

Appendix 13: CoML AMSA Workshop : “what a Voyage of Discovery might look like”

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CoML-AMSA workshop: “what a Voyage of Discovery might look like”

Comments from CSIRO Marine and Atmospheric Research

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Attendees: Roland Pitcher, Peter Last

Broad Questions

The meeting might first consider some general scenario-setting questions that might include:

- A. Whether this is a one off research voyages or is intended to link with other subsequent exploration voyages that Australian institutions will continue to do. Perhaps CoML would prefer, and may support, the latter.

- B. There is the question of gap filling versus focussed census on special features or questions. Some of us think we should aim at both, whenever feasible. You could seek areas that are simply poorly surveyed – or you could enhance existing biodiversity research on regions/ecosystems that are already reasonably understood, but where there are key aspects missing, and they have a high biodiversity value.

- C. Early in the scenario setting, the *depth range* of the voyage of discovery should be clarified, because this makes a large difference to the questions, rationale and the technology (and costs) of such voyages(s).

Having noted those scenario-setting points, we have a number of suggestions:

Key points

1. Primary aim is census, but a voyage should employ modern survey techniques that add ecological context such as habitat distribution, enable hypothesis testing, and have capacity to have multiple objectives – e.g. links to Barcode of Life.
2. Start by identifying knowledge gaps –
 - documented for fishes (see Fig. below);
 - deep water >1500 m, benthic and pelagic
3. Surveys are very expensive in time and \$\$ to organise and implement. Need clear objectives, identified post-survey funding and a lead agency
4. Join forces - alternative/ cooperative ventures examining biogeography
 - Multi-agency Voyages of Discovery, WA 2005-2007 (funded thru CMAR and WfO)
 - Danish 'Galathea' survey in 2006
5. Focus on informative taxonomic groups that can
 - be reliably and consistently collected by combination of vessel, vessel staff and samplers
 - be identified to species at synoptic (at least national) level ('knowable' vs 'unknowable')
 - answer key science questions in relation to biodiversity and bioregionalisation
6. Recognise the need to integrate pre-existing biodiversity data to permit between-survey comparisons (for example, in the Tasman Sea – the area covered by NORFANZ – only one invertebrate group with synoptic species-level resolution (ophiuroids) to permit comparison of distribution data between NORFANZ, New Zealand and New Caledonia)
7. Learn lessons from the strengths and weaknesses of previous Voyages of Discovery, e.g. NORFANZ

Some general operational considerations (CMAR has recent experience with these and has a number of detailed suggestions and tools to offer)

- Multi-disciplinary: use a suite of sampling tools to extend the interpretation of biodiversity distribution
 - Multibeam acoustics ("swath") for 'feature' scale mapping of habitats (e.g. seamounts)
 - Photography (high resolution, digital, video+still, georeferenced) for fine scale understanding of biodiversity distributions and habitat associations
 - Surrogate-based extrapolations of habitat to determine animal distributions

- Use “swath” maps to optimise sampling effort (maximise contrast in habitats sampled; identify areas that can be sampled successfully)
- Implement a “smart & adaptive” survey design/implementation using bio-env stratification (classification modelling), and spatial optimisation of tracks and stations while considering deployment times, processing, travelling, storage, etc. as constraints to the daily operation.
- Plan for capacity to collect fishes and invertebrates (samplers, ship capability)
- Streamline and maximise on-board data/specimen processing
- Plan for database tracking of all biological material (to and between museums)
- Plan for equitable distribution of taxonomic material
- Plan for potential collecting for biodiversity research
- Prioritise taxonomic groups by
 - availability of expertise to complete work in project timeframe
 - ability to inform specific science questions
- Provide post-survey funding to complete the job
- Appoint a project coordinator or coordinating committee/ agency

Case Study: CoML linked international NORFANZ biodiversity survey in 2003

Sponsors: CMR, NOO, NIWA, MFish

Science agencies: Museum Victoria; Australian Museum; Sydney, Queensland Museum; Museum and Art Gallery of the Northern Territory; University of NSW; National Museum of NZ (TePapa); Auckland University of Technology; California Academy of Sciences; Museum National d'Histoire Naturelle, France; Institut de Recherche pour le Développement, New Caledonia; CMR, NIWA

Reference: media release (attached); <http://www.oceans.gov.au/norfanz/default.htm>

Some strengths

- International team of taxonomists involved
- Multidisciplinary approach (esp. multibeam mapping) highly successful to optimise sampling on seamounts (high contrast, minimise failed catches)
- Suite of physical samplers (3 net types, 3 sled types) provided rich catches
- Post-survey work coordinated:
 - all taxonomic upgrades in centralized database

- metadata records provided
- taxonomic overview in final report
- supporting data (station data, swath maps, seabed imagery) in final report
- Effective communications strategy

Some weaknesses

- Sampling design: low density of samples over large area with highly selective samplers: good for collecting taxa, poor for mapping distributions and abundance
- Lack of post-survey project funding for taxonomy; insufficient funds for coordination, report writing
- Lack of contractual arrangements to complete taxonomy
- Poorly standardized data reporting, especially for affinities of taxa identified
- No plan/ framework for publishing science results, e.g. dedicated journal volume

Fig. Gaps in fish distributional information identified by Last et al. (2005)

Validation of national demersal fish datasets for the regionalisation of the Australian continental slope and outer shelf (> 40 m depth). Report to NOO, 2005

