Reef Trust Partnership

Annual Work Plan 2021-2022

Australian Government

REEF TRUST

Great Barrier Reef Foundation

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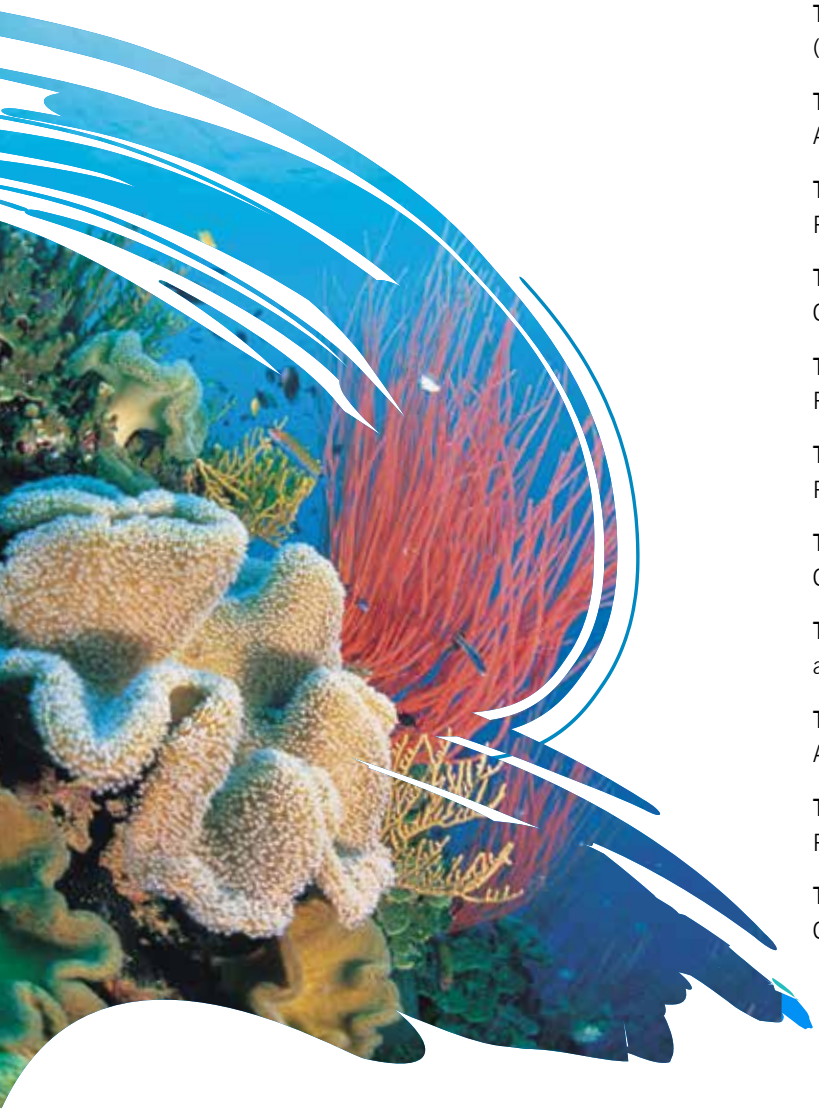


Acronyms

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

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.

This Annual Work Plan 2020-2021 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 Partnership's Traditional Owner Advisory Group and co-design groups, the Reef 2050 Independent Expert Panel, the Reef 2050 Advisory Committee, the Reef Branch of the Department of Agriculture, Water and the Environment, 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 30 June 2021.

Introduction

The Great Barrier Reef Foundation (the Foundation, GBRF) is proud to share the 2021-2022 Annual Work Plan for the Reef Trust Partnership (RTP, the Partnership). This plan represents one year of a five-year strategy and we encourage readers to refer to the Partnership Investment Strategy (released in 2019) which articulates a broader context for prioritising investment.

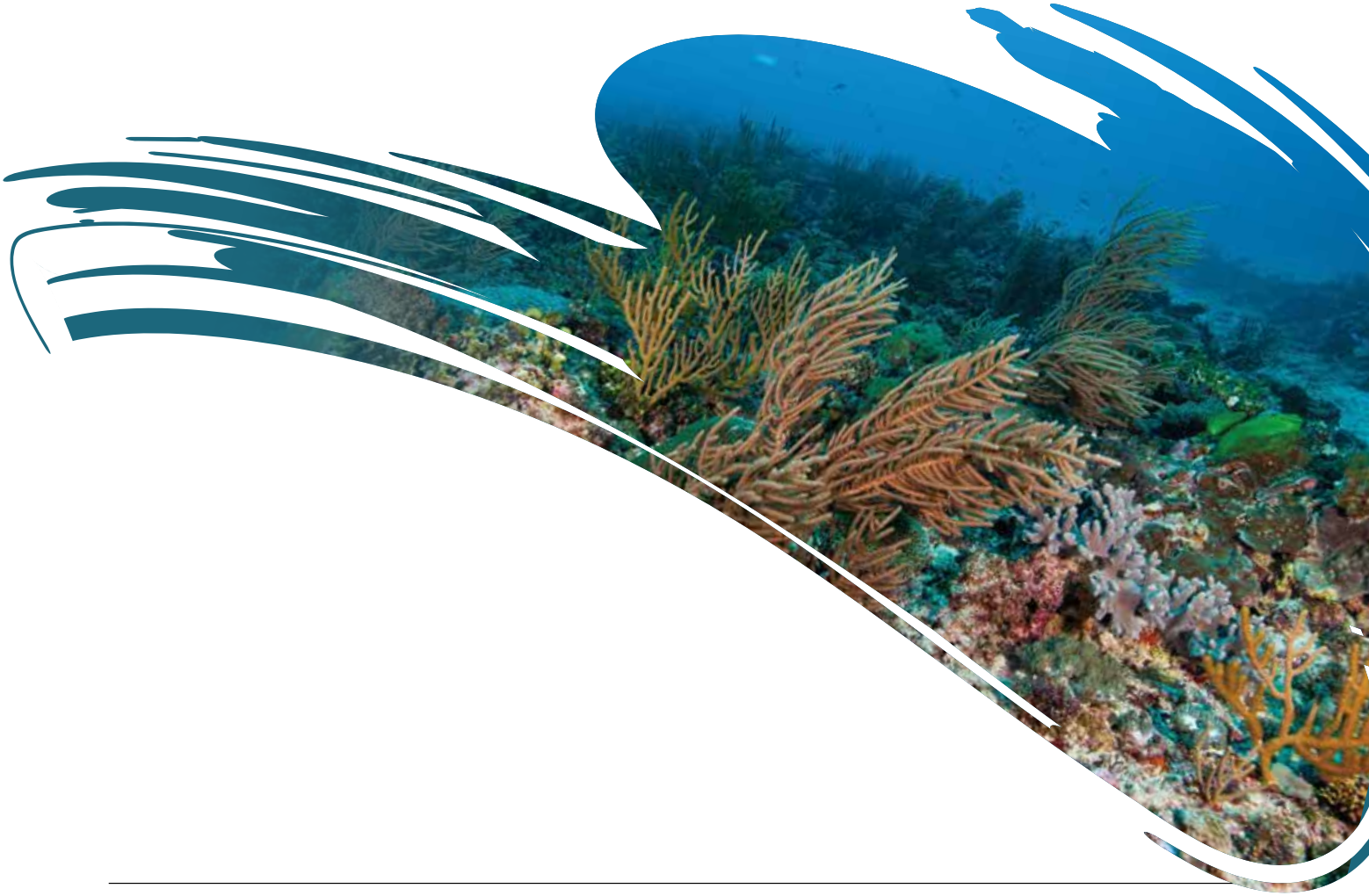
This is the third RTP Annual Work Plan, representing the half-way point of this unique and ground-breaking partnership and the start of the third year of on-land and on-water activity. Real progress on the outlook for the Great Barrier Reef (the Reef) is being made through more than 200 projects being delivered by more than 300 partners, many in regional communities, across the length of the Reef.

The scale and pace of investment is unprecedented with $432m committed across the Partnership at the close of 2020-2021. This figure includes $275m (65%) of the government grant and $157m leveraged through corporate and project partners and the generosity of many.

In the development of the 2021-2022 plan, contributors remarked on the coming year representing a 'coming of age' for the Partnership. Significant focus, understandably so, has been on the quantum of the investment by the Australian Government to enable the Reef Trust Partnership – but intertwined with this critical funding uplift is the piloting of a new model to spearhead Australia's Reef protection effort.

For Australia to truly rise to the challenge of protecting its most revered and valuable icon, there is a need for more than just money. Investment, while critical, will not guarantee the desired system change, and this effort needs multiple agents of change to coordinate and accelerate impact.

The RTP model forges a collective effort across Reef protection, bringing government, science, communities, Traditional Owners, industry and not-for-profits together to seed greater innovation and to inspire global co-investment in coral reefs. In the last six months, these tenets of the Partnership have started to shine through, bringing with them new hope and aspiration for our Reef's future.



Accelerating Impact

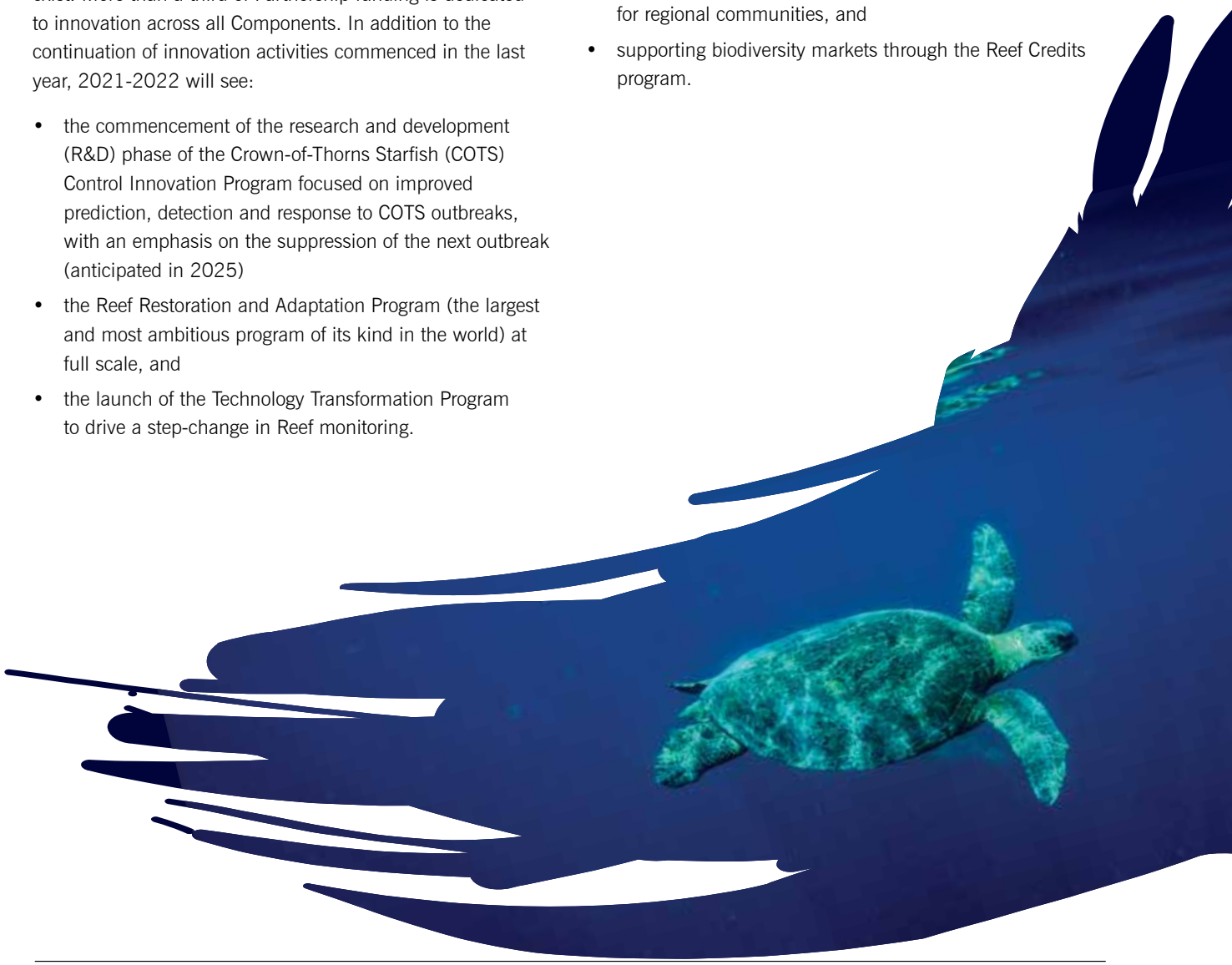
The sheer, unprecedented scale of the Partnership means that impact is undoubtedly being accelerated. An example of this is in the Water Quality Component. Through leveraging the extensive work undertaken by the Australian and Queensland governments in improving Reef water quality, the Partnership is now implementing 10 major water quality improvement programs simultaneously across 11 of the Reef's 35 catchments. This is providing not only improved water quality outcomes across an area of 11 million hectares, but also a unique opportunity for sharing learnings quickly across a huge catchment area to adaptively guide the ongoing activities of each program. The collective efforts of these 10 programs are expected to result in significant water quality improvements, with 456 fewer tonnes of dissolved inorganic nitrogen (DIN), 250 fewer kilograms of pesticides and 462 fewer kilotonnes of sediment entering the Reef every year from 2024.

While water quality is a good example of accelerating and scaling what we know and is proven, a key focus of the Partnership is developing new solutions where none currently exist. More than a third of Partnership funding is dedicated to innovation across all Components. In addition to the continuation of innovation activities commenced in the last year, 2021-2022 will see:

- the commencement of the research and development (R&D) phase of the Crown-of-Thorns Starfish (COTS) Control Innovation Program focused on improved prediction, detection and response to COTS outbreaks, with an emphasis on the suppression of the next outbreak (anticipated in 2025)
- the Reef Restoration and Adaptation Program (the largest and most ambitious program of its kind in the world) at full scale, and
- the launch of the Technology Transformation Program to drive a step-change in Reef monitoring.

The upcoming year will also see a heightened focus on sustainable financing as the Foundation builds on recent work to develop an impact investment pipeline and explore carbon opportunities within the portfolio. We will also continue supporting a suite of water quality innovative financing projects including:

- assessing the feasibility of a billion-dollar impact investment fund aimed at achieving agricultural and water quality outcomes in the Reef catchments
- testing a world-first nitrogen insurance product to mitigate the risk to landholders of reduced fertiliser application
- matching next-generation farmers with those looking to retire from the land by providing access to capital and linking this to improved outcomes for the Reef
- partnering with QIC (Queensland Investment Corporation) in the development of the Queensland Natural Capital Fund
- understanding how changes in land use could deliver improved environmental, social and economic benefits for regional communities, and
- supporting biodiversity markets through the Reef Credits program.



The Power of Collaboration

The Partnership is a vital proving ground for the power of collaboration and collective impact. At its heart it is a story of Australians doing great work for the benefit of our Reef – the more than 1,200 farmers improving water quality outcomes, the 24,000 community members engaged in delivering Reef protection activities, the 120 scientists and engineers working on the world's largest coral reef restoration and adaptation program, the 32 Traditional Owner groups caring for Land and Sea Country and the more than 100 marine vessel and tourism staff on the frontline protecting coral from coral-eating starfish, to name just a few. Every day across the Reef's catchments and out on the water, people are working on a Partnership project and connecting us all in the largest collective effort focused on coral reefs anywhere on the planet.

The Partnership is more than a collection of projects: it is a highly-integrated program focused on delivering maximum impact and enduring outcomes, creating synergies across Components and regions to deliver more than just the sum of its parts. Achieving integration is easy to say but difficult to achieve. It requires collaborative design and fit-for-purpose frameworks and structures that promote strong partnerships and collaboration, the rapid sharing of learnings and continuous refinement.

A compelling case for collaboration is evident though the Partnership's efforts to deliver Australia's reef restoration ambitions. The Reef Restoration and Adaptation Program (RRAP) is tackling the global challenge of large-scale reef restoration and adaptation through a highly-ambitious program of research and field trials. Communicating the complex science and engineering approaches and outcomes of RRAP to the wider public is not always easy. To make this work more accessible, RRAP is strongly integrated with two public-facing restoration initiatives – the Cairns Port Douglas Reef Hub and the Healing Country Program which collectively bring community, tourism operators, Traditional Owners and scientists together to restore reefs and their interconnected mangrove and seagrass systems. By integrating these three programs we do more than just provide improved communication and education channels for complex science, such as cloud brightening and cryopreservation. We also provide a platform for delivering best-practice community-based approaches to local coral restoration, for connecting Traditional and Western knowledge systems and for growing the Reef stewardship movement.

1,200

Number of landholders involved in Partnership water quality improvement activities

24,000

community members engaged in delivering Reef protection activities

120

Scientists and researchers involved in RRAP so far

100+

COTS control divers across the Reef

32

Traditional Owner groups leading Partnership on-ground projects

Enduring legacy

The opportunity afforded by the Partnership is significant but finite, with a completion date of June 2024. To be truly successful, we must not only achieve significant outcomes for the Great Barrier Reef through the life of the Partnership, but also support and enable the optimal conditions for Reef protection into the future.

The work undertaken in the Traditional Owner Reef Protection Component exemplifies how immediate impact and transformational change are being achieved in parallel through the Partnership. While investing in and supporting on-ground reef protection programs, this Component is also strengthening Traditional Owner governance in decision-making and co-design processes, building capacity through training and employment opportunities and facilitating new partnerships. Actioning governance arrangements early through the establishment of an overarching Traditional Owner Advisory Group and co-design groups has proven critical to the effective establishment of grant programs, designed by Traditional Owners, for Traditional Owners. Co-design has resulted in a clearer identification of the conditions of long-term success and, together with on-ground activities, is turning aspirations into plans, plans into action and action into stronger advancement and development of communities and enduring benefits for the Reef.

The Foundation's role and responsibility

The Foundation entered into our partnership with the Australian Government in 2018 because we believed we could make a difference. Underpinning the success of any collective impact is the presence of a backbone organisation – one with the right set of skills and relationships to serve as the coordinator for the entire initiative. The expectation that collaboration can occur without a supporting infrastructure is one of the most common reasons it fails.

Accountability and transparency have been core to the design and delivery of the Partnership and are embedded within its architecture. This is evident in how we work across a growing partner network, in our relationship to government and in our communication to the Australian public. To demonstrate transparency and provide a clear line of sight on portfolio progress and performance, the Foundation has published reporting dashboards on our website. Each dashboard shows how a Component is tracking towards achieving its End-of-Partnership Outcomes, as documented in the Partnership Monitoring and Evaluation Plan and outlined on the Foundation's website. This represents a step-change in the transparency of reporting on Reef programs.

Strong and effective governance is also an important tool in driving accountability and ensuring that those delivering outcomes understand their obligation to do so. For the first time, partner payments are tied to the delivery of water quality targets within the Partnership's 10 regional water quality programs. As the largest investment under the Partnership (at $138.1m) it is vital that commitments are upheld, and in instances where programs are underdelivering, funds are diverted to other areas. Novel governance arrangements are also in place to manage conflicts of interest, while encouraging collaboration between partners and promoting strong local buy-in and ownership to facilitate enduring outcomes. In other areas, stop-go points are built into contracts, which avoids maintaining investments in projects that will not deliver impact.

With a 20-year history of raising funds to deliver Reef programs in partnership with government, corporates and research institutions, the Foundation's Collaborative Investment Strategy (released in 2019) set forth an ambition to leverage the Australian Government grant and lead the largest environmental fundraising effort in Australia's history.

Coral reefs are the lungs of the sea and uniquely susceptible to a changing climate – yet they are often overlooked in marine conservation investment. Making a compelling case for coral reefs to a global audience of investors and supporters is an ever-present priority of the Foundation.

Putting an at-times challenging external environment aside, momentum is building, with the leveraging campaign tracking at 40% of target. Much of this early success has been realised in Australia and through existing partners. As the world's borders start to open and meaningful global engagement recommences, the full leveraging opportunity of the Partnership can begin to be realised.

Global leadership

Perhaps the greatest legacy of the Partnership will be the contribution it can make to improving outcomes for coral reefs around the world. Australia is the guardian of not only the Great Barrier Reef, but also two other World Heritage coral reef sites – Ningaloo Reef and the coral reefs of Lord Howe Island. Australia is also a global hub for coral reef research and has Reef management agencies with significant resourcing and capacity when compared to many other coral reefs around the world.

Australia, through this investment and collective approach, has an unprecedented opportunity – and given what is at stake, some would say an imperative – to rapidly share the tools, technologies and approaches developed and implemented through the Partnership for the benefit of the world's reefs.

