RV *Investigator* Voyage Plan

VOYAGE #:	IN2026_T03
Version Number:	FINAL
Voyage title:	IN2026_T03 Transit Voyage
Mobilisation:	MNF equipment mobilisation Hobart July 14-15th, 2026
	Science mobilisation and onboarding July 15th, 2026
Depart:	Hobart 1000 July 16th, 2026
Return:	Brisbane 0900 TBC July 22nd, 2026
Demobilisation:	Science demobilisation (day of arrival) Brisbane July 22nd, 2026
Voyage Delivery Coordinator:	Susan Carins
Voyage Manager:	Rod Palmer
Chief Scientist:	Dr Robin Beaman
Affiliation:	James Cook Univeristy
Principal Investigators:	Dr Robin Beaman, James Cook University (JCU) Dr Joel Williams, University of Tasmania (UTAS) Dr Albert Pessarrodona, University of Western Australia (UWA) Dr Rob King, Australian Antarctic Division (AAD) Carlie Devine and Dr Rich Little, Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Project names:	*Improving the national bathymetry grid, Hobart to Brisbane, Resourcing Australia's Prosperity* – Dr Robin Beaman, JCU *The influence of marine heatwaves on seafloor biodiversity of the Hunter Marine Park outer shelf* – Dr Joel Williams, UTAS *Tracing carbon transfer from coastal vegetated habitats to the deep ocean* – Dr Albert Pessarrodona, UWA Tasmanian commissioning deployment of mark II prototype Krill Observational Mooring for Benthic Investigation (KOMBI) - Dr Rob King, AAD *Developing Jonathan: An On-vessel Automated Seabird Detector* - Carlie Devine, Dr Rich Little, CSIRO

Voyage objectives

The primary objective of this transit voyage is to relocate *Investigator* from Hobart to Brisbane. In addition, there are three supplementary projects and two piggyback projects included in the voyage detailed below.

The supplementary projects have equal share of the 24-hour science time allocated to this project with key objectives and priorities detailed below.

Supplementary Projects

Improving the national bathymetry grid, Hobart to Brisbane, Resourcing Australia's Prosperity – Robin Beaman, JCU

This project seeks to improve the quality of seabed mapping off Australia's eastern continental shelf, in an area of particular benefit to efforts to produce a morphologically sound national dataset of Australia's seabed. Geoscience Australia's Resourcing Australia's Prosperity initiative (RAPi) is a 35-year (2024–2059) investment by the Australian Government, with $3.4 billion committed over the first decade, to accelerate the discovery of resources necessary for Australia's net zero transition and a key component of the Future Made in Australia policy. RAPi will produce Australia-wide foundational geoscience datasets, including integrated bathymetric and topographic grids, and seabed feature maps. Offshore, foundational geoscience dataset requirements for RAPi include national and regional bathymetry and seabed feature maps, which build on historic work by Geoscience Australia (GA) and Dr Robin Beaman at James Cook University to produce the AusBathyTopo series of gridded data products in Australia's marine jurisdiction and surrounding waters. In data-poor areas, such as the deep waters of the Tasman Sea basin, poor-quality legacy data may be the only data available, which results in significant artefacts in the processed surface, even at low resolutions. The objective of this project is to re-survey the RV Maurice Ewing (EW0201) track from Hobart to Brisbane, originally surveyed in 2002 using an Atlas HydroSweep DS system that generated a wide strip of very poorly resolved seafloor with unresolvable vessel motion artefacts in depths ~4000 m in the Tasman Sea basin. The strip is highly visible in the current national AusBathyTopo grid and will affect planned regional AusBathyTopo grids in the region if the data cannot be replaced. This project will resurvey the EW0201 transit with modern deep water multibeam methods. The new multibeam data will be used to update the AusBathyTopo series, specifically the annually released national 250 m grid, and for planned future 30 m grids along the NSW coast that intersect the EW0201 transit. Replacing the poor EW0201 data with high-quality RV Investigator multibeam data will significantly improve the morphological integrity of AusBathyTopo grids along eastern Australia. This improved knowledge will advance seabed feature mapping for Australian Government priorities that include better understanding of seabed morphology for Australian Marine Parks and natural hazard modelling. Since AusBathyTopo grids will be used to improve GEBCO global products, the improved dataset will be widely used in global applications.

Waypoints RB 9 – 11 are the highest priority.

The influence of marine heatwaves on seafloor biodiversity of the Hunter Marine Park outer shelf - Joel Williams, UTAS

Marine heatwaves are becoming more frequent and severe, with dire impacts on coastal ecosystems. However, there is growing evidence that these marine heatwaves are often reaching the depths of the outer shelf regions (>100 m). Most concerningly, there is an increasing understanding of sub-surface heatwaves occurring. The Temperate East Network of Marine Parks, including Hunter Marine Park, was established to protect representative examples of the region's ecosystems and biodiversity. The Network

