



2004

RV Southern Surveyor
program

voyageplan

SS09/2004

Pelagic habitat and community comparisons in the fishing grounds of the tuna and billfish fishery off eastern Australia.

Itinerary

Depart Brisbane 1000 hrs, Wednesday 15 September, 2004

Arrive Brisbane 1000 hrs, Thursday 30 September, 2004

Principal Investigators

Dr Jock Young (Chief Scientist) • Dr Alistair Hobday

CSIRO Marine Research, PO Box 1538, Hobart, Tasmania 7001 Australia

Phone: (03) 6232 5360 **Email:** jock.young@csiro.au

Scientific Objectives

The eastern Australian longline fishery targets mainly swordfish and yellowfin and bigeye tuna. Fishing is usually carried out in relation to oceanographic features or features of the seabed topography, particularly seamounts. The fishery is presently being evaluated with respect to its ecological risk and ecosystem impacts. An FRDC project has recently been granted to CSIRO to examine the ecosystem impacts of this fishery on the oceanic community off eastern Australia. As part of that wider study we sought and gained time on FRV Southern Surveyor to describe the physical habitat and primary community characteristics of the pelagic ecosystem in which the fishery operates focusing on the area in which the fishery is operating and on seamounts with a history of fishing.

Our primary objective is to characterise the physical ocean habitat and biological community structure of these regions through systematic description using a CTD, nets and acoustics. The voyage will collect data to address the observations that CPUE for target species such as swordfish is consistently higher over seamounts and in relation to frontal features. Predictions that prey biomass will be higher and vertical ocean structure uplifted over the regions with higher CPUE, identified a-priori, will be tested. The data collected will also be incorporated into a spatially explicit ecosystem model to define the major ecosystem habitats and communities within which the fishery operates and to determine the lower order trophic linkages in the system.

Voyage Objectives

We will test the hypothesis that there is no difference in the physical and biological environments, and the ecosystem characteristics and food chain linkages, of the three areas identified in Figure 1.

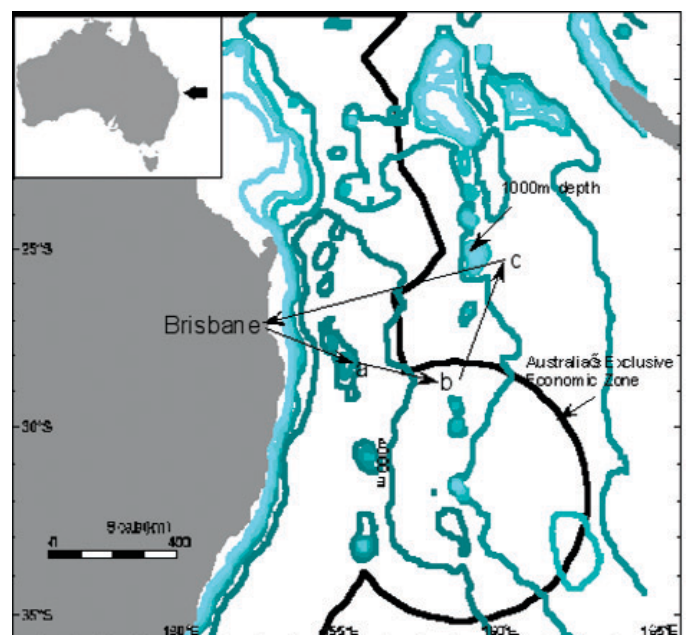
We will collect oceanographic and biological data and samples to:

- describe the physical water column structure of the three regions, and in the case of the seamount if water column structure relates to seabed topography,
- estimate the primary productivity, distribution of chlorophyll and pigments, and phytoplankton species composition in the three regions,
- establish stable isotope signals for the base of the food chain in the three regions,
- quantify the zooplankton and micronekton biomass in the three regions using nets and acoustics,
- determine, in cooperation with the longline fleet and AFMA observers, the food chains leading to species targeted by the fishery (tuna and billfish) in the three regions through stomach collections and stable isotope analysis of predators and prey and
- begin, in conjunction with the longline fleet, a study of longline setting characteristics to determine average feeding depths (and times) of target species.

NOTE: Fishing permit will be required for this voyage.

Voyage Track

Figure 1: Positions at which major sampling sites will be concentrated (a, Britannia Seamount; b, open ocean; c, Lord Howe Rise)



Time Estimates

Given the dynamic nature of the fishery, and our need to work as closely as possible to the fleet, we can only give an approximate voyage track. We will aim to complete a physical and biological description of the three regions (Fig. 1) and will divide our time equally between them. However, the first region we study will be the seamount within the Tasmanid group which has had the most recent history of fishing, presently the Britannia Seamount. We are presently negotiating for a longliner to work with us in this region.