We must actively support our Pacific neighbours and beyond, bringing the most promising ideas from the Partnership into real world application. Our involvement in global forums such as the United Nations Decade of Ocean Science for Sustainable Development and Decade on Ecosystem Restoration and the G20 Coral Reef Initiative has only reinforced our commitment to play our part in a global response to the survival of coral reefs.

The Critical Decade

The past year has been underscored by an ever-present sense of uncertainty driven by the continuing COVID-19 pandemic, but also a sense of hope as vaccines have been developed, tested and delivered in unprecedented timeframes.

It has also been a year where the warnings of insufficient global action on climate change have grown louder, the evidence stronger and the consequences of not dramatically escalating our response more dire. We know that coral reefs and their communities are on the front line, we know current climate change commitments won't get us where we need to go and we know this is the critical decade in which to act with urgency.

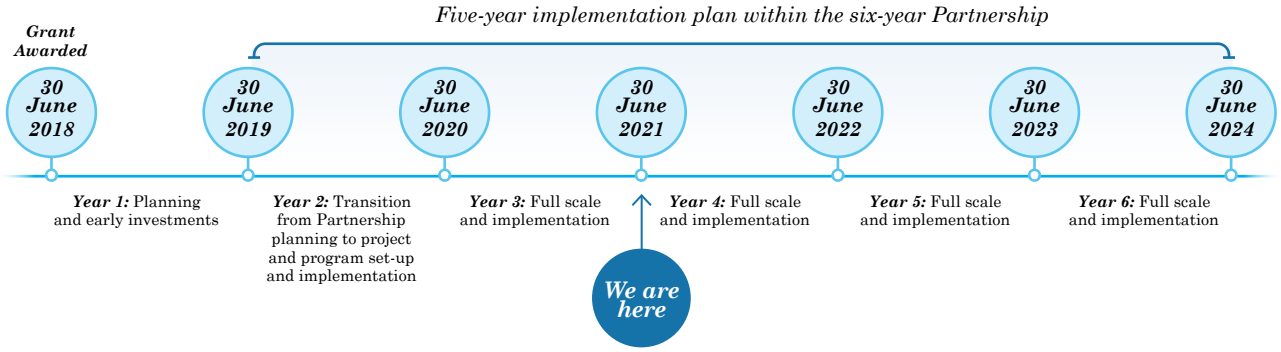
It is likewise the critical decade to build and deliver adaptation strategies to address the impacts of climate change already in the system. Through combining the rapid acceleration of both climate mitigation and adaptation, we can change the current trajectory provided we all work together.

So while celebrating the Partnership's progress and achievements to date and its ambitions for the upcoming year, we must also consider how we can all do more. As we emerge from one crisis, we must use the looming presence of its successor – a climate crisis – to drive us all to do more and to do better. Australia's largest single investment to support Reef conservation, resilience, adaptation and restoration – the Reef Trust Partnership – can and must play its part.

Annual Work Plan 2021-2022: Summary

2021-2022 Budget: $111.04 million

2021-2022 is the fourth year of the six-year, $443m landmark Reef Trust Partnership. It is the third year of on-ground and on-water delivery.



Annual Work Plan 2021-2022 activities at a glance

Water Quality Component

Budget: $45.35 million

- Continued implementation of 10 regional programs
- Commencement of conservation and protection activities in less disturbed catchments including an $8m integrated catchment management pilot project in south-eastern Cape York and a wetland prioritisation tool
- Continued delivery of the $10m innovation program

COTS Control Component

Budget: $8.7 million

- Launch of the research and development phase of the COTS Control Innovation Program ($10m)
- Continued implementation of the COTS Control Program

Reef Restoration and Adaptation Science Component

Budget: $31.13 million

- Full-scale implementation of the Reef Restoration and Adaptation Program

Community Reef Protection Component

Budget: $3.57 million

- Implementation of projects identified by Reef communities across 6 regional Community Action Plans
- Launch of a second citizen science grant round, and a new local climate action grant round championed through Local Marine Advisory Committees
- Continued implementation of existing citizen science and local action projects
- Continued delivery of the Cairns-Port Douglas Reef Hub and local coral restoration and stewardship projects

Traditional Owner Reef Protection Component

Budget: $12.16 million

- Launch of a Healing Country grants round to support Traditional Owner-led restoration of coral reefs and associated mangrove and seagrass systems
- Continued delivery of 25 on-ground projects across Stage 2 and Healthy Water grant program and implementation of Traditional Owner-led projects under Community Action Plans
- Piloting of the Strong People-Strong Country monitoring program across 4-6 Indigenous Reef communities
- Continuation of Reef Traditional Owner women leadership program and launch of men and youth programs
- Launch of the COTS traineeship program

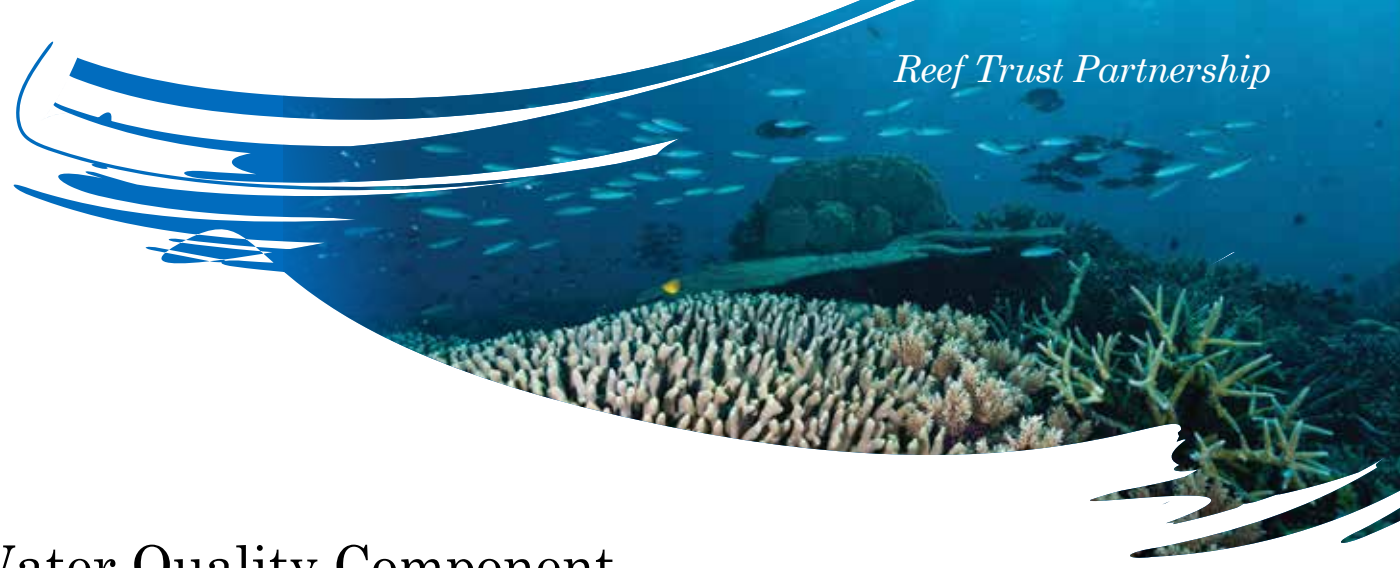
Integrated Monitoring and Reporting Component

Budget: $10.13 million

- Continued implementation of Stage 1 Critical Monitoring projects
- Implementation of Stage 2 Critical Monitoring projects
- Scoping work on the design of a Data Management System and its subsequent implementation
- Launch of the Technology Transformation Fund

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



Water Quality Component

Partnership Budget: $200.6 million

2021-2021 Budget: $45.35 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

Innovations for system change in water quality improvement made available

Maintenance of water quality from less disturbed catchments

Increase in Traditional Owner-led water quality improvement projects

Progress on five-year journey

In partnership with the major water quality program funders, the Queensland and Australian governments, the Reef Trust Partnership Water Quality Component aims to make meaningful progress towards improved water quality for the Reef, while at the same time improving the way we make change happen. The five-year strategy prioritises funding for proven, on-ground measures aimed at addressing priority pollutants – dissolved inorganic nitrogen (DIN), pesticides, and fine sediment – while also trialling a suite of innovative technologies and approaches.

As the Component commences its third year, real change is being seen on the ground. More than 50% of the available funding has been committed and over 60 projects with more than 200 partner organisations are underway across 17 of the 35 Reef catchments. The majority of these are focused on achieving enduring improvements in land management practice, while also maintaining or improving agricultural productivity. The first round of early investment projects has been completed, with these showing meaningful improvements in end-of-catchment water quality.

At the same time, the Partnership is demonstrating different ways of going about business. Program and project selection have been guided by a strategic vision that focuses on taking action in the highest priority locations in the most cost-effective way (see further here). Water quality improvement targets have been set for all regional programs and all on-ground projects, with targets linked to contractual obligations for delivery providers. Novel governance arrangements are in place to maximise accountability and transparency, while encouraging collaboration between partners. This model also promotes strong local buy-in and ownership to facilitate enduring outcomes. More than one-third of projects are focused on achieving innovation and system-change in water quality improvement, although such objectives are embedded across the whole portfolio. Collectively, these approaches promise a legacy from the Partnership that can guide future water quality investments.

A major investment has been made in best-practice Monitoring and Evaluation (M&E) systems, including the capture of farm-level data. A database has been developed to capture information directly from delivery providers. Supported by this system, dashboards are available for delivery providers and regional managers to visualise their data, ensuring they have the tools to manage their information and track their progress. Public dashboards are also available, with updates to data provided every six months. Relevant information from the database is transferred periodically to the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program.

The establishment of the database and dashboards is a first in this field and provides unprecedented transparency and accountability of the investment.

2021-2022 will focus on implementation and integration, with planning mostly completed and the majority of programs and projects now underway. The year will involve ongoing work to drive coordination and synergies between projects and programs to maximise the value and sustainability of their outcomes. Extensive monitoring programs will be rolled out for the regional programs to support implementation, to validate outcomes and to add to the knowledge base regarding the effectiveness and efficiency of different interventions. Project and program reviews will be undertaken, particularly a major assessment towards the end of the period.

Water Quality Regional Programs

Ten regional water quality improvement programs accounting for $138.1m of the total Water Quality Component's budget have been initiated, with a total of 26 on-ground projects in eight regional programs now underway. Regional program managers and partnership coordinators are in place for the larger programs to oversee and coordinate local actions, and delivery providers and on ground-projects have been selected, with most projects now underway. The last two regional programs to be rolled out – the Mulgrave-Russell and Tully and Johnstone Regional Programs – will have projects commence in July 2021.

A different delivery model has been adopted in the Bowen Broken Bogie (BBB) regional program, which recognises the substantial work done under the Queensland Government's Major Integrated Project and which has resulted in a detailed understanding of priority sites for restoration. A regional program manager has been selected to implement the program, including finalising an implementation plan for the program and contracting delivery providers to deliver specific interventions under that plan.

Under the Partnership's Monitoring and Evaluation Plan, the Water Quality Component is committed to achieving end-of-catchment load reductions of 456 tonnes of dissolved inorganic nitrogen (DIN), 462 kilotonnes of fine suspended sediment (FSS) and 250kg of pesticides per annum. Based on existing contracted commitments, the Partnership is generally on track to achieve these targets.

2021-2022 will see the first significant reviews of the success of on-ground projects and programs. Notably, a substantive review across the Water Quality Component will be undertaken in the first half of 2022 to assess progress and to guide adaptive management, including the allocation of remaining contingency funds as the Partnership heads into the last two years of implementation.

The regional programs include support for regional monitoring programs, targeting a range of biophysical, social and economic indicators. Taking a program (and partnership approach to the design of the monitoring programs will allow for efficiencies and will maximise the value from the investment. The process is being guided by experts on the Partnership's Water Quality Technical Advisory Group (TAG) to ensure the robustness of the science, to drive a consistent approach and to allow for lessons to be shared across the portfolio and with other water quality investors. A number of the programs have also set aside funding to support behaviour change programs, aimed at better understanding and utilising the motivators that drive long-term changes in land management practice. The behaviour change programs will be rolled out over 2021-2022 with support from the TAG. TAG members will also play a key role in reviewing designs for major gully and streambank interventions and will support project reviews.

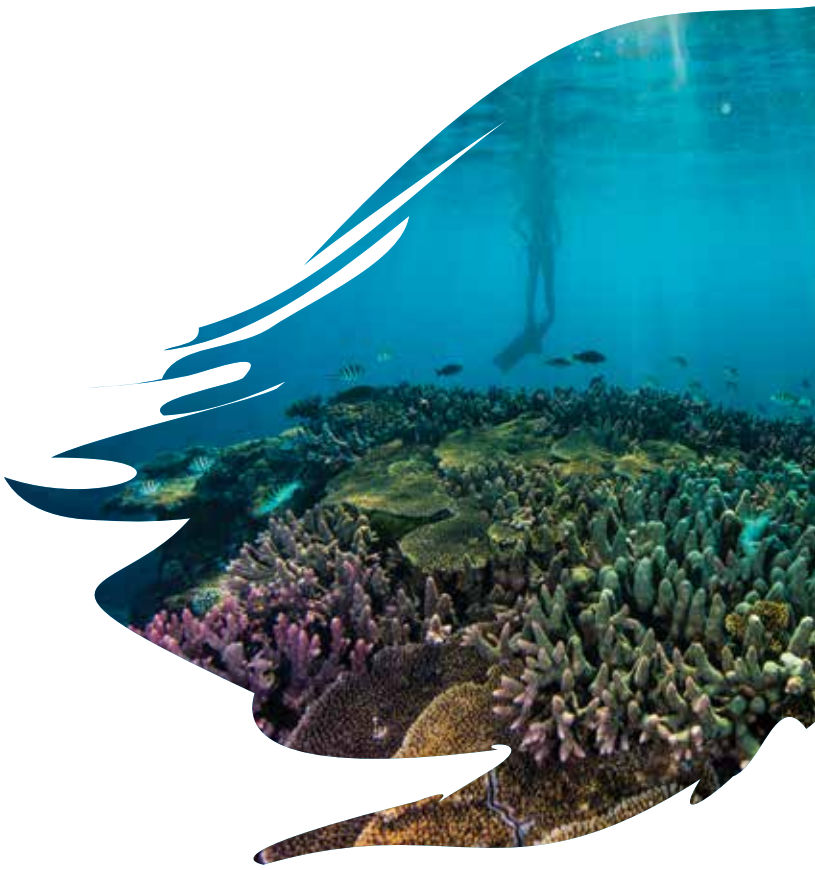


Table 1: RTP Water Quality targets as a subset of WQIP target load reductions

RTP Water Quality Regional Program	Catchment	Target pollutant	RTP Target	% of WQIP target	WQIP* target load reduction
Mulgrave-Russell program	*Mulgrave-Russell*	DIN	72t	21%	336t
Johnston and Tully program	*Johnstone and Tully*	DIN	170t	24%	720t
Lower Herbert program	*Herbert River*	DIN	140t	22%	641t
Upper Herbert program		Sediment	12kt	13%	95kt
Lower Burdekin program	*Lower Burdekin*	DIN	48t	8%	585t
		Pesticides	35kg	3%	1318kg
Bowen Broken Bogie program	*Bowen Broken Bogie*	Sediment	330kt	77%	426kt
Upper and East Burdekin program	*Upper and East Burdekin*	Sediment	42kt	13%	320kt
Mackay Whitsunday program	*Plane Creek and Pioneer River*	DIN	26t	7%	372t
		Pesticides	215kg	11%	2008kg
Fitzroy program	Fitzroy and Mackenzie Rivers	Sediment	50kt	19%	262kt
Mary program	Mary River	Sediment	28kt	21%	131kt

*Note that the WQIP targets are based on adjusted figures to reflect more up-to-date modelling (Alluvium, 2019).

Innovation and system change

The Partnership has committed $10m to a water quality innovation and system change program, with a view to driving transformational change in how water quality improvement activities are designed, funded and implemented. An open grant round in 2020 led to the selection of 22 projects under the following thematic areas that have been contracted, with most running until late 2022:

- **Technology transformation.** Ongoing implementation of 11 projects trialling a range of tools and approaches to reducing priority pollutants. Examples of projects include robotic weed control to reduce herbicide use and costs; trialling drones in catchment restoration projects for mapping, weed spraying and seed dispersal; testing the use of seaweed biofilters to capture carbon and nitrogen; testing the effectiveness of enhanced efficiency fertilisers; and assessing water quality benefits of *regenerative grazing*.
- **Broad and local-scale planning to support future interventions**. Six projects are 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. This includes projects measuring and monitoring riverbank and gully erosion through analysis of an extensive powerline asset management database; the delivery of a wetland capture software application to support wetland management; and developing new design guidelines for streambank restoration.
- **Innovative finance and funding.** Ongoing implementation of five projects aimed at increasing the potential sources of funding for water quality improvement activities. This includes developing a business case for establishing a billion-dollar impact investment fund aimed at achieving agricultural and water quality outcomes in the Reef catchments; testing a world-first nitrogen insurance product to mitigate the risk to landholders of reduced fertiliser application; and supporting the Reef Credit Scheme.

Work under the fourth theme of the Innovation program – sharing and management of industry and landholder-owned data – will accelerate in 2021-2022 after some initial 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.

An additional piece of work will clearly identify the linkages and establish synergies for all innovation and regional water quality programs/projects, as well as organising various events to support collaboration and sharing. Where applicable, innovation projects are also being embedded in the regional programs.

Protection and conservation of less-disturbed catchments

The Partnership has allocated $10m to the protection and conservation of less-disturbed catchments, recognising that early intervention can reduce degradation that would likely require larger scale, future remediation investment. This investment is also expected to protect other values (including ecological values) and realise a range of co-benefits, while also improving understanding of water quality issues in less-disturbed catchments. Following consultation with key stakeholders across Reef catchments in early 2021, three priority workstreams have been identified.

The principal workstream will be on-ground pilot projects that demonstrate the water quality and multiple co- benefits of integrated catchment management and wetland rehabilitation associated with restoring catchment–wetland–reef inter-connectivity. A request for expressions of interest for projects to form part of a program in eastern Cape York was released in May 2021. A second pilot program may be undertaken, subject to funding availability.

Two desk-top exercises will provide a legacy to help further prioritise future water quality improvement investments:

- The first will involve development of a tool to support and complement the existing planning, modelling and prioritisation of wetland rehabilitation and reinstatement undertaken across the Reef catchment by the Queensland Department of Environment and Science (DES), supported by research from James Cook and Griffith Universities. This tool will be designed to allow for sites to be selected to deliver maximum water quality benefits alongside other positive ecological, social, cultural and economic outcomes.
- A second analysis will provide further specificity of the potential future Reef water quality risks and management mechanisms likely required to maintain or reduce existing pollutant loads in less-disturbed catchments across the entire Reef catchment.

Case Studies

Project Catalyst ($2.4m)

This early investment project aims to promote the development and implementation of innovative, ground-breaking and sustainable farming practices to improve the quality of water impacting the Reef. Managed by Catchment Solutions, Project Catalyst has directly supported a total of 128 cane farming businesses (from an initial target of 80) in the Mackay-Whitsunday, Burdekin and Wet Tropics regions, undertaking 42 innovation trials, validating and demonstrating the effectiveness of 43 operating farms and providing extension support to 47 growers. Farming business participating in the project accounts for a total area of 36,446 hectares.

Project Catalyst has exceeded most planned outcomes and reported an annual reduction of 37.6 tonnes of DIN, 5.7 kilotonnes of sediment and 6.9 kilograms of pesticides. The project outcomes have been showcased to a further 3,151 growers through a series of peer-to-peer learning opportunities. This project has been extended for a further 12 months to allow for 10 innovation trials to continue at no additional cost, demonstrating that producing significant water quality improvement is achievable with cost-effective strategies.

Ray Zamora with the wild wetlands and sugarcane on his property in the Wet Tropics region.
Image credit: Catchment Solutions.

Mary Water Quality Program ($9m)

Completed work at the first location include earthworks to batter the site, installation of pile fields and revegetation.

This regional program is being delivered by a consortium led by the Burnett Mary Regional Group and includes the Mary River Catchment Coordinating Committee and Alluvium Consulting Australia. The program involves large-scale restoration of eroding riverine areas and revegetation work, which is complemented by community engagement activities. Ultimately, the program aims to reduce the amount of fine sediment from the Mary River catchment that enters the Reef by 26,000 tonnes per year.

Although still early in the program, on-ground works at the first project site on the Mary River at Conondale have been completed. The site is a dairy farm owned by the Watson family and completed works involved earthworks to batter the site, installation of pile fields and revegetation. Property owners will irrigate the revegetation from their own farm dam and have contributed to the development of communication materials and the promotion of the project.

