



PHOTO CREDITS:

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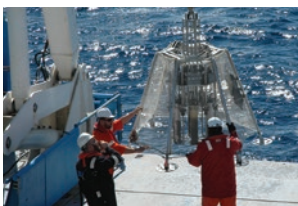
About the Marine National Facility

Australia has the third largest marine estate globally. The Marine National Facility (MNF) is a keystone element of the nation's research infrastructure and has been funded by the Australian Government since 1984. Owned and operated by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the MNF is overseen by an independent Steering Committee to provide Australian marine researchers and their international collaborators with a blue-water research capability for work in Australia's vast marine estate. Through merit based grants of sea time, research undertaken through the MNF benefits Australia by providing key information to government, industry and other stakeholders to support evidence-based decision making towards sustainable development. For example, MNF research has focused on challenges in environmental and fisheries management, geological resources, regional and global climate, coastal and offshore development. To complement and increase utilisation of MNF capability, user funded voyage applications are awarded sea time commensurate with the national benefit offered by the proposed research.

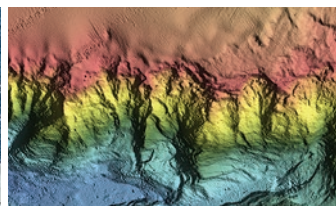
THE MNF CONSISTS OF:



The 94 metre blue-water research vessel *Investigator*.



An extensive suite of fixed and modular state of the art scientific research equipment.



A growing repository of publicly available marine data and samples collected over 30 years.



A team of specialists to support the Facility and research vessel users.

From the Chairman, MNF Steering Committee



Ian Poiner
Chairman, Marine National
Facility Steering Committee

This year it has been pleasing to see *Investigator* successfully brought into full operation as well as significant developments in the allocation of sea time and student training initiatives.

In September, MNF Steering Committee considered a business model defining various possible groups of ship users. To encourage increased utilisation of MNF capability, a new *Principles of access* policy guides potential ship users with various pathways to access *Investigator*. In particular and noting the *Investigator* is not currently funded for full operations of 300 sea days, the policy guides those seeking access outside the granted voyage schedule including the priorities, processes and pricing principles that apply.

The assessment of applications for sea time is the strategic cornerstone of the MNF, with merit determined on the basis of scientific excellence, national benefit and track record.

A new *National Benefit Assessment Panel* which includes experts in the application of research across MNF stakeholder sectors will be used to specifically advise on the national benefit of applications for sea time. The Panel will hold its inaugural meeting in November 2016 to review applications for sea time for *Investigator's* 2018–19 research schedule. This new initiative will provide greater transparency in assessing the path to research impact.

To enhance blue-water training opportunities on *Investigator*, MNF Steering Committee has approved a three year transit voyage trial of the *Collaborative Australian Postgraduate Sea Training Alliance Network (CAPSTAN)*. Coordinated by Macquarie University, CAPSTAN is a practical post-graduate at sea training initiative governed by a network of leading industry and university partners from within marine science and geoscience. The program is the first of its kind for Australia and will transform the way marine science education is delivered. The inaugural CAPSTAN transit voyage is scheduled to sail from Fremantle to Hobart for 13 days commencing on 14 November 2017.

Looking to the future the Steering Committee will be focused on seeking the support of Government for the full operations of the *Investigator* by increasing the number of granted sea days from the current 180 days to 300 days. The demand continues to be high as reflected in the 869 days applied for in 2015–16. Full utilisation is a key recommendation of the National Marine Science Plan released in 2015 and is strongly supported by the marine stakeholders as reflected in many submissions to the 2016 National Research Infrastructure Roadmap process.

I would like to take the opportunity to thank the MNF Ships Group and technical support staff for their hard work and dedication over the past 12 months, which has made *Investigator's* research schedule a reality. On that note, you are kindly invited to review this Annual Report which provides an overview of MNF activities for the 2015–16 year.

From the MNF Director



Ron Plaschke
Director, Marine National Facility

This year heralded the transition from commissioning activities to scientific operation on *Investigator*. With a schedule featuring multi-disciplinary voyages to some of the most remote areas in Australia's marine estate, the vessel has been tested to the edge of its operational envelope.

