

MARINE
NATIONAL FACILITY

2010 *RV Southern Surveyor* program

voyageplan **SS02-2010 TRANSIT**

Deep-water benthic biodiversity of the GAB Marine Park

Itinerary

Mobilise Fremantle 0800hrs, Tuesday 10 August, 2010

Depart Fremantle 1600hrs, Tuesday 10 August, 2010

Arrive Hobart 1600hrs, Friday 20 August, 2010 and demobilise

Principal Investigator

Dr David Currie (Chief Scientist) – SARDI Aquatic Sciences

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Scientific Objectives

The Benthic Protection Zone (BPZ) of the Great Australian Bight Marine Park (GABMP) was proclaimed in 1998, and consists of a 20 nautical-mile-wide strip of seafloor orientated north to south and extending from three nautical miles from the coast to the edge of Australia's Exclusive Economic Zone (EEZ), 200 nautical miles offshore (Figure 1). Within this zone, the benthic assemblages are protected from demersal trawling and other potentially destructive human activities.

The BPZ is presently one of fourteen temperate Commonwealth Marine Protected Areas (MPAs) in Australia. These MPAs form part of an integrated strategy for marine conservation and management through the National Representative System of Marine Protected Areas (NRSMPA). At present, no data are available on the benthic biodiversity of the continental slope of the BPZ, or the environmental factors that affect their patterns of distribution and abundance. This research addresses this knowledge gap and aims to provide quantitative information on the regional significance and diversity of the deep-water faunal communities of the BPZ.

Voyage Objectives

The main voyage objective is to collect quantitative samples of benthos (both infauna and epifauna) from a series of six depth-stratified sampling stations on the continental slope of the BPZ (200, 500, 1000, 1500, 2000 and 4000m; Figure 1). At each site, infaunal organisms will be collected using a Smith McIntyre grab. These grabs will be sieved and the fauna retained preserved. This will be later sorted in the laboratory to the lowest taxonomic level, before being photographed, counted and weighed. Sediment sub-samples will be retained from each grab prior to sieving to characterise the physical, chemical and geological composition of the seafloor. Beam-trawl samples will also be collected at the same six sampling stations to quantify the distribution and composition of the sedimentary epifauna. To achieve this, a 4m-wide beam-trawl will be towed over a 500m distance and the samples collected, bagged and frozen. As for the infauna, all epifaunal organisms will later be identified, photographed, counted and weighed.

A secondary voyage objective is to collect acoustic backscatter for the seafloor at and between each sampling station. Measures of bottom hardness and roughness will be logged on-the-fly using the *Southern Surveyor* sounder (Simrad EK500) whilst steaming between adjacent sampling stations in the BPZ. These data will subsequently be used to determine whether acoustic measures can be related to sedimentary facies and selected measures of biodiversity.