Case Studies

Reducing herbicide use on sugarcane farms using precise robotic weed control ($400,000)

This two-year innovation project is being implemented by James Cook University (JCU) and aims to reduce herbicide run-off into the Reef by at least 80%. This novel approach to weed management uses the latest advances in artificial intelligence to reduce pollutants through more efficient application of herbicide in sugarcane.

Partnering with AutoWeed Pty Ltd and Sugar Research Australia, the pioneering technology uses a smart spot spraying system equipped with image features for detecting and spraying weeds within sugarcane crops.

Demonstrations of the technology will be delivered to the wider sugarcane growing community on farms in the Burdekin and neighbouring Mackay Whitsundays catchment region.

Reduced weed management costs will result in significant financial savings for participating farmers, who will be able to continue using the technology beyond the completion of the project. The project aims to result in a commercially viable product that will ultimately become available to farmers across the Reef catchments.

The AutoWeed prototype machine, which uses sensors and deep learning to distinguish weeds from crops (James Cook University).

Water Quality Five-Year Plan

Our five-year plan for the Water Quality Component includes six Partnership Activities outlined in Table 2.

Table 2: Water Quality Component Partnership Activities and Total Partnership Budget

Partnership Activity	Rationale	Outcome	Budget
Early investments	Significant on-ground resources are required to deliver activities to make progress towards water quality targets. The first funding released under the Reef Trust Partnership Water Quality Component was via a round of water quality grants, focused on projects that would maintain or build on-ground delivery capacity throughout the Reef catchments.	Maintain/build on-ground capacity across moderate, high and very high priority catchments to support program implementation, while also reducing pollutant run-off.	$19.2m (previously $19.7m)*
Regional programs	Ten regional water quality programs have been designed to directly reduce nitrogen, sediment and pesticide loads from priority Reef catchments.	These programs will focus on proven, on-ground measures for improving water quality, including through catchment restoration and improved land management practices.	$138.1m (previously $140.9m)*
Conservation and protection of less disturbed catchments	Avoid degradation of the quality of water entering the Reef, particularly from less-disturbed catchments and contribution to land stewardship objectives	This funding aims to avoid degradation of the quality of water entering the Reef, particularly from less-disturbed catchments.	$10m
Traditional Owner-led Reef protection initiatives	Direct investment in Traditional Owner Country-based planning and management for improved water quality outcomes.		$20m
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.	$10m
Technical advisory	Technical expertise is required to guide program design and implementation, to ensure the quality of on- ground actions, to manage project data, and to validate outcomes. There are also opportunities to leverage project activities to maximise scientific learning and to support capaci-ty building on the ground.	Programs and projects are designed/ endorsed based on best available technical advice. Purpose-builtd 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

* In previous plans, costs associated with technical advisory work (including the investment pathways consultancy undertaken by Alluvium Consulting) have been embedded within the different Partnership Activities. For ease of administration and to improve transparency, these costs are now shown separately. The Technical Advisory budget consists primarily of a re-allocation of 2% of the budget for the regional programs, noting these funds will continue to be used to support those programs.

Water Quality Annual Work Plan: 2021-2022

Major deliverables and budget for each Water Quality Partnership Activity in 2021-2022 are shown in Table 3.

Table 3: Water Quality Component Partnership Activities and Budget for 2021-2022

Partnership Activity	Description	Budget
Early investments		
Ongoing water quality activities Continuation of contracted projects under Stage 1 water quality grant round	Early investment projects contracted in 2018-2019 have progressed well and have greatly contributed to the maintenance of delivery capacity in the regions. Nine of the 11 projects were successfully completed in 2020-2021. The other two projects have been extended for an additional 12 months. Although these projects have already exceeded their targets, budget savings are allowing these projects to undertake additional activities, including funding a further graduate extension officer, and undertaking additional monitoring of trial sites. *Deliverables: Maintenance of delivery capacity (training of extension providers) and adoption of improved management practices; improved understanding of benefits from better management practices.*	$200,000
Regional Programs		
DIN and pesticide regional on-ground programs Implementation of major DIN and pesticide reduction programs in the Lower Herbert, Lower Burdekin, Plane Creek and Pioneer, Mulgrave, Russell, Tully and Johnstone catchments	All five programs are underway, with Program Managers and Partnership Coordinators appointed where relevant. Delivery providers are contracted and implementing projects in three of the five regions. On ground projects for the Mulgrave-Russell and Tully and Johnstone Regional Programs are expected to commence in July 2021. A behaviour change program to encourage improved practices be developed will be rolled out, with a focus on Plane Creek and Pioneer. Regional on-ground monitoring programs – to be designed by the Technical Advisory Group – 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. Some of the contingency funding (approx. 5% of regional program budgets) to be released to support further initiatives, with a focus on leveraging existing, successful projects and programs. *Deliverables: Plans finalised for the Mulgrave-Russell and Tully and Johnstone Regional Programs, and delivery providers contracted. Additional funding released to support/ expand existing projects/programs. Behaviour change program implemented. Local monitoring programs established. 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 the Foundation's database system.*	$20.03m
FSS on-ground regional programs Implementation of FSS reduction programs in the Fitzroy, Upper Herbert, Burdekin (Bowen, Broken Bogie, and Upper and East Burdekin) and Mary River catchments	All five programs are already underway, with 10 delivery providers contracted and projects under implementation, including two initial projects in the Bowen Broken Bogie (BBB) catchments. In the BBB, where projects underway represent a minority of the total budget, detailed planning will be undertaken by the newly selected regional program manager to identify priority restoration sites and activities, to be followed by a procurement process to select on ground delivery providers. Mid-program reviews will be undertaken for many of the programs and projects. Some of the contingency funding (approximately 5% of regional program budgets) to be released to support further initiatives, with a focus on leveraging existing, successful projects and programs. Regional on-ground monitoring programs – to be designed by the technical advisory group – will be established to assess the performance of projects and will consider both biophysical and socio-economic outcomes. *Deliverables: Plans finalised (where relevant) and BBB delivery providers contracted. 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. Local monitoring programs established. Pollutant reductions are reported by delivery providers under the Foundation's database system.*	$18.94m

Partnership Activity	Description	Budget
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 have been contracted and commenced implementation in 2020-2021. This includes eight projects focused on technologies, methods, and approaches for reducing dissolved inorganic nitrogen and pesticides, and five projects related to fine sediments. *Deliverables: Trials of a series of technologies, methods and approaches to reducing pollutant loads.* **Sharing and management of industry and landholder-owned data:** Eight projects have been shortlisted under this thematic area. A process to review the approaches identified in these proposals will be undertaken, together with a scoping work to identify other options and opportunities for data management. This design process will lead to the identification of pilot projects that will commence implementation in 2021-2022. *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.** Six projects were selected in 2020-2021 under this thematic area and are now underway. These projects are aimed 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.** Ongoing implementation of five projects aimed at trialling new approaches to using financial mechanisms to drive water quality improvement. *Deliverables: Trials of new approaches to funding and financing water quality improvement activities.*	$3.7m
Conservation and protection of less disturbed catchments		
Scoping options and planning	Limited work has been done previously on the options, costs, and benefits of interventions aimed at maintaining water quality in less disturbed catchments. An Options Paper was developed in late 2020 to identify priorities for investment under this workstream. As a result of this consultative process, two main types of projects were identified and prioritised: 1) one or two on-ground pilot programs focused on integrated catchment management and wetland rehabilitation with significant Traditional Owner participation, and 2) two desktop analyses to support further prioritisation of future water quality improvement investments. *Deliverables: Program design and procurement process comwpleted for each of the prioritised areas of investment. On-ground pilot projects and desktop analyses commence implementation.*	$1.8m
Technical advisory		
Technical advisory group (TAG) and other technical support	The TAG will provide independent expert advice to the Foundation across all 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.*	$680,000
Traditional Owner-led water quality activities	Refer to Traditional Owner Reef Protection	
2021-2022 WATER QUALITY COMPONENT BUDGET		**$45.35m**

Table 4: Water Quality Component Gantt Chart for 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Early investments														
Ongoing delivery of Stage 1 early investment water quality projects	Ongoing implementation of two projects contracted in 2018-2019. Focused on practice change (innovation trials) and capacity building of exetnsion officers.	$200,000	Implementation											
Technical advisory														
Technical advisory	Provision of cross-cutting technical advice and guidance to programs and projects	$680,000	Implementation											
Regional monitoring programs	Monitoring programs rolled out for the regional programs to support implementation, validate outcomes, and add to the knowledge base		Rollout of regional monitoring programs						Ongoing monitoring programs					
Behaviour change program	Behaviour change program rolled out with support from the TAG		Rollout of behaviour change program						Ongoing behaviour change program					
Regional program reviews	Major program reviews to determine progress and to guide adaptive management											Regional program reviews		
Innovation and system change														
Technology transformation	Ongoing implementation of 11 projects focused on new technologies, tools, systems and methods for reduing pollution from DIN, fine sediment and pesticides.	$3.7m	Implementation of projects											
New data sharing and management platform	Review the approaches identified in selected projects, together with a scoping work to identify other options and opportunities for data management. Contract pilot project(s) and commence implementation.		Contracting	Implementation of projects										
Planning initiatives to support future interventions	Implementation of six projects aimed at undertaking planning and mapping activities to inform future water quality investments and improvement activities.		Implementation of projects											
Innovative financing and funding opportunities	Implementation of five projects aimed at piloting new measures and tools for funding and financing water quality improvement activities.		Implementation of projects											
Regional programs - DIN and Pesticides		$20.03m												
Mackay Whitsunday	Dissolved inorganic nitrogen (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 three of the five regions. The last two regional programs to be rolled out, the Mulgrave-Russell and Tully and Johnstone regional programs, will follow a design process and further contracting of delivery providers. All five regional plans will then continue implementation with the support of regional program managers/partnership coordinators.	$6.35m	Implementation of on-ground projects											
Lower Herbert (DIN only)		$4.11m	Implementation of on-ground projects											
Lower Burdekin		$4.48m	Implementation of on-ground projects											
Mulgrave-Russell (DIN only)		$1.66m	Contracting	Implementation of on-ground projects										
Johnstone and Tully (DIN only)		$3.43m	Contracting	Implementation of on-ground projects										
Regional programs - Fine sediments		$18.94m												
Fitzroy	Fine sediment focused improvement programs. All five programs are underway, with 10 delivery providers contracted and projects being implemented, including two initial projects in the Bowen Broken Bogie (BBB) catchments. Next step will involve a procurement process to release the balance of the BBB funding, the only program where a considerable portion of the funds have not been yet allocated. The aim is to time the release of this funding to align with the Queensland Government's approach and timeframes for the Burdekin Major Integrated Project. The delivery model for the BBB region will likely include the appointment of a program manager to oversee the regional program and directly grant funds to on-ground delivery providers.	$6.94m	Implementation of on-ground projects											
Mary		$2.35m	Implementation of on-ground projects											
Upper Herbert		$860,000	Implementation of on-ground projects											
Upper and East Burdekin		$2.03m	Implementation of on-ground projectc											
Bowen, Broken, Bogie		$6.76m	Implementation of initial on-ground projects											
			Contracting	Implementation of the remaining on-ground projects										

Table 4: Water Quality Component Gantt Chart for 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Conservation and protection of less disturbed catchments														
Pilot project(s)	On-ground pilot project(s) demonstrating reef water quality & co-benefits associated with wetland re-instatement and integrated catchment management	$1.8m	Program manager procurement and design phase			Delivery providers procurement /contracting			Implementation of first pilot project					
Prioritising wetlands reinstatement	Desktop analysis to support and complement the existing planning, modelling and prioritisation of wetland rehabilitation and reinstatement across the entire Reef catchments		Contracting	Implementation of desktop projects										
Maintianing/reducing catchment loads	Desktop analysis of the potential future reef water quality risks and management mechanisms likely required to maintain or reduce existing pollutant loads in less disturbed catchments		Design	Procurement/contracting			Implementation of desktop project							

Crown-of-Thorns Starfish (COTS) Control Component

Partnership Budget: $57.8 million

2021-2022 Budget: $8.7 million

Purpose: To expand efforts to control crown-of-thorns starfish (COTS) to reduce coral mortality from COTS outbreaks, in order to protect high ecological and economic value coral reefs in line with GBRMPA's COTS Strategic Management Framework.

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

New methods identified to manage COTS at scale

More partners involved in COTS management (including Traditional Owners)

A strategy available for long-term funding

Progress on five-year journey

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

The Partnership's five-year plan prioritises investment in on-ground action to protect coral now through the COTS Control Program, while also investing in a research program to improve surveillance and control methods, as well as activities to enhance engagement of Traditional Owners and the community in COTS management. Taken together, these activities create a foundation for enduring impact through a combination of action, innovation, partnerships and capacity-building.

Delivering on-ground impact to protect coral

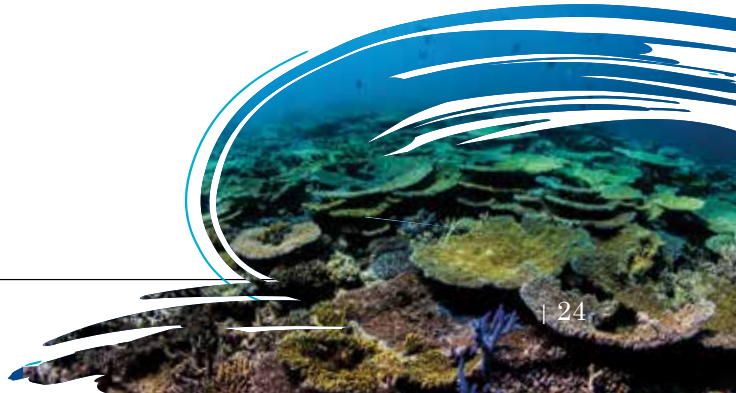
The COTS Control Program is by far the largest scale on-ground intervention program on the Great Barrier Reef aimed at directly protecting coral. From its initial beginnings as a program that conducted culling at a small number of sites to support the Reef tourism industry, it has since transformed into a strategic and sophisticated intervention program and adopted an Integrated Pest Management (IPM) approach. Today, the program employs more than 100 professionally-trained crew across five vessels, delivering strategically-targeted surveillance and culling to achieve ecological sustainability for coral across a network of approximately 200 reefs of high ecological and economic value across the northern, central and southern regions of the Great Barrier Reef.

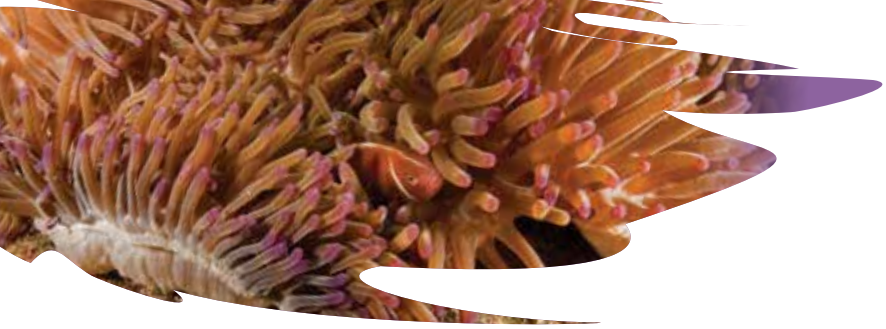
An independent scientific review of this program, funded by the Partnership in 2019-2020, highlighted the continuous and adaptive improvements in the program over time through application of best-available science and decision-support tools to ensure program resources are used as efficiently and effectively as possible. To date, the Partnership has invested a total of $30.048 million to secure on-going delivery of the program at full capacity through 2021-2022 in partnership with GBRMPA and the RRRC.

A governance group and an operational working group have been established to underpin a partnership approach to strategic delivery and adaptive management through the application of best-available science and innovation.

In 2021-2022, the COTS Control Program will continue to deliver strategic on-ground action to protect coral at hundreds of high-value reefs across the Great Barrier Reef World Heritage Area. This action will be guided by the program's Annual Work Plan, developed by GBRMPA in consultation with key stakeholders and delivery partners. Ongoing improvements in the COTS Control Centre, the program's custom-built decision-support system developed by the CSIRO under the National Environmental Science Program (NESP), will be trialled and implemented by vessel crews to continuously improve operational and ecological efficiencies. In addition to conducting surveillance and control activities, the vessel crews will also deliver hundreds of hours of research support activities including collection of plankton and COTS tissue samples for genetic analyses and collection of live COTS for laboratory experiments conducted by research partners.

2021-2022 will also see the Partnership invest $150,000 towards the development of a long-term funding model for the COTS Control Program. Future outbreaks are almost certain, with the next one expected to be fully underway by 2025 and a subsequent outbreak expected by 2040. Once initiated, these outbreaks spread across the Reef causing damage to coral at significant spatial scales, such that the Reef is always experiencing impacts from COTS outbreaks with no gap between the end of one and the start of the next. One of the most critical learnings to date has been that funding delays have prevented proactive action to intervene in the early stages when primary outbreaks are just beginning to develop in the northern initiation region and are most receptive to being prevented and suppressed. Early warning and proactive intervention at this early stage in outbreak development has potential to deliver benefits at scale by mitigating the spread of the outbreak across the Reef. Developing a strategy to secure on-going funding that enables proactive rather than reactive management is imperative if we are to learn from the lessons of the past. Given all of this and that the funding for the control program under the Partnership will be exhausted by June 2023, discussions need to commence as soon as possible regarding future funding to ensure the window in which to suppress the anticipated 2025 outbreak in its early stages is not lost.





> *"I am a marine scientist, dive instructor and coxswain. I feel privileged to be able to use these skills every day, living and working on the beautiful Great Barrier Reef. It has been so rewarding to see the positive effects we are having on the reef, first-hand, and to see the control program improve more and more, as we gain experience in on-water operations."*
>
> Liz O'Connor, COTS Control Program Voyage Leader, Blue Planet Marine

Innovation and step-change

The Partnership has established the COTS Control Innovation Program (CCIP) to invest in Research and Development (R&D) that delivers innovations for trialling and implementation in the on-water COTS Control Program. Building on the IPM strategy developed through the NESP research investment, the goal of the CCIP is to create a step-change and accelerate the development and uptake of innovative methods that improve the efficacy and efficiency of COTS control and surveillance.

In 2020-2021, a Program Director was hired, a Steering Committee was established and a Collaboration Agreement was executed between the Great Barrier Reef Foundation (GBRF) and core research partners AIMS, CSIRO, JCU and UQ. An initial investment of $1.5m delivered a feasibility and design phase to inform a targeted R&D investment strategy.

The design process brought together 43 multidisciplinary experts who identified and scoped 52 research opportunities across six research themes (population control, monitoring and surveillance, decision support and modelling, proximal causes of outbreaks, biology and ecology, and social acceptability, regulatory and institutional arrangements). A structured decision-making process was used to systematically and transparently assess the relative feasibility and benefit of these research opportunities, while also considering cost and risks, in order to develop and prioritise an integrated R&D portfolio. External assessors were engaged as part of the design phase to provide independent perspectives on research priorities, alongside the views of technical experts and Steering Committee members.

Figure 1: COTS Control Innovation Program Themes

COTS Control Innovation Program Themes

Prediction

Delivering new knowledge of when, where, and why outbreaks initiate and terminate and the role of predators in causing outbreaks.

Detection

Delivering a step-change in monitoring and surveillance strategies, tools, and technologies for efficient early detection of outbreaks, to inform effective outbreak response.

