RV *Investigator* Voyage Plan

Voyage #:	**IN2017_C02**		
Voyage title:	RAN Hydrographic Survey		
Mobilisation:	Hobart, Tuesday May 02, 2017		
Depart:	Hobart, 08:00 Thursday May 04, 2017		
Return:	Bell Bay, 08:00 Monday May 15, 2017		
Demobilisation:	N/A		
Voyage Manager:	Matt Boyd	**Contact details:**	Matt.boyd@csiro.au
Chief Scientist:	LCDR RICHARD CULLEN		
Affiliation:	RAN	**Contact details:**	John.mcgannon@defence.gov.au Richard.cullen@defence.gov.au

Scientific objectives

To gain an understanding of the nature of the marine environment in the survey area and to collect meteorological and oceanographic data in the area to contribute to current modelling systems. Additionally, this information will benefit the management of the Commonwealth Marine Reserve at Hogan Island.

Voyage objectives

To undertake hydrographic survey operations in vicinity of Hogan Island (Bass Strait) to facilitate safe navigation for international and coastal shipping.

The MET and OC observations and data collection have three purposes, namely:

a. To collect data from which a sonar or radar range prediction can be calculated (humidity, pressure, temperature, wind speed, ocean temperature and salinity profile, currents through depth, sediment type, sub-bottom classification (where possible)
b. To identify what observations can be conducted concurrently, and what observations have limiting factors that preclude concurrent operations/survey activity
c. To develop understanding of what types, accuracy and formats of data can be collected and how this might be of use to the scientific community and Defence