Voyage track

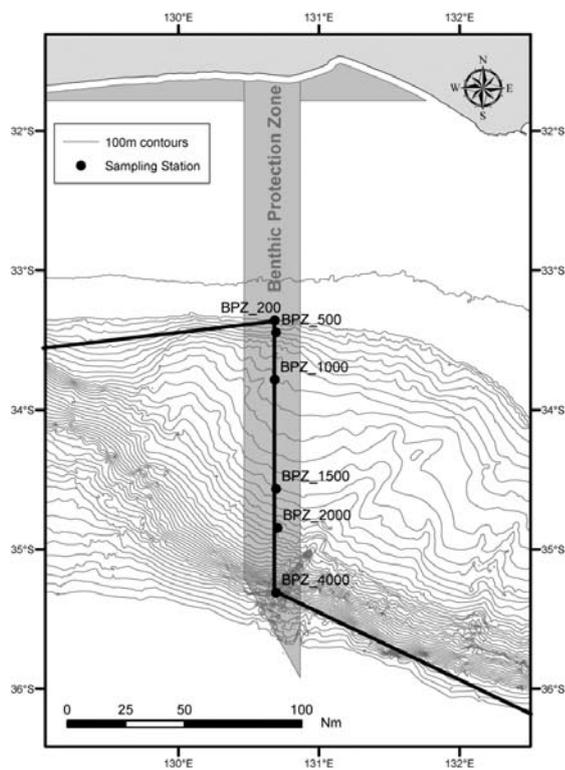
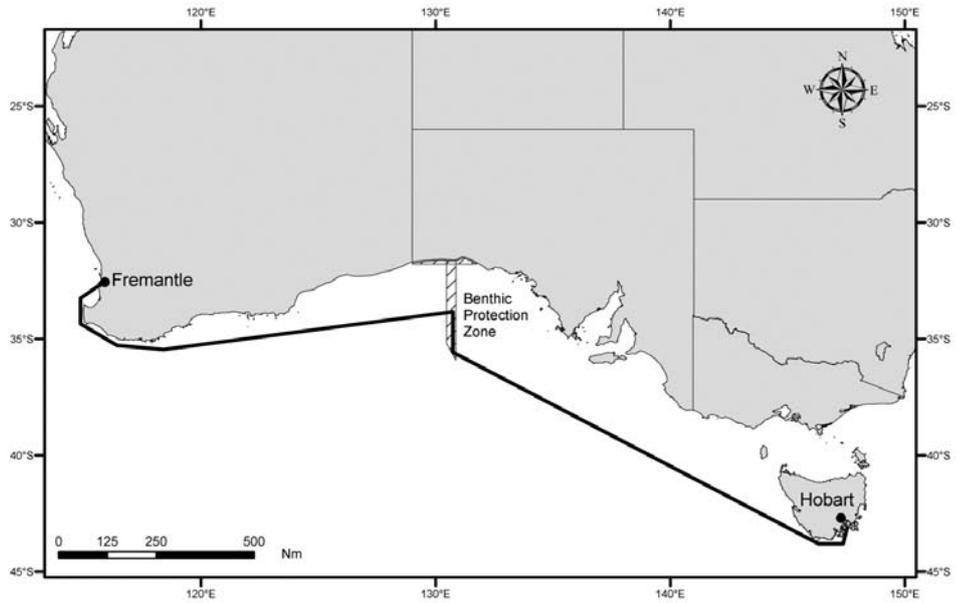


Figure 1: Map showing proposed transit route for RV *Southern Surveyor* during research voyage SS2010_T02 (Fremantle-Hobart, 10-20 August 2010), and the location of 6 deep-water benthic sampling stations on the continental slope of the Great Australian Bight Marine Park – Benthic Protection Zone.

Time Estimates

Departing Fremantle at 1600hrs on Tuesday the 10th of August, the vessel will head south to the 1000m depth contour off Cape Leeuwin, following the edge of a previous swath line. The first CTD cast will be undertaken at this location, before proceeding eastward along the upper slope towards the GABMP. A further three CTD casts, to a depth of 1000m, will be undertaken at regular intervals along this path before arriving at the BPZ. Benthic sampling will commence at the shelf-break (200m) with a single Smith Macintyre grab. This will be immediately followed by a single beam-trawl tow. The vessel will then proceed directly south through the BPZ, alternately sampling the benthos with grabs and beam-trawls at 500, 1000, 1500, 2000 and 4000m. A fifth CTD cast will also be taken whilst on station at the 1000m site. On completion of the last beam-trawl the vessel will transit directly towards Hobart, stopping only for the final CTD cast at 1000m off Cape Sorell.

Activity	Region	Distance (nm)	Time (hrs)	Total Time hrs (days)
Transit	Fremantle – BPZ (mid)	970	97	205 (8.5 days)
	BPZ (mid) – BPZ (outer)	120	12	
	BPZ (outer) – Hobart	960	96	
Benthic sampling (6 grabs + 6 beam-trawls)	BPZ (mid) – BPZ (outer)		12	
CTD (6*1000m casts)	Fremantle – Hobart		9	21 (0.9 days)
Total				226 (9.4 days)

Poor weather conditions and equipment failures have the potential to adversely impact on the scientific outcomes of this project. A flexible sampling plan, to be revised on a daily basis, is therefore proposed. Where necessary, this may involve the omission of sampling at one or more lower priority benthic/CTD sampling sites. Benthic sampling sites in descending priority are (500m, 2000m, 4000m, 1000m, 1500m, 200m). CTD casts in descending priority are (1, 6, 5, 3, 4, 2).

Piggy-back Projects

Project Title:

Characterising water mass interactions on Australia's southern continental margin

Laura Richardson (ANU)

Scientific Objectives

Very little is known about the water mass structure along the southern margin of Australia, and particularly the chemical properties and water mass signatures of the westward flowing Flinders Current. This current is thought to source deep upwelling around Kangaroo Island, and feed the Leeuwin Undercurrent on the west coast. Improved understanding of these water masses is important, as they may have a profound influence on regional marine productivity. This research project aims to use hydrographic data and stable isotopes of seawater to determine water mass interactions along the southern margin of Australia.

