

Green Climate Fund Regional Tuna Programme:

Feasibility Study

Chapter 4

Programme overview

Prepared by the Pacific Community and Conservation International on behalf of 14 Pacific Island countries for submission to the Green Climate Fund

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Annex 2-E of the Funding Proposal “Adapting tuna-dependent Pacific Island communities and economies to climate change”



Pacific
Community
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Chapter 4: Programme overview

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4. Programme Design

4.1 Design and implementation approach

4.1.1. Stakeholder engagement to inform design and implementation of Components A and B

Stakeholder engagement and assessments of the GCF Regional Tuna Programme (RTP) priority areas for both Component A and Component B were undertaken by SPC and CI during months 3-10 of Funding Proposal development in the national capitals of all 14 participating countries.¹ These preliminary, in-person national consultations utilized a tiered approach: the first day consisted of courtesy meetings with the offices of the 14 GCF National Designated Authorities and their key staff, and advice was taken regarding courtesy calls to other pertinent government ministries or departments. The following day consultations focused on the National Fisheries Agencies, including both oceanic and coastal fisheries staff, and other key government ministries and regional agencies with overlapping initiatives, including but not limited to Ministries of Finance, Environment and Climate Change departments.

Following these consultations, CI and SPC worked closely with the Fisheries Ministries and NDA offices to conduct in-depth stakeholder consultations (see Annex 07). Where possible the Ministry of Fisheries staff led the stakeholder consultations themselves, often in both English and local languages. The stakeholders in attendance of these consultations included members from civil society, public and private sector actors, other key government entities, micro, small and medium scale enterprises operating within the fisheries sector, women's groups, fisher's associations, non-profits and other organizations. These in-country consultation events provided an opportunity for a variety of stakeholders to be briefed on the overall GCF Programme and to solicit their guidance and feedback on individual country priorities under components A and B to be incorporated into the full Funding Proposal. A summary of key areas identified for consideration in Programme design during these national level consultations is summarized in the Stakeholder Engagement Plan in Annex 7.

Additional engagement was supported at four regional meetings (WCPFC-19 in month 3, Heads of Fisheries in month 6, WCPFC-20 in month 15, and the Climate Change Adaptation Workshop – National GCF Programme Validation Meeting in month 17). These consultations provided opportunities to keep the participating countries abreast of updates, changes and challenges, and provided them further opportunity to provide feedback and ask questions. Specific feedback related to governance and implementation arrangements was received and incorporated into the overall programme design as well as detailed workplans and Programme activities. The message communicated to the countries at all consultations has remained consistent: this is their Programme and their full ownership and buy-in is necessary, supported and expected.

During WCPFC-20 in December 2023, a side meeting was held with industry to brief them on the overall programme and solicit buy-in and support for participation and cofinance. Because the industrial fishing fleets have the means to conduct the type of oceanographic data collection required to feed into the AWS under Component B, SPC briefed them on the overall programme design specific to these data collection needs and requested support via their participation in Component B of the programme. Although no firm industry commitments were made at that meeting SPC has already established collaborative arrangements with several fishing companies operating in the region (in Solomon Islands, Fiji and FSM). These companies are supporting field activities to collect tissue samples for genetic analysis and oceanographic data. This collaboration will be expanded in the immediate future including under the Programme. In addition, the value of industry support for the research that will be undertaken under Component B has been the subject of dedicated consideration

by the 14 Participating Countries. Countries have undertaken to underscore this critical engagement with industry during their bilateral fisheries access negotiations. In addition, countries have undertaken to review national legislation to ensure that such collaboration is not inconsistent with national policy and legislative provisions.

Engagements with stakeholders were held at both the national and community level during the PPF. A summary of the key outcomes from these consultations are presented in Annex 07 of the Funding Proposal.

At the community level, consultations were held with representatives of community fishers in all participating countries. These consultations took the form of interviews to determine the needs and priorities of small-scale fishers. Across all countries, there was an awareness of FADs and a consensus over the perceived benefits afforded by FADs to food security. More detailed community consultations, particularly around selection of FAD installation sites is planned for Programme implementation. The messaging from community level consultation varied depending on whether they were familiar or not with FAD fishing (refer to Annex 07 of the Funding Proposal for a summary of these consultations).

In November 2023, consultations relating to Technical Study 3² were undertaken with each of the 14 countries participating in Programme with a focus on Activity 1.1 relating to national FAD programmes. Thirty-eight additional officials from the 14 participating countries (nine women) participated in these half day consultations virtually. A PowerPoint presentation was prepared for each meeting. A copy of the presentation was provided to each country. At the conclusion of the presentation the floor was opened for general discussion on the status of the preparation of the Funding Proposal, budget matters and approval processes.

Prior to finalising Programme design, SPC and CI sent a full draft of the Funding Proposal main text to the 14 countries in January 2024, ensuring they had a full month to review the document prior to the Regional Validation Meeting. SPC and CI hosted this regional Validation meeting for the 14 NDAs and Heads of Fisheries in February 2024 with the aim to review the most pertinent components of the FP, including proposed work programs and budgets, implementation arrangements, the monitoring and evaluation plan³ (M&E Plan, see below). During this workshop, the countries identified errors, gaps and shortcomings, and SPC had the chance to clarify process, timeline, staffing, procurement and governance questions and comments. The Theory of Change and Logical Framework were also presented in detail. All 14 NDAs, Heads of Fisheries or their representatives, and participants from FFA and CSIRO participated in the workshop. The NDAs reflected on the advice and recommendations of the CI-GCF Agency, SPC and their Heads of Fisheries and undertook a critical review of the Proposal. Additional clarifications and requests related to country level workplans and budgets were provided back to SPC and CI. As a result, further revision and refinement was undertaken by SPC and CI prior to formally inviting NDAs to provide no-objection letters (NOLs) supporting formal submission of the Funding Proposal to the GCF Secretariat through CI as the GCF Accredited Entity for this Programme.