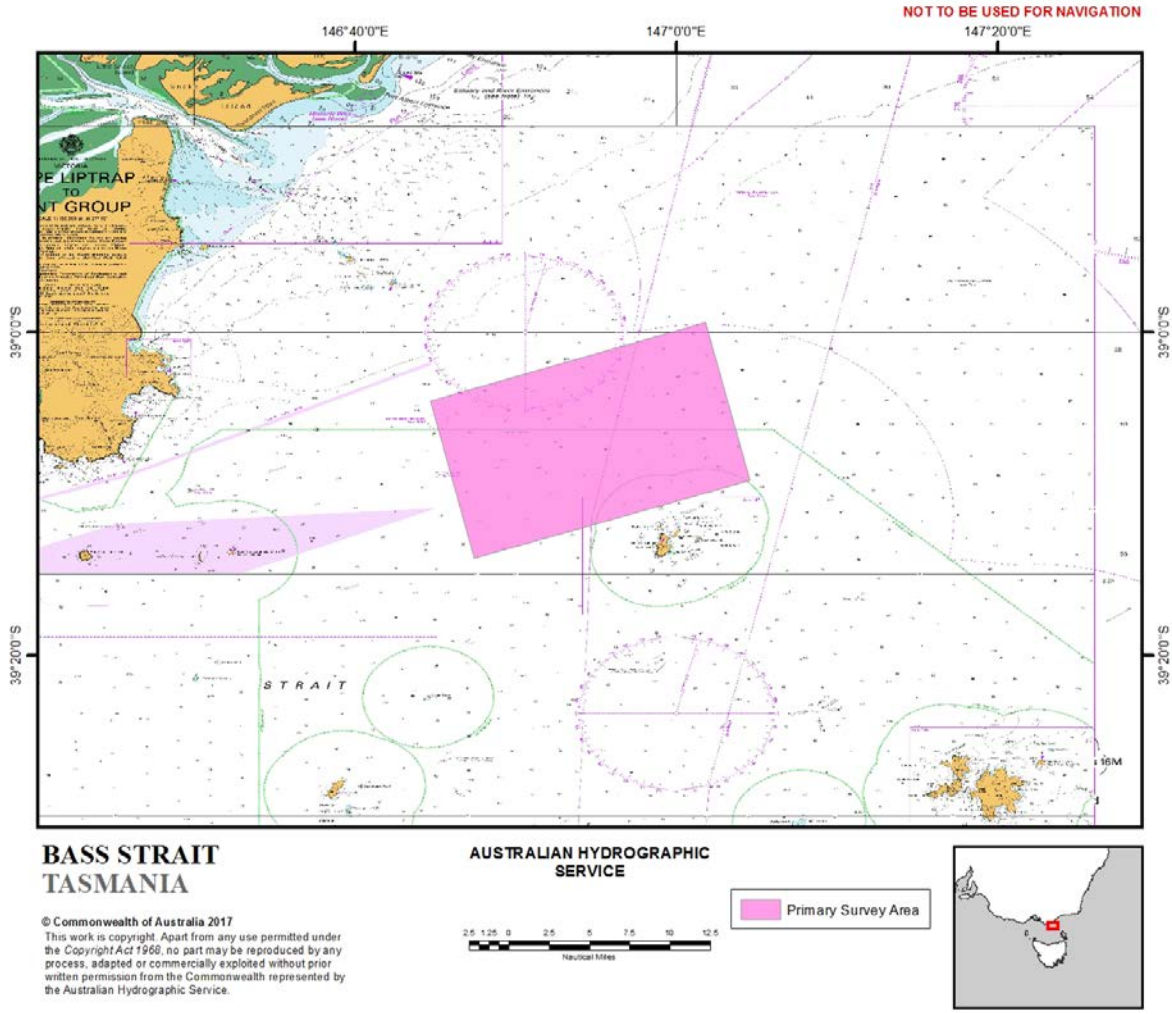
Operational Risk Management

No potentially high risk work has been identified outside standard operations.

Overall activity plan including details for first 24 hours of voyage

Investigator will transit to the survey area and commence hydrographic survey IVO Hogan Island.

Voyage track example



Waypoints and stations

Survey area shown in attached survey instruction. Co-ordinates of Box as follows, from NW corner clockwise.

Corner	Long (E)	Lat (S)
NW	146 44.702	-39 04.245
NE	147 01.810	-39 59.380
SE	147 04.551	-39 09.188
SW	146 47.422	-39 13.975

Time estimates

The following time estimates are based on a steaming speed of 11 knots.

Date	Time	Activity
N/A	N/A	N/A

Piggy-back projects (if applicable)

N/A

Investigator equipment (MNF)

Hydrographic suite
Sound velocity profiler
Smith Mac grabs x 2

User Equipment

Nil

Special Requests

Nil

Permits

CMR-17-000467: Scientific research - underway data collection - Tasman Fracture, Zeehan, Nelson, Murray and Beagle Commonwealth Marine Reserves:

The survey area overlaps the Marine Reserve IVO Hogan Island.

Personnel List

1.	Matt Boyd	Voyage Manager / GSM Support	CSIRO MNF
2.	Stuart Edwards	GSM Support	CSIRO MNF
3.	Amy Nau	GSM Support	CSIRO MNF
4.	Ian Hawkes	DAP Support	CSIRO MNF
5.	Pamela Brodie	DAP Support	CSIRO MNF
6.	Aaron Tyndall	SIT Support	CSIRO MNF
7.	LCDR Richard Cullen	AHO	RAN
8.	LCDR Scott Rivett	AHO	RAN

Signature

Your name	LCDR RICHARD CULLEN
Title	Chief Scientist
Signature	
Date:	21/04/2017

List of additional figures and documents

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Australian Hydrographic Service.

Minute

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AA945120

HYDRO 007/17

RV *Investigator*

For information:

See Distribution

SURVEY INSTRUCTION 001 — BASS STRAIT

References:

A. IHO Standards for Hydrographic Surveys, 5th Edition, Feb 2008 (Special Publication No.44)

B. IHO C-13 Manual of Hydrographic Surveying

C. AA932316 – Hydrographic Instruction 598 – Bass Strait, TAS (HS Blue Crew) dated 29 Nov 16

General

1. RV *Investigator* will undertake survey operations in Bass Strait, from 04 – 15 May 17.

2. This is the second survey undertaken by *Investigator* on behalf of, and funded by, the AHO and serves to strengthen cooperative arrangements into the future. Three navy representatives will embark in *Investigator* - LCDR Richard Cullen (Scientific Adviser), LCDR Scott Rivett (Meteorological and Oceanographic Advisor) and LCDR Wendy Stewart (observer). Any variations to this instruction should be discussed, in the first instance, with the scientific adviser.

