

Reef Trust Partnership



Annual Work Plan 2022-2023



Australian Government

REEF TRUST



Great Barrier
Reef Foundation

Contents

List of figures	iii	Traditional Owner Reef Protection Component	41
List of tables	iii	End-of-Partnership Outcomes	41
Acronyms and Glossary	iv	Progress on five-year journey	42
Introduction	6	A shared drive toward laying the foundations for the future	43
The next horizon	6	Achieving improved integration through effective partnerships	43
Annual Work Plan 2022-2023: Summary	10	Unique opportunities to create place-based economies that nurture people, their knowledge and the environment	44
Annual Work Plan 2022-2023 activities at a glance	11	Elevating Traditional Owner Voice – respect and recognition as inherent rights and interests holders	44
Water Quality Component	12	Leadership and succession planning in Governance	44
End-of-Partnership Outcomes	12	Funding Traditional Owner priorities: grants through to Partnership Models	45
Progress on five-year journey	13	Traditional Owner-led integrated, monitoring and reporting	45
Water Quality Regional Programs	14	Strong Peoples – Strong Country Framework	45
Innovation and system change	15	Case Studies	46
Protection and conservation of less-disturbed catchments	16	Indigenous women are vital to climate action and the future of the Great Barrier Reef	46
East Cape York Water Quality Program	16	Grant Programs designed by Traditional Owners, for Traditional Owners	47
Wetland Restoration Prioritisation	16	Traditional Owner Reef Protection Five-Year Plan	49
Case Studies	17	Traditional Owner Reef Protection Annual Work Plan: 2022-2023	51
Eastern Cape York Water Quality Program	17	Community Reef Protection Component	56
Data management systems supporting water quality	18	End-of-Partnership Outcomes	56
Water Quality Five-Year Plan	19	Progress on the five-year journey	57
Water Quality Annual Work Plan: 2022-2023	21	Strengthening and accelerating on-ground action	57
Crown-of-Thorns Starfish (COTS) Control Component	25	Connecting community with decision making	58
End-of-Partnership Outcomes	25	Building understanding, hope and action	59
Progress on five-year journey	26	Fostering enduring outcomes	59
Delivering on-ground impact to protect coral	26	Case Studies	60
Innovation Program in full swing	27	Community data making change	60
Enhanced partnerships and integration	28	Community leading action to protect the Reef	61
Case Studies	29	Community Reef Protection Five-Year Plan	62
CCIP Early Investment Research	29	Community Reef Protection Annual Work Plan: 2022-2023	64
Rapid response to early warning signs of next major outbreak	29	Integrated Monitoring and Reporting (IMR) Component	67
COTS Control Five-Year Plan	30	End-of-Partnership Outcomes	67
COTS Control Annual Work Plan: 2022-2023	31	Progress on five-year journey	68
Reef Restoration and Adaptation Science Component	33	Filling critical Reef monitoring gaps	68
End-of-Partnership Outcomes	33	Building a federated Data Management System	69
Progress on five-year journey	34	Technology Transformation Fund – guiding and tracking RRAP intervention deployment	70
Scientific breakthroughs	34	Integration – a critical cross cutting theme in IMR	70
A pathway to coral reef adaptation and recovery at scale	35	Case Studies	71
RRAP on the global stage	36	Critical Monitoring Stage 1 – eReefs	71
Case Studies	37	Critical Monitoring Stage 2 – Sea Cucumber Monitoring	72
A Reef-wide map of heat tolerance	37	Integrated Monitoring and Reporting Five-Year Plan	73
Engineering solutions to stabilise the Reef	37	Integrated Monitoring and Reporting Annual Work Plan: 2022-2023	74
RRAP Annual Work Plan: 2022-2023	38		

List of figures

Figure 1: COTS Control Innovation Program structure	27
Figure 2: RRAP R&D Program structure	40

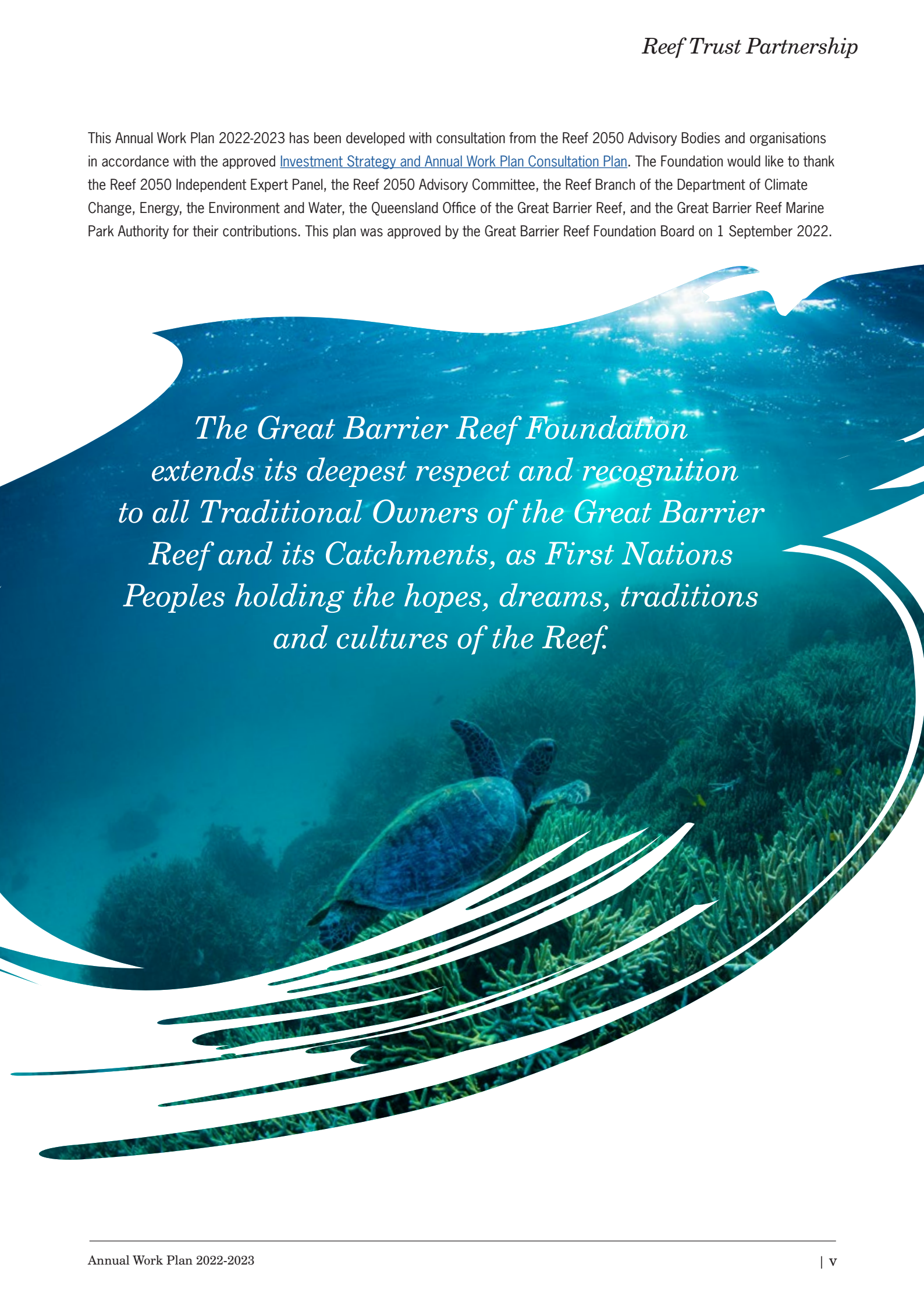
List of tables

Table 1: RTP Water Quality targets by Regional Program	14
Table 2: Water Quality Component Partnership activities and budget	19
Table 3: Water Quality Component investment areas and budget for 2022-2023	21
Table 4: Water Quality Control Component Gantt chart 2022-2023	24
Table 5: COTS Control Component Partnership activities and budget	30
Table 6: COTS Control Component investment areas and budget for 2022-2023	31
Table 7: COTS Control Component Gantt chart 2022-2023	32
Table 8: RRAS Component Partnership investment areas (RRAP Subprogram) and budget 2022-2023	38
Table 9: RRAS Component Partnership activities (RRAP Subprogram) and budget for 2020–2024	40
Table 10: Traditional Owner Reef Protection Component Partnership activities and budgets	49
Table 11: Traditional Owner Reef Protection Component investment areas and budget 2022-2023	51
Table 12: Traditional Owner Reef Protection Component Gantt chart 2022-2023	54
Table 13: Community Reef Protection Component Partnership activities and budget	62
Table 14: Community Reef Protection Component investment areas and budget for 2022-2023	64
Table 15: Community Reef Protection Component Gantt chart 2022-2023	66
Table 16: Integrated Monitoring and Reporting Component Partnership activities and budgets	73
Table 17: Integrated Monitoring and Reporting Component investment areas and budget 2022-2023	74
Table 18: Integrated Monitoring and Reporting Component Gantt chart 2022-2023	75

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
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DES	Queensland Department of Environment and Science
DIN	Dissolved Inorganic Nitrogen
DMS	Data Management System
DSS	Decision Support System
FS/FSS	Fine Sediments / Fine Suspended Sediments
GBR	Great Barrier Reef
GBRF	Great Barrier Reef Foundation (the Foundation)
GBRMPA	Great Barrier Reef Marine Park Authority (the 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 2022-2023 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 1 September 2022.

An underwater photograph of a sea turtle swimming over a vibrant coral reef. Sunlight rays penetrate the clear blue water from the surface. The image is framed by a white, stylized wave-like border.

*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.*

Introduction

Right now, across the length of the largest living structure on the planet, over 30,000 people are hard at work on the largest collaborative reef protection effort of its kind.

The Reef Trust Partnership (the Partnership) represents a major elevation and escalation of activity. It builds on the work of many, accelerating and scaling their endeavours to respond to the closing window of opportunity to protect one of the most valuable and vulnerable parts of Australia. More than 300 programs involving 428 partners – including scientists, engineers, farmers, marine and tourism vessel operators, Traditional Owners, philanthropists, industry, community groups and everyday Australians – are on the front line, tackling the impacts of climate change and local stresses, and contributing to an ever-growing number of positive outcomes for the Reef, at a time when it needs it most.

The Great Barrier Reef Foundation is proud to play its part, under an agreement with the Australian Government, as a designer and manager of this remarkable program. The 2022-2023 Annual Work Plan sets out the key activities and investments to be undertaken in the fourth year of a five-year strategy. We encourage readers to refer to the [Partnership Investment Strategy](#) (released 2019) which articulates the broader vision for investment over the Partnership term.


An independent mid-term review states the Partnership is on track to deliver against all of its performance measures. Despite this, there is no room for complacency, in fact the Partnership needs to do more if we are to keep pace with the rapidly escalating threats facing the Reef.

The next horizon

The Reef's future is on a knife-edge and what Australia and the world does, or does not do, in the next 5 to 10 years will determine the fate of these ecosystems globally. Already this year we have witnessed unprecedented flooding and the first ever mass coral bleaching event on the Great Barrier Reef in a La Niña year, making this the Reef's fourth mass coral bleaching event in just six years. In parallel, the IPCC released a very sobering series of reports predicting that on our current trajectory we will reach 1.5 degrees of planetary warming sooner than expected. The only answer is to urgently and dramatically reduce emissions while rapidly accelerating and scaling local action and adaptation.

This is the backdrop to the 2022-2023 Annual Work Plan. With the remaining time and budget, the Partnership will continue its unwavering focus on accelerating action and impact for the Reef. Every project, activity and dollar spent has a clear path to impact. We will use the momentum generated by the Partnership to push the bar even higher in our pursuit of excellence, accountability, transparency and rigour.

The Foundation will unashamedly focus on aiming high, we will seek out the promising pilots in restoration, COTS and water quality and drive them closer to being shelf ready solutions, and we will continue to bring new players, new thinking and new investment into the tent. In short – we will keep pushing ourselves. This is what the Reef needs and this is what Australians are demanding.



Every project, activity and dollar spent has a clear path to impact. We will use the momentum generated by the Partnership to push the bar even higher in our pursuit of excellence, accountability, transparency and rigour.

Partnership progress to date includes:

Preventing
188 tonnes



of dissolved inorganic nitrogen (41% of target), **230kg of pesticide** (92% of target) and **37.2 kilotonnes of fine sediment** (8% 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 **55 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 \$240m raised to 30 June 2022 (\$30m ahead of the published fundraising target).

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

In 2022-2023, beyond continuing the implementation of the current portfolio of 300+ projects and monitoring, measurement and validation of their outcomes and impact, we will:

- ➔ **Drive the innovation agenda** by scaling the most promising ideas from previous innovation programs.
- ➔ **Unlock emerging environmental markets** by piloting new innovative financing mechanisms, particularly relating to biodiversity and co-benefits.
- ➔ **Establish a translation workstream** within the Reef Restoration and Adaptation Program (RRAP) to expedite the transition from R&D to on-water deployment and kickstart a Reef adaptation industry of the future in Regional Queensland.
- ➔ **Drive enduring integration across the Partnership's components** with the establishment of a network of Reef Protection hubs within key Reef localities.
- ➔ **Fund, champion and inspire local climate action** and community reef protection with the launch of the Reef Protection challenge.
- ➔ **Build a portfolio of large, collaborative partnerships with Reef Traditional Owners** that support nature-based solution enterprise development and enable digital economy opportunities to support more sustainable futures.
- ➔ **Work with the federal, state and local governments** to embed the learnings and principles of the Partnership into the design of future Reef programs.
- ➔ **Launch a portfolio of strategic partnerships** across the Reef landscape that will support and fund activities beyond the life of the Partnership.
- ➔ **As per the RTP Communication and Engagement Plan, continue to work closely with our delivery partners** via a wide range of engagement tools and processes, to articulate the challenges the Reef is facing and the role we're playing in tackling them – through the over 300 projects currently underway through the Reef Trust Partnership.
- ➔ **Amplify global awareness and engagement of Reef Recovery 2030** through a series of events and activities in association with the UN Decade of Ocean Science.

Partnerships underpin impact

In the year ahead, the Foundation will continue its strong focus not only on what the Partnership delivers but how it is delivered. We believe that this is crucial to achieving better outcomes for the Reef. We have built our overall model for delivery of the Partnership around collective impact, underpinned by a set of strategic and operational principles.

A recent independent expert review of the Partnership found that:

The strategic principles – of advancing partnerships, leveraging investment and opportunities for integration, empowering partners, adopting Traditional Owner norms, and using innovation – represent a new and more enduring approach to securing the health of the Reef. Collectively, they guide effective practice as well as help to more readily identify partners that share a common vision for the Reef. The Foundation has led by example, demonstrating what 'good partnering' looks like, and how to effectively utilise these strategic principles, for better outcomes for the Reef.

Complementing these are the more operational principles – regarding the achievement of multiple benefits, the use of best available science and expert knowledge, complementing existing investments, addressing the highest priority threats in the highest priority locations and improvement through on-ground change – which explicitly inform the design of all Partnership components and investment decisions. The operational principles ensure a consistent, robust, defensible and transparent approach to investment decisions in particular, consolidating stakeholder confidence in the decisions and actions of the Foundation in delivering the Partnership.

This is validation that the Partnership model is working and provides a strong case for building on this principles-based approach when designing future Reef programs.

Leveraging the leadership investment from the Australian Government will continue to be a critical focus area for the Partnership this year. Thanks to the generous contributions of our project partners, corporate Australia and individuals, we have unlocked an additional \$240m (\$30m ahead of the 30 June 2022 fundraising target) in leveraged funding.

The opening up of international borders has unlocked global markets, particularly in the USA and Europe, and the Foundation and its development team are quickly making up for lost time. Global interest in the Reef and what Australia is doing has intensified due to the 2022 mass coral bleaching event and a potential In Danger Listing by UNESCO. The desire to help our oceans has never been stronger.

In the last 12 months there has been remarkable leadership shown by corporate Australia in investing and promoting greater action on environmental protection. The Reef has been identified as a critical investment by some of our most trusted brands and we are thrilled to share news of these new partnerships throughout 2022. In addition to real investment into programs around reef restoration and water quality, each of these partnerships enables a powerful platform for storytelling. Since the inception of the RTP, one of the most constant calls from our partners has been to elevate awareness of action on the Reef. The extensive customer base of these companies provides unprecedented opportunity to communicate to a mass audience about the challenges facing the Reef, the great work being done right now by so many, and what can be done to help. Growing the number of informed and passionate Reef supporters is a key step in securing its future.

With 24 months to go, and the Partnership on-track to meet all its outcomes, we want to call out all of our incredible partners, including the Australian Government, who share in every success and breakthrough enabled by this landmark investment. At last count this included 25,000 community members, almost 3000 farmers, 400 scientists and engineers, more than 1200 Reef Traditional Owners and about 170 marine and tourism vessel operators and crew, not to mention all those supporting behind the scenes. This work is not easy. Each year the challenges and threats grow. And still our partners tirelessly persist and are delivering outcomes for the Reef at a scale never seen before.

We also recognise that a healthy and resilient Great Barrier Reef requires, maintaining the connection between its Traditional Custodians, their lands and waters, a sustainable economy and healthy community. We are committed to recognising, respecting and supporting the ancestral tie of the Reef's Traditional Owners and the upholding of their rights and interests in Country, in accordance with the Uluru Statement from the Heart.

We remain incredibly grateful to the Reef's Traditional Owners for their ongoing leadership and their patience as we and our partners continue to grow cultural awareness and capability, and learn from more than 60,000 years of their experience in caring for Country.

The Reef Trust Partnership was intended to be a new way of working, and unsurprisingly this has attracted a level of scrutiny and curiosity. The core Foundation team, working from Brisbane, Townsville, Cairns and Mackay, has at all times risen to the unrelenting pressure and demands that come from work of this nature and pace. Their professionalism and dedication, at times in the face of insurmountable challenges and uncertainty, requires acknowledgement and gratitude.

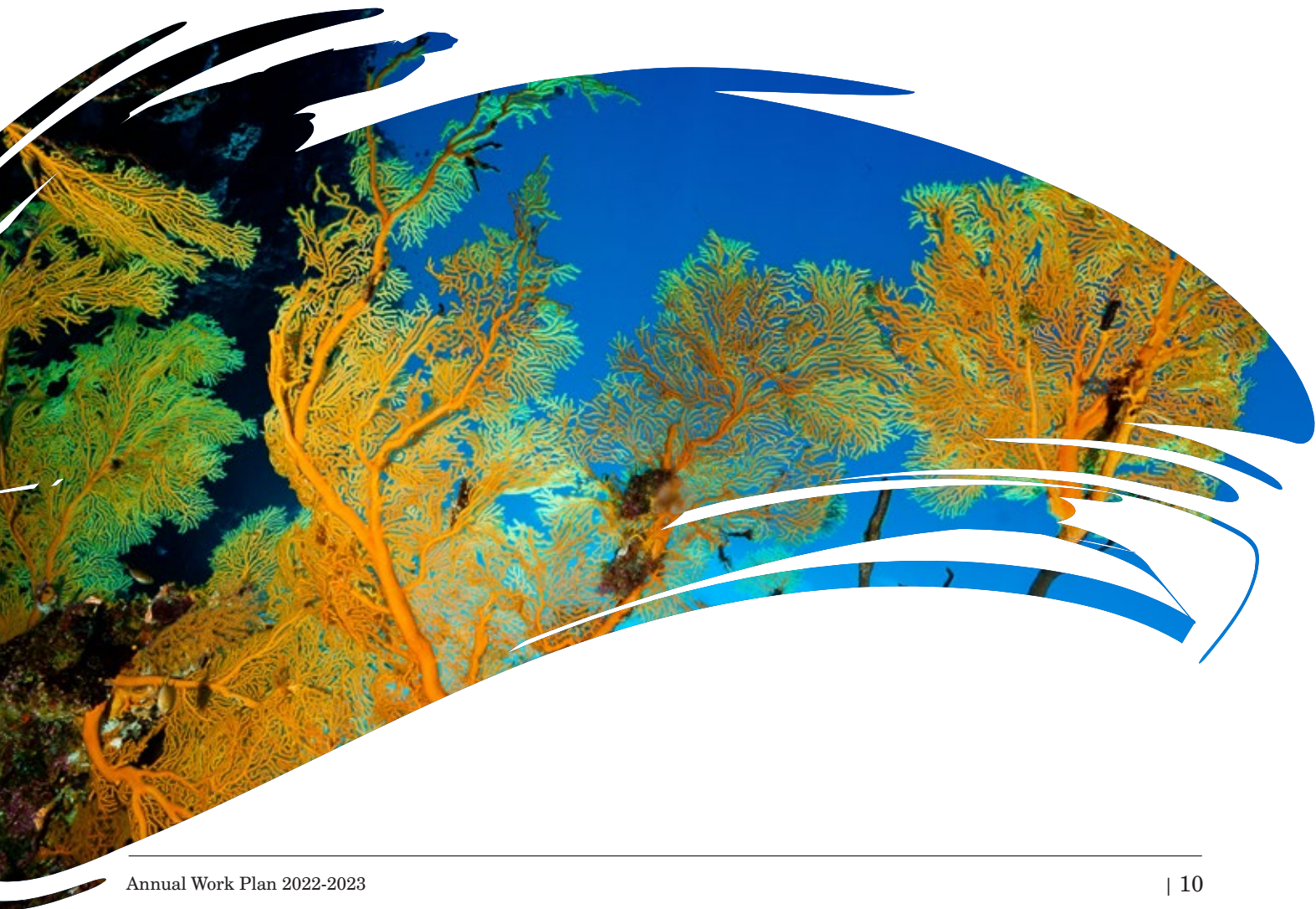
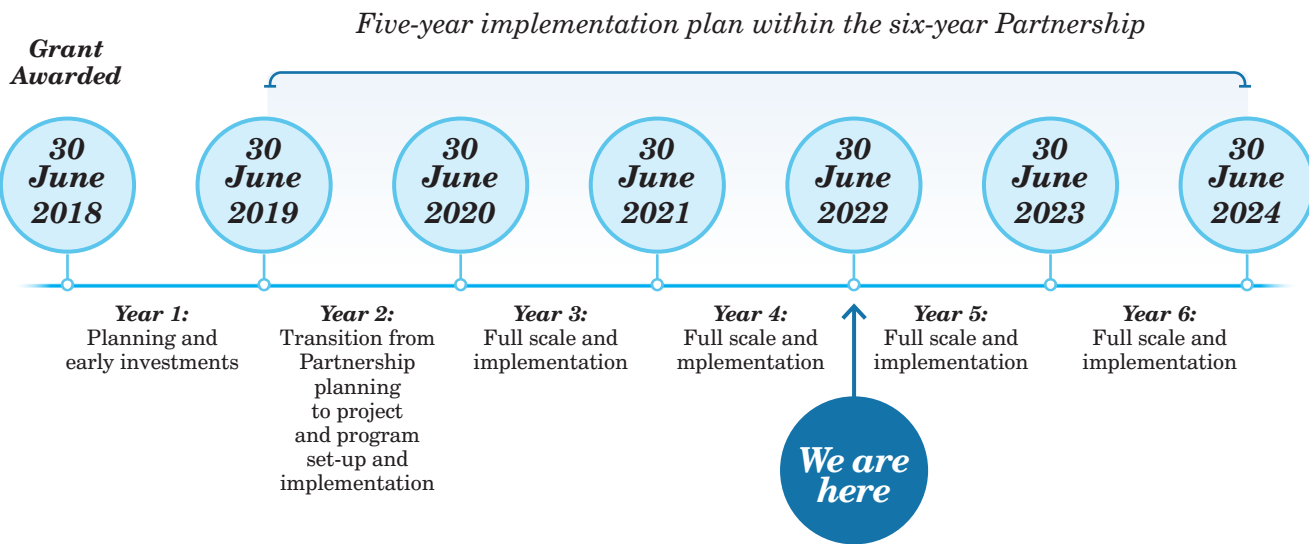
With the urgency of the interconnected climate and biodiversity crises never clearer, we know that we have years and not decades in which to take bold and decisive action. How we as a global society respond will literally set the scene for future generations. We are encouraged by announcements of future investment into the protection of the Reef and look forward to the more courageous 2030 climate targets being actioned to create the change needed for the Reef.