Following the regional validation workshop in Wellington, CI and SPC arranged for national validation meeting in each of the 14 Participating Countries. These workshops were multi-stakeholder events facilitated by a senior representative of the national fisheries administration with administrative and technical backstopping provided virtually by CI and SPC. The workshops provided an opportunity for minor refinement of some elements of the Programme. Importantly, none of the participating countries considered there was any major obstacles to securing formal endorsement for submission of the Funding Proposal to the GCF.

4.1.2. Relevance of the Programme to prior and ongoing regional projects related to fisheries and climate

In early 2023, SPC surveyed regional and national initiatives and projects related to fisheries and climate change that were being implemented, or were in planning stages, of relevance to the RTP. The purpose of the survey was to complete a profile for each project or initiative that is of direct, or potential, relevance to the RTP.

The projects reviewed were a mix of single country (bilateral), groupings of between 2 – 7 Pacific Island countries and regional arrangements, projects and initiatives. Regional arrangements included participation by the majority of the membership of SPC and FFA. There were also instances of the inclusion of a Pacific Island country in a funded programme for which most of the participating countries are not geographically located in the Pacific.

A number of climate change programmes are also supported through collaboration between funding organisations, and in some instances with governments of developed countries. Some have led to the establishment of finance hubs or other funding facilities that make funds available for climate change or conservation investment in the form of loans or grants.

RTP proponents engaged with participating countries through a variety of channels because the methods by which Pacific Island States designate contact points with funding bodies for the UN and international conservation and climate change conventions is not uniform. For example, the national contacts for GCF and GEF are not usually the same individual or institution. While a few countries have created dedicated Climate Change offices, most have created divisions within the offices of heads of state or, for the most part, with economic planning, environment, or finance ministries. The latter are also likely to deal directly with international finance institutions such as the World Bank and ADB. GEF on the other hand communicates with political focal points that are typically Ministries of Foreign Affairs and operational focal points which are typically within environment departments. Projects coordinated by regional organisations generally will have established official contacts first politically and then, as appropriate, from the government agency responsible for the sector concerned.

The ability for countries to access climate change funds for national projects coordinated through a dedicated climate change office is likely to build capacity to manage and implement projects and strengthen inter-sectoral and inter-ministry communication across the different arms of the government with differing mandates. However, this system presents communication challenges for small and poorly resourced administrations which could contribute to slow or poor project implementation.

These considerations are important when considering the design of the RTP and have implications for implementation arrangements and coordination at the national level.

4.1.2.1. Process to identify relevant projects and initiatives

To identify relevant initiatives and projects, officials representing fisheries agencies, departments, and ministries with responsibilities for environment, development assistance and other relevant government agencies in each of the 14 GCF Participating Countries were consulted. Individuals were typically national designated authority (NDAs) contacts, focal or operational contacts for principal climate change funding avenues such as the GCF itself or the GEF. These contacts were not necessarily based in departments or ministries that had the overall national mandate for climate change and environment.

Regional projects and initiatives typically had multiple sources of relevant project information. This wasn't the case for national or bilateral projects for which information sources were limited to one or two individuals.

Time limitations constrained the capacity to engage with environmental non-governmental organisations (eNGOs) directly. However, references to some initiatives were identified on donor websites. These included a relevant recently completed project delivered by the Micronesian Conservation Trust (MCT) in FSM listed on the Adaptation Fund website. Another was a Vanuatu community-based climate resilience project (VCCRP) that aims to work with highly vulnerable rural and coastal communities to increase their resilience to climate change, through targeted community and local adaptation activities in the agriculture and fisheries sectors. It is funded by the GCF and delivered through Save the Child Fund Australia.

Initiatives led by NGOs, that may or may not source funding support from traditional environment funders, and with who may, or may not, liaise closely with relevant mandated government bodies, raises questions about coordination and synergies across the climate finance sector.

Project information was sourced from the websites of organisations such as the International Union for Conservation of Nature (IUCN), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), GCF, GEF, Australian Centre for International Agricultural Research (ACIAR), NZ Aid Programme, United Nations Food and Agriculture Organisation (FAO), Asian Development Bank (ADB), Pacific European Union Marine Programme (PEUMP) and the Adaptation Fund.

A review of the websites for participating countries' national fisheries and other administrations also provided information on relevant projects currently being implemented. The review of these websites, however, did not often provide information for pipeline initiatives or projects that might be under discussion or design. Information typically was confined to projects currently being implemented.

Website searches and direct communication also extended to regional organisations such as the FFA, SPC, SPREP and the Forum Secretariat. The Regional Manager for GCF also provided some project information and regional contacts for other donor entities that support projects focused on the environment and natural resources.

It is important to note that the Pacific is a dynamic environment where Projects are continually conceived, implemented, and concluded.

4.1.2.2. Project Relevance

A simple system of ranking projects or initiatives of relevance to the RTP proposal was applied (**Error! Reference source not found.**).⁴ This was based on the information available for each project which was then subjectively ranked the projects in terms of relevance:

Projects and initiatives include those that:

- replicate through similar objectives and activities as are planned for the RTP;
- are currently being designed or have the flexibility to adapt, to support similar activities; and
- have recently been completed⁵, or are currently being implemented.

Projects determined to be directly relevant, are those thought to replicate in whole, or in part, the effort to increase the domestic consumption of tuna, particularly through the deployment of Fish Aggregating Devices (FADs). These projects also feature the availability and use of reliable ecosystem

information needed to determine how tuna resources will respond to climate change and the adoption of reforms required to minimize risks to food security across countries.

Table 4 A simple ranking projects or initiatives in the Pacific Islands region of relevance to the RTP proposal

	Directly	Some overlap relating directly to tuna fisheries and climate information and use
	Somewhat	Climate and ocean specific information and use – e.g. science-based advice on adaptation planning for longer term climate change impacts applied for fisheries, including coastal and other resilience work. Keywords – coastal and marine ecosystems, metrological, disaster risk, food security. Not necessarily tuna.
	Less	Completed projects, projects where fisheries focus mentioned but no evidence of tuna specific activities
	Marginally	Of note: Project titles listed but no summaries prepared. Of little direct relevance to the RTP.

