

## VOYAGE PLAN SS07/2003

### Title

Seasonality in Community Structure, Productivity and Energy Flows in the Continental Shelf and Offshore Pelagic Environment off Southwestern Western Australia

### Itinerary

Depart Fremantle 1000 hrs, Friday 22 August 2003

Arrive Fremantle 1000 hrs, Saturday 30 August 2003

### Principal Investigator(s)

Dr. Tony Koslow (Chief Scientist)

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### Scientific Objectives

To use Southern Surveyor to investigate

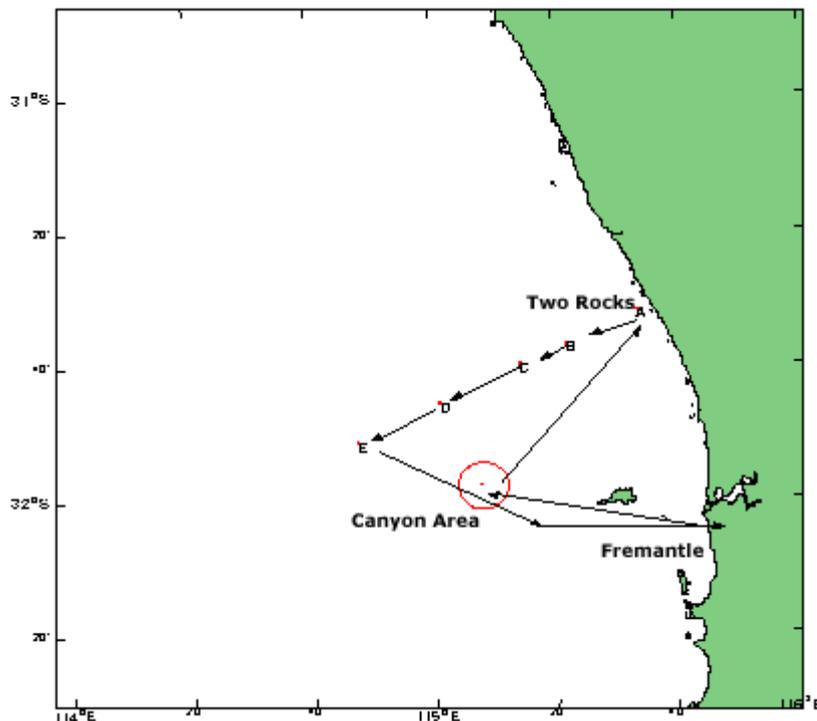
- a. The physical, chemical, and biological (phytoplankton, zooplankton and micro-nekton) structure along a transect north of Perth extending from the nearshore (17 m depth) to offshore (1000 m depth);
- b. Measure processes associated with biological productivity inshore and offshore;
- c. Relationships between topography, currents and concentrations of krill in the region of Perth canyon.

### Voyage Objectives

- a. Occupy stations at the following depths: 17 m (coastal), 40 m (inner shelf), 100 m (outer shelf), 300 m (shelf break), and 1000 m (offshore-Leeuwin Current) along a transect north of Perth orthogonal to the coast, with its nearshore station outside Two Rocks. A CTD cast will be made midway between each full sampling stations. Each station will be repeated day and night.
- b. At each station (A — E) and midway between each station, to conduct a CTD profile measuring temperature, salinity, light, chlorophyll, oxygen, and acoustic backscattering (TAPS).
- c. To conduct a rosette cast to collect water for oxygen, nutrients (N, P, Si), salinity, chl a, photosynthetic pigments, micro-zooplankton and determinations of primary productivity. The following depths will be sampled (as available): 0 (bucket or sub-surface Niskin), 10, 25, 50, 75, 100 and 150 m depth or near bottom at shallow stations. A sample from the chl max should be substituted for one of the latter depths, depending upon its position.

- d. To conduct replicated double-oblique Bongo net tows at all stations, plus one daytime and one night-time depth stratified tow from near surface to within 5-10 m of bottom or to a maximum of 150 m depth. Depth-stratified tows will cover the following strata: surface, mixed layer above chlorophyll maximum, chl max, layer below chl max. Fewer strata may be sampled at station B (40 m depth).
- e. To collect underway temperature, salinity, and chlorophyll fluorescence between each station. A sample will be obtained at each full station to calibrate the underway fluorescence.
- f. To conduct replicated midwater trawl tows at all stations, vertically stratified at stations  $\geq 100$  m depth, day & night.
- g. To measure upwelling and downwelling light irradiance at each station and hyperspectral irradiance through the water column to 30 m depth.
- h. To measure primary productivity based on 24-hr  $^{14}\text{C}$  incubations, microzooplankton and mesozooplankton grazing at stations A, C and E. Microzooplankton dilution experiments will be carried out at the surface and chl max depths.
- i. To deploy and retrieve a drifting sediment trap, with satellite tracking buoy, at station E.
- j. To conduct an acoustic transect across Rottneest canyon and sample potential krill layers with stratified net tows on the North flank of the canyon.
- k. To collect three (3) replicate box-core or grab samples of the bottom sediments at stations A — D to assess sources of organic matter deposited in the sediments.

