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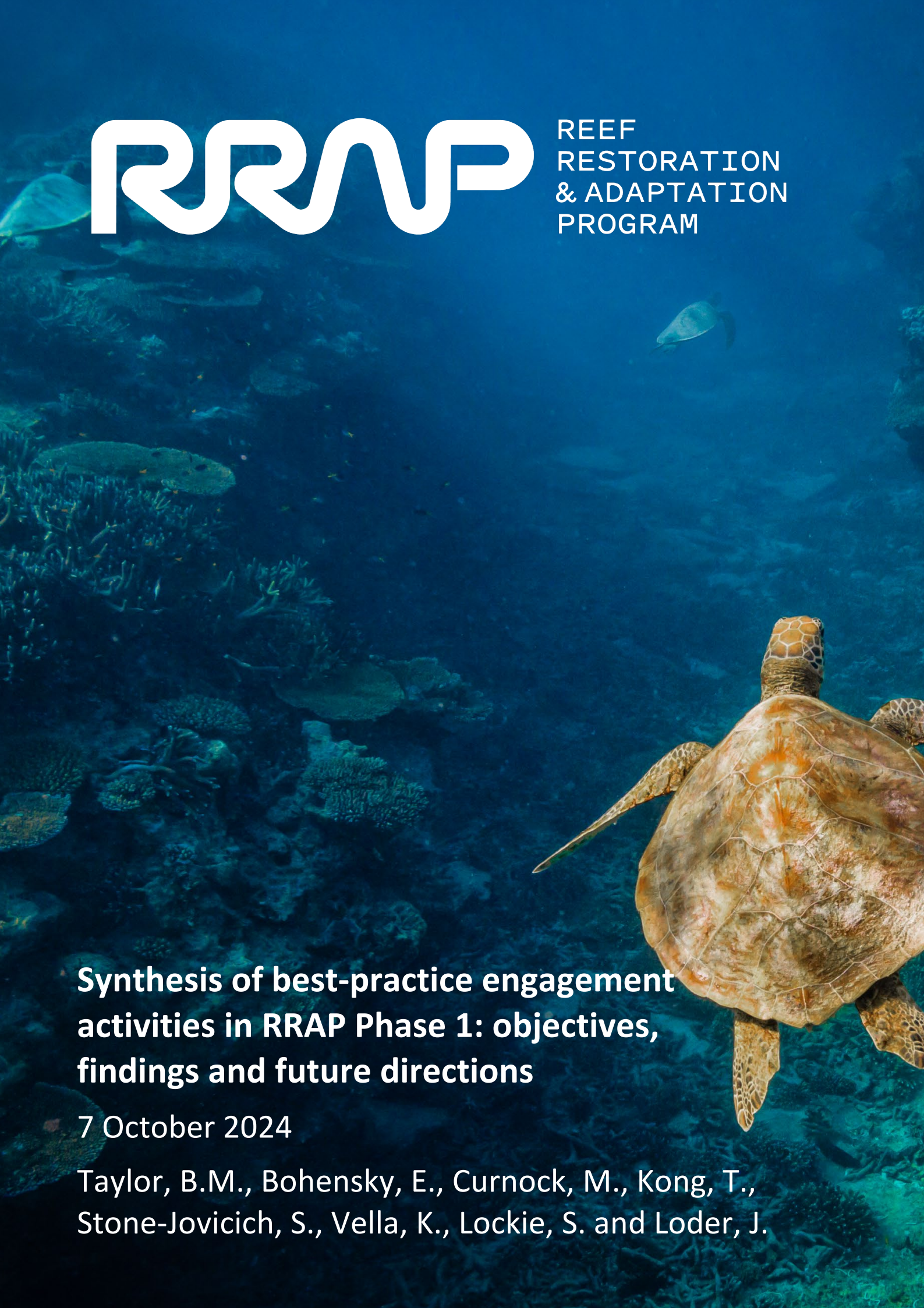

Synthesis of best-practice engagement activities in RRAP Phase 1: objectives, findings and future directions

7 October 2024

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Report Title

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The RRAP partners acknowledge Aboriginal and Torres Strait Islander Peoples as the first marine scientists and carers of Country. We acknowledge the Traditional Owners of the places where RRAP works, both on land and in sea Country. We pay our respects to elders; past, present, and future; and their continuing culture, knowledge, beliefs, and spiritual connections to land and sea Country.

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We specifically acknowledge and thank the following Traditional Owners of sea Country that this report relates to:

Location	**Traditional Owner Group**
	Gunggandji Traditional Owners

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1 Key messages

- This RRAP Phase 1 research piloted and assessed the benefits of several different participatory and collaborative approaches to stakeholder and community engagement in research and development for novel ecosystem interventions in the Great Barrier Reef.
- These approaches, grounded in applied social sciences, included: community panel dialogues; a collaborative monitoring pilot; exploring partnership opportunities to scale up restoration; mobilising and supporting a multi-stakeholder platform in the Cairns-Port Douglas region; and the co-design and development of a biocultural assessment framework with Reef Traditional Owners. Providing these different avenues for meaningful participation has made a fundamental contribution to social acceptance of the interventions among place-based communities and stakeholders.
- Providing opportunities for two-way dialogue through these engagement activities increased transparency of the Program and its activities, increased joint-learning and largely confirmed communities' support for RRAP's ambition and research.
- Where risks or concerns about specific technologies or reef intervention methods were identified by community and industry stakeholders, dialogue with RRAP scientists and exposure to the intervention methods and their use, generally improved understanding and built consensus on the conditions for social acceptability or strategies for the management of those risks.
- Forward demand for diverse and meaningful participation opportunities is high. Looking ahead RRAP will need to balance investing in improved coordination of information sharing, consultation and procurement-based approaches to engagement, with targeted and deeper partnership-working and joint-learning with key communities, industry sectors and Reef Traditional Owners.
- Recognising and building on the human capital (e.g. skills, knowledge, collaborations) that already exists in the Reef communities should form a key part of the research translation and scaling strategies for the Program.
- Separate reporting has been developed to describe outcomes, and provide guidance to RRAP, from the Biocultural Assessment Framework activity, that was co-designed and produced by Reef Traditional Owners and the RRAP project team.

2 Purpose and scope

This report is the final report for the CSIRO-led *Best Practice Engagement* component of the Stakeholder and Traditional Owner Engagement Subprogram of the Reef Restoration and Adaptation Program (RRAP) between 2021-2024. It reports on four applied and participatory social research activities: (i) the Townsville and Cairns-Port Douglas *Community Panels* (ii) the Moore Reef *Collaborative Monitoring Pilot* (iii) the *Partnerships for Scaling Up* activity and (iv) the mobilisation and evaluation of the *Cairns Port Douglas Reef Hub* (see Figure 1). This report provides a brief overview of the context in which these research activities were conducted, a description of the main methods and outcomes, and recommendations and issues for further consideration under future RRAP research and development, and the Pilot Deployments Program. The work reported here complements other components of the Subprogram namely the social risk focused activities led by James Cook University (JCU), and, the monitoring, evaluation and learning activities led by Queensland University of Technology (QUT), including the RRAP Stakeholder Advisory Group.

