

Reef Trust Partnership



Annual Work Plan 2023-2024



Australian Government

REEF TRUST



Great Barrier
Reef Foundation

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Acronyms and Glossary

AIMS	Australian Institute of Marine Science
CAP	Community Action Plan
CAP Leaders	Community Action Plan Leaders
Co-Design Groups	Formerly referred to as Traditional Owner Technical Working Groups.
Component	A term used in the Grant Agreement to describe the six different focus areas under the Partnership: Water Quality, Crown-of-Thorns Starfish Control, Reef Restoration and Adaptation Science, Integrated Monitoring and Reporting, Traditional Owner Reef Protection and Community Reef Protection
COTS	Crown-of-thorns starfish
DMS	Data Management System
DES	Queensland Department of Environment and Science
DIN	Dissolved inorganic nitrogen
DSS	Decision support system
FS/FSS	Fine sediments/fine suspended sediments
GBR	Great Barrier Reef
The Foundation/GBRF	Great Barrier Reef Foundation
GBRMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
IMR	Integrated Monitoring and Reporting (Component of the Reef Trust Partnership)
JCU	James Cook University
LMAC	Local Marine Advisory Committee
M&E	Monitoring and Evaluation
NESP	National Environmental Science Program
NRM	Natural resource management
Partnership	Reef Trust Partnership
Partnership Activities	An overarching term for the key deliverables of the RTP portfolio, described as Activities and listed in each Annual Work Plan. Programs and projects ladder up into the Partnership Activities.
QUT	Queensland University of Technology
R&D	Research and Development
RIMREP	Reef 2050 Integrated Monitoring and Reporting Program
RRAP	Reef Restoration and Adaptation Program
RRAS	Reef Restoration and Adaptation Science
RRRC	Reef and Rainforest Research Centre
RTP	Reef Trust Partnership
SCU	Southern Cross University
TAG	(Water Quality) Technical Advisory Group
TOAG	Traditional Owner Advisory Group
TWG	Traditional Owner Technical Working Group. NB: As of the start of 2021-2022, these groups will be referred to as Co-Design Groups, working across the Traditional Owner Reef Protection Component.
UQ	The University of Queensland
WQIP	Reef 2050 Water Quality Improvement Plan

This Annual Work Plan 2023-2024 has been developed with consultation from the Reef 2050 Advisory Bodies and organisations in accordance with the approved [Investment Strategy and Annual Work Plan Consultation Plan](#). The Foundation would like to thank the Reef 2050 Independent Expert Panel, the Reef 2050 Advisory Committee, the Reef Branch of the Department of Climate Change, Energy, the Environment and Water, the Queensland Office of the Great Barrier Reef, and the Great Barrier Reef Marine Park Authority for their contributions. This plan was approved by the Great Barrier Reef Foundation Board on 23 June 2023.

*The Great Barrier Reef Foundation
extends its deepest respect and recognition
to all Traditional Owners of the Great Barrier
Reef and its Catchments, as First Nations
Peoples holding the hopes, dreams, traditions
and cultures of the Reef.*

Executive Summary

We are pleased to share the 2023-2024 Annual Work Plan under the Reef Trust Partnership (RTP or the Partnership) – a landmark collaboration between the Australian Government and the Great Barrier Reef Foundation (GBRF or the Foundation) aimed at improving the health of the Great Barrier Reef (the Reef).

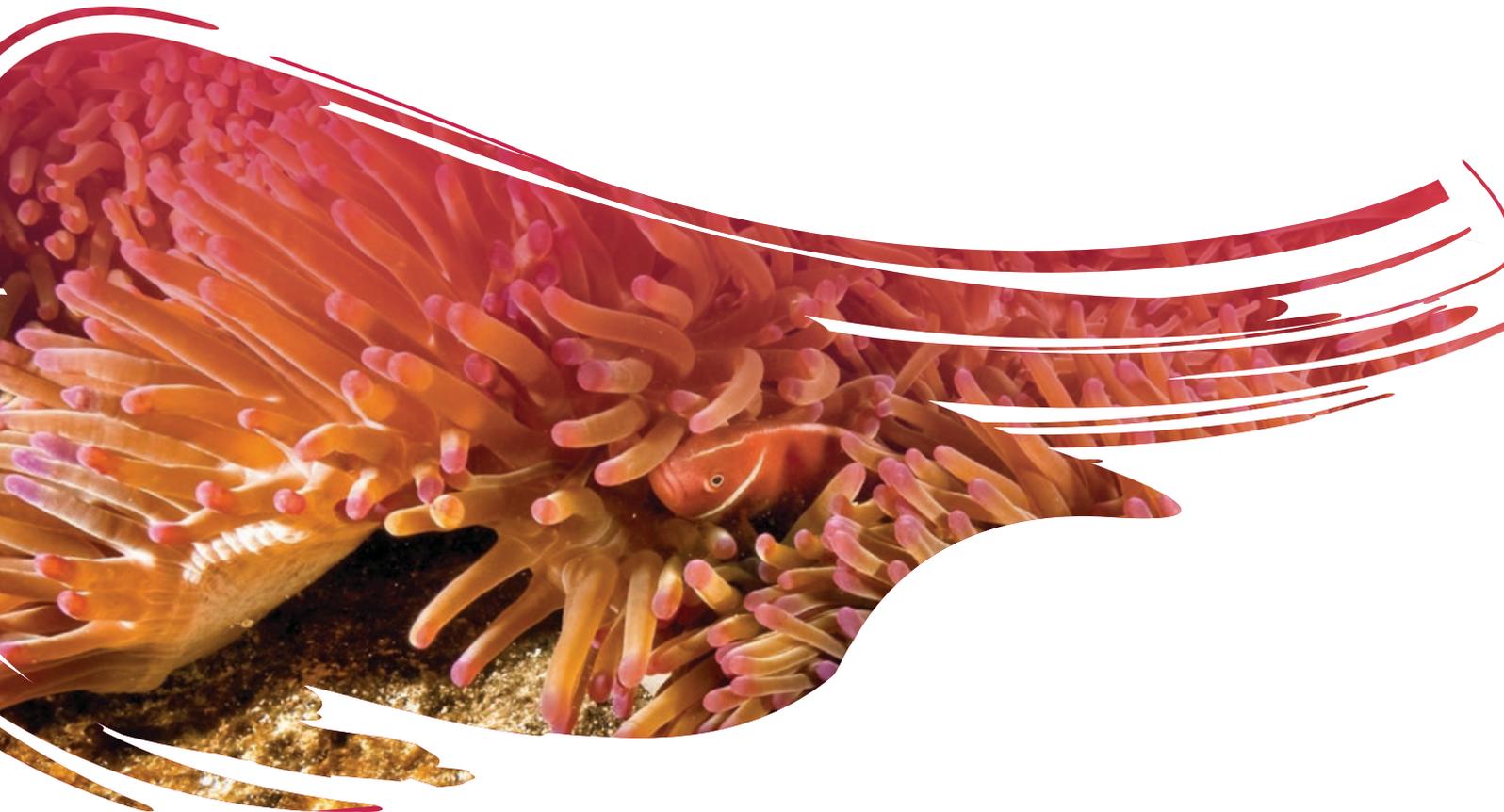
This plan outlines the investments and activities for the next twelve months across six priority Components: Water Quality, Crown-of-Thorns Starfish Control, Reef Restoration and Adaptation Science, Community Reef Protection, Traditional Owner Reef Protection, and Integrated Monitoring and Reporting. With a shared vision and a clear plan, the RTP has already delivered significant impact across each of these key Reef threat themes, clearly demonstrating what can be achieved when people are placed at the centre of reef conservation program design and delivery.

From its inception, the RTP was a strategic investment by the Commonwealth to accelerate and amplify the protection of the Great Barrier Reef. The devastating summers of 2016 and 2017, which caused widespread coral loss due to climate change and warming waters, prompted a call for bolder action to address climate change and support the health and resilience of the overall ecosystem. Over the past five years, the Foundation, together with over 500 dedicated delivery partner organisations, has embarked on an inspiring journey to protect our Reef, utilising a public-private partnership model to deliver positive outcomes.

Innovation

The Reef is widely regarded as having the most advanced and comprehensive approaches to reef protection, management and restoration. However, despite this, no coral reef nation can afford to be complacent. Innovation has been a driving force, with a quarter of the RTP investment dedicated to unlocking and piloting new products and knowledge. Key achievements in the innovation space include:

- The release of a world-first commercial insurance product to protect against losses resulting from reducing nitrogen use for sugar cane.
- A robotic sprayer solution that is reducing herbicide application on cane farms by 40% compared with traditional spraying.
- Advanced methodology for eDNA sampling, offering the earliest possible warning signs of COTS presence on a reef.
- Improved scalability of coral seeding through automation of aquaculture processes and optimisation of coral settlement devices.



Collaboration

As highlighted in previous Work Plans, the RTP has shown to be a vital proving ground in driving collaboration and collective impact. Through this delivery model, the RTP has delivered a new platform that harnesses the great work of existing players (government agencies, scientists, conservation groups) and brings valuable capabilities in from the side-lines (Industry, Traditional Owners, communities).

At the time of releasing this plan, there are 538 unique partners contracted within the RTP. Importantly, 97% of these partners are non-government. This level of coordinated participation across all aspects of the Reef effort is unprecedented and has been transformational in driving a new era of genuine partnership and strategic cooperation across the Reef.

One of the biggest success stories of the RTP is the Traditional Owner Reef Protection program which has been designed by Traditional Owners for Traditional Owners. Guided by advice from our Traditional Owner technical working groups and Traditional Owner Advisory Group the grant currently enables 79 Traditional Owner-led projects across 49 different Traditional Owner groups.

The Community Action Plans are another excellent exemplar of collaboration through the RTP. This new model of delivering community-led reef protection projects has brought community groups working in a particular place together to develop a collective vision and action plan, supported by a local coordinator. More than 400 community-based organisations, generally small and resource-constrained, are now working together across the six Reef regions.

The RTP's success as a collaboration platform is evident in the engagement survey results, where stakeholders overwhelmingly praised the Foundation's positive working relationships and trustworthiness. Moreover, the commitment to government to leverage the initial investment by securing additional funding from industry, philanthropists and other partnerships, has so far raised an additional \$280 million bringing the total value of the RTP portfolio to \$723 million.

Legacy

Looking towards the future, the RTP is committed to leaving a lasting legacy. It aims to establish sustainable finance mechanisms, build the capacity of local communities and Traditional Owners, and incorporate the lessons learned into future Reef programs, promoting accountability, transparency and governance.

As we enter the concluding year for most activities within the RTP, the focus for 2023-2024 will be on completing ongoing projects, gathering data for final impact measurements, reporting, and successfully transitioning activities to new funding mechanisms. While Water Quality and Traditional Owner Reef Protection Components have received extensions until 2025 and 2026, respectively, the majority of the RTP's work will reach its culmination over the next twelve months.

We extend our heartfelt gratitude to the partners who have been at the core of the RTP's success from the very beginning. Partnering is the cornerstone of this program, recognising that no single entity can accomplish the necessary scale of work alone. The Foundation has been honoured to work alongside delivery and funding partners. Together we have strived to build bridges, fostered collaboration, incubated new thinking and worked hand in hand with Traditional Owners.

The RTP was formed in response to a tragic period in our Reef's history. Although concerns for the Reef's future remain, the RTP stands as a testament to the resilience and determination of those involved. As we cautiously consider the coming summer and those beyond, we remain united in our commitment to protecting our precious Reef, armed with newfound strength, resources and a shared purpose.

*We may be running out of time,
but we are not running out of solutions.*

Partnership progress to date includes:

37 on-ground projects preventing **315 tonnes** of dissolved inorganic nitrogen (**69% of target**), and **144 kilotonnes of fine sediment** (**31% of target**) from entering the Reef each year.



Over **30,000 people** working on the **largest collaborative reef protection** effort of its kind.



Coral increase
More coral on the Great Barrier Reef today as a result of **effective suppression of the current COTS outbreak**.



Advancing the science and engineering towards the deployment of first generation, **thermally tolerant corals at scale by 2025**.



Reef monitoring
Filling all critical Reef monitoring gaps as identified in the RIMREP Prospectus¹.



Reef-wide data system
Enabling **more responsive and informed decision-making** through the design and development of a Reef-wide data management system for the first time.



Increasing **community engagement** and **volunteering in Reef protection** (predominantly in youth) to unprecedented levels.



Driving **greater collaboration** **across citizen science and reef management and science agencies** so data collected by the community can play a critical role.



More than **1,200 Traditional owners** involved in the delivery of **79 co-designed Reef Protection projects, spanning 49 Traditional Owner groups** – increasing Reef Traditional Owner participation in land and sea Country management.



Doubling the representation of **Traditional Owners** in Reef governance and decision-making roles.



Leveraging funding leveraging every dollar of grant funding with **over \$280m raised** to date.

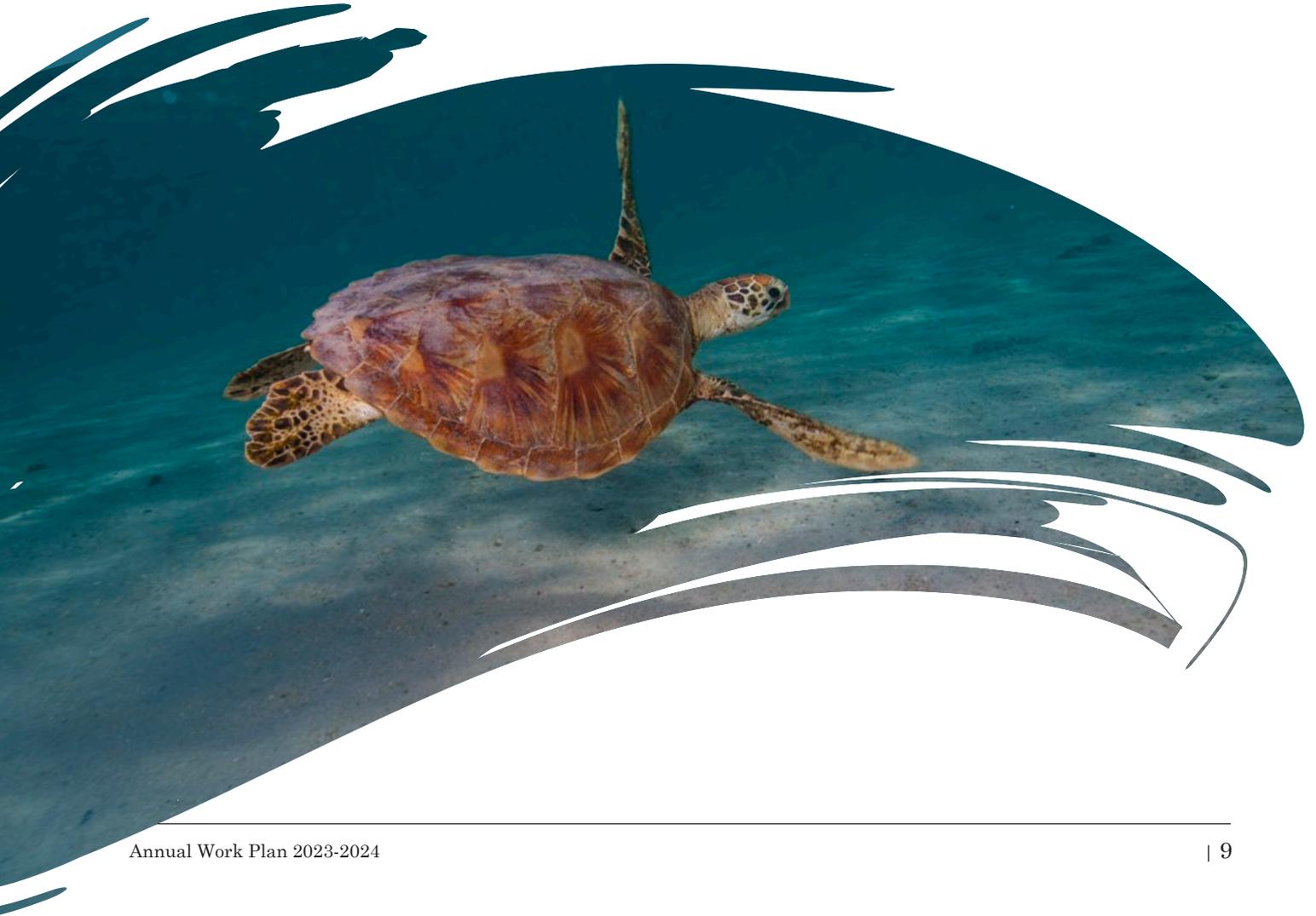
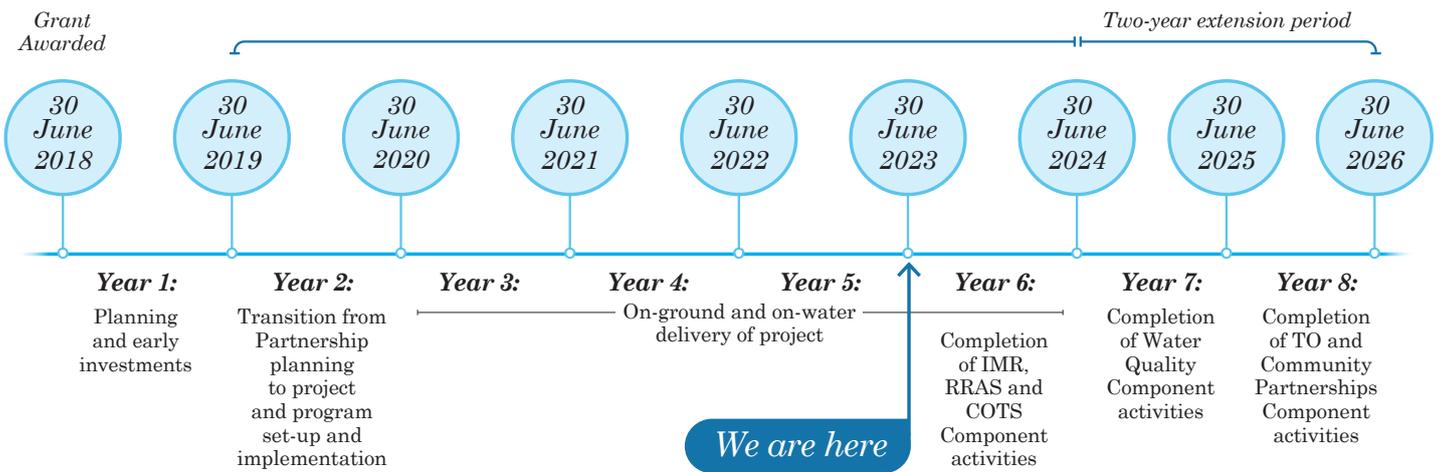


¹ Great Barrier Reef Marine Park Authority 2021, Priority Monitoring Gaps Prospectus: Reef 2050 Integrated Monitoring and Reporting Program, GBRMPA, Townsville.

Annual Work Plan 2023-2024: Summary

2023-2024 is the sixth year of the \$437.8m landmark Reef Trust Partnership. It represents the fourth year of on-ground and on-water delivery. In early 2023, the Australian Government granted a 12-month extension (to June 2025) to deliver activities under the Water Quality Component, and a 24-month extension (to June 2026) to deliver activities under the Traditional Owner and Community Reef Protection Component in recognition of ensuring the full impact of the RTP investment is realised for the Reef. As such, this will be the last Annual Work Plan that incorporates all six Components.

Reef Trust Partnership Timeline



Annual Work Plan 2023-2024 activities at a glance

Budget: \$113.65 million

Water Quality Component



Budget \$45 million

- Continued delivery of 10 regional programs.
- Final reporting on completed contracted projects including regional 'reflections workshops' to inform legacy and transition activities.
- Continued implementation of conservation and protection activities in the Eastern Cape York Water Quality Program and further development of the wetland restoration prioritisation tool.
- Continued delivery of the innovation program including assessment processes for continuation of projects into 2024-2025.

COTS Control Component



Budget: \$8.29 million

- Continued delivery of the COTS Control Innovation Program (Prediction, Detection and Response subprograms).
- Continued delivery of the COTS Control Program.
- Consultation and options development for COTS long-term funding strategy.
- COTS Forum to share knowledge and learnings across scientists, managers, Traditional Owners and community stakeholders.

Reef Restoration and Adaptation Science Component



Budget: \$34.83 million

- Continued delivery of the Reef Restoration and Adaptation Program R&D program.
- Detailed design of the next phase of R&D (post the RTP) and design of targeted deployment pilots for select interventions.
- Continued exploration and design of sustainable financing options to enable the transition from R&D to deployment on a large scale.

Community Reef Protection Component



Budget: \$3.465 million

- Continued delivery of the Community Action Plans (CAPs), Cairns-Port Douglas Reef Hub, IMR integration (stewardship monitoring project), and 'communicating stories of hope' workstreams.
- Launch of the Community Climate Action Grant Program.
- Continued delivery of the community sector leadership and development support programs.

Traditional Owner Reef Protection Component



Budget: \$11.065 million

- Continued delivery of all existing programs.
- COTS, RRAS and IMR projects supported through stage 2 grants, support for TO grants in CAP grants in Community Component.
- Design and delivery of stage 3 grants (\$5m Helping Country grants) – ending 2026.
- Design and delivery of a men's leadership program, continuation of women's leadership program implementation, continued support for youth leadership programs.
- Design of the Futures Fund sustainable funding model.
- Continued implementation of the Traditional Owner Strategic Communication Framework.

Integrated Monitoring and Reporting Component



Budget: \$11 million

- Continued delivery of Critical Monitoring projects.
- Launch of a toolbox of engagement resources/guidelines to assist science partners' engagement with Traditional Owners.
- eReefs phase 5 evaluation.
- Completion of stage 2 of the Data Management System build including integration of data use case learnings.

← Across the Portfolio →

- There will be a continued focus on building and nurturing strategic partnerships across the Portfolio.
- The RTP will continue to support system readiness for TO governance and power sharing arrangements as a number of complementary Traditional Owner Reef Protection workstreams are activated in the coming years from management partners.
- All Components will be undertaking transition planning in 2023-2024 including knowledge capture and transfer activities, formal close out of concluding programs, identifying and operationalising integration opportunities and extensive engagement with management and delivery partners.
- At a Portfolio level, there will be formal RTP transition planning and legacy capture processes occurring to ensure the momentum of impact the RTP is delivering is not lost at the end of each Component's activities.
- There will be a focus on designing the most effective and useful final format and distribution of the RTP's Evaluation and Final Report to ensure the depth of learnings are captured.



Water Quality Component

Partnership budget: \$201 million

2023-2024 budget: \$45 million

Purpose: To address water quality improvement targets impacting the Great Barrier Reef World Heritage Area through activities such as improved farming practices, reduced fertiliser usage and uptake of new technology and land management practices.

Priorities under the Partnership Investment Strategy

- Investment in on-ground actions
- Systems-level change and innovation

End-of-Partnership Outcomes

The Reef Trust Partnership's Water Quality Component will result in:

 <p>Enduring reduction in long-term end-of-catchment pollutant loads</p>	 <p>Innovative solutions for systems change in water quality improvement are available</p>	 <p>Maintenance or improvement of water quality from less disturbed catchments</p>
 <p>Increase in Traditional Owner-led water quality improvement projects and Traditional Owner involvement in non-Traditional Owner-led projects</p>	 <p>An improved approach for implementing water quality improvement programs</p>	 <p>Enduring economic drivers for improved land management or land use change are available</p>

Progress on five-year journey

The Water Quality Component is delivering a meaningful improvement in the quality of water that flows from the catchments to the Reef, supporting the sustainability of the agricultural sector and bringing innovation in the approaches applied to make change happen. The five-year strategy prioritises funding for proven, on-ground measures aimed at addressing priority pollutants: dissolved inorganic nitrogen (DIN), pesticides and fine sediment (FS). This is complemented by significant funding to drive innovation, as well as work to protect less-disturbed catchments, notably in Eastern Cape York.

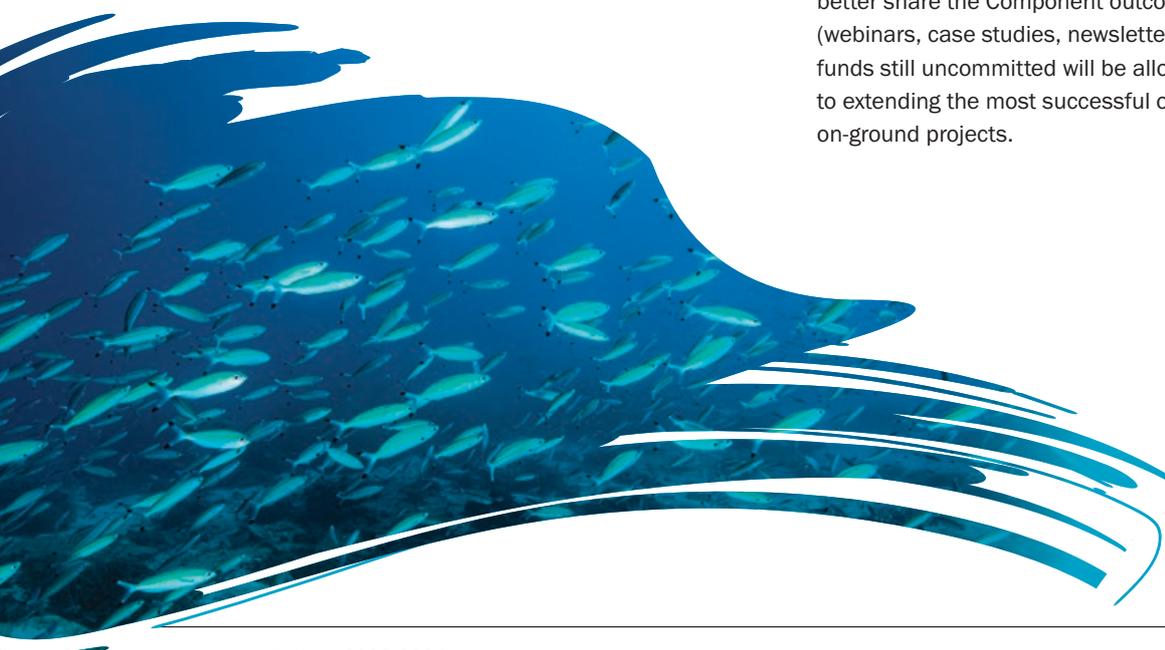
As we commence the sixth year of the program, 97% of the Component funding is committed with 24 projects completed and another 52 still underway across 28 catchments. Working together with water quality experts from more than 100 organisations and thousands of individual landholders we are:

- ✔ **On track to prevent 315.1 tonnes of DIN** and 144 kilotonnes of fine sediment per year from entering the Reef.
- ✔ **Improving land management across 942,156 hectares** in partnership with 1,689 landholders.
- ✔ **Rehabilitating landscapes** with 46 gullies and 11 streambanks restored to date.
- ✔ **Supporting new ideas to deliver stepchange in Reef water quality**, with a pipeline of innovation projects spanning technology transformation, planning and innovative financing on a path towards commercialisation, implementation, scaling or systems/policy change outcomes.
- ✔ **Working in partnership with local communities and Traditional Owners to reduce sediment loads** caused by erosion from unsealed roads, informal tracks, gullies and uncontrolled bushfires in Eastern Cape York.

The 2023-2024 period will focus on:

- **Consolidation and wrap up** of the majority of water quality projects.
- **Extending a small number of projects** that commenced later in the program to finalise their practice change activities and/or complete restoration works in an additional dry season.
- **Integrating outcomes and innovations** from the innovation program into the on-ground work across the regions.
- **Sharing lessons across programs and with key stakeholders** through regional events, targeted forums and Reflection workshops.
- **Monitoring and evaluation to track final outcomes of projects** including continuing the on-ground verification processes to better understand landholder motivations and to ensure real change is occurring in the paddock.
- **Technical Advisory Group support to strengthen the monitoring and evaluation framework**, identify additional indicators related to social and behavioural change, and develop additional methods to estimate water quality improvements.

A key task for the Water Quality Component team over the coming year will be to ensure the learnings, information, systems, methods and tools are available to guide and support future Australian and Queensland Government investments in water quality. This process will include the development of briefing papers on specific areas of work and carrying on with 'knowledge exchange sessions' where key topics are openly discussed with representatives from both the Australian and Queensland Government. It will also involve actively participating in forums and specific Working Groups or Committees (such as the Sediment Working Group for Investors) and developing communication products to better share the Component outcomes and lessons learned (webinars, case studies, newsletters etc.). The limited funds still uncommitted will be allocated, with priority given to extending the most successful of the innovation and on-ground projects.



Water Quality Regional Programs

Ten regional water quality improvement programs are underway and well advanced, with a total of 36 on-ground projects being implemented. Regional program managers and partnership coordinators (where applicable) are in place for the larger programs to oversee and coordinate local actions and actors.

