

DIVISION OF FISHERIES

1994 RESEARCH VESSEL PROGRAM

CRUISE PLAN

**FRV SOUTHERN SURVEYOR
CRUISE SS1/94**

1-16 FEBRUARY 1994

**CSIRO DIVISION OF FISHERIES
MARINE LABORATORIES
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HOBART TAS 7001
AUSTRALIA**

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ITINERARY

DEPART HOBART : 0900 H TUESDAY, 1 FEBRUARY 1994

ARRIVE RECHERCHE BAY: 1700 H SATURDAY, 12 FEBRUARY 1994

DEPART RECHERCHE BAY: 1800 H SATURDAY, 12 FEBRUARY 1994

ARRIVE HOBART: 1700 H WEDNESDAY, 16 FEBRUARY 1994

AREA OF OPERATION

LEG 1:

Continental slope south of Tasmania within latitude $44^{\circ} 00' - 44^{\circ} 40'S$ and longitude $146^{\circ} 00' - 147^{\circ} 35'E$ (see Figure 1)

LEG 2:

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

RESEARCH BACKGROUND

Leg 1 of the cruise will carry out an acoustic survey of orange roughy (*Hoplostethus atlanticus*) and deepwater oreos, smooth oreo (*Pseudocyttus maculatus*) and black oreo (*Allocyttus niger*), on the deepwater fishing ground off southern Tasmania. This survey follows the CSIRO acoustic survey of this fishery in February 1992, and a third such survey is planned for 1995. This series of surveys is among the first acoustic surveys of a deepwater multispecies fishery. The survey will employ the SIMRAD split-beam EK500 acoustic system and trawl sampling to estimate the species and size composition of acoustic targets.

Leg 2 of the cruise involves a pilot study of the fisheries oceanography of Maatsuyker, one of the principal seamounts fished for orange roughy off southern Tasmania. The study will examine potential topographically-induced anomalies in the temperature and salinity field and in concentrations of plankton and midwater fish around the seamount. It is hoped that this pilot program will indicate how physical and biological processes may interact to establish the conditions to support commercial concentrations of fish and how variability in those conditions may affect the availability of orange roughy and oreo dories to the commercial fishery.

CRUISE PLAN

LEG 1:

The vessel will depart Hobart and proceed to the fishing grounds off southern Tasmania. These grounds consists of ~50 'hills,' on which the orange roughy and deepwater oreo dories aggregate. Of these hills, ~10 are considered of primary importance. These hills will be surveyed, along with ~50% of the remainder, which will be randomly selected following depth stratification. At each hill 2 acoustic transects (N-S & E-W) will be carried out initially. Additional transects will be carried out if concentrations of fish are detected. These surveys will be carried out primarily with the transducer mounted in the towed body, which will be towed at ~5 kt with ~1 km (0.5 minute longitude) spacing between acoustic transects.

A proportion of the orange roughy in the region are not associated with the hills. A second phase of the survey will consist of a broad acoustic and trawl survey of the region from 147°30' and 146°10'E longitude between 800 and 1500 m.

The composition of acoustic marks will be examined based upon the *in situ* TS distribution, which will be obtained from additional acoustic transects carried out over specific targets, and targeted trawling on acoustic targets. All trawling will be carried out by 2 commercial trawlers, which will accompany FRV *Southern Surveyor*, and which will fish on targets as directed. It is expected that 'windows' in the net and constriction of the codend will limit trawl samples to no more than 5 tonne/shot. Two scientists will be present on each trawler to monitor the trawl program. They will record approximate catch weight by species, as well as the length frequency distribution and biological information (sex, maturity stage) for commercial species. Two pairs of commercial vessels will be selected by ballot to assist in the survey. The first pair will assist from 1-6 February; the second from 7-12 February. Scientific personnel will switch over at Recherche Bay.

The towed transducer will be calibrated at depth when weather conditions permit. TS measurements will be carried out on an orange roughy suspended beneath the towed body at depth.