While several of the activities reported have involved Reef Traditional Owners as participants, this report does not include the final guidance on the *Traditional Owner Biocultural Assessment Framework*. This guidance is reported separately (see Maclean, K., Muir, B., Forester, M., et. al., 2025). However, it is important to note that the development of the biocultural assessment framework represents a significant co-designed investment by Reef Traditional Owners, the RRAS Traditional Owner Working Group and RRAP, that recognises the rights and interests of Reef Traditional Owners as key decision-makers on what interventions take place on their sea countries, how that happens, what opportunities are realised and how risks managed.

Figure 1: Best Practice Engagement research activities in the Engagement Sub-program included in this report (in blue) and future reporting (in red).

3 Background

Ecosystems around the globe are under increasing pressures from human use and climate change. Coral reef ecosystems are particularly under intense pressure from the impacts of climate change. Since 2016 the Great Barrier Reef has experienced five mass coral bleaching events with associated impacts on coral mortality. Reef managers recognise the need to revisit the long-held management paradigm of conservation and expand the toolkit for resilience-based management through more partnership-based, anticipatory and interventionist strategies to protect the values of the World Heritage-listed icon, including its cultural, social and economic values.

Research and development partners, funded through the Australian Government's Reef Trust Partnership, initiated an integrated program of multidisciplinary research and development, the *Reef Restoration and Adaptation Program* (Bay et al., 2023 for overview of the RRAP). The RRAP includes subprograms of applied research focusing on the development and trialling of novel interventions such as selective breeding of thermally-tolerant corals, methods to deploy these corals on devices and capture and re-settle larval slicks, cooling and shading strategies such as fogging and marine cloud brightening methods to reduce the water surface temperature leading into and during marine heatwave events; cryopreservation; ecological modelling, monitoring and decision-support to guide the development, assessment and later deployment of these methods; and, engineering and logistical expertise to design and advance the supply chains required for scaling restoration and adaptation interventions.

The Engagement Subprogram of RRAP, a multi-disciplinary sub-program of applied social science research, was designed to meet two related needs: (1) support identification of social risks and explore the conditions of social acceptance of novel technologies and methods under development for large scale reef restoration (see Lockie et al., 2024a, 2024b); and, (2) design and apply principles and methods to support stakeholder and Traditional Owner participation (see Vella et al., 2021, Taylor et al., 2019). In keeping with these objectives, the focus of the research reported here was to answer the question: *how do we productively and appropriately engage with local stakeholders and publics in both the emerging R&D program itself, and around its longer-term objectives and implications?* In pursuing this focus, we sought to (i) improve the transparency and accountability of RRAP's implementation, (ii) encourage and facilitate two-way exchange and dialogue between researchers and publics, including joint learning and co-production of knowledge within the program, (iii) contribute to the participatory identification of risks and benefits, and, (iv) explore community aspirations for future involvement and partnering opportunities. This work has drawn on several bodies of literature that explore, theorise and evaluate the application of public participation mechanisms in environmental and natural resource management, including in ecological restoration, and to appraise risks associated with novel or contentious developments, science or technologies.

4 Research methods and activities

Broadly each of the activities in this component of work employed research methods that could be grouped as participatory action research (PAR) methodologies. These methods position the researchers as active and interested parties within the research process, rather than as distant observers. Here, researchers engage with stakeholders and other community participants to jointly define and then progress understanding of a practical problem or identified need. This occurs through cycles or stages of iterative engagement, open exploration and the use of data and observations to feed the next stage of the process in a responsive and reflexive way. This methodological approach emphasises learning-by-doing, knowledge sharing, deliberation and joint action and reflection.

This methodology initially gained traction in international development related research where there was a need to contextualise proposed development solutions to local social and cultural contexts, and/or where expert knowledge was limited, and complexity and uncertainty were part of the decision context. These methods can also be applied to improve inclusion of 'non-expert' knowledge and values and promote power sharing within problem domains that are traditionally seen as expert led. We combine this broad strategy of PAR with techniques from applied qualitative social sciences such as in-depth semi-structured interviews, research focus groups, structured deliberation, participant observation and participatory evaluation methods. These approaches are also well-suited to working with other biophysical or technology-based sciences.

This component of the Engagement Sub-program included five major research activities:

1. The design and operation of two regional community panels
2. The design and implementation of a collaborative monitoring pilot for ACR devices
3. Exploration of cross-sectoral partnership opportunities to scale up restoration
4. Mobilising and supporting the development of a regional multi-stakeholder platform – the Cairns-Port Douglas Reef Hub
5. Co-design and development of a biocultural assessment framework with Reef Traditional Owners (addressed in a separate forthcoming milestone report).

In the following section we outline the methodological strategies we employed to implement the above activities. These activities are summarised in the below table (Table 1) and then described in turn in the following sections. In the final section we provide a synthesis of key insights and lessons from the research and explore what the implications for potential future RRAP design might look like under two possible future program implementation scenarios.

