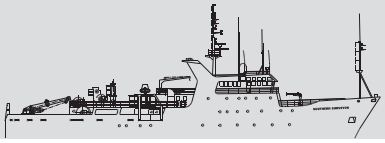

MARINE
NATIONAL FACILITY

2007 program

RV *Southern Surveyor*

voyageplan
SS04-2007

Pelagic ecosystem productivity and dynamics off the West coast of Western Australia

Itinerary

Mobilise Hobart, Monday 30th April 2007.
Transit 03/2007: Depart Hobart 1800hrs, Monday 30 April 2007
Arrive Fremantle, AM Wednesday 9 May 2007, bunker and store.

Leg 1: AM Thursday 10 May 2007, load WA-based scientific equipment
Depart Fremantle 1600hrs, Thursday, 10 May 2007
5 days of benthic survey off Perth
Arrive Fremantle 0800hrs, Tuesday, 15 May 2007.

Leg 2: Depart Fremantle 1600 hrs, Tuesday 15 May 2007
Several transects south of 30°S
Small boat transfer of personnel to harbour near Perth, ~ 20-21 May.

Leg 3: Depart Perth after small boat transfer (~20-21 May)
Transects north of Perth and eddy mapping (if eddy is present)
Arrive Dampier 0800 hrs, Wednesday 6 June 2007 and demobilise.

Principal Investigators

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John Keesing – CSIRO Marine & Atmospheric Research, Floreat, WA.
Lynnath Beckley – Murdoch University, Perth, WA.
Martin Lourey – CSIRO Marine & Atmospheric Research, Floreat, WA.

CSIRO

Scientific Objectives

The Leeuwin Current, a unique poleward-flowing eastern boundary current, dominates the oceanography off the west coast of Western Australia. Factors regulating the seasonal plankton cycle and its interannual variability remain poorly understood in this region. One of its most interesting features is the ten-fold increase in chlorophyll, which coincides with the seasonal intensification of Leeuwin Current flow. We propose here to examine:

– the regional extent of this bloom and its key drivers for primary production: stratification and depth of the mixed layer, the influence of Leeuwin eddy dynamics and local wind-driven upwelling, and alongshore and cross-shelf advection,

– plankton food web structure during the bloom: the relative importance of picoplankton and larger phytoplankton, micro- and meso-zooplankton, and links with larval and juvenile fish in relation to onshore-offshore and north-south oceanographic features.

– Benthic productivity and recycling of nutrients on the shelf.

– If a suitable eddy has formed off the west coast between May 15th and May 20th we propose to spend 1-3 days mapping the features of the eddy and sampling it.

Voyage Objectives

These objectives require a voyage to cover the west coast of Australia during the late autumn/early winter (May/June) period. Initially the voyage will survey the shallow habitats near Perth do assess benthic productivity. Swath mapping, video 'samples', dredges, grabs and box cores are to be collected. Rates of primary production and nutrient efflux will be measured from box cores. Animals and plants will be sorted and stored for analysis later.

The voyage will then be based on 13 CTD onshore-offshore transects undertaken every degree of latitude from Northwest Cape (22o S) to Capes Naturaliste and Leeuwin (34o S). Each transect will extend from as nearshore as is practicable (25 – 30 m depth) to 2000 m depth (Fig. 4). Stations will be set at 25 (inshore), 50, 75, 100 (mid-shelf), 200 (shelf-break), 300, ~500 (Leeuwin core), 750, 1000, and 2000 (offshore) m depth.

