Australian Government

Australian Institute of Marine Science

AIMS Research

Our Fleet

and our need to

Update & Refresh

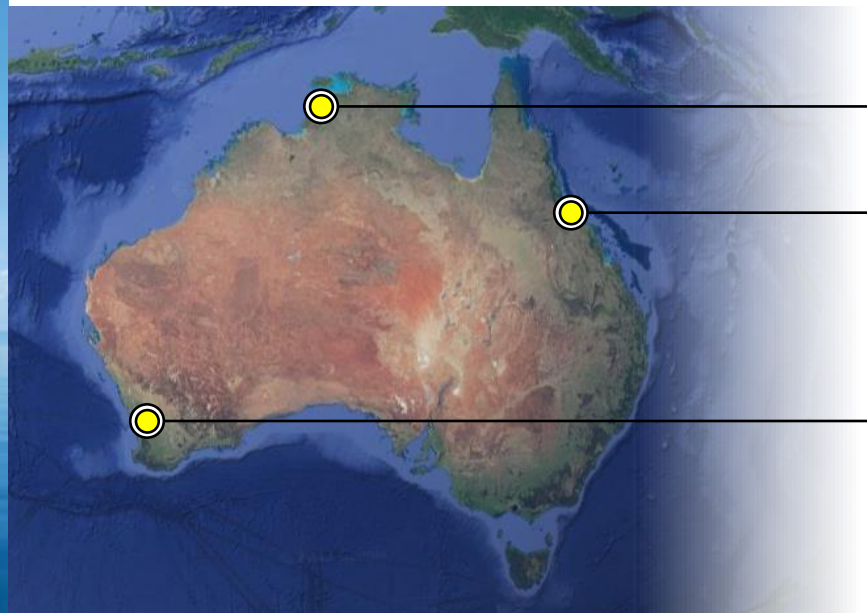
Dr Richard Brinkman
Chief Operating Officer

Australian Government

Australian Institute of Marine Science

Australian Institute of Marine Science

- A publicly funded research agency under the AIMS Act 1972
- ~350 staff , 20 postdocs, 80 PhD students



Darwin
(Northern Territory)

Townsville - Headquarters
(Queensland)

Perth
(Western Australia),

AIMS' Mission

To provide the research and knowledge of Australia's tropical marine estate required to support growth in its sustainable use, effective environmental management and protection of its unique ecosystems.

AIMS' activities over its 50+ years history

Observe

Understand

Solve

Guide

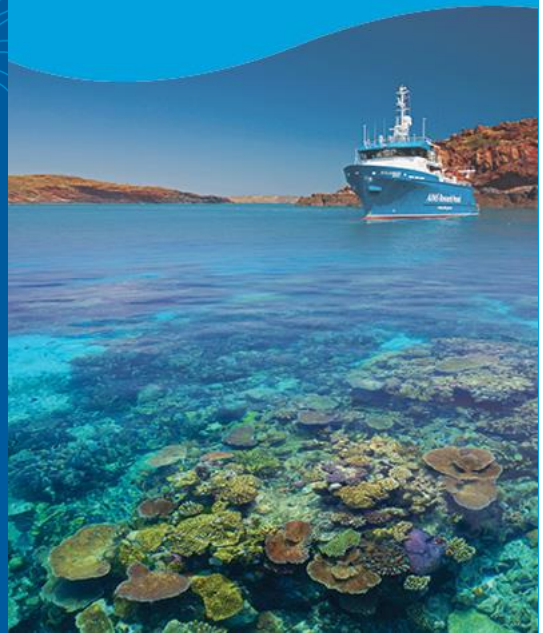
Provide research that guides industry and government decision makers in implementing large scale solutions and interventions

Develop science and technology solutions to emerging issues and opportunities

Analyse the data to understand and forecast

Monitor and collect data about our marine ecosystems

ACHIEVING OUR MISSION



OUR CORE CAPABILITIES

- Large-scale and long-term ocean monitoring
- Risk assessments of pollution and other cumulative impacts
- Analyses and prediction of ecosystem function and change

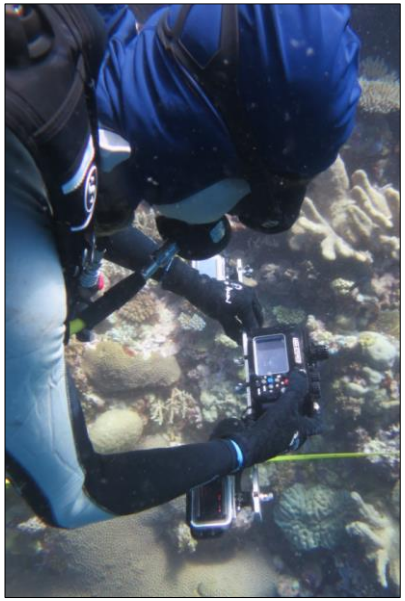
ACHIEVING OUR MISSION

OUR ENHANCED CAPABILITIES

- Working with stakeholders and partners to turn our science into solutions
- Embedding new technologies and the latest data science into our core capabilities
- Building effective, evidence-based decision-support systems
- Working with Traditional Owners to create new shared research that integrates Indigenous knowledge of sea country with other sciences