Table 1: Summary of research activities

Activity	Objective	Methods employed	Participants, duration, location	Publications (see App. 1)
1. Community Panels	Encourage community engagement with science through collaborative relationship-building and two-way knowledge exchange. Explore diverse views around specific novel reef interventions from different stakeholder and community perspectives, including potential benefits and challenges associated with developing and deploying these interventions. Provide guidance to reef intervention teams	Adapted Participatory Technology Assessment Panel (PTAP) model in two regions. Open-call Expression of Interest (EOI) process Five full-day workshops in each region consisting of facilitated group-based deliberation among diverse community members, RRAP scientists and RRAP management. Panel members and scientist surveys and interviews for monitoring, evaluation and learning. Guided field trips for panel members to a cloud brightening research vessel and the Sea Sim.	Townsville Panel (10 months); Cairns-Port Douglas Panel (7 months) Active panel phase 2022-2024. Total 30 community panel members; 15 scientists from Cooling & Shading, CAD, ECT, Moving Corals, T2D Sub-programs; 2 from RRAP Management	1-3
2. Collaborative Monitoring Pilot	Co-design, implement & evaluate a model of local partner monitoring of deployment devices to improve program transparency and explore future benefit pathways. Quantify reef visitor perceptions of assisted coral recovery devices	Participatory planning workshop to establish pilot objectives (social and biophysical). Reef site selection, training in monitoring protocols, in-water deployment and in-water monitoring. Partner & key informant interviews to evaluate the model. Reef visitor questionnaire (tourist perceptions of in-water devices).	Approx. 20 Cairns-based actors from April 2022 to June 2024. In September 2023, 708 Reef visitors (tourists and local residents) were surveyed on perceptions of assisted coral recovery devices, aboard five vessels in the Cairns region.	4, 5
3. Partnerships for Scaling Up	Explore the social dimension of scaling up Moving Corals (MC) and Coral Aquaculture Deployment (CAD) for Pilot Deployment Program (PDP) and large-scale coral protection programs.	This project activity has four phases: 1. Initial scoping and workplan (using desktop review and interviews) 2. Mapping potential partners and their roles, benefits motivating partnership, barriers, enablers and desirable characteristics of partnership 3. Case studies (Great Reef Census, mapping of capacity development with Traditional Owners on marine management in the GBR) 4. Translating findings into impacts relevant to scaling coral protection in the GBR	Organisations and individuals who are potential deployment partners or who have relevant experience and knowledge to contribute to a situational assessment of key players and institutional context to scale up reef protection interventions in the GBR. June 2021 – June 2025 Whole of GBR	6-12
4. Regional hub mobilisation – Cairns-Port Douglas Reef Hub	Undertake scoping study to mobilise and support a regionally based multi-purpose engagement platform in the Cairns Port Douglas region and evaluate its potential as a model for other regions.	Qualitative interviews & research focus groups, workshops, participatory evaluation methods, consensus building and partnership brokerage. The Hub has been an interface for the three activities listed in this table above.	2019-2024. The Reef Hub currently has 140 members. ENG researchers, GBRF, JCU TropWATER, Hub members. RRAP & PDP.	13-16

4.1 Activity 1: Community panels to support deliberation

Background

The formation of geographically based community panels enabled citizens in regional communities to explore and discuss reef interventions being investigated by RRAP. The RRAP community panels offered a novel approach to involving community members in extended and in-depth dialogues with RRAP scientists about specific interventions proposed in the Reef. The panels drew on diverse community perspectives and aspirations for the Reef and its management. By providing a space for community members and RRAP scientists to share and examine views on interventions and future possible risks and opportunities related to deployment, the panels aim to strengthen foundations for future planning on pilot deployments of some interventions in parts of the GBR.

Objectives

The community panels were designed to: (1) encourage community engagement with science through collaborative relationship-building and two-way knowledge exchange; (2) stimulate open discussion and draw on the panel members' knowledge and networks in the regional communities; (3) explore diverse views around specific novel reef interventions from different interest-based and community perspectives, including potential benefits and challenges associated with developing and deploying these interventions; and (4) provide guidance to RRAP reef intervention teams.

Methods

Two panels were established and ran in sequence in the Townsville region (July 2022-May 2023) and Cairns-Port Douglas region (March-September 2024), with design insights from the first panel informing the second. The panel design adapted the Participatory Technology Assessment Panel (PTAP) model (Joss and Bellucci 2002; Ely 2011), an established methodology through which safe spaces are created for mutual learning between scientists and public citizens, providing opportunities to learn about proposed technologies, and discuss concerns, sensitivities, or potential challenges and opportunities (Bohensky et al. 2021 RRAP milestone report).

Panel members (12 in Townsville, 18 in Cairns) were recruited through open calls for expressions of interest. Due to the EOI method adopted, the panel tended to self-select for individuals with existing interests or affiliations with the Reef and its well-being. The recruitment process also resulted in a relatively balanced gender, age and geographic (within the regions) profiles of applicants. Each of the panel engagements entailed five one-day, purposefully designed and facilitated meetings, with each structured around sequential steps of opening, deliberation and sharing, and closure, and focused on a subset of objectives and themes (Axelrod et al., 2004). While adapting in line with panel members' input and availability of RRAP intervention teams, both panels progressed from introductions and foundation-setting to exploration of specific reef interventions; to more in-depth conversations and exchange of perspectives and assessment of risks, uncertainties, opportunities and benefits; to outlining impact initiatives and; lastly to recommendations and reflection on panel achievements.

Scientists leading the RRAP intervention research were approached, briefed and invited to participate in the panel conversations. The panels engaged with intervention sub-programs that were conducting research activity in the regions at the time of panel operation, and that were ready to participate in the community panel process: Cooling and Shading (Townsville), Coral Aquaculture and Deployment (Townsville and Cairns), Enhanced Corals and Treatments (Townsville and Cairns), Moving Corals/Slick Capture and Release (Cairns). The Cairns-Port Douglas panel also had the opportunity to engage with Translation to Deployment and RRAP Management. A total of 15 RRAP reef intervention researchers engaged with the panels during their operation, including through two field days involving a tour of the research vessel being used for fogging and cloud brightening research, and the national Sea Simulator (SeaSim). A Monitoring, Evaluation and Learning (MEL) process, including short surveys, pre- and post-

participation interviews, ran alongside the panel meetings to track panel insights on meeting content and topics as well as panel members and scientists' experiences and learnings as participants in the process.

Key findings and outcomes

Panel design features. We identified the following design features that contributed to achieving the panel objectives:

- face-to-face engagements over an extended period (e.g. 7-10 months) to build two-way trust and knowledge sharing between scientists and panel members, and allow the research team to be responsive to developments in science and RRAP programming
- commitment of intervention scientists to attend meetings, in person where possible, and to develop relationships with panel members
- dedicated independent facilitation integrated into the research team to build relationships with panel members and group cohesion
- place-based model, allowing a common point of connection for panel members and potential for site visits.

The Cairns-Port Douglas panel also identified the importance of increased involvement of RRAP management and the Translation to Deployment Sub-program team in the panel meetings and strong engagement with the Cairns-Port Douglas Reef Hub for continued influence and relevance of the panel approach.

Enhanced awareness, understanding, and relationships. Evaluation to date also suggests an increase in panel members' awareness and understanding of the technical aspects of interventions, and the challenges and the uncertainties involved in R&D and ways in which intervention scientists work. In addition, the panel process enhanced relationships between panel members and intervention scientists, with the latter gaining a better understanding of community members' personal connections and aspirations for the Reef, and motivations for seeking greater engagement in dialogues with scientists.