Investigator has performed very well to successfully deliver a range of scientific objectives, with dedicated commitment from MNF staff, support teams, marine crew and ship users crucial to this success. I would like to take the opportunity to sincerely thank these teams for their hard work and their continued development of *Investigator* as a world leading blue-water research capability.

The MNF Annual Report provides a valuable snapshot of activities in 2015–16. It also discharges the obligation to provide an Annual Report endorsed by the MNF Steering Committee to CSIRO's CEO and Board, detailing the MNF's operations including the allocation of time, scientific achievements and finances.

MNF voyages

This year the MNF provided 248 research voyage days to 235 individual scientists from 29 Australian research agencies and their international collaborators from the United States, Germany, France, Timor Leste and New Zealand.

Operations commenced with the successful completion of commissioning activities in the first quarter of 2015–16. Following trials, MNF research vessel *Investigator* ramped up to a full schedule of

research operations, commencing with two CSIRO research charters in the Great Australian Bight in collaboration with Chevron and BP for a total of 61 days. *Investigator* then completed three granted voyages to the remote Heard and McDonald Islands, Southern Ocean and from the Antarctic ice-edge to the equator totaling 160 days. In addition, to maximise efficiencies in the research schedule, the MNF chartered the Australian Institute of Marine Science research vessel *Solander* for 27 days to undertake Indonesian through-flow moorings work out of Darwin.

The MNF also maintained a commitment to develop the next generation of Australian marine researchers by providing 25 students with unique blue-water training opportunities aboard *Investigator*.

Scientific Support Excellence award – FRV Project Team

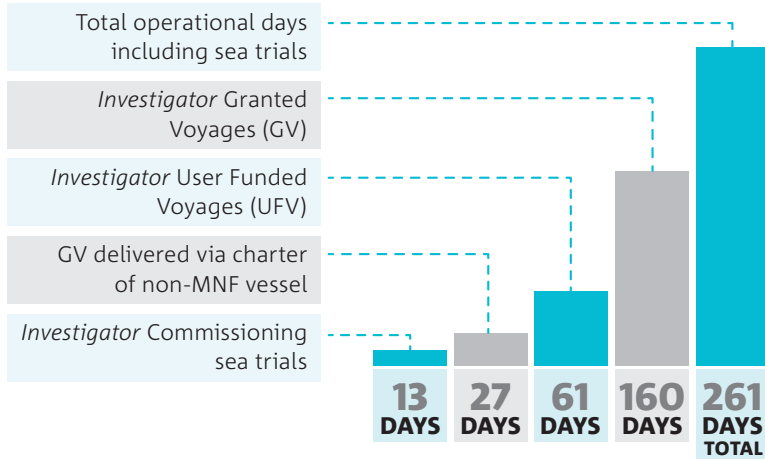
In October 2015, the *Future Research Vessel (FRV)* Project Team was awarded the 2015 CSIRO Medal for Support Excellence for the successful design, construction and commissioning of *Investigator*.

Congratulations to Toni Moate, Executive Director FRV Project and the various teams for their hard work and well earned recognition from the CSIRO Award Panel.

2015–16 Highlights

ZERO
number of days
lost to injury

52,625
Kilometres travelled



SCIENTIST DAYS **DELIVERED** **8549**
TOTAL OPERATIONAL DAYS X BERTHS UTILISED



869 TOTAL GRANTED VOYAGE DAYS APPLIED FOR



AREA MAPPED
262,688 km²

Volume of data collected
8.3 TERABYTES

Voyages delivered in collaboration with
29
AUSTRALIAN RESEARCH AGENCIES
and their international collaborators

Health, Safety and Environment

The maritime context in which the MNF operates brings unique challenges in the management of health, safety and the environment. The MNF aspires to zero harm and is continuously seeking opportunities to improve systems, procedures and policies designed to ensure the safety of people on and around *Investigator*. People are at the heart of the MNF’s ability to deliver great science and innovation to our customers.

