

DIVISION OF FISHERIES

1996 RESEARCH VESSEL PROGRAM

CRUISE PLAN

**FRV *SOUTHERN SURVEYOR*
CRUISE SS 02/96**

16 APRIL - 12 MAY 1996

**CSIRO DIVISION OF FISHERIES
MARINE LABORATORIES
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ITINERARY

LEG 1

DEPART: HOBART 0900 TUESDAY APRIL 16
RETURN: EDEN 1800 WEDNESDAY MAY 1

LEG 2

DEPART: EDEN 1200 THURSDAY MAY 2
RETURN: EDEN 1200 SUNDAY MAY 12

AREA OF OPERATION

Tasmanian, Victorian and New South Wales coastal and offshore waters bounded by 36°S–44°S and 144°E–151°E.

RESEARCH BACKGROUND

Legs 1 and 2 will examine ecosystem structure in the South East Fishery region with an emphasis on the relationship of seafloor habitat to fisheries productivity. Sampling will be undertaken on the continental shelf in eastern Bass Strait and southern NSW in the vicinity of several important commercial fishing grounds. This is the third in a series of four cruises which provide seasonal coverage for the study.

Biological samples, information on sea floor topography and oceanographic data will be collected from the study area in two phases. The first phase, a broad scale survey based on seven cross-shelf transects, will provide information on the primary patterns of distribution and abundance of fish and invertebrate communities. Demersal trawling, acoustic profiling and hydrological sampling will be undertaken at five sites per transect. Phytoplankton, zooplankton and micronekton will be sampled at two sites per transect. The second phase will be directed at intensive sampling on and around two or three areas of diverse bottom habitat to extend the information gathered in phase one to smaller scale highly diverse habitats. Samples will be taken with the towed video system, benthic sled, demersal trawl, midwater trawl, plankton nets, and the CTD.

In both phases, the physical association of fish and invertebrate assemblages will be determined in relation to the physical character of sea floor habitats and overlying water masses. Biological species and the habitat they occupy will be determined through analysis of diet, trophic position and morphological adaptation.

Subsequent to the sampling undertaken by the *Southern Surveyor*, similar diverse habitat areas will be sampled with gill nets and traps deployed from commercial fishing vessels.

A related study will conclude the examination of the effects of ten years of commercial fishing on the benthic composition and associated fish community at Darcey's Patch off Maria Island, eastern Tasmania. This upper-slope site was first examined by CSIRO fisheries scientists in 1984 before the start of commercial trawling in the area and resampled on SS05/93. The demersal sled will be used to extend the area photographed in previous years and to confirm species identifications of benthic macrofauna from underwater photographs.

CRUISE PLAN

LEG 1

The vessel will steam from Hobart around to Darcey's Patch off Maria Island. A test deployment of the benthic sled will be undertaken en route. A series of four tows with the benthic sled (including Photosea 2000) will be made to cover the length and breadth of the Darcey's Patch site. A demersal trawl will be undertaken to collect upper slope fishes for the 'SEF species guide' and 'seafood guide' projects. If weather conditions permit, the RV *Quest* will rendezvous with us here for film coverage of our sampling operations. Once this is completed, the *Southern Surveyor* will steam to the closest sampling station on the western-most transect off Wilsons Promontory. Biological sampling on Leg 1 will be mainly by demersal trawl along 7 cross shelf transects (Fig. 1). Two or three of the five stations on each transect will be sampled each day. Since several of the key fish species of interest may move into the water column at night, demersal trawling will be carried out during daylight hours only. A midwater trawl using the opening-closing MIDOC net will be made after dark at the end of each day when demersal fish trawling is completed. Scientific work should be completed during a straight 12 hour daytime shift on Leg 1, but may be staggered if this is necessary to complete the midwater tows. For the next 14 days the vessel will move east and north completing one transect every two days. Sampling will be at sites identified during the 1993 cruise at 25, 40, 80, 120, 200 m depths. At each site a 30 min fish trawl, sediment grab samples and a CTD cast will be undertaken. Plankton samples will be taken with oblique Bongo net tows and vertical ring net drops at the 80 and 200 m station on each transect. Vertically stratified micronekton samples will be taken with MIDOC net at the same two stations. In addition, a few target shot will be made with the benthic sled at sites previously identified as having high concentrations of molluscs. If time is available a cross-shelf transect will be made with the benthic sled and Photosea camera. The underwater video system will be deployed on a time available basis at various sites.

Demersal trawl samples from each station will be sorted and the fish identified, enumerated and weighed. Commercial quota species and a range of other abundant fishes will be sub-sampled for further data collection. This will include taking length frequency and biological data, stomach contents, muscle samples

for stable isotope analysis and otoliths from representative numbers of each key species at a range of localities. Water samples for salinity, oxygen and nutrients will be collected from as many of the following depths as possible: 0, 10, 25, 50, 75, 100, 200, 250, 300, 350 and 400 m. Fluorometer data from the CTD will be calibrated using chlorophyll-a measurements at 0, 10, 25, 75 and 100 m from the 80 m and 200 m stations on each of 2 transects. At night, when the scientific crew are off-watch, the vessel will undertake a series of acoustic surveys for bottom topography and pelagic biomass distribution over predetermined areas before steaming to the next transect. Transects will be done at 10–11 knots speed under optimal sea conditions.