### Voyage Track



### Time Estimates

**Day 1** Rottneest Canyon: acoustic, CTD, and EZ net sampling.

Steam: Fremantle — canyon: 31 n mi: 3 hr @ 11 kt

18 n mi acoustic transects (@ 6 kt): 3 hr

4 EZ plankton tows: 8 hr

10 CTD casts: 5 hr

Steam to Thompson's Bay, Rottneest 2 hr

(personnel transfer)

TOTAL: 21 hr

**Day 2:** Station A (coastal: ~17 m depth: 31° 32.20' S, 115° 33.50'E)

Steam Rottnest — Station A (30 mi): 3 hr

2 CTD casts (D/N): 1 hr

4 Bongo tows (2D/2N) 2 hr

2 IYGPT tows (1 D/1 N) 2 hr

2 neuston tows (D/N) 1 hr

3 benthic sediment samples 3 hr

Zooplankton/water collections

for experiments; irradiance profile 2 hr

Pump zooplankton profiles (D/N): 3 hr

Steam Station B (40 m)

+ CTD: 3 hr

TOTAL: 21 hr

**Day 3:** Station B (inner shelf: 40 m depth: 31° 37.10' S, 115° 21.90' E)

2 CTD casts (D/N): 1 hr

4 Bongo tows (2 D/2 N) 2 hr

2 IYGPT tows (1 D/1 N) 4 hr

2 EZ net tows (1 D/1 N) 4 hr

2 neuston tows (D/N) 1 hr

Irradiance profile 0.5 hr

Pump zooplankton profiles (D/N): 3 hr

3 benthic sediment samples 3 hr

Contingency 3.5 hr

Steam Station C (100 m) (9 mi @6 kt)

+ CTD: 2 hr

TOTAL: 24 hr

**Day 4:** Station C (outer shelf: 100 m depth: 31° 40.00'S, 115° 14.20'E)

2 CTD casts (D/N): 1.5 hr

4 Bongo tows (2 D/2 N) 3 hr

2 IYGPT tows (1 D/1 N) 4 hr

2 EZ net tows (1 D/1 N) 4 hr

2 neuston tows (D/N) 1 hr

3 benthic sediment samples 3 hr

Zooplankton/water collections

for experiments; irradiance profile 2 hr

Pump zooplankton profiles (D/N): 3 hr

Steam Station D (300 m)

(12 mi @6 kt) + CTD: 2.5 hr

TOTAL: 24 hr

**Day 5-6:** Station D (outer shelf: 300 m depth: 31° 46.33'S, 115° 02.90'E)

2 CTD casts (D/N): 1.5 hr

4 Bongo tows (2 D/2 N) 3 hr

2 stratified IYGPT tows (D/N) 4 hr

2 EZ net tows (D/N) 4 hr

2 neuston tows (D/N) 1 hr

3 benthic sediment samples 3 hr

Irradiance profile 0.5 hr

Pump zooplankton profiles (D/N): 3 hr

Steam Station E (1000 m)  
(13 mi @6 kt)+ CTD: 2.5 hr  
Contingency allowance: 1.5 hr  
TOTAL: 24 hr

**Day 7-8:** Station E (offshore: 1000 m depth: 31° 51.65'S, 114° 47.55'E)  
4 CTD casts (D/N): 3 hr  
4 Bongo tows (2 D/2 N) 3 hr  
4 stratified IYGPT tows (2 D/2 N) 8 hr  
4 EZ net tows (2D/2N) 8 hr  
3 neuston tows (1 D/2 N) 2 hr  
Zooplankton/water collections  
for experiments; irradiance profile 3 hr  
Pump zooplankton profiles (D/N): 4 hr  
Deploy & retrieve drifting sediment  
trap, including tracking 6 hr  
Suspend sampling before/after sunrise  
and sunset, contingencies 6 hr  
Steam Fremantle (52 mi) 5 hr  
TOTAL: 48 hr

**Contingency (if Stn A cannot be occupied)**

Occupy station at ~20-25 m depth on seaward side of reefs along line of Two Rocks transect.

**Southern Surveyor Equipment**

- Navigational: GPS, sounder
- ADCP
- Simrad EK 500 sounder
- Underway temperature, salinity & fluorescence (CTD)
- CTD with Salinity, Oxygen, Fluorescence, PAR sensors
- Rosette sampler
- Hydrographic sample analyses: salinity, oxygen, nitrate, ammonia, silicate and phosphate, pH
- EZ multiple O/C zooplankton sampler
- Smith-McIntyre grab
- Running seawater on the deck (deck hoses)

**User Equipment**

- Tracor Acoustic Profiling System (TAPS)
- Hyperspectral radiometer
- IYGPT Midwater Trawl with multiple O/C codend system
- Bongo nets
- Zooplankton pump
- Chl pump & filtration system
- Neuston net
- ES 60 Simrad multi-frequency acoustic system
- Drifting sediment traps with tracking buoy
- Box corer
- Liquid N<sub>2</sub> dewar

**Personnel List**

Tony Koslow, CMR, Chief Scientist

Nick Mortimer, CMR, Acoustician

Kate Berry, SS Support, Hydrochemistry

Joanna Strzelecki, CMR, Zooplankton biologist

Stephan Pesant, UWA/CWR, Phytoplankton

Harriet Paterson, UWA, Microzooplankton

Chris van Etten, Curtin, Acoustics (Day 1 only)

Mark Lewis, CMR, Biological technician

Lindsay MacDonald, SS Support Electronics

Barbara Muhling, Murdoch, Ichthyoplankton

Mirosław Ryba, SS Support Computing

Leon Majewski, Curtin, Remote sensing

L Beckley, Murdoch, Zooplankton/Watch leader (Transfer Day 2)

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

**Dr Tony Koslow**

**Chief Scientist**