



RV Southern Surveyor
CSIRO MARINE RESEARCH

Research Voyage Plan -- SS03/99

Title

Biomass of the orange roughy and study of its deep-water seamount habitat off the east coast of Tasmania.

Itinerary

Depart Hobart 00:01 hrs, Friday 16 July, 1999

Arrive Hobart 10:00 hrs, Monday 2 August, 1999

Principal Investigator

Mr. Rudy Kloser (Chief Scientist)

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Scientific Objectives

The orange roughy fishery remains the most valuable component of the South-East Fishery (SEF). Following a series of egg and acoustic surveys of the spawning stock off St. Helens, Tasmania from 1990-1993, and an international review in 1994, it was concluded that the fish-down of the stock had been completed and SETMAC adopted a TAC that would enable the stock to rebuild to 30% Bo by 2004. However, following data reanalysis and increasing emphasis on the combined stock hypothesis in the 1996 and the 1997 assessments, it appears that TACs would need to be further reduced to enable the stock to rebuild to 30%Bo by 2004. This would be a major loss of revenue to industry. The validity of the current estimates of stock status therefore need to be clarified.

To clarify the status of the stock a survey of St Helens hill was requested that had greater spatial and temporal coverage than in previous years. In addition, there is an ongoing need to develop deepwater acoustic assessment techniques for orange roughy stock assessment using both industry vessels and research vessels. To carry this out in a cost effective manner, information from fishing vessel sounders will be collected over a four week period in conjunction to the precise CSIRO deep-towed multi-frequency acoustic surveys over the height of the spawning period. During the intensive survey we will cross calibrate the various acoustic platforms to assess how best to use industry acoustics in the long term management of the resource.

It is not known why orange roughy spawn at St Helens Hill with such regularity and part of this study will be to establish both the water column and seabed attributes at both the St Helens and St Patricks Head grounds.

A large fishery for orange roughy on the South Tasman Rise (which straddles the Australian EEZ and International waters) developed strongly in 1997. As part of our voyage we will survey the main spawning hill at the time of anticipated peak spawning to obtain an initial indication of stock size.

Cruise Objectives

1. To assess the biomass of orange roughy based on acoustic surveys on the Eastern Zone fishing grounds (St Helens and St Patricks) during the spawning period using industry vessel acoustics over an extended 4 week period and the CSIRO acoustic package during the anticipated peak spawning period.

2. To compare the sensitivity and precision of acoustic surveys using scientific vessel-mounted and towed-body acoustics and industry vessel-mounted acoustics at various frequencies.
3. To further develop the acoustic method by improving the multi-frequency technique for species identification: sound absorption coefficient and in-situ target strengths.
4. Map significant deep-water seabed habitats using the towed deep-water video camera and towed acoustic system and further develop the technique with experiments in shallow water.
5. Identify the composition of distinct bio-acoustic scattering layers with underway multi-frequency acoustic data and target sampling with a pelagic trawl capable of depth stratified sampling.
6. To conduct a preliminary survey of the orange roughy on the South Tasman Rise spawning hill.

Cruise Track

The vessel will operate off the eastcoast of Tasmania on a seamount known as St. Helens Hill 41:14S 148:45.5E and associated fishing grounds. Over a two week period the vessel will conduct three echo integration acoustic surveys of the hill and associated fishing grounds using multi-frequency techniques. These surveys would provide species composition, biomass and school dynamics information. In between the acoustic surveys detailed multi-frequency in-situ target strength measurements will be performed to obtain both target strength and species composition information. Species identification will be validated with catches obtained from a MIDOC opening and closing pelagic trawl from the vessel. Demersal trawling on deep-water marks at the base of the hill will be performed by a commercial vessel. CTD measurements will be taken continuously with the towed body as it is being towed, as well as dedicated vertical CTD drops to measure sound speed and absorption.

The benthic habitat of the fishing grounds will be assessed from samples taken with the benthic sled, and digital video system. Mapping of the seabed will also be undertaken with the deep-water acoustic towed system.

If available the ADCP will be used to measure currents at the hill and underway to investigate the current field around the fishing ground as well as long term trends.

On 28 July we will leave the St Helens Hill area and steam to the South Tasman Rise (approx 47 20:0 S 149 00:0 E) to perform an acoustic survey of a known spawning aggregation.

Time Estimates

Operation	Description	Distance	Time
Transit	Hobart - St. Helens		12 hrs
	12345St. Helens- Hobart		12 hrs
Acoustic Survey	Three acoustic surveys of St. Helens Hill and associated fishing grounds with multi-frequency vessel and towed transducers		70 hrs
Species composition	Acoustic loops around the hill and associated fishing grounds		48 hrs
Habitat assessment	6 transects with the video and photographic gear around the hill and associated ground truthing with a deep water sled		48 hrs
	Trials in the shallow water off Maria Island to test methodology		12 hrs
Target strength	10 vertical drops with the towed body on acoustic marks at several depths around the hill		48 hrs
CTD casts	CTD casts for sea water propagation properties and absorption measurements* 2		6hrs
Calibration	Calibration of hull mounted and towed transducers		24hrs
Pelagic Trawls	10 pelagic trawls using the MIDOC system.		50hrs
Towed body tests	Tests on the dynamics and operation of the towed system		6hrs
Steaming	Hobart to South Tasman Rise to Hobart		54hrs
Acoustic survey	Acoustic survey of the spawning hill		12 hrs
Species composition	Deep-tow species composition surveys		24 hrs
			372hrs
	Total Days		18days

Piggy-back Projects

To obtain trace metal (pCu and pCd) profiles from the jarosite dumping site using newly developed in situ Ion Selective Electrodes (ISE) which will be attached to the CTD rosette for deployment. These ISE profiles will be calibrated by discrete trace metal samples taken from the same cast using Helmond Byrne bottles and standard trace metal collection techniques. The 12 calibration sample bottles will be packed in transport boxes and transferred to the sharkcat in Port Arthur (along with the ISE system) for return to the CSIRO in Hobart for subsequent sampling and processing under clean conditions. (Denis Mackey)

If available underway ADCP data will be recorded (George Cresswell).

