40° 12.1'	149° 59.1'	CTD,SDL,DN,S
9	2/19/94	1:15	39° 55.0'	150° 06.9'	MIDOC
10	2/19/94	3:15	39° 49.2'	150° 10.0'	MIDOC
11	2/19/94	5:00	39° 45.0'	150° 12.6'	CTD,SDL,DN"
12	2/19/94	9:30	39° 16.1'	150° 26.2'	CTD,SDL,DN,S
13	2/19/94	14:30	38° 59.3'	150° 33.8'	CTD,SDL,DN,S
14	2/19/94	22:10	38° 14.5'	150° 53.0'	CTD,SDL,DN,S
15	2/20/94	0:05	38° 14.3'	150° 48.1'	MIDOC
16	2/20/94	2:00	38° 16.5'	150° 39.6'	MIDOC
17	2/20/94	8:30	38° 20.9'	149° 30.6'	CTD
18	2/20/94	9:00	38° 20.9'	149° 30.6'	Bongo
19	2/20/94	11:25	38 °10.8'	149° 24.9'	CTD
20	2/20/94	14:30	38° 10.8'	149° 24.9'	Bongo
21	2/20/94	16:10	37° 59.6'	149° 21.6'	CTD
22	2/20/94	16:40	37° 59.2'	149° 20.8'	Bongo
23	2/20/94	18:10	37° 51.2'	149° 14.6'	CTD
24	2/20/94	18:30	37° 51.2'	149° 14.1'	Bongo
25	2/20/94	21:45	37° 40.0'	149° 47.9'	CTD
26	2/20/94	22:05	37° 40.0'	149° 47.9'	Bongo
27	2/20/94	23:30	37° 47.2'	149° 58.2'	CTD
28	2/21/94	0:15	37° 48.3'	149° 58.6'	Bongo
29	2/21/94	2:00	37° 54.0'	150° 09.0'	CTD
30	2/21/94	2:50	37° 55.9'	150° 08.1'	Bongo
31	2/21/94	4:15	38° 01.1'	150° 18.6'	CTD
32	2/21/94	5:45	38° 03.8'	150° 17.6'	Bongo
33	2/21/94	16:20	37° 25.9'	150° 33.9'	CTD
34	2/21/94	11:40	37° 25.9'	150° 33.2'	Bongo
35	2/21/94	13:25	37° 23.0'	150° 22.0'	CTD
36	2/21/94	14:15	37° 22.8'	150° 20.0'	Bongo
37	2/21/94	15:40	37° 21.0'	149° 56.9'	CTD
38	2/21/94	16:15	37° 22.0'	150° 08.7'	Bongo
39	2/21/94	17:20	37° 18.9'	150° 02.3'	CTD
40	2/21/94	18:10	37° 19.6'	150° 02.3'	Bongo
41	2/21/94	22:00	36° 55.3'	150° 00.3'	CTD
42	2/21/94	22:25	36° 56.4'	150° 00.3'	Bongo

Stn No.	Date	Time	Latitude	Longitude	Activity
43	2/21/94	23:30	36° 59.1'	150° 10.3'	CTD
44	2/22/94	0:15	36° 55.1'	150° 13.8'	Bongo
45	2/22/94	2:00	36° 55.0'	150° 15.2'	CTD
46	2/22/94	3:00	36° 52.0'	150° 23.3'	Bongo
47	2/22/94	4:35	36° 54.7'	150° 35.0'	CTD
48	2/22/94	5:45	36° 55.6'	150° 34.4'	Bongo
49	2/22/94	20:50	37° 16.6'	149° 58.6'	Grab,Dem. trawl
50	2/22/94	22:45	37° 17.5'	150° 01.3'	Grab,Dem. trawl
51	2/23/94	4:20	37° 18.9'	150° 04.4'	Grab,Dem. trawl
52	2/23/94	12:20	37° 19.9'	150° 11.5'	Grab,Dem. trawl
53	2/23/94	14:50	37° 24.3'	150° 17.4'	Grab,Dem. trawl
54	2/23/94	19:15	37° 36.8'	150° 23.0'	Deep Dem. trawl
55	2/24/94	3:05	37° 48.8'	149° 04.3'	Grab,Dem. trawl
56	2/24/94	4:50	37° 49.4'	149° 05.0'	Grab,Dem. trawl
57	2/24/94	8:15	37° 52.7'	149° 06.0'	Grab,Dem. trawl
58	2/24/94	11:15	38° 00.9'	149° 12.7'	Grab,Dem. trawl
59	2/24/94	16:05	38° 11.8'	149° 17.9'	Grab,Dem. trawl