CSIRO Communications Group personnel (2) may join the vessel off Eden for a 2-day/ 1 night period. These personnel and equipment would be ferried to the *Southern Surveyor* which would not have to dock.

The vessel will finish Leg 1 in Eden on the afternoon of May 1, as soon as possible after the final stations off Bermagui are completed. A change in some of the scientific crew will occur at this time and the vessel will depart at 1200 the following day, May 2.

LEG 2

Leg 2 will sample sites in the vicinity of Eden, Gabo Reef and, potentially, suitable habitat further south. Sampling will have a diel component requiring scientists to revert to separate day and night shifts. Fish and invertebrate communities will be sampled on and off hard bottom using a variety of gears. Pelagic and demersal trawls will sample fish over and adjacent to the bottom; the benthic sled and sediment grabs will sample invertebrates; vertically stratified micronekton tows will be made with the MIDOC system and a towed video system will be deployed. Acoustic profiling with the EK500 (with Roxanne as back up) will map the bottom characteristics. CTD casts will be made to define the overlying water mass(es). The collection and processing of biological and hydrological data will be same as during Leg 1. Invertebrate samples will be sorted, identified to the lowest possible taxonomic level and processed for length and biological information. Video images will be interpreted in real time for bottom roughness, percent bottom cover with macrofauna and dominant macrofauna description. Higher quality video (or still) images will be collected for subsequent measurement of the size composition of macrofauna in different habitats.

The vessel will finish Leg 2 in Eden on the afternoon of May 12. A direct (small plane) flight from a local airfield will return staff directly to Hobart by early evening.

CRUISE OBJECTIVES

1. Over a broad area of the continental shelf off eastern Bass Strait and southern NSW:
 - a) determine the autumn distribution and abundance of demersal fish species by demersal trawling
 - b) identify and determine the distribution of sea floor habitat types through photographic, acoustic and sediment sampling of bottom topography and bottom type, and their associated fish and epibenthic faunas
 - c) determine the characteristics of the primary water masses in the sampling area during the survey
 - d) determine the autumn distribution of zooplankton and micronekton.
2. Obtain samples of fish, plankton and sea floor invertebrates for analysis of stable isotopes to identify their positions in the community food web.
3. Sample stomach contents from commercial and other abundant fish species to determine their immediate feeding links and to compare with stable isotope analyses of trophic structure.
4. Collect water column and benthic sediment samples for analysis of phytoplankton pigments and breakdown products.
5. Through an intensive survey of two or more areas of diverse habitat:
 - a) determine the composition of the fish and invertebrate communities associated with rough ground, adjacent flat bottom, and the overlying water mass(es) by sampling with demersal and pelagic trawls, benthic sled or trawl, cameras and acoustics
 - b) determine the characteristics of the primary water masses over the sampling areas
6. Determine the species composition of macrofauna and the distribution of brittle stars off Maria Island for confirmation of and comparison with earlier data.
7. Collect biological samples and photograph fishes for the FRDC-funded 'SEF species guide' and 'seafood guide' projects
8. Collect biological material for collaborative studies with other Australian research institutions and for stock assessment.
9. Develop collaboration within the Division to enhance our capacity to conduct larger-scale ecosystem research.

PERSONNEL**LEG**

Dr Alan Williams (Cruise leader/Assist. Cruise leader)	1, 2
Dr Nic Bax (Assist. cruise leader/Cruise leader)	1, 2
Mr Mark Lewis	1
Ms Stephanie Davenport	1, 2
Mr Bruce Barker	1, 2
Mr Ross Daley	1
Dr Vicki Wadley	2
Ms Di Furlani	1
Mr Dave Terhell	1
Mr Mark Rayner	2
Mr Ron Plaschke	2
Mr Matt Sherlock	1
Mr Jeff Cordell	2
Mr Lindsay MacDonald	2
Mr Dave Evans, CSIRO Marmion	2
Ms Chris Grieve (AFMA)	1
Mr Miroslaw Ryba	1
Ms Karen Gowlett-Holmes	2
Plus 1 additional person	1, 2

CONTACTS

For further information about this cruise contact:

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P/C. Young
Chief, CSIRO Division of Fisheries

APPENDIX 1: CRUISE TIME ESTIMATES

ACTIVITY	TIME (DAYS)
SEF ECOSYSTEM STUDY (27 DAYS)	
LEG 1 (BROAD SCALE SURVEY)	
Maria Island	0.5
sampled with benthic sled, demersal trawl, CTD	
Steaming	1.5
7 transects	14
each sampled with:	
demersal trawls	
camera	
CTD	
sediment grab	
bongo nets	
drop net	
pelagic trawl	
benthic sled (opportunistically)	
LEG 2 (HARD GROUND SURVEY)	
Steaming	1
2 or 3 intensive survey areas	10
each sampled with:	
pelagic trawl	
demersal trawl	
benthic/ epibenthic sled	
bongo nets	
cameras	
CTD	
sediment grab	
 Total	 27

Figure 1. Location of transects sampled during broad-scale phase of ecosystem study (Leg 1).