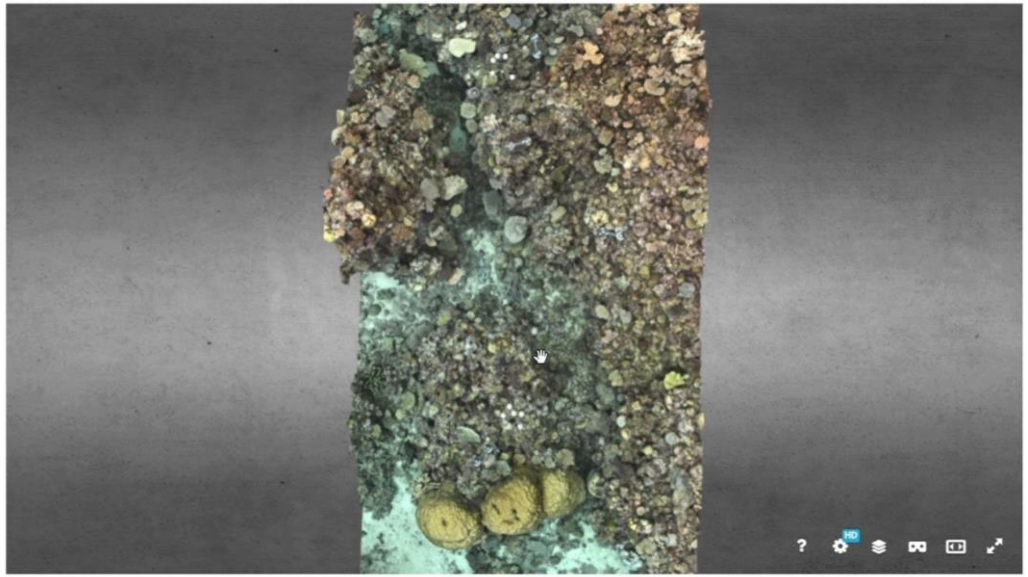
Knowledge of tropical marine ecosystems

- Long-term monitoring of coral reefs & innovation in marine observation technologies
- Forecasting climate impacts and recovery of coral reef ecosystems
- Expanding the knowledge of key species of conservation and commercial interest



Visual census, moving to image-based techniques with AI processing, sensors

Reef Monitoring – 3D mapping



AIMS - EcoRRAP 3D model - Davies Reef 2023, GBR

3D Model

IN COLLECTIONS

Davies Reef

EcoRRAP

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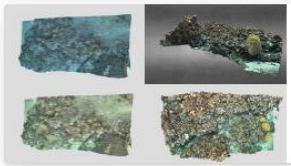


EcoRRAP

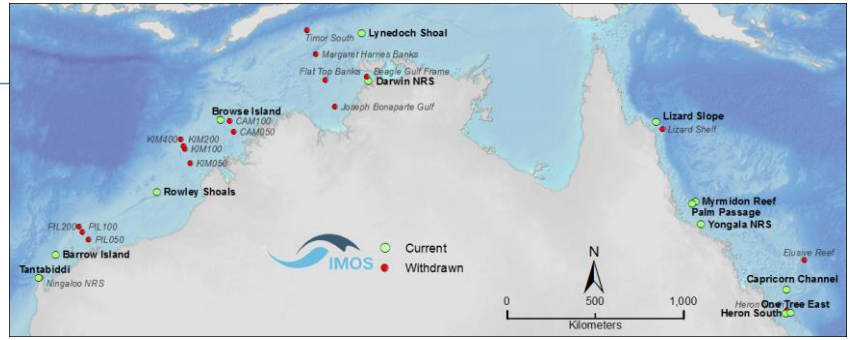
renataferrari

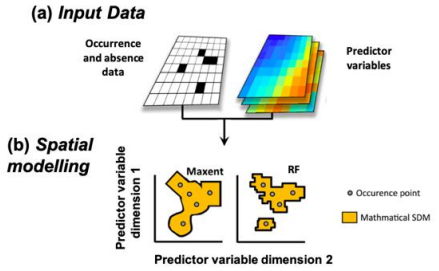
4 0

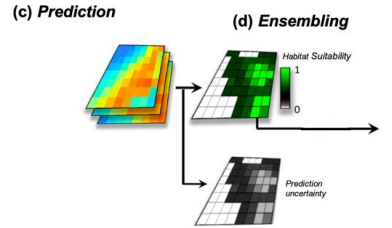
https://sketchfab.com/3d-models/aims-ecorrap-3d-model-davies-reef-2023-gbr-7b57600e681b4bb78929ca90aa4d51fb

