

DIVISION OF FISHERIES

1996 RESEARCH VESSEL PROGRAM

CRUISE PLAN

**FRV *SOUTHERN SURVEYOR*
CRUISE SS04/96**

16 - 30 JULY 1996

CSIRO DIVISION OF FISHERIES
MARINE LABORATORIES
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ITINERARY

DEPART: HOBART 0800 TUESDAY, JULY 16

RETURN: HOBART 1800 TUESDAY, JULY 30

AREA OF OPERATION

Orange roughy fishing grounds off northeastern and southern Tasmania , 41° 14' S, 148° 45'E and 44° 00'–44° 40'S and 146° 00'–147° 35'E, respectively.

RESEARCH BACKGROUND

The cruise undertakes the fourth survey of the orange roughy on their spawning 'hill' off northeastern Tasmania. As the first survey of the orange roughy since 1993, it will monitor spawning stock size following completion of the fishdown phase of the fishery. For the first time, the stock will be surveyed in the Southern Zone as well during the spawning season, in order to estimate the combined biomass of the orange roughy population in both major fishing zones.

The cruise will test the use of multi-frequency acoustics (12, 38, and 120 kHz) to assess species composition in the survey area. Acoustic surveys of orange roughy are highly sensitive to error in assessment of species composition, because orange roughy have relatively low acoustic reflectance due to their lack of a gas-filled swimbladder. Furthermore, because the target strength of orange roughy is similar to that of small feed fishes (i.e. myctophids) with swimbladders at 38 kHz, it has not been possible to differentiate between these two types of acoustic targets using split-beam technology at this frequency. A major potential source of bias may be eliminated, therefore, if such targets can be discriminated using several frequencies.

CRUISE OBJECTIVES

1. Conduct echo-integration acoustic surveys of orange roughy on the St. Helens spawning ground and off southern Tasmania.
2. Assess the composition of demersal and mid-water acoustic marks by trawling and using multi-frequency, split-beam acoustics.
3. Assess the target strength of fish within acoustic marks using the multi-frequency towed body
4. Calibrate vessel and towed transducers

SECONDARY OBJECTIVES ARE TO:

1. Assess *in situ* target strength bias due to distance from the transducer (i.e. beam thresholding) and target density.

2. Sound absorption measurements at 120 kHz and 38 kHz.
3. Assess the performance of the multi-frequency towed body by measuring the vessel and towed body dynamics.
4. Collection of acoustic data for bottom typing of the hills and comparison with previous acoustic surveys.
5. Collection of acoustic and trawl data for analysis of the height and distribution of fish in the near-bottom acoustic shadow-zone.
6. Describe the community composition from the surface to 1000 m using multi-frequency acoustics and depth stratified opening/closing midwater trawls.
7. Collection of acoustic data at 28 kHz using the Industry Acoustic Project's data logger.

CRUISE PLAN

The *Southern Surveyor* will steam from Hobart to St. Helen's hill, carrying out an acoustic survey en route based on zig-zag transects between 700 and 1300 m. A commercial trawler will accompany the vessel and trawl on acoustic marks as directed. At the spawning ground, the vessel will carry out an acoustic survey using the multi-frequency acoustic system mounted on both the towed body and ship's hull and based on the survey design used in 1990-93 surveys (i.e. 6 N-S and 6 E-W transects at half-minute latitude and longitude spacing). For 36 h, the *Southern Surveyor* and commercial vessel will sample the size and species composition of acoustic marks throughout the depth range of the hill and surrounding flats using multi-frequency acoustics and trawling, respectively. A second acoustic survey will then be conducted, followed by a further 36 h sampling of the acoustic marks. Barring mishaps, the acoustic surveys should be completed within 5 d. Upon completion of the spawning ground survey (but no later than 0000 h, 23 July), the spawning area will be re-opened to commercial fishing activity.

Southern Surveyor will then transit to the Southern Zone, again conducting a survey based on zig-zag transects en route. At the end of the first week, there will be a changeover of commercial vessels and a transfer of scientific staff from one to the other. On the southern ground, 6-10 hills noted by industry for having orange roughy will be targeted for acoustic survey. Approximately ten additional hills will be selected randomly from several depth strata. Trawling and multi-frequency target strength measurements will be taken when acoustic marks are encountered. This portion of the survey will be completed by 28 July at the latest.

A deep-water acoustic calibration of the multi-frequency acoustic system will be carried out when weather conditions are suitable.

There will be a transfer of personnel at Recherche Bay on 27-28 July depending on weather conditions.

The capability of the multi-frequency system to assess community composition will be tested during the last 48-72 h (depending upon progress with the remainder of the survey). Acoustic sampling followed by depth-stratified tows will be carried out day and night throughout the water column from the surface to 900 m at the site of the former mid-slope ecosystem study. If time is available, discrete acoustic layers will also be sampled with the opening/closing midwater trawl.

PERSONNEL

Dr. Tony Koslow (Cruise leader 16-27 July)
Mr. Rudy Kloser (Assistant cruise leader/Cruise leader 27-30 July)
Mr. Lindsay MacDonald
Mr. Alan Poole
Mr. Tim Ryan
Dr. Alan Williams
Ms Kath Whitefield-Masson
Mr. Mark Lewis (27-30 July)

Commercial Vessel

Mr. Mark Lewis (16-27 July)
Mr. Alex Terauds (16-30 July)

CONTACTS

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P C Young
Chief, CSIRO Division of Fisheries

Date

3/7/96

FIGURE 1. AREA OF OPERATION