A procurement process was completed in August 2022 to extend existing projects within the Regional Programs.

Almost \$6m (comprised of contingency funds) were made available to expand the scope of works of existing contracted providers, with assessment criteria focused on performance and cost-effectiveness. Twenty projects were extended to either undertake additional on-ground water quality improvement activities with a focus on reducing DIN (6), pesticide (1) and sediment (3), or to fund activities that would allow the outcomes from existing projects and/or the program objectives to be shared, expanded, strengthened, or made more enduring (10).

Table 1: RTP Water Quality targets by Regional Program

Regional program	Constituent	RTP target	Progress to RTP target	% of progress to RTP target	Program manager	Partnership coordinator	Number of on-ground projects
Bowen, Broken, Bogie (BBB)	Fine Sediment	330kt	84.5kt	25.6%	NQ Dry Tropics (Regional manager to plan and implement the delivery of the BBB program)		3
Fitzroy	Fine Sediment	50kt	37.2kt	74.4%	GBRF	Fitzroy Basin Association	5
Lower Burdekin	Dissolved Inorganic Nitrogen	48t	45.9t	95.6%	NQ Dry Tropics		5
	Pesticides	576,809 Risk Units (RU)	899,332 RU	156%			
Lower Herbert	Dissolved Inorganic Nitrogen	140t	168.8t	120%	GBRF	Herbert River District Cane Growers Organisation Ltd	6
Mackay-Whitsunday	Dissolved Inorganic Nitrogen	26t	42.2t	73%	GBRF	Reef Catchments	9
	Pesticides	2,960,100 RU	2,161,024 RU	73%			
Mary	Fine Sediment	28kt	13.4kt	47.9%	None appointed, but the Burnett Mary Regional Group and the Mary River Catchment Coordinating Committee perform the Program Manager and Partnership Coordinator equivalent roles, respectively		1
Mulgrave-Russell	Dissolved Inorganic Nitrogen	72t	4.6t	6.4%	The Reef and Rainforest Research Centre	Canegrowers Cairns Region Ltd	2
Upper and East Burdekin	Fine Sediment	44kt	20.7kt	47%	N/A	N/A	1
Upper Herbert	Fine Sediment	12kt	3.3kt	27.5%	N/A	N/A	1
Tully and Johnstone	Dissolved Inorganic Nitrogen	170kt	49.7t	29.2%	Terrain NRM		3



The Water Quality Regional Programs delivered under the RTP are unprecedented in their scale – both in terms of the number of projects (36), and the size of the investment (\$138m to spend in a six-year window inclusive of program design). This, combined with the cumulative impacts of COVID-19, consistent extreme weather events and capacity challenges in regional Queensland, has resulted in the slippage of some of the regional programs to a point where some of them are unlikely to achieve their expected end of program milestones. In addition, some of the initial assumptions within the investment tool used to inform our cost-effectiveness model are no longer valid, either because the data available at the time of planning has been demonstrated to be inaccurate, or because externalities have had greater impact than anticipated. This means that the targets we set using this data will not be met in all cases, particularly relating to fine sediment.

A range of novel approaches and systems continue being implemented to improve the delivery of the Regional Programs:

Monitoring and evaluation (M&E) systems, including the capture of farm-level M&E data. The Water Quality Component M&E systems are driving accountability, transparency and resource efficiencies within the water quality landscape. The M&E data collection infrastructure (the Foundation’s database system) continues to support the reporting of farm-level data by delivery providers. Similarly, the visualisation tools developed and made available to project managers and delivery providers continue to provide them with the tools to manage the program closely, adaptively manage and identify opportunities for synergies. Dashboards are also available to the public through the Foundation’s website. The establishment of the internal data collection system and the availability of the information through the dashboards is a first in this field. A priority for 2023-2024 for the RTP will be to look for opportunities to communicate to future investors the value of visibility that these systems offer, and to transfer the knowledge of how to implement such systems in future water quality improvement programs.

Governance arrangements that more clearly identify responsibilities between program partners. These arrangements have also improved accountability and supported adaptive management where particular partners are underperforming.

Building on both the governance and M&E systems, the program is implementing processes to track progress towards targets, including the process for verifying on-ground outcomes through site visits to ensure that land use practices are being correctly reported, and stop/go points for projects that are not meeting cost-effectiveness requirements.

The 2023-2024 period will see all 10 regional programs under full implementation with at least half of the programs expected to complete all project activities by the end of June 2024, and the other half potentially continuing for a further 6-12 months. Annual reviews will continue, as well as site visits to verify on-ground interventions. These activities will support managers to assess progress and will be key to guide adaptive management actions when needed. An internal assessment process focused on project performance will be conducted in July/August 2023. Through this process, most of the Component remaining funds will be allocated to extend the scope of successful on-ground projects.

A series of consultancies to address the data and monitoring gaps identified during the analysis undertaken by the TAG are well underway. These consultancies are supporting regional programs by:

- **Developing additional lines of evidence** for providing greater confidence in the water quality improvements delivered by on-ground projects. An alternate method to evaluate property scale investment for improving Grazing Land Management practices on grazing lands has been completed. This will be followed by the development of other methods, such as an additional line of evidence to estimate the water quality improvements associated with mill-mud application practices, and another one to estimate DIN savings associated with improved irrigation practices.
- **Providing technical support across all DIN and pesticides focused projects** that involve water quality monitoring. After an in-person, cross-regional workshop, a set of recommendations was shared and discussed with all relevant delivery providers to improve aspects around the design, equipment selection, sampling methods, analysis and approach to communicating results. Next steps will focus on supporting communication aspects and developing specific ‘knowledge narratives’ on approach and water quality outcomes of each project.

- ➔ **Building an understanding of the social context and measuring the social changes** occurring through the regional programs. A characterisation of sugarcane landholders has been completed, identifying sugarcane farmer profiles in the Reef regions, and providing strategies to engage with each profile in the most effective way. Next year this consultancy will be focused on collecting the corresponding data and implementing the monitoring methods developed to evaluate the social change of the Water Quality program. The evaluation findings will represent a legacy piece that will help guide future programs.
- ➔ **Implementing a behavioural change program** tailored to the particular mix of social factors of the landholder population in the Mackay-Whitsunday regional program.

The TAG will also continue playing a key role in reviewing designs for major gully and streambank interventions and will support project reviews.

Innovation and system change

The Partnership continues delivering an innovation and system change program, aiming to produce transformational change in the way water quality improvement activities are designed, funded and implemented. A total of 22 projects were contracted in 2020-2021 under the three workstreams described below. Nine of these projects have now been completed, with most of the outstanding projects expected to be finalised in 2023-2024.

- ➔ **Technology transformation** – Ongoing implementation of eight projects trialling a range of tools and approaches for reducing priority pollutants.
- ➔ **Broad and local-scale planning to support future interventions** – Two projects are still underway to support the prioritisation of future strategic investments, to assess the suitability of different interventions, and to guide the identification and implementation of specific on-ground activities.
- ➔ **Innovative finance and funding** – Ongoing implementation of three projects aimed at increasing the potential sources of funding for water quality improvement activities.

Innovation projects have progressed well with most extended projects demonstrating promising technologies (AutoWeed – robotics and AI to reduce pesticide application; Farmacist – banana yield monitoring system; JCU – irrigation rapid visualisation tool), better planning approaches (Griffith University – unlocking data to improve erosion sites prioritisation), and tangible financial solutions (CSIRO – Nitrogen Risk Insurance; TNC-Kilter Rural – Natural Capital Investment Fund) in support of water quality improvement across Reef catchments. These projects have progressed, or are progressing well, towards a commercialisation, implementation and/or spatial scaling outcome. Depending on budget availability and critical timeframe requirements, several of these projects could be extended beyond June 2024.

Work under the *Sharing and management of industry and landholder-owned data* thematic area has progressed with the engagement of independent consultants to support the planning process on several fronts: (i) understanding the commonalities and needs of the local data platforms; (ii) identifying a governance framework; and (iii) developing a strategy that becomes indispensable for the industry and delivers impact/business value in the future. A two-page strategy along with a proposed solution ‘*an open-source data product to improve system efficiencies in the sourcing and creation of accurate farm maps (cane block layers and soil maps)*’ has been completed. The proposed solution was widely validated with key delivery providers and parties; however, this process did not determine a clear project for the RTP to invest in. An expert consultant has recently been engaged to develop an options paper to inform the potential next steps for this innovation theme.

Successes under the Innovation workstream have been promoted via different communication channels including webinars, videos, stories and the Water Quality Synthesis Workshop. A final paper and/or communication product to share the findings of the Innovation program and identify what is next for new approaches for the Reef space will be progressed during the 2023-2024 period.

Protection and conservation of less-disturbed catchments

In 2022-2023, the Foundation made significant progress on its two substantive initiatives:

- ➔ Water quality management program in the southern catchment areas in Eastern Cape York
- ➔ Development of new modelling tools to assist the prioritisation of wetland restoration or construction for the purpose of maximising nutrient removal.

Implementation of each of these initiatives will continue in 2023-2024.

East Cape York Water Quality Program (ECY WQP)

This Program is coordinated by the Cape York Water Partnership Inc. and delivered by four local, community-based organisations: South Cape York Catchments, South Endeavour Trust, Cape York Water Partnership and Yuku Baja Muliku Traditional Owner Corporation. The Program Steering Committee met regularly during 2022-2023 and will continue bi-monthly meetings in 2023-2024.

Seven catchment management projects commenced implementation of substantive on-ground workplans in July 2022. This has reduced erosion and sediment runoff to the Reef from roads, tracks and gullies, and hot, uncontrolled, late season fires. Annual work plans for 2023-2024 have been developed for each of the seven projects and endorsed by the Foundation.

Work under the ECY WQP is expected to be extended for an additional 12 months with an end in June 2025. This time extension will allow full completion of projected activities, maximise program-wide outcomes, and consolidate the work that partner organisations have successfully been delivering under the current governance model. In March 2023, an internal process was initiated with the support of Cape York Water Partnership to release \$250,000 of contingency budget kept under this program. Through this Expression of Interest based on a specific selection criterion, the RTP will expand the existing projects that can demonstrate additional value from either receiving extra funds and/or a time extension.

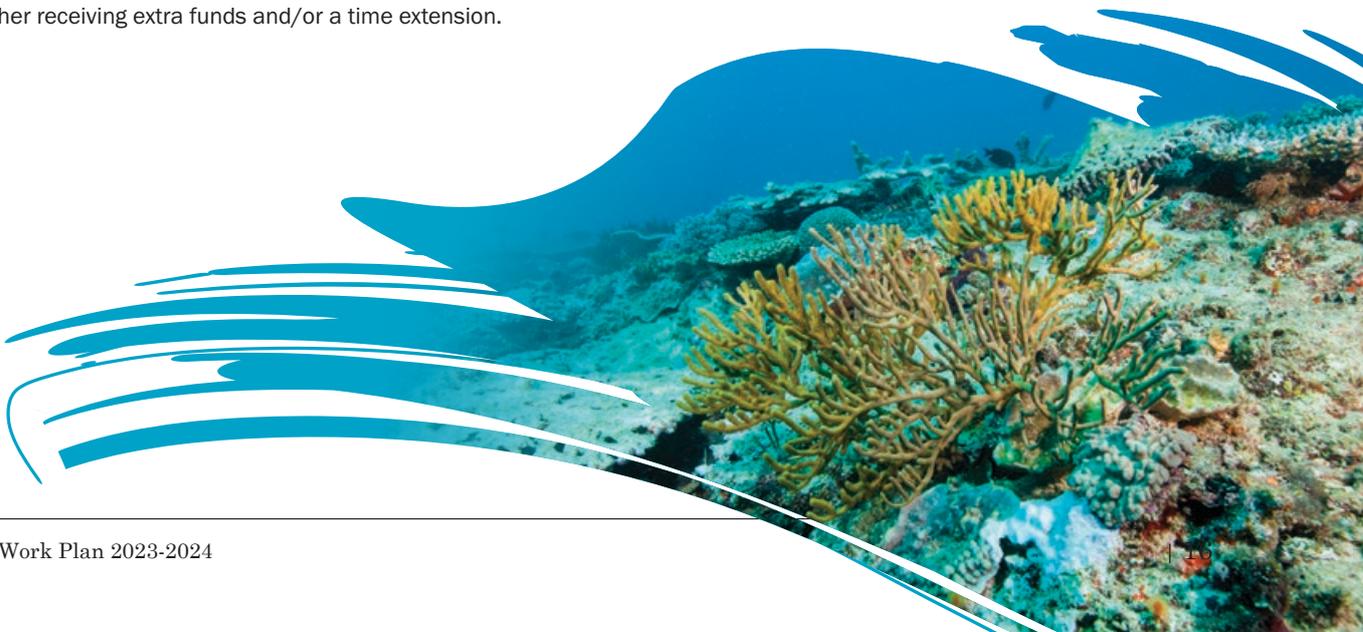
Cultural connectivity and engagement are central to this program. In the 2022-2023 period, the ECY WQP provided significant employment opportunities for over 70 Traditional Owners from 13 Traditional Owner organisations. Across the projects, this has occurred through employment by project teams or construction contractors, and fee-for-service engagements of Traditional Owners engaged in a variety of on-ground surveys, fire management and monitoring activities. In 2023-2024, this process of engagement and employment of Traditional Owners will continue and expand.

Water quality and ecosystem monitoring activities expanded geographically with ambient monitoring being implemented for the first time at five remote river locations. A Water Quality Monitoring Plan was developed and reviewed by the Program Steering Committee, outlining the monitoring objectives and methodology, accounting for both scientific and Traditional Owner values. This plan will continue to be implemented in 2023-2024, compiling for the first time a systematic review of water quality and ecosystem health in this region of Eastern Cape York.

Wetland Restoration Prioritisation

Prioritisation of wetland restoration and/or construction requires good monitoring data and predictive modelling capability. In 2022-2023, the Foundation commenced a project to define information and knowledge gaps associated with the role of wetlands in nutrient removal from GBR catchments. In 2023-2024, this detailed analysis will be integrated into the updated Scientific Consensus Statement.

Additionally, in 2023-2024 the RTP team will continue to collaborate with the Queensland Department of Environment and Science (DES) to develop updated or new modelling tools to enable investors and governments to have greater confidence in what nitrogen reductions can be achieved by constructed or natural wetlands under various hydrologic conditions. This work will fill an important knowledge gap and ensure greater consistency in measurable outcomes across the GBR catchments.



Case Studies

Testing a world-first Nitrogen Risk Insurance Product in support of water quality improvement

The production of sugarcane in Australia relies on the application of large amounts of nitrogen fertiliser. In particular, the discharged dissolved inorganic nitrogen (DIN) from sugarcane farms poses a major threat to coastal ecosystems and the GBR. The runoff of DIN from sugarcane farms is related to the application of nitrogen fertiliser in excess of the amount taken up by crops.

To minimise the risk of crop growth and yield being limited by nitrogen availability in a favourable season, growers often apply more nitrogen than necessary. With this common approach to farming, the primary practice change pursued by the government's water quality investment is for farmers to reduce the rate of nitrogen fertiliser applied.

While there are regulatory and financial motivations for sugarcane growers to adopt this practice, with Reef protection regulation in place and fertiliser costs rapidly increasing, the risk of productivity shortfall is still a constant concern.

The Nitrogen Risk Insurance is a world-first commercial product that helps farmers manage the risk of reduced yields from reduced nitrogen fertiliser application.

Claims are triggered by Bureau of Meteorology weather measurements, with payments being automated in response to the effect of such measurements on crops' nitrogen fertiliser requirements. Farmers can tailor policies to crop start time, location and soil type. They can also insure one, some or all their blocks, providing flexibility and control over the investment decision.

Wide uptake of a successful insurance product could result in a DIN discharge reduction of around 1,000 tonnes per year, translating to a 9% reduction of the total DIN discharged to the GBR. The cost of the insurance to the farmer is offset by the saving in fertiliser costs. Achieving such extraordinary and self-sustaining outcomes would generate a threefold benefit, allowing some public funds to be repurposed, improving water quality for the Reef, and ensuring the risk of reduced yield is protected while sugarcane farmers save money on fertiliser usage.



Cane heading to the Tully Mill. Image credit: Larelle McMillan, CSIRO.

Case Studies

Innovations in agricultural irrigation

Irrigated agriculture in the Burdekin region of northern Queensland is a key driver of water quality risk, due to the region’s relatively dry climate and strong reliance on irrigation. The prevalence of irrigation and reduced reliance on rainfall for cane farms offers a unique opportunity to implement change that can significantly improve water use and water quality while reducing runoff. Challenges for agriculture in the region include high costs of water and energy, outdated farming infrastructure, and barriers that limit farmer adoption of equipment upgrades. Innovative technology can help farmers overcome these challenges.

The RTP is investing \$20 million in the Lower Burdekin region towards projects that help prevent 48 tonnes of DIN and 35kg pesticides from flowing to the GBR each year. This is being achieved through a suite of integrated projects targeting sugarcane farming, including \$6.9 million for the Burdekin Irrigation Project (BIP). The BIP supports sugarcane farmers’ transition to more efficient, automated irrigation systems and practices. This saves farmers time and money, while improving cane productivity. Importantly, these actions reduce farm runoff and associated pollutants, helping to improve water quality.

Since its commencement in 2020, the BIP has engaged with 60 sugarcane farmers across 7,000 hectares in the Burdekin region, with the project expected to prevent 19.9 tonnes DIN from flowing to the Great Barrier Reef (the Reef). Feedback from our delivery partners is that participation has exceeded what was expected. “We have never witnessed such high demand for innovative water efficient solutions. Interest has been high, and attrition has been low. It’s early days, but we are seeing a 20-30% reduction of water use, which translates into reduced energy and water costs for farmers and improvements to downstream waterways.

Farmers’ appetite for advanced technology has outstripped the original project plan; we are on the cusp of transformational change in the Burdekin,” says Terry Granshaw of Sugar Research Australia.

Another key investment closely connected to the BIP is the Irrigation Rapid Assessment Tool (i-RAT) web application. The i-RAT is funded under the RTP Water Quality Innovation and Systems Change Program, and promotes widespread adoption of a scientifically defensible, practical and superior irrigation solutions for sugarcane farmers in GBR catchments. This tool is helping farmers compare irrigation scenarios to understand how they can lower operating costs, increase profitability and yield, and subsequently reduce runoff and improve water quality.

The RTP Water Quality Program investment is accelerating positive change for the Reef by breaking down barriers for agricultural innovation and transforming how farmers sustainably manage water resources and reduce pollution in GBR catchments. Impacts from these projects are real and meaningful, with their success leading to a million dollar corporate partnership with Lion Corporate. This new investment builds on the successes of RTP irrigation projects, expanding the technology to new farms and new commodities in the Burdekin region, past the end of the RTP to 2025.

“

This project will mean that we’ve got the equipment to know when the crop needs to be watered. Together, we’ll improve waterways from farm, to river, to the GBR.

Burdekin farmer Tiffany Hunt (pictured)

”



Farmers Tiffany Hunt and James Ware from the irrigation project funded through the Foundation’s partnership with Lion Corporate. Image credit: emvillphotography.

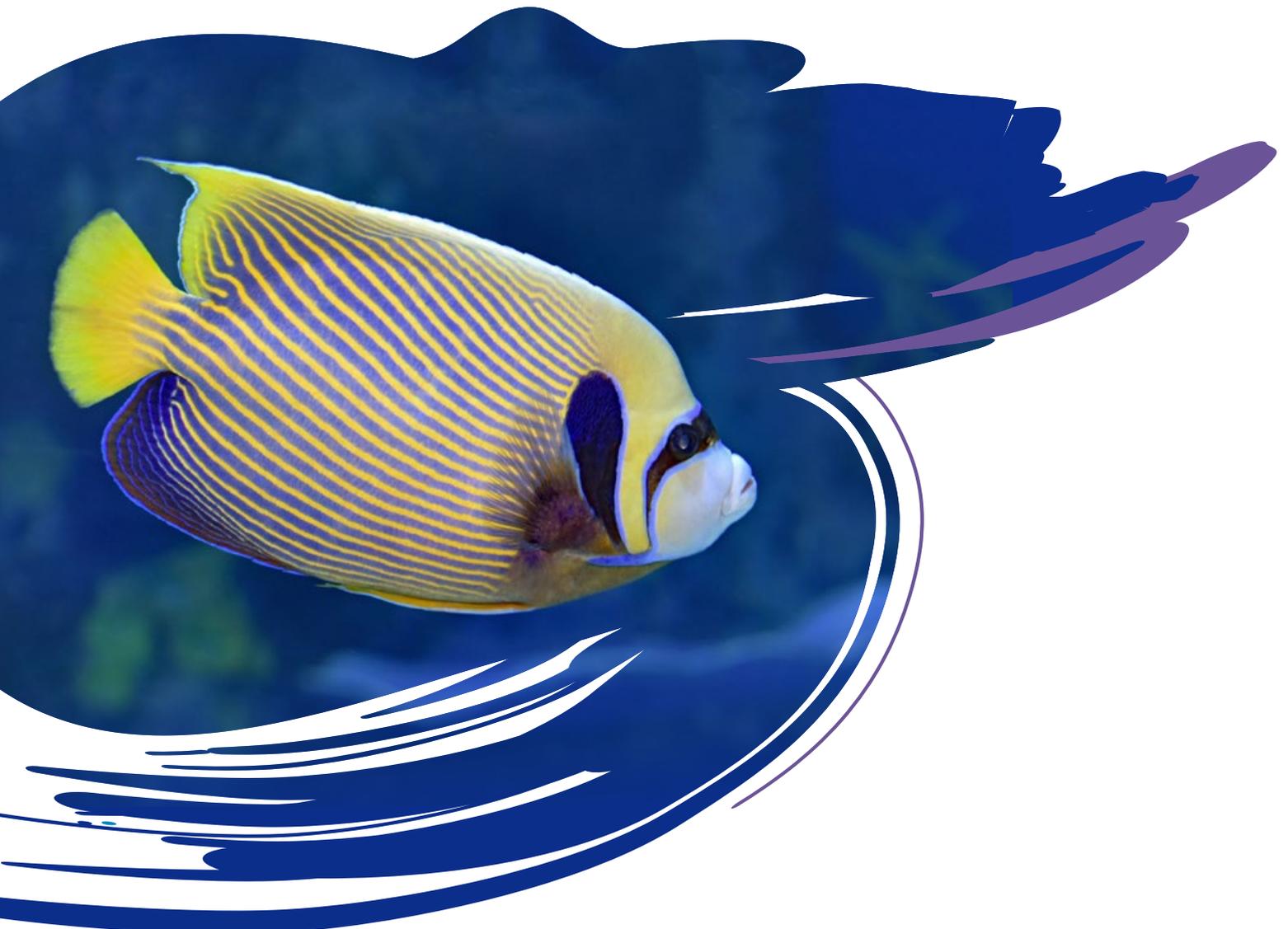
Water Quality Five-Year Plan

Major categories of activity, rationale and budget for the five-year period are shown in Table 2 for reference.

Table 2: Water Quality Component Partnership activities and budget

Partnership Activity	Rationale	Outcome	Budget
● Early investment activities	A need was identified to address existing delivery capacity constraints for on-ground activities, as well as mitigate the risk of losing current extension and delivery staff during the program development phase.	Maintain/build on-ground capacity across moderate, high and very high priority catchments to support program implementation, while also reducing pollutant run-off.	\$19.1m
● Regionally-focused on-ground actions	Limited funding relative to the total cost of achieving the WQIP objectives requires a strategic and targeted approach to addressing the highest priority pollutants in the highest priority catchments. There is now significant experience in implementing water quality improvement activities, although a more targeted approach is required that adopts the most cost-effective actions, improves upon them, and extends adoption. Investments in specific catchments have been determined by a detailed technical assessment, supported by a decision-making process that considered a range of value drivers and objectives.	Reduce dissolved inorganic nitrogen (DIN) runoff in the Wet Tropics (Johnstone, Tully, Mulgrave Russell, Herbert), Burdekin (Lower Burdekin/Haughton), and Mackay-Whitsunday (Plane Creek) regions, primarily via practice change related to fertiliser and irrigation management in the sugarcane industry.	\$62.9m
		Reduce anthropogenic fine sediment (FS) runoff from the Burdekin (Bowen Bogie, Upper and East Burdekin), Wet Tropics (Herbert River), Fitzroy (Lower Fitzroy and Mackenzie), and Burnett Mary (Mary River) raavnks and improved management of grazing lands.	\$62.3m
		Reduce pesticide runoff in Burdekin (Lower Burdekin/Haughton), and Mackay-Whitsunday (Plane Creek and Pioneer River) regions, including through practice change, particularly in the sugarcane industry.	\$7.7m
● Conservation and protection of less disturbed catchments	This mitigates the risk of degradation of less disturbed catchments and relies on the expectation that prevention and early intervention are more cost-effective than repair.	Avoid degradation of the quality of water entering the Reef, particularly from less-disturbed catchments, and contribution to land stewardship objectives. Better understanding of role of wetlands in mitigating pollutant runoff.	\$10.1m
● Traditional Owner-led Reef protection initiatives	Protect and maintain culture and heritage values for water sources (including cultural flows). Diversification of skillsets/capacity building – improved inclusion. This budget figure is also accounted for in Traditional Owner Reef Protection.	Direct investment in Traditional Owner Country-based planning and management for improved water quality outcomes; improved capacity and opportunity for Traditional Owner enterprises to become engaged in water quality programs; cultural value recognised in protection and improvement efforts.	\$20m

Partnership Activity	Rationale	Outcome	Budget
<p>● Innovation and system change</p>	<p>There is a need for a transformational change in how water quality improvement activities are designed, funded, and implemented to support enduring and self-sustaining improvements at sufficient scale.</p>	<p>New systems, technologies, and financing options available to support water quality improvement activities and achieve enduring impact.</p>	<p>\$14m</p>
<p>● Technical advisory</p>	<p>Technical expertise is required to guide program design and implementation, to ensure the quality of on ground actions, to manage project data, and to validate outcomes. There are also opportunities to leverage project activities to maximise scientific learning.</p>	<p>Programs and projects are designed/endorsed based on best available technical advice. Purpose-build GIS database is available to collate and allow for analysis of project data. Programs contribute to improved scientific understanding of Reef water quality issues and responses. Alluvium Consulting develops a quantitative assessment of the most cost-effective catchment management actions in priority catchments and associated investment scenarios to guide decision-making for program investment.</p>	<p>\$4m</p>
<p>TOTAL WATER QUALITY COMPONENT BUDGET</p>			<p>\$200m</p>



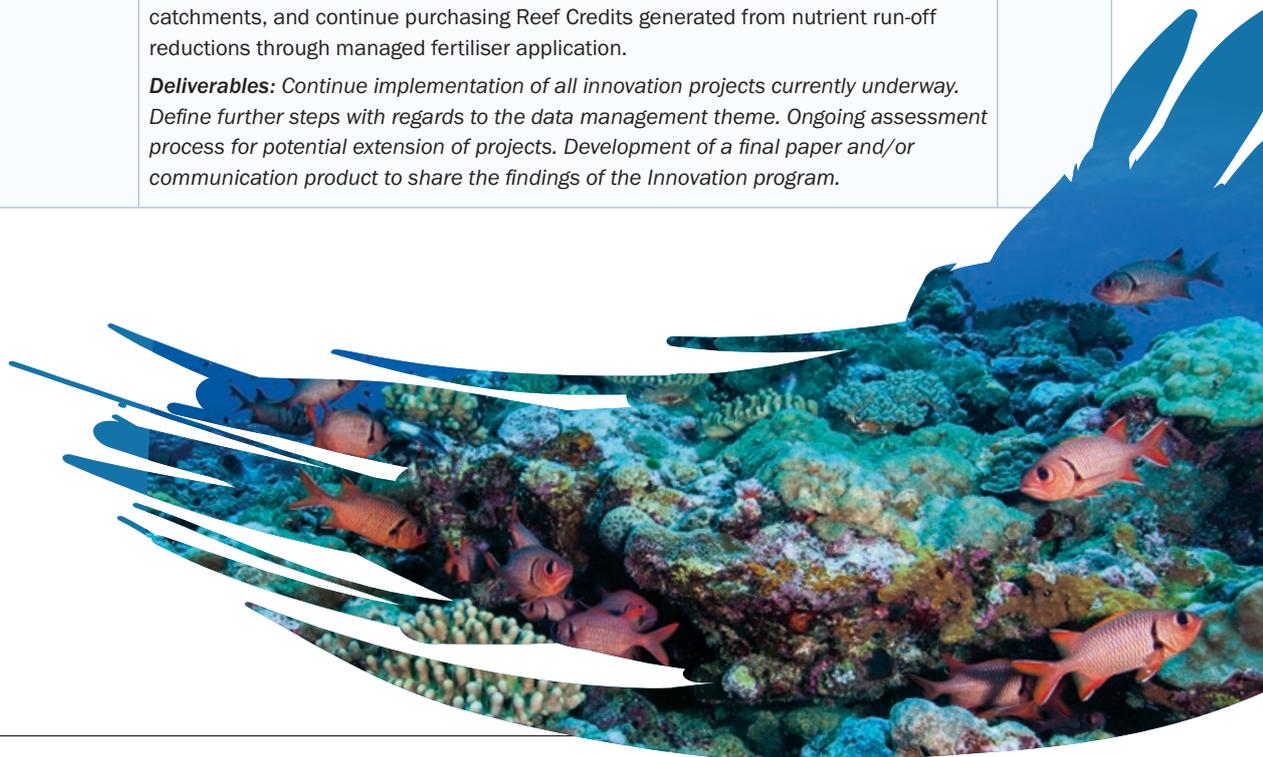
Water Quality Annual Work Plan: 2023-2024

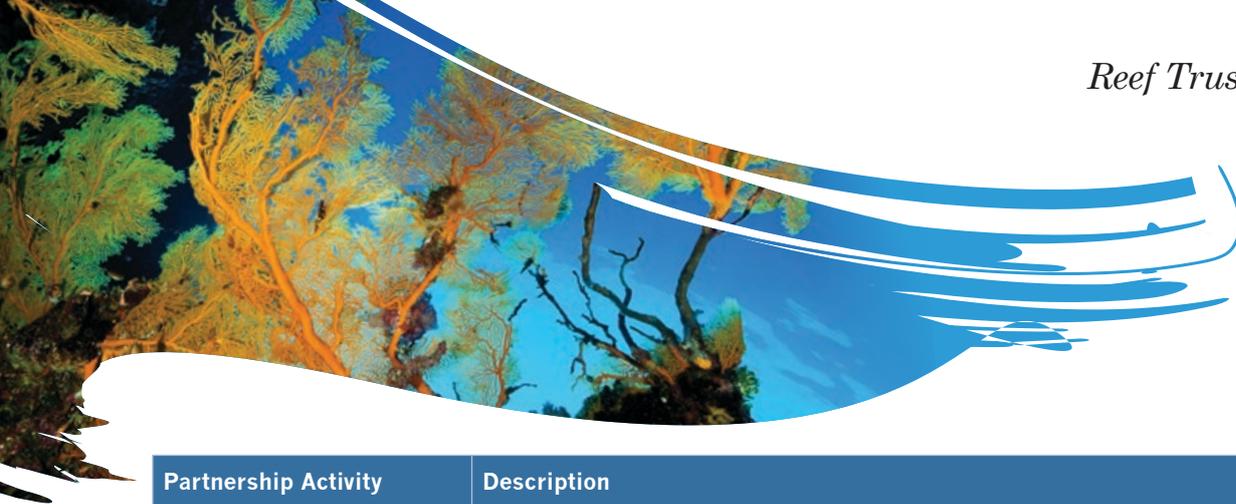
Major categories of activity, deliverables, and budget for 2023-2024 are shown in Table 3.