Southern Surveyor Equipment

Equipment required from Vessel
CTD, MIDOC net, benthic sled, logging system and DGPS.
Deepwater pole operational, Sonar system, Positioning system mounted in moon

pool

Vessel motion dynamics from Ashtec GPS and pitch roll monitors
If available the underway ADCP will be operated

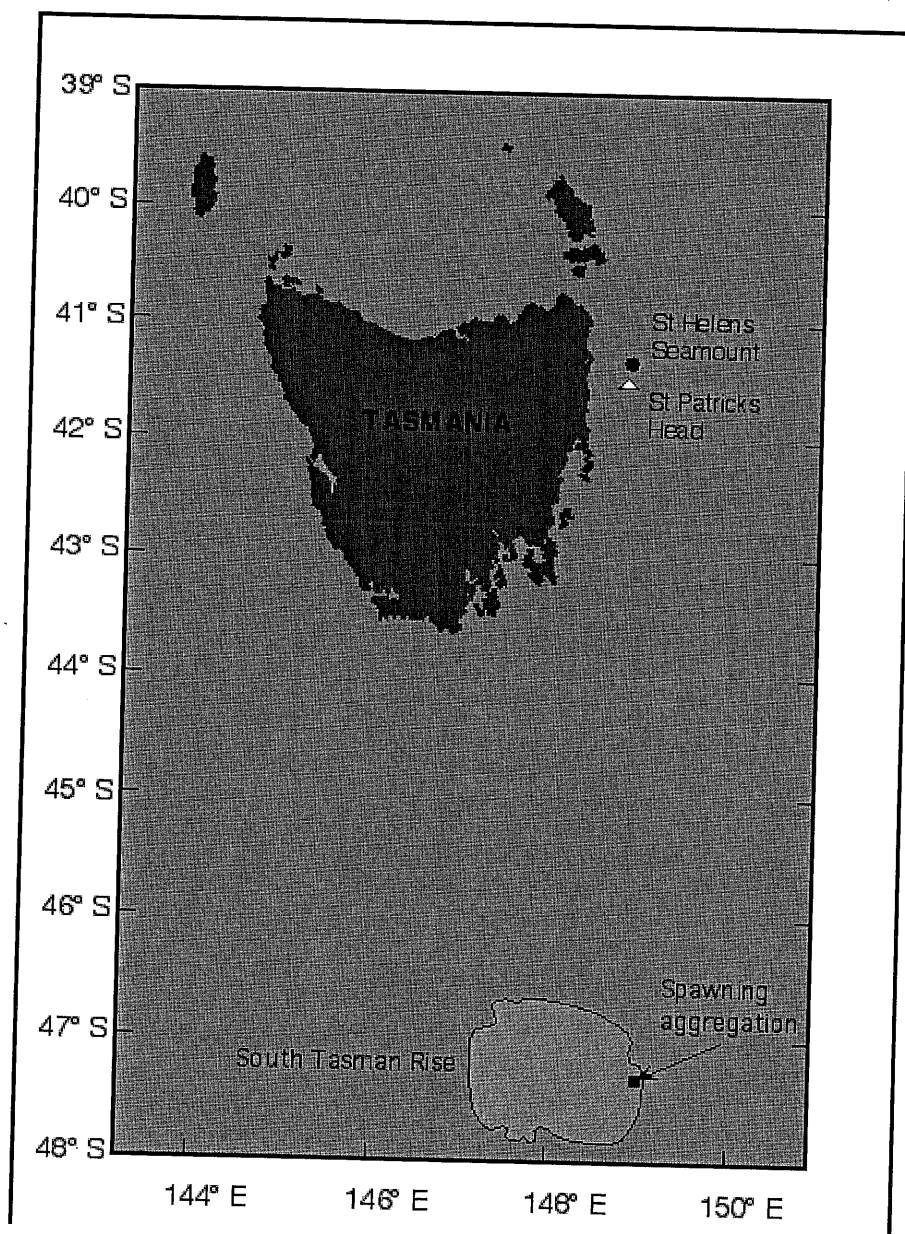
User Equipment

Simrad EK500, Deep water towed system and winch, video-camera system.
Special requirements eg: Space, power accessibility etc
Winch system on back deck
Deep-water positioning system

Personnel List

Rudy Kloser, CSIRO Marine Research (CMR), Chief Scientist (Acoustics)
Jemery Prince, BioSpherics, Co-Investigator (5 days)
Alan Williams, CMR, Watch Leader (biological sampling leader)
Mark Lewis, CMR, Gear technologist (safety officer)
Tim Ryan, CMR, Data manager
Matt Sherlock, CMR, Electronics
Jeff Cordell, CMR, Electronics
A.N. Other, CMR, Biologist/data entry
Don McKenzie, CMR, Vessel Operations/CTD operations
Karen Gowlett-Holmes, CMR, Benthic specialist/Photographer

Figure1. Location of St Helens, St Patricks and South Tasman Rise fishing grounds



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