The challenges loom large but we know what needs to be done. Working together as a truly collaborative community of partners and ensuring no critical player is left behind, is making a difference. The Foundation and its partners remain steadfastly committed to ensuring that the Reef Trust Partnership continues to play its role in the years ahead.

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Annual Work Plan 2022-2023: Summary

2022-2023 is the fifth year of the six-year, \$443m landmark Reef Trust Partnership. It is the fourth year of on-ground and on-water delivery.



Annual Work Plan 2022-2023 activities at a glance

Budget: \$135.7 million

<p>Water Quality Component </p> <p>Budget: \$54.8 million</p> <ul style="list-style-type: none"> • Wrapping up of all early investment projects • Continued implementation of 10 regional programs, including annual reviews and on-ground verification activities throughout the year • Continued implementation of conservation and protection activities in less disturbed catchments, including the integrated catchment management pilot project in south-eastern Cape York and the wetland restoration prioritisation tool • Continued delivery of the \$10m innovation program including design and contracting of a new data sharing and management platform 	<p>COTS Control Component </p> <p>Budget: \$7.6 million</p> <ul style="list-style-type: none"> • Continued implementation of the COTS Control Innovation Program (Prediction, Detection and Response subprograms) • Continued implementation of the COTS Control Program • Implementation of the community-driven COTS Control pilot project • Consultation and options development for the COTS Control long-term funding strategy 	<p>Reef Restoration and Adaptation Science Component </p> <p>Budget: \$38.6 million</p> <ul style="list-style-type: none"> • Continued implementation of the RRAP R&D phase at full pace • Establishment of a dedicated R&D translation team focused on moving from R&D to on-reef deployment
<p>Traditional Owner Reef Protection Component </p> <p>Budget: \$15.2 million</p> <ul style="list-style-type: none"> • Continued implementation of a Traditional Owners' Strategic Communication Framework to elevate Traditional Owners' voices • Selection of a Traditional Owners futures fund business model and commencement of investments • Continuation of Reef Traditional Owner women leadership program and launch of men and youth programs • Continued implementation of the COTS traineeship program • Continued implementation of the Healthy Water, Healing Country and other on-ground land and sea Country management projects • Development and implementation of the co-designed Healthy Water Literacy Toolkit • Scoping of an on-Country incubator program to support nature-based solution enterprise development 	<p>Community Reef Protection Component </p> <p>Budget: \$3.9 million</p> <ul style="list-style-type: none"> • Launch of community-led climate action initiatives • Continued implementation of citizen science projects driving change through innovation, connecting community data with end data users and applications to inform local actions • Continued implementation of local-scale coral rehabilitation and stewardship projects, as well as collaborative training and pilot activities via the Cairns-Port Douglas Hub • Implementation of Community Action Plan projects to deliver community on-ground action 	<p>Integrated Monitoring and Reporting Component </p> <p>Budget: \$15.5 million</p> <ul style="list-style-type: none"> • Continued implementation of RIMREP Critical Monitoring projects • Build and operationalisation of the RIMREP Reef Data Management System • Scoping of a Traditional Owner Decision Support System • Launch of the Technology Transformation Fund, including commencement of projects, targeted to Reef Restoration and Adaptation Program use-cases

◀ Across the Portfolio ▶

- Continued focus on transparency through updating public-facing dashboards every six months and regular communications to a variety of audiences
- Strong focus on integration between and across Components and with other Reef 2050 activities
- Continuation of RTP legacy planning to ensure momentum built across the Reefscape is not lost when RTP funding ends in June 2024

A complete list of projects currently being delivered under RTP can be found on the Foundation's website, along with interactive Monitoring and Evaluation dashboards ([Reef Trust Partnership – Great Barrier Reef Foundation](#)). These dashboards detail the progress the RTP, including each individual Component, is making towards meeting end-of-Partnership outcomes.

Water Quality Component

Partnership budget: \$201 million

2022-2023 budget: \$54.8 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:



Enduring reduction in long-term end-of-catchment pollutant loads



Innovative solutions for systems change in water quality improvement are available



Maintenance or improvement of water quality from less disturbed catchments



Increase in Traditional Owner-led water quality improvement projects and Traditional Owner involvement in non-Traditional Owner-led projects



An improved approach for implementing water quality improvement programs



Enduring economic drivers for improved land management or land use change are available

Progress on five-year journey

In partnership with the Australian and Queensland governments, the Water Quality component is achieving strong water quality outcomes for the Reef. The five-year strategy prioritises funding for proven, on-ground measures aimed at addressing priority pollutants – dissolved inorganic nitrogen or DIN, pesticides and fine sediment. This is complemented by significant funding to drive innovation, as well as work to protect less-disturbed catchments, notably in Eastern Cape York.

The program is now deep into its implementation phase, with more than 90% of the available funding committed and 77 projects underway across 20 of the Reef's 35 catchments. Working together with water quality experts from more than 100 organisations and thousands of individual landholders throughout regional Queensland we are:

- ✓ **Preventing 187.7 tonnes of DIN, 230kg of pesticide and 37.2 kilotonnes of fine sediment** from entering the Reef each year and are on track for further significant reductions in the remaining two years.
- ✓ **Driving a strong innovation agenda** with one-third of projects targeting innovation and system change in water quality improvement.
- ✓ **Forging a new partnership** in Eastern Cape York with community and Traditional Owner organisations to reduce erosion from roads, tracks and gullies and employ Traditional and Western science methods to reduce wildfires that contribute to increased sediment loads.
- ✓ **Raising the bar in the accountability and transparency** of water quality programs, supported for the first time by public dashboards, a spatial system to track real-time progress at the individual farm level and independent on-ground verification processes.
- ✓ **Securing a new corporate partnership** to support high-precision irrigation activities in the Lower Burdekin region and amplify landholder-driven water quality success stories.

Beyond continuing the implementation of the current portfolio of 77 water quality projects, the focus in 2022-2023 will be on:

- ➔ **Scaling the most promising pilots** from our innovation portfolio and commencing projects under the data innovation theme.
- ➔ **Supporting delivery providers** to maximise project outcomes, including further support to ensure the sustainability of outcomes.
- ➔ **Convening regional events** to improve coordination and integration between projects and share lessons.
- ➔ **Rolling out behaviour change programs** with a focus on the Mackay-Whitsunday and Lower Burdekin regions.
- ➔ **Strengthening the monitoring and evaluation framework** with new indicators being developed for social and behavioural change to support landholder engagement.
- ➔ **Building the legacy of the Reef Trust Partnership** by ensuring the information, systems, methods and tools are available to guide and support future Australian and Queensland government investments in water quality. This will be aided by the continued work of the Water Quality Working Group in aligning water quality investments and activities under the Partnership with those of the Australian and Queensland governments.

Water Quality Regional Programs

Ten regional water quality improvement programs have been initiated with 34 on-ground projects underway. Regional program managers and partnership coordinators (where applicable) are in place for the larger programs to oversee and coordinate local actions and actors. The last two regional programs rolled out were those in the Mulgrave-Russell and Tully and Johnstone catchments, with both launched in late 2021.

Different governance models have been adopted across the regional programs, with the approach particularly dependent on the size and complexity of the program, and the availability of suitable providers for the program manager/partnership coordinator roles. The delivery model adopted in the Bowen, Broken and Bogie (BBB) regional program recognises the substantial work done under the Queensland Government's Major Integrated Project. The program manager, NQ Dry Tropics, is transitioning from the program design phase to the implementation phase, which will see service providers being contracted directly by this local entity.

A range of novel approaches and systems have been implemented to improve the delivery of the regional programs:

Monitoring and evaluation systems, including the capture of farm-level M&E data. An in-house spatial database has been developed to capture information directly from delivery providers. Visualisation tools have been made available for delivery providers and regional managers. This provides them with the tools to manage the program closely, adaptively manage and identify opportunities for synergies, and maximise the water quality outcomes obtained from on-ground actions. Dashboards are available to the public, showing up-to-date data on progress. The establishment of this internal database and the availability of the information through the dashboards is a first in this field and provides unprecedented transparency and accountability.

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.

Table 1: RTP Water Quality targets by Regional Program

Regional program	Constituent	RTP target	Progress to RTP target*	WQIP target	Program manager	Partnership coordinator	Number of on-ground projects
Bowen, Broken, Bogie	Fine Sediment (FS)	330kt	1kt	426kt	NQ Dry Tropics (Regional manager to plan and implement the delivery of the BBB program)		3
Fitzroy	FS	50kt	4.3kt	200kt	GBRF	Fitzroy Basin Association	5
Lower Burdekin	DIN	48t	9t	585t	NQ Dry Tropics		4
	Pesticides	35kg	2kg	1,318kg			
Lower Herbert	DIN	140t	119t	641t	GBRF	Herbert River District Cane Growers Organisation Ltd	5
Mackay Whitsunday	DIN	26t	23t	230t	Reef Catchments		8
	Pesticides	215kg	12kg	2,008kg			
Mary	FS	28kt	2kt	131kt	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	DIN	72t	3.5t	336t	The Reef and Rainforest Research Centre	Canegrowers Cairns Region Ltd	2
Upper and East Burdekin	FS	44kt	1kt	320kt	N/A	N/A	1
Upper Herbert	FS	12kt	1kt	95kt	N/A	N/A	1
Tully and Johnstone	DIN	170kt	28kt	720t	Terrain NRM		4

* Progress to targets is primarily based on completed Early Investment projects. While other projects have made substantial progress, this is only reported once activities are completed.



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 2022-2023 period will see all 10 regional programs under full implementation with delivery of projects and ongoing support from regional program managers and partnership coordinators. 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 guiding adaptive management actions when needed.

The regional programs will benefit from key knowledge gaps that will be filled through a series of consultancies that are the result of analysis undertaken by the TAG to identify key data and monitoring gaps. These consultancies will support the regional programs by:

- Developing additional lines of evidence for estimating water quality improvements associated with regional on-ground projects, which will provide greater confidence that the predicted water quality outcomes are being delivered.
- Providing technical support across all DIN and pesticides focused projects that involve local-scale water quality monitoring to aid engagement, with a view to ensuring that the overall approach is fit for purpose and consistent across projects and programs.
- Building an understanding of the social context and measuring the social changes occurring because of the regional programs.
- Designing and implementing a behavioural change program tailored to the particular mix of social factors of the landholder population in the Lower Burdekin and Mackay-Whitsunday regional programs.

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 is delivering an innovation and system change program, with a view to driving transformational change in how water quality improvement activities are designed, funded and implemented. A total of 22 projects were contracted in 2020–2021 under the three thematic areas described below. Three of these projects have now been completed, with most of the remaining ones expected to be finalised in 2022-2023:

- **Technology transformation.** Ongoing implementation of nine projects trialling a range of tools and approaches for reducing priority pollutants.
- **Broad and local-scale planning to support future interventions.** Five 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 four projects aimed at increasing the potential sources of funding for water quality improvement activities.

Overall, the projects have progressed very well and have provided early indications of promising technologies, approaches, financial mechanisms and/or research findings in support of water quality improvement across Reef catchments. While the initial budget for this program was \$10 million, in recognition of the great promise of some of the approaches, part of the contingency funds originally allocated to regional programs have been reallocated to fund extensions for some of the existing, successful innovation projects. This will allow these projects to realise their potential for moving closer to the commercialisation and scaling of the new concepts or technologies developed in their initial stage.

So far, three innovation projects have been extended with additional funding. These projects will (i) assess and validate the benefits of commercial scale adoption of precision agriculture efficiencies in banana production in Reef catchments; (ii) facilitate a fully developed commercial nitrogen insurance product offered to sugarcane farmers so that they can manage risks associated with reduced fertiliser applications; and (iii) proceed with marine trials to demonstrate the viability of a network of seaweed biofilters for converting DIN into biomass that could then be harvested and used in agricultural products such as biofertilisers.

Work under the fourth thematic area under the Innovation program – sharing and management of industry and landholder-owned data – will accelerate in 2022-2023 after some delays. This theme will focus on selecting and implementing a suite of projects that support centralisation of landholder-data in a way that protects their privacy while maximising the value of the data to the landholder, as well as allowing for aggregated data to be used to assess impact and guide future investments.

Important linkages and synergies between innovation projects and regional on-ground projects have been established so far, with some innovation projects being embedded in regional plans. For example, an app developed by JCU to support improved irrigation management practices is now being trialled as part of a major on-ground project in the Lower Burdekin. This integration piece is key and will be a priority for the 2022-2023 period, with various events to be organised to support collaboration and sharing.

Protection and conservation of less-disturbed catchments

The Partnership has allocated \$10m to protection and conservation in less disturbed catchments, in recognition that such investment can deliver several benefits, including:

- More cost-effective water quality improvement interventions in the future
- Reducing degradation that would likely require larger scale, future remediation investment
- The protection and realisation of co-benefits and protection of other ecosystem and cultural values.

Following further consultation with key stakeholders across GBR catchments, in 2021-2022 GBRF made significant progress with two substantive initiatives:

- Water quality management program in the less disturbed catchment areas in Eastern Cape York
- Prioritisation of wetland restoration or construction for the purpose of maximising nutrient removal.

In 2022-2023, each of these will be advanced to the stage of implementation.

East Cape York Water Quality Program

Following the contracting of seven catchment management projects, and the Program launch in April 2022, on-ground work commenced in July 2022. This will reduce erosion and sediment runoff to the Reef from roads and tracks, gullies and uncontrolled fire. It will deliver more sustainable property management and expansion of the existing ecosystem and water quality monitoring. This suite of projects is being coordinated by the Cape York Water Partnership Inc in their capacity as program manager.

The seven projects are being undertaken 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 will meet bi-monthly during this period.

Wetland Restoration Prioritisation

GBRF will continue its close collaboration with the Queensland Department of Environment and Science (DES) and the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) to define information and knowledge gaps associated with the role of wetlands in nutrient removal from GBR catchments, specifically DIN. This detailed analysis will be integrated into the 2023 Scientific Consensus Statement (SCS).

Additionally, GBRF will collaborate with DES to develop updated or new modelling tools to enable investors and governments to have greater confidence in what DIN reductions can be achieved by a variety of constructed or natural wetlands under various hydrologic conditions. This work will fill an important gap in knowledge and ensure greater consistency in measurable outcomes across the GBR catchments.

Case Studies

Eastern Cape York Water Quality Program

The Eastern Cape York Water Quality Program (ECYWQP) is the culmination and acceleration of the efforts of a community long committed to improving the health of the land and Reef adjacent to the Cape York coast.

Collectively, four local community and Traditional Owner organisations will reduce erosion and sediment runoff to the Reef from roads and tracks, gullies and uncontrolled fire.

Capacity building for local community-based organisations, active leadership and engagement in all projects from Traditional Owners in the region, and strong community consultation have been the cornerstones of developing the ECYWQP. The program and all its projects are managed collaboratively by local organisations and Traditional Owners, whose Country-specific activities are an integral component. Long operating as an informal network entrenched in the community, the Cape York

Water Partnership member organisations used this program as a catalyst to formalise their governance arrangements and, in doing so, demonstrated their capability and capacity as a program management organisation.

The Great Barrier Reef closely hugs the coastline of Cape York, making the Reef more vulnerable to changes in land management that increase pollutant loads, particularly sediment. This program is a unique opportunity to proactively manage pressure on the Great Barrier Reef caused by increasing pollutant loads from development in the region. While the region's catchments are considered 'less disturbed' compared to other GBR catchments, poorly managed roads, tracks and fires continue to pose a serious risk to the adjacent reef. Preventative interventions that cost far less than what is required in 'highly disturbed' catchments can preserve and restore the catchment, bringing incalculable benefits for the Reef for generations.



Cape York gullies. Image credit: Jeff Shellberg

Case Studies

Data management systems supporting water quality

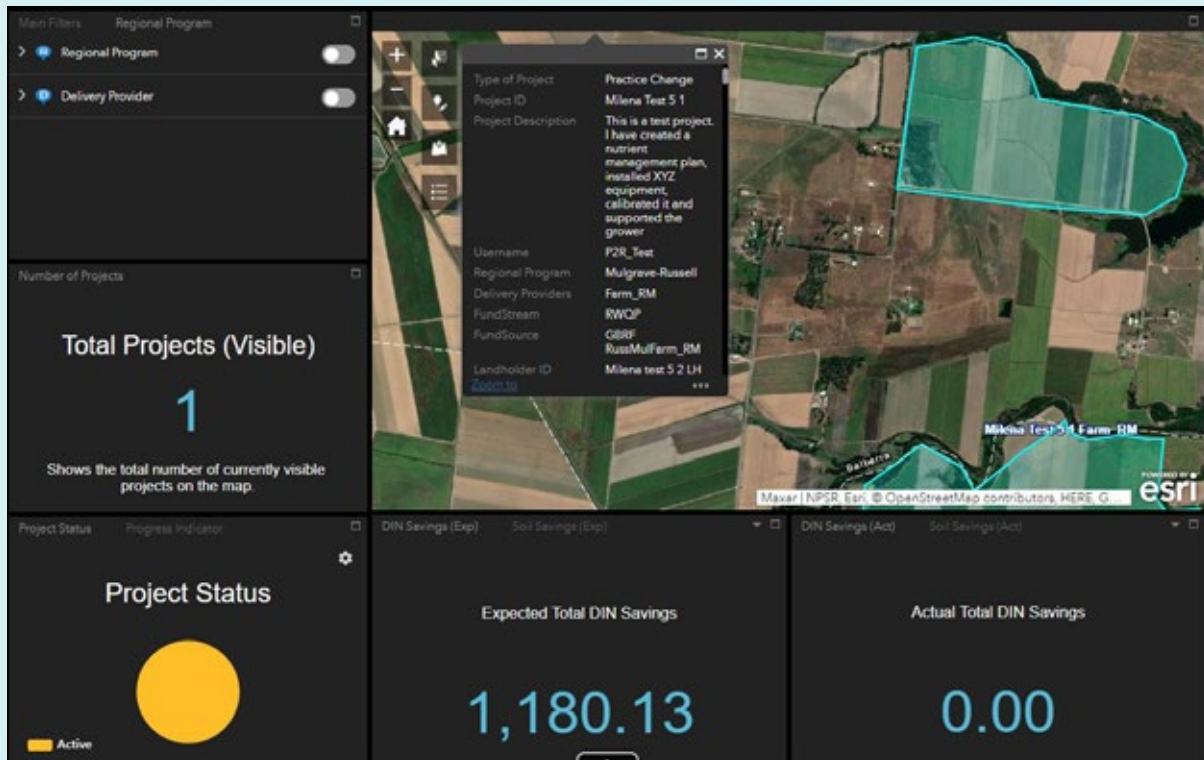
Historically, Reef water quality investors have had limited visibility on where interventions took place on the ground, and a full understanding of the impact that investments had on water quality was only available years after the actions took place. This has changed over the last 12 months with GBRF's development of a data collection and reporting system to track on-ground actions in real time.

The system consists of an online spatial database – a bespoke app for on-ground data collection and visual dashboards. Delivery providers upload relevant data to the app and GBRF and regional managers can use the dashboards to view data in real time and extract it for reporting to the Australian and Queensland governments. This ability to see live data allows regional managers to spot issues early, and identify and avoid overlaps with previous investments. It gives GBRF and partners the information needed to agilely manage the program. It also provides confidence to the Australian Government,

as the funder, of the successful implementation of the project in close to real time.

Farmers can be certain their data is safe because the system includes privacy and security gold standards and a solid data management policy. By leveraging and inbuilding compatibility with the P2R Projector² and embedding the Gully and Streambank Toolbox apps³, the estimated pollutant load reductions are tracked at a farm level, providing a measure of progress against the water quality targets from project to program.

The establishment of the Water Quality platform overcomes the limitations of previous water quality improvement programs by providing, for the first time, visibility to the investor of on-ground actions and program progress in real time. This supports proactive management of the program, enhanced transparency and accountability and achievement of the highest possible water quality impact with the available funds.



Dashboard example from the spatial database.

2 A tool created and maintained by Queensland Government that estimates the water quality benefits of farm-scale agricultural improvement projects in Great Barrier Reef catchments <https://p2rprojector.net.au/>

3 The Gully and Streambank toolbox apps were developed by the Queensland Government Department of Agriculture and Fisheries and the Australian Government's Reef Trust as a tool to estimate sediment erosion from restoration projects.