Table 3: Water Quality Component investment areas and Budget for 2023-2024

Partnership Activity	Description	Budget
<p>Dissolved inorganic nitrogen (DIN) and pesticide regional on-ground programs</p> <p>Implementation of major DIN and pesticide reduction programs in the Lower Herbert, Lower Burdekin, Mackay-Whitsunday, Mulgrave-Russell, Tully and Johnstone catchments</p>	<p>All five regional water quality improvement programs (DIN) are underway, with a total of 25 on-ground projects under implementation. Regional program managers and partnership coordinators (where applicable) are in place for the larger programs to oversee and coordinate local actions. At least one regional program is expected to complete project activities by the end of June 2024, with the other programs potentially continuing for a further 6-12 months but with restricted components of work only. An internal assessment process will be conducted to allocate the remaining funds to extend the scope of successful on-ground projects. On-ground verification processes will be conducted to validate nutrient and pesticide abatement interventions and/or management practices. Regional program evaluations will be conducted and presented to partners at 'Reflections workshops', inviting them to validate findings and add their perspective.</p> <p>Deliverables: Continue implementation of 25 projects resulting in a long-term reduction in DIN and pesticides at end of catchment. Pollutant reductions reported by delivery providers under GBRF's database system. Contract variations to extend the scope of successful on-ground projects based on an internal assessment. On-site inspections carried out. Conduct regional 'Reflections workshops'.</p>	\$20.6m
<p>Fine sediment on-ground regional programs</p> <p>Implementation of fine sediment reduction programs in the Fitzroy, Upper Herbert, Burdekin (Bowen, Broken Bogie, and Upper and East Burdekin) and Mary River catchments</p>	<p>All five regional water quality improvement programs (FSS) are underway, with a total of 11 on-ground projects under implementation. Regional program managers and partnership coordinators (where applicable) are in place for the larger programs to oversee and coordinate local actions. At least three regional programs are expected to complete project activities by the end of June 2024, with the other programs potentially continuing for a further 6-12 months. An internal assessment process will be conducted to allocate the remaining funds to extend the scope of successful on-ground projects.</p> <p>On-ground verification processes will be conducted to validate both landscape remediation interventions and grazing land management practices. A desktop evaluation will be conducted to understand the impact of landscape remediation projects.</p> <p>Deliverables: Continue implementation of 11 projects targeting gully and streambank restoration and improved land management practices resulting in a long-term reduction in fine sediment at end of catchment. Pollutant reductions reported by delivery providers under the Foundation's database system. On-ground verification processes for landscape remediation and improved management practices conducted. Desktop evaluation for all landscape remediation projects completed.</p>	\$16.5m

Partnership Activity	Description	Budget
<p>Innovation and systems change</p> <p>Implementation of projects related to innovation and systems change</p>	<p>Technology transformation</p> <p>A total of 11 projects trialling a range of new technologies commenced implementation in 2020-2021. This includes seven projects focused on technologies, methods and approaches for reducing DIN and pesticides, and four projects related to fine sediments (three of which have been completed).</p> <p>Five projects under this thematic area have been extended with additional funding given their substantial potential to contribute to a future step-change in the way water quality improvement activities are undertaken.</p> <p>Sharing and management of industry and landholder-owned data</p> <p>Work under this thematic area has progressed in 2022-2023 with the engagement of independent consultants to support the planning process. Although a strategy to develop an open-source data product to improve system efficiencies for the creation of farm maps was completed and validated with key stakeholders, the process did not lead to a clear project for the RTP to invest in.</p> <p>In 2023-2024, the RTP will continue working with the independent consultants, experts in the field, to obtain the evidence required, as well as a range of potential investment options. This process will inform the decision-making around the future of this innovation theme.</p> <p>Broad and local scale planning/mapping of future interventions</p> <p>These projects aim to develop a suite of mapping and planning tools to guide future water quality interventions.</p> <p>Two projects under this theme are underway (both of which have been extended), while another four have been completed. Current projects are focused on preventing erosion and sediment loss by better identifying and repairing risk areas in the unsealed road network, and on unlocking data to improve erosion sites prioritisation.</p> <p>Innovation financing and funding initiatives</p> <p>Five projects were contracted in 2020-2021 to trial novel financial mechanisms that could drive water quality improvement. Three of these projects are still underway, while the other two have been completed.</p> <p>Work in the 2023-2024 period is expected to analyse outcomes from insurance policies sold in 2022 and increase sales, develop a GBR Natural Capital investment Fund focused on sugarcane farmlands, undertake preliminary analysis of blue carbon potential in sugarcane and grazing agricultural systems in the Burdekin and Fitzroy catchments, and continue purchasing Reef Credits generated from nutrient run-off reductions through managed fertiliser application.</p> <p>Deliverables: Continue implementation of all innovation projects currently underway. Define further steps with regards to the data management theme. Ongoing assessment process for potential extension of projects. Development of a final paper and/or communication product to share the findings of the Innovation program.</p>	<p>\$3.2m</p>





Partnership Activity	Description	Budget
<p>Conservation and protection of less disturbed catchments</p> <p>Scoping options and planning</p>	<p>The two main types of activities prioritised for this workstream have significantly progressed in 2022-2023 and are expected to ramp up in the current financial year:</p> <p>Eastern Cape York Water Quality Program</p> <p>The ECY WQP program is well underway, delivered by four local community-based organisations and coordinated by a local partner. Seven catchment management projects currently underway are reducing erosion and sediment runoff to the Reef from roads and tracks, gullies and hot, uncontrolled, late season fires. Cultural connectivity and engagement are central to this program.</p> <p>Wetland restoration prioritisation</p> <p>Several knowledge and information gaps have been identified in relation to the role of wetlands in nutrient removal from GBR catchments. In 2022-2023 the Foundation commenced a project to better define these gaps and develop a detailed scientific consensus of the new scientific knowledge associated to this topic. In 2023-2024, this detailed analysis will be integrated into the updated Scientific Consensus Statement.</p> <p>This year the RTP team will also continue working together with DES to develop updated or new modelling tools to enable investors and governments to have greater confidence in what nitrogen reductions can be achieved from a variety of constructed or natural wetlands under various hydrologic conditions.</p> <p>Deliverables: Continue implementation of seven on-ground projects for maintaining the water quality in eastern Cape York. Integration of new scientific knowledge into the Scientific Consensus Statement. Develop a model platform, framework and application to quantify the performance of wetlands in their ability to improve water quality in tropical and sub-tropical catchments flowing to the Reef.</p>	\$3.5m
<p>Technical advisory group (TAG) and other technical support</p>	<p>The TAG will continue providing independent expert advice to the RTP across all WQ workstreams. This includes supporting project and program reviews and endorsing key design documents for major restoration projects.</p> <p>A series of consultancies to address the data and monitoring gaps identified during the analysis undertaken by the TAG are well underway. As a result, in 2023-2024 at least two additional lines of evidence will be developed to estimate water quality improvements associated to specific DIN reduction projects. Technical support will be provided to projects that involve water quality monitoring, with a focus on supporting communication aspects and developing specific 'knowledge narratives' on water quality outcomes. Relevant data will be collected to implement monitoring methods previously developed to evaluate the social change of the Water Quality program. A behaviour change program to encourage improved practices will be rolled out in the Mackay-Whitsundays regional program.</p> <p>Deliverables: Provision of independent technical advice on project and program design and implementation. Development of additional lines of evidence for estimating water quality improvements. Provision of technical support across water quality monitoring activities. Implementation of methods to evaluate the social change aspects of the regional programs. Implementation of a behaviour change program in the Mackay-Whitsundays region.</p>	\$1.2m
<p>Traditional Owner-led water quality activities</p>	<p>Refer to Traditional Owner Reef Protection Component.</p>	
TOTAL INVESTMENT		\$45m

Crown-of-Thorns Starfish (COTS) Control Component

Partnership budget: \$57.8 million

2023-2024 budget: \$8.29 million

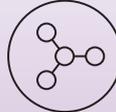
Purpose: To expand efforts to control Crown-of-Thorns Starfish (COTS) to reduce coral mortality from COTS outbreaks, in order to protect high ecological and economic value coral reefs in line with GBRMPA's COTS Control Strategy.

Priorities under the Partnership Investment Strategy

- Support existing in-water COTS control and drive improved efficiency
- Lead a step-change in surveillance for early COTS detection and early intervention
- Explore alternative control methods to address COTS management at a broad scale in the future

End-of-Partnership Outcomes

The Reef Trust Partnership's COTS Control Component will result in:

 <p>Reduced coral mortality from COTS outbreaks at high-value reefs</p>	 <p>Improved methods to manage COTS at scale have been identified</p>	 <p>Expanded delivery partners involved in COTS management (Traditional Owner enterprises)</p>	 <p>A strategy for long-term funding is available for influencing/advocacy</p>
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Progress on five-year journey

Outbreaks of coral-eating COTS are responsible for significant coral decline and are a major threat to the long-term health of the Great Barrier Reef. GBRMPA's [COTS Strategic Management Framework](#) highlights COTS control as one of the most scalable and feasible direct management interventions available today to enhance the Reef's resilience in the face of climate change. With increasing frequency of mass bleaching events, a current outbreak still spreading across the central and southern regions of the Reef, and the next outbreak already beginning to develop in the northern region, there is an urgent need to invest in activities that protect coral from COTS impacts now and into the future.

The Partnership's five-year plan prioritises investment in on-ground action to protect coral now through the COTS Control Program, while also investing in a major research and innovation program to accelerate and scale up our surveillance and control capabilities. Additional investments in activities that enhance partnerships with Traditional Owners and the community help to expand the collective effort to manage this coral-eating pest. Taken together, these activities create a foundation for enduring impact through a combination of action, innovation, partnerships and capacity building.

As the COTS Component enters its final year, strong progress has been made in achieving the four end-of-partnership outcomes.

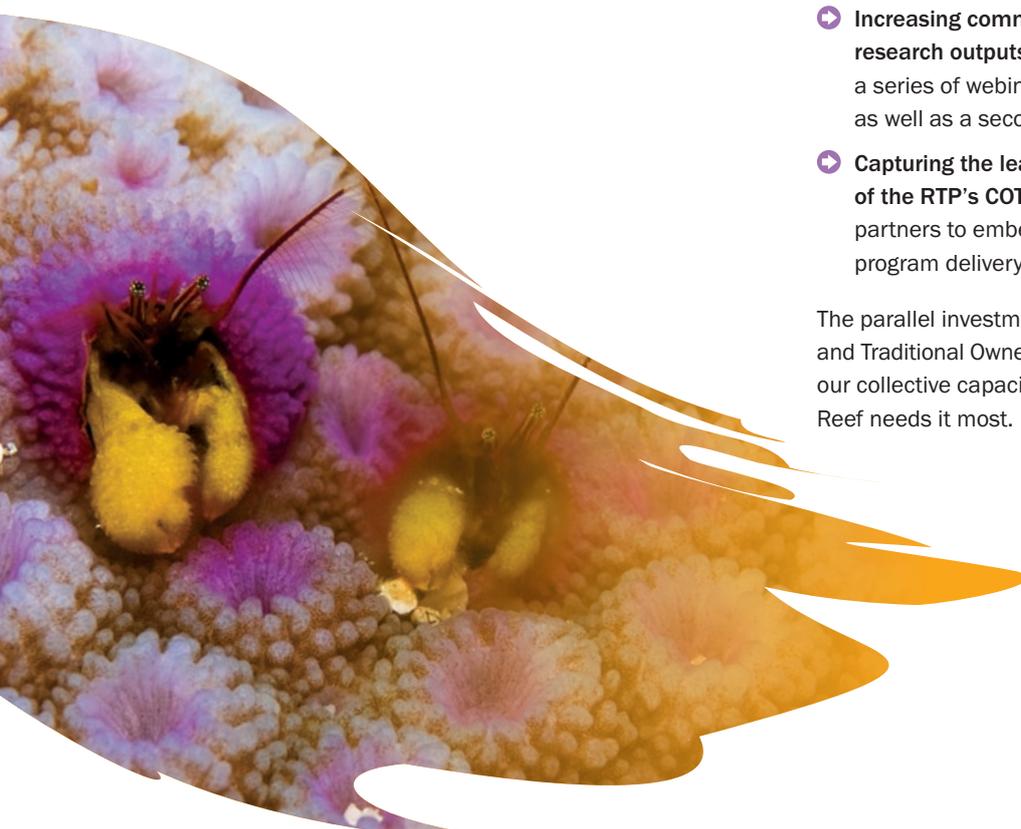
Together with more than 100 highly trained crew and more than 90 scientists we are:

- ✔ **Protecting coral by proactively suppressing the current COTS outbreak** and the emerging new primary outbreak in the north of the GBR.
- ✔ **Delivering continued breakthroughs** in the prediction, detection and response to COTS including advancing the methodology for eDNA sampling, which offers the earliest possible warning signs of COTS presence on a reef and developing the first prototype of the COTS Surveillance System, an end-to-end system for COTS and coral surveys across the GBR.
- ✔ **Developing new performance metrics** and setting targets for the program's operational inputs and management outcomes to drive ongoing improvements in efficiency and value for money.
- ✔ **Improving the culture of partnership and shared purpose** through the integrated delivery of the integrated on-water control, innovation and TO leadership programs.

The 2023-2024 period will focus on:

- ➔ **Transitioning the COTS Control Program to GBRMPA.**
- ➔ **Completing the COTS Control Innovation Program** which will end in June 2024.
- ➔ **Delivering a social, cultural and economic impact assessment** and documenting Traditional Owner interests and aspirations in COTS research and management.
- ➔ **Increasing communication and translation of the research outputs** to end-users and stakeholders through a series of webinars and workshops across the year, as well as a second COTS Forum.
- ➔ **Capturing the learnings from the design and delivery of the RTP's COTS Component** and working alongside partners to embed successful elements into future program delivery.

The parallel investments in COTS management, research and Traditional Owner partnerships will catalyse and accelerate our collective capacity to control COTS outbreaks when the Reef needs it most.



On-ground impact to protect coral

The COTS Control Program is by far the largest scale on-ground intervention program on the Reef aimed at directly protecting coral. The program employs over 100 professionally trained crew that deliver strategically targeted surveillance and culling to achieve ecological sustainability for coral across a network of more than 200 reefs of high ecological and economic value across the Reef. The Program is delivered as a partnership between the Foundation, GBRMPA and RRRC, with co-funding from GBRMPA and the Foundation through the Reef Trust Partnership.

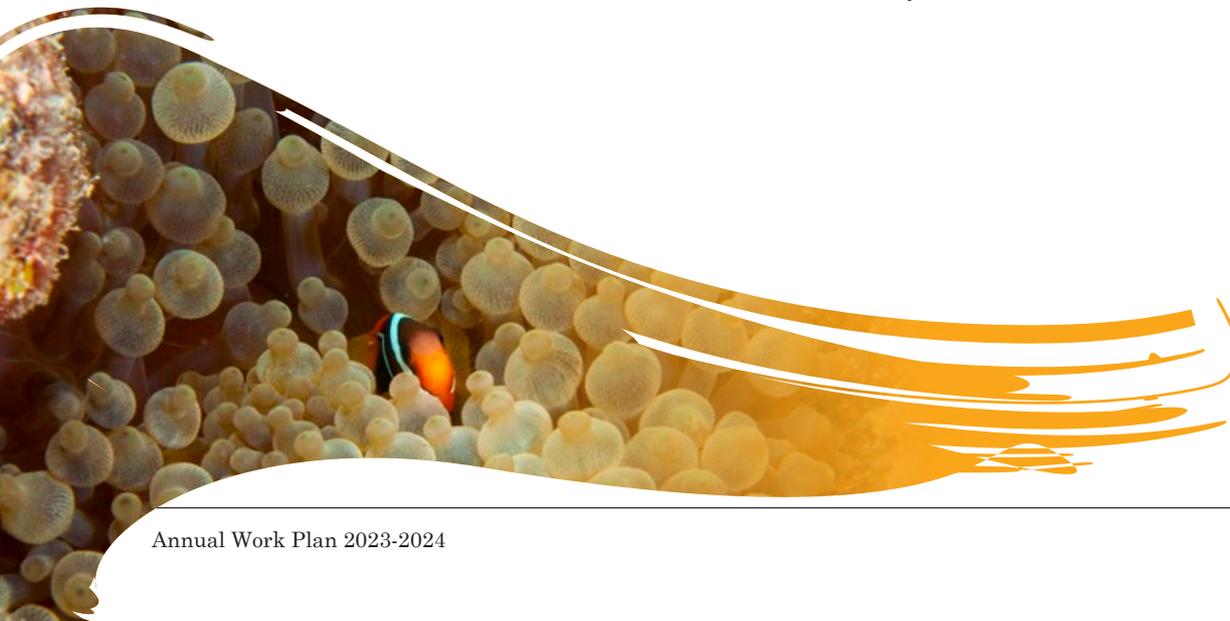
Over the course of the five-year journey, the COTS Control Component has demonstrably achieved the end-of-partnership outcome of *reducing coral mortality from COTS outbreaks at high value reefs*. For example, in 2021-2022, the program's vessel fleet managed the impacts of coral-eating starfish on over 150 high value reefs between Lizard Island in the north and Lady Elliot Island in the south. The program's crew delivered 1,344 on-water days and invested 17,037 diver hours conducting surveillance and culling to protect coral. As a result of this targeted effort, 88% of cull sites actioned were managed to sustainable levels for coral growth and recovery, and the program is estimated to have effectively protected coral from COTS predation across more than 215,000 ha of reef habitat. These adult breeding corals saved from COTS predation are critical to boost the resilience of the Reef, spreading their larvae far and wide during the Reef's annual mass spawning event to repopulate damaged areas.

The COTS Control Program's 2022-2023 Annual Work Plan was collaboratively developed with GBRMPA leading the reef prioritisation process, including engagement of partners and stakeholders through a series of meetings and workshops. Under this plan, the program's vessel fleet intends to deliver approximately 1,500 on-water days and 21,000 dive hours managing starfish impacts on over 200 high value reefs across the northern, central and southern GBR. Progress is on-track to deliver coral protection outcomes, with 114 high value reefs actioned by December 2022.

Targeted effort in 2022-2023 has focused on proactively managing an emerging outbreak in the northern 'initiation zone' following early warning signs detected in the summer of 2021-2022. Several reefs across the initiation zone have emerged as primary outbreak hotspots, with crews culling thousands of larger, reproductively mature starfish from reefs in the vicinity of Lizard Island. Proactively suppressing the build-up of these new aggregations before they can spawn and trigger waves of secondary outbreaks has potential to deliver ecosystem benefits at scale by mitigating the spread of the new outbreak across the GBR over the next +10 years.

In 2023-2024, the COTS Control Program will continue to protect coral by proactively suppressing the emerging new primary outbreak in the north while also continuing to manage the impacts of the ongoing secondary outbreaks in the central and southern GBR. In the process it will protect hundreds of thousands of hectares of coral reef habitat from the damage caused by starfish outbreaks. When selecting reefs to target for COTS management, the program considers the most recent field data on coral and COTS outbreak status, logistical feasibility, tourism value, as well as a range of ecological modelling predictions (i.e., COTS and coral connectivity, COTS risk, resilience potential). The prioritisation process led by GBRMPA has increasingly adopted a multi-criteria decision analysis approach through a collaboration between managers and CCIP researchers, ensuring that available resources are used as strategically as possible.

Underpinning these achievements is a governance model for the COTS Control Program that has proven to be highly effective, promoting principles of transparency, information sharing, open data access, and collective decision-making. This includes a COTS Partnership Group to provide strategic oversight of the program, as well as a COTS Action Group to coordinate tactical operational delivery. In 2022-2023, governance groups focused on developing new performance metrics and setting targets for the program's operational inputs and management outcomes. In 2023-2024, performance against these metrics will be further evaluated to drive ongoing improvements in efficiency and value for money.



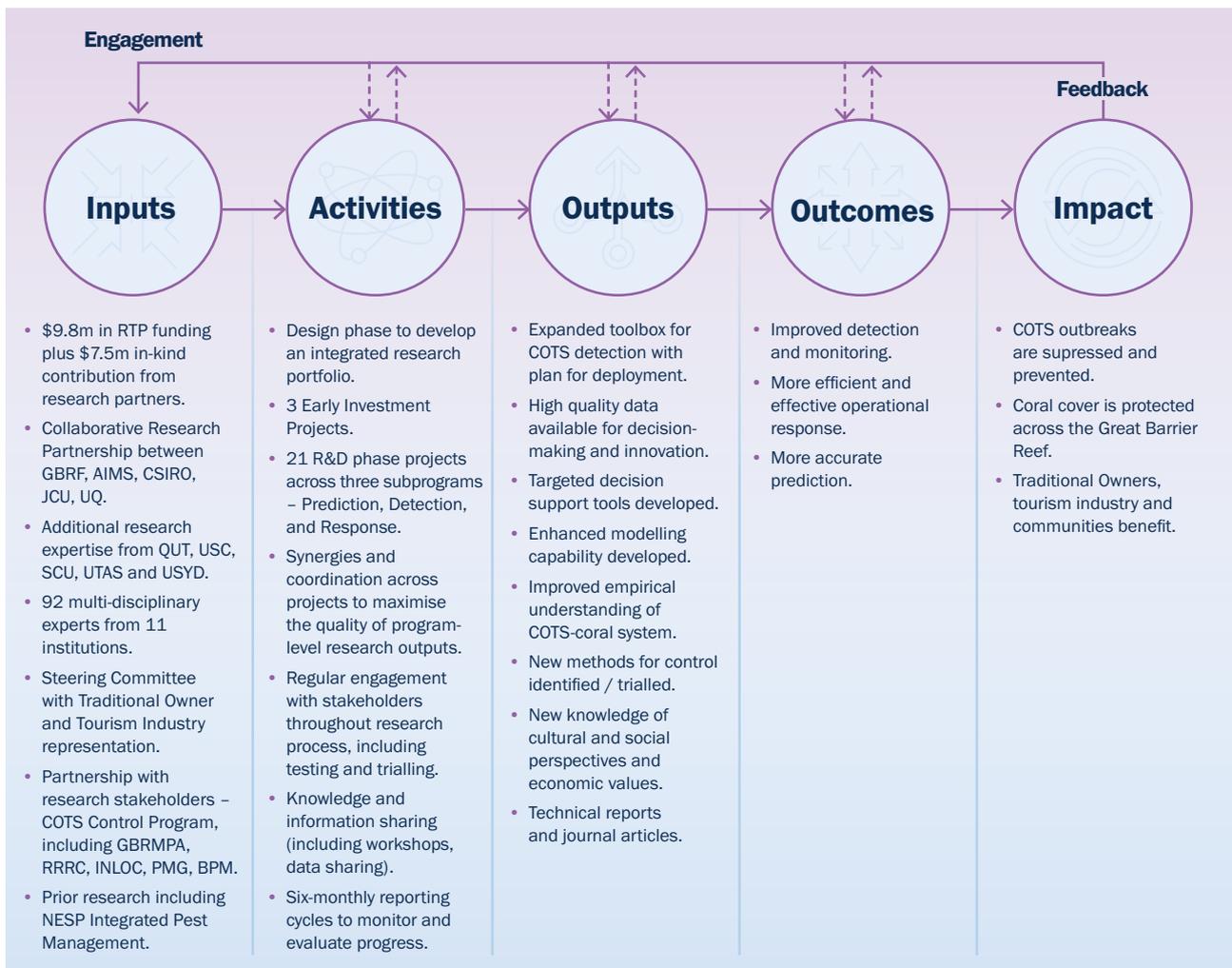
Targeted innovation to maximise impact

Increasing the efficiency, effectiveness and scale at which COTS outbreaks are managed across the Reef requires innovation in outbreak prediction, detection and response. Under the Reef Trust Partnership, the Foundation has invested \$9.8m to deliver the COTS Control Innovation Program (CCIP) in partnership with AIMS, CSIRO, JCU, UQ and GBRMPA. Under this collaborative research program, over 90 of the best and brightest multidisciplinary experts from across Australia are working together across 24 projects to deliver the end-of-partnership outcome of *identifying improved methods to manage COTS at scale*.

As a program of research, CCIP is uniquely positioned to plan for and deliver real-world benefits because it is closely linked to an existing on-ground management program – the COTS Control Program. In 2022-2023, CCIP partners

finalised a Research Impact Plan (Figure 1) that details how the innovation program's inputs and activities lead to outputs that translate through to outcomes and long-term impacts for the Reef and its adjacent communities. This framework highlights the importance of ongoing engagement and feedback from stakeholders throughout the process, to ensure the research is relevant to end-users and any risks are identified and mitigated. The program has taken several key actions to facilitate this ongoing engagement and feedback, including embedding reef managers from GBRMPA as part of project teams, iteratively testing and trialling new tools and technologies onboard COTS Control Program vessels to ensure final outputs are fit-for-purpose, and hosting regular seminars and workshops that provide the opportunity for knowledge exchange and information sharing across COTS researchers, managers, Traditional Owners and stakeholders.

Figure 1: Research impact plan for the COTS Control Innovation Program



As the innovation program enters its third and final year, the research teams will continue to deliver field and laboratory work, develop new tools and technologies for COTS detection and control, drive advances in data, modelling and decision support that underpin management action, and engage with Traditional Owners and communities to integrate their perspectives. Research highlights from each subprogram are provided below.

The **Prediction subprogram** has conducted coordinated field and laboratory work to deliver new empirical data on COTS biology and ecology that fills critical knowledge gaps for outbreak management. This has included use of 3D photogrammetry to reveal marked seasonal differences in starfish feeding rates and patterns, which have significant implications for quantifying their ecological impacts as well as their detectability. Additional research has focused on understanding the role of natural predators (e.g., fish, crustaceans, worms) in suppressing COTS abundance, leading to the discovery of a novel, rubble-dwelling crab predator that consumes at least five juvenile starfish per day. Another project has deployed novel survey methods to document abundance and body size of starfish populations across the northern and far northern GBR, providing the first ever data on the demographic changes that lead to primary outbreak initiation. In 2023-2024, field and laboratory work will continue, and the new empirical data collected across this subprogram will be integrated to the ecological models being developed in the Response subprogram.