Dialogue on risks and opportunities of reef interventions has indicated high levels of panel member support for reef intervention broadly and to a large degree for the specific interventions explored through the panels. Several risks and uncertainties were raised, however, related to unintended ecological consequences (e.g. invasiveness of heat tolerant coral species), managing public perceptions, maintaining long-term funding commitments, and capacity to scale-up the technology cost-effectively. Opportunities or benefits were identified (e.g. educational and citizen science opportunities, development of local supply chains) with discussion often emphasising the resources and stakeholder relationships that may be required to realise these opportunities. Community panel member and scientist views of risks and opportunities were often convergent; where they diverged, scientists were often able to resolve these differences through more detailed explanation, or took panel insights on board for further consideration in their future work plans (e.g. the need for more research into alternative energy options to power the cloud brightening vessels).

Participants expressed, and have demonstrated, a strong appetite for self-initiated engagement and action beyond the panel process. The Cairns-Port Douglas panel members are seeking to create "ripples of influence" stemming from the panel engagement including: (i) looking for opportunities to continue providing knowledge and insights into the program and on-reef activities; (ii) sharing positive stories about RRAP and non-RRAP activities through social media or other avenues; (iii) connecting to and "bringing-in" non-reef aligned groups and networks (e.g. education, creative, professional, youth); (iv) connecting into other reef related networks and actors in the region (e.g. existing local restoration or stewardship activities). Cairns-Port Douglas panel members have established a panel LinkedIn page to support communication in their new network and to progress actions catalysed and inspired by their participation.

Townsville panel members co-developed and delivered a presentation at the Social Science Community for the Reef (SSCR) 2023 Symposium, and presented reflections on their involvement at a local community forum. In short, participation through the panels has helped bridge the program's mission into the lives of local advocates, champions, science translators, and emerging coalitions in the community, and in doing so contributes to establishing a constituency immersed and invested in the potential for science-led scalable restoration.

4.2 Activity 2: Collaborative monitoring pilot

Background

Traditional Owners, tourism operators, NGOs and other local partners are already involved in a range of assisted coral recovery (ACR) trials at local scales across the Great Barrier Reef. In this pilot study, we sought to operationalise and evaluate a 'collaborative monitoring' model that would bring diverse partners together with RRAP scientists, to monitor a field trial of a new ACR device being trialled by RRAP and thereby share knowledge, build capacity, and identify potential pathways and benefits for future collaboration on monitoring activities. The impetus for this research activity came from a convergence of interest from both the RRAP research team, and the strong interest expressed by local stakeholders during the formative period of the Cairns Port Dougals Reef Hub (see Activity 4, this report), to have direct exposure to seeing the devices go into the field.

Objectives

The collaborative monitoring concept draws on and builds from the idea of demonstration sites. It provides partners and participants with a shared purpose and structured activities around which social capital, knowledge advancement, and technical capacity can be built through joint action. The presupposed benefits (or logic) of the collaborative monitoring model are shown in Fig 2 (below), which outlines short, medium and longer-term outcomes for partnerships and trust, local capacity, and monitoring and learning.

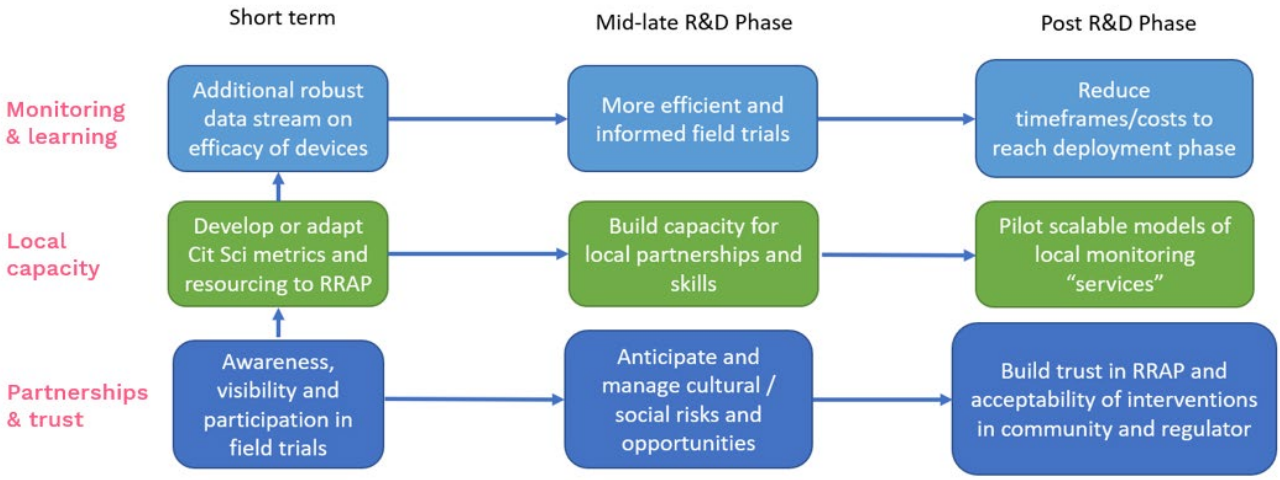

Figure 2: Logic for Collaborative Monitoring Pilot at Moore Reef.

Specific goals of the Collaborative Monitoring Pilot (CMP) activity undertaken at Moore Reef (2022-2024) included:

1. In-water R&D goals: (i) improved understanding of natural coral recruitment at sites, (ii) improved understanding of performance of CAD coral seeding devices in rubble habitats, (iii) improved understanding of survivorship of corals on seeding devices.

2. Social R&D goals: (i) improved engagement between local partners and RRAP scientists, (ii) build a shared understanding of risks and benefits of RRAP interventions, (iii) enhance local capacity to sustain and scale up collaborative initiatives, (iv) create local partner benefits and identify pathways to future benefits.

Process and methods

This participatory action research activity engaged with local partners of the Cairns region via the newly established Cairns-Port Douglas Reef Hub. The Hub coordinators provided local leadership and coordination of training activities and field data collection at six experimental plots near tourism facilities at Moore Reef. Australian Institute of Marine Sciences researchers from the RRAP Coral Aquaculture & Deployment (CAD) Subprogram provided coral seeding devices for the experiment and delivered training activities for local partners. The ENG researchers brokered the project with partners, facilitated the co-design of objectives and scope and led the iterative evaluation of the project. During the life of the CMP two onshore training days were conducted with participants to build competence with photogrammetry-based monitoring methods and three in-water field site monitoring visits were undertaken at 3-4-monthly intervals with varied levels of community and Gunggandji Traditional Owner participation over the three visits to the sites. The accessibility of the experimental sites (proximate to tourism facilities) enabled partners in the pilot study to contribute to an additional quantitative social survey of Reef visitors' perceptions of a range of different ACR devices in situ at GBR tourism sites.