Water Quality Five-Year Plan

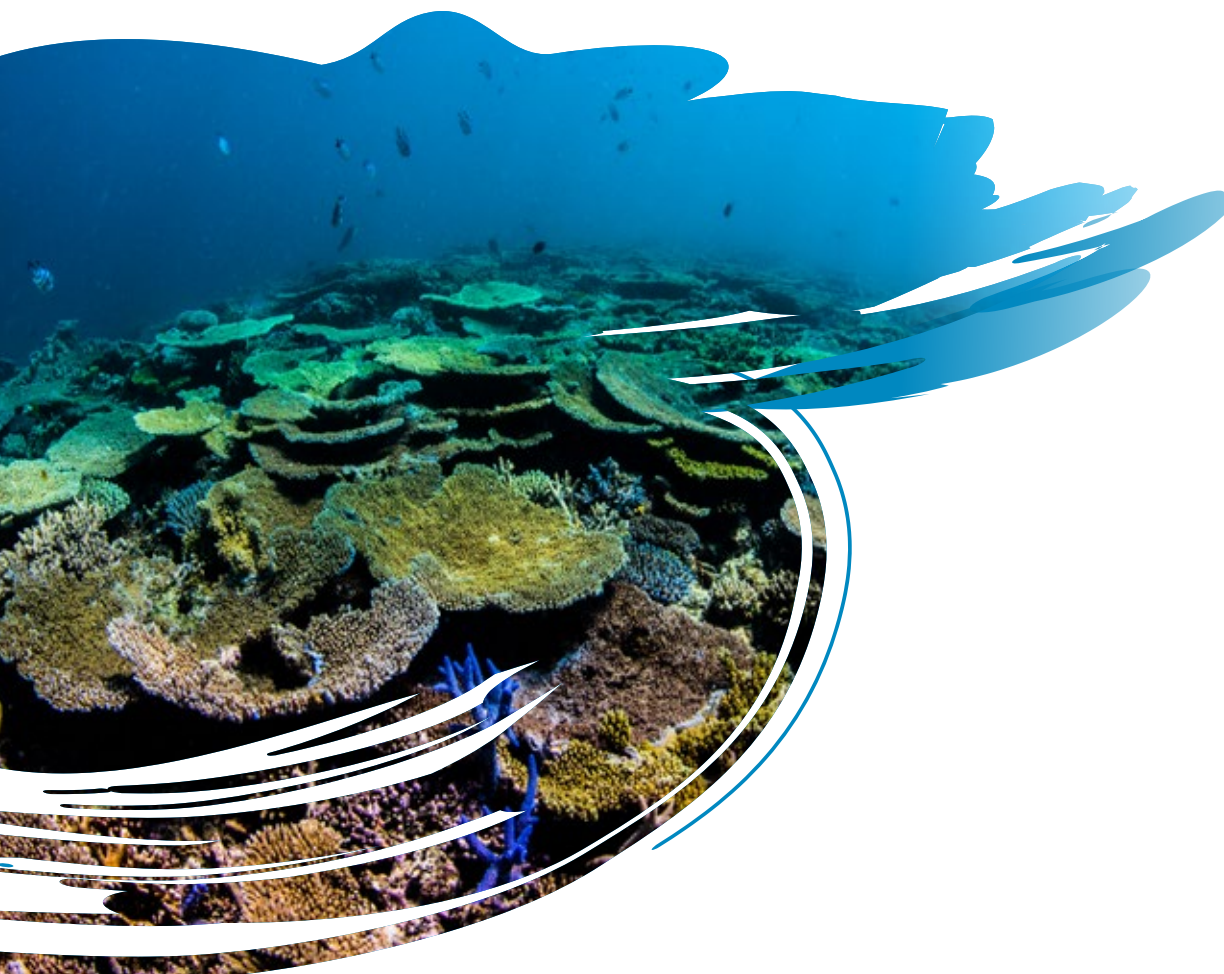
Major categories of activity, rationale and budget for the five-year period are shown in Table 2 for reference.

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 runoff.	\$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.	Reduce 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.	\$59.5m*
	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.	Reduce anthropogenic fine sediment runoff from the Burdekin (Bowen, Bogie, Upper and East Burdekin), Wet Tropics (Herbert River), Fitzroy (Lower Fitzroy and Mackenzie), and Burnett Mary (Mary River) regions, including through restoration of the landscape (gullies and streambanks) and improved management of grazing lands.	\$61m*
	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 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.	\$14.7m
● 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 the role of wetlands in mitigating pollutant runoff.	\$10m
● Traditional Owner-led Reef protection initiatives	Protect and maintain cultural 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 values recognised in protection and improvement efforts.	\$20m

Partnership Activity		Rationale	Outcome	Budget
●	Innovation and system change	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.	New systems, technologies and financing options available to support water quality improvement activities and achieve enduring impact.	\$13m*
● ●	Technical advisory	Technical expertise is required to guide program design and implementation to ensure the quality of on-ground actions, manage project data and validate outcomes. There are also opportunities to leverage project activities to maximise scientific learning.	Programs and projects are designed/endorsed based on best available technical advice. A purpose-built 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 report on investment pathways and online interface for development and assessment of investment scenarios.	\$3.3m
TOTAL WATER QUALITY COMPONENT BUDGET				\$200.6m

* \$3m originally allocated against regionally-focused on-ground actions has been re-allocated to the innovation and system change program.



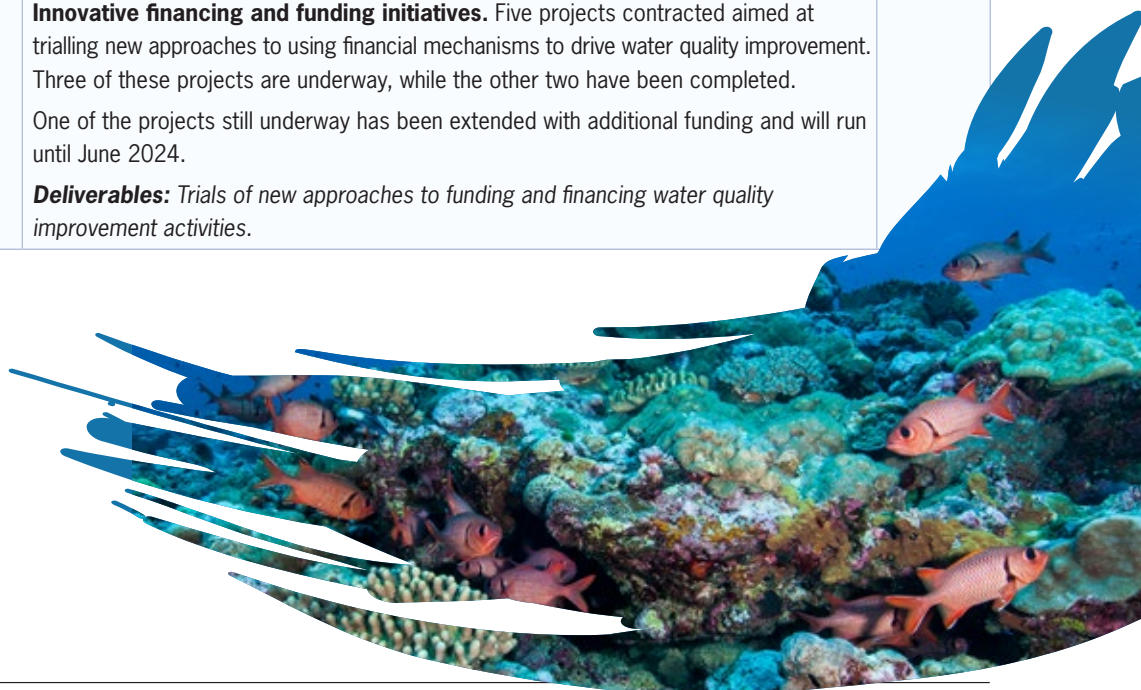
Water Quality Annual Work Plan: 2022-2023

Major categories of activity, deliverables, and budget for 2022-2023 are shown in Table 3.

Table 3: Water Quality Component investment areas and budget for 2022-2023

Partnership Activity	Description	Budget
<p>DIN and pesticide regional on-ground programs</p> <p>Implementation of major DIN and pesticide reduction programs in the Lower Herbert, Lower Burdekin, Plane Creek and Pioneer, Mulgrave-Russell, Tully and Johnstone catchments</p>	<p>All five regional programs are underway, with program managers/partnership coordinators appointed (where relevant) and regional plans finalised. Delivery providers are contracted and implementing 27 projects across all five regions. A behaviour change program to encourage improved practices will be developed and rolled out, with focus on Mackay-Whitsundays and the Lower Burdekin regional programs. Remaining unallocated funds to be released to support existing initiatives with assessment criteria focused on cost-effectiveness and current performance. Regional on-ground monitoring programs will be established to assess the performance of projects, including biophysical and socio-economic outcomes. Mid-program reviews will be undertaken for many of the programs and projects, as well as independent on-ground validation processes to verify nutrient and pesticide abatement interventions and/or management practices.</p> <p>Deliverables: Implementation of a suite of integrated projects targeting improved land management practices, construction of wetlands, etc., resulting in a long-term reduction in DIN and pesticides at end of catchment. Pollutant reductions are reported by delivery providers under GBRF's database system. Additional funding released to support/expand existing projects/programs. Behaviour change program implemented. Local monitoring programs established. Mid-term reviews and on-site inspections conducted.</p>	\$23.7m
<p>FS on-ground regional programs</p> <p>Implementation of FS 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 programs are underway, with program managers/partnership coordinators appointed (where relevant) and regional plans finalised. Delivery providers are contracted and implementing 11 projects across all five regions. In the BBB, where only limited on-ground works have commenced, detailed planning has been completed and will be followed by a procurement process led by the regional program manager to select on-ground service providers. Remaining unallocated funds to be released to support existing initiatives with assessment criteria focused on cost-effectiveness and current performance. Mid-program reviews will be undertaken for some of the programs and projects, as well as independent on-ground validation processes to verify sediment abatement interventions and/or management practices.</p> <p>Deliverables: Implementation of a suite of integrated 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 are reported by delivery providers under GBRF's database system. Additional funding released to support/expand existing projects/programs. Mid-term reviews and on-site inspections conducted. BBB service providers contracted.</p>	\$23.8m

Partnership Activity	Description	Budget
Ongoing water quality activities Continuation of contracted projects under Stage 1 water quality grant round	Early investment projects contracted in 2018-2019 have mostly been completed (10 of the 11 projects) and have resulted in significant improvements in water quality, preventing 187t of nitrogen, 229kg of pesticides and up to 36,000t of fine sediment from entering the Reef. One project will continue implementation in 2022-2023, as budget savings have allowed this project to undertake additional activities, including funding a further graduate extension officer. Deliverables: Maintenance of delivery capacity (training of extension providers).	\$7,000
Innovation and systems change Implementation of projects related to innovation and systems change	Technology transformation. 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 (one of which has been completed). Two 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. Deliverables: Trials of a series of technologies, methods and approaches to reducing pollutant loads. Sharing and management of industry and landholder-owned data. Work under this thematic area is expected to accelerate in 2022-2023. Eight proposals were short-listed, with further refinement required to match the available funding envelope (\$1.5m). Projects implemented under this theme will aim to maximise the value of landholder-owned data through centralisation. The intended outcome is access to de-identified, aggregated data for individual landholders to make better decisions and for funders to assess impact and guide future investments. Deliverables: Piloting of initiatives aimed at establishing a new platform for collation, management and use of industry and landholder-owned data. Broad and local scale planning/mapping of future interventions. Five projects under this thematic area are underway, with one completed in 2021-2022. These projects aim to develop a suite of mapping and planning tools to guide future water quality interventions. These include tools for prioritising site selection for streambank and gully restoration and soil mapping to support precision agriculture. Deliverables: Maps, plans and other tools to support water quality improvement activities. Innovative financing and funding initiatives. Five projects contracted aimed at trialling new approaches to using financial mechanisms to drive water quality improvement. Three of these projects are underway, while the other two have been completed. One of the projects still underway has been extended with additional funding and will run until June 2024. Deliverables: Trials of new approaches to funding and financing water quality improvement activities.	\$3.5m



Partnership Activity	Description	Budget
Conservation and protection of less disturbed catchments	The two main types of activities prioritised for this workstream have significantly progressed in 2021-2022 and are expected to ramp up in the current financial year: Integrated catchment management in Eastern Cape York	\$2.9m
Scoping options and planning	A program has been established in the Eastern Cape York with a local program manager overseeing implementation of seven on-ground projects that will reduce pollutants caused by erosion from unsealed roads, informal tracks, gullies and uncontrolled bushfires. The program has significant Traditional Owner participation and is overseen by a Program Steering Committee. Wetland restoration prioritisation Several knowledge and information gaps have been identified in relation to the role of wetlands in nutrient removal from GBR catchments. However, over the past five years there has been considerable research to enhance the scientific understanding of these processes, making it timely to review and collate this information. A consultant has been contracted to develop a detailed scientific consensus of the new scientific knowledge associated with this topic and integrate that with the revised Scientific Consensus Statement being developed by DCCEE and DES. Deliverables: Implementation of seven on-ground projects for maintaining the water quality in Eastern Cape York. Developing a robust scientific consensus on the role of wetlands in nutrient removal in the catchments of the Great Barrier Reef. Developing new/updated tools to support wetland prioritisation.	
Technical advisory group (TAG) and other technical support	The TAG will provide independent expert advice to the Foundation across all Water Quality workstreams. This will include guiding regional monitoring programs, supporting project and program reviews, and endorsing key design documents for major restoration projects. The TAG will also identify opportunities for improving scientific understanding through program implementation, and will support sharing of lessons across the portfolio. As part of a major review of regional programs, the original prioritisation work will be re-evaluated in light of new information, including through updating the modelling undertaken by Alluvium Consulting. Deliverables: Provision of independent technical advice on project and program design and implementation.	\$0.8m
Traditional Owner-led water quality activities	Refer to Traditional Owner Reef Protection Component.	
TOTAL INVESTMENT		\$54.7m

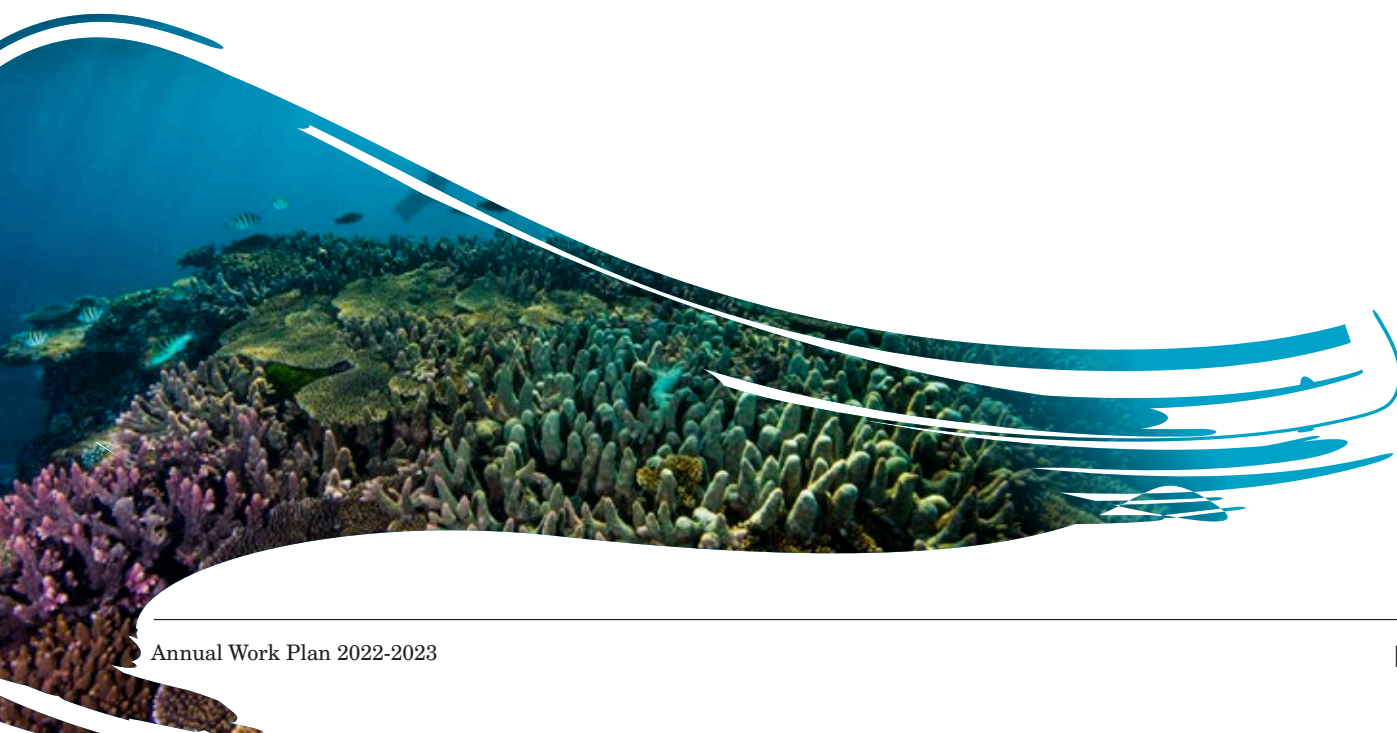


Table 4: Water Quality Control Component Gantt chart 2022-2023

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Early investments		\$7,000												
Ongoing delivery of existing Water Quality (WQ) projects	Ongoing implementation of one project focused on building capacity of extension officers, to be completed by the end of August 2022.		Implementation											
Technical advisory group (TAG) and technical panel		\$795,000												
Technical advisory	Provision of cross-cutting technical advice and guidance to programs and projects.							Ongoing						
	Develop additional lines of evidence for estimating water quality improvements.		Implementation						Ongoing support					
Address the recommendations of the TAG Gap Analysis	Provide technical support across DIN and pesticide projects for water quality monitoring.		Planning	Technical review and design phase						Implementation and ongoing support				
	Build an understanding of the social context of landholders and measure the social changes in RTP WQ projects.			Data collection phase							Measuring change			
	Design and implement a behavioural change program for the Mackay-Whitsundays and Lower Burdekin regional programs.		Design phase						Implementation					
Innovation and system change		\$3.5m												
Technology transformation	Ongoing implementation of projects focused on new technologies, tools, systems and methods for reducing pollution from DIN, fine sediment and pesticides.							Implementation of projects						
New data sharing and management platform	Pilot initiatives aimed at establishing a new platform for collation, management, and use of industry and landholder-owned data.		Design	Contracting				Implementation of projects						
Planning initiatives to support future interventions	Ongoing implementation of projects aimed at undertaking planning and mapping activities to inform future WQ investments and improvement activities.							Implementation of projects						
Innovative financing and funding opportunities	Ongoing implementation of projects aimed at piloting new measures and tools for funding and financing WQ improvement activities.							Implementation of projects						
On-ground actions - DIN and Pesticides		\$23.7m												
Plane Creek and Pioneer	DIN and pesticide focused improvement programs. All five programs are underway, with program managers/ partnership coordinators appointed (where relevant) and delivery providers contracted and implementing projects in the five regions.	\$6m	Annual					Implementation of on-ground projects						
Lower Herbert (DIN only)		\$4.2m						Implementation of on-ground projects	Annual					
Lower Burdekin		\$6.1m	Annual					Implementation of on-ground projects						
Mulgrave Russell (DIN only)		\$2.6m						Implementation of on-ground projects						Annual
Tully Johnstone (DIN only)		\$4.8m						Implementation of on-ground projects						Annual
On-ground actions - Fine sediments		\$23.8m												
Fitzroy River	Fine sediment focused improvement programs. All five programs are underway, with program managers/ partnership coordinators appointed (where relevant) and delivery providers contracted and implementing projects in the five regions.	\$5.4m						Implementation of on-ground projects				On-ground verification		
Mary River		\$4.4m			On-ground verification			Implementation of on-ground projects						
Upper Herbert		\$1.3m						Implementation of on-ground projects				On-ground verification		
Upper and East Burdekin		\$1.2m			On-ground verification			Implementation of on-ground projects						
Bowen Broken Bogle		\$11.5m						Implementation of on-ground projects				On-ground verification		
Conservation and protection of less disturbed catchments		\$2.9m												
Integrated catchment management in Eastern Cape York	Seven on-ground projects are underway, with a local program manager overseeing their implementation.							Implementation of projects						
Wetland restoration prioritisation	Develop a detailed scientific consensus of the new scientific knowledge associated to this topic and integrate it with the revised Scientific Consensus Statement being developed by DCEEW and DES.													

Crown-of-Thorns Starfish (COTS) Control Component

Partnership budget: \$57.8 million

2022-2023 budget: \$7.69 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 the Great Barrier Reef Marine Park Authority's (the Authority) COTS Control Strategy.

Priorities under the Partnership Investment Strategy

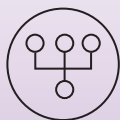
- Support existing in-water COTS control and drive improved efficiency
- Lead a step-change in surveillance for early COTS detection and early intervention
- Explore alternative control methods to address COTS management at a broad scale in the future

End-of-Partnership Outcomes

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



Reduced coral mortality from COTS outbreaks at high-value reefs



Improved methods to manage COTS at scale have been identified



More partners involved in COTS management (including Traditional Owners)



A strategy available for long-term funding

Progress on five-year journey

Outbreaks of COTS are responsible for significant coral decline and are a major threat to the long-term health of the Great Barrier Reef. The Authority's [COTS Strategic Management Framework](#) highlights COTS control as one of the most scalable and feasible direct management interventions available today to protect coral cover. 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 targeted activities that provide a first line of defence from COTS now and into the future.

The Partnership's five-year plan prioritises investment in immediate on-ground action to protect coral now, 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.

To date, achievements in the COTS Component include:

- ✓ **Effectively suppressing the current COTS outbreak**, resulting in more coral on the Great Barrier Reef today.
- ✓ **Responding to the earliest warning signs** of a fifth outbreak of COTS. This is the first time that the program has had the field intelligence and resources to detect and respond so quickly, positioning us well to suppress the spread of this new outbreak over the next >10 years.
- ✓ **Developing a new partnership-based delivery model** for the COTS Control Program delivering a new level of collective decision making, accountability and transparency.
- ✓ **Achieving scientific breakthroughs** in the prediction, detection and response to COTS outbreaks through the COTS Control Innovation Program (CCIP).

In 2022-2023 the focus will be on:

- ➔ **Delivering a scaled-up COTS Control Program** in partnership with the Reef and Rainforest Research Centre (RRRC) and the Authority.
- ➔ **Accelerating development of new innovations** to drive step-change in COTS control, through CCIP – the only program of its kind globally.
- ➔ **Utilising citizen science data** to support COTS detection and response efforts for the first time.
- ➔ **Developing a long-term funding strategy** for COTS management which includes COTS control, ongoing research and development, community participation and Traditional Owner business enterprise development.