Management Plan acknowledges that shelf rocky reefs are key ecological features with significant cultural, social, and economic value. The impacts of these deep marine heatwaves on shelf rocky reef ecosystems and the Temperate East Network of Marine Parks are virtually unknown. Furthermore, the outer shelf is a popular destination for recreational fishers targeting species that inhabit these deeper reefs, such as kingfish and barred rock cod. This project will also help understand how these extreme events will impact some of the most lucrative recreational fisheries on the central east coast. Using a deep-towed video system or remotely operated vehicles (ROVs), we will image the seafloor between 100 and 300 meters. Downward-facing imagery will be used to quantify habitat type and structure across a depth gradient to produce habitat maps. Forward-facing imagery can be used to quantify and map the associated fish assemblage across depth gradients. With this new information, we can identify regions of the outer shelf that support vulnerable habitats and are at greatest risk from marine heatwaves and ongoing climate change. A core component of this project is sharing knowledge with the Gumbaynggirr and Yaegl People (Solitary Islands) and Worimi People (Hunter), the first custodians of this Sea Country. The Ngiyambandigay Wajaarr Aboriginal Corporation (NWAC) is an active partner in this project. First Nations people will be invited to participate in this voyage to enhance connections with Sea Country and provide training and sea time. This project is a high priority for Parks Australia. Parks Australia requires this new information to improve the management of the Temperate East Network of Marine Parks, including identifying regions of their Marine Parks at great risk from marine heatwaves and climate change. This information can inform targeted monitoring to detect and understand changes. The project will also provide information on which fish species and habitats should be prioritised in monitoring. This information will be compiled in a project final report and a marine heatwave response plan tailored for Parks Australia.

This project will be completed within the boundaries of the Hunter Marine Park. Specifically, in the 100-200 m depth band of the outer shelf to shelf break. A spatially balanced study design will be used to ensure that a representative sample of video transects are collected. Some sites may be selected for sampling based on seafloor feature of interest or know locations important to fisheries. Transect lengths will be determined at a later date. A minimum transect length of 200m per sample is required. However, longer transects may be done with 200m sections being sub-sampled to maximize gear in water time. The number of sites sampled will be determined by how much can be achieved within the hours allocated to this supplementary video. Ideally, we would sample at both day and night. These methods are directly comparable to towed video work that has been completed by this project team on the inner shelf region of the Hunter Marine Park and within other marine parks including the Solitary Islands Marine Park. The towed video methodology will follow the NESP Marine and Coastal Hub Marine Field Manuals (https://towed-imagery-field-manual.github.io/) to ensure methods are consistent and standardise. This means data from this project can contribute to a national collection of seafloor imagery. All imagery and will be immediately backed up using project RAID hard drives. All imagery will be annotated post-voyage.

Key sites are DTC 1-5 based on voyage track, ship time available and bathymetry data available.

Tracing carbon transfer from coastal vegetated habitats to the deep ocean - Albert Pessarrodona, UWA

To achieve its ambitious climate mitigation targets, Australia has placed substantial focus on and investments in ‘blue carbon’: carbon stored in marine ecosystems. Coastal vegetated ecosystems play a key role in the coastal carbon cycle, with increasing recognition that they act as important donors to several blue carbon sinks. These include continental shelf sediments and the deep sea, which represent promising new avenues for climate action as emerging blue carbon sinks. Yet, accurately measuring the amount of carbon transported from coastal ecosystems to deep carbon sinks remains challenging and relies on ocean current models and expensive in situ verification. Kelp forests represent one of the most extensive coastal ecosystems in the world and are estimated to contribute upwards of 30% of all carbon sequestered by

coastal vegetation in Australia. Validating these estimates has proved extremely challenging to date as sampling shelf sediments and offshore waters is logistically challenging and expensive. Here, we aim to obtain the first evidence of coastal vegetation carbon export and sequestration in emerging blue carbon sinks in Australia. To do so, we will obtain sediment (and water) samples along the continental shelf and shelf break at locations predicted to have high and low input of kelp-derived particulate organic carbon as predicted by particle tracking models. Export of kelp and other seaweed-derived carbon will be traced from water and sediments using biomarkers (eDNA, stable isotopes). Sequestration will then be determined using particulate organic carbon content along dated sediment cores (aged via 210 Pb dating). Results will feed back into the models to improve estimates of coastal carbon transfer to emerging blue carbon sinks. This research represents a critical step towards quantifying kelp carbon sequestration in the deep ocean and, subsequently, the inclusion of kelp forests in the blue carbon ecosystem Supplementary Proposal policy framework and future carbon dioxide removal projects in Australia. Importantly, the samples collected during the voyage will be made accessible to other researchers and end-users , extending their utility beyond the immediate scope of this project, and helping to improve valuable baseline data from the continental shelf of Australia.