Science for sustainable marine industries

- Integrated marine observing in Northern Australia
- Improved understanding of ocean processes and implications for ecosystem function
- Targeted regional models to support decision making
  - Pollution
  - habitat models
- Offshore industry & Decommisioning
- Science for a low carbon future
  - Mapping, quantifying and growing coastal blue carbon reserves in Northern Australia
  - Developing a Blue Carbon Economy for Coastal Communities

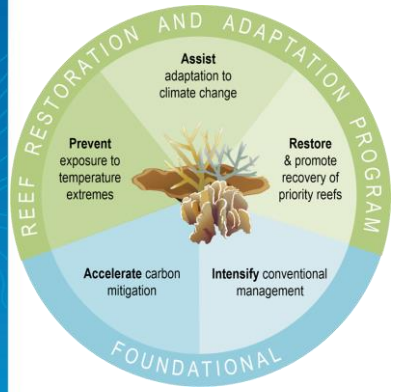


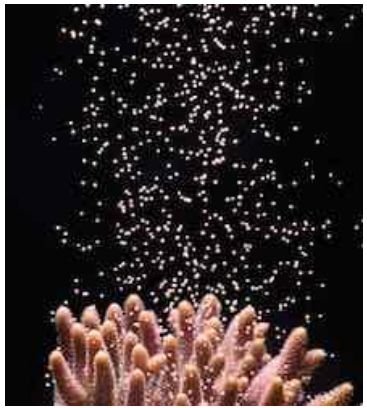


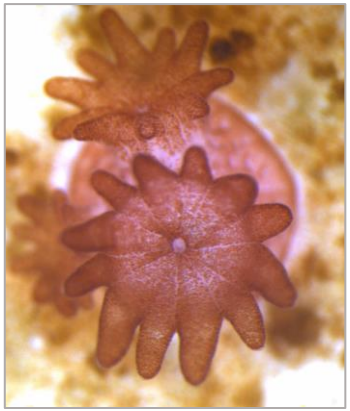


Reef Recovery, Adaption and Restoration

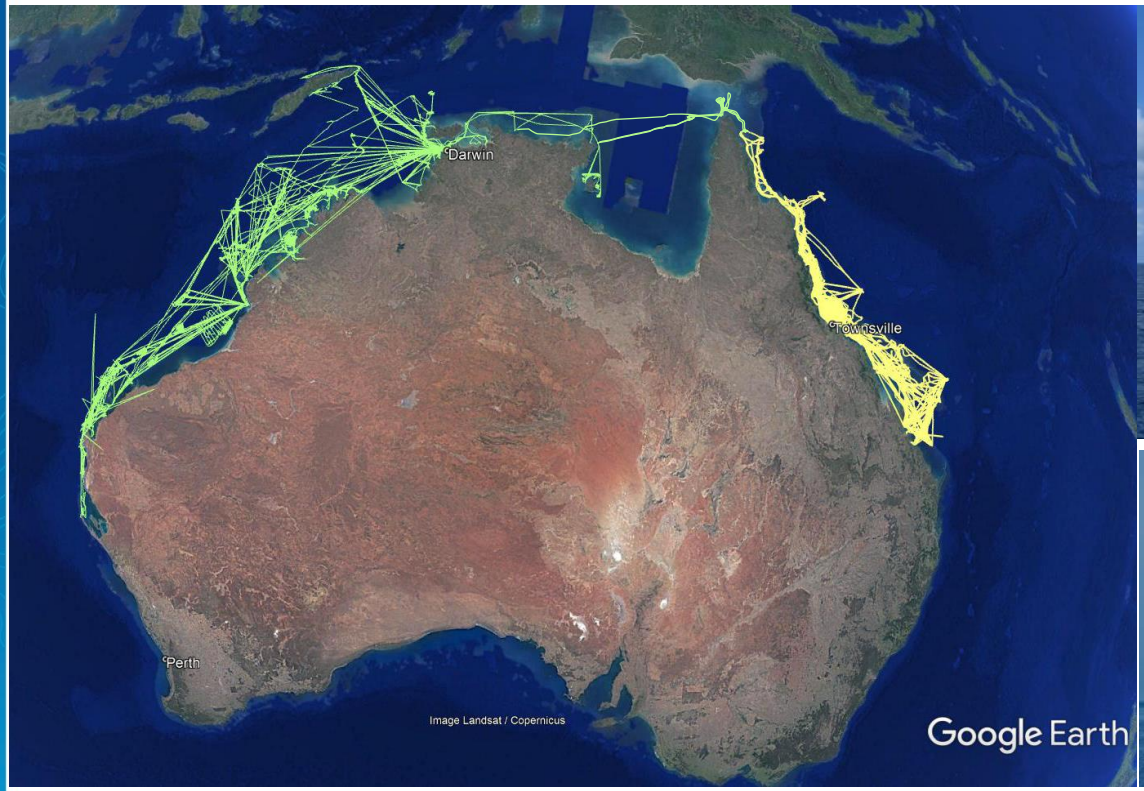
- Advancing knowledge of acclimatisation, adaptation and reproduction in corals.
- Optimising cost and scale of propagation and deployment of corals for reef restoration
- Developing microbial and hardening treatments for improving coral performance







