

VOYAGE PLAN NO SS01/2004

Title

Seasonality in community structure, productivity and energy flows in the continental shelf and offshore pelagic environment off southwestern Western Australia.

Itinerary

Depart Fremantle 0800 hrs, Tuesday 20 January 2004

Arrive Fremantle 1000 hrs, Wednesday 28 January 2004

Principal Investigator

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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;

Voyage Objectives

C) 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 offshore of Two Rocks. A CTD cast will be made midway between each full sampling station. Each station will be repeated day and night.

D) At each station (A – E) and midway between each station, to conduct a CTD profile measuring temperature, salinity, light, chlorophyll, and oxygen.

c. To conduct a vertical cast day and night at each station with the plankton pump to measure acoustic backscattering (TAPS) and to obtain pump plankton samples.

E) 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 may be substituted for one of the latter depths, depending upon its position.

F) 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).

G) 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.

H) To conduct replicated midwater trawl tows at all stations > 100 m depth, day & night. The Isaacs-Kidd trawl will be used inshore and the IYGPT net where there is sufficient depth.

I) To measure upwelling and downwelling light irradiance at each station and hyperspectral irradiance through the water column to 30 m depth.

J) To measure primary productivity based on 24-hr ^{14}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. Samples for an enzyme assay of secondary production will be collected from the oblique Bongo tows.

K) To carry out one or more Bongo tows at each station day and night to measure gut fluorescence, copepod egg production and for stable isotope analysis.

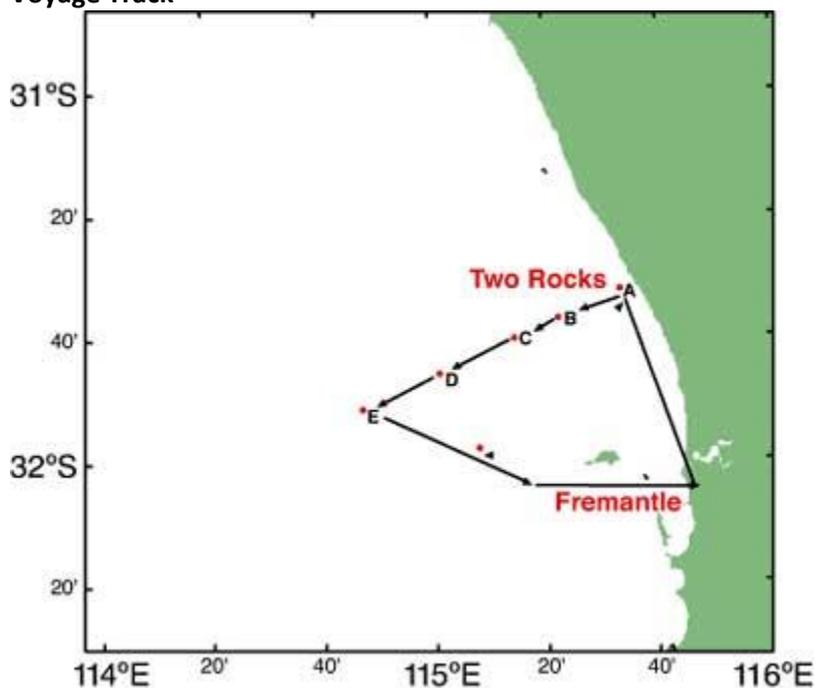
L) To deploy and retrieve a drifting sediment trap with satellite tracking buoy at Stations C & E.

M) 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.

N) To conduct neuston (surface) tows at each station, day and night.

O) To sample Langmuir cells (areas of convergence and in between) with the plankton pump and TAPS where conditions are suitable.