As we move into the second last year of the RTP, the strong integration between COTS research and management facilitated through the COTS Partnership will continue to catalyse and accelerate our collective capacity to control COTS outbreaks when the Reef needs it most.

Delivering on-ground impact to protect coral

There has been excellent progress in the delivery of the COTS Control Program with strong evidence that the partnership-based delivery model is working effectively to enhance strategic and tactical performance, build trust and transparency, and deliver coral protection outcomes for the health of the Reef.

The COTS Control Program is by far the largest scale on-ground intervention program on the Great Barrier 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 over 200 reefs of high ecological and economic value across the Great Barrier Reef. The Program's capacity to have a meaningful impact is becoming increasingly clear. New modelling by the Authority has estimated that in 2020–2021 the Program achieved an **annual coral protection benefit** of +4.3% coral cover on reefs managed in the North, +10.9% coral cover in the Central, +20.5% coral cover in the South. This means there is significantly more coral on the Great Barrier Reef than there would have been without this pest management program. The 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.



Not only does the Control Program demonstrably save coral, emerging information suggests it is also effectively suppressing the spread of coral-eating pests across the Reef. Since 2018–2019, the program has strategically invested in controlling outbreaking reefs offshore from Townsville in order to suppress their southward spread towards the Whitsundays. The Whitsundays region is incredibly valuable for the Reef tourism industry and was impacted by tropical cyclone Debbie in 2017, making it vital to prevent further damage from coral-eating starfish as the region recovered. As of 2021–2022, independent data from the AIMS Long-term Monitoring Program (LTMP) shows minimal signs of outbreaks on the reefs between Townsville and the Whitsundays. When compared to AIMS LTMP data from previous outbreak cycles this is notable as reefs in this region would usually show signs of infestation at this stage. This suggests the Control Program's efforts are effectively suppressing outbreak spread.

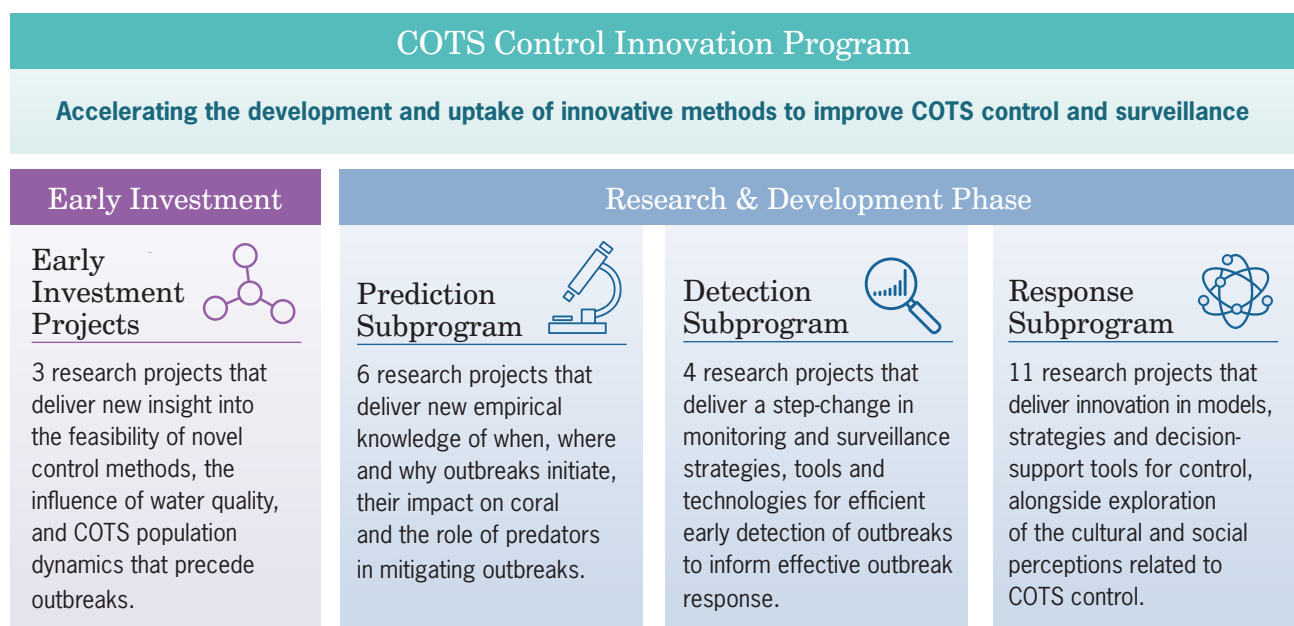
Underpinning these achievements is a governance model for the COTS Control Program that has proven to be highly effective, promoting principles of transparency, information sharing, open data access and collective decision making. In 2021–2022, partners from the Authority, RRRC and GBRF met nine times to oversee program strategy, ensure the program adapts based on the latest science and innovation, and develop new performance metrics that will drive ongoing improvements in efficiency and value for money.

In 2021–2022, a key focus area for the COTS Partnership Group was funding for the program in both the short and long-term, given that the RTP funding was not sufficient to maintain full delivery of the program in the 2022–2023 year or beyond. However, in January 2022 the Australian Government announced a \$1b Reef Protection package that includes \$161m in funding for the COTS Control Program to 2030. These funds will be managed through the Authority and will supplement RTP funds to deliver the program through 2023–2024. Building on that new-found funding security, the 2022–2023 year will see the Partnership invest \$120k towards the development of a long-term strategy to ensure the program continues to learn, adapt and improve based on the latest knowledge and science.

Innovation Program in full swing

Increasing the efficiency, effectiveness and scale at which COTS outbreaks are managed across the Great Barrier Reef requires innovation in outbreak prediction, detection and response. In 2021–2022, CCIP launched its R&D Phase through an RTP investment of \$6.47m over three years, with core partners from AIMS, CSIRO, JCU and UQ co-contributing an additional \$6.41m. CCIP brings together 75 multi-disciplinary experts from 11 institutions working collaboratively across 24 projects to accelerate the development and uptake of innovative methods for COTS control and surveillance. This investment in science is critical to ensure that the Australian Government's long-term investment in the COTS Control Program delivers value for money and the best possible outcomes for the health of the Great Barrier Reef.

Figure 1: COTS Control Innovation Program structure



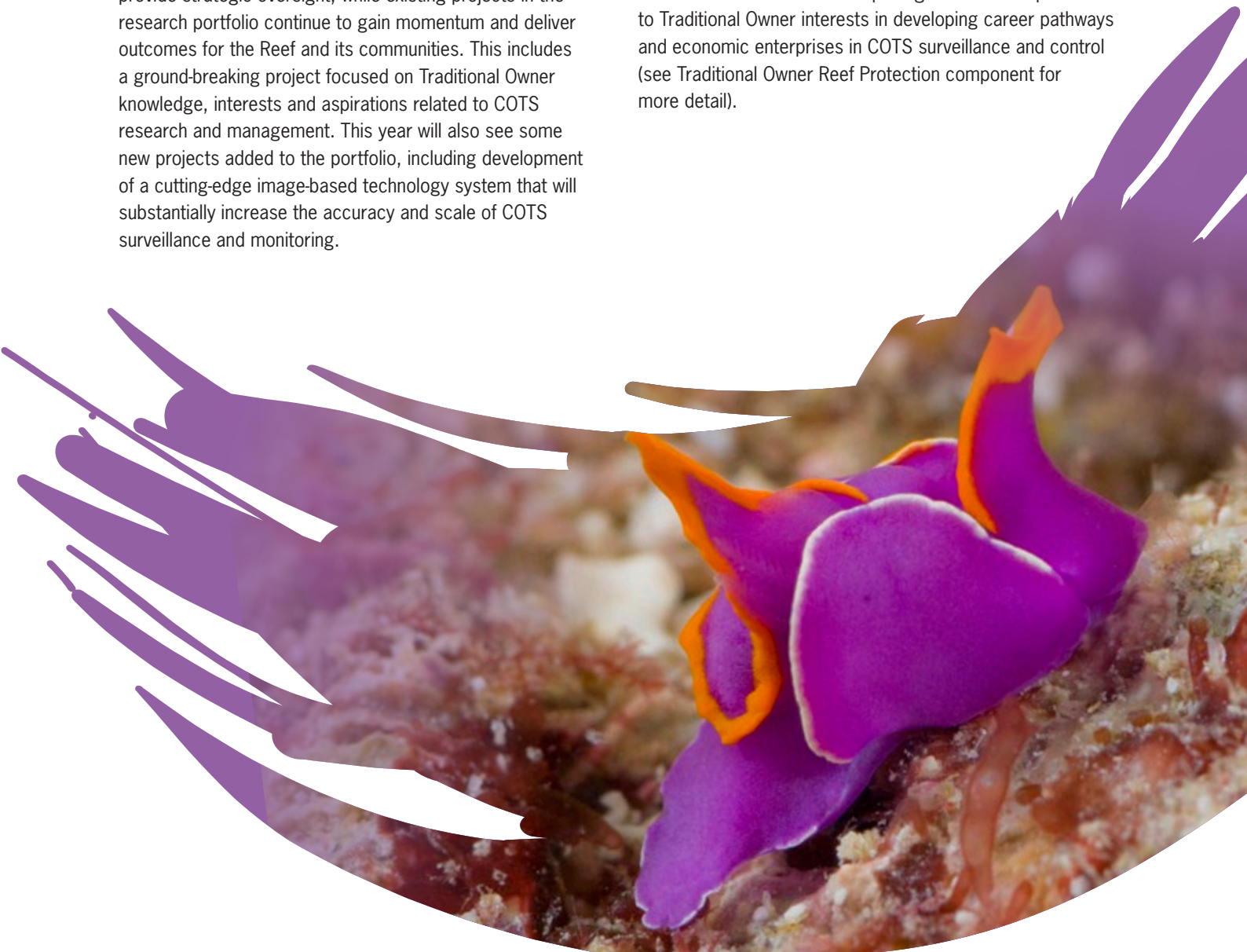
CCIP's research is already making an impact. The outcomes of three early investment projects have challenged existing paradigms of outbreak development and spread, and provided pioneering insight into the efficacy of deploying pheromone baits as a new biocontrol method. Furthermore, a suite of CCIP projects delivered modelling and decision support in 2021-2022 that was fundamental to development of the COTS Control Program's strategy and planning for outbreak response leading into 2022-2023.

This close relationship between COTS research and management is one of the Reef's best examples of innovation having an almost immediate on-ground application. From design, development and delivery, there is a clear pathway for CCIP's research to have a meaningful impact.

The 2022-2023 year will see CCIP's Steering Committee provide strategic oversight, while existing projects in the research portfolio continue to gain momentum and deliver outcomes for the Reef and its communities. This includes a ground-breaking project focused on Traditional Owner knowledge, interests and aspirations related to COTS research and management. This year will also see some new projects added to the portfolio, including development of a cutting-edge image-based technology system that will substantially increase the accuracy and scale of COTS surveillance and monitoring.

Enhanced partnerships and integration

Delivering effective COTS control at scale across the Great Barrier Reef requires the collective efforts of the reef community, including scientists, Traditional Owners, managers, governments and community groups. The Partnership's investment in Traditional Owner and community-led COTS activities is focused on building broader capability and fostering partnerships and integration across activities amongst stakeholder groups. In 2021-2022, initial consultation with stakeholders identified an opportunity for citizen science programs to fill knowledge gaps that inform COTS outbreak response, and in 2022-2023 a pilot project will be funded to explore that opportunity. The 2022-2023 year will also see ongoing implementation of a highly innovative new COTS Manual 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).



Case Studies

CCIP Early Investment Research

CCIP research aims to deliver answers to long-standing mysteries about COTS outbreaks on the Great Barrier Reef, including when and where major outbreak waves initiate. In this early investment project, delivered by scientists from JCU and AIMS, new surveillance techniques are being used to monitor COTS populations in the lead up to outbreaks. Their findings suggest outbreaks may start farther north than currently believed and revealed signs the next major outbreak is already developing. This information is critical to inform management response.



CCIP scientist measuring a COTS as part of research to understand where and when major outbreaks first initiate on the Great Barrier Reef. Image credit: Ciemon Caballes (JCU).

Rapid response to early warning signs of next major outbreak

In 2021-2022, the COTS Control Program boosted its coral defending fleet with two additional vessels to suppress the next major outbreak developing in the northern GBR. This response was informed by field intelligence from research and management partners, which provided an early warning that an outbreak is imminent. Such swift and proactive intervention at the earliest stages of outbreak development has potential to deliver benefits at scale by mitigating the spread of the outbreak across the Reef over the next 10+ years.



COTS Control Program vessel leaders from INLOC ready to set sail on a voyage to respond to early warning signs of a new COTS outbreak developing in the northern GBR. Image credit: INLOC.

COTS Control Five-Year Plan

Our five-year plan for the COTS Control Component includes the eight Partnership Activities outlined in Table 5.

Table 5: COTS Control Component Partnership activities and budget

Partnership Activity	Rationale	Outcome	Budget
 COTS Control	Controlling COTS 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 (previously \$41.50m)
  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.	\$8.33m (previously \$8.30m)
 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 regular independent reviews (2020 and 2024).	\$0.19m (previously \$0.25m)
   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.	\$0.15m
  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: 2022-2023

Major categories of activity, deliverables and budget for 2022-2023 are shown in Table 6.

Table 6: COTS Control Component investment areas and budget for 2022-2023

Partnership Activity	Description	Budget
In-water COTS Control Program	<p>Continued delivery of the COTS Control Program as a strategic partnership between GBRF, the Authority and RRRC, with the Authority co-funding the program in 2022-2023 alongside the RTP investment. The program will be delivered across at least five vessels 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: 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.</p>	\$4.44m
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. CCIP brings together multidisciplinary experts through a collaboration between GBRF, AIMS, CSIRO, JCU and UQ to develop new knowledge, tools, methods and technologies to address the COTS threat.</p> <p>During the second year of the Program's R&D Phase, research that advances capacity to predict, detect and respond to outbreaks will continue to be developed, alongside research to explore and understand the social and cultural implications of COTS surveillance and control on the Great Barrier Reef. Several new projects will also be added to the portfolio in 2022-2023 to address emerging research needs.</p> <p>Deliverables: 21 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; new projects scoped and contracted to add to the existing portfolio.</p>	\$3.06m
Community-led COTS activities	<p>This funding will support an initiative to strengthen and expand the role of community and citizen science in COTS management. Initial consultation and engagement with key stakeholders in 2021-2022 suggested that there is an opportunity for citizen science programs to provide reef reconnaissance data that fills key gaps in knowledge to inform strategic planning for the COTS Control Program.</p> <p>Deliverables: Scoping and delivering a citizen science initiative to collect reef reconnaissance data that informs strategic planning for COTS management; engagement with key stakeholders and community groups to galvanise participation; conduct reef surveys and provide data and recommendations to COTS managers.</p>	\$0.07m
Long-term funding strategy	<p>Sustained funding for COTS control is imperative to enhance the Reef's resilience in the face of climate change. The Australian Government's Reef Protection Package includes \$161m in funding for ongoing delivery of the COTS Control Program to 2030. This RTP activity will invest in developing strategic options for expenditure of these funds to ensure this program continues to adapt based on the latest science. A consultant will be engaged to provide recommendations on potential delivery models and explore options for long-term sustainable financing for the program.</p> <p>Deliverables: Consultant conducts review and analysis to inform development of strategic options for long-term sustainable program funding; recommendations provided to COTS Partnership Group to inform future program planning and financing.</p>	\$0.12m
Traditional Owner-led COTS Control activities	Refer to Traditional Owner Reef Protection.	
TOTAL INVESTMENT		\$7.69m

Table 7: COTS Control Component Gantt chart 2022-2023

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
COTS Control														
COTS Control Partnership meetings	Governance group provides strategic oversight of the Program, conducts long-term planning, and approves Annual Work Plans.	\$4.44m		Meeting			Meeting			Meeting			Meeting	
COTS Action Group meetings	Coordination of the tactical and operational delivery of the Program in accordance with the COTS Control Program's 2022-23 Annual Work Plan.		Meeting		Meeting			Meeting			Meeting		Meeting	
COTS Control Program Annual Work Planning	Workshops and meetings to review progress against the 2022-23 Annual Work Plan. Planning for the next financial year begins the second half of 2022-23.					2022-23 progress						2023-24 planning		
On-water delivery of COTS Control Program	On-water delivery of the COTS Control Program with at least five vessels and >100 crew as a strategic partnership between GBRF, GBRMPA and RRRC, and co-funded by GBRMPA.								Program implementation					
COTS Control Innovation Program - R&D phase														
CCIP Steering Committee meetings	Governance committee provides strategic oversight of the innovation program.	\$3.26m			Meeting			Meeting			Meeting			Meeting
Prediction subprogram	Implementation of six projects to deliver new knowledge of when, where and why outbreaks initiate and terminate.								Subprogram implementation					
Detection subprogram	Implementation of four projects to deliver new strategies, tools, and technologies for efficient early detection of outbreaks.								Subprogram implementation					
Response subprogram	Implementation of 11 projects to deliver innovation in models and decision support, integrated with deeper social and cultural knowledge to guide outbreak response.								Subprogram implementation					
Community-driven COTS Control														
Delivery of citizen science pilot project	Pilot project implemented to explore capacity of citizen scientists to provide data that fills key knowledge gaps to inform strategic planning for the COTS Control Program.	\$70,000												
Stakeholder engagement and recommendations	Key stakeholders engaged during pilot project planning and implementation, with recommendations on the feasibility and benefit of future initiatives.			Engagement										
Long-term funding strategy														
Cost-benefit and options analyses	Consultant engaged to conduct cost-benefit analysis and develop options for sustainable long-term funding.	\$120,000											Recommendations	
Consultation and recommendations	Key stakeholders consulted throughout process, including the COTS Partnership Group.		Consultation										Consultation	



Reef Restoration and Adaptation Science Component

Partnership Budget: \$100 million

2022-2023 budget: \$38.6 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 Adaption 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

Recent reports by the Intergovernmental Panel on Climate Change indicate that the world is likely to see a 1.5°C increase in average temperature by the year 2040⁴. At this pace, it is widely accepted that mass bleaching will become a regular occurrence on the GBR, at least twice per decade from 2040⁵. Against a backdrop of another mass bleaching event experienced by the GBR in 2021-2022, the very first during a La Niña cycle, these scientific findings add to a clear sense of urgency.

Actively building climate resilience and restoring reefs to sustain their essential ecosystem functions is set to become a fundamental part of reef protection. This is why an investment in an R&D program to deliver such solutions is critical and represents a lifeline.

RRAP as an R&D program has reached its half-way point and, despite most of this first phase being delivered in the midst of a global pandemic, RRAP has made very significant progress towards its 2024 goals and broader long-term objectives:

- ✓ **Systems are fully operational** and underpin a comprehensive integrated program delivery framework involving seven core partners, more than 30 collaborating organisations and in excess of 300 researchers, engineers and students.
- ✓ **Scientific and engineering breakthroughs have occurred** across all key technology development areas, both in the laboratory and out on water, paving the way for real-world deployment of a first generation of interventions by 2025-2026.
- ✓ **Third-party funding has been secured** to support and accelerate catalytic R&D, while sustainable financing options are being canvassed to enable the transition from R&D to deployment on a large scale.
- ✓ **RRAP has matured as a trusted partner** and increased direct engagement with Traditional Owners, GBR communities and regulators as well as local, national and international stakeholders, continuing to build a positive profile and solid reputation centred on scientific integrity and information sharing.

With two years to go, it is time to commence planning around the next phase of RRAP – being the transition into in-water deployment of interventions as soon as possible. This is reflected in the planning of activities for 2022-2023.

Scientific breakthroughs

RRAP is now operating at full capacity, conducting another successful year of integrated laboratory and fieldwork, and achieving scientific breakthroughs across all areas of investigation. While it would be too challenging to present those in detail in this Annual Work Plan, some selected highlights follow.

The **Enhanced Corals and Treatments and Coral Aquaculture and Deployment** subprograms made strong progress across critical areas of R&D, building on another successful spawning season. The heat tolerance of two coral species have been identified and systematically mapped, and corals with improved thermal tolerance were produced across multiple species by selective breeding or symbiont replacement. Coral aquaculture is continuing to advance towards more efficient and reliable systems, by optimising the steps of gamete collection and fertilisation, broodstock holding, larval settlement, survival and growth, and grow-out and deployment methods. New larval rearing automation systems were piloted and this year saw a progressive scale-up of the deployment of coral settlement devices at multiple sites on the GBR. One of those sites is the Moore Reef Cluster where RRAP scientists engaged with Traditional Owners, industry operators and citizen science groups, within the framework put in place by the RTP-funded (Community Reef Protection) Cairns-Port Douglas Reef Hub.

The **Moving Corals** subprogram delivered significant new information on methods for collection of wild multi-species coral spawn and on techniques to culture, settle and deliver millions of larvae onto target reef areas currently lacking sufficient reef-coral cover, with active participation from Traditional Owner groups.

⁴ IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

⁵ Heron et al. 2017. Impacts of Climate Change on World Heritage Coral Reefs : A First Global Scientific Assessment. Paris, UNESCO World Heritage Centre.

The **Cooling and Shading** subprogram conducted multiple field trials, increasing in complexity and scale, generating further high-value data and making significant advances in the design of spraying nozzles, monitoring technologies and modelling for both areas of fogging and cloud brightening.

The **Foundational ecological knowledge (EcoRRAP)** subprogram established reference sites across eight reef clusters, generating critical environmental, genetic, population demographic and community data collected using traditional and cutting-edge tools including 3D photogrammetry. This information is feeding directly into the ecology and population dynamics models developed by the Modelling and Decision Support teams.

The **Modelling and Decision Support** subprogram delivers a core integration function within RRAP by modelling the cost, risk and benefit of interventions against counterfactual predictions, and embedding this information within a broader decision-support framework. It has completed an intensive exercise of design and coordination across multiple individual projects, developing information systems, identifying critical decision-support elements (across capability, knowledge, processes and systems), and making significant advances in improving core hydrodynamic connectivity, ecosystem and population models operating at multiple levels of resolution.