Response

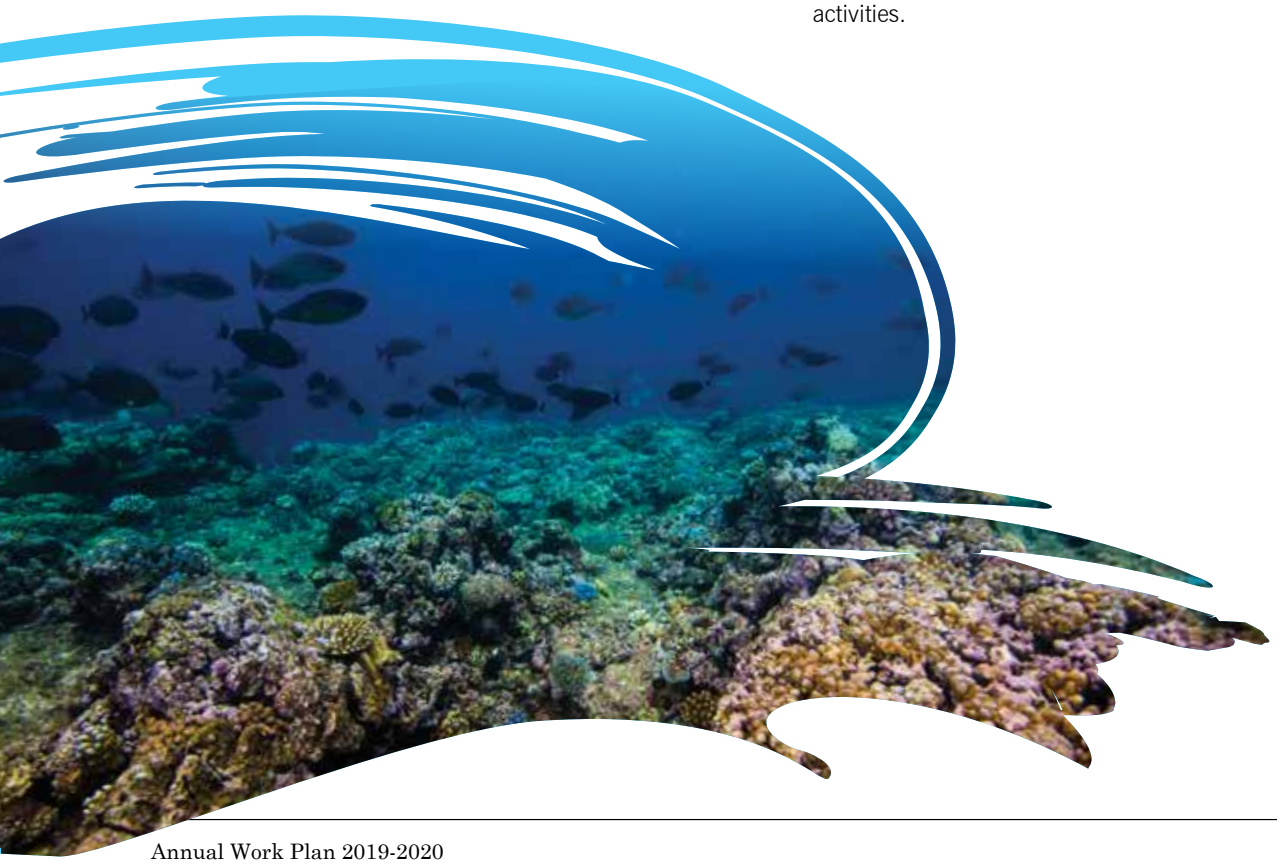
Delivering innovation in outbreak response models, strategies, and decision support tools, with exploration of the technical, cultural, social, and regulatory feasibility of innovative control methods.

2021-2022 will see the implementation of the R&D investment recommendations from the design phase. Detailed program planning and budgeting early in the year will support full implementation by the second quarter. Key areas for investment to improve capacity to supress the current and impending outbreak include development of new monitoring and surveillance technologies to enable earlier outbreak detection and response, as well as enhanced modelling and decision-support platforms to support real-time data processing for decision-making. Guided by recommendations from the NESP review of biocontrol technologies, CCIP will also kick-start some investment in research that explores the technical, social and regulatory feasibility and efficacy of new control methods that have potential to deliver future benefits for COTS outbreak management in the medium to long-term (more than 10 years).

Enhanced partnerships, engagement and capacity-building

Given the significant threat COTS outbreaks pose to the health of the Reef, building capacity and expanding the delivery partners involved in COTS management is one of the key goals of the Partnership's COTS Control Component investment. To that end, an International COTS Control Forum was hosted in 2020-2021, bringing together COTS management stakeholders, including domestic and international experts and researchers, on-water practitioners, tourism industry representatives and Reef Traditional Owners, to discuss the current state of knowledge and identify opportunities for innovation and collaboration. Convened over two days, the Forum attracted 105 in-person delegates with an additional 65 delegates connecting remotely from across Australia, Japan, Vanuatu and Indonesia. The Forum promoted cross-sector dialogue, connection and partnership-building across diverse groups through a program of 37 presentations and nine panel discussions, with the audience engaged and interacting with presenters using a Slido application.

2021-2022 will see the Partnership implement a training program that builds Traditional Owner capacity to achieve economic enterprises in COTS surveillance and control (see Traditional Owner Reef Protection Component for more detail). There will also be a $30,000 investment in scoping opportunities for capacity building and engagement of community and citizen science groups in COTS management activities.



Case Studies

COTS Control Forum

Traditional Owners presenting their perspective and aspirations in COTS management at the COTS Forum.

Co-designed by a consortium of experts and delivered by the RRRC, the International COTS Control Forum reviewed the current state of knowledge for COTS Integrated Pest Management (IPM) and identified opportunities for future innovation. This was the first event in the history of COTS management on the Great Barrier Reef to connect such a diverse group of 105 experts and stakeholders around the common goal of developing solutions to address the COTS threat.

Presentations from 37 speakers provided deep insight into the achievements and challenges of managing this formidable pest species, highlighting areas for scientific innovation to further improve our capacity to effectively predict, detect and respond to these damaging outbreaks. Presentations by international researchers and reef managers, as well as Reef Traditional Owners, provided fresh perspectives and new opportunities for collaboration.

Decision Support System guides COTS Control Program

A state-of-the-art decision-support system, called the "COTS Control Centre", guides the delivery of the COTS Control Program. This system has been developed by CSIRO under the National Environmental Science Program (NESP), with input from key end-users including GBRMPA. It leverages innovations in Integrated Pest Management and puts that knowledge in the hands of program managers and vessel crews, empowering them to make strategic and tactical decisions that are effective and efficient.

Each of the COTS Control Program's five vessels are out on the water taking action to protect coral at least 200 days a year. On each voyage, vessel crews use a suite of custom-built apps to collect up-to-date field data on COTS abundance and sizes, presence of feeding scars and coral cover across high-value reefs targeted for pest management. This data is processed in real-time through ecological models and decision-trees, providing crews with guidance on when, where and how to deploy resources to best achieve sustainability for coral. Program data from across all vessels is then synthesised and visualised on dashboards to track progress in achieving pest management goals, plan future voyages and adaptively manage program resources.

Facilitated through the COTS Control Centre, the COTS Control Program is a shining example of how science and management can work together to achieve tangible on-ground impact to protect the health of the Reef.

COTS Control Program divers are guided by advanced decision support tools when controlling COTS to protect coral.
Image credit: Daniel Schultz ©Commonwealth of Australia (GBRMPA)

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 Total Partnership Budget

Partnership Activity	Rationale	Outcome	Budget
COTS Control	Controlling crown-of-thorns starfish is the most scalable and practical tool we currently have to protect our Reef's corals. The Partnership's COTS control program is by far the largest-scale intervention program happening right now on the Reef.	This funding will support continued COTS control at a level consistent with scientific advice and intensity of the current outbreak.	$41.5m
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.	$8.3m
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).	$250,000
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.	$200,000
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.	$150,000
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.	$100,000
Traditional Owner-led COTS control (to be defined under 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: 2021-2022

Major deliverables and budgets for 2021-2022 under each Partnership Activity are shown in Table 6.

Table 6: COTS Control Component Partnership Activities and Budget for 2021-2022

Partnership Activity	Description	Budget
COTS Control Program	Continued delivery of the COTS Control Program, delivered as a strategic partnership between the Great Barrier Reef Foundation, GBRMPA and the RRRC. The program will be delivered across five vessels that are deployed across the northern, central and southern regions of the Reef 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. *Deliverables: In-water control of COTS populations at priority locations in accordance with an Integrated Pest Management strategy.*	$5.67m
COTS Control Innovation Program – R&D Phase	A dedicated innovation program is required to improve COTS surveillance and control to supress and prevent future outbreaks. This research program 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. During the first year of the program, research and innovation that advances capacity to predict, detect and respond to outbreaks will be developed, alongside research to explore and understand the social and cultural implications of COTS surveillance and control on the Great Barrier Reef. *Deliverables: Detailed project planning, budgeting and contracting, followed by implementation of initial research projects.*	$2.85m
Community-driven COTS control	Note: This activity was not conducted in 2020-2021 and is carried over from the Annual Work Plan 2020-2021. A consultation and planning process informed by the Community Reef Protection Component will identify areas of strategic alignment with community and citizen science needs, in particular opportunities for community participation in COTS surveillance and control. This will result in a strategy to enable these opportunities and further engagement and co-investment across the life of the Partnership. *Deliverables: Identification of opportunities that support community and citizen science participation in COTS surveillance and control, and strategy for investment in community pilot projects.*	$30,000
Long-term funding strategy	Note: This activity was placed on hold until a new governance model for in-water COTS control had been established and is carried over from the Annual Work Plan 2020-2021. Sustained funding of COTS control is imperative if future outbreaks are to be detected and acted upon as early as possible. Even though we are still dealing with an existing secondary outbreak, there is a need to proactively consider long-term funding model options to ensure we are ready to tackle new outbreaks and avoid repeating mistakes of the past. A consultancy will be procured this year to engage with key stakeholders, review potential funding models and provide recommendations (roadmap). This will form the basis of further engagement between providers and funders and facilitate future planning and policy decisions for long-term stable investments in COTS control. *Deliverables: Development and analysis of options for long-term funding of COTS control and management*	$150,000
Traditional Owner-led COTS Control activities	Refer to Traditional Owner Reef Protection	
2021-2022 COTS CONTROL COMPONENT BUDGET		**$8.7m**

Table 7: COTS Control Component Gantt Chart 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
COTS Control														
COTS Control partnership governance	Delivery of COTS control as a strategic partnership between GBRF, GBRMPA and RRRC, overseen by a COTS Partnership Group.	$5.67m	Meeting			Meeting				Meeting			Meeting	
Delivery of COTS control program			Program delivery (GBRMPA and RRRC)											
COTS Control Innovation Program - R&D phase														
Project planning and budgeting	Detailed project planning, budgeting and contracting based on the recommendations of the design phase, leading to implementation of a suite of research projects across as part of an integrated R&D portfolio	$2.85m	Project planning & budgeting											
Program implementation						Program implementation								
Community-driven COTS Control														
Scoping with Community Reef Protection Working Group	The Community Reef Protection Working Group will identify opportunities and strategic alignment with community and citizen science needs to identify a preferred strategy to engage with and identify opportunites for community and citizen science involvement in reef management through participation in COTS control.	$30,000					Working group							
Engagement activities and recommendations									Engagement				Recommendations	
Long-term funding strategy														
Scoping and procurement	Terms of reference will be developed for a consultancy to review funding model options, engage with key stakeholders and provide recommendations (roadmap). These recommendations will form basis of further engagement between providers and funders.	$150,000			Scoping		Procurement							
Delivery and engagement									Delivery					
Review and recommendations													Recommendations	

Reef Restoration and Adaptation Science Component

Partnership Budget: $100 million

2021-2022 RTP Budget: $31.13 million

2021-2022 Total Reef Restoration and Adaptation Program Budget*: $44.95 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

*The total 2021-2022 RRAP budget includes, in addition to the RTP RRAS budget, an estimated $13.82 million in additional funding and co-investment through the Collaborative Investment Strategy.

Progress on five-year journey

Current climate change modelling and analysis of trajectories point to a more than 95% chance that the international community will not be able to keep global warming below 2°C. Bleaching is predicted to happen more frequently, shifting from being a 'natural event' to a recurring threat needing to be actively managed. While no major bleaching event was experienced during the 2020-2021 summer season, projections remain concerning.

In addition, significant ocean warming is already 'locked in', irrespective of actions to reduce greenhouse gas emissions, and this realisation is driving communities toward practical action to mitigate the impact of global warming – in essence dealing with the symptoms while we find a cure. Applying conventional conservation strategies is no longer considered sufficient given the scale and pace of decline in coral reef ecosystems. Actively building resilience and restoring reefs to sustain essential ecosystem functions is becoming a fundamental part of management.

This is evidenced by international initiatives and associated investments, such as the United Nations Decade for Ecosystem Restoration, G20 Coral Reefs R&D Accelerator Program, Global Fund for Coral Reefs and the L'Oréal Fund for Nature Regeneration, to name a few. In Australia, RRAP plays a central role in this effort and is joined by recent investments by the Australian Government, such as the Reef Builder Program (restoration of shellfish reefs) and mangrove, seagrass and tidal marshes restoration initiatives.

Building on the foundations of the RRAP Concept Feasibility Study, RRAP partners have designed an integrated Research and Development (R&D) program which will deliver practical outcomes within the next two to four years, while at the same time being able to accommodate new partners, funding and innovations over time.

In 2020-2021, a strong focus on establishing a best-practice governance framework, materialised in an overarching collaboration agreement between the seven partners (AIMS, CSIRO, GBRF, JCU, QUT, SCU and UQ), has placed the program in an ideal position to perform across multiple dimensions to:

- tackle complex delivery challenges and manage strategic and programmatic risk,
- engage effectively with the regulator, community and Traditional Owners, industry and key stakeholders,
- communicate our vision for coral reefs and opportunities offered by reef restoration and adaptation interventions,
- seek further investment from philanthropic, corporate and impact investors, and
- play a leadership role within the international scientific community.

Even though significant effort was involved in developing the project planning and contractual framework needed to deliver such a large-scale multi-party consortium, in parallel, research teams initiated and progressed all critical areas of the program. This included recruiting new talent, developing systems and infrastructure and conducting scientific experiments in the lab and out on the ocean, making the most of a successful spawning season in late 2020.

Beyond the advanced R&D and engineering involved in RRAP, reef restoration and adaptation is also a great platform for communities to engage and take action, as evidenced by the Cairns Port Douglas Reef Hub activities (see Community Reef Protection Component). RRAP co-invested in the Hub, with the RRAP Stakeholder and Traditional Owner Engagement team contributing to its design and delivery, paving the way for a model where science, industry (in particular tourism) and community work together for the benefit of the Reef.

Underpinned by the RRAP Indigenous Engagement Framework and under the guidance of the RRAS co-design group, foundations have been laid for a positive engagement and the creation of learning and employment opportunities for Reef Traditional Owners, both during the R&D phase as well as in future deployments of interventions (see Traditional Owner Reef Protection Component). Over the coming year, this will result in traineeship opportunities within RRAP partner organisations and the launch of a Traditional Owner-led Healing Country grants program focused not just on coral reefs but interconnected seagrass and mangrove systems.

RRAP in full swing

RRAP has, over the course of the last 12 months, successfully transitioned out of the Concept Feasibility phase, delivering on the RRAP Investment Case recommendations and kickstarting a four-year integrated R&D program. The program is anticipated to involve up to 250 scientists and engineers, including many PhD students and post-doctoral fellows, representing an average of 125 full-time equivalents per year, which will deliver across the following priority areas:

- Furthering our scientific understanding of coral reefs and our ability to predict how interventions could be deployed and monitored, benefits these would generate and the associated risk and mitigation strategies,
- Developing and testing interventions across the spectrum of coral protection, adaptation and restoration including cooling and shading, cryopreservation, coral enhancements and treatments, growing and moving corals and rubble stabilisation,
- Creating an enabling environment for a future large-scale reef restoration and adaptation effort, by working with reef managers, policy makers and investors to build the foundations of regulatory and social licence, share knowledge and methods with communities and industry and implement best practice decision support.

Even though COVID-19 hampered staff movement and presented significant logistical challenges for experimental and field work, 2020-2021 saw many scientific achievements. RRAP scientists and engineers were able to capitalise on a successful summer and coral spawning, collecting precious samples to conduct research and testing in genetics, cryopreservation, coral thermal tolerance, aquaculture techniques and coral larvae settlement to name a few. Small-scale experiments were conducted to develop and test cloud brightening equipment and further our understanding of atmospheric conditions on the Reef. An integrated field-testing program was implemented and the first reference sites established (see Case Studies). In addition to delivering the core research and development, RRAP is committed to delivering a range of practical outcomes within two years across all areas of the program.

RRAP ramped up communication and engagement activities, refreshing its website, building a social media presence and creating fit-for-purpose technical documentation to inform and engage with Traditional Owners and communities about research activities conducted in their environment. In accordance with the RRAP Indigenous Engagement Framework, free, prior and informed consent was obtained for all field activities on Sea Country.

A strong partnership and governance framework

Since the Concept Feasibility Study phase, RRAP has demonstrated the value of a partnership approach for public-good science. Building on the many talents within leading Australian research agencies and institutions, the program relies on cross-institutional collaboration to achieve maximum impact and support. This principle of a shared vision is not only at the core of the delivery of the scientific program itself, but is also anticipated to play a fundamental role in the future uptake and implementation of reef restoration and adaptation interventions.

In Australia, this will manifest in continuing investments in partnerships between Reef managers, Traditional Owners, community, industry and research, such as those being piloted in the Cairns Port Douglas Hub, Ningaloo Resilient Reefs Initiative or the Reef Islands Initiative. Internationally, similar models will continue to arise, supported by international investment and scientific partnerships, within enabling frameworks set out in the United Nations Decade of Ocean Science for Sustainable Development, the United Nations Decade for Ecosystem Restoration and the International Coral Reef Initiative. RRAP and its partners are directly involved and investing at multiple levels within these local and global partnership initiatives.

The RRAP governance framework is now firmly in place, underpinned by a comprehensive Collaboration Agreement and overseen by a highly-skilled Board and Steering Committee established over the course of 2020. This framework:

- Provides strategic guidance and ensures the current program is delivering value for money, while looking to the future of Reef interventions and how these could be deployed safely and with support from the wider community,
- Embeds principles of knowledge-sharing and international collaboration for the benefit of coral reefs globally by fostering transparency, seeking peer-review and making scientific outputs publicly available,
- Recognises the critical importance of communication, engagement and co-design with Traditional Owners, Reef managers and regulators, communities, Reef industries and all levels of government in the future implementation of interventions developed and tested within RRAP.

Case Studies

Supporting RRAP decision scientists on the what, where and when of interventions

Understanding the capacity for and speed at which reefs can naturally recover from disturbances is critical – helping to choose the best times and places to deploy RRAP interventions to support natural processes and achieve the best outcome, including identifying situations where interventions may not be needed.

A cross-cutting program, known as EcoRRAP, is providing this ecological 'intelligence' by conducting high resolution, state-of-the-art monitoring of ecological, physical and environmental information at reef clusters located across the Reef, north to south, inshore to offshore.

A number of 'Reference Reefs' have now been established and long-term mapping and data collection instruments installed, including wave buoys, settlement tiles and oceanographic loggers, in addition to developing new reef imaging technologies, to track reef recovery over time.

Divers establishing reference reef plots
©AIMS Credit Marie Roman

Strong governance to ensure RRAP delivers outcomes for the reef in a strategic, safe and transparent manner

As defined under the Collaboration Agreement, RRAP has implemented a best-practice governance framework which includes representation from RRAP partners, independent members, Traditional Owner members, as well as observers from GBRMPA and the Department.

A Board, chaired by independent Professor Rob Vertessy, includes senior executives from partner organisations. Together with independent members Andrew Wood (former CEO of engineering firm Worley), Gordon De Brouwer (former Secretary of the Department of Environment) and Michelle Deshong (former CEO of the Australian Indigenous Governance Institute), the Board is the custodian of the RRAP partnership and provides strategic direction for the current program and future implementation of interventions.

A Steering Committee, composed of senior technical leaders from RRAP partners and independent Traditional Owner members, focuses on addressing complex program design and delivery issues, guiding the managing entity (AIMS) and program management team to ensure key objectives are being met.

These groups are supported and advised by a Risk Subcommittee of the Board, a co-design group, and working groups focusing on communications and fundraising.

RRAP Annual Work Plan: 2021-2022

Major deliverables and budgets for Partnership Activities in 2021-2022 are shown in Table 8.

Table 8: RRAS Component Partnership Activities (RRAP Sub-Programs) and Budget in 2021-2022

Partnership Activity (RRAP Sub-Programs)	Description	Budget
Aquaculture and deployment systems	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. *Deliverables: Ongoing improvements to aquaculture processes, testing of settlement and deployment devices to improve production rates, major field test in early 2022.*	$3.66m ($5.46m)
Enhanced corals and treatments	Measure the scope and the testing of methods for enhancement of heat stress performance in corals, while minimising potential tradeoffs. These would be operationalised via the Aquaculture and Moving corals sub-programs. *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 early 2022 aquaculture trials.*	$2.78m ($4.16m)
Moving corals	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). *Deliverables: Ongoing field test 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.*	$1.32m ($1.97m)
Rubble stabilisation	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. *Deliverables: Development of a decision support system designed to aid decisions as to when and when rubble stabilisation will have benefit. Early development of chemical/ biological binding method designed to operate a much larger scales than current methods.*	$1.58m ($2.33m)
Cooling and shading	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. *Deliverables: Field testing fogging and cloud brightening technologies and gathering atmospheric data to enable assessments of potential efficacy.*	$6.28m ($8.66m)
Cryopreservation	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. *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.*	$590,000 ($770,000)
Foundational ecological knowledge (EcoRRAP)	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. *Deliverables: Using the field testing sites established in 2020/2021, the program will commence the foundation ecological studies.*	$3.76m ($5.52m)

Partnership Activity (RRAP Sub-Programs)	Description	Budget
Integrated logistics and automation	Aiming to address the scalability and input the deployment cost modelling of interventions. Considerations around centralised versus de-centralised facilities and improved cost savings through integrated logistics (large, coordinated field trials, coordination of citizen science with ongoing data collection, improved costing methods) will be an important part of this program. Automation of propagation, deployment and monitoring is key to achieve scale and impact. *Deliverables: Improved modelling, feasibility/scalawbility assessments and guidance on integration opportunities. Assessment of areas/interventions where automation can lead to cost savings and improved capacity.*	$860,000 ($1.18m)
Program management	This specifically refers to the funding of the RRAP managing entity, Executive Director, Program Director and Program Management Team, responsible for the delivery of a broad range of services including administration, program management (design, scheduling, budgeting, accounting and reporting), science and engineering coordination, monitoring and evaluation, communications, and governance functions (including remunerations and expenses of independent board and committee members). *Deliverables: All ongoing program management and governance functions.*	$3.32m ($4.49m)
Traditional Owner and stakeholder engagement	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. *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.*	$1.54m ($2.27m)
Regulation and policy	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. *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.*	$440,000 ($680,000)
Modelling and Decision support	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. *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.*	$5m ($7.46m)
2021-2022 RRAS COMPONENT BUDGET (TOTAL BUDGET*)		**$31.13m ($44.95m)**

*The total 2021-2022 RRAP budget includes, in addition to the RTP RRAS budget, an estimated $13.82 million in additional funding and co-investment through the Collaborative Investment Strategy.