The lead investigators were actively involved in the CMP design, activity planning, implementation and evaluation, alongside partners and CMP participants. Mixed methods were used to gather evidence that informed an ongoing Monitoring, Evaluation and Learning cycle for the CMP, including (a) an initial participatory design workshop, (b) periodic key informant interviews with local partners, and (c) structured deliberation discussions involving the CMP Coordination Team. Membership of the Coordination Team included the Hub Coordinators, the GBRF Director of Community Partnerships, a representative from the AIMS RRAP CAD Subprogram, and the CSIRO lead investigators. An additional research method was (d) administer a visitor survey, to investigate Reef visitor perceptions of ACR devices at GBR tourism sites.

Key findings and outcomes

From the in-water R&D: Key findings are expected to be reported by the RRAP CAD team; however, one important lesson arose from the CMP about limitations associated with handling coral recruits prior to reef site deployment (i.e. our recruits suffered 100% mortality within 3 months of deployment).

From the social R&D: Outcomes of the Moore Reef CMP included:

- Improved engagement and trust between RRAP scientists, CMP local partners and Traditional Owners of Moore Reef, with improved understanding of potential pathways associated with collaborative monitoring activities in collaborative restoration initiatives.
- An improved understanding of Gunggandji Traditional Owner aspirations for future collaborative restoration and monitoring, and resourcing and capacity building support required to enable more meaningful engagement, leading to tangible benefits.
- New skills and capabilities developed among CMP partners from training and monitoring activities, that are being applied in other local ACR projects. For example, Hub coordinators' involvement in the CMP led to insights on community participation that shaped subsequent local efforts in establishing non-RRAP tile recruitment studies.
- An improved understanding of other partners' (i.e. tourism operators, restoration practitioners) motivations and capabilities that can be leveraged in future collaborative initiatives.

From the visitor social survey key findings included:

- Reef visitors' observation of ACR devices at reef tourism sites had no significant effect on (a) their overall Reef trip satisfaction, (b) their perceptions of the Reef's visual aesthetic beauty, or (c) their level of concern about the future health of the Reef.
- Concerns about the use of ACR devices were generally low overall but were significantly lower among Reef visitors who observed them in situ at reef site(s).
- Reef tourism operators and demonstration sites, like those utilised in the Moore Reef CMP, provide a valuable communication and engagement pathway that can enhance stakeholder and public understanding and acceptance of RRAP restoration initiatives.

4.3 Activity 3: Exploring Partnerships for Scaling Up

Background

Scaling up coral protection interventions in the GBR is currently constrained by substantial costs. Market mechanisms to generate revenue for protection efforts are rare because reefs are a common-pool resource. There is a range of actors such as government, environmental non-for-profits, tourism industry and Indigenous rangers participating in coral protection interventions in the GBR. However, more actors including those who are not currently involved could be a potential resource for future scaling up of coral protection efforts, and they could potentially contribute to different aspects of scaling strategies beyond direct participation in deployment. Yet, there has not been an identification of new potential scaling partners, roles that they can play in contributing to different aspects of scaling strategies, and benefits that would motivate their participation in future interventions. Similarly, it was not well understood characteristics of partnership arrangements that are important to these potential scaling partners, and what could be barriers and enablers of such partnership. This project activity addressed these gaps by using a desktop review, interviews and case studies.

Objective

The objective of the project activity was to contribute to scaling up of coral protection interventions in the GBR by providing evidence to the RRAP leadership to inform scaling planning as it relates to Pilot Deployment Program and future large-scale intervention programs. Specifically, it explores the social, enterprise, cooperative and capability-based requirements of scaling strategies to complement the engineering, logistical and ecological requirements explored in other parts of the Program. This project activity also aims to achieve impact through sharing its findings with the broader community of practitioners, scientists and investors of coral protection through publications, conferences and RRAP communication efforts.

Methods

The work was undertaken in four phases between June 2021 and June 2025 with phase 1-3 below completed by June 2024 and phase 4 is currently ongoing.

1. Developed a workplan based on a desktop review of scaling frameworks for ecological restoration, initial scoping of coral protection in the GBR, and interviews with relevant RRAP leadership and researchers. Ethics review for the research methods was approved by the CSIRO Social Science and Human Research Ethics Committee.
2. Conducted 33 semi-structured interviews to map potential partners and their roles, benefits motivating partnership, barriers, enablers and desirable characteristics of partnership. The participants covered 11 sectors mirroring those of the referred through a snowballing method.
3. Completed two case studies to examine enabling elements of scaling strategies:

a. Capacity development for Traditional Owners – consisted of a full-day workshop with nine organisations and programs that provide capacity development-related services to Traditional Owner groups and Indigenous people on marine management to generate a collective picture of their activities, shared learnings, and explored possible connections.

b. Great Reef Census (GRC) - uses a business model canvas to unpack how this initiative scaled up volunteer and citizen science-based reef monitoring activities along the length of the GBR.

4. Translating findings on social strategies to scale coral protection in the GBR through publications, conferences and RRAP communication efforts, and provide inputs to RRAP R&D and Pilot Deployment Programs in their planning for scaling field trials as appropriate.

Key findings and messages

We identified a diverse range of potential partners from 11 sectors offering different combinations of physical, human and organisational capitals. Participants described nine different roles they could play to scale up coral protection, and many of these roles relate to ecosystem restoration scaling strategies. Benefits that motivate collaboration fall into seven categories: environmental benefit, business opportunity and value, employment opportunity, knowledge and technology, innovation, hope, and reputation. Participants expressed that trust, equity, respect and transparency are essential to relationship building and the kind of culture that they want to operate in, if engaged in future deployment. We elicited seven challenges and barriers to scaling up deployment partnerships, namely high costs and funding gaps, regulatory hurdles, capacity gaps, uncertainty and risks, poor management of local knowledge and intellectual property, improving Traditional Owner engagement, and misalignment of priorities. Enablers shared by participants provided contrasting features for similar themes to many of the identified challenges and barriers. At their core, these enablers reflect the partnership principles of trust, equity, respect and transparency.

The interview findings could inform RRAP scaling planning as:

- The findings relating to challenges, enablers and the case studies expand consideration of the soft infrastructure or toolkit available to inform and guide future scaling strategies.
- A mosaic of business models and relationship types will be required to scale up intervention deployment over time. The identification of potential deployment partners, diverse roles and co-benefits in this study contributes to scenario development and exploration of the relative merits of different scaling strategies such as those being proposed and pursued under the Pilot Deployment Program in southern, central and northern regions.
- The findings highlight the value of recognising and building on human capital that exists in the reef communities as part of the scaling solutions. Enrolling and developing that existing capital also increases social acceptance of interventions.
- Pursuing scaling opportunities through 'bottom-up' partnerships can provide important capability in the early to mid-deployment phases using existing human capital while technological, financial and regulatory aspects of scaling come online over time generating shorter-term 'wins' for the program and building of regional coalitions of potential future delivery partners.