Other areas of achievement include **Cryopreservation**, demonstrating that cryopreserved sperm could achieve comparable fertilisation rates to fresh sperm and paving the way for large scale aquaculture; **Rubble Stabilisation**, developing new experimental testing systems and demonstrating those at offshore and inshore sites; **Integrated Logistics and Automation**, conducting the field evaluation of multiple Autonomous Surface Vessels (ASVs) assessing coral spawn collection, precision coral deployment and large-scale 3D mapping of deployment and control sites.

A pathway to coral reef adaptation and recovery at scale

Furthering our scientific knowledge and demonstrating the technical feasibility of interventions are essential building blocks of future coral reef adaptation and recovery, and the progress made to date is very encouraging. Yet RRAP has recognised, from its inception, that achieving impact at scale would require a much broader effort, defining success across other critical dimensions such as social and regulatory licence, and activating many sectors of our reef communities, including through Traditional Owner participation, industry innovation and citizen science.

By design, RRAP includes a strong emphasis on technology transfer and real-world applications. Its initial focus is on delivering R&D that is intervention-focused (demonstrating technical feasibility and understanding risk, costs and benefits) as well as cross-cutting (creating the enabling environment for future deployments), with a view that interventions will progress to deployment as soon as these reach a necessary level of maturity.

The enabling conditions for deployment, from 2025-2026, have started to materialise for a subset of interventions, namely the aquaculture and seeding of corals with improved thermal tolerance, and the collection of spawning slicks and production and resettlement of coral larvae. If proven effective, fogging technologies could also become available for deployment within a similar timeframe.

To lay the foundations for future deployment, starting in 2022-2023, RRAP will establish a dedicated Translation to Deployment subprogram, as an evolution of the Integrated Logistics and Automation subprogram, focused on refining deployment scenarios for these initial interventions and identifying the critical path, dependencies and stage gates leading to their implementation. It will engage with existing RRAP R&D subprograms, building on progress to date, and play a facilitating role in integrating further R&D outputs to achieve specific targets across critical delivery dimensions:

- Modelling costs and benefits for a range of possible scenarios and counterfactuals, driving towards the design of specific intervention strategies and selection of target reef locations.
- Coordinating independent risk assessment and regulatory submissions, proactively engaging with the Authority and other regulators, to ensure interventions can be delivered in a safe and responsible manner. An independent reef restoration and adaptation expert panel will be established to support these activities.



- Actively developing a social licence to operate, building on findings by the Stakeholder and Traditional Owner Engagement subprogram, including social surveys, deep-dive interviews, impact assessments and pilots in best practice engagement (e.g. local hubs and community panels already in operation).
- Traditional Owner engagement, co-design and capacity building. Under the guidance of the Traditional Owner Reef Restoration and Adaptation Co-Design Group, RRAP has given effect to its Indigenous Engagement Framework, including obtaining Free, Prior and Informed Consent for all activities on sea Country, identifying employment opportunities within the program, and co-designing strategies for capacity building and long-term partnerships. In this next phase, the program will focus on deepening engagement and implementing these strategies to ensure Traditional Owners and their enterprises can meaningfully contribute to and benefit from future intervention deployment activities.
- Industry participation and uptake. Local communities and industries will undoubtedly play a major role in the future implementation and scaling up of RRAP interventions at specific reef locations. RRAP will work with industry operators and government to develop a roadmap for technology uptake, infrastructure and capacity development.
- Stakeholder engagement and communication, focusing on developing and communicating a shared vision for a future reef restoration and adaptation industry.

This increased focus on translation of R&D to real-world applications is consistent with, and will aim to seamlessly integrate with, recent commitments by the Australian Government, through the Billion-dollar Reef Protection Package, allocating \$92.7m over eight years (2022-2023 to 2029-2030) to support advanced R&D and deployment of interventions to help the Reef adapt and remain resilient to climate change.

Enabling the industry needed to address the scale and urgency will require a significant increase in funding targeted to reef restoration and adaptation. The Foundation and its RRAP Partners will continue to explore sustainable funding options, recognising and quantifying the intrinsic value of the GBR in terms of biodiversity and provision of ecosystem services, and activating global private investors seeking to deliver impact through nature-based solutions.

RRAP on the global stage

The threat posed by climate change is not limited to the GBR but extends to many reefs around the world. RRAP and Australia can play a clear leadership role, advancing science and demonstrating real-world approaches that could be applied in many other settings.

RRAP is internationally engaged, as a program and through its core partners, at two levels:

- **Knowledge sharing and scientific collaboration.** Contributing to international conferences and forums such as the International Coral Reef Initiative, the Reef Resilience Network, or the G20 Coral Reef R&D Accelerator Program, RRAP seeks to avoid duplication of effort and promotes an increased focus on the translation of R&D findings to on-ground applications.
- **Development of pathways for at-scale reef restoration and adaptation.** Engaging with reef communities such as Pacific Island Countries and Territories, the Coral Triangle Initiative and Meso-American reefs, RRAP seeks to become a positive contributor in restoration and adaptation efforts, by sharing knowledge, methods and technologies with local partners. It also engages with international partners to design sustainable funding mechanisms, such as the Global Fund for Coral Reefs and international NGOs.

Case Studies

A Reef-wide map of heat tolerance

Understanding how and where corals on the Great Barrier Reef might be able to resist warming temperatures is critical for our future restoration and adaptation efforts. The RRAP team is mapping across the GBR bleaching and heat tolerance and other important traits that corals pass from generation to generation.

Tiny fragments of healthy corals are collected, and stress tested using special mobile aquarium tanks where higher water temperatures or increased amounts of light can be applied. To date, we have been successful in sampling thousands of individual corals, and identifying several genetic markers associated with heat resistance and bleaching tolerance. This knowledge will now support the development of diagnostic tools, like those used in human medicine, and enhance coral fitness.

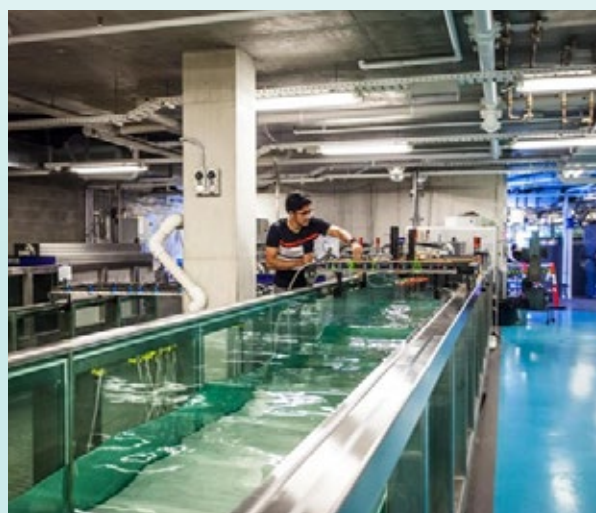


Acropora coral fragments undergoing rapid heat stress tests in mobile aquaria. Image credit: Line Bay, AIMS.

Engineering solutions to stabilise the Reef

Coral reefs can be damaged by acute events like severe coral bleaching, cyclones and ship strikes, creating large areas of rubble beds, made up of pieces of dead coral skeletons and rock fragments that can constantly move with tides and waves. These surfaces are no longer suitable for natural coral settlement and recovery.

Right now, our researchers are mapping these vulnerabilities, addressing knowledge gaps about rubble formation, to help determine how we can best intervene to re-build the foundations for new corals to grow. Experimental 'stabilisation' strategies are being tested in bespoke hydrodynamic tanks that replicate varying conditions on the Reef, before being deployed at a small scale onto the Reef, with the long-term aim of determining optional designs and methods for stabilisation at scale.



Use of wave flumes to simulate and measure the impact of waves on coral rubble. Image credit: University of Queensland.

RRAP Annual Work Plan: 2022-2023

Major deliverables and budgets for Partnership Activities in 2022-2023 are shown in Table 8.

Table 8: RRAS Component Partnership investment areas (RRAP Subprograms) and budget 2022-2023

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>	\$4.86m
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 subprograms.</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>	\$2.81m
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>	\$1.35m
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>	\$1.67m
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>	\$10.26m
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>	\$0.74m
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>	\$4m

Partnership Activity (RRAP Subprograms)	Description	Budget
Translation to Deployment (former Integrated logistics and automation)	<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>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.</p>	\$2.81m
Program management	<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 remuneration and expenses of independent board and committee members).</p> <p>Deliverables: All ongoing program management and governance functions.</p>	\$3.79m
Traditional Owner and stakeholder engagement	<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>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.</p>	\$1.56m
Regulation and policy	<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>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.</p>	\$0.46m
Modelling and Decision support	<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>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.</p>	\$4.29m
2022-2023 RRAS COMPONENT BUDGET		\$38.6m

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 2020–2024 period against the Partnership Activities (RRAP Subprograms) described above are detailed in Table 9.

Table 9: RRAS Component Partnership activities (RRAP Subprograms) and budget for 2020-2024

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 (\$9.2m)	\$4.9m (\$7.3m)	\$4.8m (\$7.1m)	\$15.4m (\$23.5m)
Enhanced corals and treatments	\$4.3m (\$6.5m)	\$2.8m (\$4.2m)	\$1.5m (\$2.3m)	\$8.6m (\$13m)
Moving corals	\$2.3m (\$3.9m)	\$1.3m (\$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 (\$10.8m)	\$10.3m (\$13.1m)	\$9.6m (\$12.6m)	\$27.6m (\$36.5m)
Cryopreservation	\$1.1m (\$1.3m)	\$0.7m (\$1m)	\$0.8m (\$1m)	\$2.6m (\$3.4m)
Foundational ecological knowledge (EcoRRAP)	\$5.4m (\$9m)	\$4m (\$5.9m)	\$3.1m (\$4.7m)	\$12.5m (\$19.5m)
Translation to deployment (former Integrated logistics and automation)	\$1.3m (\$2.2m)	\$2.8m (\$4.2m)	\$3.8m (\$5.7m)	\$7.9m (\$12.2m)*
Program management	\$5.9m (\$8.1m)	\$3.8m (\$4.6m)	\$3.9m (\$4.7m)	\$13.6m (\$17.4m)
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)	\$0.5m (\$0.7m)	\$0.5m (\$0.7m)	\$1.7m (\$2.7m)
Modelling and decision support	\$3.4m (\$6.8m)	\$4.3m (\$6.3m)	\$3m (\$4.4m)	\$10.7m (\$17.6m)
RRAS BUDGET (TOTAL BUDGET)	\$42.5m (\$66.3m)	\$38.7m (\$54.1m)	\$35.5m (\$49.9m)	\$116.7m (\$170.5m)**

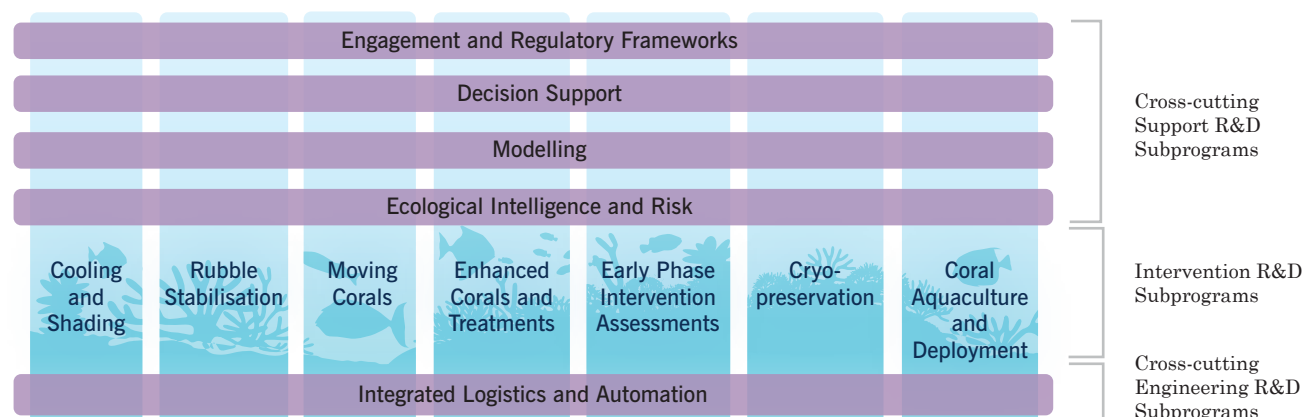
* The Translation to Deployment subprogram budget includes an anticipated investment of \$4.5m from the IMR Component under the Technology Transformation Fund activity.

** The total budget includes, in addition to the RTP Component 4 budget, an estimated ~\$76.6 million in additional funding and co-investment through the Collaborative Investment Strategy.

Figure 2 below provides an overview of the RRAP R&D program structure and interactions between intervention and cross-cutting programs. 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 million⁶

2022-2023 budget: \$15.22 million

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

Priorities under the Partnership Investment Strategy

- 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

⁶ The [Investment Strategy](#) describes the Foundation'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 five-year journey

As the Partnership passes the half-way point, the Traditional Owner Reef Protection program continues to focus on implementing priorities outlined in the Partnership Investment Strategy, which accord to the *Reef 2050 Traditional Owner Aspirations Report*⁷ and the Uluru Statement from the Heart. Design of the Traditional Owner Reef Protection program considers the growing support in recognition of Traditional Owner rights and interests, and the desire to grow and strengthen on-ground relationships between multiple partners. Collectively, investment in on-ground activities through grants and partnerships continues to support and promote the growth of Traditional Owner customary rights and governance systems through their involvement in sea Country management and business ventures.

This is the largest Traditional Owner-led Reef protection effort in the world and a genuine partnership with Reef Traditional Owners. It sets a new standard, with every program co-designed and delivered by Reef Traditional Owners, resulting in equitable and effective Traditional Owner participation in the management and protection of the Reef and its catchment areas.

Key achievements to date include:

- ✓ **Doubling the representation** of Reef Traditional Owners in Reef governance and decision making.
- ✓ **Delivering significant on-ground outcomes** with more than 1200 Traditional Owners involved in the delivery of 55 co-designed Reef protection projects from Bundaberg to the tip of Cape York.
- ✓ **Supporting Traditional Owner agency and empowerment** by contracting directly with Traditional Owner groups.
- ✓ **Unlocking new and previously inaccessible land and sea management funding opportunities** for Traditional Owner groups by strengthening business readiness.
- ✓ **Partnerships in place** with more than half of the Reef's Traditional Owner groups.
- ✓ **Building and implementing a co-design model** and governance support system that is the heart of all programs.
- ✓ **Elevating Traditional Owner voice** by providing a platform and in-region Story Hub for Traditional Owners to share their unique stories through self-determined ways.

As we move into 2022-2023, the Foundation will:

- **Launch the first ever Leadership and COTS Control traineeship program**, co-designed with Reef Traditional Owners, for Traditional Owners.
- **Support the on-ground delivery of Traditional Owner actions** through existing grant programs while exploring a transition to a partnership approach to facilitate more enduring program outcomes.
- **Continue to improve Traditional Owner involvement** in the governance and management of the Great Barrier Reef, while looking at succession planning and experiential development for up-and-coming young Traditional Owner leaders.
- **Showcase impact stories** that place Traditional Owner voice at the centre, uplifting communities and increasing awareness in the broader community.
- **Co-design programs** that support Reef Traditional Owner women, men and youth in leadership initiatives.
- **Present options for appropriate business and governance models** that will support a sustainable funding stream (Futures Fund) for Traditional Owner Reef protection activities.
- **Increase participation of Traditional Owners** in the innovation economy, including community-led digital skills programs that aim to strengthen culture, protect and preserve Country and create economic opportunities.
- **Pilot on-Country incubator** to accelerate a nature-positive future by incubating, scaling and flowing finance to Traditional Owner nature-based enterprises within the Great Barrier Reef World Heritage Region.



⁷ Traditional Owners of the Great Barrier Reef: The Next Generation of Reef 2050 Actions, Commonwealth of Australia 2018

A shared drive toward laying the foundations for the future

The Traditional Owner Program is now entering a phase of accelerated operations and integration with other Reef programs and initiatives. As the program moves into 2022-2023, there is a shared drive toward laying the foundations for the future with a focus on Country-based activities and partnership-focused action.

Building on grants, we are now seeing new partnerships being forged – moving from transactional to transformative – that aim to further improve inclusion and participation of Traditional Owners in the management of the Great Barrier Reef World Heritage Area. A good example of this is where Traditional Owners of the Great Barrier Reef wished to see tangible career pathways for specialised, culturally appropriate training and employment included in the design and delivery of the COTS Control program. To enable implementation of this action, the RTP Traditional Owner Advisory Group was supported to work with RRRC and its training provider INLOC over a 12-month period to co-design the Indigenous COTS Control and Leadership Program. Traditional Owners were able to include important design elements through this process to add value to the original proposal. This included connecting more deeply into the community through community champions, especially Elders and other leaders, as essential drivers and mentors to support nominated participants in their learning journey. This was felt to be a core part of ensuring their retention and in delivering an enhanced program that is culturally inclusive and safe.

Building on core training and qualification requirements, other design elements include sharing important science and information about COTS on Country to inform and include relevant Traditional Owner communities in this targeted management practice. Other key components of this program include working with industry partners to build a greater understanding and awareness of the Great Barrier Reef as a cultural landscape and strengthening partner practice.

While still in its early days, this program is celebrated as being a unique opportunity and partnership to address key actions that Traditional Owners hold important and is the first co-designed program of its kind. The experience undertaken to co-design and negotiate this project will assist Traditional Owners to consider and negotiate further partnerships that look to establish career pathways, inclusion and participation within the 2022-2023 Annual Work Plan and beyond, including significant opportunities in the Reef Restoration and Adaptation domain.

Achieving improved integration through effective partnerships

There is a lot of activity with Traditional Owners of the Great Barrier Reef underway, with many passionate, involved and active people, institutions and diverse programs in either planning or action. As a result, complexity in governing, administration and operationalising program delivery within the Great Barrier Reef World Heritage Region is ever increasing. Achieving improved integration through effective partnerships remains one of the core challenges facing delivery of the Traditional Owner Reef Protection Program. To navigate this in 2021-2022, the Partnership explored the opportunity for improved integration under the Traditional Owner Reef Protection Program by inviting over 30 partners to the table to understand collective interests and motivations. These conversations surfaced alignment in interests between Traditional Owners and partnering organisations in delivery of the RTP and identified three emerging themes that are recommended to explore further throughout the remaining delivery of the Partnership including:

1. Decision making and governance.
2. Building capacity across all partners.
3. Partnership practice. Participants widely shared the view that the conditions are right to accelerate current success into long-term outcomes, alongside a focus on what is achievable with tight resources, including time.

While there is a lot of activity, enthusiasm and support in this area, better linkages are needed to improve the quality, efficiency and effectiveness of on-ground activities. Success was seen to be dependent on acknowledging and working to improve awareness, taking coordinated Country-focused action, working with real timelines and building capacity across all partners. There should continue to be pursuit of honest, open and truth-seeking interactions. There is general acknowledgement that a gap exists between perceptions versus reality of the time that is required to establish good collaboration. This concept is paired with the need for support and a requirement to build everyone's capacity to help alleviate the continuous strong pull on Traditional Owners. The Partnership remains committed to exploring practical solutions with key partners throughout delivery of the 2022-2023 Annual Work Plan to improve communication, coordination, collaboration and integration for mutual benefit.

⁵ Traditional Owners of the Great Barrier Reef: The Next Generation of Reef 2050 Actions, Commonwealth of Australia 2018

Unique opportunities to create place-based economies that nurture people, their knowledge and the environment

There remains a unique opportunity in the Great Barrier Reef to elevate and invest in knowledge that Traditional Owner communities hold, and to create place-based economies that nurture people, their knowledge and the environment. The Foundation will continue its role as a critical connector – bringing Traditional Owners together with key partners that may currently sit outside the existing partnership landscape. To this end, through the Partnership the Foundation is committed to sourcing new partnerships that facilitate novel streams of thinking and working, particularly around technology and innovation, which aims to not only complement the status quo but amplify new pathways and connections. This work will include looking at community-led digital skills programs that aim to strengthen culture, protect and preserve Country and create economic opportunities for Traditional Owners, as well as exploring a key partnership to pilot an on-Country incubator, aiming to accelerate a nature-positive future by incubating, scaling and flowing finance to Traditional Owner nature-based enterprises within the Great Barrier Reef World Heritage Region.

Elevating Traditional Owner Voice – respect and recognition as inherent rights and interests holders

The Foundation remains committed to elevating Traditional Owner Voice through delivery of the RTP's co-designed Traditional Owner strategic communication framework. This work directly responds to supporting Traditional Owner aspirations and actions underpinning the Reef 2050 Plan. Powerful communications and storytelling are essential tools for documenting system transformation, sharing Traditional Knowledge with the younger generation and non-Indigenous peoples, and helping support Traditional Owners in their rightful position as global leaders in the care and protection of the Great Barrier Reef. Traditional Owners are very clear on the role they have held for many thousands of years in providing care and management to the Great Barrier Reef, and continue proudly in their ongoing cultural obligations, responsibilities and custodianship of Country. Implementing this framework is positioning Traditional Owners to share their unique stories through self-determined ways, that uplift their communities and create a shared understanding in the broader community.

A dedicated communications consultancy will support delivery of this important framework and will work with the Foundation and Great Barrier Reef Traditional Owners to share information about their work and showcase the many stories of impact being achieved under the RTP. The co-designed framework identifies the principles for communication, target audiences, potential channels, story opportunities and key messages. It also applies a blueprint that includes key points agreed upon through the original co-design sessions with Traditional Owners – the shared focus, objectives, pillars, reframing the narrative and the key ingredients for every story. Key components to the framework include a *Strategy Circle* to identify opportunity and guide storytelling under agreed governance; *Story Creation* – a set of frameworks and tools that help make sure that every co-designed story told is best practice and follows a strict set of approval and consent guidelines; access to an in-region *Story Hub* – a trusted and dedicated communications team with agile processes that help bring the stories to life; *Story Sharing* – a set of strategies, audience tools, calendars and channels that take each story and make sure it is being delivered to the right audience, through the right channel, at the right time; and finally *Learning* – a process of listening and learning methodologies that can be fed back into the strategy circle to help improve and inform future storytelling.

Leadership and succession planning in governance

The Foundation continues to invest in supporting the governance arrangements which empower Traditional Owner leadership in co-design and delivery of the RTP. The ongoing investment of time and effort by Traditional Owners in this work is a testament to the need and want of people to be in decision-making positions for the management of the Reef. The need to support our governance members in their leadership and capacity building skills remains a focus, as does the need to work smarter and more efficiently in challenging times as people are asked to contribute more into the engagement and advice space for everyone working on the Reef.