Several environmental adaptation and climate change resilience projects are also relevant. They focus more broadly on building the resilience of Pacific Island coastal and marine ecosystems through strategic approaches to climate change adaptation planning and decision making by strengthening integrated holistic and long-term strategic frameworks. Typically, they also support and focus on the availability and use of ecosystem-related information, including climatic change and climatic variability (See Section 2.4 and 4.1.2).

Projects considered to be less relevant to the RTP proposal may include actions such as integrated risk-assessment information and data and analysis arrangements to support decision making. However, the purpose for the inclusion of projects classified as less relevant primarily relates early warning systems⁶ focused on land-use and development planning and disaster preparedness and the use of common climate related information and data bases. These essentially climate change or adaptation projects are not necessarily directly marine, fisheries or food security focused. A final section relates to climate change projects that are of note but which do not fall within the general scope of the first three categories. Summaries were not prepared for these projects.

The summary list of the projects reviewed, in no order of priority, is appended at [Appendix 4-A](#). Project summaries are appended at [Appendix 4-B](#).

4.1.2.3. Coordination

The RTP has been designed to avoid duplication of effort, to maximize complementarity with existing initiatives, and to add value to the maximum extent feasible. Information generated during the scan undertaken in early 2023 identified several projects that are directly relevant to the RTP. While climate resilience and adaptation are common features across most projects there are a limited number that support activities associated with FADs or the utilisation of tuna to support national food security. However, all of those identified with FAD and food security components, apart from the World Bank PROPER project and the GEF-supported Oceanic Fisheries Management Project III, will have concluded by the time the GCF programme commences in late 2025/early 2026.⁷

During the early stages of implementation of the RTP, in consultation with national stakeholders, it will be useful to learn about the achievements, challenges and lessons learned for these projects. Such information will provide valuable guidance for adapting the RTP, as appropriate, to add genuine value to these initiatives. Given the changing environment and limited visibility into pipeline projects currently under development, efforts will also be made during the start of RTP implementation to ensure complementarity with new projects not identified here.

4.2. Detailed Programme design

Programme interventions were designed to specifically address barriers identified through consultation with governments, regional organizations, stakeholders, experts, and potential beneficiaries of the Programme. These barriers are listed below.

4.2.1 Barriers preventing solutions to the socio-economic problems caused by coral reef degradation and tuna re-distribution

The barriers preventing solutions to socio-economic problems to be addressed by the RTP fall into two categories:

- those that are limiting increased access to tuna for the livelihoods, food security and healthy diets of coastal and urban communities; and
- those that prevent governments from understanding and responding to the implications of climate-driven tuna redistribution for their communities and their economies.

4.2.1.1. Barriers to use of tuna for the food security of urban and coastal communities

Coastal communities have not been able to access sufficient tuna to offset the effects that climate change-induced coral reef degradation, and population growth, are having on per capita fish supply for a variety of reasons.

First, many Pacific Island governments do not have sufficient resources and capacity to scale up the use of the nearshore artisanal fish aggregating devices (FADs), recommended by the Pacific Community (SPC),⁸ designed to help coastal communities catch tuna and other types of near shore pelagic fish.

Specific barriers to scaling FAD programmes include lack of resources to: institutionalise national FAD programmes; provide training in safe and effective aFAD-fishing methods; provide technical services and support to remote coastal rural communities, ensure that vessels used by small-scale fishers to fish around FADs are fit for purpose; mainstream disaster preparedness and recovery plans for small-scale fishing communities; cyclone proof national FAD systems in countries prone to cyclones; train communities without refrigeration in simple post-harvest methods (e.g., drying and smoking) to increase the storage life of tuna caught around FADs and promote small scale enterprise participation in the FAD related activities.⁹

Second, despite existing regulations mandating that transshipment of tuna catches caught by industrial purse-seine fleets must occur in Pacific Island ports,¹⁰ many governments have not been able to invest in supply chains to deliver tuna from transshipping operations to rapidly growing urban and peri-urban communities, due to uncertainty about the locations of future hubs of fishing activity.¹¹ Patterns of transshipment in regional ports are already affected by ENSO and will be influenced further by climate change.¹² Unless reliable information on the locations of future fishing hubs is available it will not be possible to identify the investments in market and supply-chain facilities needed to distribute tuna to urban communities effectively.¹³

Third, there is a lack of awareness among both coastal and urban communities about the current and projected climate-change induced shortage of coral reef fish,¹⁴ and the need to diversify fish consumption to include much more tuna in their diets to ensure food security and healthy diets.¹⁵ A description of each barrier in relation to access to tuna and bycatch for the livelihoods, food security and healthy diets of coastal and urban communities is presented in [Appendix 4-C](#).

4.2.1.2. Barriers to national economic security and economic development due to tuna redistribution

The governments of tuna-dependent Pacific Island countries are acutely aware of the implications of climate-driven redistribution of tuna from their EEZs to high-seas areas for their economies.¹⁶ However, there is a fundamental barrier preventing adaptation to the economic impacts of tuna redistribution, i.e., inadequate information for governments about the timing and extent of climate-driven changes in the distribution of tuna biomass. This lack of information limits the ability of Pacific Island countries to maintain their jurisdiction over the historical levels of tuna catch taken in their territorial waters. For example, the existing fishing restrictions designed to constrain operation of purse-seine vessels in high seas areas described in WCPFC's Conservation and Management Measure (CMM 2021-01¹⁷), could be challenged by nations from outside the region once a greater proportion of tuna occur in international waters.

To ensure that the effects of climate change are increasingly integrated into regional tuna management arrangements, the Pacific Islands Forum Fisheries Agency (FFA) succeeded in having a Climate Change Resolution adopted by the Western and Central Pacific Fisheries Commission (WCPFC) in 2019 (See Section 2.4).¹⁸

However, measures to secure the benefits of tuna for Pacific Island countries under a changing climate remain to be identified and implemented. For example, obtaining the necessary international agreements in the relevant fora, including through the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, will only be possible with improved modelling and monitoring of tuna stocks. In particular, negotiating continued rights for Pacific Island countries to tuna as the biomass of the target species progressively decreases in their EEZs and increases in the high seas as a consequence of climate change will require more accurate information on the timing and extent of tuna redistribution.