A common theme of the two case studies is how collaboration is used, or could be used effectively, to find innovative solutions to scaling up management activities in marine environments. This strategy may be complementary to but distinct from more conventional strategies of seeking to increase funding or resources, technological or other strategies. The GRC case illustrates how collaboration can be embedded in a business model. The GRC were able to expand their access to key resources such scientific and technological capabilities and vessel time by building key partnerships based on the principle of mutual

benefits and alignment of interests. The first case study highlights how RRAP would benefit from exploring collaboration with existing marine management related Traditional Owner capacity development organisations and programs as they share aligned scope, beneficiaries, and locations. Moreover, these providers constitute a significant resource within the existing capability 'landscape' in which RRAP seeks to operate and contribute.

4.4 Activity 4: Scoping and supporting regional networks as multi-stakeholder platforms

Background

In several locations around the world, research, community and other stakeholders are trialling different models of regional networking as a strategy to support the scaling of coral restoration activities. In 2019 RRAP ENG researchers and RTP Community Partnerships Program Director recognised the opportunity to support the formation of nascent community-level collaborations in the Cairns-Port Douglas region as a pilot multi-stakeholder engagement platform for RRAP R&D and deployment and capacity building.

Objectives

Our action research objectives were to help scope, mobilise and support the development of a place-based collaborative network of local restoration practitioners, Reef Traditional Owners, scientists, NGOs, marine tourism operators and other local businesses in the Cairns-Port Douglas region. The network's purpose was to facilitate exchange of knowledge and build capability; and, to anticipate and help bridge a potential and perceived gap between diverse, existing local restoration efforts and emerging RRAP R&D activities. From an RRAP ENG perspective there was a deliberate intent to explore the potential of such a network to provide a multi-purpose engagement platform for RRAP R&D activity and future pilot deployment activities in the region; and evaluate this as a pilot model for potential use in other regions. Each of the three activities above have subsequently engaged through or leveraged off this emergent Reef Hub, and interaction is ongoing.

Methods

The core team for this activity included RRAP ENG researchers, RTP Community Partnerships Program Director and JCU TropWater researchers, who later provided formal Hub coordination functions. Broadly the research team adopted a hybrid action-research and interpretivist methodology. RRAP researchers played several critical roles in this process including conducting six initial research focus group discussions and several qualitative interviews with local and regional stakeholders to scope and frame the prospective collaboration and then document that scope, agreed operating principles and priority activities (see GBRF 2020, Appendix 1). ENG researchers participated directly in the Steering Group established to guide the Hub's early development. We also designed and implemented two cycles of a bespoke Monitoring, Evaluation and Learning Framework using qualitative interviews and participatory evaluation methodologies to support adaptive learning among participants (see Stone-Jovicich et al., 2021, Appendix 1). The ENG Subprogram also provided multi-year financial contribution to the operation of the Hub's Coordinator roles. The team has also engaged the Hub Coordinators, Steering Group and members in joint RRAP-Hub activities including as a point of engagement in social and ecological research; provided RRAP briefings to the Hub network on program progress and plans; and enabled discussion of opportunities for participation and procurement of services from local operators in pilot deployment with the Pilot Deployment Program (PDP) team. Activity was initiated in 2019 following the completion of the RRAP feasibility phase and is ongoing.

Key findings and outcomes

Since 2019 the CPD Reef Hub network has evolved and expanded to have ~160 members with 30-40 of those members regular participants in training1, events, planning days, briefings or collaborative projects. One of those collaborative projects has been the co-development of *collaborative monitoring program* in partnership with RRAP ENG and CAD teams (see *Activity 2*, this report). The Hub is locally governed and continuing to pursue its objectives around local capacity building, coordination and championing local restoration activities by regional researchers, tourism operators, Traditional Owners and others. We are continuing to see persistent demand from the Hub membership and leaders to engage with current and future plans for RRAP R&D and pilot deployments in the region. Importantly this is a demand that arguably RRAP is yet to fully meet. There is sufficient evidence to state that the Hub has significant scope to serve as an effective 'boundary' space to improve vertical and horizontal collaboration in research, development and practice in coral restoration and stewardship in the region that can contribute to scaling strategies. And importantly it can contribute to developing a local constituency and complimentary translation network for RRAP restoration techniques and methods as they mature. There is significant scope to consider how RRAP capacity building investments for the PDP could be served or augmented by working, in part, through the Hub and its members. There are both real and perceived issues regarding liability and probity surrounding Hub engagement in service provision for deployment that require further exploration. RRAP ENG researchers are currently developing plans (and novel processes) with M&DS sub-program and PDP team, the Hub and Great Barrier Reef Marine Park Authority to conduct a pilot process to trial the inclusion of local stakeholder values and priorities into the reef and site selection (during 2024-2025) for pilot deployment post November 2025, and as part of a potentially ongoing annual process of planning and review for pilot deployments in the region.

[1] Training events conducted by the Cairns Port Douglas Reef Hub have included a Coral Identification Workshop (March 2022) – a practical two-day workshop focused on identifying corals to the genus level; Collaborative Monitoring Project: photo-mosaic training – to undertake collaborative monitoring of CAD devices; Spawning School (December 2023) – a practical learning program on how to raise coral larvae for reef restoration; and the Recruitment Tile Study (late 2023), involved training participants to identify and monitor new coral recruits. See https://www.reefhub.com.au/

5 Summary of key findings from best-practice engagement research

1. Investing in practice-based, participatory action research that seeks to engage local stakeholders and community members, and foster inclusion in the RRAP, has yielded significant benefits for the Program by creating visible, practical and in some cases enduring spaces for participation. In essence this work has invested in building (and piloting) processes, practices, and platforms that can continue to support local stakeholder engagement and collaboration and potentially augment existing engagement forums in the Reef.

2. Providing different avenues for participation (e.g. from informing to collaborating) is a fundamental condition influencing social acceptance and support among the interest-based and place-based stakeholders in GBR regions and their aligned networks. There is considerable opportunity for RRAP (with other partners and managers) to contribute to building and strengthening a constituency for scalable coral restoration and adaptation if these conditions can be supported.

3. Each of the research activities confirmed there is a strong appetite amongst local stakeholders, interested community members, and actors engaged in existing restoration efforts and reef-related businesses to (i) learn more about what RRAP is doing and planning to do; (ii) contribute their own time to engage in meaningful dialogue and knowledge-sharing on the technical, social and ecological activities within the Program; (iii) initiate their own individual and collective actions in response to their participation, and; (iv) explore diverse opportunities for future involvement (from staying informed, through to exploring collaborations for implementation).