Sediment samples. A multi corer will be used to retrieve up to 1-m deep sediment samples from the sampling stations. Cores will be processed on the ship deck or lab by subsampling ten 1-cm sections. Initially, a subset (n=3) of the slices will be analysed for (a) total organic carbon (TOC) and total carbon (TC) contents, (b) age (210Pb dating), and (c) genetics (kelp DNA abundance via quantitative polymerase chain reaction, qPCR) according to pre-existing standard operating procedures. Following results from these slices, the remaining slices for cores of interest will be analysed. Briefly, sediment TOC and TC contents will be quantified with a CHN elemental analyser after the removal of inorganic carbon with diluted hydrochloric acid; sediments will be aged with an accuracy of up to ~ 120 years by the Pere Masqué Lab (Edith Cowen University); and qPCR assay optimization and sample testing will be conducted using BioRad CFX96 (Frigstad et al. 2021) by the Wernberg Lab members (Indian Ocean Marine Research Centre, UWA). Sediment grain size will also be determined; dry bulk density will be calculated to convert TOC content from %C to C density; and depth layer-specific sedimentation rates will be calculated from 210PB dating results. DNA extraction and further sequencing will be completed at the NSW Department of Primary Industries' eDNA facility (Narrandera Fisheries Centre- ISO9001 certification) using established methods for brown seaweeds (e.g., Vranken et al. 2021). Water samples. Processing for water samples involves filtering 3-5 L of water through a 0.45 µm sterilized filter using a peristaltic pump. Filters containing the eDNA particle pools sampled from the water will be flash frozen in liquid nitrogen and stored at −80 °C in a Dewar until further processing. Algal DNA will be extracted at the NSW Department of Primary Industri es' eDNAfacility (Narrandera Fisheries Centre- ISO9001 certification) from the water samples using Qiagen Power Pro kits and amplified using pPCR according to optimised and strict (against contamination) protocols (Frigstad et al. 2021) with 6 technical replicates. Amplification will be done using COI primers for brown seaweeds (e.g., Coleman et al. 2022) as well as species-specific primers for Ecklonia radiata, the main kelp in Australia, based on our Ecklonia mitochondrial genome (Wheeler et al. 2022). Whatman GF/F filters (25 mm diameter; pre-treated with acid to remove inorganic carbon, pre-combusted at 500°C for 24h, and pre-weighed) containing material for POC analysis will be stored in cell culture plates until further processing in land. Filters will then be dried at 60°C for 48h, folded into a tin cup, and analysed with an elemental analyser coupled to an isotope ratio mass spectrometer (e.g., Lorrain et al. 2003)

Minor voyage track deviations

Site	Seaweed carbon Export	Lat	Long	Priority (South)	~Depth m
MC Site 4 HMP (outside)	Low	-32.709841	152.469017	7	114
MC Site 2 Jervis	Medium	-35.080699	150.940123	5	129
MC Site 1	Low	-36.992359	150.27838	8	133

Piggyback projects

Tasmanian commissioning deployment of mark II prototype Krill Observational Mooring for Benthic Investigation (KOMBI) - Rob King, Australian Antarctic Division

This piggyback project aims to commence commissioning of a modified sea floor lander that is intended for monitoring Antarctic krill biomass and vocalising krill predators. The Krill Observational Mooring for Benthic Investigation (KOMBI) was first deployed from RV Investigator in 2021 (TEMPO Voyage). The KOMBI II is the upgrade of the original KOMBI mooring and includes stereo cameras to enhance Antarctic krill biomass estimation accuracy through the provision of krill length information in support of the onboard active acoustics. RV Investigator is making a short transit voyage Hobart to Brisbane July 16-22, 2026 and will pass over the desired test deployment site (148.2052° E 43.2002° S) approximately 10 nm east of the Tasman Peninsula. This positions the KOMBI in an area that is convenient for recovery by RSV Nuyina during the December 2026 Trials Cruise and at a location that coincides with migrating Humpback Whale populations and so will collect useful data also. This test deployment enables the KOMBI II to be proven prior to a yearlong deployment in the Antarctic, thereby saving a year of development time for the project and enabling production of additional units to commence. The Australian Antarctic Division (AAD) has developed a tractable plan to autonomously collect data from moorings in support of the long term sustainable management of the krill fishery in East Antarctica. The KOMBI includes a krill echosounder, current meter, video and lighting system, passive acoustics predator recorder. The first KOMBI was deployed 2021 by RV Investigator and successfully recovered one year later by RSV Nuyina. During the 2024/25 financial year the design of the KOMBI was improved to incorporate stereo cameras, the redesign is referred to as the KOMBI Mark II. The stereo cameras will improve the accuracy of the active acoustics which inform the estimation of krill biomass. The intention is to build up to 6 KOMBI II moorings in Piggyback Application total and they will operate in parallel with deeper water Moorings for the Epipelagic Echosounding of Krill (MEEK) and ship collected hydroacoustic data to create a comprehensive data stream of krill distribution, abundance and flux. The KOMBI mooring system is a key fisheries management tool for measuring krill biomass above the mooring throughout an entire year and at times when the area is inaccessible to survey vessels due to sea ice coverage. This comprehensive dataset will yield insights into krill distribution that will influence management decisions for the krill fishery.