Voyage Objectives

To collect profiled water samples and hydrographic data from six sampling sites along the voyage path, close to the shelf edge-slope (Figure 1). This will be accomplished by deploying the CTD-rosette sampler down to approximately 1000m depth at each site. It is proposed that five of the CTD casts will be located at regular intervals between Cape Leeuwin and the BPZ, while the final cast will be located on the upper continental slope immediately west of Cape Sorell, on Tasmania's west coast.

Project Title:

National upper slope seabed multi-beam mapping and ecological interpretation

Dr. Rudy Kloser (CSIRO Marine and Atmospheric Research)

Scientific Objectives

Swath data are currently being collected around Australia's continental margin to underpin a national habitat mapping project. A major focus for this project is the upper-slope and mid-slope seabed (100 m to 1500 m depth range), as these regions are important for regional marine planning, biodiversity and conservation assessments and fisheries habitat mapping. By combining data collected from several transit voyages the heterogeneity of the seabed will be reported to assist with spatial management planning.

Voyage Objectives

Using available transit time the EM300 swath mapper will be used to target previously unmapped sections of the upper-slope and mid-slope seabed between Fremantle and Hobart. These data collections will focus on the 100 m to 1500 m depth range and regions important to national marine planning (e.g. canyons, reefs etc).

Southern Surveyor Equipment

- Communications – Voice, fax and data
- Navigation – archiving of underway data including time, ship position, bathymetric depth
- Meteorological data – air temperature, humidity, wind-speed, and direction, barometric pressure and light
- Oceanographic data – underway logging of sea surface temperature and salinity
- General computing facilities and marine charting software
- Seapath Seatex 200 – for heading pitch and roll
- Simrad EK500 sounder (12, 38, 120kHz)
- Simrad EM300 multibeam swath mapper
- ADCP
- General purpose laboratory
- Hydrochemistry laboratory
- Wet laboratory/CTD Room
- Fish laboratory/geoscience laboratory
- Fish sorting room
- Photographic/preservation laboratory
- Blast freezer
- Walk in freezer
- Scanmar (for monitoring altitude of underwater equipment)
- Sonardyne USBL Underwater Positioning System
- Sensors to measure: tension, winch-speed and wire out for CTD, trawl and coring winches
- Trawl winches with 5,000m of 24mm wire
- Coring winch with 7,000m of 19mm wire
- CTD/Hydro winches with 7,000m of 8mm single core conducting cable
- Hydrographic A-frame
- Stern A-frame (SWL 15 tonnes)
- 7 tonne knuckleboom crane
- Gilson winches (15 tonne, 5 tonne)
- Smith McIntyre grabs (2)
- Small epibenthic sled
- Rock dredge
- CTD (seabird SBE 911 plus)
- Additional CTD sensors (Profiling fluorometer, DO, Light)
- Rosette (24 x 10 litre Niskin bottles)
- On deck flowing seawater supply

User Equipment

- Beam-trawl (4m headline – Lewis/CSIRO design)
- Small epibenthic sled (1m width – Ockelmann design)

Personnel List

David Currie	SARDI	Chief Scientist
Saras Kumar	DEH	Invertebrate Taxonomist
Rod Simpson	UNE	Invertebrate Taxonomist
Laura Richardson	ANU	Oceanographer, PhD Student
Pamela Brodie	CMAR	MNF Voyage Manager / Computing Support
Bernadette Heaney	CMAR	MNF Swath Mapping Support
Karl Forcey	CMAR	MNF Electronic Support
Sue Reynolds	CMAR	MNF Hydrochemistry
Ron Plaschke (TBC)	CMAR	Safety Audit
Rohanne Young (TBC)	CMAR	Safety Audit

As per AMSA requirements for additional berths on *Southern Surveyor*, the following personnel are designated as System Support Technicians and are required to carry their original AMSA medical and AMSA Certificate of Safety Training on the voyage:

Name	AMSA Certificate of Safety Training No.
Pamela Brodie	AS02447
Bernadette Heaney	AS02397
Karl Forcey	BB02062
Sue Reynolds	BB03210

This voyage plan is in accordance with the directions of the Marine National Facility Steering Committee for the Research Vessel *Southern Surveyor*.

Dr David Currie

Chief Scientist