While the six-year Reef Trust Partnership involves a five-year implementation phase and budget across each of its Components, RRAP is a longer-term initiative – the first phase funded under the Reef Trust Partnership – and operates under a four-yearly budget. The forecast budgets for the FY2020-2024 period against the Partnership Activities (RRAP Sub-Programs) described above are detailed in the following Table 9.

Table 9: RRAS Component Partnership Activities (RRAP Sub-Programs) and Budget FY2020-24

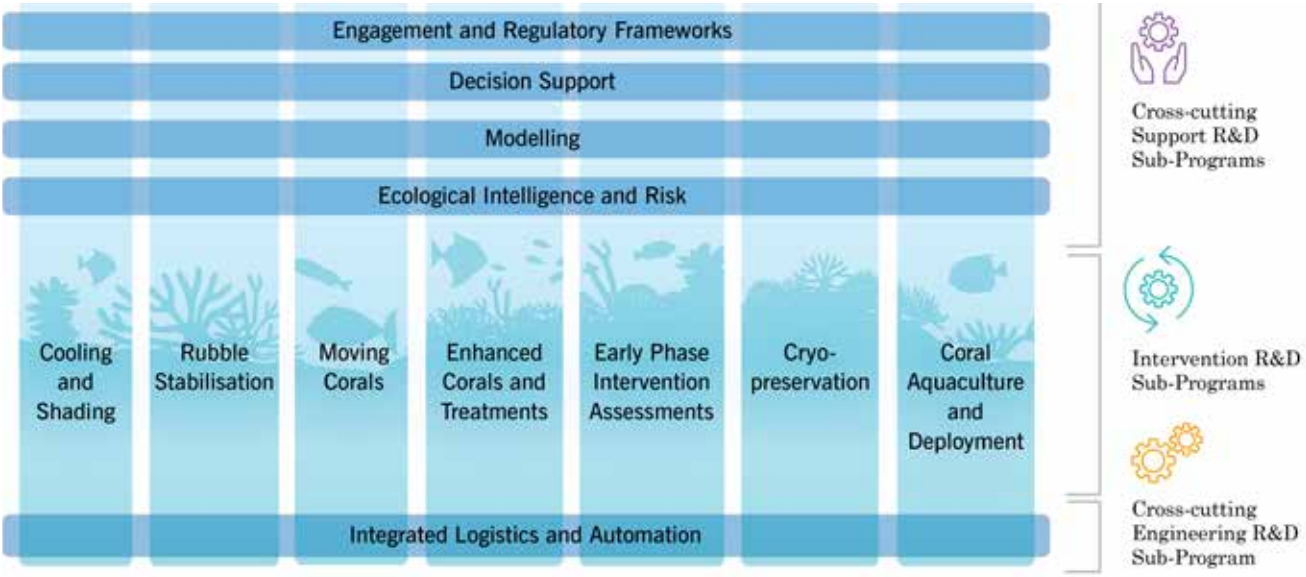
Partnership Activity (RRAP Sub-Program)	2020-22 RTP RRAS Budget (total budget)	2022-23 RTP RRAS budget (total budget)	2023-24 RTP RRAS budget (total budget)	2020-2024 RTP RRAS budget (total budget)
Aquaculture and deployment systems	$6.9m ($10.3m)	$4.4m ($6.6m)	$4.3m ($6.5m)	$15.6m ($23.3m)
Enhanced corals and treatments	$4.4m ($6.5m)	$3.1m ($4.6m)	$1.5m ($2.3m)	$9m ($13.4m)
Moving corals	$2.6m ($3.9m)	$1.3m ($2m)	$1.6m ($2.3m)	$5.5m ($8.2m)
Rubble stabilisation	$2.8m ($4m)	$1.6m ($2.4m)	$1.4m ($2.2m)	$5.8m ($8.6m)
Cooling and shading	$11.1m ($15.2m)	$9.5m ($12m)	$7.2m ($9m)	$27.8m ($36.2m)
Cryopreservation	$1.1m ($1.3m)	$0.7m ($1m)	$0.8m ($1m)	$2.6m ($3.4m)
Foundational ecological knowledge (EcoRRAP)	$6.3m ($9.3m)	$3.9m ($5.8m)	$3m ($4.5m)	$13.2m ($19.5m)
Integrated logistics and automation	$1.6m ($2.2m)	$1.1m ($1.6m)	$1.2m ($1.6m)	$3.9m ($5.4m)
Program management	$6m ($8.1m)	$3.4m ($4.6m)	$3.4m ($4.7m)	$12.8m ($17.4m)
Traditional Owner and stakeholder engagement	$2.4m ($3.6m)	$1.4m ($2.1m)	$1.5m ($2.2m)	$5.4m ($8m)
Regulation and policy	$900,000 ($1.3m)	$500,000 ($700,000)	$500,000 ($700,000)	$1.8m ($2.8m)
Modelling and Decision support	$6.6m ($9.8m)	$3.2m ($4.7m)	$2.5m ($3.8m)	$12.3m ($18.4m)
RRAS BUDGET (TOTAL BUDGET*)	**$52.7m ($76.1m)**	**$34.4m ($48.4m)**	**$29.2m ($41.2m)**	**$116.3m ($165.6m)**

*The total FY2020-2024 RRAP budget includes, in addition to the RTP RRAS budget, an estimated $79.4 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 Sub-Programs will be supported by cross-cutting science and engineering Sub-Programs.



Traditional Owner Reef Protection Component

Partnership Budget: $51.8 million[1]

2021-2022 Budget: $12.16 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:

A Traditional Owner co-design action framework implemented

Improved benefits to Traditional Owners engaged in Land and Sea Country management

Improved Traditional Owner participation in Reef governance

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

Traditional Owner on-Country activities contributing to Reef bio-cultural health

Improved cultural awareness within Partnership projects and partners

[1] 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

The Foundation is growing a deeper understanding about what is important to Traditional Owners in empowering the management of their cultural lands and seascapes. The Partnership investment acts to catalyse and accelerate important activities that Traditional Owners have planned to look after Country, maintain cultural practice and build strong foundations for the future.

As the Traditional Owner Reef Protection program commences its third year it remains focused on the implementation of priorities outlined in the Partnership Investment Strategy that accord to the Reef 2050 Traditional Owner Aspirations Report.[2] This approach recognises and builds on work undertaken by Reef Traditional Owners over the last two decades and ensures actions are centred on creating the conditions required to achieve Traditional Owners' Reef 2050 vision for a 'Healthy Reef and Healthy People.'[1]

Improving Traditional Owner engagement in the protection of the Reef through a commitment to co-design principles and practices[3] lies at the heart of all Traditional Owner Reef Protection activities under the Partnership. Co-design has resulted in a clearer identification of the conditions of success and together with on-ground activities turn aspirations into plans, plans into action, and action into stronger advancement and development of communities. Strengthening Traditional Owner involvement in decision making; co-designing and delivering fit-for-purpose Traditional Owner programs; building capacity and harnessing Traditional Owner leadership; and implementing pilot programs to connect people and projects were key focus areas in 2020-2021.

The Foundation understands investing in Traditional Owner groups is fundamental to building a thriving economy. Like the on-ground support provided to Traditional Owners through the Cairns-Port Douglas Hub (see Community Reef Protection Component), or the coordination support offered under the Strong Peoples – Strong Country framework[4] pilot; and extension support designed to help build relationships and broker partnerships in healthy water projects, the Partnership is adding value directly where Traditional Owners indicate it is needed.

Three grant rounds have increased engagement of Traditional Owners in the management of the Reef and catchment areas – contracting over 40 on-ground projects so far that support local planning and implementation of on-ground activities, junior rangers, enhanced leadership whilst building capabilities, increased skills and training opportunities; and for the first time there has commenced a significant program of work in Traditional Owner led healthy water projects.

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

COVID-19 continued to impact the delivery of engagement activities, including regional on-Country workshops. The proposed Reef-wide forum has now been deferred to 2022-2023 to enable the team to engage with Traditional Owners more fully on the content of the forum and for people to feel safe about travelling to a major event. In the interim, and where safe to do so, the team is supporting and co-investing in smaller, regional-scale Traditional Owner-led events. Moving forward, these delays will challenge delivery of some Component activities, with many Reef programs entering a 'catch-up' phase, compounded by Traditional Owners managing multiple competing priorities and commitments across the Reef landscape.

Heading into the remaining three years of this Program we will:

- continue to support the design and on-ground delivery of Traditional Owner-led Reef protection actions through grant programs. This will include an increased focus on tackling capacity gaps and other barriers experienced across the partnership landscape in an effort to improve Traditional Owners' ability to successfully access funding and deliver projects. The Foundation is particularly excited to work alongside Traditional Owners in the co-design of a new 'Healing Country' grant program in 2021-2022 that will support Traditional Owners in on-ground activities that connect and restore Country.
- build relationships, facilitate partnerships and collaborations, and implement pilot programs based on co-design principles and practices that enable Traditional Owners' to: create and/or sustain strong operational platforms; safeguard the use of Indigenous knowledge (including data ownership and agreement making); build capabilities, leadership opportunities and enterprises; improve cultural awareness and competency across Reef 2050 partners; and maximise the delivery of positive outcomes for the Reef and communities.
- investigate options and implement the most appropriate business and governance model for establishing a sustainable funding stream (Future's Fund) for Traditional Owner Reef protection activities, and critically
- continue to work with Traditional Owners', management agencies and *Reef 2050* partners to improve Traditional Owner involvement in the governance and management of the Reef.

[2] Traditional Owners of the Great Barrier Reef: The Next Generation of *Reef 2050* Actions, Commonwealth of Australia 2018
[3] The Auckland Co-design Lab, 2020
[4] Jarvis et. al., 2019. Monitoring the Indigenous heritage within the *Reef 2050* Integrated Monitoring and Reporting Program: Final Report of the Indigenous Heritage Expert Group, Great Barrier Reef Marine Park Authority, Townsville

Strengthening Traditional Owner involvement in decision-making

The Foundation continued to respond to Traditional Owners' consistent call for a greater voice in decision making, genuine partnerships in the overarching governance of the Reef, and increased participation in its active management to ensure their rights, responsibilities and interests are recognised, respected and play a central role in implementation of the Partnership.

To better understand the existing governance landscape, the Foundation conducted an audit of Traditional Owners' involvement in Reef governance arrangements. The audit provided a baseline of information about the number of Traditional Owners' participating on Reef 2050 and Reef Trust Partnership governance structures and the adoption of culturally appropriate practices. Over the last 12 months we continued to see the documentation of positive trends across the Reef 2050 landscape as mainstream governance arrangements have been influenced by new programs, approaches and evolving management frameworks, including the Traditional Owner Partnership co-design governance arrangements and action framework, along with an increase in the adoption of Free, Prior and Informed Consent for better-practice ethical research. We have seen an increase in Traditional Owner identified positions in both new and existing Reef governance arrangements such as the RRAP Board and Steering Committee, the COTS Control Innovation Program Steering Committee and the RIMREP Executive and Operations Committees, and the Foundation will continue to connect and link up Traditional Owner work under the Reef 2050 umbrella through existing and new governance arrangements for improved coordination and unity.

The audit also identified some major challenges including the over-reliance on a small number of individuals for strategic and expert technical advice in the absence of engagement networks and/or representative governance that effectively give voice through local Traditional Owner arrangements. This is an ongoing problem and reflects the consistent call from Traditional Owners for support to establish a Reef-wide 'Sea Country Alliance' that is connected through appropriate engagement and representative frameworks. The audit also drew attention to the less tangible but essential matter of developing governance practices that make people of differing cultures feel welcome, safe and valued. Achieving this means doing things differently – from where we meet and how we work together, to the language used and actions practiced. The audit will be regularly updated to benchmark progress in future years.

Leadership and capacity-building

The Foundation has invested significant effort in the establishment and support of governance arrangements which empower Traditional Owner leadership in co-design and delivery of the Partnership. In working through our co-design process, Traditional Owners have strongly identified investment and support in leadership and capacity-building activities as more important than ever. At the joint Traditional Owner governance workshop held in February 2021, participants openly discussed the increasingly vulnerable position they find themselves in as contemporary leaders operating in a complex world. This was acutely felt in response to a year in isolation with additional pressures of keeping their communities safe from a global pandemic, coupled with the increase in work requests needed to meet the high demand for Traditional Owner input and participation across multiple business sectors and partnerships. In 2021-2022, the Foundation will support Traditional Owners to come together to design projects that look at what support is needed to better sustain existing and future leaders in their leadership roles, having regard to gender and age. The 2021-2022 work plan therefore identifies dedicated cultural leadership activities that focus on supporting women, men and youth in their engagement in looking after the Reef and catchment areas.

The Foundation will continue to build on a Traditional Owner estate audit through authorised processes to capitalise on localised strengths, as well as address the highest needs identified by Traditional Owners. This work aims to assist, broker and connect other relevant partnership opportunities through coordinated investment. In working with Traditional Owner groups to execute contract agreements for delivery of on-ground projects, the Foundation continues to identify capacity gaps as an ongoing wicked problem facing both Traditional Owners as grant recipients and partners as funding providers. One of the key capacity gaps relevant to both partners includes having timely access to a business-ready workforce, including building a healthy pipeline of talent to attract into jobs that are available now or will become available into the future.

The Foundation is collaborating with partners and working across the five Component areas to build capability pathways that will assist to future-proof a collective workforce and invest in emerging and innovative leaders, such as the work in the COTS Control and RRAS Component areas. For example, the Foundation will support the design and implementation of a dedicated traineeship program through a collaborative partnership agreement with the Reef Restoration and Adaptation Program Joint Venture, which aims to place Traditional Owner trainees in partner organisations to gain experience and accredited qualifications.

A workforce planning and career development project will look to identify Traditional Owner career and enterprise pathways as part of de-risking program delivery across the Partnership.

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

Strategic communication and engagement

The Reef landscape is a complex, dynamic and crowded space. Traditional Owners remain committed to an elevation of their unique voice as inherent rights and interest holders. As Custodians of the Reef and catchment areas, Traditional Owners are looking to reframe the narrative in powerful and positive ways to underpin healthy relationships and build trust.

The Foundation is working side-by-side with Reef Traditional Owners within the Partnership governance arrangements to take a structured approach to building a new narrative which can be a springboard for telling Traditional Owner stories. During 2020-2021, the Foundation commissioned a Traditional Owner Strategic Communications Framework. In working through the Partnership Traditional Owner governance arrangements, key themes were captured which form part of shared storytelling, now and into the future. In essence, Traditional Owners value a connected system and want their individual stories or achievements to add to a collective overarching narrative that is positive and powerful.

Throughout the Foundation's co-design sessions, a number of significant themes emerged that are important in helping partners challenge assumptions so that we can achieve a more appropriate and accurate dialogue. Too often, and often unknowingly, Aboriginal and Torres Strait Islander identity is framed in a language of negativity, deficiency and disempowerment. Traditional Owners wish to address this as an important step towards building trust and investing in positive relationships so that enduring partnerships can be formed and sustained. Key to the strategy for Traditional Owner communication is a series of principles that will be embedded in content, messages and approaches as Traditional Owners share stories of impact from different Components under the Partnership. This approach re-enforces Traditional Owners and their partners' joint care for the Reef. The Traditional Owner Strategic Communications Framework will commence implementation in 2021-2022.

Co-design action framework

The Traditional Owner Partnership Team continues to progress development of its co-design action framework in partnership with the Auckland Co-design Lab and Cause Collective NZ and progressively embed co-design principles, mindset practices and learnings into its co-design and delivery of Partnership programs.

Working with its Traditional Owner Advisory Group (TOAG) and across three dedicated co-design groups (formerly referred to as Traditional Owner Technical Working Groups), the Foundation progressed co-design and delivery of:

- three Traditional Owner-led Reef Protection grant programs delivering over 40 on-ground projects,
- a highly-supported pilot program to test the implementation of the Strong Peoples–Strong Country integrated monitoring and reporting framework,
- conditional approval for ethical research in integrated monitoring and reporting; and endorsement of free, prior and informed consent as ethical standards by which to engage Reef Traditional Owners,
- communication products to engage Traditional Owners appropriately and effectively across Partnership opportunities,
- Traditional Owner engagement and participation in the Cairns- Port Douglas Reef Hub, which clearly identifies the need to look after 'sick country' by implementing 'healing country' activities as part of restoration and adaptation to support a healthy and resilient Reef, and
- early design considerations in the need and development of a cultural program to support delivery of COTS control training and leadership opportunities.

Establish Reef Traditional Owners Futures Fund

The immediate focus for the Futures Fund is to source a consultant to compare and contrast possible business models that the fund could take on and present an options paper. The governance structure that will have the legal responsibility for the oversight of the Futures Fund will be discussed with the Traditional Owner Advisory Group and more broadly amongst Traditional Owner leaders across the Reef. Arrangements governing the Futures Fund will need to consider possible alignment with a Sea Country Alliance (or representative network) and the transparency of the processes needed for Traditional Owner governing roles. There are still a number of meetings and discussions to have with state and federal government representatives in this area to look at critical partnerships and possible alignment.

Case Studies

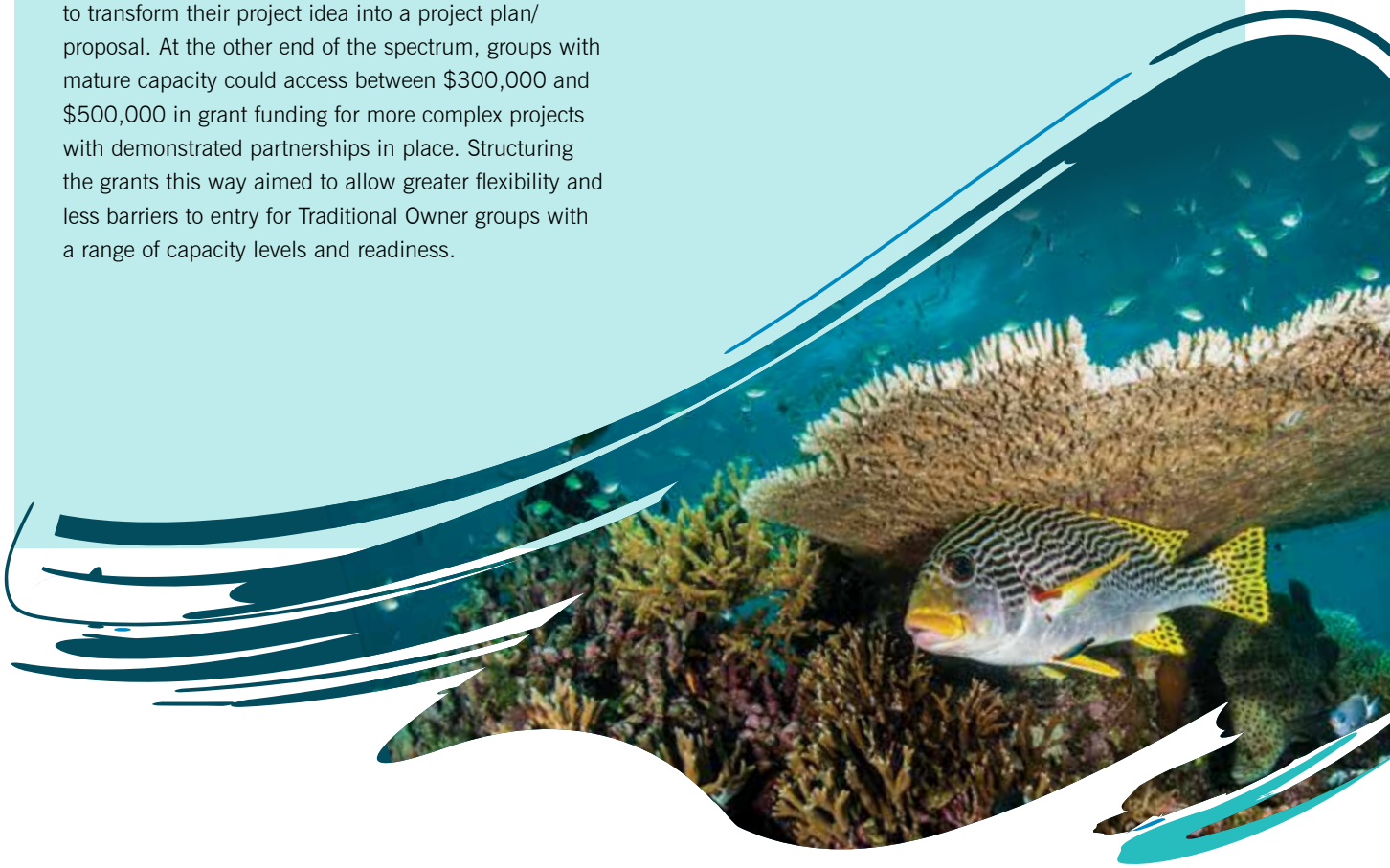
Healthy water grants program

The Foundation worked within its Traditional Owner governance arrangements to design two dedicated grant programs, resulting in an additional 25 Traditional Owner on-ground projects to help keep the Reef healthy.