The **Detection subprogram** has made strong progress in the development of an expanded toolbox for detecting the cryptic starfish pests. Technical work has advanced the methodology for eDNA sampling, which offers the earliest possible warning signs of COTS presence on a reef. Researchers have now begun trials on-board COTS Control Program vessels to refine the methods and workflows for future use by citizen scientists. At the same time, a team of roboticists, engineers and data scientists have developed the first prototype of the COTS Surveillance System, an end-to-end system for COTS and coral surveys across the GBR. The technology development passed two major stage gates in 2022-2023 and intends to deliver a major step-change in the accuracy, safety and scale of outbreak surveillance, with next steps focused on field trials with end-users to inform the next generation system development. The data from these emerging new tools will need to be integrated with datasets collected using existing low-tech COTS survey methods, and 2022-2023 also saw the delivery of dedicated fieldwork to calibrate across the various tools. Ultimately, this will inform CCIP's design of a monitoring plan in 2023-2024 that seeks to leverage all the tools and technology at our disposal and deploy them in a coordinated way to inform management response.

The **Response subprogram** has progressed on multiple fronts, with a suite of projects focused on advancing the models and decision support tools that underpin the COTS Control Program's strategic and tactical actions. This has included the design of a digital information infrastructure that will act as a hub for transfer of field, derived and modelled data between researchers, managers, and COTS Control Program vessel crews. Modelling has assessed the benefit of the Integrated Pest Management approach currently employed by the COTS Control Program, revealing it is significantly more effective and efficient than the previous approach, saving up to 70% more coral per dive minute. Additional ensemble modelling has developed new COTS and coral larval dispersal predictions that have been used by the COTS Control Program to identify and target highly connected reefs for pest management. At the same time, a team of geneticists and chemical ecologists have sequenced the COTS genome, identifying and fractioning several promising candidate pheromone attractants that will now be tested in large-scale aquarium trials. Alongside this technical work, CCIP social scientists have engaged with Traditional Owners and reef communities to understand their perceptions of COTS control. The initial outcomes of 48 interviews revealed that these stakeholders view COTS as a problem for the health of the GBR and recognise the ecological, economic and social benefits of COTS management. These stakeholders expressed desire for greater equity in distribution of these benefits across the community. Ongoing social science research in 2023-2024 will deliver a social, cultural and economic impact assessment and document Traditional Owner interests and aspirations in COTS research and management.

As all projects across the COTS innovation portfolio near completion in 2023-2024, the program will also increase its focus on the communication and translation of the research outputs to end-users and stakeholders. This will be achieved through a series of webinars and workshops across the year, as well as a second COTS Forum. This Forum, held in the final year of the RTP will enable the COTS community to come together, share learnings and reflect on the progress achieved through collective efforts to protect the GBR from the impacts of these damaging outbreaks.

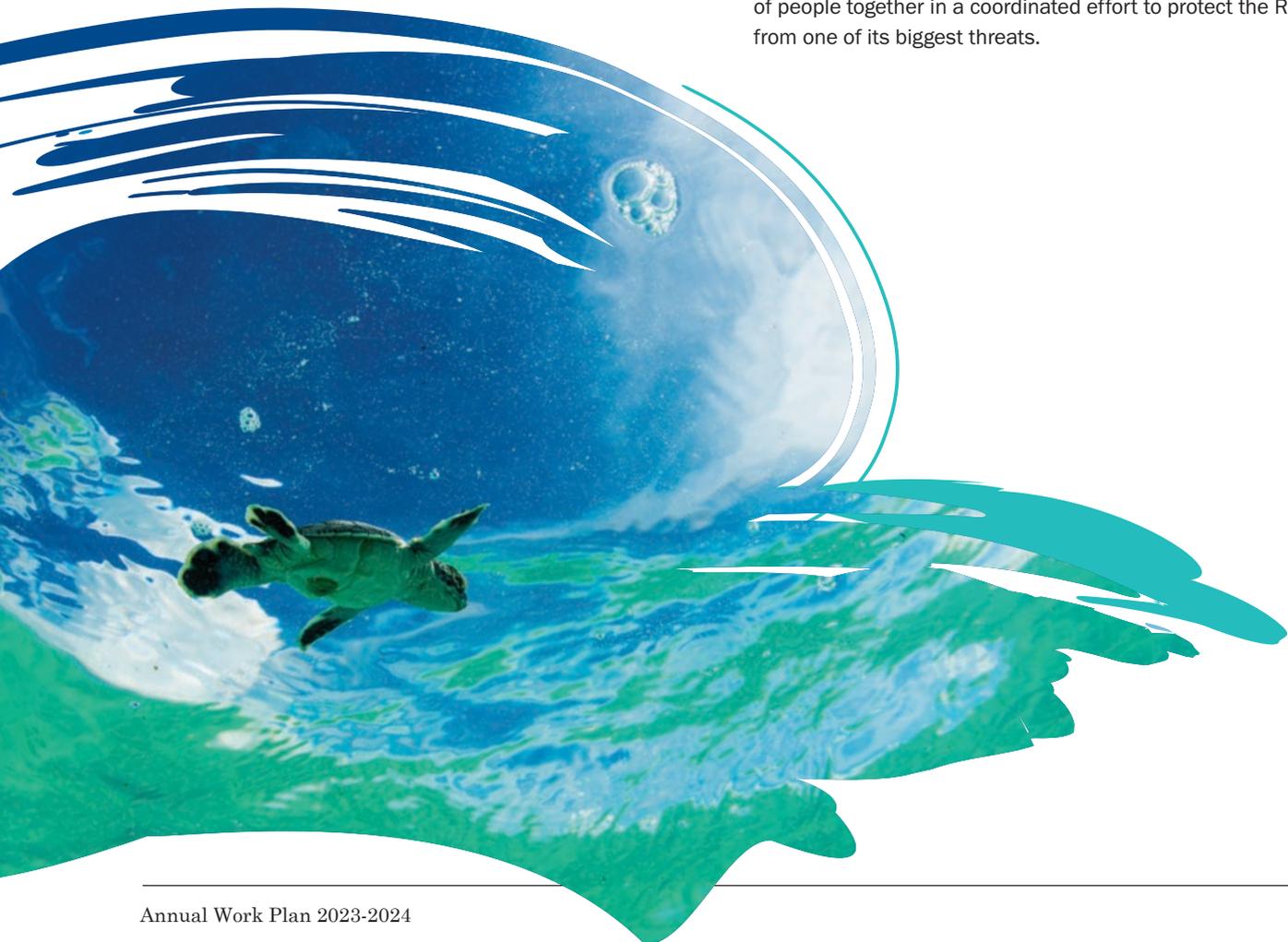
Expanding delivery partners

Delivering effective COTS control at scale across the GBR requires the collective efforts of the reef community, including scientists, Traditional Owners, managers, governments and community groups. Under the RTP, the Foundation has invested in several initiatives to achieve the end-of-partnership outcome of *expanding the delivery partners involved in COTS management*. This includes the ongoing delivery of a culturally-safe TO COTS Control and Leadership Program which responds to Traditional Owner interests in developing career pathways and economic enterprises in COTS surveillance and control (see Traditional Owner Reef Protection component for more detail). In parallel with that program, 2022-2023 saw investment to engage citizen scientists in collecting data for COTS management through the Great Reef Census. Over 300 image-based surveys were completed by citizen scientists at key locations across the northern and far northern regions to fill knowledge gaps for the COTS Control Program's strategic planning. In 2023-2024, these images will be analysed and Standard Operating Procedure will be delivered to guide future citizen science efforts to inform COTS management. This investment in Reef Census marks the third round of our investment into the Program, with IMR and the Foundation itself funding activities since 2020.

Securing the future and building a legacy

Recognising that COTS control is a key action identified in the Reef 2050 Plan to support the long-term health of the Barrier Reef, the RTP COTS Component includes an end-of-partnership outcome to have a *strategy for long-term funding available for influencing/advocacy*. Over the course of the RTP there has been significant progress toward funding security, with GBRMPA awarded \$161m in new Australian Government funding to support the COTS Control Program to 2030. COTS partners have therefore turned attention toward strategy development for ongoing funding in COTS innovation and Traditional Owner partnerships, which are essential complements to the on-water control program. In 2023-2024, members of the COTS Partnership Group and CCIP Steering Committee will continue this strategic planning and may engage a consultant to develop roadmaps for these initiatives.

In this final year, there will also be significant focus on capturing the learnings from the design and delivery of the RTP's COTS Component and working alongside partners to embed successful elements into future program delivery. The governance and funding models implemented have substantially increased collaboration and knowledge sharing across COTS managers, researchers and Traditional Owners. The improved culture of partnership and shared purpose is the key legacy of the Component's integrated on-water control, innovation and TO leadership programs, uniting hundreds of people together in a coordinated effort to protect the Reef from one of its biggest threats.



Case Studies

Discovering the role of COTS predators

Predators play an important role in regulating the abundance of prey populations. On the Reef, it has long been hypothesised that COTS outbreaks are caused, in part, by reductions in their natural predators. Yet very little is known about who these predators are and how they influence COTS abundance. Research under CCIP is filling crucial knowledge gaps related to COTS predation through targeted field and laboratory studies combined with ecological modelling.

One study is focused on identifying the predators of small juvenile starfish as this is when they are most vulnerable. A team lead by UQ conducted more than 500 aquarium trials and tested over 100 potential predators, including species of crabs, shrimp, worms, snails and small fish. They discovered 29 new species that feed on juvenile starfish, though one species was a clear standout.

*The red decorator crab, *Schizophrys aspera*, consistently consumed more than five juvenile COTS per day, and chose to eat the starfish even when it was presented with other prey options.*

Collaborators at AIMS then developed an eDNA technique to detect the consumed starfish in the guts of the crab predators. Ongoing research will now assess the potential to use these crabs as an early warning indicator of developing outbreaks. Collectively these discoveries lend exciting new insight into the role of predators in managing the abundance of the coral-eating starfish and offer potential tools for outbreak management.



The red decorator crab feeding on tiny pink juvenile crown-of-thorns starfish in a laboratory experiment. Image credit: Kennedy Wolfe (UQ).



Case Studies

Developing new tools for COTS detection

Effective and efficient pest management relies on early detection and timely action. Like many pests, COTS are highly cryptic, often hiding in reef crevices during daylight hours. They are also patchily distributed, making it challenging to monitor for their presence across the entire scale of the Reef. Current methods to monitor their distribution and detect developing outbreaks suffer from low accuracy, especially when numbers are still low and most amenable to efficient management action.

The CCIP Detection subprogram is focused on developing new methods for COTS surveillance and monitoring, including eDNA techniques and smart robotics technology that scans the reef and detects starfish using real-time artificial intelligence. These methods are being developed by researchers from AIMS and CSIRO, working in partnership

with management end-users to ensure the tools are practical and fit-for-purpose. In 2022-2023, a major field effort involving seven organisations and 24 people was undertaken to trial the new technologies alongside existing methods.

The team visited seven different reefs, collecting 240 eDNA samples and 80,000 images to be analysed using machine learning models.

In 2023-2024, these tools will continue to be developed, alongside analyses that demonstrate how these new datasets can be integrated into the decision support tools used by the COTS Control Program to guide the on-ground management effort.



A team of CCIP researchers, Marine Parks managers and COTS Control Program vessel crew on a fieldtrip to test new COTS detection technology. Image credit: Scott Foster (CSIRO).

COTS Control Five-Year Plan

Our five-year plan for the COTS Control Component includes the eight Partnership activities outlined in Table 4.

Table 4: COTS Control Component Partnership activities and budget

Partnership Activity	Rationale	Outcome	Budget
● COTS Control	Controlling crown-of-thorns starfish is the most scalable and practical tool we currently have to protect our Reef's corals. The Partnership's COTS control program is by far the largest-scale intervention program happening right now on the Reef.	This funding will support continued COTS control at a level consistent with scientific advice and intensity of the current outbreak.	\$41.53m
● COTS Control ● Innovation: Feasibility Study	This funding will deliver a collaborative feasibility study involving key scientific agencies to systematically investigate the potential of new COTS control options.	Recommendations from this study will guide the subsequent COTS Control Innovation: Implementation activity, with the goal to enhance our ability to predict and detect outbreaks and more effectively control their spread and impact.	\$1.5m
● COTS Control ● Innovation: Research and Development	Targeted investment in transformational innovations, based on outcomes of the COTS Control Innovation Feasibility Study, can provide a pathway towards a step-change in COTS control.	This funding will enable research and development, testing and implementation of new methods, including early warning systems, early intervention options, alternative control technologies and improved prediction and decision-making.	\$8.49m (previously \$8.33m)
● Independent scientific reviews	The need for an independent review of COTS control program effectiveness was highlighted during Partnership consultations (including with the Reef 2050 Independent Expert Panel).	The COTS control program is continuously evolving, and its effectiveness will benefit from an independent review.	\$0.08m (previously \$0.19m)
● COTS Forums	Regular forums dedicated to COTS research and management are planned for 2021 and 2024, focused on identifying innovation priorities and to address the long-term challenge of COTS control.	These forums will enable cross-sector dialogue and support long-term planning of innovation in COTS management.	\$0.2m
● Long-term funding strategy	COTS control is critical to the health of the Reef long-term and an appropriate funding strategy is needed to ensure enduring outcomes.	This funding will provide a comprehensive business case and real options to support planning and policy development for long-term funding of COTS management.	\$0.13m
● Community-driven COTS control	The role of community and citizen science to engage more widely in COTS control has been identified as an opportunity to expand delivery partner capacity.	This funding will identify opportunities to support community and citizen science participation in COTS control and implement pilot programs.	\$0.1m
● Traditional Owner-led COTS control (refer Traditional Owner Reef Protection Component)		This funding will identify and deliver training to upskill Traditional Owners and provide funding to enable COTS control activities. It will also support business-ready Traditional Owner groups to transition to manual COTS control activities.	\$5.8m
TOTAL COTS CONTROL COMPONENT BUDGET			\$57.8m

COTS Control Annual Work Plan: 2023-2024

Major categories of activity, deliverables and budget for 2023-2024 are shown in Table 5.

Table 5: COTS Control Component investment areas and budget for 2023-2024

Partnership Activity	Description	Budget
In-water COTS Control Program	<p>Continued delivery of the COTS Control Program as a strategic partnership between the Foundation, GBRMPA and RRRRC, with GBRMPA co-funding the program in 2023-2024 alongside the RTP investment. The program will be delivered across six vessels (five funded through GBRMPA, one funded through the RTP) that are deployed across the northern, central and southern regions of the GBR in accordance with an Annual Work Plan that identifies the priority locations for intervention based on an Integrated Pest Management strategy. Program oversight and strategic direction will continue through the COTS Partnership Group, with additional operational coordination through the COTS Action Group.</p> <p>Deliverables: <i>In-water control of COTS outbreaks at priority locations in accordance with an Integrated Pest Management strategy; COTS Partnership Group meetings and COTS Action Group meetings to support effective strategic oversight and tactical delivery.</i></p>	\$4.22m
COTS Control Innovation Program – R&D Phase	<p>A dedicated innovation program is required to improve the efficacy and scale of COTS surveillance and control in order to suppress and prevent future outbreaks. The COTS Control Innovation Program brings together multidisciplinary experts through a collaboration between the Foundation, AIMS, CSIRO, JCU and UQ to develop new knowledge, tools, methods and technologies to address the COTS threat.</p> <p>During the third and final year of the Program's R&D Phase, research that advances capacity to predict, detect and respond to outbreaks will continue to be delivered, alongside research to explore and understand the social and cultural implications of COTS surveillance and control on the Reef.</p> <p>Deliverables: <i>20 projects across the innovation portfolio deliver milestones and reports in accordance with project work plans; CCIP Steering Committee oversees program delivery and identifies emerging research needs; regular seminars and workshops convened to share knowledge and coordinate across the research portfolio.</i></p>	\$3.85m
COTS Forum	<p>Regular forums dedicated to COTS research and management are needed to enable cross-sector dialogue and support long-term planning for innovation in COTS management. The first COTS Forum was held in 2021 and a second forum will be convened in 2024. Opportunities to integrate this event with forums planned by other research and monitoring programs to enable further cross-sector knowledge-sharing will be explored.</p> <p>Deliverables: <i>Plan and deliver a two-day forum to share knowledge and learnings across scientists, managers, Traditional Owners and community stakeholders.</i></p>	\$0.10m
Community-led COTS activities	<p>This funding supports an ongoing initiative to strengthen and expand the role of community and citizen science in COTS management through a partnership between the Great Reef Census program and the COTS Control Program.</p> <p>Deliverables: <i>Development of a Standard Operating Procedure that provides guidance on the collection and use of reconnaissance data collected through the Great Reef Census in COTS Control Program decision-making.</i></p>	\$0.01m
Long-term funding strategy	<p>Sustained funding for COTS innovation and Traditional Owner partnerships is essential to complement the COTS Control Program's operations out to 2030. This activity will invest in development of strategic options for sustained funding in consultation with COTS Control Program and CCIP partners.</p> <p>Deliverables: <i>Consultant conducts review and analyses to inform development of strategic options for long-term sustainable program funding; recommendations on potential funding models provided to COTS Partnership Group and CCIP Steering Committee to inform future planning beyond the end of the RTP.</i></p>	\$0.11m
Traditional Owner-led COTS Control activities	Refer to Traditional Owner Reef Protection	
TOTAL INVESTMENT		\$8.29m

Reef Restoration and Adaptation Science (RRAS) Component

Partnership Budget: \$100 million

Purpose: The purpose of this Component is to conduct and implement science activities to deliver and support reef restoration and adaptation for the Great Barrier Reef World Heritage Area.

Priorities under the Partnership Investment Strategy

- Social licence to operate
- The right science and models underpinning the right decisions
- Research and Development to boost new intervention methods
- Making interventions a reality on the Reef

End-of-Partnership Outcomes

The Reef Trust Partnership's Reef Restoration and Adaptation Science (RRAS) Component will deliver:



The first stage of the Reef Restoration and Adaptation Program: A toolbox of scientifically proven, ecologically effective, socially acceptable, technically feasible and economically viable restoration and adaptation techniques ready for implementation.



New pathways for Traditional Owner education, employment and enterprises across research and delivery activities.



International recognition that Australia is leading coral reef restoration science.

Progress on five-year journey

The 2022-2023 summer season did not see significant bleaching on the GBR, and the northern and central GBR have recorded their highest amount of coral cover since AIMS began monitoring 36 years ago. While these results are encouraging and highlight the intrinsic resilience of this ecosystem, the scientific consensus remains that coral reefs are among the most vulnerable ecosystems to climate change impacts with widespread mortality linked to increased water temperature, and increased frequency and intensity of storms (IPCC 2022²). At this pace, it is widely accepted that mass bleaching will become a regular occurrence on the GBR, at least twice per decade from 2040³. In this context, it remains essential for innovative solutions to be made available to Reef managers, as soon as possible, that can counteract the impact of climate change.

The recent adoption of the Kunming-Montreal Global Biodiversity Framework during the fifteenth meeting of the Conference of the Parties (CBD-COP15) is a significant milestone in the global conservation of coral reefs. It provides a clear strategic direction, with 23 targets including restoration and conservation of 30% of land and water ecosystems by 2030 and putting Indigenous rights at the heart of conservation. The International Coral Reef Initiative and global coral conservation community have welcomed the adoption of a stand-alone numerical target on restoration, acknowledging that restoration is a valid management option in areas when natural recovery is eroded, and can complement other actions to support reef resilience.

RRAP has completed three years of R&D and is entering the final year of this first phase. The program has started the process of transitioning some interventions from R&D to deployment at scale, with a view to making those available to reef managers from 2025.

Critical outcomes have been delivered along this pathway:

- ✔ **Funding has been secured** to complete the ambitious first phase of RRAP. Third-party private sector funds raised to date and an additional commitment of \$20m from the Australian Government allow RRAP to maintain momentum and plan for the future.
- ✔ **A new Translation to Deployment subprogram was created** to coordinate inputs from RRAP subprograms, integrate RRAP R&D outcomes and engage with local Traditional Owners, regulators and industry partners, to enable the critical path to at-scale deployments of the first generation of interventions in 2025-2026.
- ✔ **The RRAP Intervention Risk Review Group was established**, comprised of independent experts who are highly recognised in their field, internationally and in Australia. They will provide independent advice to the program on managing risks associated with the development and implementation of interventions.
- ✔ **RRAP has extended its international reach and relevance**, through strong and positive involvement in global initiatives such as the G20 Coral Reef R&D Accelerator Program, as well as direct engagement in international events such as UN Ocean Conference and CBD-COP15, the International Coral Reef Symposium and Reef Futures.

RRAP is actively planning for the next phase of R&D, in parallel with the transition to at-scale deployments of proven interventions focused on coral biodiversity and adaptation. 2023-2024 will see a focus on delivering key outcomes from each major stream of R&D investigation, learning from those to design a future program with the strongest possible chance to help the GBR adapt to climate change.



2 IPCC. 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

3 Heron et al. 2017. Impacts of Climate Change on World Heritage Coral Reefs: A First Global Scientific Assessment. Paris, UNESCO World Heritage Centre.

Scientific breakthroughs

The 2022 mid-term review of design and performance led to targeted adjustments to the program objectives, notably with an increased focus on the translation to deployment of the most advanced interventions. RRAP is maintaining momentum with all subprograms achieving significant breakthroughs, delivering an ambitious integrated and multidisciplinary schedule of laboratory and fieldwork, supported by Foundational modelling and ecological monitoring activities. Some selected highlights follow:

The **Modelling and Decision Support** subprogram is designed to inform understanding of the potential benefits, costs, risks and uncertainties associated with proposed interventions, and support identification of strategies that maximise the likelihood of successful outcomes being realised through those interventions. The value proposition of such strategies needs to be considered relative to a 'counterfactual' of no intervention. The subprogram completed a major cycle of improvements to the core RRAP connectivity and ecological models, at spatial resolutions spanning from specific target reefs to whole-of-GBR, allowing the delivery of a suite of case studies identified as critical for the design and planning of future interventions. Of particular significance were the modelled projections for coral reef futures on the GBR under different climate change scenarios, with or without interventions. These results were presented to a broad range of stakeholders such as GBRMPA, multiple departments within the Australian and Queensland Governments and Reef 2050 Plan advisory bodies.

The **Traditional Owner and Stakeholder Engagement** subprogram has delivered key milestones across foundational research and on-ground activities which will provide vital design information for the successful delivery of place-based interventions including: several Traditional Owner Biocultural Framework co-design workshops to identify expectations, risk and opportunities related to RRAP; the inception of an independent Stakeholder Engagement Advisory Group bringing stakeholder and Traditional Owner perspectives and advice for RRAP decision making; a biennial survey and study into Partnerships for Scaling Up RRAP Deployment; three meetings of the regional Community Panel for Townsville, exploring new ways of involving community members in a longer-term and deeper discussion with scientists and Reef managers about proposed novel reef interventions; and implementation of a collaborative monitoring pilot project with the Cairns Port Douglas Hub Platform and Community Partnerships. These transformational engagement initiatives contribute to an overarching strategy to understand and drive community support for novel reef interventions.

Building on another successful spawning season and suitable weather conditions, major integrated field experiments were delivered safely and successfully by the **Enhanced Corals and Treatments, Coral Aquaculture and Deployment, Moving Corals, Rubble Stabilisation and Cooling and Shading** subprograms during the summer of 2022-2023. Conducted across multiple regions of the GBR, this allowed further testing of technology developments and design strategies, increased the knowledge of environmental factors most likely to influence the future performance of interventions, and enabled meaningful on-ground engagement with Traditional Owners, industry and communities.

The future of RRAP and interventions post Reef Trust Partnership

The RRAP Investment Case referred to a “multi-decadal national mission” and recommended a ten-year R&D program, recognising inherent limitations of research, including in relation to coral reproduction (spawning cycles and reproductive maturity), the need for long-term data on the ecology and demographics of corals, and the highly innovative nature of some program areas (such as cloud brightening). It was always anticipated that the program would see a focus on piloting the deployment of the most advanced interventions and progressive elimination of some technology options as research findings improved our knowledge of feasibility, efficacy, risk, social acceptance and regulatory compliance. These assumptions have remained valid.

In March 2023, the RRAP Board conducted a strategic planning exercise, examined the performance of the program, and concluded that the RRAP collaboration model and its governance framework remains the most effective vehicle for delivery of the next phase of R&D. At establishment, RRAP Partners committed to working together to maximise the outcomes and impact of the R&D activities, through a common set of goals and drivers:

- ➔ **Managing a highly adaptive approach to prioritising technologies** proposed for intervention and delivering an R&D program that embeds the design principle that interventions need to be suitable for implementation on the Reef at scale.
- ➔ **Bringing diverse multidisciplinary research and skills** (including social science and economics) to enable delivery of core objectives and, for this purpose, maintaining this intellectual base throughout the Collaboration.
- ➔ **Collaboratively pooling the intellectual capital of many organisations** to create and maintain a ‘hybrid vigour’ that drives the Collaboration and engenders a fundamental sense of shared purpose and commitment.
- ➔ **Enabling the necessary decisions in managing the risks** inherent in deploying new intervention technologies (including at pilot-test scale) into the environment.
- ➔ **Building societal confidence in the utility of proposed interventions**, through transparent, high quality science and engineering, and a targeted engagement program with Traditional Owners and stakeholders.

RRAP has remained committed to these ideals, focused on the common mission and dedicated to transparency, knowledge sharing and integration across organisations and disciplines. It has demonstrated its ability to adapt to changing circumstances (COVID-19 outbreak, funding limitations), to assess and manage risk and to make critical decisions when needed.

While RRAP will not be responsible for future policy and management decisions to implement interventions, or determining at what scale those might be deployed, the program is developing the capacity to best inform such decisions and must ensure interventions are safe, effective, supported by local communities and that substantial risks can be appropriately mitigated.

RRAP will reach an important milestone on this pathway at the end of 2023-2024, at which point the program will focus on two major streams of activity:

- ➔ **Ongoing R&D and engineering** to continue building our knowledge of the risk and benefits of interventions, support decision making, further the development of long lead-time interventions, and continually improve the performance of interventions that are ready for deployment.
- ➔ **Design and implementation of targeted deployment pilots** for selected interventions, to support Reef managers in regulating and integrating novel interventions within the GBR policies and strategies; and to develop and demonstrate end-to-end capabilities across a range of critical dimensions, program delivery and operations, innovative financing models, monitoring and control, Traditional Owner participation, community support and industry partnerships.



The at-scale piloting of RRAP interventions, albeit limited to a few locations initially, will not only play a key role in developing further scientific knowledge (intervention delivery, cost, efficacy and monitoring), but also allow the exploration of a range of elements considered critical to a future sustainable reef restoration and adaptation sector. These include:

- Site identification and selection.
- Regulatory approval (linked to risk).
- Community engagement and endorsement involving Traditional Owners, local communities and industries.
- Financing mechanisms to achieve scale and drive impact, and developing the science needed to objectively measure benefits.
- Identification of corporate governance and delivery models, meeting principles of independence and accountability and enabling engagement with the private sector and investment community.
- Development of critical technologies required for intervention planning and cost-effective monitoring, reporting and verification of outcomes.
- Ramp-up of human and physical infrastructure for production and deployment capacities.

A strong link will need to be maintained between pilot deployments and the core RRAP R&D program, especially in the early years of translation from R&D to deployment, however it should not be assumed that the RRAP Collaboration would by default represent an appropriate vehicle for the long-term delivery of deployments. It is instead likely that future at-scale deployments would require a dedicated governance and delivery model.

The RRAP Board acknowledged that this issue should be considered on its merit, involving a broader range of stakeholders, policy makers and Reef managers, and addressing key principles of independence and integrity (such as the separation between technology proponents and implementers), performance and accountability (including management of risk and liabilities) and adaptability and scalability (including in relation to financial instruments and capacity building). The Board has endorsed the establishment of a dedicated working group to progress these matters in the final year of this current phase of RRAP.

RRAP will seek to explore and pilot sustainable funding mechanisms for the future long-term delivery of RRAP interventions, in accordance with objectives stated in the Australian Government's Nature Positive Plan "to protect and conserve 30% of Australia's land and oceans by 2030".