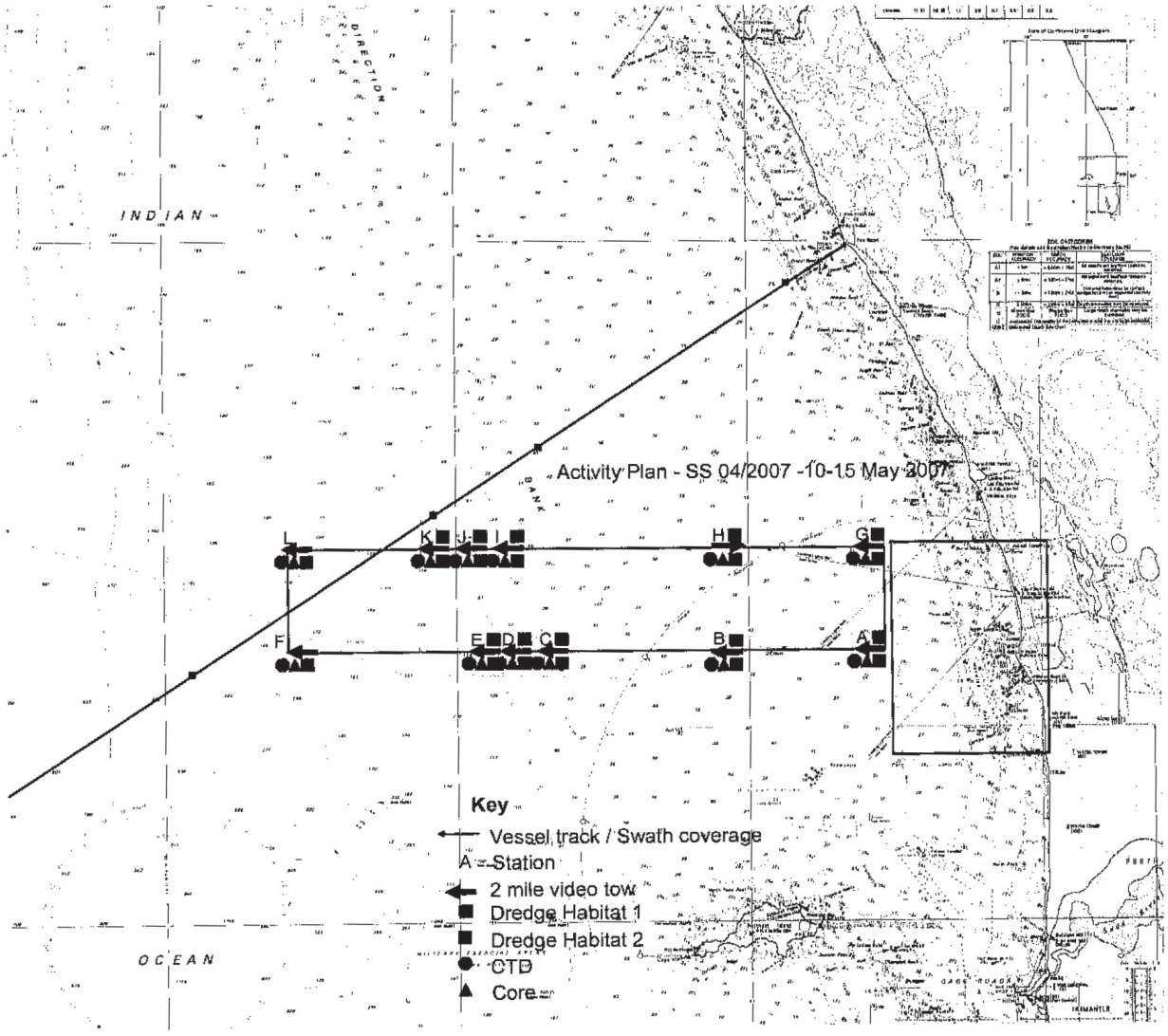
Each transect leg will have a seasoar return leg to give high vertical and horizontal resolution of temperature, salinity and fluorescence. These will be used to locate a station in the middle of the Leeuwin Current on each CTD transect.

The SeaSoar mapping, combined with current satellite images, will enable us to place the 'Leeuwin' station within the core of the Leeuwin Current on each transect.) CTD profiles will be carried out at all stations to measure temperature, salinity, dissolved oxygen, PAR, chlorophyll fluorescence, and zooplankton acoustic backscatter (using the 6-frequency Trachor Acoustic Profiling System, TAPS) through the water column to a maximum depth of 1000 m. Water samples will be taken at standard depths to measure salinity and nutrients (nitrate/nitrite, ammonia, dissolved organic nitrogen, particulate nitrogen, phosphate, silicate). Full biological sampling will be carried out at the inshore (25 m), Leeuwin Current (200 - 500 m) stations, and offshore (2000 m). Replicate oblique bongo tows to 150 m maximum; the light profile to 50 m using a hyperspectral radiometer; water samples for phytoplankton pigment (HPLC)