In the absence of a system to provide more reliable forecasts of tuna redistribution and inform appropriate adaptations, a climate justice issue will arise. Tuna-dependent Pacific Island countries that have produced negligible GHG emissions and have few other options to support their national economies will lose vital government revenue (See Section 2.3.12), resulting in an inability to provide the basic services needed by their citizens to adapt to climate change.

The subtropical Pacific Island countries are also expected to benefit from development of the reliable information system described above. In particular, it will enable subtropical countries where preliminary modelling indicates that abundance of tuna could increase¹⁹ to evaluate adaptations to capitalise on opportunities, e.g., increased industrial fishing, opportunities to host increased transshipment and unloading operations and/or tuna processing.²⁰

To provide the reliable information needed to predict the redistribution of tuna with confidence for use in management and investment decisions, the key weaknesses within existing modelling approaches need to be addressed. Essential improvements to models include: identifying responses of tuna resources to climate change at higher resolutions (this will require integration of information on tuna connectivity, tuna stock structures and meso-scale oceanography); improved assessment of

the effects of climate change on the food webs that support tuna resources; and incorporating ocean forcings for all GHG emission scenarios.

A description of each barrier preventing governments from understanding and responding to the implications of climate-driven tuna redistribution for their communities and their economies is presented in [Appendix 4-D](#).

4.2.2. Interventions to remove barriers

4.2.2.1. Strengthening national FAD programmes targeted at coastal communities

Rapid population growth, combined with degradation of coastal habitats compounded by climate change, is creating a gap in the availability of fish needed for economic and social development with specific implications for national food security.

Coastal communities have not been able to access sufficient tuna to offset the effects that the combination of climate change-induced coral reef degradation and population growth are having on per capita fish supply. This is because the promotion of nearshore fishing for oceanic tunas has only received intermittent and generally inadequately planned support from national governments. This has partly been as a consequence of limited local capacity to secure the resources required for significant initiatives targeting increased utilisation of coastal oceanic fisheries resources and a resulting reliance on bilateral or multilateral development assistance partners for relative short term project-type assistance (see [Section 4.1.2](#)). Most PICs do not have sufficient resources and capacity to scaleup the use of the nearshore artisanal fish aggregating devices (FADs), recommended by the Pacific Community (SPC),²¹ to support efforts by coastal communities to catch tuna and associated near shore pelagic fish as protein-rich alternatives to depleted reef-associated marine resources and relatively unhealthy imported alternatives.²²

One set of actions within Component A of the RTP will provide direct and supplementary resources to contribute to national efforts to address barriers constraining increased utilisation of the region's abundant tuna resources in nearshore waters by coastal communities. Programme interventions to address the barriers related to increased fishing, processing and marketing of nearshore oceanic tuna and associated species have been formulated on the basis of the region's varied experience utilising artisanal FADs.²³ This includes the lack of resources to:

- institutionalise national FAD programmes;
- provide training in safe and effective FAD-fishing methods;
- ensure that vessels designed for use by small-scale fishers to fish around FADs are fit for purpose;
- provide technical services and support to remote coastal rural communities in relation to FAD deployment and maintenance,
- train communities without easy access to refrigeration in simple post-harvest methods to increase the shelf life of tuna caught around FADs, and
- promote small scale enterprise participation in FAD related activities.

To promote the institutionalisation of FAD programmes in PIC governments' on-going recurrent support to coastal communities as a means address threats to national food security, the Programme will facilitate the review of existing institutional and legislative provisions relating to FADs utilised by local fishers. This will provide a sound basis for engaging with coastal communities to collaborate on the location, use and maintenance of FADs. Critically, in those countries subject to regular extreme

weather events, particularly cyclones, national FAD management plans will provide for the establishment of cyclone proof storage facilities, such as shipping containers, to improve resilience and reduce the response time to re-establish FADs in the event of a natural disaster. This will reduce the traditional reliance on international disaster relief efforts to support the recovery of affected communities.

Encouraging fishers to operate further from the coast in more oceanic waters offshore from traditional fishing grounds on relatively sheltered coral reefs and associated lagoons will need to be accompanied by initiatives to improve sea safety. Working with national maritime bodies and fisheries agencies, the Programme will support initiatives, such as regulatory reviews and training programmes, to improve small vessel design and vessel operational practices in efforts to minimise sea safety incidents associated with fishing around FADs.

The collection and analysis of data that can be used to assess the costs and benefits of FADs, a component generally lacking in past national FAD programmes, will be essential in terms of future planning and providing a basis for designing and implementing a sustainable national FAD programme. In addition, options for processing the catch taken in association with FADs to extend its shelf life and support possibilities for distribution of the catch to more distant areas, including inland rural communities remote from the coast, will be explored and promoted. Success in this regard opens possibilities for small and medium sized enterprises to assume a key role in promoting nearshore fisheries targeting tunas and associated species harvested from around FADs and to make a significant contribution to efforts to alleviate national food security threats for a greater proportion of the national population.

Table 4.2 Estimated tonnes of fish needed to meet the recommended protein requirements of urban or peri-urban populations in key port countries in 2030 and 2050.²⁴

Country	Estimated population in urban and peri-urban areas ²⁵	Fish needed for protein requirements (MT)	Current landings of bycatch (MT)	% of fish requirements supplied by bycatch	Gap in fish supply (MT)
2030					
FSM	23,000	1,476	135	9.1	1,341
Kiribati	74,000	4,855	386	8.0	4,469
Marshall Is.	40,000	2,399	77	3.2	2,322
PNG	1,407,000	73,773	2,739	3.7	71,034
Solomon Is.	169,000	8,786	1,036	11.8	7,750
Tuvalu	7,000	480	4.4	0.9	476
Total	1,720,000	91,771	4,378	4.8	87,394
2050					
FSM	22,000	1,467	135	9.2	1,332
Kiribati	96,000	6,399	386	6.0	6,013
Marshall Is.	39,000	2,390	77	3.2	2,313
PNG	1,962,000	104,763	2,739	2.6	102,024
Solomon Is.	253,000	13,528	1,036	7.7	12,492
Tuvalu	7,000	493	4.4	0.9	489
Total	2,372,000	129,039	4,378	3.4	124,662

4.2.2.2. Improve supply of tuna and bycatch from industrial fishing for urban communities

The combined urban populations for the key purse-seine transshipment port PICs are projected to increase from 1.5 million in 2022 to ~1.7 million in 2030, and to ~2.4 million in 2050 (Table 4.2). The increases in urban populations will put pressure on food and other resources, particularly for countries where climate change will negatively impact the productivity of marine and terrestrial environments.