4. These activities have created spaces where trust is built, and transparency demonstrated between the Program and the communities where research and deployment is occurring or planned in the future. Relationships developed and insights shared between researchers and participants were highly valued by both groups, and in several instances had a material outcome on how intervention research activities proceeded.

5. Participants reported benefiting from their engagement in these activities, intellectually, socially and emotionally which in many cases has contributed to build new and strengthen existing social ties between local stakeholders and community members in the place-based settings in which we worked; and between RRAP researchers and participants.

6. Stakeholder and public participants recognised the ambiguity and uncertainty associated with future reef environments, technologies, stewardship and related management challenges. Where RRAP intervention science leads acknowledged and discussed these uncertainties this was valued and built trust. There was no expectation of simple answers or solutions but there is an expectation amongst communities of responsive and meaningful engagement as our (RRAP) problem and solution understandings develop over time.

7. Concerns and questions do exist among stakeholder and public participants about the efficacy and outcomes of aspects of the R&D program (ecological, social, cultural and economic). However, there is, by-and-large, considerable support for the ambition the Program holds. Risks identified by Community Panel participants were often akin to those understood or identified by RRAP researchers (e.g. the risk of misinformation about intended actions or consequences) and were often able to be constructively explored through deliberation.

8. Local stakeholders and community members identified diverse short- and longer-term future roles they sought to play in R&D and deployment. Importantly these were not restricted to direct

engagement through in-water or on-water activities (as is often assumed within the Program) but include educational, creative, capacity-building, advocacy, information-sharing or other potential roles in future restoration or resilience-building value chains or business models.

9. Our engagements reveal that a productive posture for RRAP looking ahead is to recognise how it plays into the mosaic of existing and future resilience efforts, including the existing human capital and activity in regions, and how in time, it can contribute to improving the efficacy of these existing efforts or build the broader restoration capability in the GBR, directly or indirectly. Helping to 'lift all boats' through translation and collaboration and articulating a 'road map' that is widely shared and understood by stakeholders and Reef managers is crucial to this posture.

6 Exploring implications for RRAP engagement: a scenario perspective

To explore implications and next steps arising from this suite of work we use two scenarios below framed on different narratives or postures the R&D program could adopt looking ahead. These two scenarios are not mutually exclusive, but they serve to highlight the different roles and activities engagement design and research might emphasise in the next phase of the Program.

The *first scenario* is the program adopts a posture of a standalone, future focused research and development program seeking social licence for the development of cost-effective novel reef intervention technologies deployable from 2030 or later. The *second scenario* sees the program adopt a more embedded posture as a knowledge-based collaborator in real-time resilience-based management in the reef, partnering with Traditional Owners, communities, industries and the Reef managers to "get ready to go" on reef repair and protection. Please note, the scenarios address some aspects of Traditional Owner partnering and participation, however implications for working with Traditional Owners going forward arising from our *Biocultural Assessment Framework* research activities will be discussed in the coming milestone report in November 2024.

6.1 Scenario 1: Science first

Under the *first scenario* the forward engagement strategy for the program to support intervention development and piloting emphasises strategic communication, program governance and targeted consultation. The program would continue to invest in social licence monitoring through surveys and interviews to inform social risk appraisal processes as part of RRAP governance. It would seek to maintain its own dedicated advisory arrangements such as the Stakeholder Advisory Group piloted in phase 1, as part of program governance. Free, Prior and Informed Consent would continue to be sought from Reef Traditional Owners, and arrangements maintained to support Traditional Owner participation in RRAP governance.

The program would expand its outreach and operational engagement to include more regular information and consultation sessions with existing reef advisory arrangements convened by reef managers (such as the Reef Advisory Committee and Local Marine Advisory Committees). Limited and/or opportunistic participation of local stakeholders in field trials and pilot deployments could occur, however, primary participation pathways here would be through procurement of services for capacity building and deployment by the pilot deployment program, involving Traditional Owners and a relatively limited number of tourism operators, or other reef industry actors, in some regions.

In this scenario, the RRAP could continue to work through networks such as the *Cairns-Port Douglas Reef Hub* as a consultation forum, and delivery mechanism for training and capacity-building, but limit its direct support of that emerging network. The program would not seek to translate the experience of the Hub to other regions by looking to scope or establish comparable regional platforms in the Townsville or Southern region. Recognising the value but resource-intensive nature of deliberative processes, efforts would be made during the (current) transition year (2024-25) and year 1 of Phase 2 to translate practice-based lessons and insights from *community panels* for instance to the operation of Local Marine Advisory Committees and to augment the operation of the RRAP Stakeholder Advisory Group. Similarly lessons from the *collaborative monitoring pilots* and *partnerships for scaling up* studies would be 'handed over' to potential end users, including internal end-users such as RRAP field scientists and the pilot deployment program. Current research capability could be refocused towards characterising and monitoring, social and

economic co-benefits of program implementation including pilot deployment and modelling of post-2030 socio-economic outcomes.

6.2 Scenario 2: In it together

The *second scenario* sees the program adopt a more embedded posture as a knowledge-based collaborator in real-time resilience-based management in the reef, partnering with Traditional Owners, communities, industries and the Reef Authority to "get ready to go" on reef repair, adaptation and protection. The program commits to supporting and working with place-based stakeholders and industry networks in reef regions (in addition to consultation through formal advisory structures). Where feasible and appropriate there is earlier sharing of methods and tools to reef mangers and restoration practitioners (including scientific and decision-support tools) as they are developed and tested. This in turn requires active participation of reef managers and stakeholders in the design and trailing of these tools and methods to support effective translation. This posture positions RRAP and the Pilot Deployment Program as part of active climate response capability alongside and augmenting efforts of reef managers and stakeholders.

The program works with and through emerging regional practice-networks to share knowledge and convene annual priority setting and review processes for field site and pilot deployment site selection. These processes support the inclusion of local values and criteria into those decisions and explore complementarity with existing non-RRAP stewardship and restoration activity. It adopts agreed annual spatially explicit implementation plans with local stakeholders and managers. This also contributes directly to regional scale planning and management activities in the marine park (e.g. Southern Plan of Management, COTS Control Program and Joint Field Management Program).

In addition to supporting and monitoring the above processes, engagement researchers are also active in working with local and regional stakeholders to develop appropriate business models and collaboration opportunities beyond procurement-based relationships to support scaling of efforts. Over the life of the program co-benefits are routinely monitored from the R&D and Pilot Deployment programs to understand the benefits of R&D and different deployment models (e.g. TO-led, tourism-led, and science-led) and used to report impact from the Program to partners and investors as well as improve program engagement design. This co-benefit monitoring data is also used improve the accuracy of modelling the longer-term (post 2030) program impacts on emerging restoration economies, stewardship and livelihoods.