Day 1:

Steam from Brisbane to Britannia seamount (27 degrees South, 158 degrees East)

Day 2:

A transect of 10 CTDs will be completed from upstream to downstream over the seamount over a distance of ~50 n.miles, the direction of which will be determined taking into account current direction as interpreted by ADCP. Each CTD will be deployed to 500 m and will collect along with physical parameters, nutrients, oxygen, current data, pigments (for chl and isotope analysis) and fluorescence measurements. Swath mapper will be used at low resolution to distinguish main seamount characteristics. An independent pre-dawn cast will be made for a primary productivity experiment.

Days 3, 4 and 5:

Midoc and bongo nets will be deployed within the depth strata 0-100, 100-200, 200-300, 300-400 day and night. These tows will be supported by acoustic monitoring using the EK 500. Echo intensity of the EK 500 will be routinely calibrated by a drop TS system developed by CSIRO. On day 4 or 5, at or near the completion of the net sampling, a second pre-dawn CTD cast will be made for primary productivity experiments. (The first productivity cast needs to be before dawn at each site and the second primary production CTD cast on each transect should be before dawn at least 48 hours later. The incubations ideally should start at dawn.). We will collect stomach contents of key species in the area for food chain studies via the longline fleet.

Day 6:

Steam to area of main fishing grounds (yet to be determined) but is likely to be centred around 28 degrees South and 160 degrees East which is presently being fished for swordfish (Site 2). We will have radio contact with longliners to guide us to the fleet.

Day 7:

A transect of 10 CTDs over a distance of ~50 n.miles will be completed parallel and close to longlines set in the area. Each CTD will be deployed to 500 m and will collect along with physical parameters, nutrients, oxygen, current data, pigments (for chl and isotope analysis) and fluorescence measurements. An independent pre-dawn CTD cast will be made for a primary productivity experiment.

Day 8 and 9:

Continuation of midwater net sampling begun at site 1 day/night over the same depth strata to support estimation of acoustic backscatter of the water column. TS drop system will be deployed as necessary to calibrate EK 500. On day 9 a second pre-dawn CTD cast will be made for a primary productivity experiment. We will collect stomach contents of key species in the area for food chain studies via the longline fleet.

Day 10:

Steam to site 3. This site will once again depend on the position of the longliners in the area but we hope to target longliners fishing for tuna, which typically fish using shallower sets than those targeting swordfish. They also fish during the day. We will position ourselves through communications with longliners working the area.

Day 11:

A transect of 10 CTDs over a distance of ~50 n.miles will be completed parallel and close to longlines set in the area. Each CTD will be deployed to 500 m and will collect along with physical parameters, nutrients, oxygen, current data, pigments (for chl and isotope analysis) and fluorescence measurements. An independent pre-dawn CTD cast will be made for a primary productivity experiment.

Days 12 and 13:

Continuation of midwater net sampling at sites 1 and 2 day/night over the same depth strata. On day 13 a second pre-dawn CTD cast will be made for a primary productivity experiment.

Days 14 and 15:

Return to Brisbane

Piggy-back Projects

Sea surface temperature data will be collected daily to support calibration of SST satellite imagery of the eastern Australian EEZ.

Southern Surveyor Equipment

ADCP

CTD with 24 *10L Niskin bottles

Salinity, dissolved oxygen and nutrient analysis

Swath mapper (operating protocols under discussion)

Trawling, towed body and CTD winches

EZ Net system and trawl doors, weights etc. (freight back to Hobart after voyage)

Foredeck extendable towing boom and wire

Moonpool transducer pole

Underway seawater supply to upper bridge deck (for incubation tanks)

User Equipment (must be removed from vessel after voyage)

Drop target strength (TS) system (Fatboy)

Primary productivity incubator tank (to be mounted upper bridge deck)

Bongo nets with live feed

MIDOC net system

Moonpool pole mounted transducer (already fitted, diver removal after voyage)

Surface nets

Turner fluorometer

Size fractionation set-up

C14 filtration equipment, GP lab (approval will be required)

Dry shipper 20L Dewar

Oracle software

Radiometer to be mounted on bow

Fish measuring boards (small?)

Special Requests

Request onboard storage of following items ex Hobart Friday 13 August
(in liaison with Iain Suthers, SS08/2004):

Drop TS system (Fatboy)

MIDOC net system

Sampling jars

Formalin (~40L)

Scintillation fluid (approval will be required)

Filtration gear in GP lab

Personnel List

Jock Young – CMR, Chief Scientist/watch leader

Alistair Hobday – CMR, Alternate watch leader

Jeff Dambacher – CMR, Biologist (nets, ctd)

Russ Bradford – CMR, Biologist (nets, ctd)

Tim Ryan – CMR, Acoustics

Mark Lewis (TBC) – CMR, Midoc net specialist

Pru Bonham – CMR, Biologist (primary productivity, isotopes)

Klaas Hartmann – CMR, Biologist

Ron Plaschke – National Facility, Voyage Manager

Lindsay MacDonald – National Facility, Electronics

Mark Rayner – National Facility, Hydrochemist

Miroslaw Ryba – National Facility, Computing

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

Jock Young

Chief Scientist