Current Operational Context



Current Operational Context

Field Operations TROPICAL NORTHERN AUSTRALIA					
	42,400 NAUTICAL MILES STEAMED	1,675 SCIENCE FIELD DAYS INCLUDING CHARTERS	4,891 NUMBER OF DIVES	293 COLLABORATORS ON FIELD TRIPS	11,358 RESEARCHER FIELD DAYS
2022-23					
2021-22	42,760	2,537	6,327	261	10,315
2020-21	42,500	1,154	3,450	103	5,790

History of AIMS Large RV Fleet

Sirius
1970s 13.9m

Harry Messel
1973 20.7m

Lady Basten
1978 24.4 m

Cape Ferguson
2000 23.9 m

Solander
2007 34.9 m

Like most research organisations AIMS' RV's have been traditional designs (Fishing Trawlers) with scientific capability squeezed into them

- Vessel size dictated by operating costs & capital budgets
- Physical surveys, collections and sampling were primary AIMS activities

- Capability Upgrades:
  - Capability shoehorned into existing space as technology developed
  - Comply with stakeholder safety standards

Background on current Large RV Fleet

2000 - RV Cape Ferguson (20-year design life)

- 23.9M LOA, 2.5M Draft, 8 Specialised Personnel, 14d endurance, 3500nm Range
- Combined Wet + Dry lab, Dive support + A-Frame, 3 x Tenders
- Life extension to 2028 (Stern tubes, Engine & winch rebuild)

2007 – RV Solander (20-year design life)

- 34.9M LOA, 2.8M Draft, 12 Specialised Personnel, 21d Endurance, 3000nm Range
- Wet Lab, Dry Lab, Moonpool, Scientific Freezer, Dive support + A-Frame, 4 x Tenders
- Possible replacement 2032

Various additional charters – 120-200 sea days p.a (since 2020)

- Fill overflow demand and capability limitations of AIMS RVs

2021 – Scibarge (3 Year contract – Not available from Dec 23)

- *36.0M LOA, 1.4M Draft, 16 Specialised Personnel, 21d Endurance, 1000nm Range*
- *2 x containerised capability (Dry lab/ Compressor/ Science Office), Dive support, Drone Pad, 6 x Tenders*

Ageing Vessel Issues

Cape Ferguson

- Significant hull steel replacement
- Identification of detailed future work for life extension.

- **Size limits the capacity of the vessel to conduct a full range of science missions**.

- Vessel capabilities and facilities, such as IT & Comms, Laboratories and Launch & Retrieval systems require updates to facilitate AIMS science missions safely.

Current Fleet - Current Use Cases

USE CASE	CURRENT Usage			VESSEL SUITABILITY	
	Estimate Time (%)	AVG Voyage Length (# days)	AVG PAX (#)	*Solander* 	*Cape Ferguson* 
Monitoring (LTM East + West, EcoRRAP)	**40%**	**20**	**6 - 12**	**Y**	**Y** (LTMP) **N** (WA, Eco..)
Oceanography (IMOS)	**20%**	**15**	**4 - 6**	**Y**	**Y** (Qld) **N** (WA)
Habitat Definition (MBES, Towedvid, Coring, Grab surveys, BRUVS)	**15%**	**14**	**5 - 6**	**Y**	**Y** (BRUVS, TowVid) **N**
Water Quality Surveys (MMP, COTS)	**10%**	**14**	**4 - 6**	**Y**	**Y**
Organism Collections (Seasim collections, SeaSim in Box)	**10%**	**12**	**12**	**Y**	**N**
REEFWORKS (Reefworks support, Technical Transformation)	**5%**	**6**	**6**	**Y**	**Y**
RRAP *(Scaling Deployments)*		***6 - 15***	***?***	**Y**	**N**
Total	**100%**				

Cape Ferguson - Size limits the capacity of the vessel to conduct a full range of science missions.

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Future Vessel – Changing Operating Model