As we continue to implement the co-designed RTP program, we will work with our governance members to look at successional planning ideas to identify and bring more young people into the leadership arena to learn and participate. With a strong and experienced leadership group tackling system change for the future of their traditional land and sea estates, the Partnership will be creating a safe space to bring emerging leadership into the governance systems to learn and lend their voice to the future direction setting of Reef management.

Funding Traditional Owner priorities: grants through to Partnership Models

The direct funding mechanism for Traditional Owner on-Country Reef protection activities has predominantly been achieved through co-designed grants. By applying the values and principles of co-design – specifically, Traditional Owner perspectives and valuing lived experience – the granting process has tackled some of the big issues that Traditional Owner groups have had in accessing grant funding.

In addition to ensuring grant rounds are open longer, the co-designed grant rounds have three different funding access levels to provide for groups of all levels of project readiness. For groups that are new to the on-ground project delivery space there are small (up to \$25,000) grants that acknowledge the foundational steps some groups might need to establish planning, governance and communication pathways. Funding in small steps reduces the risk to the group and the funder – and provides experience and leverage into future grant rounds.

At the top of the funding levels are the Keystone grants that are tailored for groups looking to invest in increasing the scope and scale of their existing Country-based activities. These projects typically look to move beyond the grants space and work into a future partnership space. This high-end funding (up to \$500,000 for some grant rounds) was another area identified by Traditional Owners as missing from the grant landscape.

By offering different funding streams, Traditional Owner groups are able to be competitively assessed for what they need and where they are in terms of experience. The funding profiles match the levels of risk associated with the types of projects that Traditional Owners are applying for.

In the three years that the grants have been offered, the Partnership has provided five different grant opportunities valued at \$14.5m. We are currently managing more than 50 on-ground projects that support local level planning and implementation of on-ground activities in the areas of Healthy Water, COTS Control, Reef Restoration and Monitoring.

Design parameters provided for these grant opportunities support self-determination, cultural resilience and community development outcomes. Moving in to the second half of the RTP, the Foundation aims to look more at leveraging funding and building strategic partnerships for enduring outcomes beyond the life of the Partnership.

Traditional Owner-led integrated, monitoring and reporting *Strong Peoples–Strong Country* framework

Partnering with four Traditional Owner groups from the Great Barrier Reef region, this co-designed, participatory research project is the opportunity to explore the enabling conditions that are needed by Traditional Owners to implement the *Strong Peoples–Strong Country* monitoring and assessment framework. This project is Traditional Owner-centric, in that it accommodates each Traditional Owner group's priorities and management needs.

The essential support elements required for the roll out of the *Strong Peoples–Strong Country* framework were co-designed with the Traditional Owner Integrated Monitoring and Reporting Technical Working Group using their lived experience and professional expertise to understand what it might take to ensure the most effective uptake and understanding of this monitoring and assessment framework. It is through this process that Traditional Owners will have a roadmap to report their Indigenous heritage values – on their terms and in a way that is appropriate to them.

Resources and support designed for successful implementation of this core program include:

- Employing Community Research Assistants (CRA) to be based within each of the Traditional Owner pilot communities.
- Specifically created accredited training programmes to build capacity in those undertaking the CRA roles.
- Contracting an on-ground Coordination and Data Management service provider to work directly with each of the pilot communities.
- International standard Indigenous legal expertise engaged for full advice and guidance on world-class data management agreements designed to protect the Indigenous intellectual and property rights of the participating Traditional Owner communities.
- Access to communication professionals dedicated to supporting Traditional Owners of the Great Barrier Reef to tell their own stories of managing, caring, monitoring and reporting on their heritage values.

Case Studies

Indigenous women are vital to climate action and the future of the Great Barrier Reef

There is rapidly growing global recognition of the critical role that Indigenous women play as ancestral knowledge-holders and caretakers of Country. Through the RTP, the Foundation is supporting a number of initiatives which aim to increase the participation of Indigenous women in land and sea Country management roles and elevate and amplify their voices. These include:

- **WomanSpeak** – A three day intensive public speaking and leadership course for Reef Traditional Owner women focused on developing the tools and abilities to find their voices and share their knowledge and stories. Women then participate in a 12 month virtual leadership circle to further refine communication skills and confidence. Thirteen women participated in the initial pilot program with many signed up as mentors for the next cohort that will commence in the second half of 2022.
- **Queensland Indigenous Women's Ranger Network (QIWRN)** – Jointly funded by the Queensland Government and WWF, and delivered by Yuka Baja Muliku this network provides a space for women Indigenous rangers to share their experiences, provide support and advice, undertake training in shared priority areas and enable connections in remote and isolated communities. The Partnership is providing top-up funding to support training needs and ensure that all women rangers in this rapidly growing network are able to attend the bi-annual forums.

- **Drone and spatial technology training** – A scalable pilot program training women Indigenous rangers in drone piloting, geospatial mapping and image processing is underway in far north Queensland. These digital technology skills are supporting enhanced land and sea Country management and provide a unique on-Country business enterprise opportunity.

Together with the Story Hub which provides practical hands-on support for developing video, photography, graphic design and storytelling skills, these initiatives are empowering the Indigenous women of the Great Barrier Reef, amplifying their voices and positioning them as champions of change in Reef conservation.

“

Indigenous women are crucial transmitters of knowledge related to sustainable environmental management to future generations.

Victoria Tauli-Corpuz,
former United Nations Special Rapporteur
on the rights of Indigenous peoples

”



Reef Traditional Owner WomanSpeak participants.



Reef Traditional Owner Women drone training participants.
Image credit: Yuka Baja Muliku.

Case Studies

Grant Programs designed by Traditional Owners, for Traditional Owners

The RTP Traditional Owner grant programs have been co-designed with Traditional Owners and are staged, with funding provided for land and sea Country activities spanning planning, implementation and scaling. Groups progressing through this staged process are reporting a maturation of governance, enhanced business readiness, greater capacity and capability, and an unlocking of funding opportunities previously out of reach, enabling enhanced outcomes for Country, culture and community.

Dabu Jajikal Aboriginal Corporation – standing on their own feet

Dabu Jajikal Aboriginal Corporation (DJAC) in the Bloomfield River Region of far north Queensland received an initial grant to develop a Country Plan, auspiced through a partner organisation. The plan identifies key outputs to be delivered, including establishing governance and management, women's leadership development, infrastructure development, heritage site protection and traditional ecological knowledge and ecosystem services (climate change adaptation, protecting marine species, reef conservation, water health, turtle and dugong management, and cultural burning). It also includes a Guide for Partners, which outlines in detail the actions that partner funders, universities and research institutions, and local, state and federal governments can take to support Dabu Jajikal people in achieving their goals.

Building from this initial plan, DJAC has now secured three more grants for plan implementation. This includes management of Balaney (Weary Bay) and Plantation Creek, cultural and heritage values mapping and the development of a cultural heritage database, with all projects guided by an Elders' Advisory Committee.

DJAC has also secured partner support for training in administration, finance and project management skills and are now self-administering their latest grant.

Through the delivery of these projects, DJAC have experienced important growth and empowerment, and development of their capacity, capability, governance and strategic partnerships – placing them on a path to achieving their long-term goals to protect their Country and cultural heritage values.



Dabu Jajikal Elder, Sunny Olbar, and family members at Country planning workshop.

“

This Country Planning project has been very important for the Dabu Jajikal people and Dabu Jajikal Aboriginal Corporation. Through the project, people have been empowered to plan for the future, grown in confidence in their own strengths and developed important partnerships with stakeholders relating to Country and culture.

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Grant Programs designed by Traditional Owners, for Traditional Owners

Healthy Water – Healthy People

Enabled by a Healthy Water grant, Wanyurr-Majay Aboriginal Corporation have developed a Country Plan for Madjandji people to take increasing responsibility and care of Wanyurr-Majay waters, working in partnership with government bodies, Mulgrave Landcare and Catchment Group and private landholders. Together they are returning degraded farming land to its previous wetland state, improving water quality and restoring critical ecological and cultural values in the process. The grant has enabled Wanyurr-Majay Traditional Owners to be employed on-Country, and be trained in conservation and land management to support longer term employment opportunities to care for Country.

The next stage of WMAC's plan sees them working with partners to co-design a monitoring program for culturally significant watercourses, develop a water quality report card incorporating Madjandji values, survey flora and fauna on their Country and develop an action plan for prioritising works to improve the health of target sites.

Through this work, WMAC are building and extending their network of partners including farmers, local and state government, agricultural and environmental NGOs, NRMs, research organisations and private enterprise.

Madjandi Traditional Owners are also participating in the \$6m Russell-Mulgrave regional water quality program, funded through the RTP Water Quality Component as cultural advisors.

With the support of their Healthy Water grant, WMAC together with their partners, are revitalising and protecting their culture, cultural values and Country, while contributing to improved water quality and environmental outcomes in a priority agricultural catchment.

These are just two examples of Traditional Owner groups who have harnessed the opportunity to further capacity and capabilities to stand on their own feet and meet their aspirations for the future.

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The Wanyurr-Majay Traditional Owners are looking forward to taking a significant role culturally informing and participating in this local Great Barrier Reef Regional Program to ensure the future health of our waters, and our cultural values and knowledge of Wanyurr-Majay waters and places are shared and respected for generations to come.

Jamie Satani, Wanyurr-Majay Director

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Wanyurr-Majay Traditional Owner Clive Murray at a community planting day for their Healthy Water project.

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 10.

Table 10: Traditional Owner Reef Protection Partnership activities and budget

Partnership activity		Rationale	Description	Budget
Indigenous innovation, leadership and collaboration				\$5m
<div><div></div><div></div><div></div><div></div></div>	Traditional Owner Partnership governance	The 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. 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.	The Partnership is committed to a process of co-design and co-delivery with Traditional Owners of the Reef.	
	Leadership and capacity-building		This activity will support leadership activities that build and strengthen the capacity and capability of Traditional Owners to actively participate in the Partnership.	
	Strategic communication and engagement		Effective communication and engagement of Reef Traditional Owners remains a critical priority throughout the Partnership.	
	Co-design action framework		This activity involves the development of a Reef co-design (co-benefit) framework with Traditional Owners, Reef 2050 partners and the broader community.	
Traditional Owner Futures Fund				\$10m
<div><div></div><div></div></div>	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
<div><div></div><div></div><div></div></div>	Crown-of-thorns starfish control	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. 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.	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
<div> <div></div> <div></div> <div></div> </div> Reef monitoring and reporting	<p>Traditional Owners are the keepers of Indigenous Knowledge and cultural values and have observed dramatic changes on their Country. The <i>Strong Peoples-Strong Country</i> 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 <i>Strong Peoples-Strong Country</i> 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
<div> <div></div> <div></div> <div></div> </div> Healthy water	<p>Traditional Owners require better engagement in the Reef 2050 Water Quality Improvement Plan and related funding opportunities.</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 the 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
<div> <div></div> <div></div> <div></div> </div> Reef restoration and adaptation	<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
<div> <div></div> <div></div> <div></div> </div> Early investment: Stage 1 grants program	<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
TOTAL TRADITIONAL OWNER REEF PROTECTION COMPONENT BUDGET			\$51.8m

Traditional Owner Reef Protection Annual Work Plan: 2022-2023

Major categories of activity, deliverables and budget for 2022-2023 are shown in Table 11.

Table 11: Traditional Owner Reef Protection Component investment areas and budget 2022-2023

Partnership Activity	Description	Budget
Indigenous innovation, leadership and collaboration		
Traditional Owner governance	<p>Ongoing delivery of Traditional Owner Reef Trust Partnership governance arrangements.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Traditional Owner Advisory Group to meet up to four times a year. 2. The established Traditional Owner Co-Design (Technical) Working Groups to meet in accordance with their terms of reference. 	\$0.325m
Leadership and capacity building	<p>This program area will support leadership activities that build and strengthen the capacity and capability of Traditional Owners to actively participate in the Partnership.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Co-investment into a Traditional Owner strategic think tank and/or support available for Traditional Owner attendance at identified conferences or learning events. 2. Investment in two regional youth leadership projects that inspire future leaders in Land and Sea management, and a Youth Reef Leadership think tank to develop a blueprint for supporting youth in the Reef space. 3. Develop and deliver a men's project and women's project, and provide mentorship and support for Traditional Owners involved in the RTP. 4. Identify relevant skills, qualification requirements and registered training providers for implementation of the RTP, and develop a Career Pathways prospectus. 5. Identify Traditional Owner groups in the GBR catchment, ground truth findings and provide a benchmark report. 	\$0.55m
Strategic communication and engagement	<p>Effective communication and engagement of Reef Traditional Owners with an emphasis on elevating Traditional Owner voice throughout the Reef and catchment regions.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Implement a Traditional Owner Strategic Communication Framework through the development of products that promote opportunities and achievements, and share learnings under RTP. 2. Develop a Traditional Owner Biocultural Ethics guideline. 	\$0.850m
Co-design action framework	<p>Continue to develop the reef co-design (co-benefit) framework with Traditional Owners, Reef 2050 partners and the broader community.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 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. 	\$0.075m
Sustainable funding (Futures Fund)		
Traditional Owner-led Futures Fund	<p>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.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Present options for appropriate business models and governance models to the TOAG. 2. Funds invested in a term deposit. 	\$0.064m

Partnership Activity	Description	Budget
Traditional Owner-led Reef protection activities		
Grants	<p>Ongoing management of the Stage 2 Traditional Owner grant round which will support projects across the three RTP components of COTS Control, Reef Restoration and Adaptation Science and Integrated Monitoring and Reporting.</p> <p>Deliverables:</p> <ol style="list-style-type: none"> 1. Delivery of on-ground activities that support COTS, RRAS and IMR projects through Traditional Owner Stage 2 grants. 2. Support Traditional Owner Community Action Plan grants in the RTP Community Reef Protection Program. 	\$1.143m
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. 	\$7.019m
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 <i>Strong People-Strong Country</i> 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 four Traditional Owner groups in the <i>Strong People-Strong Country</i> pilot program; develop objective indicators; on-ground data and information management support; data sharing agreements based on data ownership; in-house community research assistant roles; training and development; data system support (where applicable), community meetings for local decision making. 	\$1.371m

Partnership Activity	Description	Budget
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 program 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. 	\$0.896m
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 Managers engaged for extension support to positively facilitate Traditional Owners' active engagement and participation in RRAS and RRAP (1.5 FTE). 2. Healing Country grant program for reef restoration and resilience on-Country activities is rolled out. 3. Explore career pathways and support a Traditional Owner traineeship program to be delivered through RRAP which aims to improve career and employment pathways and build capacity in reef restoration and adaptation. 	\$2.93m
TOTAL INVESTMENT		\$15.22m



Table 12: Traditional Owner Reef Protection Component Gantt chart 2022-2023

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Indigenous innovation, leadership and collaboration														
Traditional Owner program governance														
Ongoing delivery of the Traditional Owner program governance	Ongoing support to host the Partnerships Traditional Owner governance arrangements including Traditional Owner Advisory Group (TOAG) and component-level co-design groups. Includes two joint workshops.	\$0.325m	Consultant for logistics support		TOAG					TOAG	W'shop			TOAG
Leadership and capacity building														
Traditional Owner support	Support for Traditional Owners to attend relevant conferences or learning events and/or support towards a Traditional Owner leadership strategic think tank.	\$0.05m						Design				Implementation		
Youth leadership support	Pilot up to two regional youth leadership projects that work on-ground with future leaders in land and sea management. Support a Youth Reef Leadership Summit to develop a blueprint for supporting youth engagement in the Reef. Includes support for specialised training in communications.	\$0.2m	Design					Implementation						
Men and Women leadership projects	Dedicated men's business leadership project designed by the male members from TOAG and co-design groups. Continuation of WomanSpeak Public Speaking and Leadership Pilot Program.	\$0.15m	Implementation WomanSpeak Leadership Project					Implementation Men Leadership Project						
Develop a career pathways prospectus as part of workforce planning	Prospectus will identify the skills, capabilities and qualifications needed for effective Traditional Owner participation and delivery of the Partnership. This work will also include identification of suitable learning pathways and potential registered training organisations.	\$0.5m	Consultant for logistics support	Consultancy					Co-design framework with key partners					
Continue developing an audit that identifies capacity across the Reef Catchment Traditional Owner Estate	Work on the Traditional Owner audit for groups in the GBR Catchment; ground truth the findings and deliver documents including a benchmark report.	\$0.1m						Data and information collection						
Strategic communication and engagement														
Implement Traditional Owner Strategic Communications Framework	Expert communication service provider(s) to implement Reef Traditional Owners' Strategic Communications Framework to highlight impact and on-ground work under the Partnership.	\$0.5m	Consultant for logistics support					Implement Communication Strategy						
Increase engagement of Traditional Owners in the Great Barrier Reef World Heritage Area	Traditional Owner Engagement (regional forums, roadshows & community meetings).	\$0.3m						Implementation						
Develop a Traditional Owner Biocultural Ethics Guideline to inform work with Traditional Owners	Consultancy to address ethics, principles and guidelines for better practice engagement. This work will be tailored to delivery of the Partnership and integration between Traditional Owners and key partners.	\$0.05m	Contract	Desktop audit		TOAG advice		Research and draft Guidelines				Test through TWGs and TOAG		
Co-design action framework														
Mentorship and guidance, prototyping and testing	Build and maintain strategic partnerships with co-design experts, participate in coaching workshops and involve TOAG and Component-level co-design group members. Publish co-design principles and develop tools and resources. Co-design Indigenous evaluation to test prototypes and process.	\$0.07m						Co-design Indigenous Evaluation						
Active Traditional Owner-led Reef protection activities														
Grants														
Deliver Stage 2 grants	Deliver projects focused across the three RTP components of COTS Control, Integrated Monitoring and Reporting and Reef Restoration and Adaptation Science.	\$0.78m						Implementation						
Support Traditional Owner Community Action Plan grants	Support Traditional Owner projects focused in the RTP Community Reef Protection Program.	\$0.36m						Implementation						
Traditional Owner-led Water Quality Improvements - Healthy Water														
Implement Stage 1 Healthy Water grants 2020-2021	Support Traditional Owners to implement foundational and key tone Healthy Water grants.	\$1.77m						Implementation						
Stage 2 Healthy Water Grant Program 2021-2022	Support Traditional Owners to implement Stage 2 Healthy Water Grant grants.	\$1.6m	Contract					Implementation						
Strategic Partnership co-investment Healthy Water	Partnership co-investments to improve Traditional Owner participation in healthy water projects with partners to deliver healthy water outcomes.	\$1.64m						Extension work to build relationships and broker partnerships						
Program extension and coordination	Facilitate Traditional Owners' engagement and participation in Healthy Water program. Facilitate understanding of healthy water objectives through extension work. Increase effective partnerships between Traditional Owners and partners.	\$0.24m						Support						
Develop a Water Quality Literacy Framework	Implement a framework that includes Traditional Owner healthy water resources to improve understanding and increase engagement in water quality projects and water science. (Keriri if more project detail is needed here).	\$2.0m						Consultancy						
Healthy Water Workshops	Support peer-peer learning opportunities for current Healthy Water grant recipients to share with the water Traditional Owner community their projects, learnings and outcomes.	\$0.15m	Consultant for logistics support	Deliver			Report							
Communication and engagement	Work with Traditional Owners to understand and implement features of the Traditional Owner Healthy Water RTP component.	\$0.05m						Co-design and deliver						

Community Reef Protection Component

Partnership Budget: \$10 million

2022-2023 budget: \$3.953 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:



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



Community project contributions are recognised, valued and celebrated



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



Community informs decision making through collaborative planning and community data use

Progress on the five-year journey

The Community Reef Protection Component aims to turbo-charge the impact that community action has for the Great Barrier Reef, and for people, by improving the engagement of the broader community.

The five-year plan focuses on improving collaboration between individuals, community groups, Traditional Owners and managers to deliver meaningful local change. It places a strong emphasis on recognising and celebrating the value of community contributions and supporting enduring outcomes through innovation in funding and partnership models for community work, leaving a lasting legacy beyond the RTP.

Achievements to date include:

- ✓ **Rapid expansion of community-led Reef protection** with 62 community projects and 356 partners delivering practical on-ground outcomes for the environment and communities.
- ✓ **Increasing community engagement and volunteering** in Reef protection with 45,000 volunteer hours and almost 25,000 participant engagements (more than one third are youth and half are involved for the very first time).
- ✓ **Driving greater collaboration** across community, citizen science, reef management and science agencies, significantly increasing the use of community data in Reef planning and management.
- ✓ **Maximising collective impact** through the establishment of seven community hubs to coordinate, accelerate and amplify community Reef protection outcomes from Bundaberg to Cooktown.
- ✓ **Building local capacity and capability**, with the citizen science program alone delivering 472 training, education and community outreach initiatives, and 59 initiatives supporting community leadership and capacity development.

Beyond continued implementation of the on-ground community project portfolio, 2022-2023 activities will include:

- ➔ **Fund, champion and inspire local climate action** and community Reef protection with the launch of the community-led climate action program.
- ➔ **Launching a new citizen science portfolio** that builds on previous projects, supports innovation and translates community data to drive on-ground outcomes.
- ➔ **Scaling activities** through the Cairns-Port Douglas Reef Hub including capacity building and piloting new approaches for enabling local-scale reef rehabilitation.

- ➔ **Facilitating greater integration across community hubs** to increase knowledge-sharing, capacity-building and collaboration, and deliver enhanced outcomes for the Reef.
- ➔ **Improving citizen science data integration** into regional Reef report cards to fill critical knowledge gaps.
- ➔ **Expanding community participation in the broader RTP portfolio** including the water quality, COTS, Reef restoration and adaptation science and Traditional Owner Components.

Strengthening and accelerating on-ground action

By December 2021, citizen science project partners had supported community participants to contribute 35,898 volunteering hours and generate over 190,000 data points about Reef wildlife and habitats from 544 field days. From these projects, there are 21 instances of community data being used to inform planning, reporting and management actions. Despite the challenges of COVID-19, partners have now delivered 472 training, education and outreach events to build community capacity, including shifting to online engagement approaches to expand the mechanisms available to connect with community. A second round of citizen science projects will progress on-ground work in 2022-2023, supporting the continuation of seven projects to build on work to date, as well as new projects focused on community participation in water quality and ecology monitoring through piloting innovations in integrating eDNA sampling, and projects enabling data integration and data use to drive changes for community Reef protection actions. The Component is also exploring priorities for citizen science data integration and legacy opportunities with the IMR Component.