Directing fresh or frozen and brined tuna and by-catch from commercial purse seine in port transshipment and longline unloading operations offers potential to assist in efforts to address impending gaps in the availability of fish that will become increasingly prevalent through to 2050.^{26,27}

However, the potential volume of tuna and bycatch processed through PIC ports may decline due to the projected effects of ocean warming on the distribution of tuna – a key area to be addressed by RTP under the Advanced Warning System (AWS) (see Section 2.310).

While transshipment at sea for longline vessels is generally prohibited by FFA countries within EEZs, transshipment at sea is allowed for longliners on the high seas subject to flag State authorisation. On that basis, a smaller proportion of the overall WCPFC longline catch is landed at PIC ports.²⁸ However, purse seiners authorised to fish within the Economic Exclusive Zones (EEZs) of FFA member countries are required to undertake all transshipments in port. The majority of the transhipped purse seine catch is destined for canneries. After processing it is sold in international markets in Europe, northern America and Asia. A simple projection of transshipment volume for the key PIC port countries, based on forecasted changes in catch within the countries' EEZs (see Chapter 2), is presented in Table .

Table 4.3 Projected volume of purse seine transshipment and potential tuna bycatch available in key port countries in 2050.

Country	Declines in tuna catch within EEZ from Bell et al. (2021) (%)	Simple projection of transshipment volume under RCP8.5 (MT) ²⁹	Potential bycatch available based on 1% of transshipment	Projected urban population growth in 2050 compared to 2022 ³⁰
FSM	-13.0%	167,625	1,676	-6%
Kiribati	-8.21%	273,727	2,737	48%
Marshall Isl.	-0.7%	255,326	2,553	-3%
PNG	-33.1%	207,441	2,074	62%
Solomon Isl.	-26.1%	53,507	535	79%
Tuvalu	-23.40%	100,217	1,002	3%
Total	-20.3%	1,057,842	10,578	46%

These projections do not take into consideration vessel licencing and/or political arrangements (including the influences on the flag States of vessels) that could lead to changes in catch unloaded or transhipped in PIC ports. This could occur as a result of changes in the behaviour of fishing fleets in response to redistribution of tuna responding to changing oceanographic conditions due to climate change and, as a result, fish caught within the countries' respective EEZs. In addition, it could also be the case that some fish caught on the high seas, including in the Eastern Pacific Ocean (EPO), will still be transhipped in a PIC port in the WCPO. In such a situation, PIC ports that are most likely to be

utilised for transshipment will be those located in the eastern WCPO, where the need for bycatch is much lower than in western PICs with larger populations.

Assuming that the potential volume of bycatch which can be recovered from purse-seine transshipments remains around the average industry estimate of 1% (essentially lower value tuna and bycatch), transshipment operations are unlikely to provide sufficient fish to fill the gap in the supply recommended as necessary to meet the protein requirements of increasing PIC populations.³¹ In addition, changes in fishing technology as well as regulatory changes, such as area closures or introduction of marine protected areas, may impact on (i.e., reduce) the volume of bycatch available from purse-seine transshipment or longline unloading operations in the future.

These factors highlight for the need for a multi-sector approach to increasing the availability of tuna and associated species from commercial fishing operations for consumption in urban centres of PICs with a high population growth under changing climate conditions.

The RTP will support activities to remove barriers to the increased utilisation of transhipped and unloaded tuna and bycatch from commercial tuna fishing operations in PICs with fast-growing urban populations by supporting:

- i) the development and implementation of policies by national governments that mandate the landing of tuna and bycatch during transshipping and unloading operations, particularly tuna caught by industrial purse-seiners (normally destined for canning) and fresh or frozen tuna unloaded from longliners in PIC ports, and
- ii) research and trials of alternative processing and product presentation options for frozen and brined tuna landed by industrial purse seiners to increase acceptance and demand among peri-urban and urban populations in PICs.

Some PICs currently have bans or restrictions on commercial landings by commercial tuna fishing vessels as a means to protect its local/artisanal fishing sector. However, as populations increase, and the availability of reef-associated fisheries resources continues to decrease in response to climate change, these PICs will be required to explore alternative sources of fish protein to address threats to national food security.

A second set of actions within Component A of the RTP will support policy review and development to promote increased availability of tuna and bycatch from the commercial tuna fleets by formalising requirements for purse seine and longline vessels authorised to fish within the EEZ of a country to undertake a minimum number of transshipments or unloadings in port, irrespective of fishing patterns that can vary across years as a result of the prevailing ENSO conditions. The policy could make it easier for port countries to encourage commercial tuna vessel operators to land tuna and bycatch as needed.³²

To harness the full benefits of policies aimed at increasing the delivery of bycatch to bolster domestic fish supply in key purse-seine and longline unloading port countries, upgrades to existing market infrastructure and supply chain networks are required. For the most part, upgrades are necessary to support more efficient distribution of all fisheries products to meet the SPC Health Division's recommended protein intake under the urban population projections.³³ The Programme will support activities that result in improved design for market facilities presenting fresh and processed tuna from commercial tuna fishing fleets that are hygienic and address key issues prevalent at current market facilities such as poor preservation facilities, access to running water and the safe disposal of waste.