By conducting the fundamental science linking reef restoration and adaptation activities to measurable biodiversity outcomes, RRAP can contribute to the Australian Government's intention to establish a nature repair market that "will deliver benefits for landholders, investors and the environment by encouraging investment in restoration activities to deliver clear, measurable biodiversity outcomes". While the marine environment is not the primary target of the Nature Repair Market, developing the fundamental knowledge and piloting these concepts for coral reefs represent precursors to a potential future marine biodiversity element.

The global scientific community is converging towards coral reef adaptation at scale

The threat posed to coral reefs by climate change is acknowledged as a global issue, and there is a growing international community of practice seeking to tackle this threat head on. At its inception, RRAP was considered a pioneer initiative, challenging the status quo of coral restoration by advocating for integrated R&D and engineering efforts and an increased focus on scale and adaptation, as the preferred pathway to sustaining the resilience of reef ecosystems.

Today there are several large scale intervention programs that focus on broadly similar objectives, including NOAA Mission Iconic Reefs (Florida), KAUST Reefscaper Restoration Initiative (Red Sea) and Reefense (Florida and Hawaii), in addition to the G20 Coral Reef R&D Accelerator Platform (CORDAP). RRAP is directly connected and collaborating with each of these initiatives, sharing knowledge, seeking synergies and advocating for common goals and the minimisation of duplication.

There has not been any significant technology disruption to the field of restoration and adaptation over the last few years. In fact, a significant level of convergence has been observed on the international stage towards the very solutions that RRAP identified as priorities, with a growing focus on: 1) increasing coral production capacity, and 2) developing the resistance of corals to temperature increase (mostly through selection).

Although no new intervention options have emerged, new opportunities for technology innovation have arisen at the production, delivery and deployment ends (methods to settle corals, probiotics treatments, monitoring and tagging technologies, AI, business models). RRAP will consider how best to integrate these innovations to improve intervention performance and to reduce cost and risk.

Case Studies

Collaboration for a new Reef restoration and adaptation industry

If proven safe and effective at scale, RRAP interventions will underpin a new reef restoration and adaptation industry likely requiring dedicated infrastructure and creating a range of career opportunities on land and water.

Interventions will only be successful if local communities and industry are involved in their implementation, under the guidance of reef managers.

Critical to this planning has been the formation of regional Community Panels to facilitate deep, two-way dialogue and knowledge exchange between Panel members and RRAP Intervention leads. The first-established Townsville-Hinchinbrook Community Panel in 2022-2023 has identified a series of risks, opportunities and knowledge gaps associated with several interventions and is exploring implications for communication strategies and community mobilisation.



Townsville-Hinchinbrook Community Panel meet to discuss RRAP interventions and their deployment.

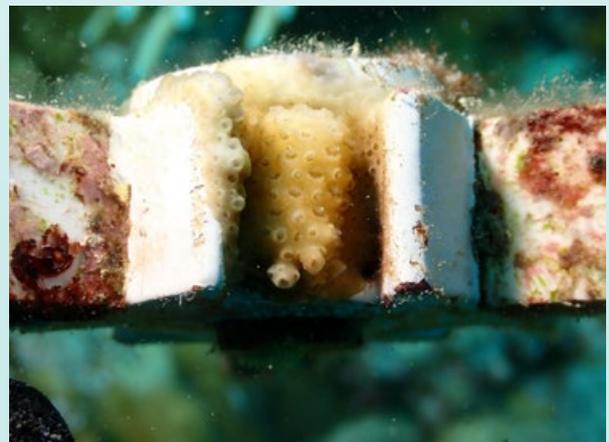
Case Studies

Optimising coral seeding and carrier devices for large-scale deployment

Throughout 2022-2023 RRAP has made scientific, technological, and engineering breakthroughs to allow for scaling of coral propagation in aquaculture, and subsequent delivery onto the Reef.

After annual spawning events, researchers have settled coral larvae or asexually produced fragments onto specially designed modular sheets treated with biofilms and antifoulants to promote survival. After a short period of growth in aquaculture facilities the sheets are transported to site in high-density self-contained systems. The sheets are then cut into 'coral tabs' which are inserted into carrier devices and then freely deployed onto the reef. Devices have been designed to be deployed in various arrangements to suit varying reef habitats.

Now in their third generation of design, devices have seen an improved retention rate, and improved coral survival rate, with plans for large scale deployments in 2024-2025.



Coral on settlement device deployed on Davies Reef for 28 weeks. The centre is coated with antifoulant which is being overgrown by a deployed coral. Image credit: Jose Montalvo Proano, AIMS.



A diver deploying a seeding device housing juvenile coral at Heron Island in early 2022 in an experiment to investigate the role of wave energy in coral survival and growth. Image credit: C. Randall.



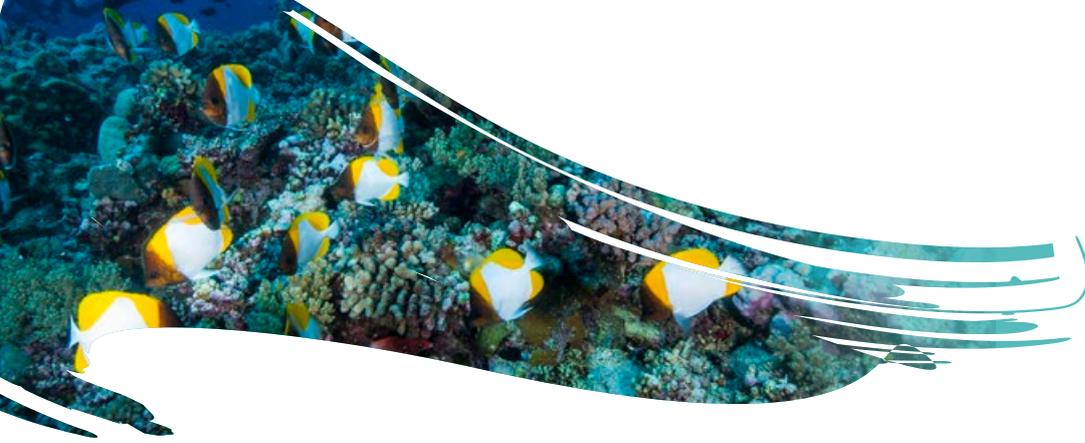
PhD student Taylor Whitman holding a recovered device with healthy coral growth. Image credit: Ian McLeod.

RRAS Annual Work Plan: 2023-2024

Major deliverables and budgets for Partnership activities in 2023-2024 are shown in Table 6.

Table 6: RRAS Component Partnership activities (RRAP Sub-Programs) and budget 2023-2024

Partnership Activity (RRAP Subprograms)	Description	Budget
● Aquaculture and deployment systems	<p>Develop the methods and systems to reliably propagate corals in captivity at scale (using sexual and asexual methods), the ability to seed corals onto reefs at low cost and with high post-deployment survival rates.</p> <p>Deliverables: Ongoing improvements to aquaculture processes, testing of settlement and deployment devices to improve production rates, major field tests.</p>	\$4.60m
● Enhanced corals and treatments	<p>Measure the scope and testing of methods for enhancement of heat stress performance in corals, while minimising potential trade-offs. These would be operationalised via the Aquaculture and Moving corals sub-programs.</p> <p>Deliverables: Ongoing development of genetic markers that can be used to identify warm adapted corals for use in RRAP interventions. Ongoing assessment of microbial methods to enhance early life stage heat tolerance. Best available methods to be utilised in aquaculture trials.</p>	\$2.01m
● Moving corals	<p>Coral seeding aims to speed the return of coral cover to a disturbed or damaged reef by increasing the number of available coral larvae for natural settlement, particularly where the reef has a low larval supply (e.g. following a large-scale bleaching event).</p> <p>Deliverables: Ongoing field tests focused on confirming post-release larval survival rates as a function of release method. This knowledge will then be utilised to guide how the method is scaled up.</p>	\$1.56m
● Rubble stabilisation	<p>Targeting the stabilisation or repair of damaged reef surfaces (for example by storms, ship groundings or coral bleaching), where dead or degraded coral can become loose and unconsolidated rubble, making it difficult for coral to regrow.</p> <p>Deliverables: Development of a decision-support system designed to aid decisions as to where and when rubble stabilisation will have benefit. Early development of chemical/biological binding methods designed to operate at much larger scales than current methods.</p>	\$1.43m
● Cooling and shading	<p>RRAP model predictions indicate that keeping existing corals alive at a large scale would have the biggest impact of all considered interventions. The concept of creating shade through clouds, mist, fog or surface films assumes that decreased solar radiation protects corals from bleaching. Ecological and physiological factors will be investigated through the foundational knowledge activity. Proof-of-concepts and assessment of the impact of manipulating solar radiation at scale will underpin risk and environmental impact assessments.</p> <p>Deliverables: Field testing fogging and cloud brightening technologies and gathering atmospheric data to enable assessments of potential efficacy.</p>	\$9.78m
● Cryopreservation	<p>Activities are focused on improving access to broodstock, tissue and gametes, promoting growth and survival in aquarium settings, investigating genotype/phenotype interactions and improved breeding methods.</p> <p>Deliverables: Establishment of an improved Australian cryopreservation capability and R&D to increase the throughput rate of sperm cryopreservation and early phase R&D into eggs and larvae cryopreservation.</p>	\$0.77m
● Foundational ecological knowledge (EcoRRAP)	<p>The objective is to optimise interventions by understanding the ‘how, where, and when’ of natural reef recovery. Centred around four themes: integrated field-testing program (within-reef fine-scale processes of natural reef recovery in several Reef regions); limitations to natural coral recovery (larval supply, juvenile growth/mortality, optimum adult densities); natural adaptation (ecological adaptation, genetic adaptation, thermal tolerance curves); and risks of interventions and field testing.</p> <p>Deliverables: Using eight field-testing sites established over the 2020-2022 period, the program will continue foundation ecological studies.</p>	\$3.29m



Partnership Activity (RRAP Subprograms)	Description	Budget
<p>● Integrated logistics and automation – Transition to deployment</p>	<p>Developing concept designs for translation of R&D outputs and early deployment of interventions from 2025-2026, addressing scalability issues, industry capacity building, coordination of social licence and regulatory activities, and input into modelling and decision support activities. Automation of propagation, deployment and monitoring required to achieve scale and impact.</p> <p><i>Deliverables: Improved concept design, modelling and planning of priority intervention deployment scenarios. Coordination of engagement with stakeholders, regulators and industry to enable delivery model. Assessment of areas/interventions where automation can lead to cost savings and improved capacity.</i></p>	\$1.99m
<p>Program management</p>	<p>This specifically refers to the funding of the RRAP managing entity, Executive Director, Program Director and Program Management Team, responsible for the delivery of a broad range of services including administration, program management (design, scheduling, budgeting, accounting and reporting), science and engineering coordination, monitoring and evaluation, communications and governance functions (including remunerations and expenses of independent board and committee members).</p> <p><i>Deliverables: All ongoing program management and governance functions.</i></p>	\$4.29m
<p>● Traditional Owner and stakeholder engagement</p>	<p>This activity will start early to capitalise on the momentum of the RRAP concept feasibility phase and ensure Traditional Owners and stakeholders remain engaged and informed, as a critical step in obtaining a social licence to progress interventions through the R&D phase. It is essential to establish a good baseline around social licence and sentiment at the start of the program.</p> <p><i>Deliverables: Established data collection and information gathering methods and processes to review, evaluate and synthesise knowledge and insights. Participatory process into the exploration of future reef/deployment scenarios and piloting of different engagement mechanisms.</i></p>	\$1.52m
<p>● Regulation and policy</p>	<p>As many of the proposed interventions will translate to activities never previously considered within the GBRWHA, a review of existing regulatory and policy frameworks is required, followed by an assessment of capacity and training needs for managers and researchers. Delivered through continuous engagement with relevant regulatory agencies, this activity will assess risks and required impact assessment needs to ensure permit processes are facilitated.</p> <p><i>Deliverables: Regulatory and permitting processes are progressing towards a system that is fit-for-purpose for the proposed interventions, with regards to adequate risk and impact assessment needs.</i></p>	\$0.35m
<p>● Modelling and Decision support</p>	<p>Continuing the development of research and operational models to improve predictions of the impact of proposed interventions, and of best practice decision-support frameworks to assess different intervention options and R&D investment prioritisation and focus. Given the uncertainty caused by climate change, these models will need to consider multiple future scenarios.</p> <p><i>Deliverables: An operational modelling and decision-support system is established and updated counterfactual (no interventions) and intervention deployment scenarios run and analysed. Outputs utilised to guide the program as it transitions from years 2 to 3, and to assess future investment options.</i></p>	\$3.81m
<p>2023-2024 RRAS COMOPNENT BUDGET</p>		<p>\$35.40m</p>

While the six-year Reef Trust Partnership involves a five-year implementation phase and budget across each of its Components, RRAP is a longer-term initiative – the first phase funded under the Reef Trust Partnership – and operates under a four-yearly budget.

The forecast budgets for the FY2020-2024 period against the Partnership Activities (RRAP Sub-Programs) described above are detailed in Table 7 below.

Table 7: RRAS Component Partnership activities (RRAP Sub-Programs) and budget for FY2020-2024

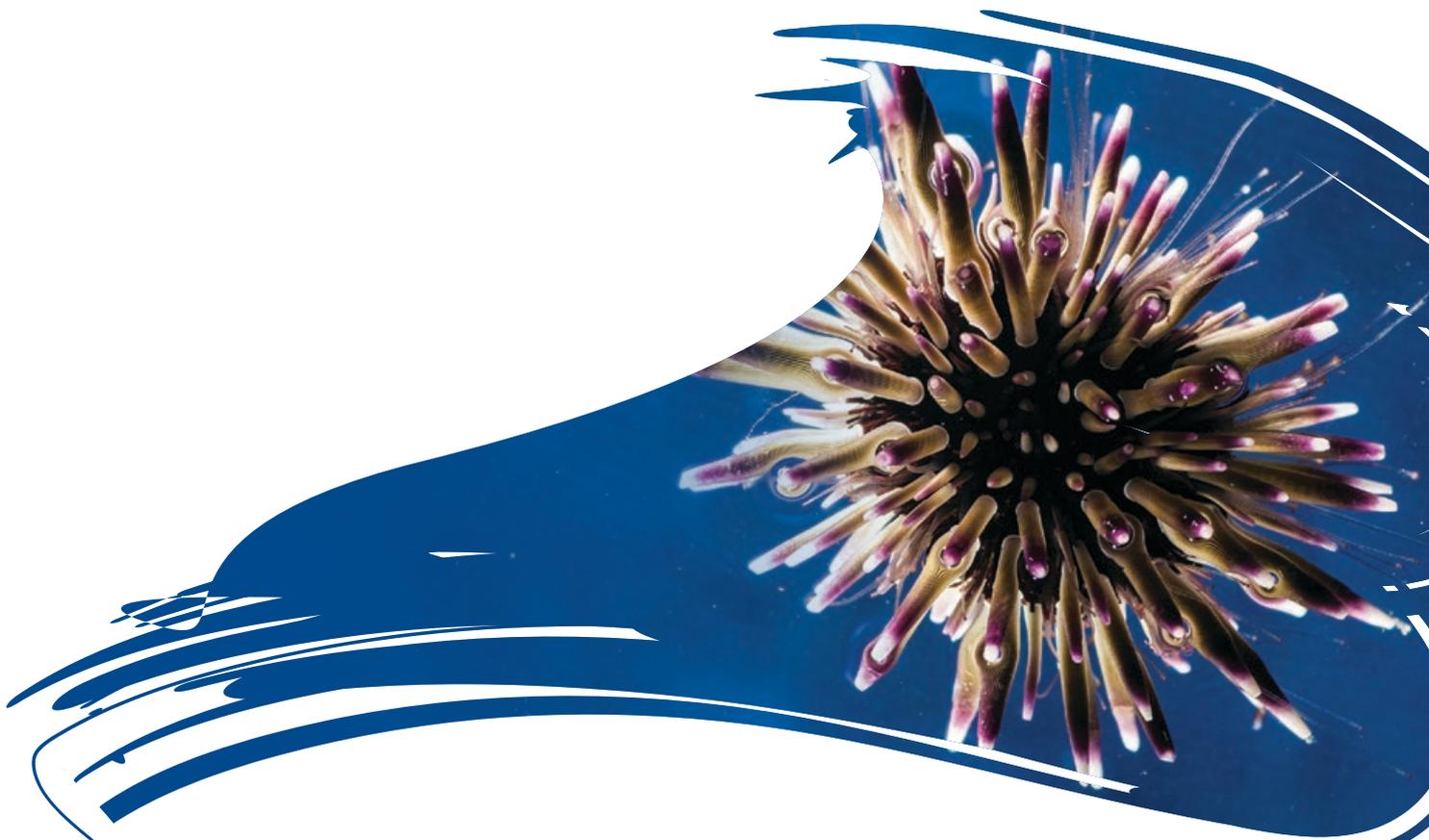
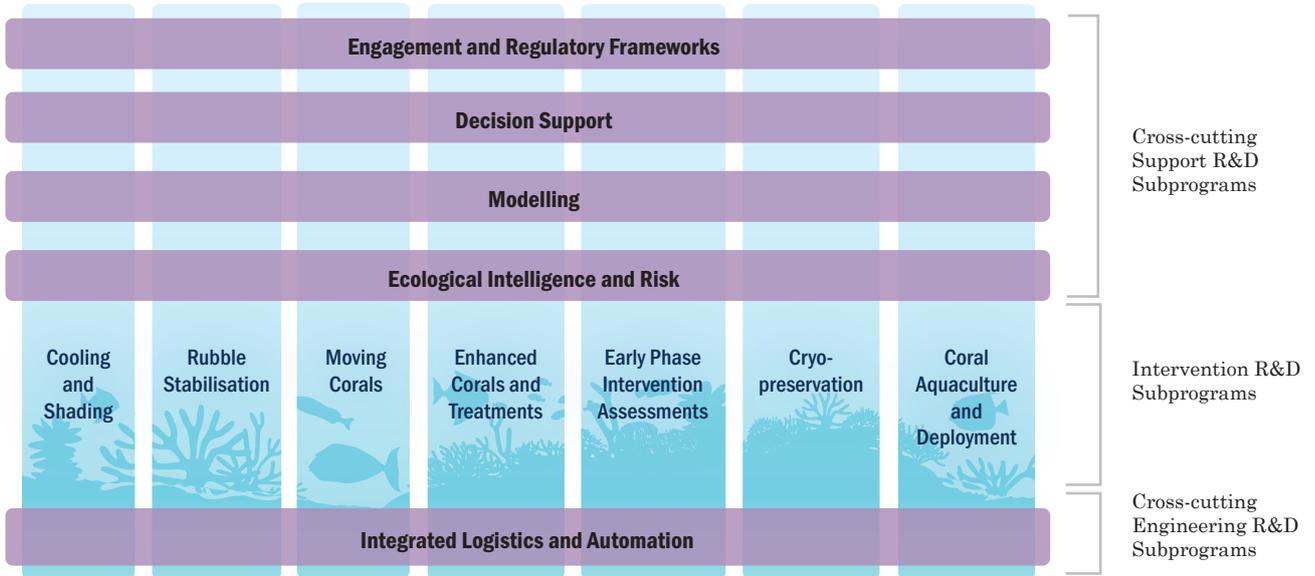
Partnership Activity (RRAP Subprogram)	2020-22 RTP RRAS Budget (total budget)	2022-23 RTP RRAS budget (total budget)	2023-24 RTP RRAS budget (total budget)	2020-2024 RTP RRAS budget (total budget)
Aquaculture and deployment systems	\$5.8m (\$9.1m)	\$4.8m (\$7.2m)	\$4.6m (\$6.9m)	\$15.1m (\$23.1m)
Enhanced corals and treatments	\$4.1m (\$6.2m)	\$2.7m (\$4.1m)	\$2m (\$3m)	\$8.8m (\$13.3m)
Moving corals	\$2.2m (\$3.7m)	\$1.5m (\$2.2m)	\$1.6m (\$2.3m)	\$5.3m (\$8.2m)
Rubble stabilisation	\$2.7m (\$3.9m)	\$1.7m (\$2.5m)	\$1.4m (\$2.2m)	\$5.8m (\$8.6m)
Cooling and shading	\$7.7m (\$10.9m)	\$10m (\$12.7m)	\$9.8m (\$12.7m)	\$27.5m (\$36.3m)
Cryopreservation	\$1.1m (\$1.3m)	\$0.7m (\$1m)	\$0.8m (\$1m)	\$2.6m (\$3.4m)
Foundational ecological knowledge (EcoRRAP)	\$5.3m (\$8.9m)	\$3.9m (\$5.7m)	\$3.3m (\$4.9m)	\$12.5m (\$19.5m)
Integrated logistics and automation	\$1.3m (\$2.2m)	\$1.7m (\$2.5m)	\$2m (\$3m)	\$4.9m (\$7.7m)
Program management	\$5.1m (\$6.9m)	\$3.5m (\$4.7m)	\$4.3m (\$5.6m)	\$12.9m (\$17.1m)
Traditional Owner and stakeholder engagement	\$1.8m (\$3.4m)	\$1.6m (\$2.3m)	\$1.5m (\$2.2m)	\$4.9m (\$8m)
Regulation and policy	\$0.8m (\$1.2m)	\$0.4m (\$0.7m)	\$0.3m (\$0.6m)	\$1.6m (\$2.5m)
Modelling and decision support	\$3.4m (\$6.8m)	\$4.3m (\$6.3m)	\$3.8m (\$5.6m)	\$11.5m (\$18.6m)
RRAS BUDGET (TOTAL BUDGET)	\$41.3m (\$64.5m)	\$36.8m (\$51.7m)	\$35.4m (\$50m)	\$113.5m* (\$166.3m)

* The total budget includes, in addition to the RTP Component 4 budget, a \$20 million commitment from the Australian Government (October 2022 budget measure) and an estimated \$58.9 million in additional funding and co-investment through the Collaborative Investment Strategy.

The intervention-focused subprograms will be supported by cross-cutting science and engineering subprograms. Further details on each subprogram and projects funded by RRAP can be found at <https://gbrrestoration.org/the-program>.

Figure 2: RRAP R&D Program structure

The intervention-focused subprograms will be supported by cross-cutting science and engineering subprograms.



Traditional Owner Reef Protection Component

Partnership Budget: \$51.8 million⁴

2023-2024 budget: \$11.065 million

Purpose: To improve the engagement of Traditional Owners in the protection of the Great Barrier Reef World Heritage Area.

- Land and sea action and investment planning
- Active Traditional Owner-led Reef protection activities
- Indigenous innovation, leadership and collaboration
- Sustainable funding (Futures Fund)

End-of-Partnership Outcomes

The Reef Trust Partnership's Traditional Owner Reef Protection Component will result in:



Traditional Owner co-design action framework is implemented across the Partnership to help build capacity



Benefits to Traditional Owners engaged in Sea Country Management improve



Traditional Owner participation in governance arrangements for Reef protection and management is improved



The first stage of a Great Barrier Reef Traditional Owner Futures Fund is in place and operating effectively



Traditional Owners' on-Country activities contribute to Reef biocultural health



Improved cultural awareness within Partnership projects and partners

⁴ The [Investment Strategy](#) describes the RTP's commitment to allocate a minimum of \$42 million to Traditional Owner-led Reef protection actions under the Reef Trust Partnership. This includes a minimum 10% from each of the Water Quality, COTS Control, Reef Restoration and Adaptation Science and Integrated Monitoring and Reporting Component budgets towards co-designed Traditional Owner-led activities. When combined with the \$12 million allocated towards Indigenous Reef Protection in the [Grant Agreement](#), this equates to \$51.8 million.

Progress on our journey

The socio-political landscape for Traditional Owners of the Reef and its catchment has changed dramatically since the start of the RTP in 2018. We are currently experiencing a period of unprecedented, and long overdue, support and advocacy for Traditional Owner involvement in the Reef and Country generally, and the desire to grow and strengthen relationships between multiple partners has seen a ground swell of investment in on-ground activities through grants and partnerships.

At the inception of the RTP, the Foundation worked at the pace that was needed for Traditional Owner governance to be established and the co-design approach to be adopted in its entirety. Now, five years on, we find ourselves being able to apply our learnings and implement authentic co-designed programs that have emerged from the long-standing working relationships that we have developed with our Traditional Owner governance members. The Foundation is uniquely positioned to partner with Traditional Owners to catalyse the opportunities that will be released through ongoing water quality and Reef restoration funding and realised through the establishment of a taskforce, which will work towards the delivery the Reef 2050 Traditional Owner Implementation Plan.

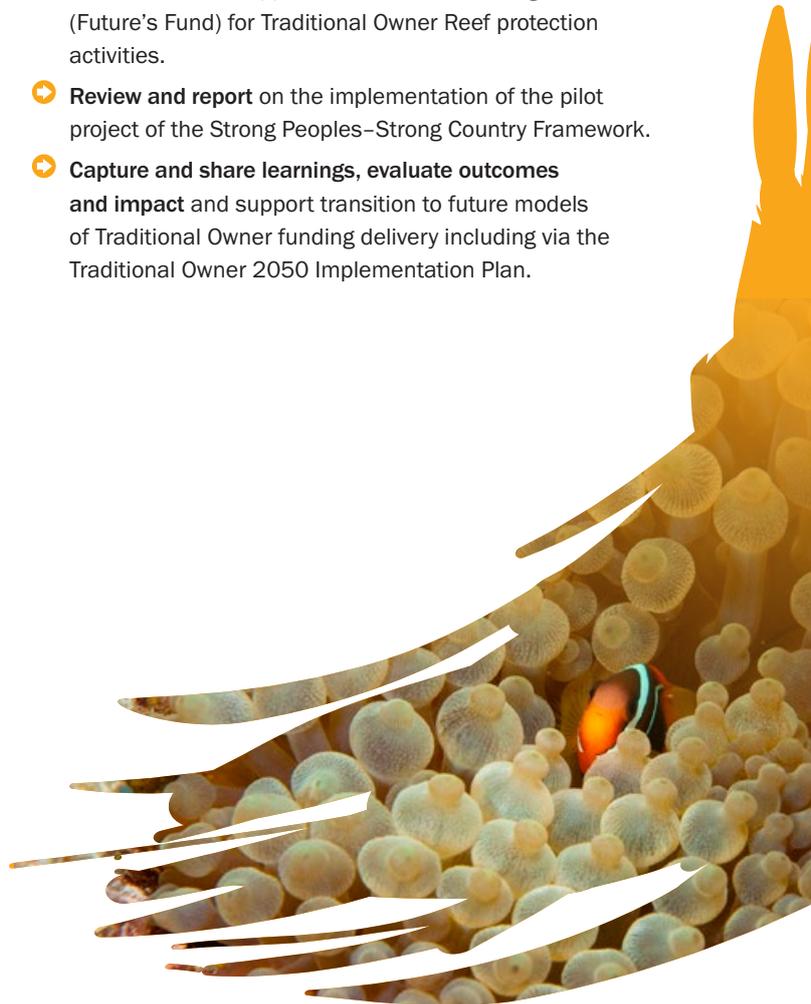
Activities within the Traditional Owner Reef Protection component of the RTP will be extended until June 2026 to provide time for a complete delivery process of the work that has been carefully curated through our co-design processes. This will also provide an opportunity to fully consider the impacts of the program, capture the lessons learned and provide advice for future programs that can lend themselves to the transformational path that the Foundation and Traditional Owners have set themselves on.

Key achievements to date include:

- ✔ **Delivering outcomes for land, sea and community** with more than 2,380 Traditional Owners involved in the delivery of 79 Reef protection projects led by 49 Traditional Owner groups.
- ✔ **Advocating for changed processes that see Traditional Owners involved and consulted** in Water Quality planning processes at a State and Reef level, including the Scientific Consensus Statement and Water Quality Improvement Plan.
- ✔ **Building and implementing a co-design model and governance support system** that is the heart of all Traditional Owner-driven programs.
- ✔ **Doubling the representation of Reef Traditional Owners in Reef governance and decision making** and supporting the ongoing involvement of those original members.
- ✔ **Elevating Indigenous women voices** and creating advocacy for gender equity in environmental programs.

As we move into 2023-2024, the RTP will:

- ➔ **Continue to work with Traditional Owners and Reef 2050 partners** to improve Traditional Owner involvement in the governance and management of the Reef, while looking at succession planning and experiential development for up-and-coming young Traditional Owner leaders.
- ➔ **Showcase impact stories** from a strategic communication lens that places Traditional Owner voice at the centre of stories.
- ➔ **Continue to manage the on-ground delivery** of Traditional Owner activities through existing grant programs
- ➔ **Launch a final funding round** that will provide the critical fiscal support to enable activities for healthy water, integrated monitoring and reporting, COTS control, healing country, and other identified Traditional Owner needs and aspirations.
- ➔ **Co-design and deliver pilot programs** that support Traditional Owner women and men in leadership initiatives and consider the models of care that are needed within cross cultural situations.
- ➔ **Present options for appropriate business and governance models** that will support a sustainable funding stream (Future's Fund) for Traditional Owner Reef protection activities.
- ➔ **Review and report** on the implementation of the pilot project of the Strong Peoples–Strong Country Framework.
- ➔ **Capture and share learnings, evaluate outcomes and impact** and support transition to future models of Traditional Owner funding delivery including via the Traditional Owner 2050 Implementation Plan.