Under this scenario the engagement strategy includes the support for and enrolling regional networks, continuing to immerse interested community members in the science and ambition of the Program through deeper deliberative processes and experiences that explore emerging risks and opportunities from multiple perspectives, and foster champions and translators in their communities. Here the engagement strategy also focuses on capturing and sharing stories of how RRAP is working with communities, managers and industry to create real benefits, build capacity and prepare for the challenges ahead.

7 Final comments

The two scenarios above are useful in that they highlight different needs and functions of the Program going forward. Scenario 1 emphasises the need for ongoing information gathering and formal consultation to ensure RRAP governance forums has the evidence, and procedures in place to demonstrate an understanding of social licence and public awareness of the program. Under this scenario the program views stakeholder and community engagement in a relatively minimalist, functional way, that is necessary to maintain support and understand stakeholder and community expectations. Genuine partnership opportunities however are limited in the short to medium term with RRAP seen operating 'at a distance' from existing restoration and resilience-based activities. This scenario would still require RRAP to invest in the development of information products and improve its operational capability and coordination to actively report and consult with the various advisory forums in the GBR on a regular basis. This would still see significant unmet demand for engagement and joint action that may result in greater likelihood of misinformation, loss of support and scepticism. The pace at which delivery capacity develops through translation may be reduced and there is less experimentation with business models resulting in greater reliance on public investment or high-level market mechanisms. Most direct socio-economic benefits would be limited to stakeholders enrolled through fee-for-service arrangements or where appropriate partnerships could be negotiated with Reef Traditional Owners in regions.

Scenario 2 emphasises the additional ways of working that RRAP would need to invest in, and participate in, to provide more meaningful and embedded delivery of its research and development, and pilot deployment program. This points to a more immediate and longer-term perspective on partnership-building and deliberation as fundamental strategies for both social licence and for enhanced translation and scaling opportunities. It also implies a commitment to working closely with place-based stakeholders on regular cycles of joint planning and review as crucial steps in both maintaining that support and identifying opportunities for future collaboration and benefit-sharing. Here RRAP is seen as a valued member of the resilience building community in the Reef, as well as a cutting-edge R&D program. Under both scenarios, new forms of R&D that aim to monitor and report on co-benefits accruing from the program (R&D and PDP) over time would generate valuable evidence for investors and stakeholders.

The 'best-practice engagement' research team will continue to work with the Subprogram and Program more broadly to identify which elements and postures from the above scenarios are both scientifically and operationally possible and normatively desirable, under the forward R&D planning arrangements. These findings are already being utilised by the team currently tasked with developing the *Engagement Strategy* for the Program.

Appendix 1. Publications and reports developed from the research

1. Bohensky, E., Stone-Jovicich, S., Williams, L. and J. Lacey. 2021. Best Practice Engagement - Participatory Community Panels. RRAP Milestone Report.

2. Stone-Jovicich, S., Bohensky, E., Taylor, B. 2024. Scaling out, up and deep: Lessons in collaborative planning from the Reef Restoration and Adaptation Program (RRAP) Community Panels. Presentation to the Reef Resilience Symposium, Cairns, 17 April 2024. (*also paper in preparation*)

3. Bohensky, E., Stone-Jovicich, S., et al. Revisiting "what to study" and "when to stop": A community panel perspective on novel coral reef intervention feasibility. *In preparation.*

4. Curnock M, Scott A, Chartrand A, Murgha B, Loder J, Donnelly R, Kish H, Fisher E, Forster R, Taylor B & Kong T. (2024). Collaborative monitoring for assisted coral recovery: Opportunities and potential benefits for large scale deployments and lessons from a pilot study at Moore Reef. Presentation to the Reef Resilience Symposium, Cairns, 17 April 2024.

5. Curnock M, Arya R, Chamberland E, Chartrand K, Edmondson J, Fisher E, Forster R, Lockie S, Loder J, Nembhard D, Scott A, Taylor B, Uusitalo J. (in review). Reef visitors' observation of assisted coral recovery devices in situ reduces concern about their use. (Submitted to PLOS ONE on 6/6/24).

6.Kong, TM and Taylor, B (2021) Reef Restoration and Adaptation Program – Partnerships for Scaling Up Reef Restoration and Adaptation: Brokering Co-benefits (Annual report 2020-2021). RRAP Milestone Report.

7. Kong, TM and Taylor, B (2023) Reef Restoration and Adaptation Program – Implementation of engagement with benefit group 1: semi-structured interviews on partnerships for scaling deployment. RRAP Milestone Report.

8. Kong, TM and Taylor, B (2023) Reef Restoration and Adaptation Program – Interview findings on scaling deployment partnerships. RRAP Milestone Report.

9. Kong, TM and Taylor, B (2023) Reef Restoration and Adaptation Program – Milestone 10.4 'Scaling' case study lessons mapped. RRAP Milestone Report.

10. Graham, V, Kong, T, Paxton, G, Piggot-McKellar, A, Baresi, U, Siehoyono Sie, L et al. (2022) Exploring the human dimensions of assisted adaptation and restoration of coral reefs. Sustainability Research & Innovation Congress: Oceania Satellite Event, Brisbane.

11. Kong, TM, and Taylor, B (2023). Scaling collaboration for coral restoration and adaptation in the Great Barrier Reef. AMSA Annual Meeting, Gold Coast.

12. Kong, TM, Taylor, B, and Graham, V (in review) Why partner? Harnessing value from collaborative sustainable business models to restore coral reefs at scale. (Submitted to PLOS ONE on 26/6/24).

13. GBRF (2020) Cairns-Port Douglas Reef Hub Discussion Paper: Ideas and next steps, December 2020. Prepared by GBRF, CSIRO, JCU and QUT (9pp.)

14. Stone-Jovicich, S. and Loder, J. 2021. MEL Framework CPD Hub – Scoping and Design Phase. Cairns – Port Douglas Reef Hub Monitoring, Evaluation and Learning Framework. Unpublished report to the Steering Group 15th February 2021. CSIRO & GBRF (19pp.)

15. Stone-Jovicich, S. 2022 Cairns-Port Douglas Reef Hub: Insights and Lessons Learned from the Setting Up Phase, Unpublished report to the Steering Group 30 June 2022 CSIRO (12pp)

16. Stone-Jovicich, S. 2024. Update and report to CPD Reef Hub Steering Group, 22nd March 2024. Unpublished presentation.

17. Maclean, K., Muir, B., Forester, M., Moran, C. Grant, C., Evans-Illidge, L., Devow, D., Taylor, B., and Schmitt, K. (2025) Reef Restoration and Adaptation Program – Guidance to RRAP from the Biocultural risk and opportunity assessment project. Reef Restoration and Adaptation Program (pp30)

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