Climate change-related impacts on coral reef ecosystems are reducing the supply of reef-associated fisheries resources and threatening the food security of more than four million people that live along

the coasts of the Programme's targeted 14 PICs. Shared across the coastal and urban communities in these PICs is a general lack of awareness about the imminent climate-change induced shortage of reef-associated fisheries resources,³⁴ and the need to diversify fish consumption to include much more tuna in daily diets to address threats to national food security and maintain healthy diets.³⁵ The Programme will support focussed activities designed to improve awareness of these impending threats to traditional lifestyles in PICs and behavioural change initiatives will encourage increased representation of tuna and associated bycatch species in the diets of PIC peri-urban, urban and rural coastal communities.

4.2.2.4 Development of an Advanced Warning System to reduce uncertainty in climate-driven tuna redistribution and tuna catch/access fees and inform adaptations to maintain important contributions of tuna to national economies.

Component B of the RTP addresses the need to manage the risks to PIC economies, and the vulnerable populations who depend on public spending, associated with the changing distribution of tuna due to climate-induced changes to the WCPO ocean ecosystem by providing reliable information on the scope and magnitude of tuna redistribution.

This will be achieved through the development of an 'Advance Warning System' (AWS) to forecast and project nearer-term changes in the distribution of tuna across the tropical Pacific Ocean, providing robust forecasts in 1–10-year timeframes, rather than the existing 30–50-year range.

Because the AWS will provide a finer resolution of changes in tuna distribution, from the current basin scale to the scale of individual EEZs, including relative abundance within EEZs and the high seas, the AWS will support PICs to identify adaptations to capitalise on projected changes in the abundance of tuna in their waters with greater confidence.³⁶

Development of the AWS centres around a new paradigm of reducing uncertainty in assessing the likely effects of ocean warming on tuna by establishing tuna 'resource maps' based on the distributions of self-replenishing tuna populations (stocks) and modelling the effects of climate change on each tuna stock. The key investments needed to build and operate the AWS are:

- i) Collection of tissue samples from tuna across the WCPO and EPO, in collaboration with industrial fishing companies, for use in genetic population analyses to identify the stock structure of skipjack, yellowfin, bigeye and albacore tuna;
- ii) Analysis of genetic samples to produce 'resource maps' showing the number and distribution of all stocks comprising each species of tuna within its range in the tropical and subtropical Pacific Ocean;
- iii) Tuna-tagging programmes to verify the distribution, size and behaviour of all identified tuna stocks;
- iv) Launching the AWS by integrating the projected effects of climate change on each tuna stock to produce robust assessments of the recommended sustainable catch from the WCPO expected to be caught in the EEZs of Pacific Island countries, and in high-seas areas, on a regular basis in the decades ahead; and
- v) Collaborations with industrial fishing companies operating in the WCPO to collect data on sea surface temperatures and ocean current velocities to inform and validate global climate models. Acoustic data will also be collected to assess responses of tuna prey to climate change to improve models predicting the responses of tuna species to ocean warming.

As a key Implementing Partner, Australia's Commonwealth Science and Industrial Research Organisation (CSIRO) will have a significant role in delivering the Programme targets associated with

the AWS. Through its Oceans and Atmosphere business unit, CSIRO will contribute its extensive experience to Component B of the RTP through the provision of technical support to the development and application of the Advanced Warning System (AWS):

- Close-kin Mark Recapture (CKMR)
- Gene-tagging and high through-put workflows
- Population structure, connectivity and species identification
- Population biology and epigenetics of tuna
- Integrated relational data systems
- Climate, ocean and fisheries modelling
- Climate change impacts on fisheries

Critically, applying the outputs from the AWS, PICs whose tuna resources are affected by climate change will be appropriately resourced to negotiate the right to manage the historical levels of tuna catch taken in their waters. This means PICs will have a stronger negotiating position and have greater confidence negotiating in international fora with confidence within WCPFC (the relevant Regional Fisheries Management Organisation (RFMO)), for example, through the process for allocation of fishing rights in high-seas areas under development by WCPFC, and relevant international development forums.

SPC has established a foundation for Activity B1 through its work as the Science Service Provider for WCPFC. This work has resulted in:

- i) development of the SEAPODYM model to assess the effects of climate change on the distribution and abundance of tuna;
- ii) protocols for collecting and storing tuna samples for genetic analysis;
- iii) methods for tagging tuna to verify the stock structure; and
- iv) stock assessment models that can be used to develop indicators for climate-driven redistribution of tuna.

This experience lays a firm foundation for building an AWS based on identifying the stock structure of the main tuna species and then applying improved versions of the SEAPODYM model to each stock at finer spatial resolution. In collaboration with the Forum Fisheries Agency (FFA), which will provide the necessary economic analysis, this will provide tuna-dependent countries with the capability to anticipate the magnitude and consequences of tuna redistribution on future government revenue.

In addition, despite existing regulations mandating that transshipment of tuna by industrial purse-seine fleets must occur in Pacific Island ports, many governments have not been able to invest in supply chains to deliver tuna from transshipping operations to rapidly-growing urban communities, due to uncertainty about the locations of future hubs of fishing activity. Patterns of transshipment in regional ports are already affected by ENSO and will be influenced further by climate change. Unless reliable information on the locations of future fishing hubs is available, it will not be possible to identify the investments in market and supply-chain facilities needed to distribute tuna to urban communities effectively. The AWS will generate the information required to support future investment decisions relating to shore-based support to the fishing industry.

The AWS will also ensure the continued effective and sustainable management of the largest tuna fishery on the planet as the impacts of climate change force an eastward redistribution of tuna stocks. The AWS will collect, analyse, and disseminate critical information on the stock structure, abundance, and projected climate change-driven redistribution of tuna to PICs and the primary regional management body for Western and Central Pacific Ocean (WCPO) tuna stocks – the WCPFC.

In so doing, the AWS will ensure that appropriate management decisions continue to be made under changing climate conditions. The AWS will collect data across more than 3.4 billion hectares. The information produced by the AWS will contribute directly to effective management decisions and strategies by using data to sustain the productivity of the industrial fisheries targeting the dominant tuna species in the WCPO, and the ecosystem that supports them.