The Healthy Water Grant Program provides a good example of where Traditional Owners, together with the Foundation, designed a purposeful structuring of the application process to enable the greatest inclusion possible as well as increase engagement in this new opportunity. Specific design features for the process included holding informational webinars, providing access to grant application training sessions to support Traditional Owners in their application process and structuring of grant categories to cater for a diverse range of Traditional Owner needs held across the Reef and catchment areas. For example, Traditional Owners could apply for foundational grants of up to $25,000 to work with a consultant or bring the community together to transform their project idea into a project plan/ proposal. At the other end of the spectrum, groups with mature capacity could access between $300,000 and $500,000 in grant funding for more complex projects with demonstrated partnerships in place. Structuring the grants this way aimed to allow greater flexibility and less barriers to entry for Traditional Owner groups with a range of capacity levels and readiness.

In undertaking this approach, the Foundation is beginning to see new groups emerge alongside well-known groups to deliver on-ground action for the Reef. The competitive grant round is now delivering a range of activities that address water quality priorities, including:

- planning and recording how people wish to care for their water sources,
- holding activities that support improved leadership and competency levels (building skills, ability, knowledge and relevant experience),
- supporting on-Country water management activities to improve the health of water and water sources, and
- enabling the documentation, conservation, management and promotion of heritage values associated with water and water sources.



Traditional Owner-led Reef monitoring and reporting

The Partnership is working with the Integrated Monitoring and Reporting co-design group to finalise and implement the Strong Peoples-Strong Country framework. This package of work includes developing a set of Traditional Owner-identified objective indicators to monitor the condition and status of Traditional Owners' heritage of the Great Barrier Reef.

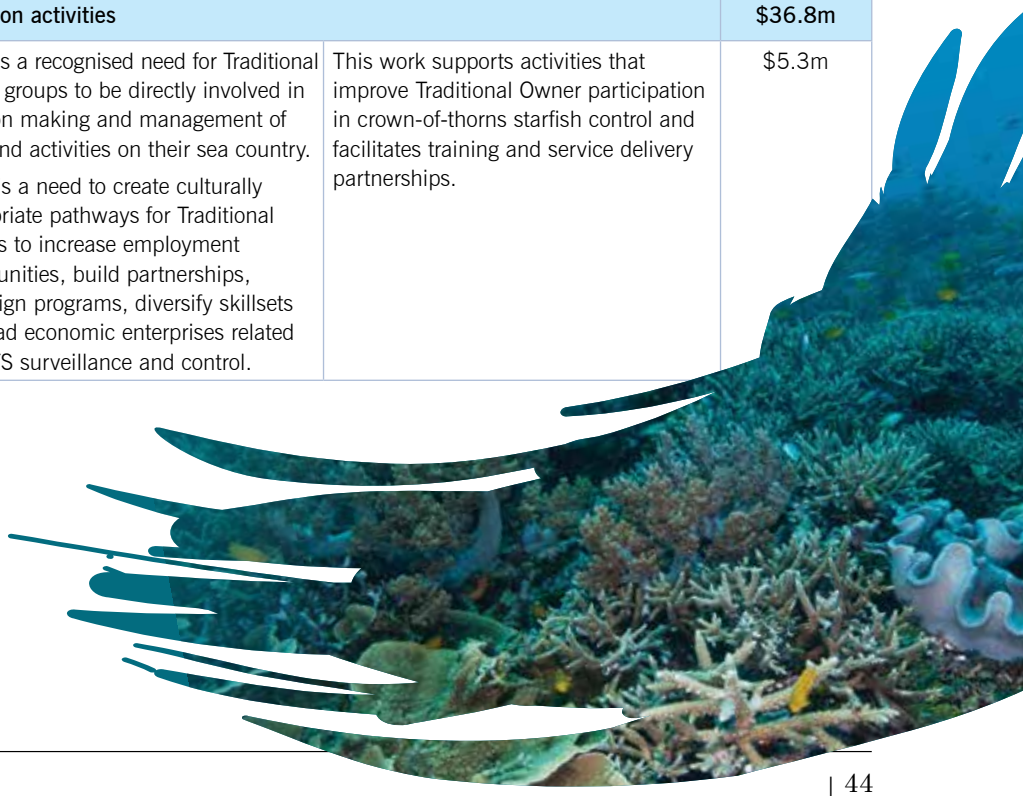
Together, Traditional Owners and the Foundation with support from CSIRO have co-designed reinforcing measures needed by pilot community groups to successfully trial the Strong Peoples-Strong Country framework at a local community scale. Significant work has been put into co-designing communication materials so Traditional Owner groups are fully engaged and informed about this opportunity and the potential benefits they may receive for participating in the community pilots. Elements that were designed to support successful community pilots include on-ground data management and information support; coordination and extension support services, support and legal advice for groups to work through the areas of data ownership, authorisation, permissions and agreement-making, in-house community research assistants, training and development for participants, data system support including provision of databases or upgrading data systems (where applicable); and assistance for community meetings to support community level decision making (see image inset).

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 Total Partnership Budget

Partnership Activity	Rationale	Outcome	Budget
Indigenous innovation, leadership, and collaboration			**$5m**
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**
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 $10 million allocated to this fund and invested in term deposits.	
Active Traditional Owner-led Reef protection activities			**$36.8m**
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	Outcome	Budget
Reef monitoring and reporting	Traditional Owners are the keepers of Indigenous Knowledge and cultural values and have observed dramatic changes on their country. The Strong Peoples-Strong Country Framework provides the basis for understanding the Reef as a biocultural ecosystem and requires investment to develop indicators to understand the condition and status of Indigenous heritage in the Reef. 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.	Traditional Owner knowledge forms a critical part of building a holistic understanding of the condition and trend of Reef values. This work aims to implement the *Strong Peoples-Strong Country* framework including negotiation of data sharing agreements, audit of monitoring skills, tools and assets, and development and implementation of education and employment pathways.	$3.5m
Healthy water	Traditional Owners require better engagement in the *Reef 2050* Water Quality Improvement Plan and related funding opportunities. Consideration of Indigenous values in current water quality programs are needed to improve decision making.	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. Adoption of co-design approaches in the Reef Trust Partnership Water Quality Component will improve active participation and maximise benefits for Traditional Owners.	$17m
Reef restoration and adaptation	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. 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.	This work aims to improve Traditional Owner access to and active participation in Reef restoration and adaptation projects.	$9m
Early investment: Stage 1 grants program	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. There is a need for Indigenous heritage including biocultural systems, culturally significant species, and important habitats to be mapped and monitored.	This initial open grant round was launched in early 2019 and to addresses three key focus areas: 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**

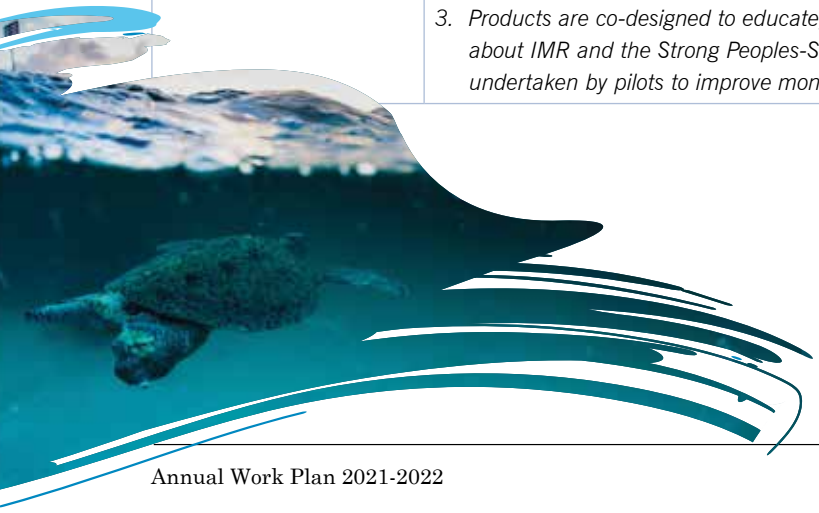
Traditional Owner Reef Protection Annual Work Plan: 2021-2022

Major deliverables and budget under each Partnership Activity for 2021-2022 are shown in Table 11.

Table 11: Traditional Owner Reef Protection Component Partnership Activities and Budget for 2021-2022

Partnership Activity	Description	Budget
Indigenous innovation, leadership and collaboration		
Traditional Owner governance	Ongoing delivery of Traditional Owner Reef Trust Partnership governance arrangements. *Deliverables:* 1. *Traditional Owner Advisory Group to meet up to four times a year* 2. *The established Component-specific co-design groups to meet in accordance with their terms of reference* 3. *Workshop for collaborative networking of Traditional Owner-led governance and leadership arrangements held at least twice a year.*	$500,000
Leadership and capacity building	Continuing to build and strengthen the capacity and capability of Traditional Owners to actively participate in the Partnership. *Deliverables:* 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. *Pilot up to 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. *Deliver a men's project (to be designed) and women's project (WomanSpeak), 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. *Work with partners to build a Traditional Owner audit, ground truth findings, and deliver documents including a benchmark report, communication projects and spatial mapping* 6. *A protocol for working with Traditional Owners and their partners in a bio-cultural landscape (including ethics, principles and guidelines) developed by an expert consultant*	$550,000
Strategic communication and engagement	Effective communication and engagement of Reef Traditional Owners with an emphasis on elevating Traditional Owner voice throughout the Reef and Catchment regions. *Deliverables:* 1. *Implement a Traditional Owner Strategic Communication Framework through the development of products that promote opportunities and achievements, and share learnings under RTP* 2. *Conduct regional face-to-face engagement to engage with participants to promote RTP and seek input for continuous improvement*	$650,000
Co-design action framework	Continue to develop the Reef co-design (co-benefit) framework with Traditional Owners, *Reef 2050* partners and the broader community *Deliverables:* 1. *Strategic partnership with co-design experts built and maintained* 2. *Participation in coaching workshops and TOAG and TWG members involved* 3. *Co-design principles published, tools and resources developed* 4. *Indigenous evaluation completed to test the prototype and process*	$80,000

Partnership Activity	Description	Budget
Traditional Owner Futures Fund		
Traditional Owner-led Futures Fund	Sustainable funding through establishing the Traditional Owner Futures Fund. *Deliverables:* *1. Report on appropriate business models for presentation to the TOAG* *2. Thinktank developed to investigate and report on governance models* *3. Funds invested in a term deposit*	$195,000
Active Traditional Owner-led Reef Protection activities		
Stage 2 grant round	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 *Deliverables:* *1. Delivery of COTS, RRAS, and IMR projects supported through Stage 2 grants.* *2. Support Traditional Owner Community Action Plan grants in the RTP Community Reef Protection Program.*	$1.15m
Healthy Water	*Deliverables:* *1. Traditional Owners are supported to implement their foundational or keystone Healthy Water grants.* *2. Second round of Healthy Water grants conducted.* *3. Delivery of Healthy Water partnership co-investments that provide for positive outcomes for water quality and Traditional Owners.* *4. Engagement of two project coordinators to facilitate Traditional Owner engagement and participation.* *5. Development of a water quality literacy framework that includes Traditional Owner Resources (kit).* *6. Peer-to-peer learning opportunity held for current Healthy Water grant recipients to share with the wider Traditional Owner community, their projects, learnings and outcomes.* *7. Products are co-designed that educate, engage and inform Traditional Owners about the Healthy Water Traditional Owner component and water quality issues in general.*	$4.58m
Reef monitoring and reporting	*Deliverables:* *1. Comprehensive data/information needs are mapped (to respond to information needed to report under Reef 2050 framework), the full data connectivity required to operationalise a database that is a single web-based platform with multiple database/web applications/connections is scoped.* *2. Facilitation of engagement and participation of 4-6 Traditional Owner groups in the pilot program; develop objective indicators; on-ground data and information management support; data sharing agreements based on data ownership; in-house community research assistants; training and development; data system support (where applicable), community meetings for local decision making.* *3. Products are co-designed to educate, engage and inform Traditional Owners about IMR and the Strong Peoples-Strong Country Framework and the work being undertaken by pilots to improve monitoring and reporting literacy.*	$1.07m



Partnership Activity	Description	Budget
COTS control	*Deliverables:* 1. *RRRC is contracted to deliver the Traditional Owner training 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.* 4. *Co-designed communication products that educate, engage and inform Traditional Owners about COTS control and the COTS manual control and leadership program.*	$1m
Reef restoration and adaptation	*Deliverables:* 1. *Investment in local Traditional Owner groups' active engagement and participation in the Cairns Port Douglas Hub, including a Traditional Owner Support Coordinator.* 2. *Project Manager engaged for extension support to positively facilitate Traditional Owners' active engagement and participation in RRAS.* 3. *Education material developed in collaboration with strategic partners (eg. Reef resilience continuum) to inform Traditional Owners about reef restoration and adaptation including permit locations, findings, research and opportunities to discuss reef resilience and restoration. Organise for Traditional Owner communities.* 4. *Co-designed Traditional Owner grant program for reef restoration and resilience on-Country activities.*	$2.39m
2021-2022 TRADITIONAL OWNER REEF PROTECTION BUDGET		$12.16m

Table 12: Traditional Owner Reef Protection Component Gantt Chart 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Indigenous innovation, leadership and collaboration													
Traditional Owner program governance													
Ongoing delivery of the Traditional Owner program governance	Ongoing support to host the Partnership's Traditional Owner governance arrangements including Traditional Owner Advisory Group (TOAG) and component-level co-design groups. Includes two joint workshops.	$500,000		TOAG		W'shop				TOAG	W'shop		TOAG
				Component-level Co-Design Groups									
Leadership and capacity building		**$550,000**											
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.	$50,000						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.	$200,000						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.	$150,000								Design Men Project		Implementation - Women and Men Leadership Projects	
Develop a career pathways propspectus 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.	$50,000		Consultancy		Co-design framework with key partners							
Continue developing an audit that identifies capacity across the Reef Traditional Owner Estate	Through a multi-year collaborative research partnership with CSIRO, continue to work on the Traditional Owner audit; ground truth the findings and deliver documents including a benchmark report, communication products and spatial mapping.	$100,000		Collaborative partnership		Data and information collection							
Strategic communication and engagement		**$650,000**											
Implement Traditional Owner Strategic Communications Framework	Expert communication service provider(s) to implement Reef Traditional Owners' Strategic Communitcations Framework to highlight impact and on-ground work under the Partnership	$500,000				Implement Communication Strategy							
Engagement	Regional face-to-face roadshows to engage with Traditional Owners of the Reef and Catchments to promote the Partnership and engage in the full co-design process	$100,000			Regional engagement						Regional engagement		
Develop a Traditional Owner Biocultural Ethics Guideline to inform work with Traditional Owners	Consultancy to addresses 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.	$50,000				Contract	TOAG advice	Research and draft Guidelines				Test through TWGs and TOAG to finalise	
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.	$80,000				Co-design Indigenous Evaluation					Co-design framework with key partners		
Active Traditional Owner-led Reef protection activities													
Grants		**$1.15m**											
Deliver Stage 2 grants	Deliver projects focused across the four RTP components of water quality, Crown-of-Thorns starfish control, integrated monitoring and reporting and Reef restoration and adaptation science	$700,000											
						Implementation							
Support Traditional Owner Community Action Plan grants	Support Traditional Owner projects focused in the RTP Community Reef Protection Program	$450,000											
						Implementation							

Table 12: Traditional Owner Reef Protection Component Gantt Chart 2021-2022 (continued)

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Traditional Owner-led Water Quality improvements *Healthy Water*		**$4.58m**											
Implement Stage 1 Healthy Water grants 2020-2021	Support Traditional Owners implement foundational and keystone Healthy Water grants	$1.78m	Implementation										
Stage 2 Healthy Water Grant Program 2021-2022	Stage 2 Healthy Water Grant Program	$1m				Funding round				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.	$750,000	Extension work to build relationships and broker partnerships										
Program extension and coordination	Faciliate Traditional Owners' engagement and participation in Healthy Water program. Faciliate understanding of healthy water objectives through extension work. Increase effective partnerships between Traditional Owners and partners.	$240,000	Support										
Develop a Water Quality Literacy Framework	Develop a framework that includes Traditional Owner healthy water resources to improve understanding and increase engagement in water quality projects and water science.	$500,000	Design			Consultancy							
Healthy Water Workshop	Organise a peer-peer learning opportunity for current Healthy Water grant recipients to share with the wider Traditional Owner community their projects, learnings and outcomes	$210,000					Engage Consultant		Consultant to work with co-design working group and logistics support		Deliver	Report	
Co-design communication materials	Co-design products that educate, engage and inform Traditional Owners about the Healthy Water program and other relevant water issues	$100,000	Co-design and deliver										
Traditional Owner-led integrated monitoring and reporting		**$1.07m**											
Data and information management and co-ordination	Map information required under *Reef 2050* (reporting and decision support). Scope and develop database system requirements for Traditional Owner information. Provide data management and coordination to SP-SC pilot groups including support for data sharing agreement making.	$250,000	Engage Consultant		Consultancy								
Implement the Strong Peoples–Strong Country (SP-SC) pilots	Faciliate engagement and participation in 4-6 SP-SC pilot groups: subjective and objective indicators; data sharing agreements; community research assistants; training and development; data system support (where applicable), support for community meetings (local decision making).	$720,000	Contract Agreem-ents in place		Data sharing agreement development with SP-SC pilot groups		Pilot implementation						
					Community Research Assistants								
Research project: Futures thinking with Traditional Owner communities to create and model scenarios for the Reef	Traditional Owner participation through SP-SC framework to focus on different pathways to achieve the future scenario that Traditional Owners want for themselves and the Reef, as well as the priority objectives under the revised *Reef 2050 Plan*, by incorporating Traditional Owner heritage, rights and responsibilities into management planning (year 1 of a mulit-year project)	$50,000			TOAG advice				TOAG advice				
					CoDesign Group				Work with SP-SC pilot groups				
Co-design communication materials	Co-design products that educatie, engage and inform Traditional Owners about the Integrated Monitoring and Reporting Component, the SP-SC and the work being undertaken by pilots to improve monitoring and reporting literacy.	$50,000	Co-design and deliver										
Traditional Owner-led COTS control		**$1m**											
Traditional Owner COTS control training and leadership program	Delivery of an external Traditional Owner training and leadership program for COTS control and management (year 1 of a 2-year program)	$650,000	Implementation of contract agreement with service provider										
Co-design culturally safe COTS control program including support governance arrangements	Establish and support the COTS Traditional Owner Consultative Committee to work with service providers to identify, document and implement the enabling conditions for Traditional Owners to effectively undertaking a training and leadership program in a culturally safe way. Program extension and coordination to increase engagement of Traditional Owners' in COTS management.	$200,000	Co-design and deliver										
Reef Traditional Owner COTS research project	Co-investment with COTS Control Innovation Program (CCIP) Feasibility and Design Phase: Biocultural values and governance assessment under the Social Acceptability, Regulatory and Institutional Arrangements (year 1 of a 3 year project)	$100,000	Co-invest through COTS Control Innovation Program										
Co-design communication materials	Co-design communication products that educate, engage and inform Traditional Owners about COTS control and the COTS manual control and leadership program	$50,000	Co-design and deliver										

Table 12: Traditional Owner Reef Protection Component Gantt Chart 2021-2022 (continued)

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Traditional Owner-led Reef restoration and adaptation science		**$2.39m**											
Strategic partnerships	Traditional Owners' active engagement and participation in the Cairns-Port Douglas Hub, including funding for up to 5 Traditional Owner groups in the region to design and deliver on-ground reef restoration/ healing country projects	$500,000	Contract agreements in place						Deliver on-ground projects				
Stage 1 Healing Country - Resilient Reef Grant Program	Co-design a Traditional Owner grant program to restore the health and improve resilience of the Reef (year 1 of 2 year program)	$750,000			Co-design grant program					Funding round		Contract agreements in place	
Engagement and project management support	Equivalent of up to 2 FTE to support capacity building and on-ground extension: •1 FTE project coordination and engagement, including support to TWG members; •0.5 (external consultancy) to support local engagement in pilot hub(s) (ongoing); •0.5 FTE RRAP coordinator	$240,000	Contracts in place	Support									
Traditional Owner Reef restoration traineeships and participation	Map / design a Traditional Owner traineeship program (cost and uptake) to be delivered through RRAP, and commence pilot to improve career and employment pathways and build capacity in reef restoration and adaptation. Co-investment through RRAP.	$750,000	Co-investment through RRAP		Co-design traineeship program and agree partnering organisations					Recruit and onboard trainees in partnering organisations (ongoing)			
Traditional Owner Reef restoration research project	Scope, research and develop Traditional Owner innovations from Indigenous knowledge systems, and identify transitional pathways	$200,000	Co-design and deliver										
Co-design communication and education materials	Develop education material to inform Traditional Owners about reef restoration and adaptation including activities and opportunities	$50,000	Co-design and deliver										
Establish Reef Traditional Owner Futures Fund		**$0.195m**											
Business model and options paper	Investigate and report on appropriate business models for presentation to the Traditional Owner Advisory Group	$120,000							Engage consultant		Project implementation		
Futures Fund options paper	Investigate governance models (think tank and report)	$75,000							Develop options paper - TOAG			Refine options	
Invest funds	Invested in a term deposit		Investment										

Community Reef Protection Component

Partnership Budget: $10 million

2021-2022 Budget: $3.57 million

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

Priorities under the Partnership Investment Strategy

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

End-of-Partnership Outcomes

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

Community action delivering effective outcomes for the Reef and community

Targeted local action aligning with strategic needs

A dynamic suite of tools for enduring funding and partnerships for community action made available

Community action is recognised, valued and celebrated

Shared knowledge and decision-making enhancing governance and delivery models

Progress on the five-year journey

The Community Reef Protection Component aims to increase and enhance the positive impact that local action has for the Great Barrier Reef and for communities.