To date, 19 local action projects championed through the Great Barrier Reef Marine Park Authority's Local Marine Advisory Committees (LMACs) and their partners have empowered solutions to local Reef threats, with three key focus areas: catchment and waterway protection, habitat rehabilitation, and litter and marine debris source reduction. Projects delivered 97 education, leadership and data collection events, leading to 20 instances of data use to inform planning or management, including informing litter source reduction plans, report cards, state government management frameworks and placement of litter bins in hotspots.

For example, the Fishing for the Future project led by Douglas Shire Council and supported by the Douglas Local Marine Advisory Committee is one of the local action grants' many success stories. This project brought the Port Douglas community together to create a sustainable fishing strategy that encourages both locals and tourists to help protect the Reef through more sustainable fishing and boating practices. A Recreational Fishing Strategy and Action Plan, Charter Fisher Working Group and Code of Practice, a Best Practice Fishing Guide for Kids, and an online community hub were all developed and will continue.

Building on this success, the final two years of the RTP represent an opportunity to integrate activities to amplify impact and build foundations to endure beyond the completion of the RTP. With feedback from LMAs to focus local action grants under a shared theme of local action on climate change, and learnings across programs, this year's plan will unite the local action grants and previous National Reef Protection Challenge under one community-led climate action framework. This amplifies the pool of funds for Reef-wide community climate action grants and unifies efforts to deliver impact (see section on Building understanding, hope and action).

In 2021-2022, the Cairns-Port Douglas Reef Hub focused on developing governance and plans to enable a network for enhanced communication, collaboration and learning among partners involved in local-scale and large-scale research and development for coral rehabilitation and stewardship activities in the region. A Steering Group has been formed to provide locally relevant strategic leadership to guide the design and operations of the Hub. A local Coordinator is now in place and is actively shifting into implementation of network activities including training, knowledge sharing and collaborative monitoring activities. Three local-scale coral rehabilitation and stewardship projects were funded in the region, supporting projects that explore new models for scaling, integrating knowledge systems and understanding efficacy and challenges in local site protection activities.

This includes the Coral Nurture Program, a partnership of research and six tourism operators, which has out-planted 48,000 corals over 18 months, and the Kul-bul project, which brings together tourism operators, not-for-profits and Traditional Owners to integrate Indigenous Ecological Knowledge with contemporary biological monitoring practices to better design and guide future on-ground actions at three reefs in Yirrganydji sea Country.

Connecting community with decision making

In 2020-2021, community, science, management, business, youth and Traditional Owners came together to create six Community Action Plans (CAPs) across the Queensland coast. The CAPs identify local actions which address regional priorities for Reef protection outcomes, helping tangibly connect community aspirations with a complexity of regional and Reef-wide strategic plans. The collaborative and systematic planning process also catalyses new ways of working together for enhanced impact.

A series of grants for projects identified under the CAPs is progressing steps to immediately translate plans into action by kickstarting community and Traditional Owner-led CAP projects to engage community in delivering a range of activities including climate action projects, on-ground habitat and wildlife protection, citizen science programs, and Traditional Owner-led actions to care for Country. CAP Leaders will continue as backbone organisations to guide, support and enable their communities to deliver on key priorities in their regions, supporting capacity building, storytelling about collective achievements and ongoing refinement of the CAPs to support measurable outcomes for the Reef.

Cross regional themes emerged across CAPs including reducing climate emissions through local action, turtle conservation, Traditional Owners caring for Country, citizen science for targeted action, and protecting and restoring wetlands and fish habitats. These cross-regional priorities offer ongoing opportunities to explore larger, more collaborative approaches to resourcing and delivery.

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. In 2022-2023, a project to integrate coral reef fish data into the three northern report cards for formal reporting or stewardship narratives will be implemented.

Building understanding, hope and action

The Reef is an icon. With a sixth mass bleaching event on the Reef and the growing urgency around our window to act to shape a better path for the future of the Reef, we need new ways to mobilise change. The community-led climate action program aims to grow a collective impact model connecting multiple organisations to empower their community networks to deliver climate emissions reduction for the Reef, measure these outcomes using a shared approach, and tell a powerful story of hope and change to help grow a movement.

The program has been in design phase in 2021-2022, informed by the development of Community Action Plans highlighting strong interest in community-led climate action, as well as feedback from the Local Marine Advisory Committees in support for cross-Reef collective approaches focused on climate action. Community commitment was further illustrated by the recent citizen science grant round focused on empowering local communities to work with partners to understand Reef health and drive local Reef protection actions in the face of climate change.

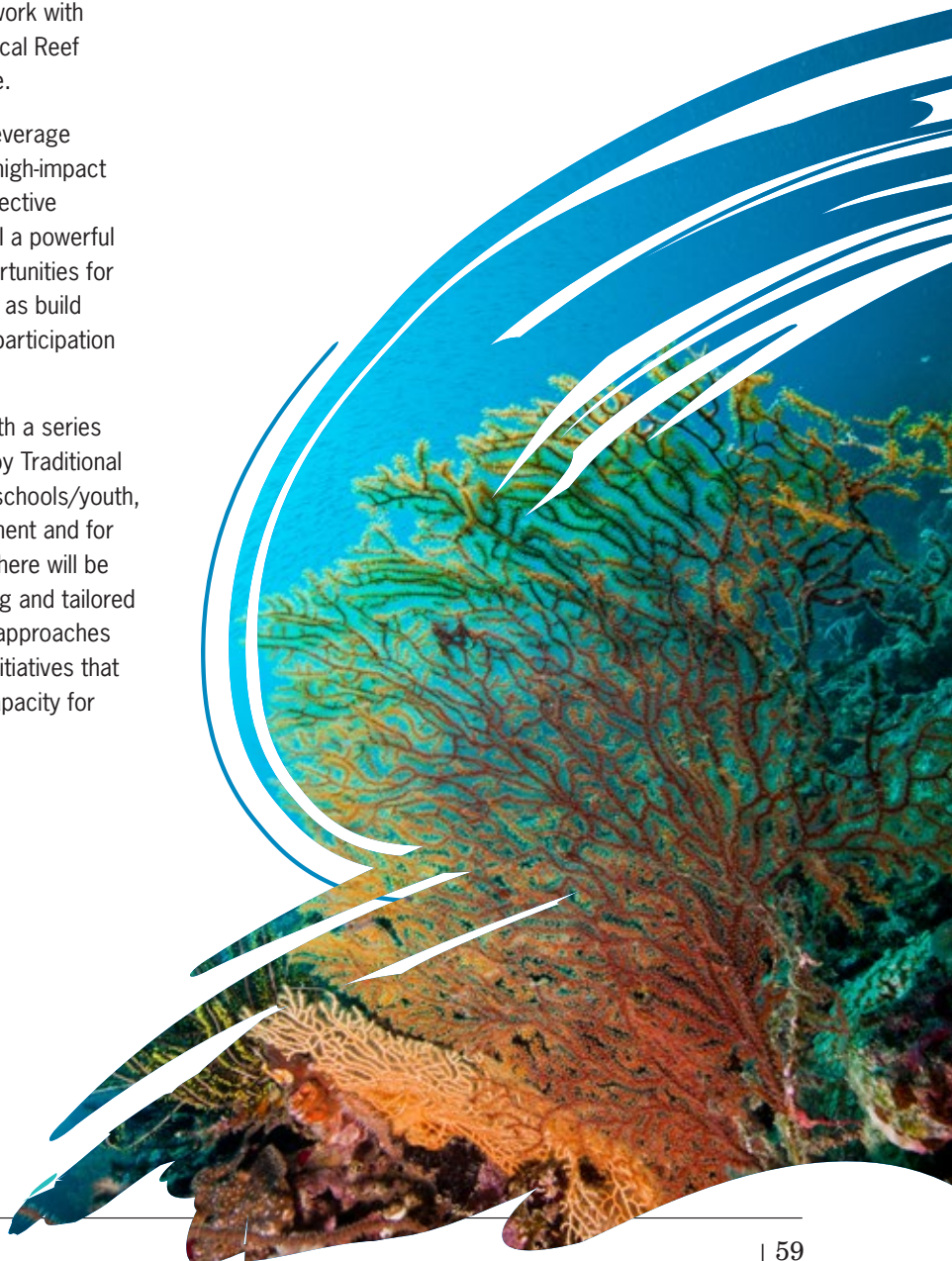
GBRF has been exploring key partnerships to leverage behavioural science insights, identify practical high-impact individual and community actions, measure collective outcomes, apply cutting-edge research, and tell a powerful story of hope. The approach will focus on opportunities for Reef communities to champion change, as well as build a scalable model that can foster national level participation and connect with the global movement.

This program will launch in early 2022-2023 with a series of grants to empower community-led projects by Traditional Owners, NFPs, councils, local businesses and schools/youth, with a specific project stream for local government and for youth as our emerging leaders for the future. There will be support for project design mentoring via training and tailored support to ensure well-designed and impactful approaches for practical community-driven climate action initiatives that address identified needs by building broader capacity for driving change.

Fostering enduring outcomes

Monitoring of Reef stewardship has been prioritised for investment by the Reef Integrated Monitoring and Reporting Program (RIMREP) partnership under the IMR Component. The desktop community stewardship audit previously undertaken is helping to inform the work. Building on that, the Community Component and project partners will actively contribute to collaborative design to ensure those delivering stewardship work on-ground can shape the program approach and ensure benefits for their wider community in documenting and celebrating their efforts. Some community project partners will also have the opportunity to access tailored social science advice to leverage this framework and apply the learnings.

An audit of global community programs and fundraising models will explore proven and new models for investment and delivery of community programs to support improved design and capacity building opportunities for enduring change.



Case Studies

Two initiatives illustrate the progress to strengthen community connections with decision making to deliver targeted and collaborative local actions for the Reef, helping progress towards end-of-program outcomes.

Community data making change

From 2019-2021, 15 citizen science projects engaged community members in collecting and sharing reef health data, with 21 instances of project data used to inform planning or management, including integration into regional report card reporting, changes in beach management practices, support for local advocacy to protect coastal boardwalks, and facilitating wildlife management activities. Community data was used in formal reporting for the first time in four instances – with applications in multiple regional reef report cards and Australian Government blue carbon modelling.

For example, the Cairns and Far North Environmental Centre MangroveWatch project assessed mangrove and tidal wetland health across seven estuaries within the Wet Tropics and Southern Cape York region. Project leads worked with the Wet Tropics Report Card to design a set of indicators to use this citizen science data set to report on mangrove health in the 2022 report card. This sets up a model for citizen science data use across other report card areas that has been endorsed by the technical officers and Independent Science Panel.

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The implementation of MangroveWatch shoreline assessments coordinated by CAFNEC in estuaries of the Wet Tropics region over the last few years provides effective data and results for reporting on mangrove condition in the Wet Tropics to assess change in the condition of mangroves of the Wet Tropics over time.

Richard Hunt
Science Technical Officer for Wet Tropics Waterways Report Card

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This project is one that will now continue through the Citizen Science for Change grant round, expanding coastal wetland mangrove monitoring locations to continue providing data for the report card, as well as informing a series of five local action plans to inform on-ground mangrove and saltmarsh protection actions.

To date, projects have catalysed 16 first-time examples for action and applications of community data, such as changing the use of plastic materials, informing the design of fishways, expanding applications for coral clips® by the Authority, and formal adoption of pilot citizen science methods into future Authority data collection and reporting for the Eye on the Reef program and data use.



Mangrove condition reporting underway in North Queensland.
Image credit: Cairns and Far North Environment Centre (CAFNEC).

Case Studies

Community leading action to protect the Reef

Community Action Plans from Cape York to Burnett Mary are using interactive and iterative planning approaches to empower community networks and key partners to tackle the complex issues facing the future of the Reef and the communities that rely on it – ranging from local climate action to habitat rehabilitation and protecting cultural values.

This pilot program relies on regular input from partners and applies an action learning approach that is continuously refined to align with and support delivery towards the Reef 2050 Plan. In this way, the CAPs act as a conduit for linking large-scale strategy to local, on-ground actions and provide an opportunity to demonstrate community contributions towards a bigger, Reef-wide outcome. To support an ongoing adaptive approach, a review of the CAP development process was undertaken through survey and interview results from CAP Leaders and CAP community partners and participants.

There were a number of indicators to suggest that the CAP development process strengthened the quality of how communities were engaged in planning Reef protection actions.

Two thirds (66%) of CAP leaders completing the online follow-up survey indicated that they observed some shift in the quality of how communities were engaged in planning. Although very early in the program, 40% of CAP leaders could identify specific examples of increased valuing of community participation by decision makers, suggesting potential for the program to strengthen community participation in decision making.

A key outcome of the CAP development process articulated by CAP Leaders was the opportunity to develop new relationships and strengthen existing relationships with community partners to support ongoing action.

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It brought people together in more ways than I expected. This included a cross section of community members and it helped get people out of silos and gave people space to work together to identify some shared goals. We really valued the connection with other organisations. It felt like I was in a beehive, all working on our own areas, but working things out together. It was a collective. The chance to check in and see how other people were doing things and learn from each other isn't something we do often enough, and this really helps.

CAP Leader

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









CAP workshop. Image credit: Fitzroy Basin Association.

Community Reef Protection Five-Year Plan

Our five-year plan for the Community Reef Protection Component includes eight Partnership Activities outlined in Table 13.

Table 13: 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 growing interest and greater potential for data from these programs to better inform decision making and enhance social and ecological benefits.	This funding supports strategic and collaborative citizen science data collection, reporting and application. It will also enable strategic integration opportunities working with the IMR component to connect citizen science with critical monitoring and reporting activities.	\$3.02m
 Local-scale coral restoration and stewardship 	Alongside emissions reduction, restoration is an emerging priority as a tool to build Reef and community resilience in the face of climate change.	This funding supports the development of a Cairns-Port Douglas Reef Hub to strengthen collaboration across a range of scales of reef intervention and stewardship actions to deliver greater collective impact. Investment will also enable on-ground projects that trial impactful approaches to accelerate coral recovery and site stewardship, with learnings shared across the Hub network.	\$1.1m
 Local action   	GBRMPA's Local Marine Advisory Committees provide a platform to directly connect community with decision making, and can further activate and empower a network of dedicated community members.	This funding supports a series of on-ground projects championed by LMACs and their networks to engage communities in delivering a range of practical local solutions to Reef threats. The initiative is also providing early input to inform design approach for the Component.	1.67m
 Integrated decision making: Community Action Plans	Collaborative design to connect key management priorities with community knowledge, aspirations and capacity can help drive more effective local-scale actions.	This funding enables design and implementation of Community Action Plans along the length of the Great Barrier Reef to turbo-charge local Reef protection and community outcomes through collaborative planning and delivery of on-ground action. This funding will also support ongoing CAP leadership roles to build enduring capability to amplify community partnerships and leadership.	\$1m
 Community-led climate action program 	Climate change is the greatest threat to the Great Barrier Reef. Yet many Australians do not connect personal action on climate change with protecting the Reef.	This initiative will enable practical community-led climate action projects that empower groups and individuals to take simple, measurable and impactful actions to reduce their carbon footprint for the Reef. A shared framework for measurement 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
 Celebrating community Reef protection	Capturing, sharing and celebrating community-driven solutions and results from a range of people and projects has been identified as a key need.	This funding will collaboratively develop and deliver high impact communications to celebrate community Reef protection results and champions to celebrate achievements, share learnings and inspire increased engagement.	\$0.07m
   Support enduring investment and partnership models	While extensive work is taking place across communities, there is no comprehensive benchmark that documents community stewardship effort and impact across the Reef and its catchments. Addressing the challenge of small, inconsistent, grant-based funding for community Reef protection activities has been identified as a key barrier to achieving more efficient and enduring outcomes.	This funding includes activities to strengthen tools and models for funding community-led Reef protection activities to achieve more efficient and enduring outcomes. It includes early piloting of the IMR community stewardship monitoring work to be informed by and benefit community partners, providing tailored social science support for projects to support design and impact evaluation, and strengthening tools and models for funding community-led Reef protection activities.	\$0.130m
   Empowering community heroes	Capacity building initiatives can strengthen individual, organisational and sector-wide capacity to support place-based, sector-based and youth empowerment activities and ultimately, community stewardship outcomes.	This funding will support key capacity building needs for individuals and organisations to amplify community partnerships and leadership, and provide opportunities to further build leadership skills.	\$0.53m
TOTAL COMMUNITY REEF PROTECTION COMPONENT BUDGET			\$10m





Community Reef Protection Annual Work Plan: 2022-2023

Major categories of activity, deliverables and budget for 2022-2023 are shown in Table 14.

Table 14: Community Reef Protection Component investment areas and budget for 2022-2023

Partnership Activity	Description	Budget
Citizen science projects	<p>A series 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, and seek to 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 working with IMR to foster enduring outcomes for future strategic citizen science.</p>	\$0.84m
Local action projects	<p>Completion of local action projects. Remaining funds will contribute to community-led action on climate change projects across multiple GBR communities.</p> <p>Deliverables: Completion of local action projects. Remaining funds will contribute to community-led climate action implementation and enabling community leadership through awards and leadership development opportunities.</p>	\$0.928m
Local-scale coral restoration and stewardship program	<p>Funded local-scale coral restoration and stewardship projects will explore and strengthen models to deliver resilience outcomes for the Reef and communities.</p> <p>The Cairns-Port Douglas Reef Hub will continue to be collaboratively designed and implemented with Traditional Owners, local community, tourism, 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>Deliverables: Continuation of local-scale coral rehabilitation and stewardship projects, continuation of the collaborative design and implementation of the Hub with support from a Coordinator.</p>	\$0.283m
Community Action Plans and data integration	<p>Community Action Plan Leaders will continue their role to guide, support and enable the community to progress successful CAP projects.</p> <p>Community and Traditional Owner-led projects identified through CAP development will continue with implementation to action.</p> <p>A pilot project with the regional report card network will integrate coral reef fish citizen science into the three northern regional report cards.</p> <p>Deliverables: Implementation of the CAP projects to deliver community on-ground action that aligns with regional priorities, as well as ongoing CAP implementation support from CAP Leaders to enable collective storytelling, capacity building and investment to support enduring outcomes. The citizen science integration pilot project with regional report card partnerships will commence.</p>	\$0.185m

Partnership Activity	Description	Budget
Community-led climate action program	<p>The initiative focused on climate action will apply a collective impact model and connect multiple organisations across multiple scales of activity to deliver community-led climate emissions reduction for the Reef. This will include a range of accessible activities delivered through Councils, community organisations, local businesses, Traditional Owners, schools, as well as programs designed with and for youth as our emerging leaders for the future (including a national youth innovation grant round). A key focus will be on measuring these outcomes using a shared approach, demonstrating progress and telling a powerful story of hope to help grow a movement. The approach integrates learnings from the CAP program and local action projects with the Local Marine Advisory Committees to unify two previously distinct work areas to further amplify community and individual-level climate action efforts.</p> <p>Deliverables: Implementation will be through community grants, designed with input from partners. Projects will be further enabled through capacity-building support for design and implementation to strengthen impact, a strong focus on communicating the local champions delivering work and showcasing the value of community-led Reef protection action.</p>	\$1.47m
Celebrating community Reef protection	<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 grant recipients and partners to deliver high-impact communications celebrating results and community champions, along with case studies to share learnings.</p>	\$0.035m
Enduring investment and partnership models for Reef protection	<p>Strengthening monitoring and communicating Reef Stewardship will continue through work with the Integrated Monitoring and Reporting Component.</p> <p>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: Continue to progress work with IMR to enable a Reef stewardship assessment that empowers community partners to measure and share key metrics that communicate the value of their work. This will also include provision of tailored social science support for project partners to boost capability and measurement of outcomes. Continue to build a dynamic toolkit for enduring change.</p>	\$0.062m
Empowering community heroes	<p>The community and youth leadership budget was committed to the CAP program to ensure youth were engaged and had meaningful input in the CAP development process. Investment in the CAP program will enable CAP Leaders to support place-based, sector based and youth empowerment activities to enhance Reef protection outcomes.</p> <p>Deliverables: CAP Leaders have the opportunity to continue their CAP leadership role to enhance outcomes for the community sector and youth to support Reef protection outcomes.</p>	\$0.15m
TOTAL INVESTMENT		\$3.953m

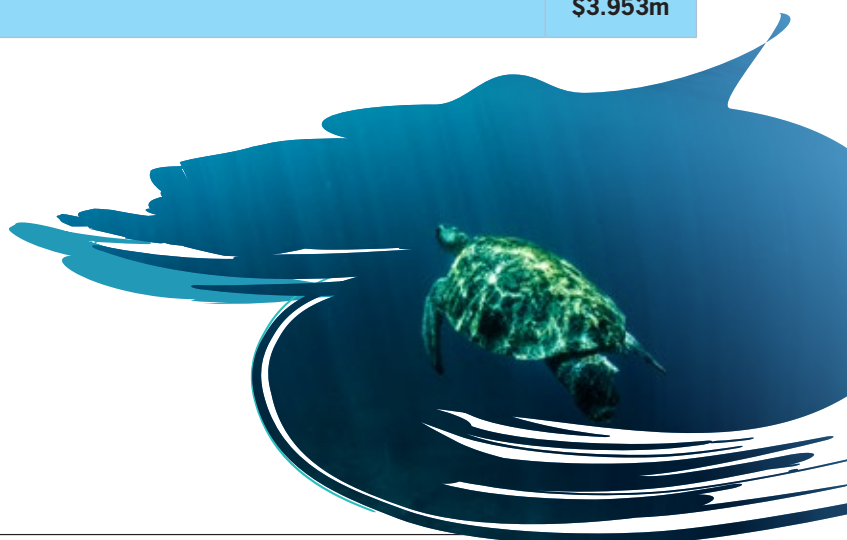


Table 15: Community Reef Protection Component Gantt chart 2022-2023

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Strengthening & accelerating on-ground actions												
Citizen science projects	Delivery of Citizen Science for Change projects in 2022-23.	\$2,051,000										
Citizen science project integration and support	Deliver of enabling activities to further support visibility, integration and application of citizen science data	\$650,000							Delivery			
Cairns-Port Douglas Reef Hub activities	Collaborative implementation of the Hub supported by a Coordinator.	\$190,000							Delivery			
Local coral restoration and stewardship projects	Delivery of local-scale coral rehabilitation and stewardship projects.	\$203,000							Delivery			
Community-led climate action program	Completion of local action projects and transition to design and delivery of the community-led climate action grants program	\$80,000							Delivery			
Community leadership support	Opportunities to further celebrate and enable leadership and innovation by community champions	\$778,000		Design						Delivery		
		\$150,000		Design							Delivery	
Connecting community with decision making												
Integrated decision making: Community Action Plans	Implementation of projects from Community Action Plans and report card community data use	\$185,000							Delivery			
Building understanding, hope and action												
Community-led climate action program	Design, launch and delivery of the community-led climate action grants program	\$1,505,000		Design							Delivery	
Growing community-led climate action capacity	Training, capacity building, measurement and program support for community-led climate action projects	\$750,000		Design						Delivery		
Celebrating community Reef protection results and champions	Collaboratively develop and deliver high impact communications to celebrate community Reef protection results and champions	\$520,000		Design							Delivery	
Communicating case studies and stories of hope	Work with partners and grant recipients to deliver project case studies and stories	\$210,000		Design								
		\$25,000							Delivery			
Foster enduring outcomes												
Support enduring investment and partnership models	Continuing work on Reef stewardship monitoring and impact measurement and funding models scoping study.	\$212,000										
Empowering community heroes	Ongoing CAP Leadership support to enhance Reef protection outcomes for the community sector.	\$62,000							Delivery			
		\$150,000							Delivery			

Integrated Monitoring and Reporting (IMR) Component

Partnership Budget: \$40 million

2022-2023 budget: \$15.5 million

Purpose: To support the implementation of the Reef 2050 Reef Integrated Monitoring and Reporting Program (RIMREP), to support resilience-based management, 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

Progress on five-year journey

Despite significant investment in marine science and management, critical monitoring gaps still remain across the Reef ecosystem. The importance of understanding, diagnosing, and treating a living system the size of the Great Barrier Reef has never been as significant as it is now. The scale of the challenge is immense – how can we fill priority knowledge gaps, utilise cutting edge innovative technology to transform current monitoring approaches, collect/manage data in a much more coordinated way, and work collaboratively together in a historically fragmented research and monitoring environment?