The key indicator for the effectiveness of the AWS will be the extent to which the Scientific Committee (SC) for the Western and Central Pacific Fisheries Commission (WCPFC) – the Regional Fisheries Management Organisation responsible for fisheries across the WCPO – incorporates information from the AWS into its recommendations to the Commission for the conservation and management measures required to sustain the production of these globally-significant tuna resources as the climate and oceanography of the tropical/sub-tropical Pacific Ocean continue to change, including through development of Harvest Strategies. The contributions of the AWS to improved tuna management by WCPFC in the face of ocean warming will be quantified by utilisation of AWS-generated information in the documentation and analyses underpinning the regular assessments of the status of tuna stocks made by the SC, independent peer reviews of the quality of those assessments by international experts, and the use of the SC assessments by third party sustainability certification bodies such as the Marine Stewardship Council.

There is limited potential for the AWS outputs to inform the establishment of large-scale marine protected areas (MPAs) as a conservation and management tool supporting the sustainable use of WCPO tuna resources. Large-scale, no-take marine protected areas (MPAs) have either been established,³⁷ or under consideration,³⁸ in several PICs and expansion of such areas to reach 30% of the ocean area is actively promoted. Justification for the establishment of large oceanic MPAs often includes the conservation benefits that they generate for tuna stocks. The conservation efficacy of an existing MPA, the Phoenix Islands Protected Area (PIPA) and a series of large hypothetical MPAs each constituting approximately 33% of the WCPO, for two important and contrasting tuna species, skipjack and bigeye tuna were recently evaluated.³⁹

The evaluation concluded that stock-wide conservation benefits of the PIPA for these species, assuming that total fishing effort was maintained, to be weak to non-existent. Conservation efficacy of MPAs for species such as tropical tunas is limited by their wide larval dispersal and high mobility of later life stages, which spatially dissipate the protective effects of MPAs. Also, the displacement of fishing effort from MPAs to areas remaining open can have negative consequences for stocks and fisheries performance in those areas. The evaluation concluded that large oceanic MPAs are not likely to be effective frontline management tools for tropical tunas and other species having similar life history characteristics. In addition, the PIPA has been unsuccessful in establishing a sustainable financing mechanism for its on-going support and the Government of Kiribati has revoked the legislation establishing the PIPA.⁴⁰

National capacity building will be incorporated into all Programme activities. The aim of this investment is to strengthen and sustain:

- i) institutional and governance arrangements for national FAD programmes, and for transshipping and unloading operations, to increase access to tuna for national food security;
- ii) understanding of the AWS at the national level and use of information from the AWS to develop the regional solidarity and negotiating skills needed to enable Pacific Island countries to maintain the historical contributions of tuna to their national economies; and

- iii) use of the AWS to guide other adaptations where appropriate, e.g. adaptations to capitalise on any opportunities arising from redistribution of tuna to subtropical Pacific Island countries.

4.2.3. Theory of Change/Logframe

The Regional Tuna Programme addresses a range of complex social, economic, environmental and resource management problems that are increasingly compounded by the adverse impacts of climate change on the Western and Central Pacific Ocean (WCPO) large marine ecosystem and the people and economies of 14 small island developing States that are reliant on the rich tuna resource that ecosystems and ecosystem services supports.

Rapid population growth in many Pacific Island countries (See Chapter 1 and 2) is already creating a gap in the supply of fish needed for food security – sustainable harvests from coral reefs and other tropical coastal habitats can no longer provide the quantities of fish recommended for good nutrition of Pacific Island people.⁴¹ Degradation of coral reefs as a consequence of ocean warming, marine heatwaves, acidification and increased frequency and severity of extreme weather events due to climate change is reducing the amount of fish reef ecosystems can provide, widening the gap in fish supply (see Chapter 2). The impacts on coral reefs are reducing the supply of reef-associated fisheries resources and threatening the food security of more than four million people that live along the coasts of the Programme’s targeted 14 PICs (see Chapter 1).

In addition, preliminary modelling of the effects of ocean warming on the WCPO marine ecosystem demonstrates that the distribution of the region’s rich tuna resources will move progressively to the east and, to a lesser extent poleward (See Chapter 2). PICs and other key stakeholders in the WCPO tuna fishery, the largest tuna fishery globally, have acknowledge increasing needs to consider the impacts of climate-induced redistribution of tuna on the commercial fleets that operate throughout the WCPFC Convention Area.

This was first elaborated by the Eleventh Regular Session of the WCPFC Scientific Committee (SC11) in 2015. In 2019, WCPFC adopted a Resolution requiring the Commission and all of its subsidiary bodies to consider the impacts of climate change in their decision-making.⁴² The Commission’s primary decision in relation to the sustainable use of target tropical tuna stocks are recorded in Conservation and Management Measures (CMMs). The latest iteration of the tropical tuna measure, CMM 2023-01 (Chair’s draft), records in its preambular paragraphs:

Noting that the SEAPODYM analyses presented to SC11, SC12 and SC13 on the projected impacts climate change will have on tuna distribution, larval numbers and stock biomass, the WCPFC needs to build resilience into the medium and long-term planning and manage WCPO fish stocks in a precautionary manner, as mandated in WCPFC Resolution 2019-01 and Article 30(2)(c) of the Convention requires the Commission to ensure there is no disproportionate burden of conservation action on developing States, Parties and Territories;⁴³

SEAPODYM is the foundation on which the Advanced Warning System (AWS) described in Component B of the Programme will be developed.

Redistribution of the region’s tuna stocks will adversely impact the economies of the 14 PICs that rely on the revenue generated through tuna fisheries that their exclusive economic zones (EEZ) support and which underpin their economic and social development.

The redistribution of tuna is projected to reduce total tuna catch from the combined EEZs of PICs by 10-30% by 2050. Lower tuna catches are expected to have significant impacts on these tuna-

dependent Pacific Island economies, 10 of which derive an average of 37% of their (non-aid) government revenue from access fees paid by industrial tuna fishing fleets operating in their waters.⁴⁴

The RTP will:

- i) increase supply of tuna for domestic consumption as an adaption to degradation of coral reefs and the resulting food insecurity for increasingly vulnerable populations; and
- ii) provide the tools and training required to minimize the risks to PICs whose vulnerable economies are threatened by climate-driven redistribution of tuna.