Operation time budgeted: 3 hours (including triangulation)

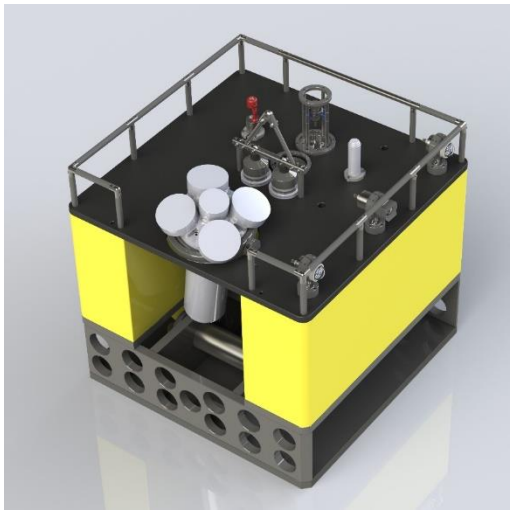


Figure 1: A KOMBI Mark I Lander model

Developing Jonathan: An On-vessel Automated Seabird Detector - Carlie Devine, Rich Little (CSIRO)

The objective of this project is to collect seabird counts using an automatic on-vessel seabird edge detector in coastal and open ocean environments.

Planned activities include:

Installation of a camera, data storage for video, and processing unit into the RV Investigator electrical system. During IN2026_T03, the camera processor will operate while Investigator is underway. The system will be supervised remotely from Hobart with DAP support on the vessel. A daily .csv report and .mp4 trip files will be saved to system hardware and backed up by DAP, indicating the number of seabirds detected at specific time intervals throughout daylight hours.

The expected outcome of this project is to bring together the hardware and software needed for an on-vessel seabird Edge detector that will provide a running count of seabirds seen by a fixed camera over the course of a day on a sea-going vessel. Successful development of such a system will be the first step in providing more comprehensive and detailed baseline environmental data. This project has the appropriate CWLLA AEC approval in place.

MNF Sustained Observation Program

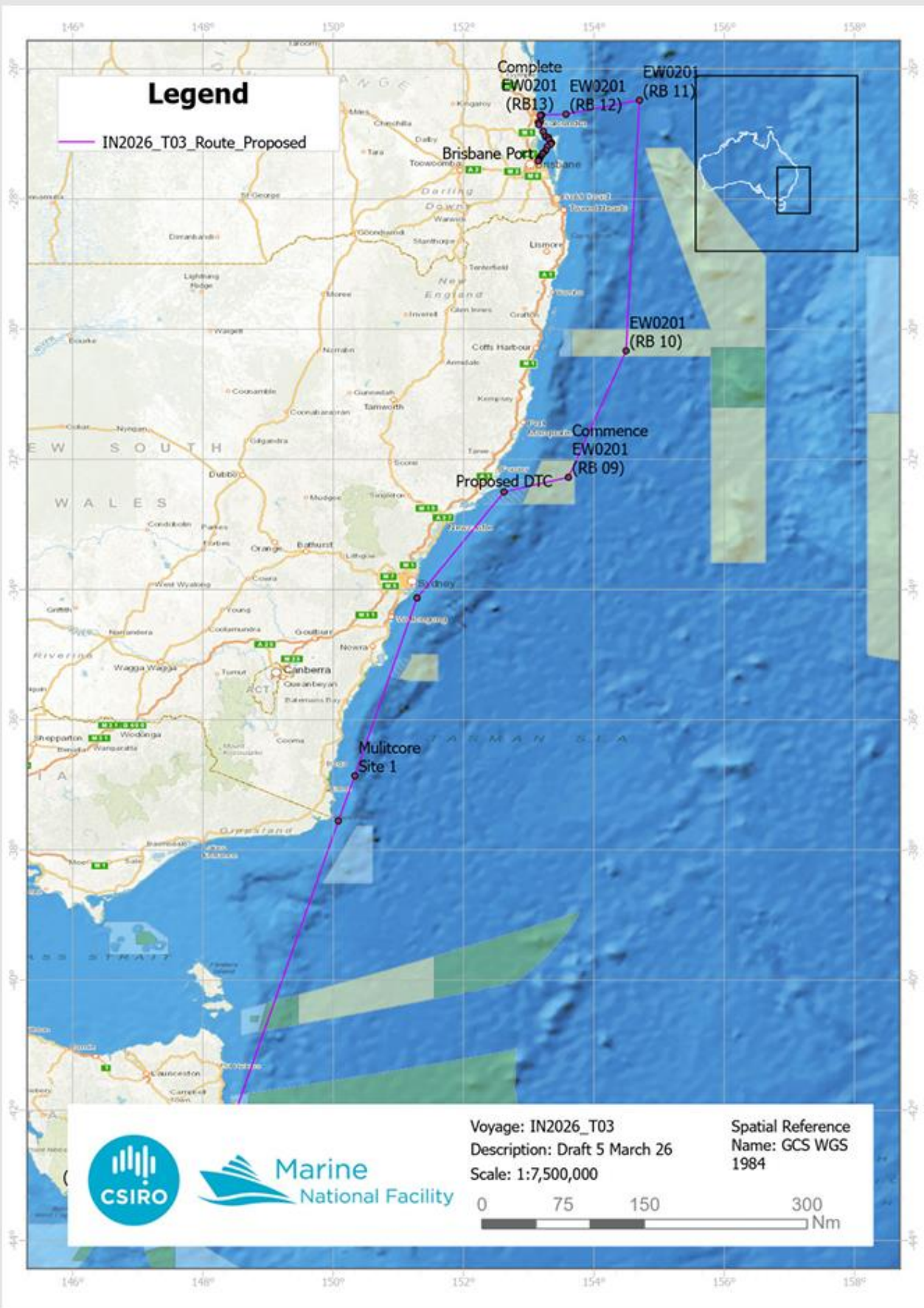
The CSIRO Marine National Facility (MNF) operates a Sustained Observation Program (SOP) through the collection and analysis of a range of parameters. Where it does not conflict with Primary or Supplementary voyage activities, the MNF may undertake the following data collection and deployment activities:

- Meteorological data collection with Weather Radar and meteorological measurement suite
- Atmospheric aerosol, greenhouse gas, and reactive gas data collection with a suite of air sampling instrumentation
- Surface temperature, salinity and biogeochemical parameters with a suite of seawater sensors
- Bathymetry and geophysical data collection with multibeam echosounders, backscatter, sound velocity, and gravity measurement systems
- Water column data measurement with XBT deployments and on-board ADCP systems (Expendable Bathy-Thermosalinograph, Acoustic Doppler Current Profiler)
- Measurement of the abundance and distribution of mid-trophic biology with bio-acoustic echosounder systems
- Mixed layer plankton collection with a towed CPR (Continuous Plankton Recorder)
- Deployment of ARGO floats

These activities contribute to national and global public data repositories including:

- Integrated Marine Observing System (IMOS)
- AusSeabed
- World Meteorological Organisation Global Atmosphere Watch (WMO-GAW)

Voyage track example



Waypoints and stations

SITE	DEGREES DECIMAL LATITUDE	DEGREES DECIMAL LONGITUDE	WATER DEPTH	DISTANCE (NM)	TOTAL DISTANCE (NM)
Hobart – PW4					
Backscatter Cal Line 1 Start	-43.198	147.625		4.78	*25*
Backscatter Cal Line 1 End	-43.248	147.710		5.7	*29.78*
Backscatter Cal Line 4 Start	-43.275	147.835		4.36	*35.48*
Backscatter Cal Line 4 End	-43.277	147.935		12.7	*39.84*
AAD Kombi Mooring	-43.200	148.205	420m	384.66	*52.54*
MC Site 1	-36.992	150.278	133m	119.19	*437.2*
MC Site 2 Jervis	-35.081	150.940	129m	161.45	*556.39*
MC Site 4 HMP outside	-32.710	152.469	114m	15.26	*717.84*
DTC 1	-32.647	152.762	154m	1.63	*733.1*
DTC 2	-32.623	152.777	156m	1.65	*734.73*
DTC 3	-32.600	152.793	168m	1.71	*736.38*
DTC 4	-32.574	152.807	165m	4.49	*738.09*
DTC 5	-32.505	152.841	162m	41.35	*742.58*
RB Waypoint 9	-32.276	153.610	4316m	125.15	*783.93*
RB Waypoint 10	-30.333	154.495	4549m	231.41	*909.08*
RB Waypoint 11	-26.483	154.699	4650m	61.86	*1140.49*
RB Waypoint 12	-26.698	153.572	124m	20.1	*1202.35*
RB Waypoint 13	-26.708	153.198	24m	1.31	*1222.45*
PBG	-26.716	153.175		39.52	*1223.76*

Time estimates

The following time estimates are based on a steaming speed of 10 knots.

Day	Date	Time	Activity
Wed	15 Jul	1500	User supplied equipment mobilisation (AAD KOMBI II Mooring) Dirty Wet Lab (PI Pessarrodona) 1500: Onboarding of science party, MNF staff as required 1530: Seagoing induction for science party and MNF technical staff
Thu	16 Jul	0800	ONBOARDING & DEPARTURE 0700: Final onboarding of MNF staff 0800: MUSTER 0900: Voyage Manager briefing

Day	Date	Time	Activity
			1000: Departure 1100: SMT meeting on bridge including KOMBI II Mooring deployment
Thu	16 Jul	1230	1230: KOMBI II Mooring deployment Toolbox 1400: On location for KOMBI II Mooring deployment, 1430: KOMBI II Mooring deployment
Thu	16 Jul	1600	Commence transit north towards Brisbane
Fri	17 Jul		Continue transit north towards Brisbane
Sat	18 Jul		Multicore Site #1
Sun	19 Jul		Multicore Site #2 DTC transects
Sun	19 Jul		DTC Transects
Mon	20 Jul		High-Priority Mapping Sites
Tues	21 Jul		High-Priority Mapping Sites
Wed	22 Jul		Pilot Boarding Ground (PBG) 0300 22nd July then arrival into Brisbane (~0800)

*Total number of DTC and Multicore sites TBD pending weather and transit speed.

Permits

This voyage will traverse through the following Marine Parks:

- Freycinet Marine Park
- Flinders Marine Park
- Central Eastern Marine Park

This voyage is operating under the following permits:

Approved activities are covered by:

MNF Permit: Temperate East Network

- PA2020-0041-6
- PA2020-0041-12
- PA2020-0041-19

Science Permits:

- AU-COM2026-035 (Multicore)

Communication plan

Geoscience Australia

1. Develop news item to publish on GA website to promote voyage science and RAPi.
2. Develop social media content for release via GA social channels during-after the voyage.

CSIRO

1. Oversee and support voyage partner communication approaches.
2. Provide media outreach and engagement support in Hobart, if required.