2015-16 INCIDENT SNAPSHOT

	RECORDED
Lost Time Injury	0
Medical Treatment Case	2
First Aid Case	6
Illness	2
TOTAL	10



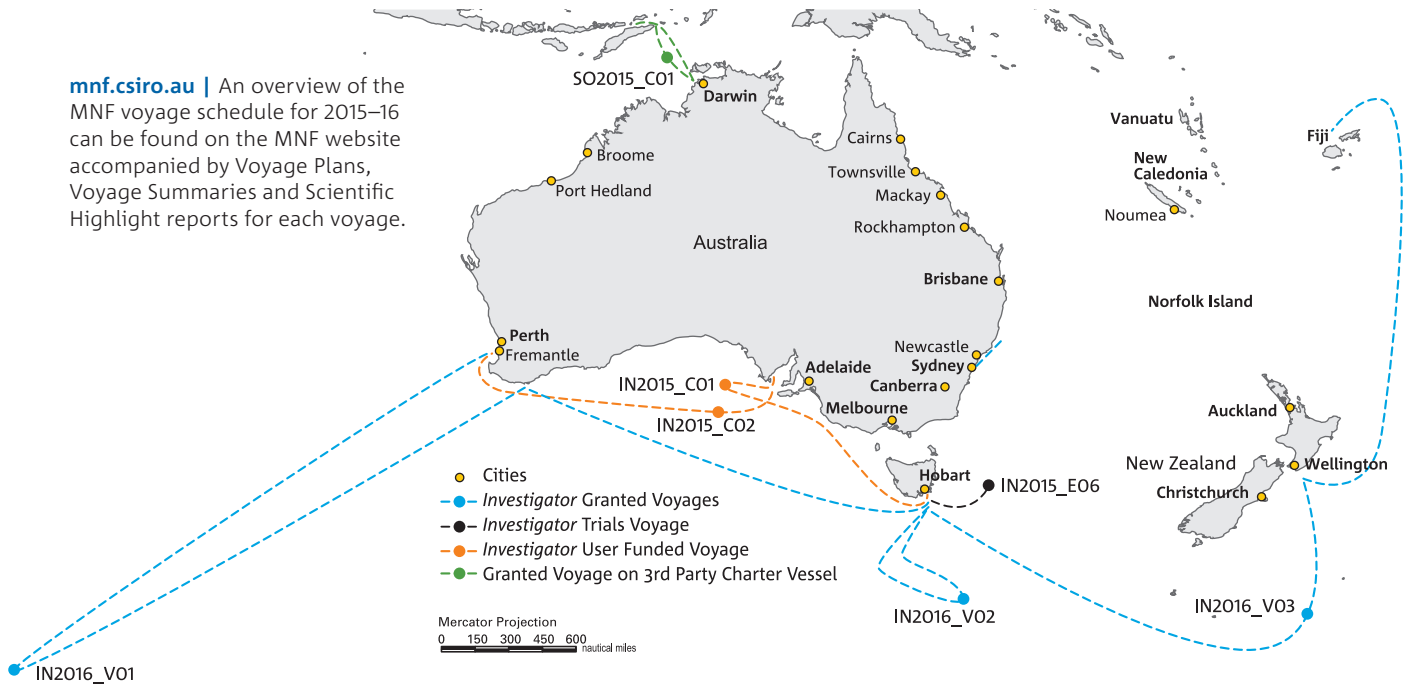
Continuous review and improvement initiatives for *Investigator*

Psychological Health and Wellbeing at Sea Strategy

In January 2016, the MNF implemented a Psychological Health and Wellbeing at Sea Strategy aimed at preparing scientific participants for time at sea, supporting them during the voyage and increasing awareness of possible issues when returning home. A cornerstone of the Strategy is an *online training course* which must be completed pre voyage by all scientific participants, including a section to be completed by the nominated next of kin in recognition of their important role. The need for this Strategy has been further highlighted by *Investigator’s* ability to operate up to 60 days at sea in remote regions.