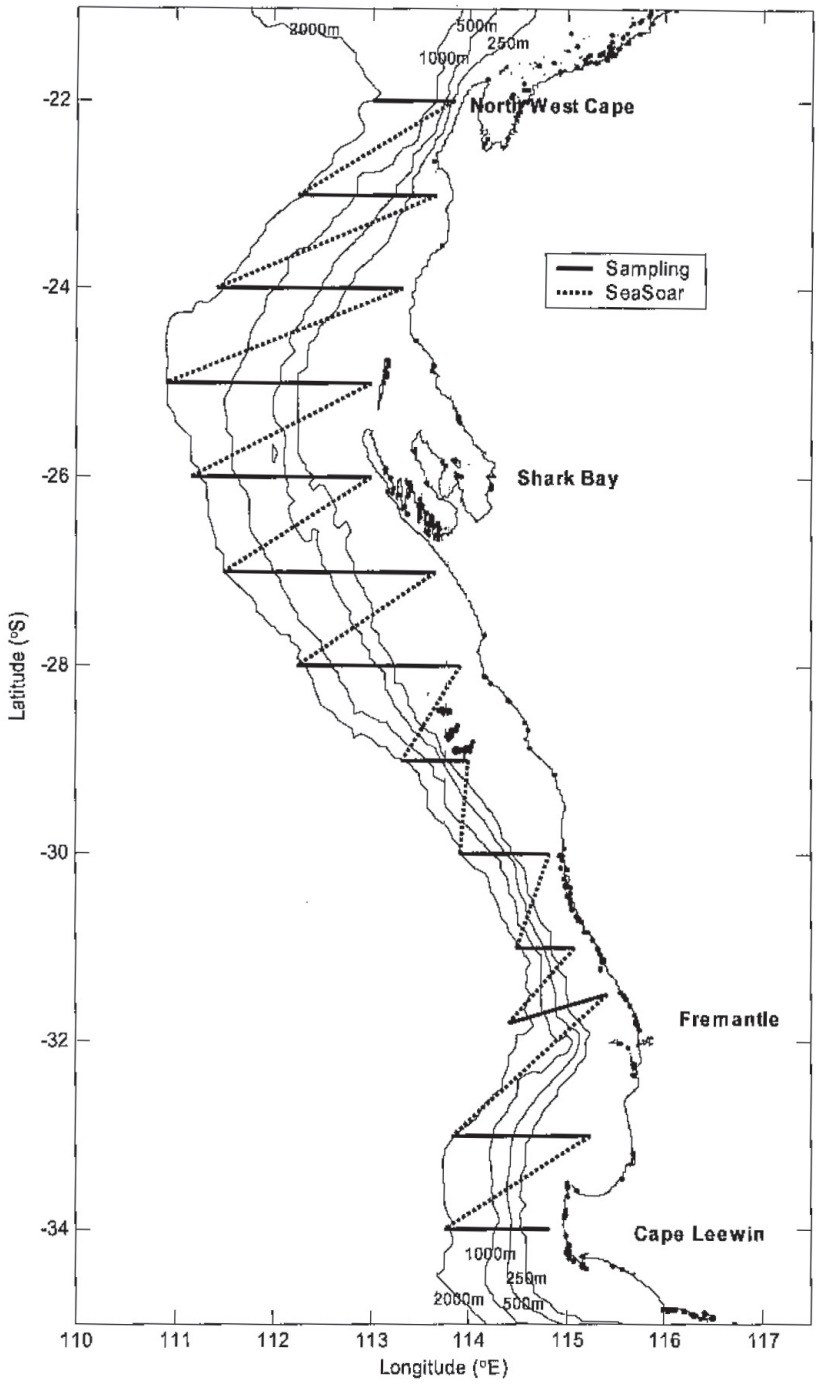
analysis and species composition from near-surface and chlorophyll maximum depths; measurement of size-fractionated primary productivity (C-14 incubation method and PAM measurements from standard sampling depths); nitrogen uptake from labelled nitrate, ammonia, and N2; sampling of lipids and/or stable C and N isotopes in the size-fractionated phytoplankton and in selected zooplankton and ichthyoplankton species to examine food web pathways; microzooplankton grazing based on the dilution method (Landry and Hassett 1982); total alkalinity & DIC (to assess pH); and secondary production estimates based on egg production and a biochemical (aminoacyl-tRNA synthetase (Yebra and Hernandez-Leon 2004)) assay. Zooplankton samples will be split, with part retained in ethyl alcohol to examine selected larval fish otoliths for growth to be related to oceanographic conditions. Neuston sampling will also be carried out.