Greater use of Autonomous Systems – amplify monitoring effort

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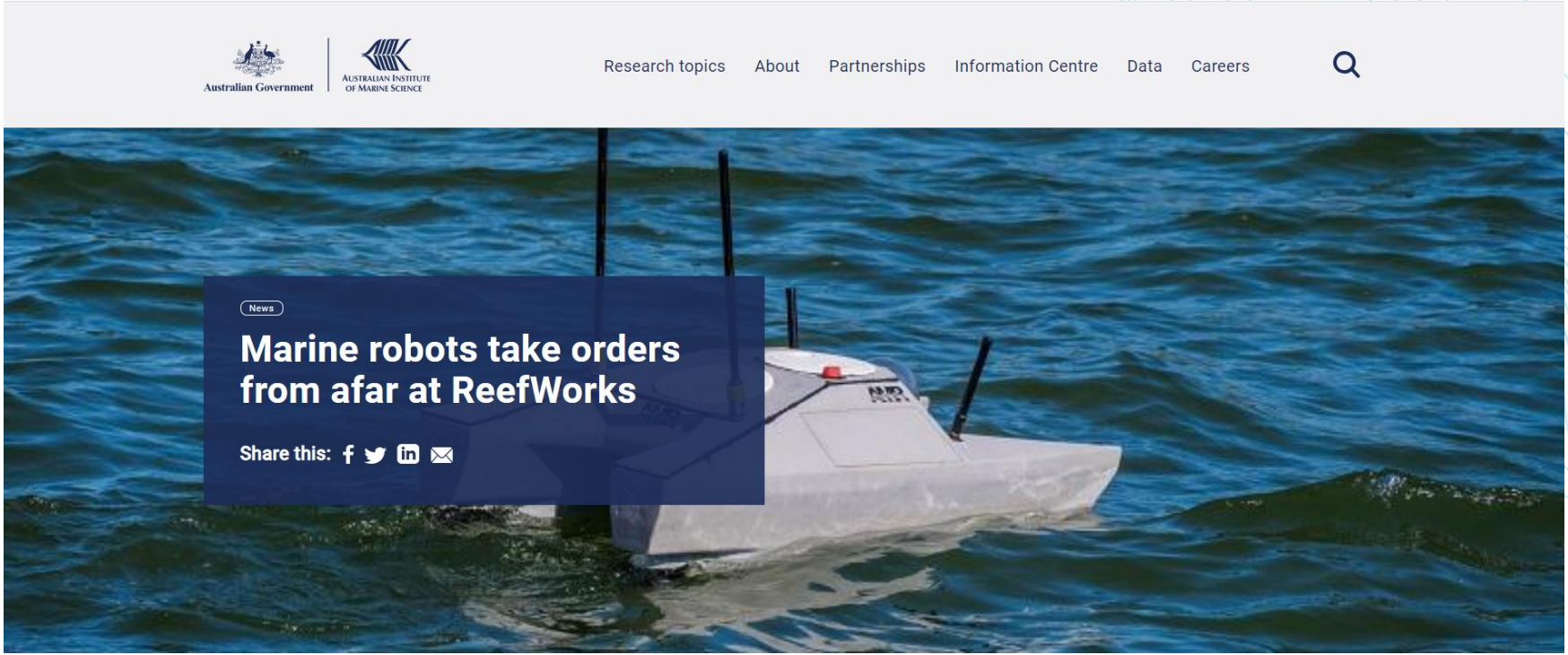
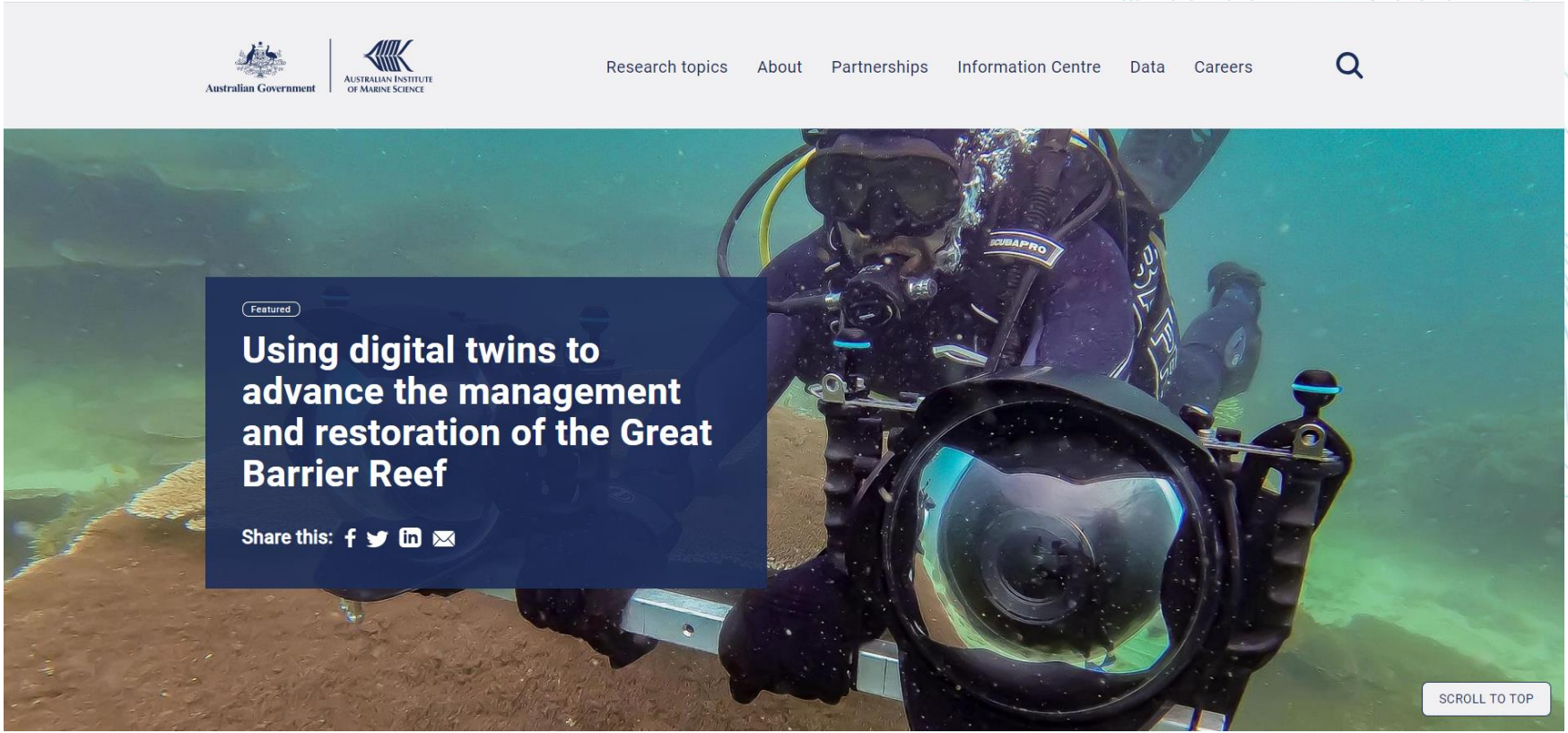