Aim

3. Purpose – To facilitate safe navigation for international and coastal shipping. The overall focus for this survey is 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.

4. Charts affected – AUSENC 439146, 439147, 440146, 440147 and AUS 148, 357, 487, 802.

Survey Area Parameters

5. The survey area consists of a 10 by 14 nautical mile box, in the vicinity of Hogan Island, along the primary shipping route between the two traffic separation schemes. The survey area consists of waters classified as ZOC B, with charted depths in the survey area between 55 - 60 metres. The area has not been surveyed using modern equipment therefore anomalies may be expected. However, due to the high amount of traffic that transits the area, dangers to navigation are considered unlikely in the primary survey area.

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6. HMAS *Leeuwin* conducted HI 598 (Ref C) in January – February 2017 to the east of this area, and the survey area issued for SI 001 has a 200 metre overlap with the HI 598 completed area on the eastern edge.

7. In determining the rate of effort necessary to complete the survey area the Party Chief should remain cognisant of the survey aim. Should the Party Chief decide to break the primary area into sub-areas, these should be progressed from east to west to ensure overlap and continuity with the area surveyed by *Leeuwin*.

8. The north-western corner of the survey area abuts the charted position for unexploded ordnance. Seabed sampling and other activities involving equipment deployed to the seafloor should be avoided within two miles of this position.

Order of Survey

9. IHO S44 Order 1a. To allow the HM Branch Bathymetric Data Assessment Section to allocate ZOC categories, the Senior Surveyor in Charge is to ensure that definitive statements are made regarding the horizontal and vertical accuracies achieved (i.e. TPU(H) horizontal +/- 2m at 95% CL; TPU(V) Vertical +/- 0.5m at 95% CL) and the confidence of seafloor coverage /feature detection for each area of differing survey quality.

Sounding Parameters

10. Sea floor coverage - Full MBES seafloor coverage is required.

11. Feature detection in accordance with IHO S44 (Ref A) is required. (Cubic features >2m in depths up to 40m; 10% of depth beyond 40m; minimum 5 pings on target). Least depth of these features must be found.

12. MBES soundings are to be retained at full spatial density.

13. The Report of Survey is to specify; the standard of seafloor coverage achieved, the degree of certainty of feature detection, and comment on any limitations of fitted survey equipment. 'Snapshot' images of significant features are to be rendered as part of the report.

Horizontal Control

14. WGS 84 - UTM Zone 55 South (CM 147°E).

Vertical Control

15. No tide gauges or current meters are required for this survey.

16. Soundings should be reduced to Chart Datum (approximating LAT) using DGNSS Tides and predicted tides for Hogan Island (ANTT Tide Station 60585 - 39°13'S, 146°59'E. MSL is 1.34m above LAT).

Wrecks

17. Three wrecks are reported in the vicinity of the survey area. Only one wreck, not dangerous to surface navigation, is reported within the primary survey area in position 39°04'S, 146°59'E. Any other wrecks identified within the survey area are to be noted and investigated. The other two wrecks lie within one mile of the western edge of the survey area within the traffic separation area, and should be investigated if all other work is completed.

Meteorological and Oceanographic Instructions

18. Seabed samples should be completed at regular spacing across the survey area during the allocated oceanographic day. Where possible, samples should be obtained:

a. On all banks, shoals and seamounts, particularly where these are likely to be unstable, and in the channels between them;

b. Where required to ground truth the interpretation of SSS or backscatter data, especially where changes in the nature of the seafloor are apparent;

c. All samples taken shall be recorded on the Seabed Sample Log, sample retention is not required.

19. Bioluminescence observations are to be recorded in the bioluminescence log when bioluminescence activity is observed. Similarly, and of equal importance, is to record when no bioluminescence was observed.