3. Create and publish Voyage Page to MNF Voyage Catalogue on https://www.csiro.au/en/about/facilities-collections/MNF/Voyages-schedules/Voyages/2026/July/IN2026_T03
4. Ensure a voyage team photo is taken prior to voyage departure.

JCU-Dr Robin Beaman
1. JCU to develop media release in conjunction with GA/CSIRO.

Signature

Your name	Dr Robin Beaman
Title	Chief Scientist
Date:	14th July 2026

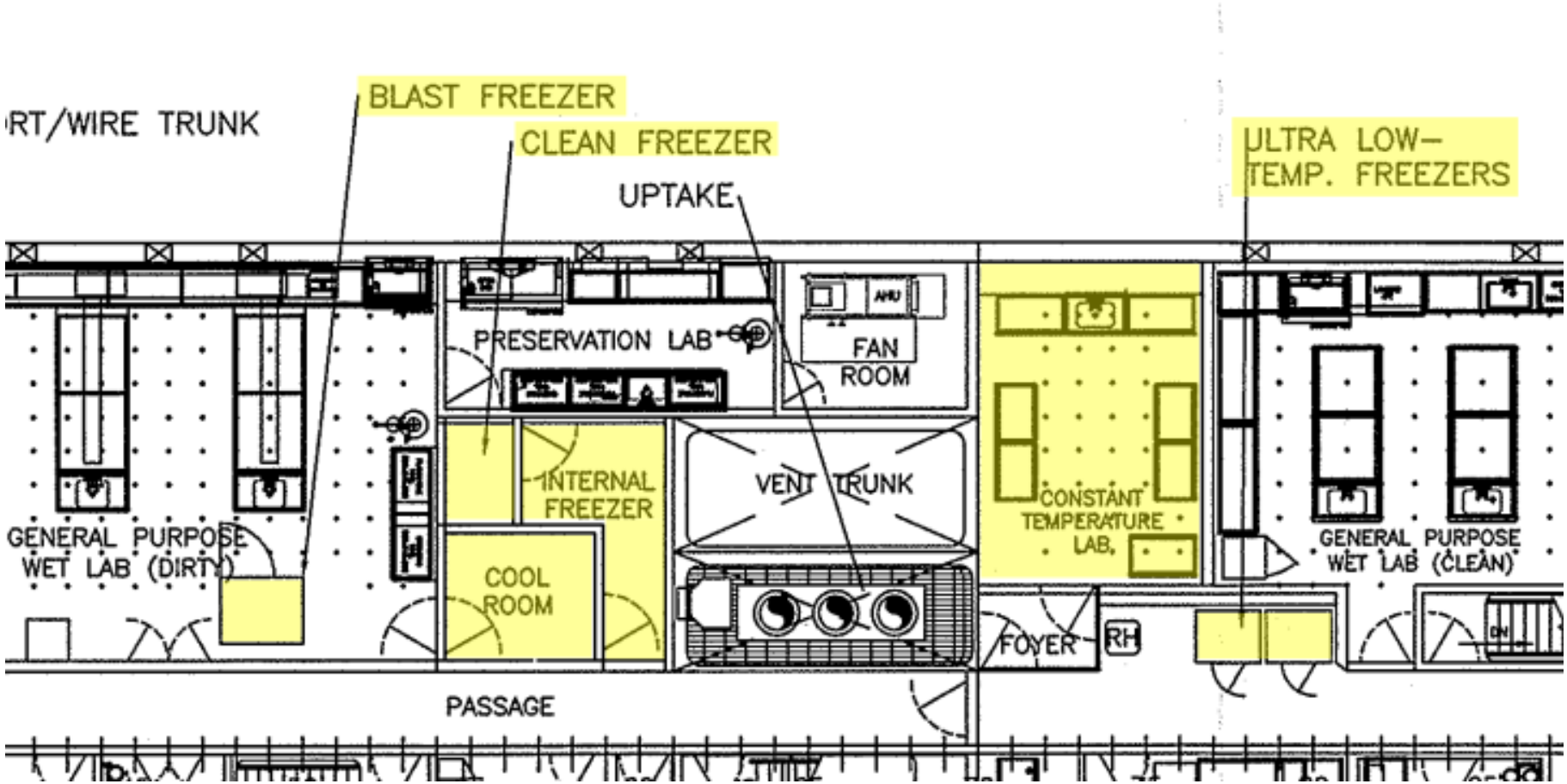
Appendix A

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.