Voyage Track

Voyage track Leg 1: Benthic work from May 10 to May 15, 2007.



Voyage track Leg 2 & 3: May 15th to June 6th 2007.



Time Estimates

5 days of benthic work near Perth. Video work at ~ 1knot.
13 transects with CTD stations ~12 days
13 seasoar transects ~ 7 days
1 – 3 days eddy mapping (dependent upon time and a suitable eddy being in region).

Southern Surveyor Equipment

Simrad EK500 sounder (12, 38 and 120 kHz)	Yes
Simrad EA500 sounder (12kHz)	Yes
ADCP - measures current vectors beneath the vessel	Yes
General purpose laboratory (includes fume hoods, fridge, freezer)	Yes
Controlled temperature laboratory /cool room – please specify temperature required	4 degrees
Hydrochemistry laboratory	Yes
Wet laboratory/CTD room	Yes
Fish laboratory/geoscience laboratory	Yes
Photographic/preservation laboratory	Yes
Blast freezer – for quick freezing of samples	Yes
Walk in freezer	Yes
Moonpool transducer trolley	Yes
Sensors to measure: tension, winch speed and wire out from CTD, trawl or coring winches	Yes
Winches, A-frames and Crane Applicants should consult the Operations Officer on carrying capacities and other technical details.	Note: Will require winches for CTD/rosette, bongo towing with conducting cable, neuston tows from starboard side
CTD/Hydro winches each with 7,000m of 8mm single core conducting cable	Yes
Towed-body winch with 3,000m of 12mm 7 core conducting cable	Yes (seasoar)
Hydrographic A-frame	Yes
Stern A-frame (SWL 15 tonnes)	Yes
ADCP: standard data provided as 20 minute averages, 8 m bins from 8m to 300m	Yes
ADCP log (photocopy)	Yes
Ship's heading and speed over ground.	Yes
Data from winch sensors (tension, winch speed and wire out)	Yes
Bridge log (photocopy)	Yes

Scientific Equipment

Smith-McIntrye sediment grab	Yes
CTD (Seabird SBE 911 plus)	Yes
Rosette (24 bottles up to 10 litres)	Yes
CTD data	Yes
CTD log (photocopy)	Yes
Echograms from the Simrad EK500 sounder – readable with Sonardata Echoview software.	Yes
Echograms from the Simrad EA500 sounder – readable with Sonardata Echoview software.	Yes

CTD/Chemical Analyses

10 litre Niskin bottles	Yes
Total number of CTD casts required.	130 (13 transects*10 stations/transect)
Number of samples/cast.	~ 8
Salinity – analyses as required only to calibrate CTD	Yes
Nitrate	Yes
Nitrite	Yes
Silicate	Yes
Phosphate	Yes
Ammonium	Yes

Other CTD Sensors

The following sensors are available for use with the CTD	
Transmissometer (to 6,000m depth)	Yes
Profiling fluorometer – requires support from users for calibration during the voyage (6,000m depth)	Yes
Light (PAR) (to 500m depth)	Yes
Dissolved oxygen (to 6,000m depth). Requires support of Marine National Facility hydrochemist for calibration.	Yes
Lowered ADCP (to 6,000m depth). Requires users support for data processing and interpretation.	Yes, on some casts.