Future Vessel – Changing Operating Model

Greater use of Autonomous Systems – amplify monitoring effort



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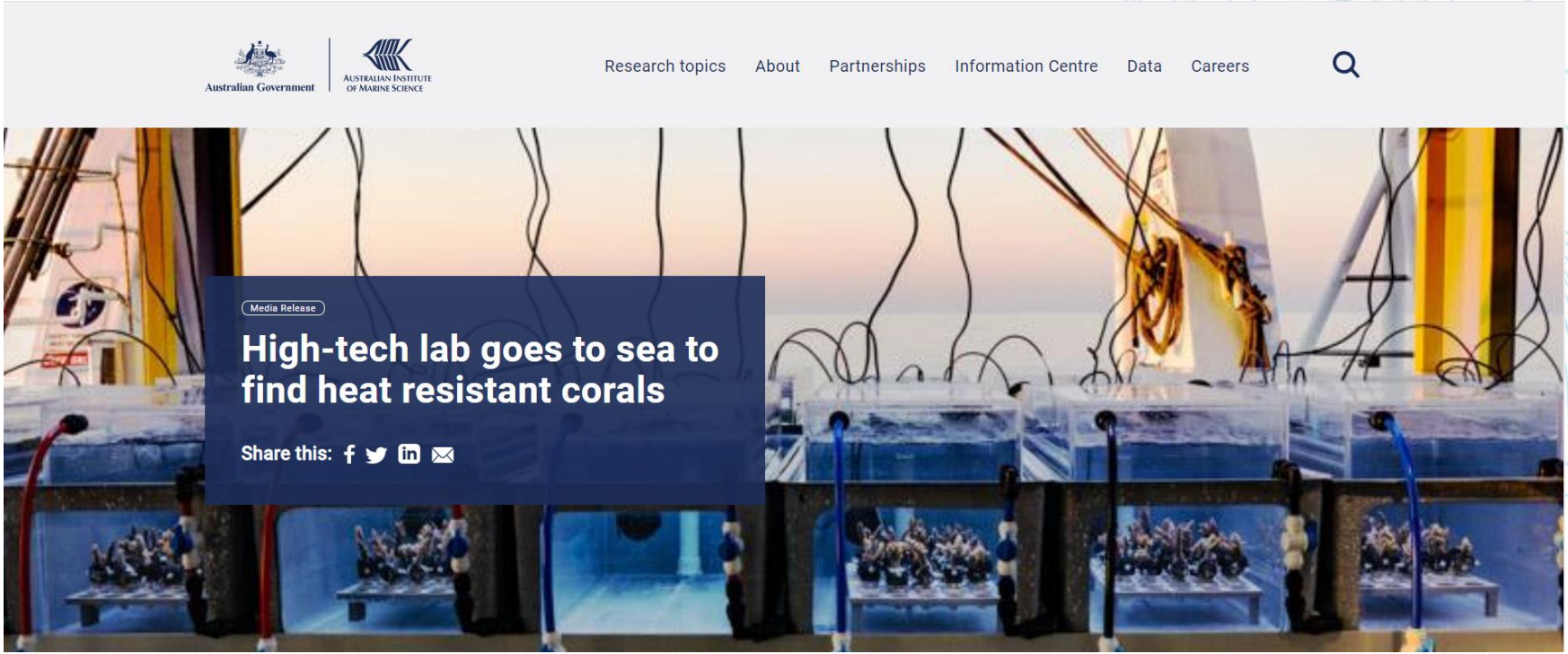
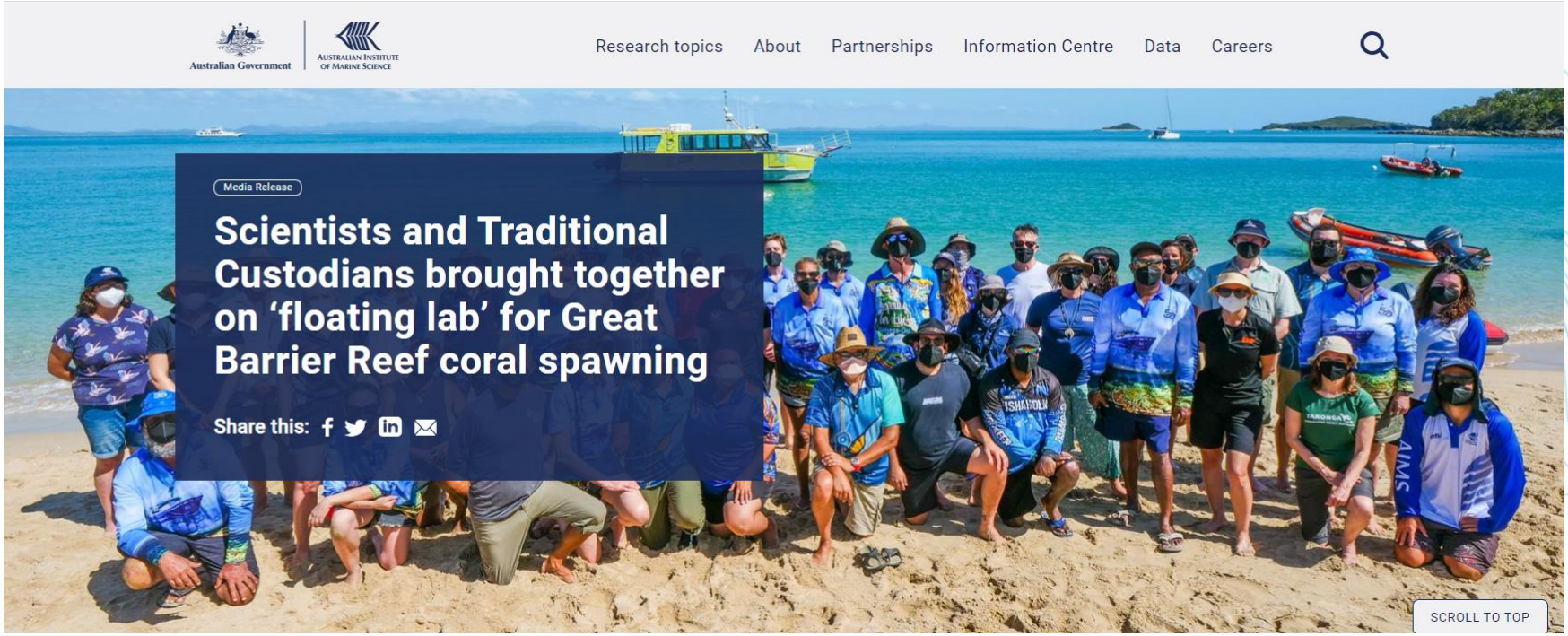
Future Vessel – Changing Operating Model