STANDARD LABORATORIES AND FACILITIES		
NAME	**REQUIRED**	**NOTES/COMMENTS**
Aerosol Sampling Lab		
Air Chemistry Lab		
Preservation Lab		
Constant Temperature Lab (Min temp: ~4°C / Max temp ~35°C)		
Underway Seawater Analysis Laboratory		
GP Wet Lab (Dirty)	x	Multicore processing and Albert Pessarodona's team usage for core sampling and processing.
GP Wet Lab (Clean)		
GP Dry Lab (Clean)		
Sheltered Science Area	x	DTC storage and staging
Observation Deck 07 Level		
Internal Freezer (Dirty Wet lab) (Min temp -25°C / Max temp 0°C) Volume: >20m^3	x	Core sample storage
Clean Freezer (Dirty Wet lab) (Min temp -25°C / Max temp 0°C)	x	Core samples storage

STANDARD LABORATORIES AND FACILITIES		
NAME	**REQUIRED**	**NOTES/COMMENTS**
Volume: >2.5m^3 Co-located within the Internal freezer and separated by a door		
Blast Freezer (Dirty Wet lab) (Min temp -30^{o}C / Max temp 0^{o}C) Internal volume >1.5m^3 Capable of reducing the temperature of 150kg of water from +20C to -30C in one hour.		
Cool Room (Dirty Wet lab) (Min temp 0^{o}C / Max temp 10^{o}C)	x	Multicore sample storage- 4^{o}C
Ultra-Low Temperature Freezers x2 (Main Deck) Min temp -80^{o}C / Max temp -80^{o}C)	x	eDNA samples from Multicore -80 freezer
YODA Freezers (x2) (Clean Dry lab) (Min temp -20^{o}C / Max temp 10^{o}C)		



MOBILE LABORATORY AND FACILITIES *(MAY REQUIRE ADDITIONAL SUPPORT)*			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Modular Isotope Laboratory			
Trace Metal Niskin Sampling Container (TM1-blue - 20ft)			

MOBILE LABORATORY AND FACILITIES *(MAY REQUIRE ADDITIONAL SUPPORT)*			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Trace Metal Seawater Analysis Laboratory (TM2-white - 20ft)			
Trace Metal Rosette and Niskin Storage Container			
Modular Hazchem Locker			
Stabilised Platform Container			
Clothing Container			

STANDARD SAMPLING EQUIPMENT			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Continuous Plankton Recorder (CPR)			

SPECIALISED SAMPLING EQUIPMENT			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS (THESE ITEMS MAY REQUIRE ADDITIONAL MNF SUPPORT STAFF)**
TRIAXUS – Underway Profiling CTD			
Desired towing profile:			
Additional instrumentation: (please supply, make and model and datasheets and a contact person for discussion on integration)			
Piston Coring System			
Gravity Coring System			

SPECIALISED SAMPLING EQUIPMENT			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS (THESE ITEMS MAY REQUIRE ADDITIONAL MNF SUPPORT STAFF)**
Multi Corer	x		Coring site depth from 100 to 400. Team's preference to take water sample from tubes once corer is on deck for eDNA sampling and store in -80 freezer. Deployments will be 3-6 pending available time.
Kasten Corer			
Smith Mac Grab			
Rock Dredges			
Rock Saw			
Seaspy Magnetometer			
Portable Pot Hauler			
Equipment to measure seawater sound velocity/CTD:			
XBT System			2 per day provided if requested
Valeport Rapid SV			
Valeport Rapid CTD			
Valeport SVX2			
Trace Metal Rosette and Bottles			
Trace Metal In-situ Pumps (x6)			
Deep Towed Camera	x		DTC transects for Joel Williams project. Water depths ~100-400m for general transects. Deeper sites x 2 if time allows- ~700-800m.

SPECIALISED SAMPLING EQUIPMENT			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS (THESE ITEMS MAY REQUIRE ADDITIONAL MNF SUPPORT STAFF)**
			Planned deployments-pending time available. User supplied sensor to be added to DTC, see notes in user supplied equipment section.
Drop Camera			
Sherman Epibenthic Sled			
Brenke Sled			
Hydro-Bios MultiNet (Mammoth) (1m x 1m)			
Surface Net (1m x 1m)			
Bongo Net			
Beam Trawl			
MIDOC			
Pelagic Trawl System (net, doors)			
Demersal Trawl System (net, doors)			
RMT-8 (Rectangular Midwater Trawl)			
RMT-16 (Rectangular Midwater Trawl)			
Trawl Monitoring Instrumentation (ITI) (2,000m depth limit)			
Stern ramp		**INSTALLED**	MNF to identify this requirement

RESEARCH SUPPORT INFRASTRUCTURE			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Saltwater Ice Machine (Dirty Wet lab)			

RESEARCH SUPPORT INFRASTRUCTURE			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Radiosonde Receiver System			
Laboratory Incubators (Clean Dry lab)			
Deck Incubators			
Milli-Q System	x		
Sonardyne USBL System			

SCIENTIFIC / SAMPLE ANALYSIS SYSTEMS				
MICROSCOPES:				**NOTES/COMMENTS**
BRAND / MODEL	**TYPE**	**ESSENTIAL**	**DESIRABLE**	
Leica / M80	Dissecting			
Leica / M80	Dissecting			
Leica /MZ6	Dissecting			
Olympus / CH	Compound			
Olympus /CH	Compound			
Leica / MTU282	Camera tube			
Adapters for tube / Nikon	Pentax			
Ring Light *2 / MEB121	LED			
Heavy Duty Electronic Balance (80kg)			x	For weighing multicore samples
Medium Duty Electronic Balance (15kg/5g resolution)			x	
Light Duty Electronic Balance (3kg/1g resolution)			x	