The program builds on and celebrates work underway, but acknowledges that to meet the scale and urgency of the challenges we face, more must be done and we must find new ways to work together to make change happen. In responding to this challenge, and the aspirations of individuals and organisations tirelessly delivering work on-ground, the Component both enables existing impactful projects and pilots new projects and program models. These new models aim to break down barriers limiting the greater potential of community-led work through innovation in how work is designed and delivered, with the goal to empower greater collective outcomes through the contributions of many.

Improving community engagement in protecting the Reef calls for both growing the movement of people empowered to take action and elevating how programs support their communities to contribute to this movement. The five-year plan focuses on improving collaboration between individuals, community groups, Traditional Owners and managers to deliver targeted local change. It places a strong emphasis on recognising and celebrating the value of community contributions and supporting enduring outcomes through system change in funding and partnership models that leave a legacy beyond the Partnership.

As of May 2021, 43 community projects have brought together 264 unique partners through projects that deliver practical environmental and community outcomes through citizen science, local action, Community Action Plans (CAPs) and site-based coral rehabilitation and stewardship projects. These projects maintain existing efforts and grow new initiatives to strengthen engagement opportunities, with programs reporting 69% of participants are new to these project activities and that 47% of participants are youth, growing our next generation of Reef champions.

Activities in 2021-2022 will include:

- enabling on-ground projects through a second funding round for citizen science projects
- launching the Reef Protection Challenge focused on community-driven climate action, linked with a third funding round for local action projects
- continuing development of the Cairns Port Douglas Reef Hub and delivery of local-scale coral rehabilitation and stewardship projects
- translating Community Action Plans into action through on-ground projects and enhancing citizen science data integration with the regional report card network.

Strengthening and accelerating on-ground action

By June 2021, citizen science project partners had engaged with over 13,000 participants contributing over 34,500 volunteering hours and generating over 134,900 data points. There are 16 instances of community data being used to inform planning or management processes from these projects, including the first instances of community coral and mangrove data being integrated into regional waterway health report cards, data for management bodies (Queensland Government and Natural Resource Management groups) on turtle conservation, and shaping future on-ground litter source reduction actions with local councils. Even through the challenges of COVID-19, partners delivered 459 training and education events, including teacher professional development courses, volunteer training workshops, community education events, and school classroom sessions. Many of these activities shifted to online engagement approaches to continue connecting with their communities in trying times. In some instances, digital platforms increased reach and capacity for scaling – the Reef Teach photo transect program expanded to the Whitsundays and the southern end of the Reef with support from video training modules and other programs switched from small in person events to larger webinars reaching remote and global audiences. Building on this success, the second round of citizen science grants announced this year includes themes focused on innovation, data integration and data use to drive changes for community Reef protection.

Nine local action projects, championed through GBRMPA's Local Marine Advisory Committees (LMACs) and their partners, are empowering solutions to local Reef threats. Projects delivered 90 education, leadership and data collection events, leading to seven instances of data use to inform planning or management, including five litter source reduction plans, one instance of data used to develop litter reporting for the Dry Tropics Partnership for Healthy Waters, and one instance of informing future plans for major public events. Building on success of the first grant round, ten projects secured funding to build on or accelerate projects for an additional 12 months. Projects are tackling litter source reduction, undertake local habitat restoration, build community program capacity for impact, undertake behaviour change and communication initiatives, and support sustainable fishing practices.

With input from the LMACs, local action grants are poised to be transformed to focus on a shared theme - local action on climate change. The local knowledge from this network of advisory groups across the Queensland coast will help inform grants that empower community partners to deliver emission reduction actions towards the Reef Protection Challenge.

Interventions at local and larger scales are a rapidly emerging element of active Great Barrier Reef management, prompting for new ways to more strategically and collaboratively coordinate planning, on-ground work, information sharing, resourcing and partnerships. In 2020, more than 30 individuals from over 20 organisations and businesses provided input into the Cairns Port Douglas Reef Hub design. The Hub is a collaborative network that seeks to strengthen Reef and community resilience outcomes by enabling enhanced communication, collaboration and learning among partners involved in local-scale and large-scale coral rehabilitation and stewardship activities in the Cairns Port Douglas region. A Steering Group has been formed to provide local and locally-relevant strategic leadership to guide the design and operations of this pilot program. In 2021-2022 a collaboration workshop and locally-based coordinator will help catalyse the Hub's action learning approach. Three local-scale coral rehabilitation and stewardship projects have already been funded (see Case Study 3).

Connecting community with decision making

Traditional Owners, science, management, community, youth, and industry 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 to tangibly connect community aspirations with a complexity of regional and Reef-wide strategic plans to deliver targeted on-ground work. The collaborative and systematic planning process also catalyses new ways of working together for enhanced impact. Funding rounds were opened in March 2021 to translate plans into action and kick start community and Traditional Owner-led CAP projects. A funding round for CAP Leaders helps to continue their essential role as backbone organisations to guide, support and enable their communities to deliver on key priorities in their regions for the next two years.

A strategic partnership with the *Reef 2050* Regional Report Cards network identified priorities for citizen science data integration and community engagement. In 2021-2022 a pilot project to develop a model for citizen science data will be launched, contributing to an identified data gap of estuarine and inshore fish.

Building understanding, hope and action

Recent research demonstrates that most Australian's do not associate personal climate action with protecting the Great Barrier Reef. The 'Reef Protection Challenge' aims to address this, by offering Australians the opportunity to make a meaningful difference to help address climate change as the greatest threat to the future of the Reef. An extensive desktop assessment identified targeted behaviours for everyday Australians to take simple, measurable action on climate change to protect the Reef. The Foundation has been exploring major partnerships to leverage additional behavioural science insights, resources, and channels to enable impactful broad-scale participation, with specific opportunities for Reef communities to champion change. This program experienced delays in 2020-2021 due to the impact of COVID-19 and the ability to progress key discussions with key partners who were focused on responding to the pandemic but is on track to launch in 2021-2022.

Fostering enduring outcomes

A two-staged Community Reef Stewardship Desktop Audit Report was completed in collaboration with GBRMPA to document a wide range of current community Reef stewardship activities taking place across the Reef and Reef catchments. The stewardship audit includes 105 programs and projects and provides a platform for better understanding, showcasing, and measuring the contributions of Reef local champions. This work will inform next steps for monitoring of Reef stewardship, which has been prioritised for investment under the Integrated Monitoring and Reporting (IMR) Component by the Reef Integrated Monitoring and Reporting Program (RIMREP) partnership. Community stewardship organisations will be actively engaged to shape and inform the work as the champions of these initiatives and community Reef stewardship every day.

An audit of global community programs and fundraising models was scoped to explore proven and new models for investment and delivery of community programs to support improved design and capacity building opportunities for enduring change. The delivery of this activity was intentionally slowed-down, allowing consideration of the best approach to a support leverage points for co-investment in the high-impact collaborative community projects developed through the CAP process and other broader strategies in 2021-2022.

Case Studies

Community collaboration to protect the Reef

In 2020-2021, eight organisations from Cape York to Burnett Mary had hundreds of discussions and 26 workshops with community partners, Traditional Owners, scientists and Reef managers to create a Community Action Plan for their regions. The plans connect community aspirations with regional and reef-wide priorities to help design better ways to work together. This collaborative planning approach empowers community networks 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. In the second half of 2021, a series of community and Traditional Owner-led projects will be launched to translate plans into action.

"One of the biggest things we're often missing in schools is the ability for students to share their voice and actually have their voices heard. This program allows for that to occur – the kids could see was where their ideas were going and what impact they were having and that their input was valued."

Rick Harting, Global Education Coordinator Pimlico State High School, as part of the Burdekin Dry Tropics CAP

Youth Community Action Plan workshop held in Townsville.
Image credit: Reef Ecologic

Citizens make the grade for report cards

Five projects worked actively to improve the integration of community data and stories for regional report cards.

In North Queensland, Cairns and Far North Environment Centre (CAFNEC) and Mangrove Watch developed mangrove condition reporting with the report card. They undertook a regional monitoring program working with over 24 partners across seven regions. Great Barrier Reef Legacy led a project to pilot how multiple citizen science datasets can be collected and combined for three reef sites to enhance opportunities for data integration and communication opportunities through the regional report card. In Townsville, Reef Check Australia citizen science data on coral cover has now been integrated into the Dry Tropics report card to coral trends alongside data from AIMS. In the Whitsundays, tourism operators are working together with researchersto fill an identified gap in water quality monitoring in the Mackay-Whitsundays report card.

The report card network has identified a shared priority to undertake a pilot study using citizen science data to address a gap in estuarine and nearshore fish populations. This project has been scoped and will progress next year, working alongside fish monitoring proposed in the Integrated Monitoring and Reporting Component.

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

Building strong community partnerships for resilience

Three local-scale coral rehabilitation and stewardship projects have been funded in the Cairns-Port Douglas region. The Coral Nurture Program is a partnership between tourism and science to support long term stewardship and adaptation at key tourism locations. Early out-planting activities have been further boosted through the Australian Government's Activating Tourism Grants, delivering out-planting of more than 17,500 corals in just several months. The Wavelength Reef Guardian Project is connecting schools with tourism to trial a new method for researching coral out-plant survival, with students involved in creating small clay tiles for new coral larvae to settle and grow and participating in coral monitoring. The Kul-Bul Project ('Spirit of Sea Country' in the local Yirrganydji language) project has launched to connect Indigenous Ecological Knowledge with contemporary biological monitoring practices to holistically assess the health of coral reef sites and plan for collaborative site stewardship approaches.

A University of Technology Sydney researcher attaching a coral fragment to the reef using a CoralClip as part of the Coral Nurture Program.
Image Credit: Christian Miller

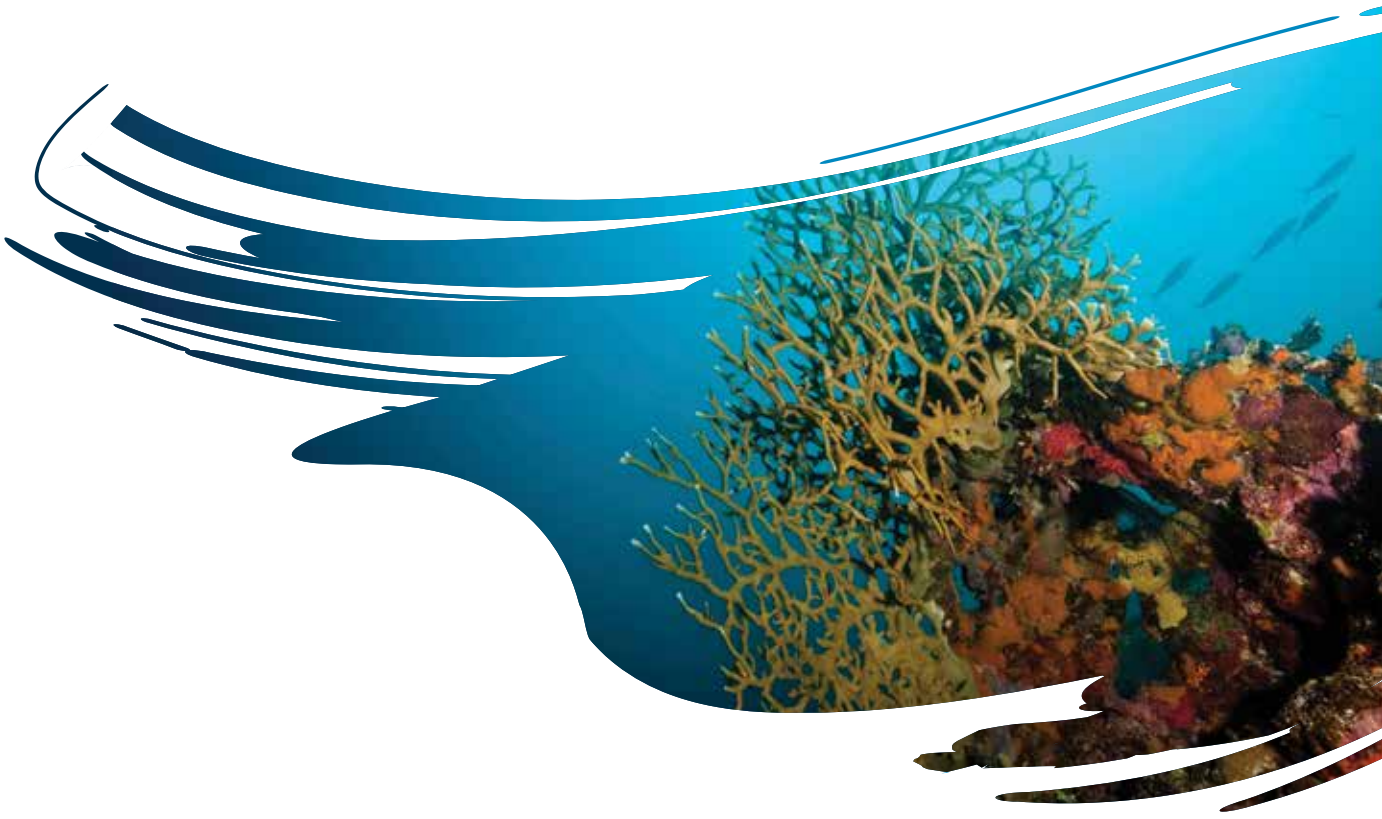
Community Reef Protection Five-Year Plan

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 Total Partnership 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. While citizen science is gaining momentum, there is potential for data from these programs to better inform decision-making and enhance social and ecological benefits.	This funding is supporting strategic and collaborative citizen science data collection, reporting and application.	$3.02m
Local-scale coral restoration and stewardship	Restoration is an emerging priority as a tool to build Reef and community resilience in the face of climate change.	This funding is supporting 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	While GBRMPA's Local Marine Advisory Committees already provide a platform to directly connect community with decision-making, additional support for inclusive project planning can further activate and empower this network of dedicated community members.	This funding is supporting and enhancing community capacity to collaboratively address locally-specific Reef threats and work with managers to build on and enhance approaches that engage the community in planning, delivery and monitoring of Reef protection activities.	$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 will support working with the Reef 2050 Regional Report Cards and 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.	$1m
National Reef Protection Challenge	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 foster wide-scale participation in a Reef protection challenge designed to empower Australians to take simple, measurable and impactful actions to reduce their carbon footprint for the Reef.	$2.48m
Communicate case studies and stories of hope	Capturing and sharing community-driven solutions from a range of people and projects has been identified as a key need.	This funding will capture and share community-driven solutions from a range of people and projects to celebrate achievements, share learnings and inspire increased engagement.	$70,000

Partnership Activity	Rationale	Outcome	Budget
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 activity will deliver a comprehensive snapshot of community Reef protection activities and seek to strengthen tools and models for funding community-led Reef protection activities to achieve more efficient and enduring outcomes.	$130,000
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 identify and deliver key capacity building needs for individuals and organisations, to amplify community partnerships and leadership. Cultural capacity building, monitoring and evaluation and empowering youth leadership are three key focus areas.	$530,000
TOTAL COMMUNITY REEF PROTECTION COMPONENT BUDGET			**$10m**



Community Reef Protection Annual Work Plan: 2021-2022

Major deliverables and budgets for Partnership Activities in 2021-2022 are shown in Table 14.

Table 14: Community Reef Protection Component Partnership Activities and Budget for 2021-2022.