Increased demand for in-situ experimental work



Future Vessel – Changing Operating Model

Increased demand for in-situ experimental work and community engagement



Future Vessel – Changing Use Cases

USE CASE		FUTURE USE							
	Estimate Time (%)	Underway Systems Tech (#)	Autonomous Sys Tech (#)	24 hour Ops Crew (#)	Additional Technical Support (#)	Trad Owner Participation (#)	Future TOTAL Pax (Max #)	Vessel Required	Future Use Case Notes
Monitoring (LTM East + West, EcoRRAP)	**40%**	**1**	**4 - 6**	**1**	**0**	**2**	**20**	**Large (> 24m)**	Autonomous Tech to augment monitoring LTMP 2.0 - expand monitoring across Northern Australia
Oceanography (IMOS)	**20%**	**1**	**2 - 4**	**0**	**0**	**0**	**9**	**Large (> 24m)**	Autonomous Tech & underway system operation to augment mooring deployments
Habitat Definition (MBES, Towedvid, Coring, Grab surveys, BRUVS)	**15%**	**1**	**2 - 4**	**1**	**1**	**2**	**14**	**Large (> 24m)**	Autonomous Tech & underway system operation to augment habitat definition 24/7 MBES
Water Quality Surveys (MMP, COTS)	**10%**	**1**	**0**	**0**	**0**	**0**	**7**	**Medium (10 - 24m)**	*Opportunity to investigate different ways of doing field work/*
Organism Collections (Seasim collections, SeaSim in Box)	**10%**	**1**	**4 - 6**	**1**	**0**	**2**	**20**	**Large (> 24m)**	Autonomous Tech to augment monitoring possible night time operations
REEFWORKS (Reefworks support, Technical Transformation)	**5%**	**1**	**2 - 4**	**0**	**0**	**0**	**9**	**Large (> 24m)**	Operationalisation of future technologies
RRAP *(Scaling Deployments)*		***1***	***4 - 6***	***?***	***0***	***?***	***10***	***Large (> 24m)***	
Total	**100%**								