Since 2018 when these questions were first posed, the Integrated Monitoring and Reporting Component of the RTP has been responding to this challenge. Working collaboratively with the Reef 2050 Integrated Monitoring and Reporting Program (RIMREP), IMR programs are now fully operational across the Critical Monitoring and Decision Support workstreams and are on track to meet end-of-Partnership outcomes.

Key Achievements to date include:

- ✓ **Filling all critical Reef monitoring gaps** as identified in the RIMREP Prospectus⁸ – 17 projects spanning biophysical, socio-economic and cultural domains.
- ✓ **Completing Phase 1 of the first ever Reef-wide data management system** (and commencing Phase 2).
- ✓ **Established strong collaborative governance arrangements** to facilitate knowledge sharing, strengthen relationships and ensure outcomes deliver on end-user needs.
- ✓ **Created an integration hub** to support and grow community and Traditional Owner engagement and partnerships throughout the delivery of the programs.

The year ahead will see the:

- ➔ **Continuation of the extensive critical monitoring projects portfolio.**
- ➔ **Launch of the build phase of the Reef Data Management System**, including ensuring that the system supports best practice data management of culturally sensitive information collected by Reef Traditional Owners.
- ➔ **Implementation of the Technology Transformation Fund** focused on accelerating the development of a cost-effective deployment guidance and monitoring system to ensure that the right corals are positioned in the right place to maximise their survival rate, and to support the automation of deployment guidance systems to achieve scale.
- ➔ **Focus on integration across projects, programs and Components of the RTP** to facilitate knowledge sharing and support enduring outcomes.

Filling critical Reef monitoring gaps

Seventeen critical monitoring projects have been funded to date (one early investment northern GBR monitoring project, five Critical Monitoring Stage 1 projects and 11 Critical Monitoring Stage 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 utilise a suite of cross-cutting innovative methodologies and engagement tools to transform Reef monitoring approaches. Examples range from utilising drones to measure a range of Reef indicators, machine learning to analyse the vast amount of generated data, a dedicated integration resource to facilitate Traditional Owner participation in monitoring activities and the piloting of a co-designed cultural heritage mapping approach with Traditional Owner Groups.

Four of the Critical Monitoring Stage 1 projects will continue into 2022-2023. The outputs of these projects have collectively increased our understanding of the Reef socio-ecological system, for example via the Socio-Economic Long-Term Monitoring Program and the Fitzroy Marine Monitoring Program, and have piloted novel approaches such as utilising citizen science as a large-scale monitoring approach (Great Reef Census). eReefs continues to demonstrate its value as a vital modelling platform being used broadly to support Reef decision-making. Further information on eReefs can be found in the case study below.

Eleven of 12 Critical Monitoring Stage 2 projects are underway as at June 2022, including projects to monitor sea cucumbers (refer to the case study below), inshore dolphins, seabirds, Island habitats including invasive species and seabirds, and Reef fish. These projects all include substantial 'on-ground' components, and all involve direct Traditional Owner participation on corresponding land and sea Country. Recognising the value of citizen science, most of these projects also include sizable citizen science data collection components, with teams working in lockstep with research organisations towards common objectives. The Foundation has made substantial progress in activating and connecting citizen scientists with end users of data and will continue to focus on this critical work moving forwards to ensure the utility of data is fully maximised and communities remain engaged in Reef science across the board.

⁸ Great Barrier Reef Marine Park Authority 2021, Priority Monitoring Gaps Prospectus: Reef 2050 Integrated Monitoring and Reporting Program, GBRMPA, Townsville.

In the Human Dimensions context, all three Critical Monitoring projects are now operational. This means that for the first time, we will have information on the use, values and benefits derived from the Reef, the status of collective capacity of Reef management (monitoring implementation effectiveness of the Reef 2050 Plan) and how individuals/organisations engage in Reef stewardship. In 2022-2023, all three of these projects will enter their major data collection and methodological testing phases.

The Foundation has established tailored governance structures across the Critical Monitoring workstream to ensure knowledge is shared, relationships are strengthened, end use of critical monitoring data is actively considered throughout the life of the project, and integration opportunities are actively sought and operationalised. This has translated into project Steering and Technical Committees comprised of Traditional Owners, scientists, Reef managers, citizen scientists, technical experts – most end users of the data – across projects meeting regularly to discuss project progress. This level of transparency, integration and collaborative project design and delivery sets a new benchmark in the reef monitoring space and will continue to be a focus until the end of the RTP.

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 governance bodies 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.

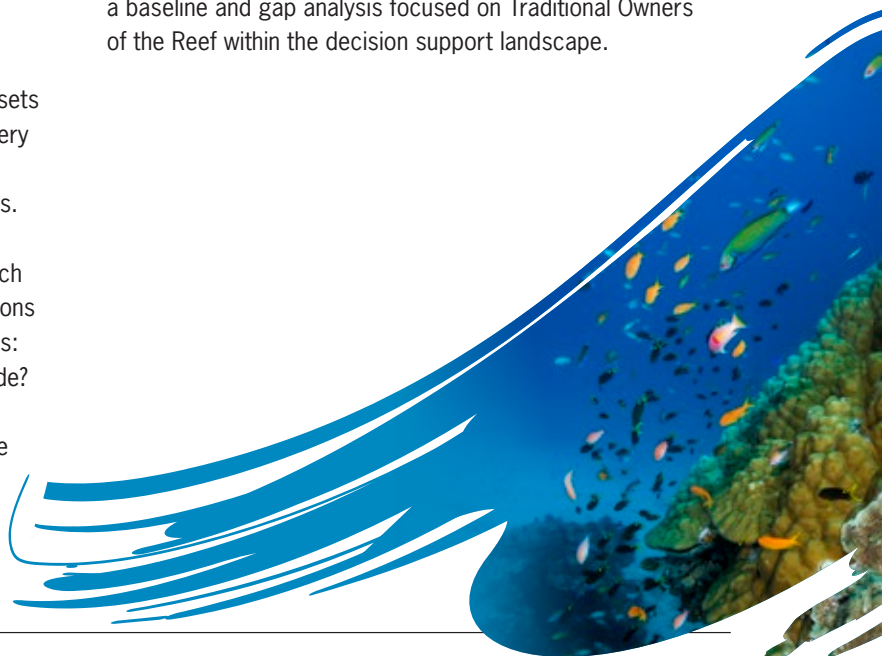
Using datasets to inform management decisions about the Reef is currently done via a series of separate datasets hosted by different management partners. This by its very nature creates silos of information and communication, along with data management and data safety challenges. In addition to this, many other datasets exist on Reef condition which are utilised for a range of end uses which would benefit from being centralised. A series of questions underpin the development of the Reef-wide DMS such as: What functions will the system need to be able to provide? What data is there to be managed? How and where will the data be housed? How will culturally sensitive data be managed?

Phase 1 of the DMS build was designed to answer these questions by clarifying expectations and operating requirements. In consultation with a network of management partners including the Authority, the DMS team has identified the scale, size and maturity of datasets critical for initial inclusion in the system. A total of 114 unique datasets were identified with existing and anticipated science-for-management use cases.

Phase 2 of the DMS project will commence in 2022-2023 and will comprise build of the system including development of the 'benchmark' data standard to facilitate 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.

One critical output and process that has come from Phase 1 of the DMS build is the engagement of a Traditional Owner knowledge and data specialist to work with the DMS team to navigate the unique requirements 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 on managing culturally sensitive data along the way.

Elsewhere in the Decision Support space in the coming year, work will commence on actioning specific recommendations from the 2020 GBR DSS scoping study, notably the development of a fit-for-purpose Decision Support System for Traditional Owners. This work will involve conducting a baseline and gap analysis focused on Traditional Owners of the Reef within the decision support landscape.



Technology Transformation Fund – guiding and tracking RRAP intervention deployment

A revised approach to delivery of the Technical Transformation Fund (TTF) was established in 2021 after engagement with global technology development experts. These experts advised that there is a wide range of ocean monitoring technologies and widgets already under development and that the TTF would deliver most value by focusing on a very high priority use-case with a clear end-user group. This approach provides a clear path to impact and minimises the risk of financing orphan technology, especially given the limited time window remaining in the RTP. Based on this advice, the TTF is being delivered in partnership with the RRAP joint venture partners, focusing on the development of monitoring technology and processes to guide the deployment of RRAP interventions and track the success and impact of the program.

RRAP's ambition is to commence deploying selected interventions at a local scale from 2025-2026. The actual interventions and how these will be implemented are still subject to R&D success, decision processes, permitting and social licence considerations. However, the targeted seeding of corals, based on aquaculture production or larval slicks, is highly likely to be central to initial interventions, and is therefore a priority use-case.

To support these deployments the TTF will focus on the following activities:

- Accelerating the development of a cost-effective operational deployment guidance and monitoring system by integrating modelling, remote sensing, high-resolution imaging and artificial intelligence systems currently developed within RRAP. During deployment, this will ensure automated systems are delivering the right number of corals at the right location within a target reef, thereby achieving maximum benefits. The same system will also allow ongoing monitoring of outcomes at the coral and ecosystem level at a fraction of the cost of current diver-based methods.
- Developing priority automation systems to support the guidance and facilitate the scaling of deployments required to achieve impact. For example, in the case of coral deployment based on larval slicks, a need has been identified for a low cost and robust package of instruments for automated monitoring and real-time analysis of environmental conditions within larval pools in order to maximise coral survival.

All the technologies and processes developed will have broader applications in coral reef monitoring beyond reef restoration and adaptation interventions. This model of integrating IMR and RRAP work packages will provide considerable leverage through RRAP and more broadly through RRAP partner organisations. It is also an area with considerable philanthropic interest with the Foundation actively fundraising for this work.

Integration – a critical cross cutting theme in IMR

Integration can manifest in various operational, technical, conceptual, governance and empowerment pathways and can bring a range of benefits to projects, programs and people ranging from more efficient coordination of resources, alignment of goals (better 'buy in'), more equitable benefit sharing for Traditional Owners, shared learnings and improved working relationships. Integration has been central to the IMR program design process and continues to be essential in its operational phase. It has been necessary to embed integration processes and activities within each of the Critical Monitoring and Decision Support workstreams to ensure the sum of the IMR investment is greater than its parts.

For example, one of the 11 Critical Monitoring Phase 2 projects is dedicated entirely to integration activities, the majority of which are supplementary resources to ensure Traditional Owner engagement and participation on all projects is appropriately supported. A similar budget allocation exists within the Decision Support workstream to ensure the appropriate management of culturally sensitive data. This includes resources to ensure engagement, protocols, sitting fees/fee-for-service arrangements are harmonised and consistent across projects. This type of integration can be thought of as through both the operational and systems-change lens.

Another example is an integration pilot project being funded out of the integration project funds described above between the Water Quality, COTS and IMR Components. The project has extended the Marine Monitoring Program (MMP) sampling beyond inner-shelf reefs and has validated remote sensing products generated through MMP by using the COTS Control vessels to conduct water quality sampling, opportunistically. Although data is still being analysed, the project has demonstrated opportunistic water quality sampling can successfully be undertaken by COTS control vessels with a small investment in training the boat crew, significantly value-adding to the COTS manual control investment.

Case Studies

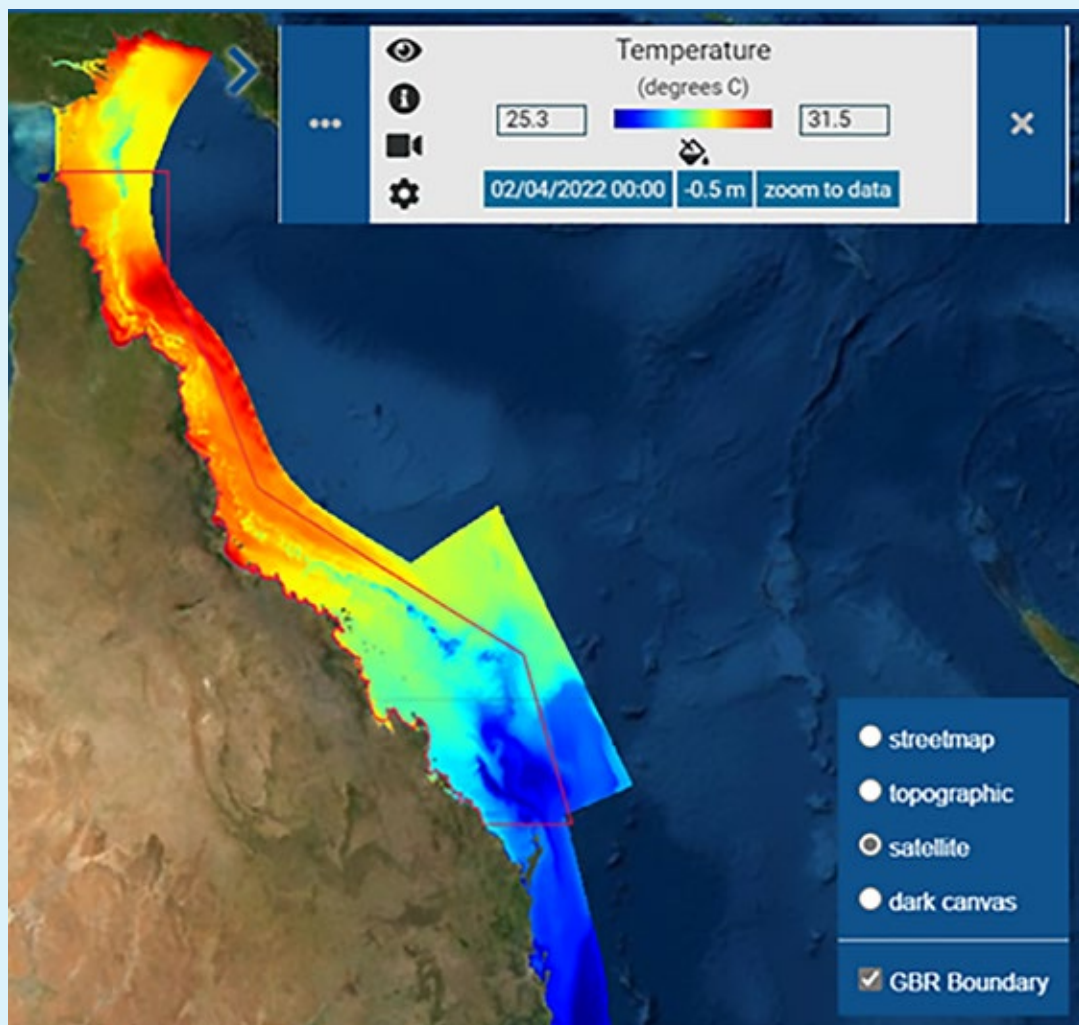
Critical Monitoring Stage 1 – eReefs

Both monitoring and modelling have important roles to play in the IMR landscape. A critical and important tool in the mix for years now, eReefs uses cutting-edge technologies including integrated monitoring outputs to produce powerful visualisation, communication and reporting tools about the Great Barrier Reef, including access in real time to metrics such as water temperature, salinity, clarity, or chlorophyll concentration. A truly collaborative endeavour, eReefs has been developed over the last decade through a collaboration between the Foundation, Australian and Queensland Governments, BHP, AIMS, BoM and CSIRO. In 2021, eReefs phase 5 officially began.

Major applications of eReefs include:

- Scenario design, target setting, and impact modelling for water quality targets under the Reef 2050 Water Quality Improvement Plan.
- Prediction of and assessment of coral bleaching.
- Informing selection of priority reefs within the COTS on-water Control Program.
- Scenario modelling to assess which interventions in RRAP are likely to have the greatest impact at different timeframes and spatial scales.
- Informing policy and delivering transparent and accurate reporting on the condition of the Reef through reports such as the Great Barrier Reef Outlook Report.

Recognising the ongoing importance of eReefs across the entire Reef management landscape, criticality of its outputs and the effectiveness of its current partnership-based governance model, funding of \$14.55 million will be provided to the eReefs project over six years post the Reef Trust Partnership (from 2024–2025 to 2029–2030) from the Australian Government, ensuring its operationalisation into the future.



Near surface temperature (degrees C) of the 1 km resolution hydrodynamic model (GBR1_H2p0) at 00:00 2nd April 2022.

Case Studies

Critical Monitoring Stage 2 – Sea Cucumber Monitoring

Populations of sea cucumbers are declining globally, largely due to harvesting. Sea cucumbers on the Great Barrier Reef have been harvested through a commercial fishery for decades, yet relatively little is known at the population level or of vulnerabilities of the species taken. In addition, some species are listed as threatened by the International Union of the Conservation of Nature (IUCN) and two species targeted by the commercial fishery have recently been listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Sea cucumbers play an important ecological role for the Reef (in both nutrient and calcium cycling) and hold unique cultural values.

Macquarie University, in collaboration with Traditional Owners, commercial fishers and other partners, is leading an innovative and integrated project to assess the population of sea cucumbers on the GBR over a vast area via the use of a combination of cutting-edge technology such as aerial drones, towed remotely operated underwater vehicles (ROVs) and machine learning. Understanding harvest impact of these animals will feed directly into real-world management decisions for long-term stability of the Reef as part of the Reef 2050 Plan.

















Diver conducting sea cucumber monitoring on the Great Barrier Reef. Image credit: Macquarie University.

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 16.

Table 16: 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 Great Barrier 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 expected to make a significant contribution to addressing priority gaps identified (alongside other funding sources).	\$27.2m (previously \$26m)
   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 (previously \$4.04m)
   Technology Transformation Fund	Recognising the perpetual need for more monitoring data (more locations, more often), there is a need for investment in transformative technologies that improve the cost-effectiveness of monitoring programs, either by improving existing approaches or developing new strategies to access the required information.	This funding will support the design and implementation of a Technology Transformation Fund, targeting areas that would most benefit from a step change or transformation.	\$5m
    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 <i>Strong Peoples-Strong Country</i> 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			\$40m

Integrated Monitoring and Reporting Annual Work Plan: 2022-2023

Major deliverables and budgets for IMR Partnership Activities in 2022-2023 are shown in Table 17.

Table 17: Integrated Monitoring and Reporting Component investment areas and budget 2022-2023

Partnership Activity	Description	Budget
Critical Monitoring	Continuation of Stage 1 and 2 monitoring activities, including completion of the Citizens of the GBR project, the <i>Strong Peoples–Strong Country</i> design project run by CSIRO (both Stage 1 projects) and the JCU Water Quality/COTS/IMR integration pilot project (Stage 2). Most Stage 2 projects will have their fieldwork complete by the end of 2022-2023. 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.	\$10.2m
Reef-wide Decision Support System	Commencement of Phase 2 of the Data Management System (build and operationalisation) and scoping of a Traditional Owner specific Decision Support System to underpin RIMREP delivery and broadly increase the quality of Reef decision making. Deliverables: Scope of individual Decision Support System build and operationalisation, including baseline and gap analysis focused on Traditional Owners within the GBR-wide decision landscape.	\$1.8m
Technology Transformation Fund	Procurement and delivery model established for Fund in partnership with the RRAP Managing Entity, followed by contracting of successful projects. Deliverables: Commencement of TTF projects.	\$3.5m
Traditional Owner-led monitoring activities	Refer to Traditional Owner Reef Protection Component	N/A
2022-2023 IMR COMPONENT BUDGET		\$15.5m



Table 18: Integrated Monitoring and Reporting Component Gantt chart 2022-2023

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Critical Monitoring		\$10.2m												
Stage 1 projects	Management and oversight of monitoring projects contracted in 2019-2021.	\$10.2m						Delivery						
Stage 2 projects	Management and oversight of monitoring projects contracted in 2021-2022.							Delivery						
Reef-wide Decision Support System		\$1.8m												
Build of Data Management System	Contracting and commencement of Phase 2 of the Data Management System (build).	\$1.45m						Build						
Decision Support System	Build of the Traditional Owner Decision Support System.	\$350,000						Design and delivery						
Technology Transformation Fund		\$3.5m												
Design of Technology Transformation Program	Finalisation of priority needs and critical gaps analysis for future deployment of RRAP interventions including independent review of findings. Procurement process for Fund including independent assessment of project applications.	\$3.5m	Design											
Implementation of technology transformation program	Contracting and commencement of projects.							Delivery						



Australian Government



Great Barrier
Reef Foundation