2015–16 Research schedule

mnf.csiro.au | An overview of the MNF voyage schedule for 2015–16 can be found on the MNF website accompanied by Voyage Plans, Voyage Summaries and Scientific Highlight reports for each voyage.



VOYAGE: N2015_E06 | Trial and Commissioning Voyage | Vessel sea trials to test, calibrate and familiarise staff with a range of ship equipment, instrumentation and procedures.

VOYAGE: SO2015_C01 | IMOS Long-term monitoring of the Indonesian Throughflow | Maintenance of Integrated Marine Observing System (IMOS) deep ocean mooring arrays that monitor ocean water properties in two key passages of the Indonesian Throughflow -Timor Passage and Ombai Strait.

VOYAGE: IN2015_C01 | GAB deep water geological and benthic ecology program | Collection of data and samples from a poorly studied region of the Great Australian Bight to permit a more detailed

understanding of the regions geological evolution and biological communities.

VOYAGE: IN2015_C02 | GAB deep water pelagic and benthic ecosystem study | Detailed whole-of-system study of the central Great Australian Bight to identify key ecological processes, and provide better understanding of benthic species diversity, pelagic production and biomass.

VOYAGE: IN2016_V01 | Heard/McDonald Islands submarine volcanism/hydrothermalism and biospheric impacts | Systematic survey of hydrothermal activity around Heard and McDonald Islands to investigate potential sources of iron fertilisation in the Southern Ocean and their impact on biological productivity.

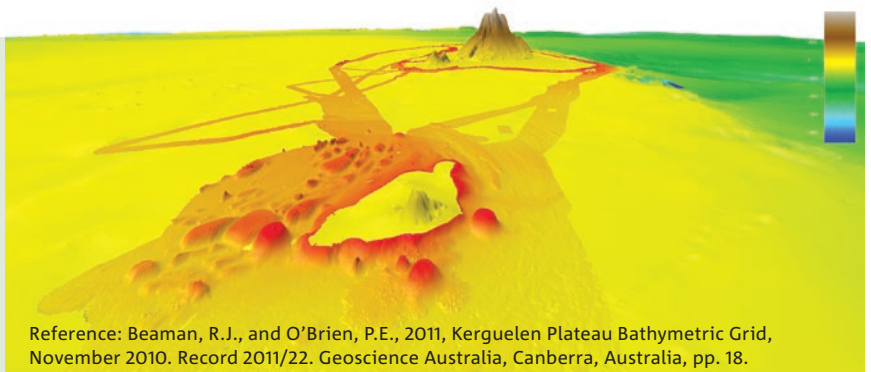
VOYAGE: IN2016_V02 | Integrated Monitoring Observing System time series automated moorings for climate and carbon cycle studies southwest of Tasmania | Maintenance of Southern Ocean Time Series (SOTS) automated moorings used for decadal monitoring of Southern Ocean temperature and carbon dioxide levels (in conjunction with two other primary projects on voyage).

VOYAGE: IN2016_V03 | Monitoring ocean change and variability along 170 degrees west from the ice edge to the equator | Measurement of a wide range of ocean water properties along 170 W from ice edge to the equator to monitor and detect ocean changes as part of the international GO-SHIP monitoring effort.