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Future Vessel – Operating Model

PRE-VOYAGE

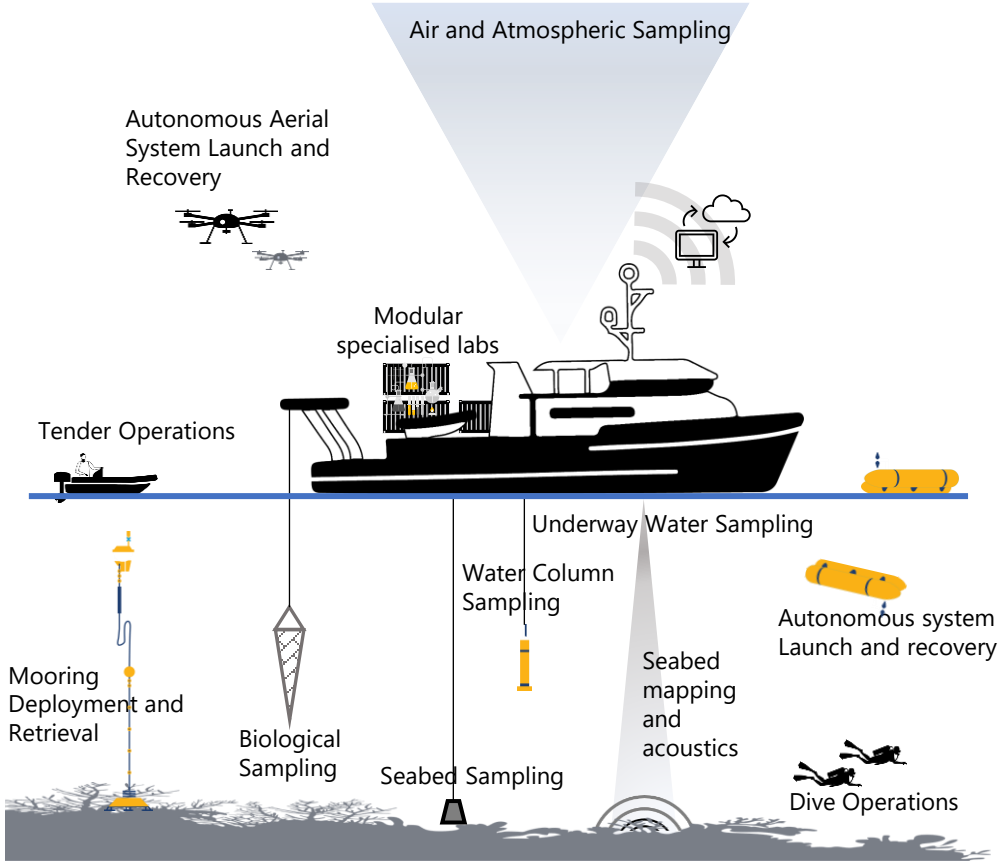
- More efficient loading through use of modular freighting

TRANSIT

- An instrumented platform, support a broad range of underway systems collecting data from a range of streams
- On board technician to assist science team

FIELD WORK

- All existing science capability
- More capable deck equipment, network and communications
- Centralised Data management and shore-connectivity
- Specialised labs/functions through modular capability
- Safer launch and recovery
- Effort augmented through autonomous systems



Future Vessel Fleet Strategy

Approval
End of life extension to 2028

Decommission from Fleet?

2000 **2023** **2028-29**

Operational Contingency

FRV Options study
staff survey
future use cases

Design
- Concept
- Detail

Design
- Detail
- Production Readiness

Production

Acceptance
Sea trials
FDS

Integration into
Fleet Operation

Future Research Vessel 1

2018-19 **2023-24** **2024-25** **2025-27** **2028 - onwards**

Construction Business Case

Yet to be funded

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2018-19 2023-24 2024-25 2025-27 2028 - onwards

Construction Business Case

Yet to be funded

Decision
End of life extension to 2032-33

2007 2026 2031-32

Future Vessel Fleet Strategy

Approval
End of life extension to 2028

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2000 2023 2028-29

Operational Contingency

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Design
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2018-19 2023-24 2024-25 2025-27 2028 - onwards

Construction Business Case

Yet to be funded

Decision
End of life extension to 2032-33

Decommission

2007 2026 2031-32

Operational Contingency

1st Pass Business Case

Lesson learned

2nd Pass

Production

Acceptance

Integration
Operation

Future Research Vessel 2

2027-28 2028-29 2030-32 2032- onwards

Yet to be funded

Future Research Vessel

Australian Government

Australian Institute of Marine Science

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