Underway systems

ACOUSTIC UNDERWAY SYSTEMS			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
75kHz ADCP			
150kHz ADCP			
Multi Beam Echo Sounder EM2040-MKII 200-700kHz (0 – 250m approx.)		x	The EM2040 may be of use for DTC camera sites to resolve high-resolution seafloor features, however, EM712 will be the priority if conflicts occur.
Multi Beam Echo Sounder EM124 12kHz (100m to full ocean depth)	x		The EM124 is an essential multibeam system to be run in water depths ~100m and deeper, so can be run concurrently with EM712 in overlapping depths.
Multi Beam Echo Sounder EM712 70-100kHz (0 –1000-m approx.)	x		The EM712 is an essential multibeam system to be run in water depths 0-1000m, so can be run concurrently with EM122 in overlapping depths.
Sub-Bottom Profiler SBP29		x	Will be useful for understanding seafloor sediments at multicore and DTC sites, however if SBP causes interference with multibeam returns then multibeam is the priority for running.
Scientific Narrowband/Broadband Echo Sounders EK80 (6 bands, 18kHz-333kHz)			EK80s will be used in narrowband mode unless otherwise requested Quantitative measurements from scientific echosounders requires sphere calibration in the watermass of sampling
Multibeam Scientific Echo Sounder ME70 (70100 kHz)			
Omnidirectional Echo Sounder SH90			
Gravity Meter			

ATMOSPHERIC UNDERWAY SENSORS			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Nephelometer			

ATMOSPHERIC UNDERWAY SENSORS			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Multi Angle Absorption Photometer (MAAP)			
Scanning Mobility Particle Sizer (SMPS)			
Radon Detector			
Ozone Detector			
Condensation Particle Counter (CPC)			
Picarro Spectrometer (analysis of CO_2/CH_4/H_2O)			
Aerodyne Spectrometer (analysis of N_2O/CO/H_2O)			
Cloud Condensation Nuclei (CCN)			
Polarimetric Weather Radar			
Filter Aerosol Sampling units (FAS) x 3			

UNDERWAY SEAWATER SYSTEMS AND INSTRUMENTATION			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Thermosalinograph			
Fluorometer			
Optode			
pCO2			

SEAWATER SYSTEMS			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Trace metal clean seawater supply			

SEAWATER SYSTEMS			
NAME	**ESSENTIAL**	**DESIRABLE**	**NOTES/COMMENTS**
Scientific clean seawater supplied to laboratories			
Raw seawater available on deck and in laboratories			

EQUIPMENT AND SAMPLING GEAR REQUIRING EXTERNAL SUPPORT (MAY REQUIRE ADDITIONAL SUPPORT FROM APPLICANTS)			
NAME	**ESSENTIAL**	**DESIRABLE**	**PLEASE GIVE THIS CAREFUL CONSIDERATION, AS THERE IS NO GUARANTEE THAT THESE RESOURCES WILL BE AVAILABLE UNLESS SPECIFICALLY REQUESTED. LIAISE WITH YOUR VOYAGE OPERATIONS MANAGER AS REQUIRED. ADDITIONAL STAFF MAY BE REQUIRED FOR THESE ACTIVITIES.**
Seismic Acquisition System			

NON-MNF OWNED EQUIPMENT WHICH MAY BE ACCESSED			
NAME	**ESSENTIAL**	**DESIRABLE**	**PLEASE GIVE THIS CAREFUL CONSIDERATION, AS THERE IS NO GUARANTEE THAT THESE RESOURCES WILL BE AVAILABLE UNLESS SPECIFICALLY REQUESTED. LIAISE WITH YOUR VOYAGE OPERATIONS MANAGER AS REQUIRED. ADDITIONAL STAFF MAY BE REQUIRED FOR THESE ACTIVITIES.**
D & N Francis winch			
UTAS In-Situ Pumps (x2)			

Appendix B

User Supplied Equipment

The table below will include information provided by the Chief Scientist / Principal Investigators in the '*Equipment Manifest-user supplied voyage specific*' document. The Chief Scientist will co-ordinate the completion of this Manifest with all PIs and forward the completed document to the Voyage Operations Manager.

NOTE: User supplied equipment will remain the responsibility of the science party throughout the voyage. The MNF technicians and ship's crew endeavour to assist wherever possible, however the MNF take no responsibility for the pre-deployment checks or repairs and maintenance of this equipment

This information will also be used for the mobilisation list and deck plan for the voyage.

Owner	Item name	Weight	Dimensions	Location on Vessel
AAD- Dr. Rob King	Krill Observational Mooring for Benthic Investigation Mark II (KOMBI II)	789 KG	1145 x 1145 x 1397 mm (lwh)	Lashed in position on aft deck near A-frame
AAD- Dr. Rob King	EdgeTech Deck Box 8011	5 kg		Stored in Dirty Wet Lab
AAD- Dr. Rob King	Sea Catch release and lifting slings	5 kg	700 x 300 x 400 mm	Stored in Dirty Wet Lab
UTAS- Joel Williams DTC Project	Moana Sensor Testing-Zebra Tech sensors x 4 and deck unit. These items are to be fix on DTC	Sensors- 346g Deck unit- 1.62kg	Deck unit- 270 mm L x 130 mm W x 43.75 mm D	Deck unit- aft deck railing