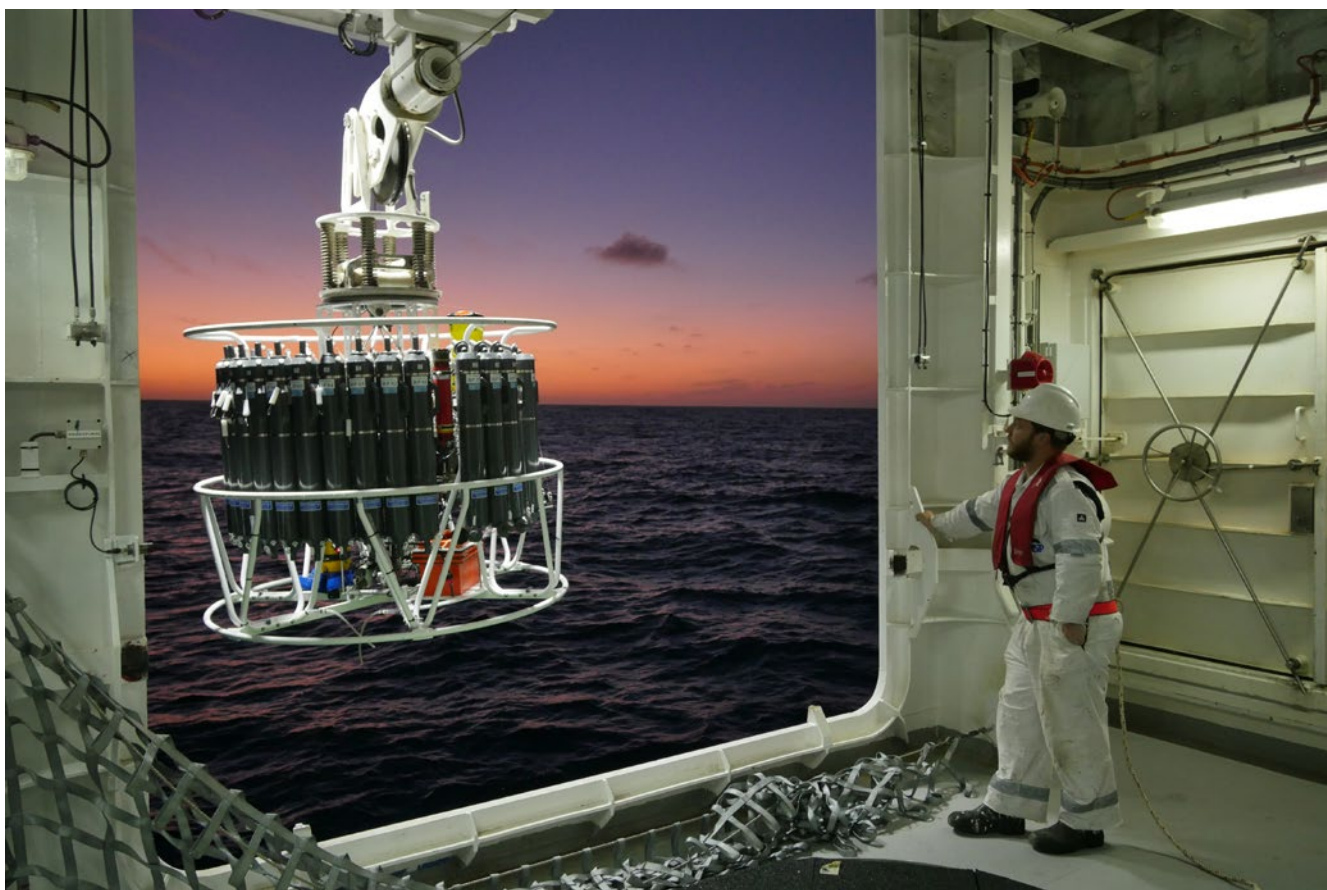


VOYAGE HIGHLIGHT | Mapping of the remote Kerguelen Plateau

Multibeam bathymetry data, coloured to indicate depth, acquired around McDonald Island (foreground) and Heard Island (peak in background) by *Investigator* on IN2016_V01 in 2016. The brighter data, acquired by the Marine National Facility, is overlain with a previous, less detailed gridded compilation (Beaman and O'Brien, 2011). The data shows a platform around the island studded by underwater volcanoes in detail not possible without the systems used by *Investigator*.



Reference: Beaman, R.J., and O'Brien, P.E., 2011, Kerguelen Plateau Bathymetric Grid, November 2010. Record 2011/22. Geoscience Australia, Canberra, Australia, pp. 18.



VOYAGE HIGHLIGHT

Leveraging the unique capability of *Investigator* to deliver science of international importance

Departing Hobart in April 2016, voyage IN2016_V03 to monitor ocean change and variability along 170 degrees west from the ice edge to the equator represented Australia's regional contribution to the international GO-SHIP program. This program seeks to monitor decadal ocean change, with a consortium of countries undertaking repeated occupation of hydrographic stations from the poles to the equator.