Voyage Track



Time Estimates

Day 1-1.5: 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 neuston tows (D/N): 1 hr

3 benthic sediment samples: 2 hr

Zooplankton/water collections for grazing, gut fluorescence, stable isotope experiments: 2 hr

Irradiance profile: 0.5 hr

Pump zooplankton profiles (D/N): 3 hr

Sample Langmuir circulation: 3 hr

Isaacs-Kidd midwater trawl (N): 1 hr

12 hr daytime sampling CTD/rosette for productivity: 12 hr

Personnel transfer (2 Rocks marina): 1.5 hr

Steam Station B (40 m) (15 n mi @ 6 kt + CTD): 3 hr

TOTAL: 35 hr

Day 2.5: 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

Bongos: gut fluorescence, etc: 1.5 hr

2 Isaacs-Kidd trawls (1 D/1 N): 2 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

Sample Langmuir circulation: 3 hr

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

+ CTD: 2 hr

TOTAL: 23 hr

Day 3.5-4: 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

Bongos: gut fluorescence, etc: 1.5 hr

2 stratified 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

Sediment trap deployment/retrieval: 2 hr

Sample 9 stations in 9 x 9 km grid with CTD/rosette cast and 1 bongo tow at each station (20 n mi = 4 hr

steaming + 9 hr sampling: 13 hr

Steam Station D (300 m)

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

TOTAL: 41.5 hr

Day 5: 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

Bongos: gut fluorescence, etc: 1.5 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 hr

TOTAL: 25 hr

Day 6-7.5: Station E (offshore: 1000 m depth: 31° 51.65'S, 114° 47.55'E)

2 CTD casts (D/N): 1.5 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

Sample 9 stations in 9 x 9 km grid with CTD/rosette cast and 1 bongo tow at each station (20 n mi = 4 hr

steaming + 9 hr sampling: 13 hr

Suspend sampling before/after sunrise & sunset, contingencies: 6 hr

Steam Fremantle (52 mi), CTD @ 5.5 hr

Rottneest station

TOTAL: 60 hr

Contingency: ~12 hr

Southern Surveyor Equipment

- Navigational: GPS, sounder
- ADCP
- Simrad EK 500 sounder
- Underway temperature, salinity & fluorescence (CTD)
- CTD with with salinity, oxygen, fluorescence and PAR sensors
- 24 bottle rosette, 10L Niskins rigged with user supplied silicon rubbers and O-rings
- Hydrographic sample analyses: salinity, oxygen, nitrate, silicate and phosphate
- EZ multiple O/C zooplankton sampler (still under development)
- Scanmar equipment for midwater trawls
- Smith-McIntyre grab
- Running seawater on the deck (deck hoses)

User Equipment

- IYGPT Midwater Trawl with MIDOC system
- Tracor Acoustic Profiling System (TAPS)
- Hyperspectral radiometer
- Bongo nets (see Special Requests)
- Zooplankton pump
- Chl pump & filtration system
- Neuston net
- ES 60 Simrad multi-frequency acoustic system
- Drifting sediment traps with tracking buoy
- Box corer
- Liquid N2 dewar
- Ammonia samples may be collected for later analysis

Special Requests

Matlab for plotting purposes. At each station, request plot of CTD variables T, S, chl fluorescence & light on the same plot, each with an expanded scale (i.e. one that covers the width of the page). In order to determine where to take the water samples for primary production, also request print out of the 1m binned values in a table.

The Bongo nets will be deployed over the stern after advice from Operations Manager that the side A-frame is not to be used for this purpose. It will be necessary to change EZ net and Bongo's on the 12mm conducting cable as required through the voyage, an operation which could take 1 hour 30 mins., which will need to be factored into the operational plan.

Scientific Personnel List

Tony Koslow	CMR	Chief Scientist
Nick Mortimer	CMR	Acoustics, operational support*
Joanna Strzelecki	CMR	Zooplankton biologist
Stephan Pesant	UWA/CWR	Phytoplankton
Harriet Paterson	UWA	Microzooplankton
Chris van Etten	Curtin	Acoustics (leave day 2)
Mark Lewis	CMR	Biological tech, operational support*
Kathy Danaher	James Cook	Plankton sampling, operational support*
Leon Majewski	Curtin	Remote sensing, operational support*
Barbara Muhling	Murdoch	Zooplankton, operational support* (join day 2)
Jeff Cordell	CMR NatFac	Electronics
Pamela Brodie	CMR NatFac	Computing, Voyage Manager
Neale Johnston	CMR NatFac	Hydrochemistry

* Note: A least one operational support person will be required on each watch depending on the equipment to be deployed. Details to be confirmed during voyage briefing soon after sailing. Prior training for operational staff is scheduled on Southern Surveyor, Victoria Quay, Fremantle 0900-1230hrs, Monday 19 January 2004.

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

Tony Koslow
Chief Scientist