Partnership Activity	Description	Budget
Citizen science	A project funding round will be contracted in 2021-2022 to support opportunities to build on high-impact projects, as well as projects delivering innovation, data integration and data use to strengthen community stewardship and drive Reef protection outcomes. *Deliverables: Delivery of citizen science projects that enhance community Reef protection outcomes.*	$920,000
Local action	A new local action funding round will be collaboratively designed with the LMACs to enable local action on climate change across multiple Reef communities. *Deliverables: Continuation of currently funded projects and implementation of a new funding round with GBRMPA & LMACs to deliver a coordinated approach to local action on climate change as part of the Reef Protection Challenge.*	$580,000
Local-scale coral restoration and stewardship	Funded local-scale coral restoration and stewardship projects will deliver projects that offer opportunities to explore and strengthen models to deliver resilience outcomes for the Reef and communities. The Cairns Port Douglas Reef Hub will continue to be collaboratively designed with Traditional Owners, local community, tourism, science and Reef management partners. *Deliverables: Continuation of local-scale coral rehabilitation and stewardship projects, and the Hub's collaborative design with Coordinator and Steering Group support. Delivery of proposed strategic planning workshop, communication products, capacity building initiatives and activities to strengthen sharing learnings from projects and research.*	$372,000
Integrated decision-making: Community Action Plans	Community Action Plan Leaders will continue their role to guide, support and enable the community to progress successful CAP projects. Investment in community projects identified through CAP development will start translating the plans into action. A pilot project with the regional report card network will strengthen integration of fish citizen science data in regional report card partnerships. *Deliverables: Implementation of the CAP projects with support from the regional CAP Leaders to deliver community on-ground action that aligns with regional priorities. The citizen science integration pilot project with regional report card partnerships will be commenced.*	$376,000
National Reef Protection Challenge	Continued from 2020-2021. The integrated initiative focused on community-led climate action will: - build a sense of hope towards the Reef that positive action can make a difference - generate a tangible behavioural change in the community that drives positive action towards the Reef - increase participation and partnerships to support positive outcomes for the Reef. *Deliverables: A coordinated initiative is launched to empower program delivery through partnerships and community project funding to deliver measurable change.*	$1.02m

Partnership Activity	Description	Budget
Communicating case studies and stories of hope	Continued from 2020-2021. 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. *Deliverables: Working with grant recipients and partners, high-impact case studies and stories from projects will be developed and shared.*	$24,000
Support enduring investment and partnership models	Continued from 2020-2021. Coordinated work on measuring and communicating Reef stewardship will be undertaken with the Integrated Monitoring and Reporting Component. Work to explore and enhance community Reef protection program and funding models will continue for community program design and tools to enable enduring change. *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. Continue to build tools to enable enduring community program investment.*	$86,000
Empowering community heroes	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. *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.*	$195,000
2021-2022 COMMUNITY REEF PROTECTION COMPONENT BUDGET		**$3.57m**

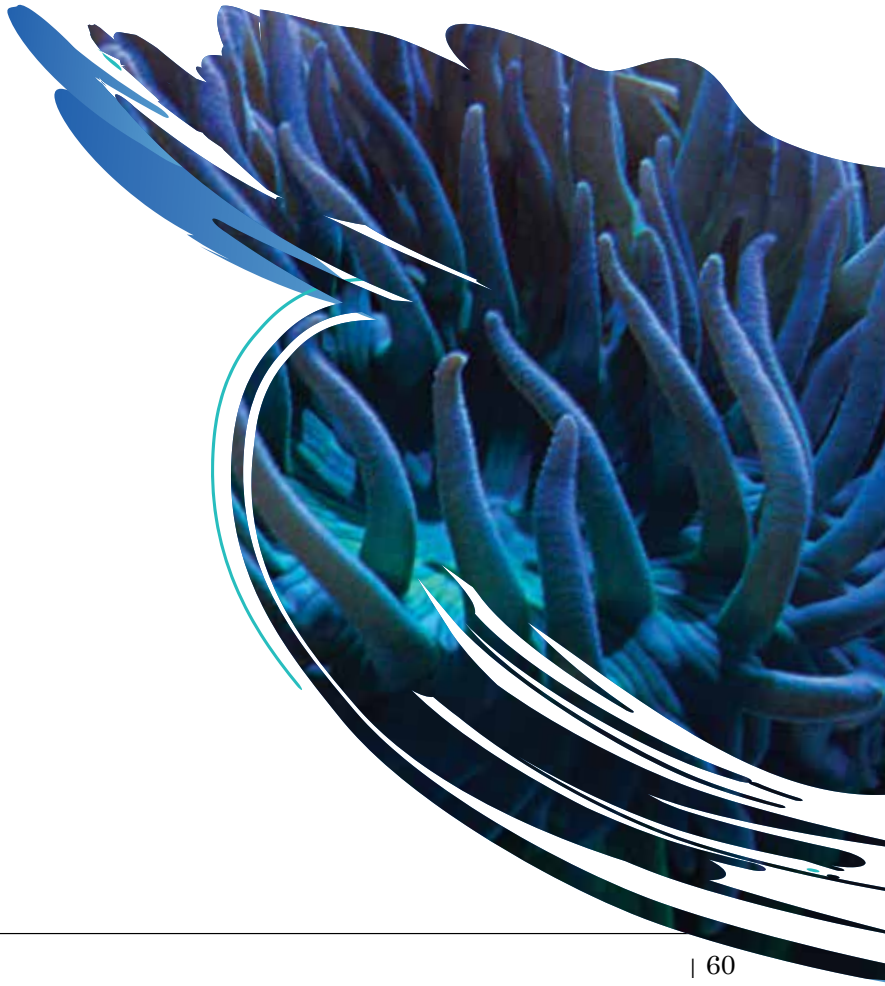
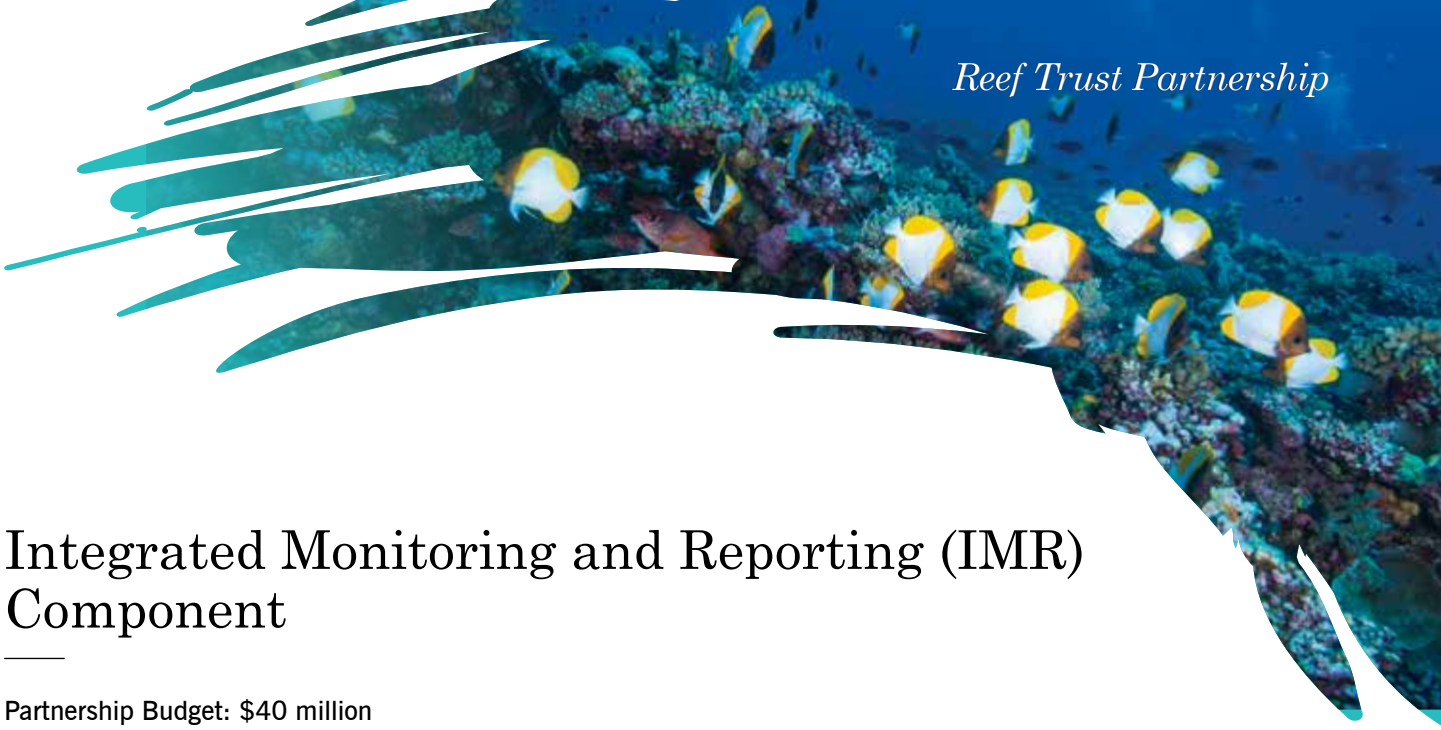


Table 15: Community Reef Protection Component Gantt Chart for 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Strengthening & accelerating on-ground actions														
Citizen science	A new (second) open grant round launched in 2020-2021 and contracted in 2021-2022.	$920,000	Open round & assessment				Delivery							
Local action grants (continuation)	Continuation of local action projects from 2020-2021.	$20,000	Delivery											
Local action grants (new)	A new local action grant round for community climate action developed through collaborative design with LMAC network	$560,000	Design							Delivery				
Cairns-Port Douglas Reef Hub and projects	Collaborative design of the Hub supported by a Coordinator. Delivery of local-scale coral rehabilitation and stewardship	$372,000	Delivery											
Connecting community with decision making														
Integrated decision-making: Community Action Plans	Implementation of projects from Community Action Plans and CAP Leadership support. Citizen science integration model piloted.	$376,000	Delivery											
Building understanding, hope and action														
Reef challenge framework	Consult on and construct Reef Protection Challenge framework for program launch in 2021-2022	$1.02m	Design							Delivery				
Communicating case studies and stories of hope	Work with partners and grant recipients to deliver high-impact case studies and stories	$24,000	Delivery											
Foster enduring outcomes														
Support enduring investment and partnership models	Continuing work on Reef stewardship audit and funding models scoping study.	$86,000	Design				Delivery							
Empowering community heroes	Ongoing delivery through the Community Action Plan program.	$195,000	Delivery											



Integrated Monitoring and Reporting (IMR) Component

Partnership Budget: $40 million

2021-2022 Budget: $10.13 million

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

Priorities under the Partnership Investment Strategy

- Supporting critical monitoring activities identified via RIMREP
- Catalysing innovation in technology to increase coverage, impact and resource efficiency
- Understanding the value of community stewardship and disclosure of high-value information
- Driving unity of purpose and adaptive management through the development and implementation of a Reef-wide decision-making and forecasting platform
- 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 Reef 2050 Integrated Monitoring and Reporting Program data needs or gaps being prioritised and met

An integrated, tactical, strategic Reef decision-support system made operational

Progress on five-year journey

In line with the objectives of RIMREP, investment in integrated monitoring (including modelling) and reporting is critical to inform reporting against the Reef 2050 Plan and enable resilience-based and adaptive management of the Reef. For this purpose, this Component has continued to focus on contributing to the implementation of an effective knowledge value chain[6], ultimately underpinning best-practice decision-making at a whole-of-Reef scale.

RIMREP was established in 2014 to conduct a stocktake of existing programs, identify monitoring needs and provide recommendations for establishing a Reef Knowledge System. This process led to the implementation phase of RIMREP commencing in 2019, and in 2020 RIMREP partners put in place new governance arrangements for RIMREP, comprising two governance bodies (Operations and Executive groups). This new governance has streamlined the Partnership's engagement with RIMREP, facilitating the alignment of the funding priorities in IMR with RIMREP priorities.

In consultation with GBRMPA, science partners and Traditional Owners, the IMR Component identified and implemented Stage 1 of critical monitoring activities in 2020. This tranche comprises five projects that cover a broad range of priorities:

1. Addressing inshore monitoring adjacent to the Fitzroy River under the Marine Monitoring Program
2. Conducting foundational research on Indigenous Heritage indicators through the Strong People-Strong Country framework
3. Redesigning and funding the next cycle (Phase 3) of the Socio-Economic Long-Term Monitoring Program (SELTMP)
4. Conducting a 'Reef Census' using citizen science
5. Supporting the operation and continuous improvement of the eReefs system.

In late 2020, the RIMREP partnership carried out a structured prioritisation process to identify further priority monitoring gaps which are needed to be closed to better inform management and report on the revised Reef 2050 Plan. This systematic review of critical monitoring gaps identified an additional set of 11 high-priority projects suitable for investment under the IMR Component, and in early 2021 the Partnership initiated procurement and design of this second stage of critical monitoring projects, to commence in July 2021.

Acknowledging the multiplicity of pressures on the Reef ecosystem's health, there is a need to further enhance the current risk-based approach to decision-making, founded on available evidence and models that enable forecasting and scenario planning. In 2020-2021, the Partnership completed an independent consultancy that scoped the design of a Great Barrier Reef decision-support system. The report emanating from this study is the first to systematically map the Reef decision space using a structured decision-making framework. It has provided a solid foundation from which RIMREP and the Partnership are developing a more detailed roadmap for the implementation of decision-support systems under RIMREP, and in the process delineating opportunities for targeted investment through the IMR Component, supplementing the investments and activities planned by RIMREP.

The IMR Technology Transformation Initiative will also launch in the coming year. Recognising the enormous size of the Reef and the challenges this presents for routine monitoring at scale, this initiative will provide a platform to pilot and prove innovative technology solutions with the potential to deliver step-change in how the Reef is monitored. The final initiative design will be completed by the end of 2021, followed by an open expression of interest process in early 2022.

[6] The knowledge value chain represents the flow of information and data across the sequence of acquisition/processing, management/sharing, scientific interpretation/synthesis and ultimately translation into decisions and response options.

Critical monitoring

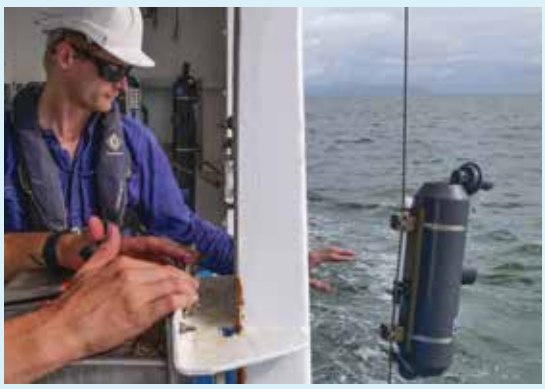
Stage 1

All five Stage 1 Critical Monitoring projects are progressing well with the exception of eReefs, which has experienced delays due to contracting but is now underway. More detailed progress on two of the five Stage 1 projects is reported in the case study text boxes below.

Fitzroy Basin: Marine Monitoring Program for Inshore Water Quality

The Fitzroy Basin region is a major contributor to river sediment and nutrient loads being delivered to the Reef lagoon. The Fitzroy region has been identified as having a "high" management priority for reduction of catchment loads of pollutants. Catchment management efforts to reduce anthropogenic pollutant loads have been implemented since 2005 and have recently been expanded through the Partnership's regional water quality improvement program in the Fitzroy region.

The re-establishment of the Marine Monitoring Program in the coastal region of the Fitzroy River will enable marine water quality monitoring in this region to measure the status and trends in water quality at six sites in the Fitzroy region. Site selection was guided by local Traditonal Owner groups and individual Traditional Owners are participating in the monitoring activities.



Fitzroy Basin Monitoring Program
©AIMS, Image credit: Marie Roman

Great Reef Census

Divers hold Great Barrier Reef Census banner during survey expedition on Spirit of Freedom
Image credit: Grumpy Turtle Creative

The Great Reef Census is an innovative pilot project that aims to trial new models of scalable data collection and analysis activities to support research and management priorities.

In 2020-2021, the project mobilised a makeshift research flotilla of more than 40 tourism boats, superyachts, fishing vessels and even a tugboat, with a mission to capture large-scale reconnaissance data from across the 2,300km length of the Reef. Together, partners contributed more than 13,000 images from over 150 reefs – encompassing locations from the tip of Cape York to the remote southern Swains. Images are being analysed online by both citizen scientists and researchers, identifying how the data complements and strengthens existing monitoring and modelling programs.

The Great Reef Census is a Citizens of the Great Barrier Reef project, in partnership with the University of Queensland, GBRMPA and AIMS. It is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation, the Prior Family Foundation and the Reef & Rainforest Research Centre.

Stage 2

In addition to the continued implementation of Stage 1 projects, a further 11 critical monitoring projects will commence in the coming months. These projects were identified and approved to progress in 2021-2022 as a result of the recent prioritisation process led by RIMREP partners, supported by a broad range of stakeholders, and well-aligned to the objectives of the Partnership.

Table 16: Stage 2 Critical Monitoring Activities and Budgets

Critical Monitoring Activity	Budget
1. Developing indicators for condition and recovery of the Reef	$500,000
2. Inshore dolphin monitoring	$560,000
3. Sea cucumber monitoring	$970,000
4. Reef fish monitoring	$6,050,000
5. Development and deployment of biosecurity monitoring tools	$560,000
6. Island habitat monitoring	$660,000
7. Seabird monitoring	$790,000
8. Sustainable use and benefits monitoring	$450,000
9. Monitoring collective capacity and effectiveness of implementation	$390,000
10. Monitoring stewardship for the Reef	$450,000
11. Developing and implementing a RIMREP integration framework	$750,000
TOTAL STAGE 2 CRITICAL MONITORING BUDGET	$12.13m

An open selection process was conducted in March-April 2021 with a large number of expressions of interest received. Design and contracting for these projects is well underway with successful proponents, with an intended start of projects in July 2021.

With the Foundation's strong commitment to continuous improvement processes, innovation and collaboration, the selection process for this funding round encouraged strong engagement and partnerships between research and government entities with community-led monitoring groups, Traditional Owners and tourism and marine vessel operators.

It has also provided an opportunity to drive a stronger alignment of data standards and data sharing protocols to support greater consistency and interoperability between monitoring activities, further enhancing integration of datasets within GBRMPA's Reef Knowledge System. This will lead to greater effectiveness and efficiency of decision-making by streamliing how data is accessed, synthesised and reported.

Decision Support

Approximately $4.4m (not including co-investment) was budgeted in the Partnership Investment Strategy to support the early-stage development and prototyping of a Reef-wide decision-support system (DSS). The first step in this process was achieved in the completion of the DSS scoping study in 2020. This study was conducted by Aurecon on behalf of the Partnership and in close liaison with GBRMPA and AIMS, delivering a systematic analysis of the decision space in the Reef, a tiered suite of recommendations and a framework of recommendations to more broadly improve the quality of Reef decision-making.

The report found that there is strong universal support:

- to make knowledge more available, accessible and synthesised, as well as more predictive and more management-focused
- that a single "Reef-wide" decision support system is not feasible, not best practice and not requested by decision-makers
- that operational or tactical decision support systems have utility in the Reef context and should be developed opportunistically in highest-value areas.

Subsequently, RIMREP partners have considered the recommendations made in the report, prioritised them and initiated planning to resource and implement the priority decision support system actions going forward. Through this process, the need for investment into a fit-for-purpose data management system (DMS), to underpin the RIMREP information management systems (ie. the Reef Knowledge System) and existing or future decision support systems, has emerged as the highest immediate priority requiring funding from this Component.

Given this, the Partnership has agreed to priortise funding for the data management system comencing with a detailed scoping and design phase (July to December 2021), followed by an 18-month development and implementation phase (January 2022 to June 2023) and a final year (July 2023 to June 2024) to transition to a maintenence phase.

The original intent of developing a Reef-wide decision support system has now evolved into supporting a range of investments aimed at supporting the development and implementation of a federated data management system underpinning RIMREP, complemented by tactical or operational decision support systems. A well-designed, federated data management system will ensure that past fragmentation of data and inefficiencies in data access can be overcome by streamlining the way in which monitoring data is integrated and made available to managers based on mutually-agreed data-sharing standards and protocols. This will represent a significant leap forward in the Reef data management space and will be a critical legacy product of the Partnership.

Residual funding will be set aside for the development of targeted DSSs and conducting additional work in support of Traditonal Owner decision-making, to be allocated in 2021-2022.

Technology Transformation Fund

The purpose of this fund is to provide funding to pilot innovative approaches that have the potential to deliver step-change to the way the Reef is monitored. Following the re-engagement of potential investors in this fund in recent months, initial work on a design is almost complete. This will be further developed early in 2021-2022 with an open call for proposals launched in early 2022.

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 17.

Table 17: Integrated Monitoring and Reporting Partnership Activities and Total Partnership Budget

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.	$570,000
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).	$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.	$4.43m
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 *Strong Peoples-Strong Country* framework and data-sharing agreements. Scoping of readiness and upskilling opportunities for Traditional Owner groups to transition to monitoring activities.	$4m
TOTAL INTEGRATED MONITORING AND REPORTING COMPONENT BUDGET			**$40m**

Integrated Monitoring and Reporting Annual Work Plan: 2021-2022

Major deliverables and budgets for IMR Partnership Activities in 2021-2022 are shown in Table 18.

Table 18: Integrated Monitoring and Reporting Component Partnership Activities and Budget for 2021-2022

Partnership Activity	Description	Budget
Critical Monitoring	Continued implementation of monitoring activities implemented in 2020-2021 (Stage 1). Implementation of monitoring activities prioritised in consultation with RIMREP in 2020-2021 (Stage 2). Most investments are distributed over the life of the Partnership and the annual budget reflects the anticipated milestone payments associated with these investments. *Deliverables: Monitoring data leading to the reduction in the critical monitoring gaps as identified by RIMREP partners and ongoing delivery of essential eReefs services.*	$8.24m
Reef-wide Decision-Support System	Detailed design of data management system (DMS) in collaboration with RIMREP partners completed by December 2021. Initiation of the build of the DMS throughout January-June 2022. The annual budget comprises a nominal allocation of $0.75M out of a total of $2.5M allocated to the implementation of the DMS. *Deliverables: Delivery model and contracting of program to establish the RIMREP management system.*	$890,000
Technology Transformation Fund	Detailed design of fund to be completed by end of 2021 with expressions of interest to open in early 2022. *Deliverables: Detailed design of technology transformation initiative, grant guidelines developed, projects commence implementation*	$1m
Traditional Owner-led monitoring activities	Refer to Traditional Owner Reef Protection	
2021-2022 INTEGRATED MONITORING AND REPORTING COMPONENT BUDGET		**$10.13m**

Table 19: Integrated Monitoring and Reporting Component Gantt Chart 2021-2022

Activities	Description	Budget	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Critical Reef monitoring														
Stage 1 projects	Management and oversight of monitoring projects committed to in 2019-2020	$8.24m												
Stage 2 projects	Inception and oversight of monitoring projects committed to in 2020-2021													
Reef-wide Decision Support System														
Design of RIMREP Data Management System	Procurement and contracting of Phase 1 scoping and design	$890,000												
Implementation of RIMREP Data Management System	Inception and oversight of development and implementation of RIMREP Data Management System													
Technology Transformation Fund														
Finalise program design	Engage experts in identifying priority themes and focus areas. Develop program guidelines.	$1m												
Open call for proposals and assessment process														
Contracting														

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