

### 4.3.3 Assistance to staff members of the Western Australian Museum to participate in the biological cruise of the Southern Surveyor off Western Australia in 2005

#### Investigators / Institutions

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#### Introduction

Relatively little is known about the benthic biodiversity in the vast expanse of the Australian Exclusive Economic Zone (EEZ) adjacent to Western Australia. For example, a review of existing data available for the national deep water bioregionalisation shows that, in the national context, the outer continental shelf and slope of the southwest region (SWR) of Western Australia is particularly data-sparse (Last *et al.*, 2004).

Presently, there is also a selective and incomplete treatment of the taxa and taxonomic resolution of fauna used to determine bioregions. For example, the best known taxa are the fishes as they tend to be larger, more visible, and well surveyed for fisheries purposes. Many other taxa are small, less mobile, can be captured only with specialised gear, are sometimes extraordinarily diverse, but so far poorly sampled in the SWR. Such taxa could provide novel insights into bioregional structure, but a dedicated research effort is required.

The geographic extent of the project is the outer continental shelf and continental slope (~100-1000 m) between the western Great Australian Bight and the northwest coast of Western Australia (east of Albany to Dampier).

This project allowed for staff of the WA Museum to participate in the 'voyage of discovery' off Western Australia in November and December 2005. The Museum staff were involved specifically to determine the sponges, echinoderms (seastars) and molluscs collected. The sponges were thought to be one of the dominant benthic space occupying fauna at the sampling depths proposed and the molluscs and echinoderms were anticipated to be some of the dominant motile taxa found. Expertise for these three groups is in the WA Museum.

In addition, the WA Museum were to ensure that voucher specimens of each species collected would be accessioned into the State's Museum. This is critically important for building on the State's intellectual knowledge base of the marine fauna of WA, and the biological cruise was in areas that had little to no sampling at these depths, particularly the SWR. Any holotypes and a proportion of paratypes are to be lodged in the WA Museum.

#### Objectives of the project

The biological survey data will meet the following over-arching science objectives:

- Test hypotheses on the evolution and biogeography of Australia's biodiversity.
- Examine the biogeographic patterns exhibited by shallow water species in southern temperate Australia and determine if they are also reflected in deeper water of the SWR (cf. O'Hara & Poore, 2000).
- Examine the biogeographic patterns exhibited by tropical upper slope fauna from the

“North West Shelf” (cf. Ward & Rainer, 1988) and determine if they are also reflected in sub-tropical and temperate waters of the SWR.

- Determine if a clinal pattern in the SWR is detectable in the epibenthic invertebrate community, and in selected species-rich taxa, such as that hypothesised for fishes (cf. Williams et al., 2001).
- Determine if the high diversity associated with the continental slope and seamounts in southeastern Australia is mirrored in the SWR (cf. Poore & Wilson, 1993; Poore et al., 1994; Richer de Forges et al., 2000; Koslow et al., 2001).

The sampling allowed for the first large scale assessment of marine biodiversity at a range of depths off the shelf of WA. This will enhance broad understanding of the WA marine ecosystem and help decision making for ecologically sustainable development and conservation in the marine environment. The results of the expedition will provide managers and resource users with broad-scale information on resource distributions, hotspots of biodiversity, presence of unique fauna, correlative relationships among species and habitats, and baseline data for monitoring future change. This will build capacity in WA for bioregional marine planning and management. In particular it will benefit research being undertaken by SRFME off Jurien Bay, the proposed Ningaloo Research Program, and the Marine Futures Program in the South West.

