STEM education and training at the CSIRO Marine National Facility

Ben Arthur & Ben Rae
Marine National Facility

RV Investigator – a new era in marine and atmospheric research for Australian scientists
Marine National Facility (MNF)
Australia’s blue water research capability

- Established in 1984
- Funded by the Australian Government
- Owned and operated by CSIRO
- Overseen by an independent Steering Committee
- Comprises vessel, equipment, datasets and voyage management
- Available to Australian researchers and their international collaborators
RV Investigator
Australia’s super science ship

Figures
• Built 2014, $120 M
• 93.9m long, beam 18.5m
• 40 scientists
• Capable of 300 days/year at sea
• Range of 10,000NM, 60 days
• Ice edge to the equator
**RV Investigator**
Multidisciplinary research

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**OCEANOGRAPHIC**
Unravel decadal climate variability and fisheries interactions
- Deep ocean observations
- CTD systems

**GEOSCIENCE**
Discover submarine volcanoes, minerals and slip zones
- Full ocean depth multibeam sonars
- Sediment sampling

**ATMOSPHERIC**
Quantify the ocean’s role in global climate
- Advanced weather research radar
- Atmospheric sampling systems

**BIOLOGICAL**
Revolutionise fisheries science and management
- Advanced biomass sonar systems
- Deepwater trawling
Investigator has 3 years demonstrated experience delivering research. But is supporting and enabling research enough?

Explicit focus on the Blue Economy throughout marine science system

$47.2$ billion in 2012

$\approx$ $100$ billion in 2025

What can the MNF do to help deliver the marine experts who will ensure we successfully manage the future conservation and prosperity of our marine and coastal environments?
Professional development program for Australian STEM school teachers

Provides berths for primary and secondary teachers to sail on board *Investigator* for short voyages:

- Work alongside scientists to assist, learn and contribute to the national collaborative marine research effort.
- Update their own STEM content.
- Conduct and educational and outreach activities including live broadcasts.
- Develop curriculum-linked resources to be shared with other Australian teachers (assisted by CSIRO Education & Outreach).
STEM Education & Training
CSIRO Educator on Board

2017 pilot – Totten Glacier, 1 teacher, 51 days
2017 – Sydney to Broome, 2 teachers, 15 days

2018 – Brisbane to Hobart, 3 teachers, 8 days
2018 – Bass Strait, 4 teachers, 11 days
"Working alongside scientists who are at the top of their field was priceless in my own development as a teacher."

"In terms of science, I’ve learned more in one week than I have in my whole life."

"I most enjoyed the interplay between the scientists – bouncing off each other. Seeing everyone swapping ideas, not putting any down, just expanding thought sequences. This is the first time, in a long time, I’ve actually seen that happen and I’m really impressed."
When in port, run your class on board...

- Ship tour followed by STEM lesson
- Secondary, tertiary & TAFE educators
STEM Education & Training

3 pilot voyages on *Investigator* 2017-20

Up to 30 students and trainers

*CAPSTAN 2017 – Fremantle to Hobart*
STEM Education & Training

Ship tours

Class to ship

Or ship to class

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**STEM Education & Training**  
The future...

**Educator on Board**  
- 2019-20 voyages  
- How do we demonstrate impact?

**CAPSTAN voyages**  
- Beyond 2020...

**Indigenous student cadetship**

**Increased sea time?**
Thank you and Questions?

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