Working towards Healthy Country

Traditional Owners have always and continue to advocate strongly for the perspective that land and sea are not separate ecosystems but remain intrinsically together ‘as one’ – referenced simply as ‘Country’. The healthy functioning of reef ecosystems operates within a cultural landscape and considers adjacent catchments and coastal lands, as well as the health and wellbeing of Traditional Owners themselves. This also includes cultural practices, observances and customs and is a matter of unique balance and harmony within the healthy functioning of the system.

The work of co-design has brought to life, honoured and actioned this holistic perspective and can be seen in practice through the Partnership’s co-designed grants programs: Healthy Water, Healing Country and Strong Peoples–Strong Country; as well as represented through key partnerships in crown-of-thorns-starfish control and reef restoration and adaptation.

The RTP codesigned grant programs have engaged with 49 Reef and catchment Traditional Owner groups through 79 contracted and supported projects. Across all our Traditional Owner Reef Protection projects we have had over 2,380 Traditional Owner engagements, funded seven youth projects resulting in over 500 young people being engaged in on-Country activities, and delivered Women’s Leadership programs that have supported the participation of over 70 women. This has been facilitated predominantly through the five co-designed grant rounds that have been deployed over this last three and a half years.

The bigger story that is emerging from the evaluation of the co-designed grant programs is that Traditional Owner groups have been able to use grant funds to initiate many of their ‘start-up’ ideas (e.g. development of a Country-based plan, training for young people, setting up monitoring projects with scientists) and then leverage the outcomes of the projects for continued investment through strengthened and new partnerships, and funding programs such as Indigenous Land and Sea Rangers, Traditional Use of Marine Resource Agreements (TUMRAs) and Indigenous Protected Areas (IPAs).

Over the next 12 months, the grants focus will be on the continued support of grant recipients implementing on-ground projects, and the launch of the final Traditional Owner grant program — Helping Country. This new and integrated grant program will be delivered in the coming months and will be inclusive of all previously co-designed features and will serve the component areas — healing Country, healthy water, monitoring and COTS management.

Celebrating Traditional Owner Voice

The launch of the ‘Healthy Water Statement’ — *Healthy Water, Healthy Country, Healthy People* — is now supporting a range of activities across the Traditional Owner water quality space. The Statement is also working its way into mainstream policy and planning development, as the Scientific Consensus Statement and WQIP processes are looking for Traditional Owner involvement.

The Healthy Water Statement was developed by Traditional Owners involved in the governance and implementation of the Healthy Water program. This program considers both freshwater and saltwater systems as a continuous waterscape, and while it centres around Traditional Owner world views, it encourages both Indigenous and western science knowledge to contribute to holistic ecosystem management. The program also addresses previous engagement and participation gaps through policy and program re-design.

The RTP remains committed to the elevation of Traditional Owner voices through the continued implementation of the Traditional Owner Strategic Communications Framework. This framework provides a platform for Traditional Owners to share their unique stories through self-determined ways that uplift their communities and create a shared understanding in the broader community.

Understanding the impact of co-design

As the Traditional Owner Reef Protection program moves firmly into the implementation and review stages, the Foundation is able to track and reflect on the efficacy of the co-design approach with its foundational principles and mindset values, all of which have been adopted by the Traditional Owner Partnership team (taking guidance from the approaches of leading experts in co-design).

An integral delivery mechanism of the co-design framework was the establishment of Traditional Owner governance structures within the RTP (20 positions) that enabled the elevation of Traditional Owner voice into the design and implementation of programs. This in turn gave insight and direction on the priority needs and aspirations of Traditional Owners in the Reef and Catchment area. Co-design enabled the 'lived experience' perspective of Traditional Owners and this knowledge has been applied to the delivery of grants guidelines, workshop design and prioritisation of work. Having real-time access to community activities and aspirations means that direction-setting on future work and keeping abreast of the everchanging socio-political landscape is efficient and effective. The outputs resulting from establishing internal governance positions within the RTP are remarkable, with 430 hours of co-design being undertaken since the Program's inception.

In addition to supporting co-design, the Traditional Owner governance groups are being increasingly called upon to collaborate with government and stakeholders in efforts to improve Traditional Owner engagement in important policy activities. Recent examples include the Healthy Water Technical Working Group involvement in updating of the Scientific Consensus Statement on Water Quality in the GBR and advising the GBR Water Quality Implementation Plan review team on inclusion of Traditional Owner voices, perspectives and knowledge. These opportunities are expected to increase over the coming years as government strengthens Traditional Owner engagement activities. The Foundation remains committed to supporting the development of relationships between Traditional Owners and key stakeholders including government, when required.

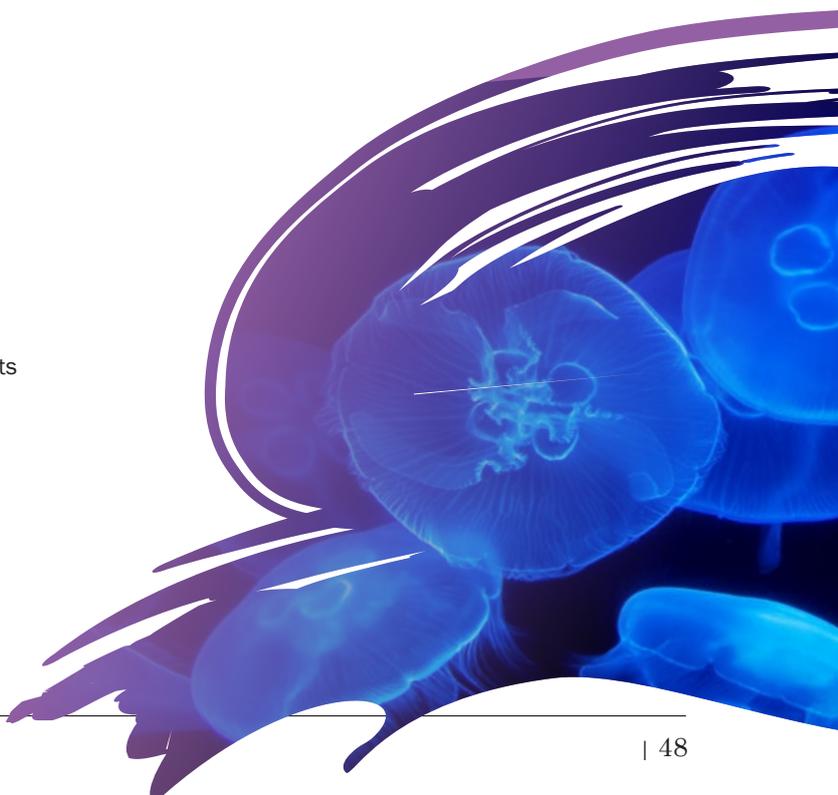
As we move into 2023-2024, the governance groups will transition from a focus on project design and delivery into reflection and review of projects and lessons learned. This presents an opportune time to reflect on the impact and outcomes of the Traditional Owner Governance arrangements and ensure that this model and its key learnings can be shared and adopted within future Traditional Owner Reef protection programs.

Transitioning to future directions

Elevating Traditional Owner contribution and amplifying Traditional Owner voices has established new inclusion pathways through the co-design process. This lays down a critical stable foundation — as the Reef Trust Partnership transitions to a new era of Traditional Owner-led operations. The Reef 2050 new Traditional Owner Taskforce will continue to advocate this legacy work through operating the [Reef 2050 Traditional Owner Implementation Plan \(2022\)](#).

The Reef 2050 Traditional Owner Implementation Plan affords direct continuance of actions that have commenced under the Reef Trust Partnership Traditional Owner Reef Protection Program (2018-26). Traditional Owner technical components relating to healthy water, crown-of-thorns starfish control; integrated monitoring and reporting; and reef restoration and adaptation are accounted for within the new Implementation Plan. The Foundation remains an important partner to Traditional Owners, well-positioned from the work of the RTP to continue deepening its partnering relationships and agreements. It remains the first contributor to the Traditional Owner Futures Fund and continues to strengthen its capabilities in fundraising and sustainable financing mechanisms.

With the RTP two-year extension confirmed, the RTP is continuing to work within existing co-design governance arrangements to consider how Traditional Owners wish to transition the work created under the RTP, through to future operations of the Reef 2050 Traditional Owner Implementation Plan. Key elements highlighted in the new Implementation Plan include establishment of a taskforce with a coordination function, amplifying Traditional Owner climate action, consideration and establishment of a sea Country alliance, as well as co-investment to the Traditional Owner Futures Fund.



Case Studies

Traditional Owners Championing Healthy Water Initiatives

In August 2022, the Foundation hosted the inaugural Traditional Owner Healthy Water Forum. The forum aimed to provide an opportunity for peer-to-peer learning and networking and to understand Traditional Owner goals and aspirations for Reef water quality. It was attended by 33 Traditional Owners from 11 Traditional Owner groups, delivering water quality projects through the RTP's Healthy Water grants program.

Co-designed by Traditional Owners for Traditional Owners, the Healthy Water Technical Working Group's vision for the forum was for a welcoming and celebratory setting, which provided a space for ceremony, serious conversations, sharing, learning and fun. The realisation of this vision combined Traditional Owner facilitation with Traditional Owner design and delivery, allowing for high levels of trust, engagement and interaction by attendees, where everyone felt free to speak openly, and be heard and appreciated by their peers.

“

It created a safe space to share knowledge, provide feedback and free-flowing advice.

Larissa Hale, Yuku Baja Muliku Traditional Owner

”

Over the two days, Traditional Owners shared updates on their Healthy Water grant projects and the positive impacts they are seeing on Country and in their communities. Attendees participated in deep discussions on cultural values of water, their goals and aspirations, and what changes they would like to see in the GBR water quality improvement space for those aspirations to be realised. Critically, several key themes and messages were identified as priority action areas to ensure greater Traditional Owner involvement, leadership and realisation of rights in the GBR water quality improvement efforts:

- Traditional Owners want strong partnerships with government and other water quality stakeholders
- Traditional Owners need and deserve a seat at the decision-making table to drive water priorities
- There is a strong need for better pathways to determine and secure cultural water rights and ownership.

Work will progress in 2023 to synthesise the key messages and actions from the forum to be shared with key stakeholders to keep driving change and removing barriers for Traditional Owners in Reef water quality. Feedback from attendees has been overwhelmingly positive, and the team are looking to build on this success with a follow-up forum down the track.



The Traditional Owner Healthy Water Forum.

Case Studies

Traditional Owners Championing Healthy Water Initiatives

Following the highly successful Traditional Owner Healthy Water Forum, the Foundation was invited to host a Traditional Owner Healthy Water session at the 2022 Water Quality Synthesis Workshop in Cairns. This three-day workshop brought together more than 100 Traditional Owners, researchers, Federal and State government policy makers and regulators, farmers and natural resource management and tourism bodies to coordinate and communicate science and research outputs related to water quality.

The Healthy Water session was chaired by Dr Cass Hunter (Eastern Kuku Yalanji and Muilgal Traditional Owner), Chair of the Healthy Water Technical Working Group who, along with Samarla Deshong (Koinjmal Traditional Owner) and Alwyn Lyall (Kuku Thypan Traditional Owner), gave a powerful inaugural presentation of the Healthy Water Statement. This Statement is a call to action for government, scientists, researchers, industry and broader stakeholders to show courage and leadership to enable Traditional Custodians' legitimate co-management for shared decision-making across the Reef and catchments.

Five individual Traditional Owner groups then presented on their Healthy Water Grant projects and what this work means to them. These presentations were raw, moving and informative, giving everyone in the room an opportunity to think about opportunities for collaboration and partnerships.

This session was rated as the highest-value session of all sessions at the Synthesis Workshop. In addition to the Healthy Water session, Traditional Owner attendees had opportunities to contribute to key pieces of work including the Water Quality Improvement Plan review. This level of Traditional Owner engagement at the WQ Synthesis workshop is unprecedented and we look forward to seeing it continue to grow.



The lights of Indigenous learnings and leadership are shining bright.

Dr Cass Hunter,
Chair of the Foundation's Healthy Water Technical Working Group



Dr. Cass Hunter presenting at the Water Quality Synthesis Workshop in August 2022.

Case Studies

Mandubarra Traditional Owners prepare for the long game

Mandubarra Traditional Owners are utilising their seagrass mapping project — granted under the co-designed Healing Country Grants Program — as a strategic tool to help them realise their long-term vision for Traditional Owner-led collaborative sea Country management.

Sharing their southern sea Country border with the Giringun Region Traditional Use Resource Management Agreement (TUMRA), and a proposed border in the north with a TUMRA under negotiation, Mandubarra Aboriginal Land and Sea Inc (MALASI) are gathering crucial data on the state of environment within the Mandubarra TUMRA area. Rangers are upskilling in identifying and understanding dugong feeding trails, developing baseline dataset for seagrass and coral, and mastering the use of underwater drones and Artificial Intelligence for monitoring.

Already in discussions with their Traditional Owner neighbours, MALASI are laying the foundations for an exciting joined-up sea Country alliance across neighbouring TUMRAs. Data collected and skills learned by MALASI under the Healing Country grant will contribute to this unique partnership between Traditional Owner TUMRA managers, where they hope to collaboratively restore, care for and heal Country through the sharing of resources, expertise and data.

This collaborative alliance will seek to create efficiencies and facilitate the scaling-up of impact across a larger geographic area, while also ensuring that Traditional Owners can continue to demonstrate their leadership and expertise as the original Custodians of the Reef.



Mandubarra Rangers volunteering to learn about seagrass plantation work at Mourilyan Harbour.



Mandubarra Rangers undertaking seagrass identification training with TropWater at Kurrimine Beach.

Case Studies

Traditional Owner leadership is intrinsic to protecting and healing the Reef

In December 2022, the Queensland Indigenous Women's Ranger Network (QIWRN) won the prestigious Earthshot Prize for the Revive our Oceans category. The prize is designed to discover, spotlight and scale ground-breaking solutions to the world's greatest challenges.

The Foundation's Traditional Owner Advisory Group Chair and proud Yuku Baja Muliku woman Larissa Hale accepted the £1 million (AU\$1.78m) prize on behalf of the Indigenous women who are leading the charge to build the next generation of female Indigenous rangers with the ancient knowledge, skills and modern conservation tools needed to better protect the Reef.

Over the past four years, QIWRN has trained over 60 women, encouraging new conservation approaches by sharing knowledge and telling stories. As custodians of the land, the rangers protect sites of great cultural and spiritual significance, bringing together traditional knowledge passed down from generation to generation and modern tools such as drones to monitor coral changes, bushfires and land degradation.

Earthshot is shining a spotlight on the vital work of Traditional Owners — particularly the role of women — in Reef conservation and management.

It is a gamechanger for QIWRN which exists to protect the Reef and vital land and sea Country. The prize will be used to grow the number of Indigenous women rangers and inspire the next generation of girls.

QIWRN has been co-designed by Indigenous women, government and non-government agencies, land councils and other stakeholders as a highly collaborative program that delivers lasting support, opportunities and security for Indigenous women rangers across Queensland. It is delivered by Yuku Baja Muliku Landowner and Reserves, a Cooktown-based Traditional Owner group who were the successful recipients of a joint Queensland Government and WWF Australia grant to establish a state-wide women's land and sea ranger network. The RTP has provided funding to support QIWRN forums and training.



Queensland Indigenous Women's Ranger Network.

Traditional Owner Reef Protection Five-Year Plan

Our five-year plan for the Traditional Owner Reef Protection Component includes the Partnership Activities outlined in Table 8. With the Component now being extended to June 2026, a future-facing plan will be developed in conjunction with Traditional Owners on the RTP’s governance groups.

Table 8: Traditional Owner Reef Protection Partnership activities and budgets

Partnership activity	Rationale	Description	Budget
Indigenous innovation, leadership and collaboration			\$5m
<ul style="list-style-type: none"> ● Traditional Owner Partnership governance ● Leadership and capacity-building ● Strategic communication and engagement ● Co-design action framework 	<p>he Traditional Owner Reef Protection Component provides an unprecedented opportunity for Reef Traditional Owners to action key recommendations and priorities for the management of Sea Country that have been consistently identified and documented over the past two decades.</p> <p>Traditional Owner engagement in the Partnership aims to strengthen active participation and decision-making, with co-designed programs and projects delivering improvements to equitable outcomes and maximising co-benefits.</p>	<p>The Partnership is committed to a process of co-design and co-delivery with Traditional Owners of the Reef.</p> <p>This activity will support leadership activities that build and strengthen the capacity and capability of Traditional Owners to actively participate in the Partnership.</p> <p>Effective communication and engagement of Reef Traditional Owners remains a critical priority throughout the Partnership.</p> <p>This activity involves the development of a Reef co-design (co-benefit) framework with Traditional Owners, Reef 2050 partners and the broader community.</p>	
Traditional Owner Futures Fund			\$10m
<ul style="list-style-type: none"> ● Establish a Traditional Owner Futures Fund 	Independent and sustainable financing is needed to support governance, future leadership activities (such as student scholarships) and strategic investments which build Traditional Owner capacity and capability in Reef management.	This activity aims to provide a sustainable funding stream for Traditional Owner Reef protection activities through the \$10m allocated to this fund and invested in term deposits.	
Active Traditional Owner-led Reef protection activities			\$36.8m
<ul style="list-style-type: none"> ● Crown-of-thorns starfish control 	<p>There is a recognised need for Traditional Owner groups to be directly involved in decision-making and management of reefs and activities on their Sea Country.</p> <p>There is a need to create culturally appropriate pathways for Traditional Owners to increase employment opportunities, build partnerships, co-design programs, diversify skillsets and lead economic enterprises related to COTS surveillance and control.</p>	This work supports activities that improve Traditional Owner participation in crown-of-thorns starfish control and facilitates training and service delivery partnerships.	\$5.3m

Partnership activity	Rationale	Description	Budget
<p>● Reef monitoring and reporting</p>	<p>Traditional Owners are the keepers of Indigenous Knowledge and cultural values and have observed dramatic changes on their country. The Strong Peoples-Strong Country framework provides the basis for understanding the Reef as a biocultural ecosystem and requires investment to develop indicators to understand the condition and status of Indigenous heritage in the Reef.</p> <p>There is a need to resource Traditional Owners to build capacity and diversify skill sets to enable recording and appropriate sharing of Indigenous Knowledge and information.</p>	<p>Traditional Owner knowledge forms a critical part of building a holistic understanding of the condition and trend of Reef values. This work aims to implement the Strong Peoples-Strong Country framework, including negotiation of data-sharing agreements, audit of monitoring skills, tools and assets and development and implementation of education and employment pathways.</p>	\$3.5m
<p>● Healthy water</p>	<p>Traditional Owners require better engagement in the Reef 2050 Water Quality Improvement Plan and related funding opportunities.</p> <p>Consideration of Indigenous values in current water quality programs are needed to improve decision-making.</p>	<p>This work aims to improve Traditional Owner access to, and active participation in, water quality projects through grants, a water literacy toolkit and assistance from a coordinator.</p> <p>Adoption of co-design approaches in the Reef Trust Partnership Water Quality Component will improve active participation and maximise benefits for Traditional Owners.</p>	\$17m
<p>● Reef restoration and adaptation</p>	<p>Traditional Owners hold inherent rights to the Reef and have successfully cared for their traditional homeland estates since time immemorial. Over the last century, they have witnessed increased pressures and a changing environment. This carries with it a deep sadness for the loss of their healthy Country. Traditional Owners must therefore form part of the solution to improve the health of the Reef.</p> <p>There is a need to create culturally appropriate pathways and make resources available for Traditional Owners to diversify skillsets, build capacity, contribute to and lead research and to formalise education and employment pathways to heal country and people.</p>	<p>This work aims to improve Traditional Owner access to and active participation in Reef restoration and adaptation projects.</p>	\$9m
<p>● Early investment: Stage 1 grants program</p>	<p>Country-based planning and implementation provides a structured approach for groups to articulate and understand the values and aspirations of their Land and Sea Country for improved management.</p> <p>There is a need for Indigenous heritage including biocultural systems, culturally significant species and important habitats to be mapped and monitored.</p>	<p>This initial open grant round was launched in early 2019 and addresses three key focus areas:</p> <ol style="list-style-type: none"> 1. Country-based planning 2. implementation of existing Country-based plans 3. junior ranger activities 	\$2m
<p>TOTAL TRADITIONAL OWNER REEF PROTECTION COMPONENT BUDGET</p>			<p>\$51.8m</p>

Traditional Owner Reef Protection Annual Work Plan: 2023-2024

Major deliverables and budget under each Partnership Activity for 2023-2024 are shown in Table 9.

Table 9: Traditional Owner Reef Protection Component Partnership activities and budget 2023-2024

Partnership Activity	Description	Budget
Indigenous innovation, leadership and collaboration		
Traditional Owner governance	Ongoing delivery of Traditional Owner Reef Trust Partnership governance arrangements. Deliverables: 1. Traditional Owner Advisory Group to meet up to four times a year. 2. The established Traditional Owner Technical Working Groups to meet in accordance with their terms of reference.	\$0.325m
Leadership and capacity building	This program area will support leadership activities that build and strengthen the capacity and capability of Traditional Owners to actively participate in the Partnership. Deliverables: 1. Develop and deliver a men's and women's project, and provide mentorship and support for Traditional Owners involved in the RTP. 2. Support youth initiatives and programs that foster emerging leaders in the youth space.	\$0.38m
Strategic communication and engagement	Effective communication and engagement of Reef Traditional Owners with an emphasis on elevating Traditional Owner voice throughout the Reef and Catchment regions. Deliverables: 1. Implement a Traditional Owner Strategic Communication Framework through the development of products that promote opportunities and achievements, and share learnings under RTP. 2. Co-investment into a Traditional Owner strategic think tank and/or support available for Traditional Owner attendance at identified conferences or learning events.	\$0.70m
Co-design action framework	Continue to develop the reef co-design (co-benefit) framework with Traditional Owners, Reef 2050 partners and the broader community. Deliverables: 1. Strategic partnership with co-design experts built and maintained. 2. Participation in coaching workshops and TOAG and TWG members involved. 3. Co-design principles published, tools and resources developed. 4. Indigenous evaluation strategy implemented. 5. Explore Traditional Owner leadership with intent to design fit for purpose model of care to strengthen leadership resilience in performance of governance duties.	\$0.15m
Sustainable funding (Futures Fund)		
Traditional Owner-led Futures Fund	This activity aims to provide a sustainable funding stream for Traditional Owner Reef protection activities through the \$10m allocated to this fund and invested in term deposits. Deliverables: 1. Present options for appropriate business models and governance models to the TOAG. 2. Funds invested in a term deposit.	\$0.05m
Traditional Owner-led Reef protection activities		
Grants	Ongoing management of three different grant rounds including the design and delivery of a large \$5m grant round that supports all component areas. Deliverables: 1. Delivery of COTS, RRAS, and IMR projects supported through Stage two grants. 2. Support Traditional Owner Community Action Plan grants in the RTP Community Reef Protection Program. 3. Design and delivery of Stage 3 grants – Helping Country Grants (\$5m grant round that will deliver Traditional Owner led projects until 2026).	\$1.98m



Partnership Activity	Description	Budget
Traditional Owner water quality improvement (healthy water)	<p>This work continues to improve Traditional Owner access to and active participation in water quality projects, science and career pathways.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Traditional Owners are supported to implement their foundational or keystone Healthy Water grants (First and second round of Healthy Water grants). 2. Delivery of Healthy Water partnerships co-investments that provide for positive outcomes for water quality and Traditional Owners. 3. Engagement of two project coordinators to facilitate Traditional Owner engagement and participation. 4. Development of a water quality literacy framework that includes Traditional Owner Resources (Kit). 5. Support peer-to-peer learning opportunities for current Healthy Water grant recipients to share with the wider Traditional Owner community, their projects, learnings, outcomes. 6. Work with Traditional Owners to understand and implement features of the Traditional Owner Healthy Water RTP component. 	\$3.28m
Traditional Owner integrated monitoring and reporting	<p>Traditional Owner knowledge forms a critical part of building a holistic understanding of the condition and trend of Reef values. This work sees a completed Strong Peoples–Strong Country framework implemented across four pilot Traditional Owner communities.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Comprehensive data needs are mapped (to respond to information needed to report under Reef 2050 framework). 2. Support up to four Traditional Owner groups in the Strong Peoples–Strong Country pilot program. 3. Research project: Support futures thinking with Traditional Owner communities to create and model scenarios for the Reef (through the communities piloting SPSC where possible). 	\$1.2m
Traditional Owner crown-of-thorns starfish control	<p>This work supports activities that aim to improve Traditional Owner participation in COTS control and facilitates training and service delivery partnerships.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. The Reef and Rainforest Research Centre continues to deliver the Traditional Owner training leadership component of the COTS Control Program. 2. The enabling conditions for young Traditional Owners undertaking training and leadership programs in a culturally safe way are identified, documented and implemented. 3. Project Manager engaged for extension support to positively facilitate Traditional Owners’ active engagement and participation in COTS. 	\$1.033m
Traditional Owner Reef restoration and adaptation science	<p>This work aims to improve Traditional Owner access to and active participation in Reef restoration and Adaptation projects.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Project Manager engaged for extension support to positively facilitate Traditional Owners’ active engagement and participation in RRAS. 2. Healing Country grant program for reef restoration and resilience on-Country activities is rolled out. 3. Support a traineeship/training program that aims to improve career and employment pathways and build capacity in reef restoration and adaptation. 4. Support Traditional Owner workshops/activities identified in the Cairns-Port Douglas Hub regional approach. 	\$1.967m
TOTAL INVESTMENT		\$11.065m



Community Reef Protection Component

Partnership Budget: \$10 million

2023-2024 budget: \$3.465 million

Purpose: To improve the engagement of the broader community in the protection of the Great Barrier Reef World Heritage Area.

Priorities under the Partnership Investment Strategy

- Strengthening and accelerating on-ground action
- Building understanding, hope and action
- Connecting community with decision making
- Fostering enduring outcomes through funding, next generation participation and partnerships

End-of-Partnership Outcomes

The Reef Trust Partnership's Community Reef Protection Component will result in:



Community informs decision making through collaborative planning and community data use



Projects are delivering effective outcomes for the Reef and community (including other RTP component outcomes)



Community project contributions are recognised, valued and celebrated



A suite of tools for funding and models of community action are available and useful

Progress on the five-year journey

This decade is the pivotal time to shape a better future for the Reef and Reef communities. Everyday, community members and organisations across Queensland are demonstrating their commitment and contributions to this cause. Many more people want to help, but aren't sure where to start, or how they can make a difference.

The Community Reef Protection Component aims to respond to the aspirations of individuals and organisations by enabling ways to elevate the quantity and quality of engagement in delivering outcomes for the Reef and Reef communities.

The five-year plan focuses on strengthening local leadership and collaboration to pilot new approaches and accelerate proven approaches to tackle the complexity, scale and urgency of challenges to deliver targeted local change and better connect the contributions of many.

Achievements to date include:

- ✔ **Enabling locally led environmental and community outcomes**, with 77 community on-ground projects delivering citizen science, local action, Community Action Plans (CAPs) and site-based coral recovery and stewardship initiatives.
- ✔ **Improving collaboration** by supporting a diverse range of over 400 partners to work towards breaking down barriers for the greater potential of community-led work through innovation in how work is designed and delivered.
- ✔ **Boosting community contribution pathways** to grow the movement now and in the future. Projects have engaged with close to 40,000 participant engagements and almost half of people (48%) were new to activities and one-third (30%) were youth.
- ✔ **Building capacity in the system**, with partners supporting their communities to connect with, contribute to and lead work through 780 training, education and outreach events, 142 leadership and capacity building events, and over 3,000 communication activities.
- ✔ **Working with partners to sharpen design for impact and building proofs of concept** to show the powerful potential of community-led efforts in delivering meaningful change for the Reef and Reef communities.
- ✔ **Setting up enduring systems change outcomes for the future** through strong partnerships, stewardship measurement, and exploring more sustainable funding models.

