

RV Investigator Scientific Highlights

Voyage #:	IN2017_C02		
Voyage title:	RAN Hydrographic Survey		
Mobilisation:	Hobart, Wednesday, 03 May 2017		
Depart:	Hobart, 0810, Thursday, 04 May 2017		
Return:	Bell Bay, 0800, Monday, 15 May 2017		
Demobilisation:	Bell Bay, Monday, 15 May 2017		
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The Chief Scientist – Certified Professional Hydrographic Surveyor (CPHS1)



LCDR Richard Cullen joined the Royal Australian Navy in 1991 and served on HMA Ships *Jervis Bay*, *Torrens*, *Newcastle*, *Hobart* and *Brisbane*. In 1997, he specialised in hydrographic surveying having completed an International Hydrographic Organisation (IHO) accredited Category B Hydrographic Surveying course. Later in 2003, Richard completed the highest level of IHO accredited course, Category A.

As a hydrographic specialist, LCDR Cullen served on HMA Ships *Moresby*, *Benalla*, *Melville*, *Leeuwin*, HM Ship *Roebuck*, two commercially leased survey vessels in the UK and the Laser Airborne Depth Sounder operating from Cairns. He has also conducted roles at the Australian Hydrographic Office as the Staff

Officer Quality Control, Hydrographic Standards and Acting Deputy Director Hydrographic Plans & Standards whereby he provided strategic planning assistance for National Charting.

Richard has been involved in commercial survey operations since 2006. A keen supporter in the professional knowledge and practice of hydrographic surveyors, he conducts volunteer activities with the Surveying & Spatial Sciences Institute as the Chair of the Hydrography Commission and is a member of the Australasian Hydrographic Surveyors Certification Panel.

Title

Survey Instruction 001 – Bass Strait.

Purpose

To facilitate safe navigation for international and coastal shipping. The overall focus for this survey was to conduct a modern survey in the primary shipping route through Bass Strait. This survey will also improve confidence for subsurface navigation in Bass Strait.

Contribution to the nation

The survey area consists of waters classified as Zone of Confidence B as per the table below:

ZOC	Position Accuracy	Depth Accuracy	Seafloor Coverage	Typical Survey Characteristics
B	+/- 50m	= 1.00 + 2% depth	Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2 (+/-20m), using a modern survey echosounder, but no sonar or mechanical sweep system.

With charted depths in the survey area between 55 - 60 metres, the area had not been surveyed using modern equipment therefore anomalies may have been expected. By conducting this survey, it is expected to increase confidence in charted depths and identification of navigational anomalies by two levels of confidence to ZOCA1 as tabled below:

ZOC	Position Accuracy	Depth Accuracy	Seafloor Coverage	Typical Survey Characteristics
A1	+/-5m + 5% depth	= 0.50 + 1% depth	Full area search undertaken. Significant seafloor features detected and depths measured	Controlled, systematic survey high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.

This improvement in charting quality ensures that the route is navigationally suitable for the types and size of vessels currently utilising the area. The area of survey is significant due to the large number of vessels transiting a primary shipping route between two traffic separation schemes.

As a result of this voyage

1. Better understanding in the capability of the CSIRO's hydrographic surveyor's and their knowledge in the conduct of nautical charting survey was achieved. Further knowledge was gained in all system fits with respect to the capability and the operational limitations given environmental conditions affecting equipment and vessel.
2. It became apparent that the fitted motion system was less reliable in sea states greater than Sea State 4 (1.25 to 2.5m wave height. Images 1 & 2), resulting in residual motion being retained in data. There is cross talk between other acoustic systems which needs to be managed and for this cruise, resulted in the inability to conduct ADCP while collecting bathymetry.
3. While the EM710 is purposed for deeper water, the EM2040c which was being trialled, provided a large swath coverage in the depths of primary concern, down to 40m (IHO S-44).

The use of the EM2040c in these depths would allow for an increased line spacing which reduces time to conduct the survey and more redundancy in data. A couple of reasons for this include, the EM710 is a single head transducer while the EM2040c is a dual head system and, the EM710 is primarily a sounder for deeper water as it's frequency range is 40kHz to 100kHz and up to 30Hz pulse repetition rate (PRR). Subsequently, the ability to detect smaller features is also reduced by these characteristics. It was noted however, that the EM710 was upgraded to multi-ping which can marginally counter the PRR. Conversely, the EM2040c has a frequency of 200kHz to 400kHz and up to 50Hz (PRR). Utilising the EM2040c for shallow water activities would maximise efficiencies of operation and increase capacity to conduct more varied data acquisition activities.

4. An area of 14 by 10 nautical miles was surveyed to improve navigational safety between Wilson's Promontory and the Hogan Group. The area was surveyed to International Hydrographic Organisation Order 1a standard for charting purposes.
5. One wreck was found, close surveyed and a drop camera used to gather imagery (Images 3 to 6). Both the Victorian and Tasmanian historic wrecks departments are investigating records to identify it. Preliminary advice is that it may be the wreck Vicky (formerly Caldare), although there are also any number of 'missing' vessels for Bass Strait where locations are not known. It was also noted that there are two entries for the Vicky in the shipwrecks database (one each for Victoria and Tasmania), but if the wreck identification is correct then it is probably in Tasmanian state waters. This is considered a good outcome as it has provided an opportunity to locate a historical wreck, re-position correctly on charts and within the correct wreck database.
6. The Australian Hydrographic Service is continuing a program of National nautical charting survey in the area, possibly using a combination of commercial industry partners and Navy hydrographic ships under the Hydroscheme Industry Partnership Program (HIPP). Other Government Agencies are likely to be engaged in those activities not released to the HIPP.