Vessel based hydrography remains the only method for obtaining high-quality, high spatial and vertical resolution measurements over the full water column which is essential for documenting ocean changes, especially for the deep ocean below 2000 metres

where 52% of the global ocean volume is not sampled by profiling floats.

RV *Investigator's* 170°W voyage also gathered high precision baseline data to calibrate the international Argo array, XBT program, and other autonomous observations made by ocean gliders, moorings and satellites which provide more detailed understanding of dynamic ocean processes occurring between research vessel visits. These autonomous observations are part of highly co-operative international efforts to meet global research challenges. For example, Australia is a member of the international Argo program and the second largest contributor globally after the USA. Argo Australia

is operated by CSIRO, with financial and operational support from the Bureau of Meteorology, IMOS, the Antarctic Climate and Ecosystem Cooperative Research Centre, the Royal Australian Navy and the Department of Environment and Energy.

Australia's participation in the international research community is very important as a key beneficiary of the value derived from data streams critical to weather prediction globally and in our region. Geographically located in a vast ocean area, it would be difficult or impossible for other countries to replace Australia's research efforts, presenting the risk of losing our leadership and opportunity to influence international initiatives.

Supporting a blue-water research capability

Supporting a blue-water research capability requires a coordinated effort by a diverse team with the specialist skills to plan and deliver all aspects of the voyage, equipment and data management.



The delivery of a complex schedule of multi-disciplinary science voyages on a blue-water research vessel requires significant effort involving specialist personnel with a range of unique and diverse skills.

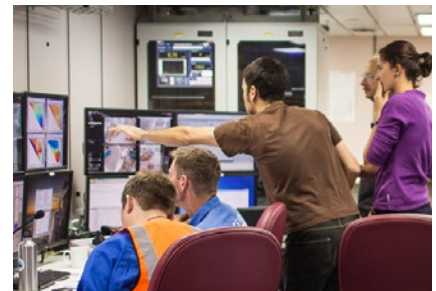
Governance – The allocation of public funds received through the Australian Government demands independent governance to ensure appropriate levels of transparency and rigour around the allocation of ship time. This governance is provided by the [MNF Steering Committee](#) who are supported by sub committees to assess applications for sea time and the [MNF Ships Group](#) who manage operations. The MNF Ships Group also deliver policy expertise to ensure operation of the National Facility aligns with the MNFs mission and strategy.

Voyage Operations – The delivery of multi disciplinary voyages requires high level planning skills from a team who understand the unique

operating environment. Constructing an appropriate schedule requires an in-depth understanding of temporal, geographical and seasonal constraints that result from operating within Australia's vast marine estate. In addition, appropriate consideration for logistical efficiencies must be applied across multi-disciplinary science proposals to ensure the MNF delivers the best available return on investment.

The MNF Ships Group and technical support staff manage all aspects of voyage planning and operations to ensure voyages successfully deliver science objectives safely and efficiently. This team also provide support at sea with a dedicated Voyage Manager who forms part of the onboard management team alongside the Master and Chief Scientist.

Scientific Equipment – In addition to a substantial suite of built in equipment, the FRV Project has procured approximately \$8M of scientific equipment for *Investigator* through



a research community technical advisory group. This equipment, both modular and fixed, provides capability across a range of scientific disciplines required by the research community.

Data and Sample management – Valuable data and samples captured by MNF and user supplied scientific instruments requires processing, archiving and publishing in the public domain. Scientific outputs from *Investigator* and those from over 300 MNF voyages over the past 30 years are made available to both researchers and to the public, not only through the MNF website but through suitable national and international repositories.

Communicating what we do

Effectively communicating what we do provides an opportunity for the MNF to demonstrate return on investment to the Australian public.