In 2023-2024, the Component will continue growing collective impact with partners through collaborative and adaptive design. The 2023-2024 activities will include:

- **Rollout of the new Community Climate Action portfolio of projects**, including collaborative design for implementation, measurement and storytelling.
- **Delivery of citizen science for change projects** and cross-project collaborations that strengthen and demonstrate pathways to impact for community data and knowledge.
- **Continued work with regional report card partnerships** on citizen science integration and future planning.
- **Implementing collaborative activities with the Cairns-Port Douglas Reef Hub** network, with a focus on strengthening deeper engagement with Traditional Owners, collaborative pilot projects, knowledge sharing and building future plans for the program.
- **Translating CAPs into action** through on-ground projects and planning for future legacy of the program.
- **Expanding community integration across RTP** with other Components including Traditional Owner Reef Protection, the Reef Restoration and Adaptation Program, Integrated Monitoring and Reporting (IMR), and COTS Control, as well as programs outside of the RTP including the Reef Islands Initiative.
- **Exploring ongoing support and funding** for community Reef protection work beyond RTP.



Strengthening and accelerating on-ground action

Collectively, on-ground activities are supporting habitat protection and restoration, wildlife conservation and threat reduction. To date, community partners have activated their networks to contribute over 50,000 volunteer hours and remove 3,500kg of marine debris across 400 hectares, cleared 10 hectares of weeds, and planted 4,400 native trees and grasses, and more than 57,000 corals. They have undertaken 812 field days to collect over 350,000 data points about Reef wildlife and habitats and their data has been used 65 times to inform planning and management. Many of these projects have focused on growing the enabling conditions for current and on-ground community actions — building capacity, collaborations and pathways to strengthen legacy outcomes.

By December 2022, a cohort of 10 citizen science for change projects were well underway, building on work to date and pushing for new innovations in how community data is collected and applied. These projects are piloting a range of new approaches to augment current citizen science methods including eDNA, drones and photo imagery data. Collectively, this community data has enabled 21 instances of collaborative planning, integration into formal reporting and management response. This includes the first citizen science assessment of mangrove condition incorporated in the Wet Tropics Waterways report card.

The two local action grant rounds demonstrated interest in collective climate action and resilience as a shared priority across the regions and identified opportunities for strengthening collective action, as well as networks for learning and sharing. As such, the remaining investment and learnings will be integrated into the Community Climate Action program (see Building understanding, hope and action).

In 2022-2023, the Cairns-Port Douglas Reef Hub focused on actions to implement an open collaborative network that connects people to share, learn and pilot new collaborative approaches to care for reefs in the face of climate change. Activities have brought together Traditional Owners, practitioners, researchers and managers for workshops, sharing sessions, training and networking days. The first on-ground pilot project was launched at Moore Reef, supporting a Collaborative Monitoring Project for coral seeding devices with RRAP, Traditional Owners and local partners. Beyond the Hub, on-ground projects have been exploring new models for scaling, integrating knowledge systems and understanding efficacy and challenges in local site protection activities.

Connecting community with decision making

In 2020-2021, community, science, management, business, youth and Traditional Owners came together to create six CAPs across the Queensland coast. The pilot CAP program aims to support place-based collaborative planning and delivery to enhance community Reef protection action for the Reef World Heritage Area. Across the regions, 15 community and Traditional Owner-led projects were catalysed through seed funding and are delivering a range of actions including protecting cultural heritage, undertaking baseline monitoring to inform protection and recovery actions, coastal and wetland recovery activities, climate action pilot projects, and growing youth leadership for the Reef.

The CAPs strongly align with Reef 2050 Plan work areas, including local actions to reduce greenhouse gas emissions, reducing impacts from land, reducing impacts from water-based activities, and protecting, rehabilitating and restoring values, as well as enabling conditions (collaborations and partnerships, monitoring evaluation and adaptive management and investment).

Interviews with Reef decision makers (i.e. Reef managers, scientists and local government partners) involved in the CAP development process, showed progress towards end-of-partnership outcomes through evidence of shifting perceptions about the role that community is playing and recognising community members and organisations as engineers of change.

CAP Leaders have been helping to unite efforts in their local area, providing backbone support for collective impact. There are examples of some CAPs building notable momentum to help deliver a more integrated, collaborative and impactful approach to community partnerships for Reef protection. Some examples include leveraging additional investment for identified priorities, building new governance structures to drive collaborative decision making, identifying critical coordination needs, and fostering greater cohesion on collective impact approaches.

In addition to CAPs, a strategic partnership with the regional waterway health report card network has undertaken a scoping project to identify the most effective opportunities for leveraging existing citizen science fish data for integration and community engagement. Community data is proposed for inclusion in stewardship reporting in 2023 and there is emerging dialogue around designing future opportunities.

Building understanding, hope and action

This is a critical decade for responding to the climate and biodiversity crisis, and shaping a better future for reefs and communities. Supporting new approaches that further amplify local community leadership and mobilise change are critical as part of a broader systems movement.

The Community Climate Action program builds on learnings and feedback from the first three years of this Component. It aims to accelerate community-led climate action and resilience activities led by Traditional Owners, community organisations, local councils, local businesses and youth.

The collaborative program will strengthen readiness of scalable community solutions to care for the Reef and deliver social benefits by reducing carbon emissions; as well as protecting, enhancing and restoring coastal habitats to mitigate impacts and enhance resilience in the face of climate change. It will apply science and local knowledge to support ways for more people to get involved or grow the way in which communities contribute.

The design seeks to respond to an aspiration to be part of a larger, coordinated initiative that grows collective capacity and tells an overarching story of impact. Working with partners offers a chance to explore a scalable model that can offer lessons around fostering broader participation and connecting with the global movement.

Under the RTP, there is also a continued focus on working with community partners to increase visibility and awareness of the community-led Reef protection work. This next year will focus strongly on working with project partners to recognise, value and celebrate the collective impact of community efforts to care for the Reef through collaborative storytelling to grow the movement of hope and action for the Reef.

Fostering enduring outcomes

The Component is underpinned by a theory of change that recognises a need to better understand the capacity, motivations, outputs and outcomes of community Reef stewardship. As such, a close project partnership with the People and Reef Organisations Tackling Environmental Change Together (PROTECT) stewardship project under the Integrated Monitoring and Reporting Component is developing, testing and refining a Community Stewardship for the Reef Toolkit with community partners. Through interviews with project partners, we are learning more about how stewardship is defined, how it is currently monitored, how we can better measure impact, and the need to build a framework around the multiple layers of interests to help communicate impact.

In addition to developing a pilot toolkit, access to tailored social science support has been provided for CAP and Citizen Science projects to strengthen capacity to document project impacts. This has included developing monitoring, evaluation and learning plans and providing advice on survey design and other data collection methods.

Further to trialling ways to strengthen measuring and sharing community efforts, we're also exploring ways to grow sustained investment to drive community work. A Community Funding and Models toolkit has been in development to build understanding about the current funding landscape and explore potential strategic approaches to further enabling community Reef protection work, including through investment and program delivery approaches.



Case Studies

The following case studies provide some highlights of progress towards the end-of-partnership outcomes.

Cairns-Port Douglas Reef Hub piloting collaborations for Reef care

The Cairns-Port Douglas Reef Hub (the Hub) aims to further boost collaboration to strengthen and scale ways to actively care for local reefs.

A new collaborative pilot project at Moore Reef is bringing together a range of partners to design and trial a new Reef Restoration and Adaptation Program assisted coral recovery technique aiming to improve the survival of young corals to help repopulate damaged reefs. This pilot is trialling deployment and monitoring of coral seeding devices to stabilise substrate in coral rubble areas around Moore Reef tourist pontoons and understand more about tourist and partner perceptions.

The project is demonstrating that designing a shared approach to pilot new ways of working together can be a useful connector which leverages a range of different capacities, helps build trust and can generate useful outcomes that enhance science and social benefits.

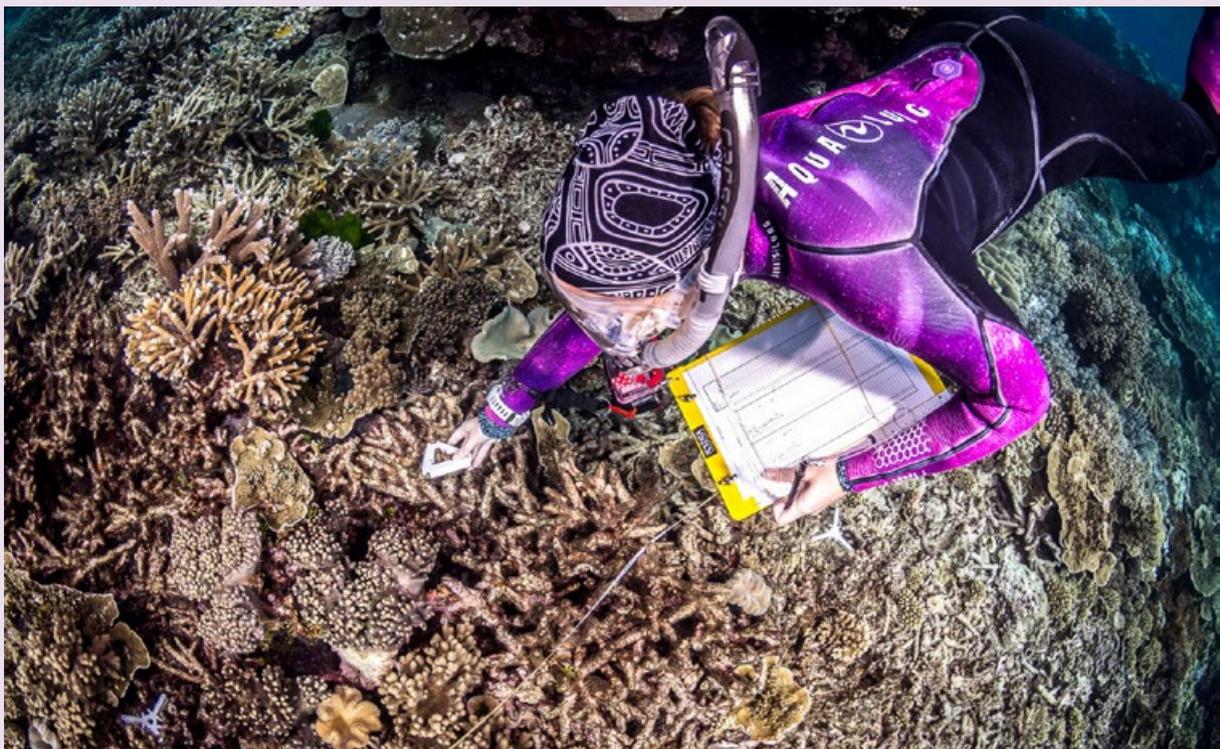
This project is a collaboration led by local partners Experience Co and Reef Restoration Foundation, with input from Gunggandji land and sea rangers, and funding and scientific input from CSIRO and AIMS through the Reef Restoration and Adaptation Program and coordinated by the Cairns Port-Douglas Reef Hub.

“

Local partners including the Traditional Owners bring a lot of skills and knowledge to this cutting-edge research and development, and they have a key role in building our region's capability for future coral reef stewardship activities.

Abbi Scott, Cairns-Port Douglas Reef Hub Coordinator

”



Snorkeller trialling deployment and monitoring of coral seeding devices. Image credit: Matt Curnock.

Case Studies

Community Action Plans delivering impacts for the Reef and communities

From Cape York to Burnett Baffle, the pilot Community Action Plan (CAP) program is enabling place-based, collaborative, impactful approaches delivering towards the Reef 2050 Plan.

In the Cape York region, Binthi Land Holding Group Aboriginal Corporation developed a Healthy Country Plan to unite their voices, pave the way in protecting Country, and leverage additional funding. This is helping to enable nominations for a National Heritage listing status for culturally significant areas. Already, the initiative has secured a Cape York Peninsula Heritage Assessment Grant.

“We’re very grateful for what the CAP has done to help us. It’s our Elders’ legacy for our clan to look after. The stories of Binthi are exemplary at a National level, we’ve got unique stories of our natural and cultural values.”

Ramona McIvor, Binthi Land Holding Group Aboriginal Corporation

In the Townsville region, the CAP program has been part of efforts to drive translation of monitoring and reporting to coordinated action.

“The CAP process has helped us progress on collective impact. Having tangible evidence helps us identify how we can come together to address problems. This process gives the grounding and framework to push the discussion and actions.”

Jake Hammelswang, former Executive Officer Dry Tropics Partnerships for Healthy Waterways

On Yunbenun-Magnetic Island, the CAP is helping support community-led approaches for a ‘whole of island’ approach to be a leading sustainable island community.

“The CAP process enabled the community to come together and talk about what impacts we’re having on our marine environment and the Reef and what strategies we need as an island community. The funding has brought people together and is building momentum.”

Gemma Wickens, MICDA CAP Leader

In 2023-2024, CAP Leaders continue providing backbone support for their community networks to translate the CAP into action through projects, storytelling and adaptive approaches for building legacy into the future.



Representatives from 14 organisations contributed to the Monitoring on Maggie community workshop.

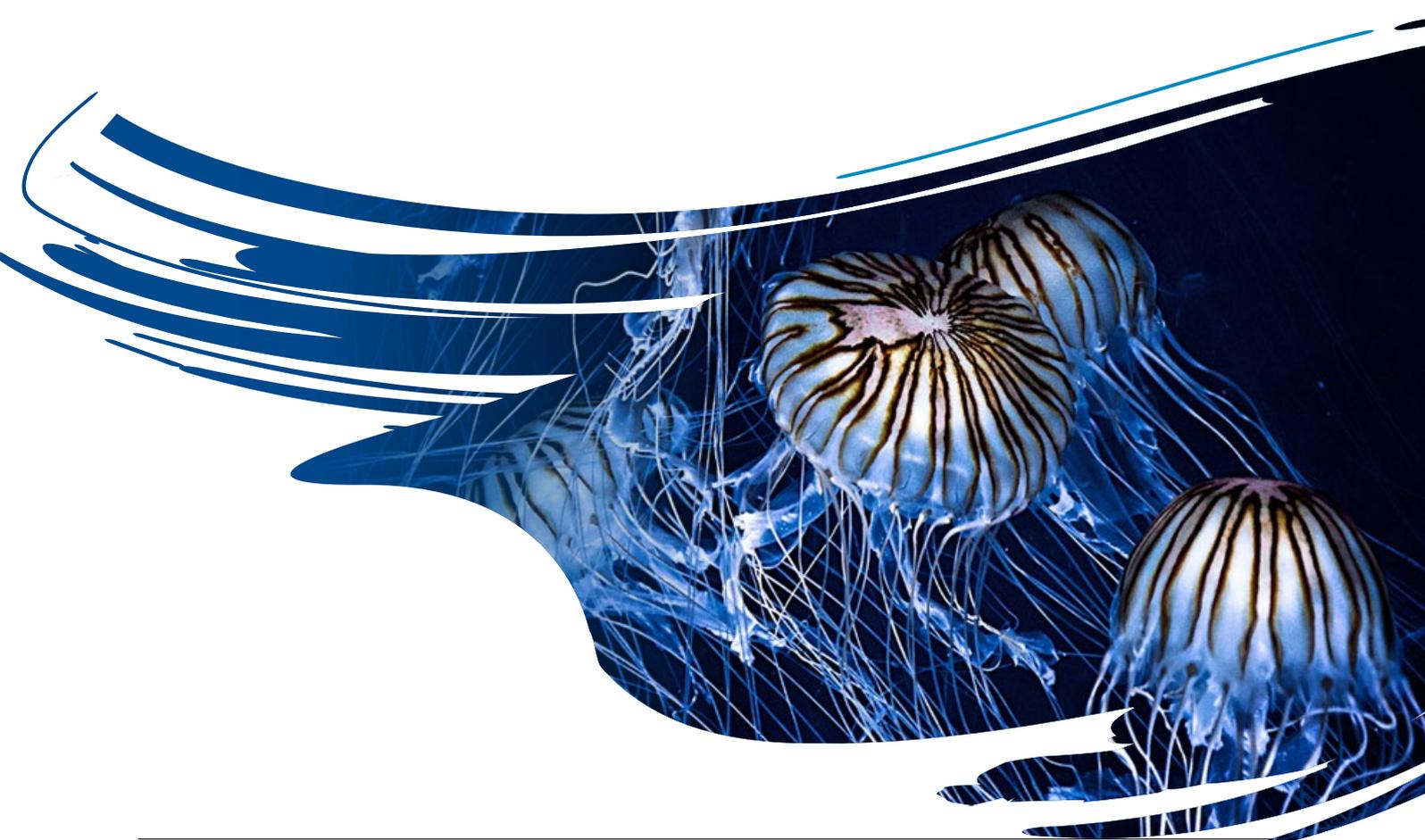
Community Reef Protection Five-Year Plan

Our five-year plan for the Community Reef Protection Component includes eight Partnership Activities outlined in Table 10.

Table 10: Community Reef Protection Component Partnership Activities and Budget

Partnership Activity	Rationale	Outcome	Budget
  Citizen science	Citizen science engages the community in data collection and sharing to increase understanding about the condition of Reef habitats and species. There is greater potential for citizen science to inform decision-making and enhance social and ecological benefits.	This funding is supporting strategic and collaborative citizen science data collection, reporting and application.	\$3.0m
   Local-scale coral restoration and stewardship	Assisted coral recovery is an emerging priority as a tool to build Reef and community resilience in the face of climate change.	This activity is supporting the development of a Cairns-Port Douglas Reef Hub to connect people to share, learn, and pilot new collaborative approaches to care for reefs in the face of climate change. Investment will also enable on-ground projects for impactful approaches to accelerate coral recovery and site stewardship, with learnings shared across the Hub network.	\$1.1m
    Local action	Collaborative community-led action, informed by local knowledge, has a valuable role to play in building local Reef and community resilience in the face of climate change. This program taps into collective knowledge and networks of GBRMPA's Local Marine Advisory Committees spanning the Queensland coast.	This activity is supporting projects that engage communities in a range of practical local solutions to Reef threats. The initiative is providing early input to inform the design approach for the Component.	\$1.57m
 Integrated decision making: Community Action Plans	Boosting collective impact requires greater knowledge exchange, more cohesive approaches, enhanced communication of community actions and seeking new ways to resource this community-led work at the scale required to support broader efforts to shape a better future for the Reef.	This activity is supporting Community Action Plans and Regional Report Cards along the length of the Reef to enhance local Reef protection and community outcomes through collaborative planning and delivery of on-ground action.	\$1.53m
 Community Climate Action	Climate change is the greatest threat to the Reef. We must both urgently reduce emissions, and build climate resilience. Yet many Australians do not connect personal action on climate change with protecting the Reef.	This activity is enabling projects that accelerate community-led climate action for the Reef through wide-scale participation in simple, measurable and impactful locally-based climate actions. The program will work towards a framework for measurement that will track outcomes and support storytelling. Projects will be supported via mentoring, training and tailored support to ensure well-designed and impactful approaches by building capacity for driving change.	\$2.48m

Partnership Activity	Rationale	Outcome	Budget
<p>● Communicate case studies and stories of hope</p>	<p>There is recognition that greater efforts are needed to shine a light on the collective impact of community efforts to care for the Reef and the incredible people driving this work.</p>	<p>This activity will capture and share community-driven solutions from a range of people and projects to celebrate achievements, share learnings and inspire increased engagement.</p>	<p>\$0.249m</p>
<p>● Support enduring investment and partnership models</p>	<p>Lack of a cohesive measurement tool for community Reef and catchment stewardship and limitations in stable and significant funding for community Reef protection activities have been identified as key barriers to achieving more efficient and enduring outcomes.</p>	<p>This activity is strengthening tools for measuring and sharing Reef stewardship, and for enabling funding for community Reef protection activities in order to facilitate more efficient and enduring outcomes.</p>	<p>\$0.2m</p>
<p>● Empowering community heroes</p>	<p>Capacity building initiatives can strengthen individual, organisational, and sector-wide capacity to support place-based, sector-based and youth leadership activities and ultimately, community stewardship outcomes.</p>	<p>This activity is identifying and delivering key capacity building needs for individuals and organisations to accelerate community leadership now and in the future.</p>	<p>\$0.2m</p>
<p>TOTAL COMMUNITY REEF PROTECTION COMPONENT BUDGET</p>			<p>\$10m</p>





Community Reef Protection Annual Work Plan: 2023-2024

Major categories of activity, deliverables and budget for 2023-2024 are shown in Table 11.

Table 11: Community Reef Protection Component investment areas and Budget for 2023-2024

Partnership Activity	Description	Budget
Citizen science projects	<p>A cohort of citizen science for change projects will be delivered to engage the community in monitoring and building understanding about impacts from climate change and local threats, as well as apply information to enable community-led solutions to build Reef and community resilience.</p> <p>Deliverables: Delivery of citizen science projects that contribute to community Reef protection outcomes. The portfolio of grants will support innovation, data integration and data use, including through portfolio-wide collaboration and uplift activities. Projects will focus on strengthening and demonstrating pathways to impact for community information.</p>	\$0.68m
Local action projects	<p>A new suite of projects focused on enabling local community climate action leveraged input and learnings from two phases of local action projects to date. This funding will be consolidated into the Community Climate Action program to further strengthen the potential for this integrated program.</p> <p>Deliverables: See Community climate action section.</p>	\$0.67m
Local coral recovery and stewardship program	<p>The Cairns-Port Douglas Reef Hub will continue to be collaboratively designed and implemented with Traditional Owners, local community, tourism, science and Reef management partners. The Hub Coordinator will support Hub implementation with advice from the Hub Steering Group and input from the broader network.</p> <p>On-ground coral recovery and stewardship projects will explore and strengthen models to deliver Reef resilience outcomes for the Reef and communities.</p> <p>Deliverables: Continuation of local-scale coral recovery and stewardship projects, continuation of the collaborative design and implementation of the Hub with support from a Coordinator. Focus will be on strengthening deeper engagement with Traditional Owners, collaborative pilot projects, knowledge sharing and building future plans for the program.</p>	\$0.305m
Community Action Plans and data integration	<p>Community and Traditional Owner-led projects will continue implementing actions aligned with the CAPs. Community Action Plan Leaders will continue their role to enable the community to progress successful CAP projects and plan for legacy opportunities.</p> <p>A pilot project with the regional report card network proposes to integrate coral reef fish citizen science data into stewardship reporting for the three northern regional report cards.</p> <p>Deliverables: Implementation of the CAP projects to deliver on-ground actions. Ongoing CAP implementation support from CAP Leaders to enable collective storytelling, capacity building and investment to support enduring outcomes. The fish citizen science integration pilot project with regional report card partnerships will deliver integration of community data.</p>	\$0.32m
Community climate action	<p>This activity will enable projects that accelerate community climate action for the Reef through a range of practical locally relevant approaches. This includes social innovation and behaviour change solutions for emissions reduction for the Reef and caring for coastal habitats to mitigate impacts and enhance resilience in the face of climate change. The program will encourage collaboration and strengthen collective capacity for technical design, behaviour change, measurement and collaborative storytelling.</p> <p>Deliverables: Work with project partners to enable projects that accelerate community climate action for the Reef, led by Traditional Owners, community organisations, local councils, local businesses and youth. Support a coordinated initiative that grows collective capacity and tells an overarching story of impact.</p>	\$1.2m

Partnership Activity	Description	Budget
Communicating case studies and stories of hope	<p>Outcomes and impacts from community projects will be shared and celebrated to demonstrate progress, acknowledge the work of individuals and community organisations, share learnings, and motivate others to get involved.</p> <p>Deliverables: Working with project partners, high-impact case studies and stories from projects will be developed and shared. An initiative to recognise, value and celebrate community Reef protection work will be designed with partners and launched.</p>	\$0.105m
Enduring investment and partnership models for Reef protection	<p>A partnership with the IMR PROTECT project will pilot a toolkit and collective measurement framework for measuring and monitoring community Reef stewardship.</p> <p>Collaborative work to explore and enhance community Reef protection program and funding models will continue for community program design and tools to enable enduring change.</p> <p>Deliverables: A collective stewardship measurement framework will be collaboratively developed and trialled, along with tailored social science support to boost capability and measurement of outcomes with project partners. A dynamic toolkit for exploring alternative funding and partnership models for community Reef protection will be piloted and shared for wider use.</p>	\$0.055m
Community sector and youth leadership development support	<p>Community leadership to support Reef protection outcomes will be designed with community partners to enable acceleration and legacy.</p> <p>Deliverables: Activities will enable community sector and youth leadership to support Reef protection outcomes.</p>	\$0.130m
TOTAL INVESTMENT		\$3.465m



Integrated Monitoring and Reporting (IMR) Component

Partnership Budget: \$34.8m (formally \$40m⁵)

2023-2024 budget: \$11 million

Purpose: To support the implementation of the Reef 2050 Reef Integrated Monitoring and Reporting Program (RIMREP), including eReefs and the Paddock to Reef monitoring and reporting programs, to improve health monitoring and reporting of the Great Barrier Reef World Heritage Area to ensure that monitoring and reporting to UNESCO is scientifically robust and investment outcomes are measurable.

Priorities under the Partnership Investment Strategy

- Supporting critical monitoring activities identified via RIMREP
- Catalysing innovation in technology to increase coverage, impact and resource efficiency
- Driving unity of purpose and adaptive management through the development and implementation of a Reef-wide decision-making and forecasting platform
- Understanding the value of community stewardship and disclosure of high-value information
- Supporting partnerships and building a community of practice

End-of-Partnership Outcomes

The Reef Trust Partnership's Integrated Monitoring and Reporting Component will result in:



Critical RIMREP data needs/gaps have been prioritised and are met



Decision Support platform integrating Data Management and Decision Support Systems is operational

⁵ In the 2022/23 Financial Year, \$5.2m was handed back to the Australian Government due to election commitments made by the incoming Government during the May 2022 election. The majority of this allocation made up the Technical Transformation Fund (\$5m) referenced in previous RTP Annual Work Plans. None of the allocation being utilised for Traditional Owner-led Monitoring (\$4m) was impacted by this process.

Progress on five-year journey

As IMR reaches the final stretch of its journey, its impact and legacy are becoming increasingly visible:

- ✓ **Critical Reef data gaps** (identified and prioritised by RIMREP in 2020/21) in the final stages of being met – 17 projects are underway.
- ✓ **New methods have been identified to increase coverage and/or improve cost effectiveness** of knowledge/data collection – fostering a culture of innovation across the Component (particularly with remotely sensed data, Artificial Intelligence/Machine Learning, eDNA and in data management and visualisation platforms).
- ✓ **The Reef's first Traditional Owner-led Monitoring Program** is up and running, being piloted by three Traditional Owner groups.
- ✓ **The Reef's first Federated Data Management System is being built** and user-tested using a range of science for management data set use cases.
- ✓ **There is also evidence that a broader range of people are being involved in the collection, collation and management of Reef data.**

The final 12 months of IMR's work is firmly focused on the delivery of the remaining activities under the Component and on maximising enduring outcomes. This will be achieved by appropriately and accurately capturing learnings from the collective experience of delivering this Component of work, and by integrating these learnings into future Reef monitoring programs, including RIMREP. In lockstep with this process, the Foundation will be designing its own innovation portfolio under its Reef 2030 Strategy, with the intention to incubate innovations that accelerate and amplify action. This portfolio will comprise a pipeline of technological, financial and social innovations being trialled and on a pathway to impact for the Reef. Our journey in collaboratively designing and delivering the IMR Component has provided the perfect basis on which to design an impactful innovation portfolio and continue to drive impact for the Reef, utilising the learnings and legacy of IMR.

Filling critical Reef monitoring gaps

The Critical Monitoring Program is in its final stages, with the majority of projects now having collected a range of data to fill the Reef's highest priority monitoring gaps. Eighteen critical monitoring projects have been funded to date (one early investment northern GBR monitoring project, five Critical Monitoring Phase 1 projects, and 12 Critical Monitoring Phase 2 projects) covering the biophysical, cultural and socio-economic contexts of the Reef. These projects represent the most critical knowledge gaps currently on the Reef and span large-scale modelling platforms (e.g., eReefs) to individual indicator development projects specific to one Reef monitoring issue (e.g., the development of standardised coral health indicators across the Reef). They also include specific integration projects aimed at maximising enduring outcomes of IMR.

Three Critical Monitoring Phase 1 projects and 11 Phase 2 projects will continue into 2023-2024 into their final stages before wrapping up by June 2024. These include:

- ➔ **eReefs** – delivering essential Reef modelling services to a range of users.
- ➔ **Fitzroy MMP** – undertaking essential water quality monitoring at sites in the Fitzroy region (integrating into the current Marine Monitoring Program).
- ➔ **SELTMP** – delivering a further round of socio-economic monitoring to provide insights into the relationships between Reef users, communities, industries and the GBR.
- ➔ **Four marine fauna monitoring projects** – sea cucumbers, Reef fish, inshore dolphins and dugongs (refer to the case study below).
- ➔ **Three GBRWHA Island-based monitoring projects** – biosecurity, Island habitats and seabirds.
- ➔ **Three Human Dimensions monitoring projects** – sustainable use and benefits, governance and stewardship.
- ➔ **Support projects from the integration incubator allocation** – supplementary resources to ensure Traditional Owner engagement and participation on all projects is maximised and the continued appointment of cultural data specialists to ensure Traditional Owner's data sovereignty is respected and formalised during the build of the Data Management System.