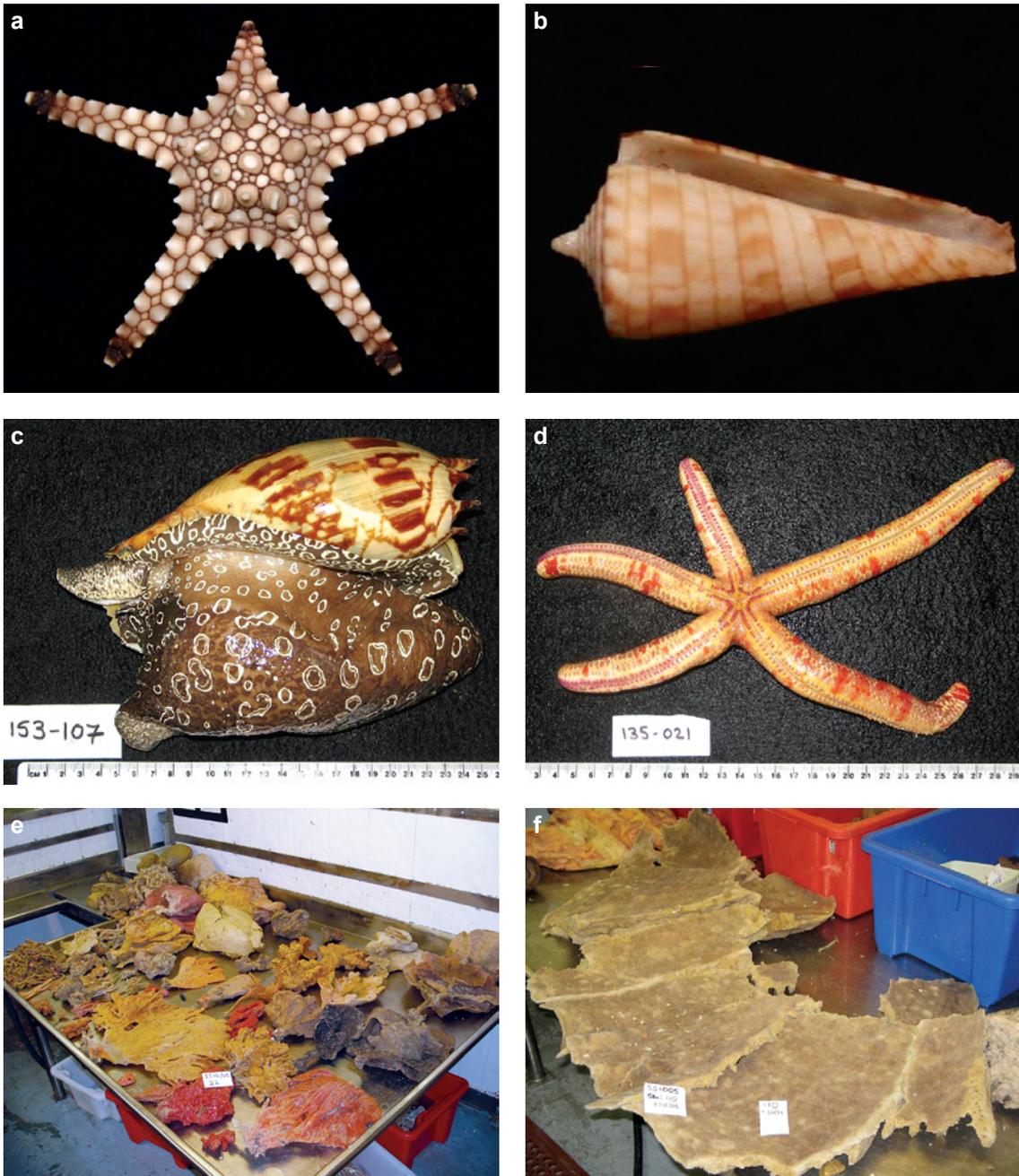
## Results

A ‘physical’ cruise was undertaken in July and August 2005 to map the bathymetry and seabed characteristics using swathmapping and other bioacoustic methods. The ‘biological’ cruise of the Southern Surveyor began in Fremantle on 18<sup>th</sup> November and ended in Dampier on 14<sup>th</sup> December 2005. The WA Museum placed mollusc and sponge specialists on board the vessel. Preliminary identifications and sorting were undertaken on the cruise with supplementary photographic records of the species collected. Specimens were appropriately preserved for accessioning into the Museum at the end of the program. We are now in the ‘post cruise’ phase of the project and undertaking specimen processing and preliminary identifications.

The number of asteroid specimen lots (seastars) processed so far is 152. All these specimens have been unpacked out of field containers and placed in Museum glassware. Forty-one of the specimens have been identified to family level.

Most of the mollusc specimens collected have been sorted and identified to at least Family level. This includes approximately 1200 dead-taken and 700 live-taken specimen lots. All six molluscan classes appear to be present, and preliminary identifications indicate as many as 100 families could be represented. Several new records and range extensions of mollusc species have been proposed, as well as possible undescribed (new) species. These await investigation and confirmation. Such examples include the first record of a *Conus* species in Australia and a range extension and rare live specimen of *Austroharpa wilsoni* Rehder, 1973 (Figure 4.2).

By far the largest component of the biomass in the shallower depths sampled (100-200 metres) consisted of sponges (Porifera). In total, 550 ‘morphospecies’ (i.e. identified in the field as distinct species but requiring taxonomic verification) were collected on the expedition. Presently the sponge processing awaits the appointment of a Technical Officer to begin work on unpacking, initiating histology and assisting with identifications.



**Figure 4.2:** Images taken during the SS1005 Voyage of Discovery.

- a.** One of only a few WA records of the seastar *Mitteliphastrer regenerator* (Station 115).
- b.** A species of Cone Shell, *Conus* sp. not previously recorded in this area (Station 146).
- c.** The Bailer Shell *Melo cf amphora* not commonly known at this depth (Station 153).
- d.** A giant seastar from the family Ophidiasteridae (Station 135).
- e.** A selection of demosponges collected off Albany at 100m (Station 22).
- f.** Pieces of a large, cup-shaped demosponge collected near Shark Bay (Station 110).

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### 4.3.4 Assessing the Potential Benefits of Marine Protected Areas to Adjacent Fished Areas

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