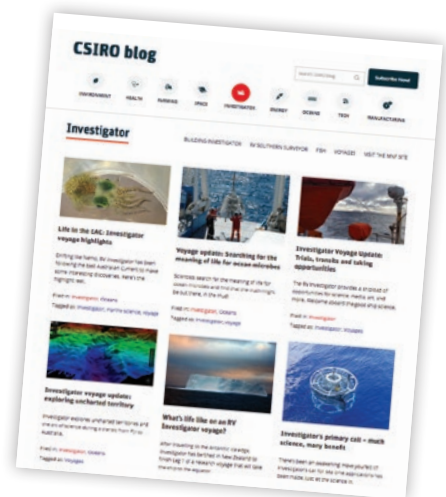
The MNF continues to produce high quality, engaging written and visual content, and to actively deliver these materials across a range of digital and print platforms. MNF communicators focus on seeking opportunities for collaboration with key stakeholders to highlight the impact of MNF activities within both the marine research and broader Australian community.

MNF communications have four primary goals:

- GOAL 1** Actively promote the research opportunities provided by the MNF to Australian marine researchers
- GOAL 2** Raise awareness of the value and relevance of the research enabled by the MNF
- GOAL 3** Effectively manage communication issues to maintain the positive reputation of the MNF
- GOAL 4** Maintain visibility of *Investigator* within key stakeholder groups

MNF Blog

Integrated with the CSIRO Blog, the *Investigator Blog* tells the story of every voyage the ship undertakes and raises awareness of the benefits of the research it enables. The Blog provides a popular way for people interested in the MNF to engage with ship activities.



MNF financial performance

Strong financial management is critical to ensuring the MNF remains viable, effective, and accountable for the expenditure of public funds.

	2016 \$'000	2015 \$'000
REVENUE		
External Funding	18	0
Internal Funding	29,130	27,757
Total Revenue	29,147	27,757
Expenditure		
Salaries (including Pan-Deployments)	4,572	4,750
Travel	317	222
Other Operating	17,004	9,958
Enterprise costs	5,742	5,018
Total Expenditure	27,634	19,948
Operating Result	1,514	7,809
Capital		
Capital Purchases (excluding FRV)	706	520

Acquisition of new science equipment and capabilities

Each year, the MNF conducts a process of identifying, prioritising and planning for the acquisition of major items of scientific equipment to inform CSIRO's Capital Expenditure (CapEx) program.

This year, the MNF was allocated \$690,000 from CSIRO's CapEx round. An overview of equipment purchased with this funding can be reviewed on the *MNF website*.



Looking to the future

The Marine National Facility must ensure current demand is sustained through engagement of early career researchers, while maintaining relevance through alignment with Australian science and research priorities.



Research community demand for sea time on *Investigator* remains strong, with over 850 days being applied for in 2015-16 through the Granted Voyage process. Through a multi-level applications process, the MNF is focused on maximising the utility of every day at sea on *Investigator* (see Scientist Days in Utilisation table).

Building on this strong demand, the MNF will seek support for the full operations of the *Investigator* by increasing the number of granted sea days from the current 180 days to 300 days. This goal is consistent with one of the key recommendations of the National Marine Science Plan released in August 2015.

In addition, through increased partnerships and collaboration, the MNF will continue to pursue opportunities to increase *Investigator's* days at sea through the User Funded Voyage process, thereby maximising return on investment in the national interest.

Key to these challenges is delivering a safe, reliable and efficient blue-water research platform which provides scientific capabilities to meet the growing demands of the research community. The outcomes of this research will increase our understanding of Australia's vast marine estate to inform sustainable development. To facilitate these outcomes, the MNF has enhanced the assessment of MNF research applications for national benefit and maintains a policy of publicly discoverable and available research data.

Blue-water research vessel training opportunities are key to developing the next generation of Australian marine researchers. The MNF prioritises research applications offering student training opportunities and through the CAPSTAN program has partnered with Macquarie University to deliver the first practical tertiary level student training program in Australia.

More broadly, the MNF will seek opportunities to assist with integrated national marine infrastructure initiatives as outlined in the National Marine Science Plan. With strong governance arrangements and a national operating mandate, the MNF is well positioned to play a leading role in this sector.

**FOR FURTHER
INFORMATION**

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