LEG 2:

A CTD+fluorometer transect will be carried out initially over the top of Maatsuyker seamount to assess its influence on the temperature and salinity structure of the water column and on chlorophyll and productivity. The transect will be along latitude 44°13' with stations at 1' longitude spacing from 146°05' to 146°09' and 146°13' to 146°18' and at 0.5' longitude spacing from 146°09' to 146°13'. Water samples for calibration purposes will be obtained at the beginning and end of the transect and over the top of the seamount. The profiles will be carried out on this initial transect from 0-1000 m or to within 25 m of bottom. On succeeding days, a shortened transect will be carried out from 400-1000 m with stations at 1' longitude spacing from 146°07' to 146°10' and 146°13' to 146°15' and at 0.5' longitude spacing from 146°10' to 146°13'. The standard salinity, oxygen, chlorophyll and nutrient analyses will be carried out on water samples.

Acoustic backscattering will be measured during the first day and night along this transect using the towed body EK500 system. A scattering layer between 700 and 1000 m will be selected for detailed sampling of the zooplankton and nekton. These will be sampled along the transect with the opening/closing net system either with plankton nets or as the cod end of the IYGPT midwater trawl. Replicated tows will be carried out in day and night over Maatsuyker seamount and on either side of it. Tow length for each net will be 2 nm, the distance over the seamount.

If conditions enable the acoustic survey (Leg I) to be completed early, the vessel will carry out a depth-stratified midwater tow in 2500 m depth of water. The tow will be conducted between 1000 and 2000 m. Each of the four nets of the MIDOC system will be towed for 2 hours over a 250 m depth interval.

A moored sediment trap in the vicinity of Pedra Branca will be recovered en route to or from the study site.

CRUISE OBJECTIVES

LEG 1:

1. Conduct echo-integration acoustic surveys of the orange roughy fishing grounds off southern Tasmania (Maatsuyker, Pedra Branca area).
2. Obtain in-situ target strength (TS) measurements of orange roughy and other species on these grounds.
3. Direct operations of commercial vessels to trawl on acoustic marks.
4. Calibrate the towed transducer at depth.

LEG 2:

1. Determine the fine-scale temperature and salinity structure across the seamount through east-west CTD transects.
2. Determine the fine-scale distribution of nekton across the seamount through a day and a night series of acoustic transects across Maatsuyker.
3. Assess possible differences in abundance and species composition of zooplankton and midwater fish over the seamount and on either side of it based upon series of opening-closing net tows.
4. Retrieve a moored sediment trap from near the Pedra Branca region.
5. Obtain a depth-stratified sample of the mid-water nekton between 1000-2000 m depth, if time permits.

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PERSONNEL

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

LEG 1

T. Koslow (Cruise Leader)
C. Bulman
R. Kloser
R. Stephenson
L. MacDonald

Commercial fishing vessel:

M. Lewis
A. Williams
C. Souris
A. Terauds

LEG 2:

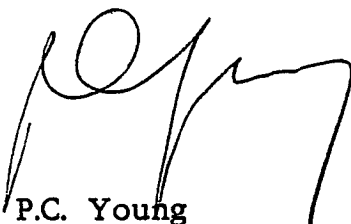
T. Koslow (Cruise Leader)
A. Williams
R. Kloser
C. Bulman
M. Lewis
P. Bonham
S. Garland
A. Terauds
R. Stephenson
L. MacDonald
OMS (2)

CONTACTS

For further information about this cruise contact:

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P.C. Young
Chief, CSIRO Division of Fisheries

DISTRIBUTION:

Normal circulation and cruise participants.



APPENDIX 1: CRUISE TIME ESTIMATES

Activity	Time (days)
LEG 1	
Broad survey of area between hills	1
Hill survey	8.5
Towed body acoustic calibration & TS measurements	1
Deepwater depth-stratified midwater tow (or weather allowance)	1
Steaming to and from survey area	0.5
LEG 2	
CTD transects	1.0
Acoustic transects (day/night)	0.25
Mid-water trawling	0.8
Plankton sampling	0.8
Sediment trap recovery	0.25
Steaming to and from study site	0.5

FIGURE 1