20. Regular sound velocity measurements will be required for the operation of the survey system and should be retained for rendering as oceanographic data. Down casts and up casts are to be maintained separately. If the combined cast is used for sounding reduction these should also be provided separately.

21. Daily water clarity and colour observations via Secchi disc or transmisiometer should be taken, with repeat observations recorded whenever possible in a similar position for approximately one week in order to identify any short period changes in water clarity over varying weather and sea conditions.

22. ADCP measurements should be recorded for the duration of the survey.

23. Hourly weather observations from the ship's automated weather station should be recorded for the duration of the survey.
24. All meteorological and oceanographic observations are to be rendered with the final report of survey in accordance with the AODC templates. (An alternative format may be agreed with the embarked METOC officer.)

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ANNEX A TO
HYDRO 007/17
05 Apr 17
CHARTLET OF SI 001 –BASS STRAIT
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ANNEX B TO
HYDRO 007/17
05 Apr 17
LIST OF ACCOMPANYING DOCUMENTS
1. DVD containing:
a. Survey Instruction SI 001 Bass Strait
b. SI 001 Bass Strait – ArcGIS Project and shapefiles
c. Documents required for submission of data

Scientific equipment and facilities provided by the Marine National Facility

Some equipment items on the list may not be available at the time of sailing. Applicants will be notified directly of any changes.

Indicate what equipment and facilities you require from the Marine National Facility by placing an **X** in the relevant box.

(i) Standard laboratory and sampling equipment

Name	Essential	Desirable
CTD - Seabird 911 with 36 Bottle Rosette		
CTD -Seabed 911 with 24 Bottle Rosette		
LADCP		
Sonardyne USBL System		
Milli -Q System		
Laboratory Incubators		
Heavy Duty Electronic Balance		
Medium Duty Electronic Balance		
Light Duty Electronic Balance		
Surface Net		
Bongo Net		
Smith Mac grab	x	
Dissecting Microscopes		

(ii) Specialised laboratory and sampling equipment

May require additional support

Name	Essential	Desirable
TRIAXUS – Underway Profiling CTD		
Continuous Plankton Recorder (CPR)		
Deep tow camera		
Piston Coring System		
Gravity Coring System		
Multi Corer		
XBT System		x
Trace Metal Rosette and Bottles		
Sherman epibenthic sled		
Trace- metal in-situ pumps		

LADCP		
Rock Dredges		
EZ Net		
Rock saw		
Portable pot hauler		
Beam Trawl		
Trawl doors (pelagic or demersal)		
Stern Ramp		
Trawl monitoring instrumentation (ITI)		
Radiosonde		

(iii) Underway systems

Acoustic Underway Systems

Name	**Essential**	**Desirable**
75kHz ADCP		x
150kHz ADCP		
Multi Beam echo sounder EM122 12kHz (100m to full ocean depth)		
Multi Beam echo sounder EM710 70-100kHz (0-1000m approx.)	x	
Sub-Bottom Profiler SBP120		x
Scientific Echo Sounders EK60 (6 bands, 18kHz-333kHz)		
Sound velocity profiler	x	
Dual head EM2040C	x	
Gravity Meter		x
Trace metal clean seawater supply		

Atmospheric Underway Sensors

Name	**Essential**	**Desirable**
Nephelometer		
MAAP (multi angle absorption photometer)		
SMPS (scanning mobility particle sizer)		
Radon detector		
Ozone detector		
Manifold instrumentation (intake temperature and humidity)	**x**	
Picarro spectrometer (analysis of CO_2/CH_4/H_2O)		
Aerodyne spectrometer (analysis of N_2O/CO/H_2O)		
O2 analyser		
Manifold instrumentation (intake temperature and humidity)	**x**	
CCN (Cloud Condensation Nuclei)		**x**

MOUDI (Micro-Orifice Uniform Deposit Impactors)		
NOx monitor		
Polarimetric Weather Radar		**x**

Underway Seawater Instrumentation

Name	**Essential**	**Desirable**
Thermosalinograph	x	
Fluorometer	x	
Optode		x
PCO2		