In the last 12 months, four IMR projects have wrapped up:

- ▶ **GBR Census** – final reporting has revealed that 441 reefs were surveyed from 2020-2022 via a fleet of 52 island resort, research and tourism operator vessels, generating over 42,000 data points to supply critical coral health data to RIMREP.
- ▶ **An integration pilot project between the Water Quality, COTS and IMR Components**, demonstrating that opportunistic water quality sampling can successfully be undertaken by COTS control vessels with a small investment to extend Marine Monitoring Program sampling beyond inner-shelf reefs and validate remote sensing products generated through the program.
- ▶ **Statistical design** for integrated monitoring projects (seabirds, sea cucumbers and Reef fish).
- ▶ The design of the **Strong Peoples–Strong Country monitoring framework** has been completed. Piloting of the framework is now in progress – refer to Chapter 4 (Traditional Owner Reef Protection) for further information on how this project is progressing.

Over the next 12 months, projects will wrap up data collection activities, and will focus on data collation, analytics and reporting. Delivery providers will work with various end/next users to ensure data is packaged as per user needs, including via ingestion into the Data Management System and where relevant, repatriation of data to Traditional Owner groups.

Building a federated Data Management System

In the Decision Support workstream, work has progressed significantly to develop the Reef’s first fit-for-purpose Data Management System (DMS) to underpin RIMREP information systems. This work was identified by the RIMREP team in 2019 as the highest priority task to complete within the decision support space. The DMS is a critical piece of foundational infrastructure on which many other decision support systems can be based, including RIMREP’s own Reef Knowledge System.

Phase 2 of the DMS project is underway and expected to wrap up in 2023-2024. It has comprised building and user testing of the system including development of the ‘benchmark’ data standard to facilitate automated data uptake. This is an important step to strengthen compatibility of the DMS with citizen science datasets and to maximise the utility of these data for management of the Reef. The DMS governance structure is now operational and is demonstrating its effectiveness in the collaborative design and build of the system. One of the ways this is happening is via use case testing of the DMS with real world science for management datasets from GBRMPA, who are co-funding the DMS project.

Further close and careful engagement is needed with Traditional Owners in the next 12 months to ensure the foundations of trust and transparency are being laid down now with respect to data ingestion into the DMS. Strategic advice is being provided to the delivery team for the DMS via the continued appointment of a cultural data expert to help navigate the unique challenges accompanying identification, management and uptake of culturally sensitive data into the DMS. Practically speaking, this has been an integration activity within itself, as it has meant a new level of connection and understanding has been built between research organisations, data technicians, indigenous data specialists and Traditional Owners. This process has employed the principles of Free, Prior and Informed Consent (FPIC) and considerations of Indigenous Cultural Intellectual Property (ICIP) with all parties, uplifting the cultural competency standard with the team and increasing understanding of the unique opportunities and challenges of managing culturally sensitive data along the way.



Integrated, adaptive and inclusive governance and a more inclusive Reef monitoring landscape

A key focus has been placed on building integrated projects, including governance structures for monitoring projects across IMR (and more broadly RTP). Each of the projects under the Decision Support and Critical Monitoring workstream have been designed with an integrated governance model in mind, which brings a range of partners, including Traditional Owners, management partners and data end users into each project's Steering Committee and/or Technical Panel. In addition to the requirement for each project to be multi-partner in nature, we are now seeing at this stage of implementation that the integrated governance structures are resulting in streamlined and efficient integration with RIMREP (via GBRMPA representation on most governance groups) and more broadly, knowledge sharing between and across projects.

Integrated project design and governance has also included the requirement for every project to meaningfully engage with relevant Traditional Owner groups. As per elsewhere in the RTP portfolio, particularly where research scientist teams are running projects on Country, the Foundation has asked Project Leads/teams to connect with Traditional Owner groups early and with FPIC principles in mind with respect to fieldwork. Engagement with Traditional Owners within the Critical Monitoring program has taken various formats, with a dedicated integration incubator funding allocation being used to provide additional support to projects as needed. In the last 12 months, the incubator has mobilised over \$300,000 of funding to support meaningful engagement with Traditional Owners (including paid engagement for Traditional Owners themselves) across the program to drive participation in on-Country monitoring projects and benefit sharing for a range of Reef projects.

The majority of Critical Monitoring projects funded under IMR include data collection by Traditional Owners and/or citizen science groups, or strong linkages to citizen science initiatives via end-use of the data. Coupled with the development of the Reef's first federated and open-access Data Management System, the RTP will leave a legacy of a more open, accessible and inclusive Reef monitoring landscape.

One additional important project will be designed and delivered during the final 12 months of IMR, comprising a key IMR legacy. A suite of engagement tools to guide best practice engagement with Traditional Owners by anyone undertaking Reef monitoring and/or data management activities will be developed in collaboration with the Traditional Owner Reef Protection team within the Foundation. We have consistently seen throughout the delivery of IMR, and elsewhere in RTP, that there is currently insufficient support, tools or resources available to assist some research and monitoring organisations/institutions in an extremely busy and in many cases, resource-stretched Reef monitoring landscape. There is no 'go to' resource which supports anyone wanting to undertake Reef monitoring to undertake meaningful engagement with Traditional Owners, encompassing the principles of FPIC, benefit sharing, fee-for-service arrangements and data sovereignty. We believe this work will strongly benefit all parties involved in Reef monitoring, and will ultimately lead to much stronger relationship building, understanding, building of trust and respect, and lifting of cultural competency, as well as a higher degree of meaningful Traditional Owner engagement and participation in the future Reef monitoring landscape.

Fostering innovation to drive improvements in monitoring efficiencies and cost effectiveness

All Critical Monitoring projects must demonstrate how they are exploring and driving innovation opportunities. Over the last 12 months, many projects are demonstrating that IMR is an exciting proving ground to test a number of innovative methodologies for data capture and/or analytics, including:

- **Aerial drones and Remotely Operating Vehicles:** these innovative methods of capturing visual data at scale for a number of key critical species and systems such as sea cucumbers, inshore dolphins, seabirds and GBRWHA Island ecosystems/habitats are demonstrating real-world potential for increases in monitoring coverage and data collection opportunities across the Reef more broadly. Significant opportunities exist for collaboration, shared learnings and identification of best practice within the community of researchers, management partners and delivery partners, which is being realised through IMR's governance structures and via the IMR Forums (held every six months).

- ➔ **Machine learning/Artificial intelligence (AI):** The application and potential use of these technologies in the IMR monitoring context across both biophysical and human dimensions contexts is vast, and like remote sensing, the RTP is facilitating the creation of a proving ground to demonstrate the efficacy of machine learning in Reef data analytics. Machine learning and/or AI is being used to analyse large datasets in the sea cucumber and inshore dolphin projects, within the acoustic monitoring component of the seabird project, and in the stewardship monitoring project to data mine relevant information to inform the classification and quantification of activities of community stewardship activities on the Reef. Machine learning is also proving to be one of the key integration opportunities being realised between projects in the Critical Monitoring Program (sharing of insights on algorithms being used which is creating efficiencies in data analytics in the dugong project).
- ➔ **Environmental DNA (eDNA)** has been increasingly used for detection of aquatic, semi-aquatic and terrestrial species of management concern in temperate and tropical areas. The eDNA technique is widely recognised as a sensitive tool for detection of exotic species, with higher detection efficiency than traditional techniques. eDNA techniques are being employed both in IMR (the QPWS-run Biosecurity project investigating whether the technique can be used to test for the presence of invasive ants on GBRWHA Islands) and elsewhere across the RTP portfolio (via citizen science projects in the Community Reef Protection Component and within the COTS Component). Testing of this methodology in different contexts on the Reef is demonstrating that the RTP comprises an exciting and necessary proving ground, and that the learnings gained within these projects will act as an innovation legacy after the RTP has ended.
- ➔ **Data processing and visualisation platforms** via eReefs and elsewhere in the IMR Component (i.e., via the Socio-Economic Long Term Monitoring Program dashboards) are demonstrating that this type of innovation can have a clear pathway to impact. eReefs is still the world's only multi-partner modelling platform that collates and models data at scale, providing critical solutions to a number of Reef data needs.

Documenting learnings and building a legacy

As the IMR Component wraps up over the next 12 months, a significant focus will be on capturing the valuable learnings and insights from design and delivery of both the Critical Monitoring and Decision Support Programs and ensuring these are utilised by relevant parties in a way that will maximise IMR's enduring outcomes. This includes ensuring learnings are absorbed into RIMREP from 2024 onwards to further accelerate Reef monitoring efforts. We understand a project which integrates learnings and outputs from the IMR Component has been built into the 2023-2024 RIMREP Annual Business Plan.

Within the last 12 months, we have held two IMR Forums — one face to face and one online — bringing together delivery and management partners, Traditional Owners and technical experts, to explore project progress, hold space for collaboration and integration discussions, and catalyse integration actions. The first forum explored cross-cutting themes of IMR such as accelerating transformation from technology/innovation, the role of co-design in the Reef's first Traditional Owner-led monitoring program (the Strong Peoples-Strong Country framework), and the role and importance of data management in the decision support landscape. The second forum successfully further explored some of these concepts in detail, with tangible integration actions raised concerning remote sensing methodologies, including the sharing of machine learning algorithms and of program-level opportunities for Traditional Owners to get involved in existing and future projects. Participants emphasised they found regular opportunities to come together across an integrated monitoring program extremely useful and that this comprises one of IMR's key learnings and legacy points.

The last 12 months have highlighted that there is a lot of enthusiasm from IMR delivery partners and the broader Reef monitoring network about integration and legacy within IMR and between IMR/RIMREP. It is pleasing to document that there is a good, shared understanding that IMR is working as an effective catalyst for integration and collaboration actions, and that this is the start of a long road that stretches far beyond the end of the RTP.

Case Studies

A complete Dugong census of Queensland

The dugong is a coastal marine mammal of high conservation and cultural value, particularly for Indigenous Australians. They are currently listed as Vulnerable on the International Union of the Conservation of Nature's (IUCN) Red List of Threatened Species. The Reef supports one of the world's largest dugong populations, and their reliance on the Reef was one of the key reasons for its listing as a World Heritage Area.

Dugongs are subject to a range of human threats, including entanglement, collisions with boats and degradation of important habitats such as seagrass meadows. Since the 1980s, dugongs have been surveyed every five years along the Queensland coast using highly trained observers in light aircraft. These large-scale surveys provide critical information to assess trends in dugong numbers (including calf counts). The data collected on their distribution and abundance are used to enhance the management and protection of the species. Dugong monitoring was identified as a critical monitoring gap during the RIMREP prioritisation process in 2020, with survey effort in the Southern GBR being particularly critical to undertake due to the timing since it was last surveyed. Importantly, the whole of Queensland (i.e., the GBR plus the critical dugong habitats of Moreton and Hervey Bay) has never been surveyed, until now.

James Cook University are leading an innovative and integrated project with the support of a consortium of partners to assess the population of dugongs on the GBR using a combination of cutting-edge technology including drones, planes and Machine-Learning (ML) based image analysis. Unmanned aerial vehicles are now also being trialed, as they provide several benefits compared with manned flight surveys, including lower human risk, cost, carbon footprint as well as higher precision and accuracy of detection. Given the current challenges involved in the continuous monitoring of this species across the Reef and its coastlines, the innovation of survey techniques will help provide better estimates of dugong abundance, as well as habitat mapping.

The project team have managed to achieve a huge amount of work in a short space of time, with an intensive period of Traditional Owner engagement, survey design and equipment testing occurring in August and September 2022, followed by Southern GBR surveys in November 2022. A total of 27 survey days were completed from Townsville to the southern boundary of the GBR. Further survey effort was completed in Hervey and Moreton Bays (under direct funding arrangements with DCCEE) to ensure the whole southern extent of Queensland dugongs were surveyed in one temporal snapshot.



Dugong surveys underway on the Southern GBR from a light aircraft. Image credit: JCU.

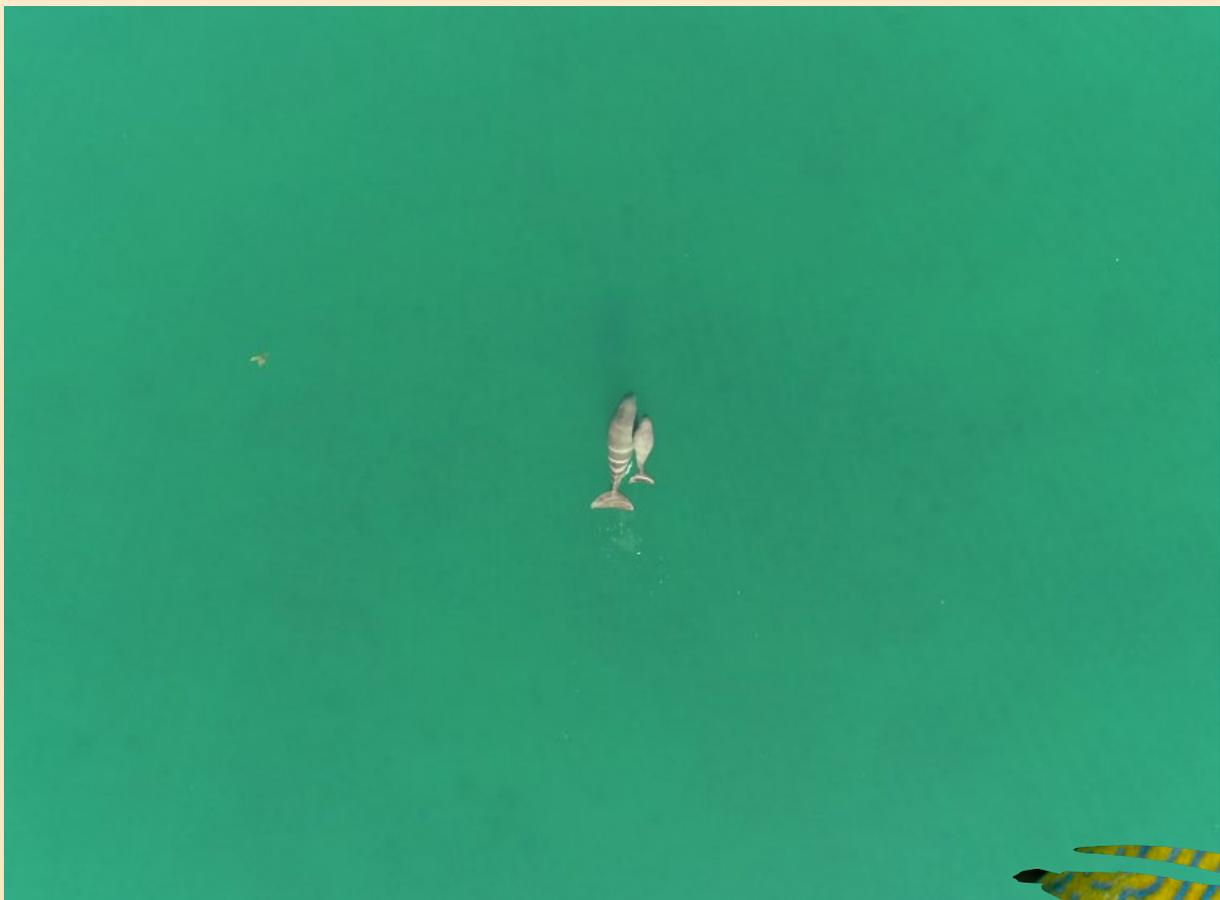
Case Studies

A complete Dugong census of Queensland (continued)

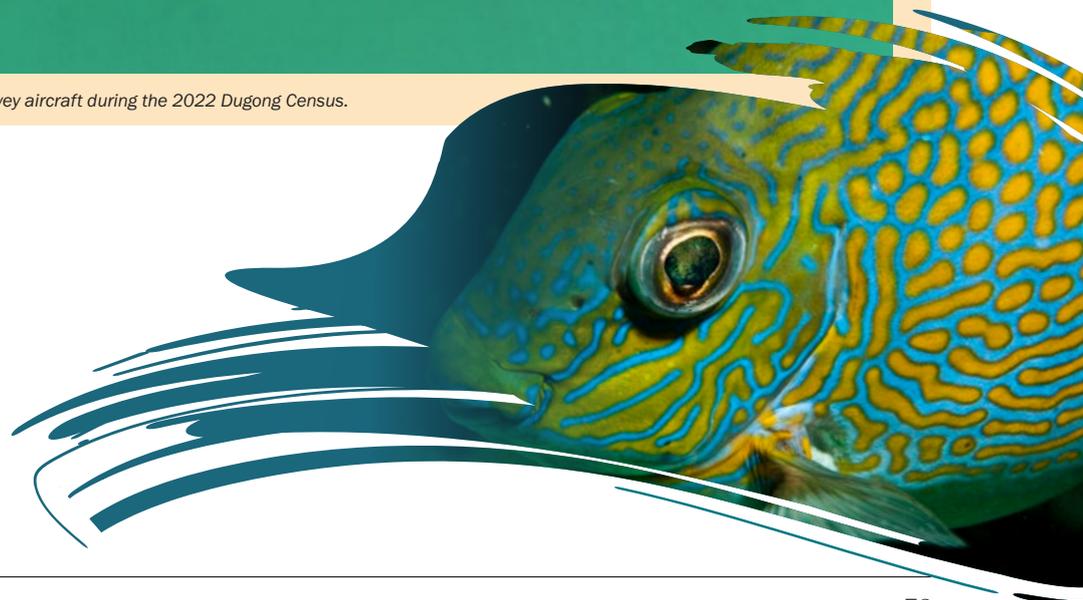
The project is also capturing opportunistic sampling data on turtles and other large megafauna, to give a holistic dataset and significant value add to RIMREP. Outputs from the first field survey are already informing the design of future dugong monitoring projects in Western Australia, highlighting one of the many pathways by which the RTP is driving impact for not only the GBR, but Australia's iconic megafauna.

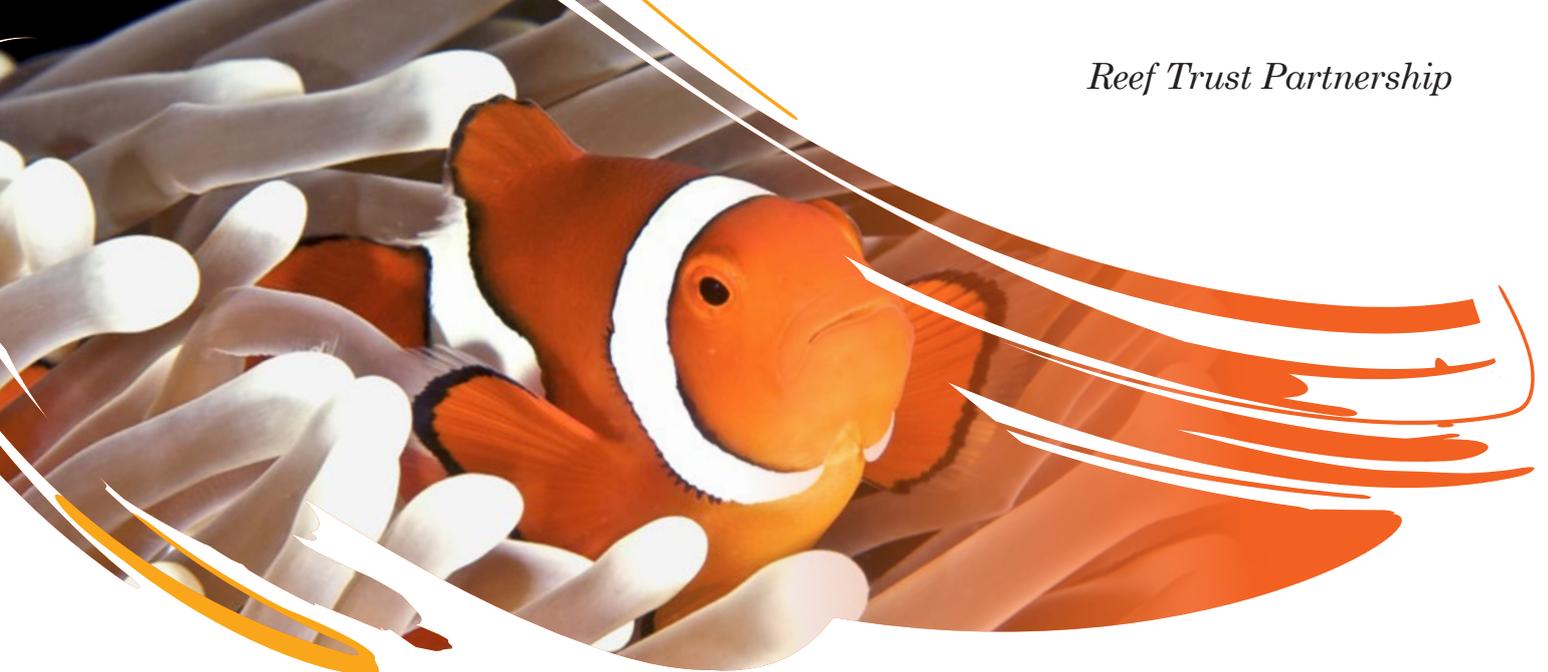
Throughout the team's media and engagement work, the focus has been on increasing awareness of ecological,

conservation and management issues to the public and Traditional Owner Groups, including Indigenous Land and Sea Rangers in the Southern GBR specifically. Along with utilising ML techniques to assist in processing the huge amount of data collected on the Southern GBR survey, the team will now focus on the design of the Northern GBR survey to be undertaken in late 2023. The outputs from this project will fill a key identified knowledge gap on these iconic animals, and will also set a new benchmark, using innovation and collaboration as guiding principles for the design of future dugong monitoring projects.



Dugong and calf as spotted from the survey aircraft during the 2022 Dugong Census.





Integrated Monitoring and Reporting Five-Year Plan

Our five-year plan for the Integrated Monitoring and Reporting Component includes the following five Partnership Activities outlined in Table 12.

Table 12: Integrated Monitoring and Reporting Partnership Activities and Budgets

Partnership Activity	Rationale	Outcome	Budget
 Early investment	To provide an updated ‘baseline’ assessment of reef condition and recovery in the northern Reef, ahead of what was perceived as a significant risk of a potential bleaching event in early 2019.	In-water surveys of coral and fish communities on up to 23 reefs in the northern sector of the Reef.	\$0.57m
 Critical Reef monitoring	Transformational investments need sound foundations with adequate baseline monitoring in place. The first phase of the RIMREP has systematically identified critical monitoring activities needed to support an integrated program.	This funding is making a significant contribution to addressing monitoring priority gaps.	\$27.4m (previously \$27.2m)
 Reef-wide Decision Support System	The Reef needs a consistent and transparent approach to decision-making based on data that is current and accurate and on models that enable forecasting and scenario planning.	This funding is enabling the scoping, development and prototyping of an operational Reef decision-support platform that is integrated, tactical and strategic.	\$2.9m
 Traditional Owner-led integrated monitoring and reporting initiatives (to be defined with Traditional Owner Reef Protection Component)	There is a need to promote positive engagement to protect and maintain culture and heritage values, improve the cycle of research information to management, build or maintain capacity of Traditional Owners and support transition into sunrise industries for increased business enterprise opportunities. This budget figure is also accounted for in the Traditional Owner Reef Protection Component.	Traditional Owner innovations from Indigenous Knowledge systems inform Strong Peoples-Strong Country framework and data-sharing agreements. Scoping of readiness and upskilling opportunities for Traditional Owner groups to transition to monitoring activities	\$4m
TOTAL IMR COMPONENT BUDGET			\$34.87m

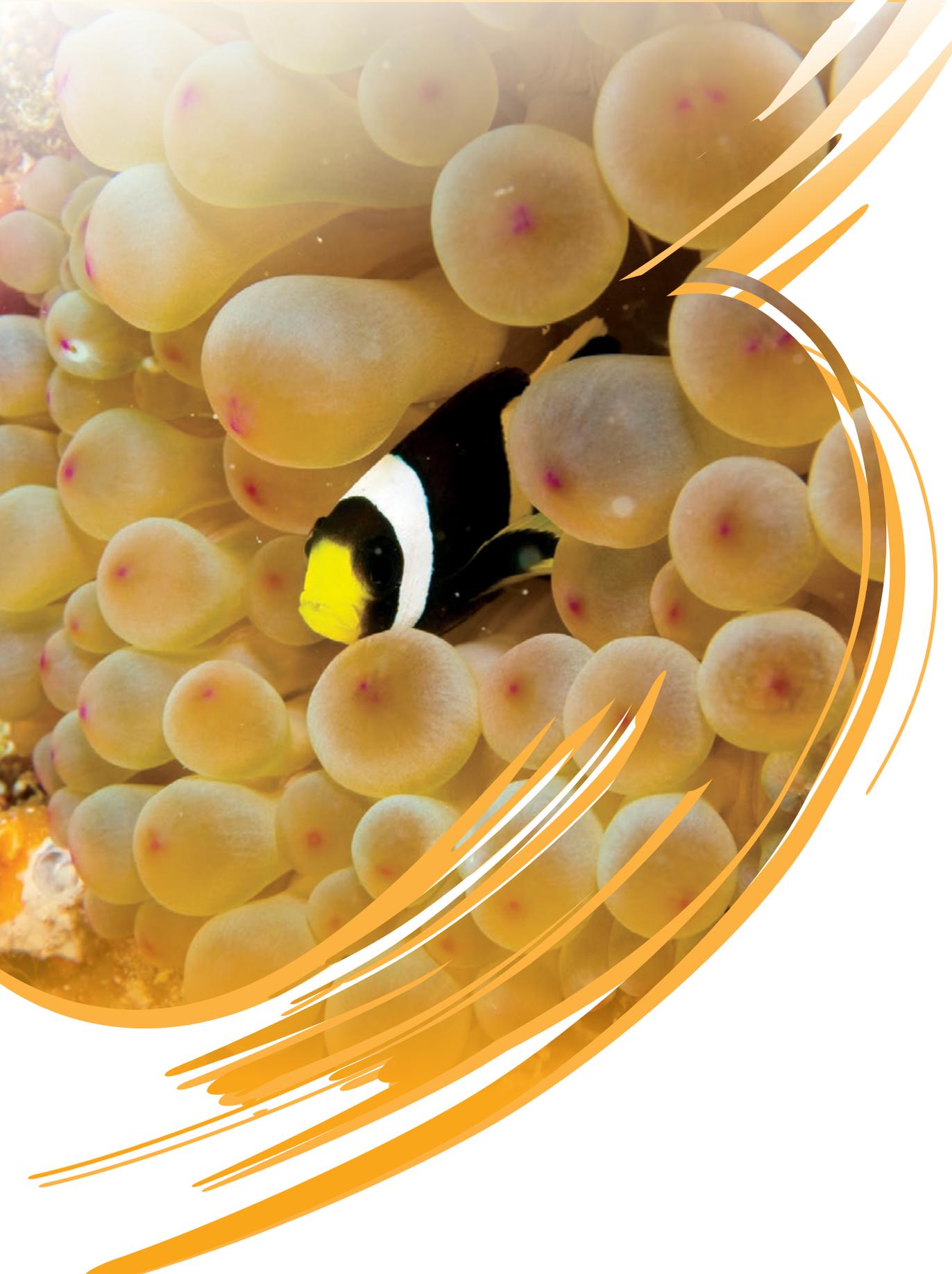
Integrated Monitoring and Reporting Annual Work Plan: 2023-2024

Major deliverables and budgets for IMR Partnership Activities in 2023-2024 are shown in Table 13.

Table 13: Integrated Monitoring and Reporting Component Partnership Activities and Budget 2023-2024

Partnership Activity	Description	Budget
Critical Monitoring	Finalisation of Stage 1 and 2 monitoring activities. Two new projects comprising the scoping and development of resources to assist Reef monitoring organisations conduct best practice engagement with Traditional Owners and a phase 5 eReefs evaluation, will be delivered in 2023-2024. Scoping a facility to further develop the most promising projects from across the innovation program (part of the integration incubator allocation). <i>Deliverables: Monitoring data and reporting leading to a reduction in the critical monitoring gaps as identified by RIMREP partners and ongoing delivery of essential eReefs services (including an evaluation of phase 5). A toolbox of engagement resources and guidelines to assist science partners engage meaningfully with Traditional Owners, comprising learnings from across RTP over the last 5 years. Design of an Innovation incubator facility.</i>	\$9.2m
Reef-wide Decision-Support System	Completion of Phases 2 (build) and 3 (implementation) of the Data Management System. <i>Deliverables: User-tested and functional Data Management System.</i>	\$1.8m
Traditional Owner-led monitoring activities	Refer to Traditional Owner Reef Protection Component	N/A
2022-2023 IMR COMPONENT BUDGET		\$11m





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