Other Equipment and Facilities

Underway fluorometer to measure sea surface fluorescence. Collection of data requires support from users for calibration of the equipment during the voyage.	Yes
Scintillation counter – this equipment can only be operated with user support.	Yes
Milli-Q water supply	Yes
Radiation Sensors – these also require user contribution and support.	Yes
SeaSoar – towed undulating CTD system. Use requires an additional Marine National Facility technician. The SeaSoar may also be used as a platform for other small sensor packages. You should discuss your requirements with the Operations Officer.	Yes

Swath mapper Kongsberg EM300 swath mapping system. Use of the swath mapper requires at least one person for technical support. Users should specify what level of support they require.	Yes
Swath bathymetry	Yes
Swath seabed reflectance	Yes
Swath water column data	Yes
Sampling Systems and Trawl Nets	Yes
Small Epibenthic Sled	Yes
Data Products available on request	
Seasoar	Yes
Hydrology	Yes
Swath bathymetry	Yes
Swath seabed reflectance	Yes
Swath water column	Yes

User Equipment

Bongo net with electronic depth sensor, flow meter (requires conducting cable)
Neuston net
TAPS
Optical sensors (still to be decided)
Small box corer (supplied by Andy Revill)
Shallow video system,
Shallow video winch,
Benthic sled (Sherman).

Special Requirements

CSIRO approval will be required for low level radiation work to be conducted in the GP lab. GP lab to be prepared as radiation laboratory including removal of general purpose PC's, removal of carpet rug and appropriate signage. GP lab fume hoods have recently been re-certified.

Separate plan to be developed for the location and use of equipment and chemicals.

Personnel List

Leg 1: May 10th to May 15th

Peter Thompson	CSIRO	Chief Scientist
John Keesing	CSIRO	Benthic sampling
Martin Lourey	CSIRO	Primary production nutrient efflux
Bruce Barker	CSIRO	Camera
Jeff Cordell	CSIRO	Camera
Mark Lewis	CSIRO	Gear/camera
Karen Gowlett-Holmes	CSIRO	Inverts
TBA	GA	Swath
Rick Smith	CSIRO	Swath support
Mark Salotti	WA Museum	Invertebrates
Julia Phillips	CSIRO	Benthic plants
Ron Plaschke	MNF	Voyage Manager
Pamela Brodie	MNF	Computing
Drew Mills	MNF	Electronics
Mark Rayner	MNF	Hydrochem

Leg 2. May 15th to small boat transfer ~ May 20-21st

Peter Thompson	CSIRO	Chief Scientist
James McLaughlin	CSIRO	C14 uptake
Joanna Strzelecki	CSIRO	Zooplankton grazing
Pru Bonham	CSIRO	Pigments
Cecile Rousseaux	UWA	Microzooplankton grazing
Nugzar Margvelashvili	CSIRO	Zooplankton acoustics
Harriet Patterson	UWA	Flow cytometry
David Holliday	Murdoch Uni	Larval fish
Lynnath Beckley	Murdoch Uni	Larval fish
Martin Lourey	CSIRO	N15 uptake
Lindsay Pender	MNF	Seasoar
Pamela Brodie	MNF	Voyage Manager & Computing
Stephen Thomas	MNF	Electronics
Dave Terhell	MNF	Hydrochem
Mark Rayner	MNF	Hydrochem

Small boat transfer: Lindsay Pender off and Karen Wild Allen on.

Leg 3. Small boat transfer to Dampier ~ May 20-21 to June 6th

Peter Thompson	CSIRO	Chief Scientist
James McLaughlin	CSIRO	C14 uptake
Joanna Strzlecki	CSIRO	Zooplankton grazing
Pru Bonham	CSIRO	Pigments
Cecile Rousseaux	UWA	Microzooplankton grazing
Nugzar Margvelashvili	CSIRO	Zooplankton acoustics
Harriet Patterson	UWA	Flow cytometry
David Holliday	Murdoch Uni	Larval fish
Lynnath Beckley	Murdoch Uni	Larval fish
Martin Lourey	CSIRO	N15 uptake
Pamela Brodie	MNF	Voyage Manager & Computing
Stephen Thomas	MNF	Electronics
Dave Terhell	MNF	Hydrochem
Mark Rayner	MNF	Hydrochem
Karen Wild-Allen	CSIRO	Marine optics

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

Peter Thompson
Chief Scientist