The Programme will be implemented in 14 PIC participating countries. Conservation International will be the Accredited Entity (AE). The Pacific Community (SPC) is the Executing Entity (EE). Implementing Partners include the Pacific Islands Forum Fisheries Agency (FFA) and Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO).

4.2.3.1. Theory of Change

The Programme's Theory of Change (ToC) guides the more detailed Programme Logical Framework. At its highest level, the ToC presents a statement of the overall Goal and intended impact of the RTP, as follows:

IF Pacific Island governments are supported to implement effective programmes for assisting coastal and urban communities to obtain and utilize more tuna, and are provided with improved information on climate change-driven redistribution of tuna;

THEN Pacific Island nations will be transformed to become more resilient to key climate change threats facing the fisheries sector

BECAUSE communities and governments will be better informed and equipped to make optimal use of the fisheries resources on which they depend for food security, livelihoods, and economic development.

The ToC illustrates the interlinkages between Programme activities and outputs to overcome the identified barriers and how these will lead to achieving the desired outcomes, co-benefits, and ultimately, the transformational paradigm shift that will bring about greater resiliency to climate change threats, the overarching Goal of the Programme. The ToC (**Error! Reference source not found.**) for the RTP is based on:

- i) providing coastal communities with the knowledge, equipment, awareness and skills needed to reduce their dependence on declining coral reef fish by supporting the transition to increased access and utilisation of tuna and associated oceanic species to meet national food security needs;
- ii) ensuring that the supply and utilisation of tuna and bycatch to urban communities from industrial tuna fishing fleets during transshipment or unloading operations is secured and increased; and
- iii) building long-term resilience to the impacts of climate change for national economies that would otherwise lack tools to understand the timing and extent of climate-driven redistribution of tuna and the full effects of this redistribution on government revenue.

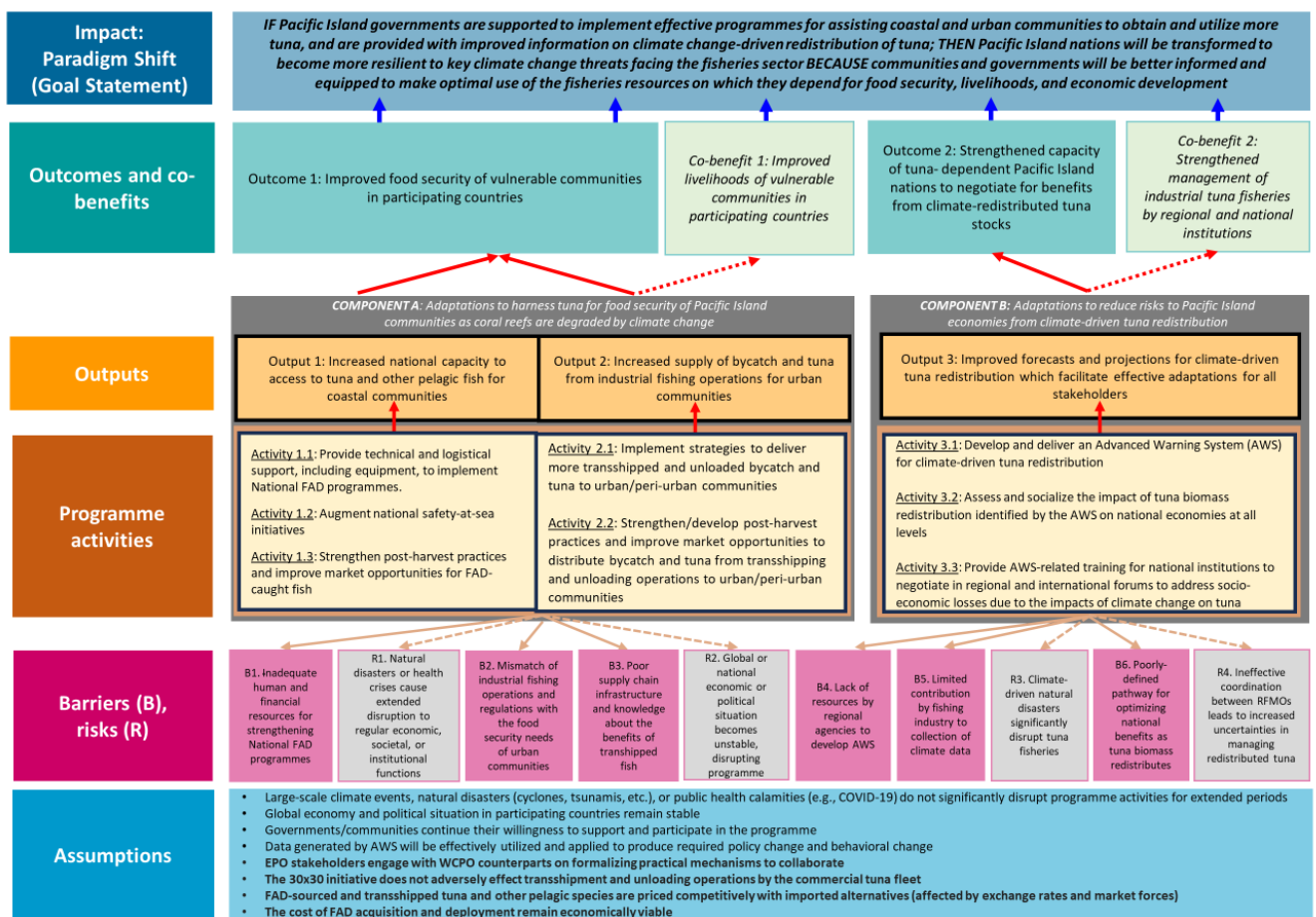


Figure 4.1. Theory of Change for the GCF Regional Tuna Programme

The transition to making tuna a cornerstone of national food systems represents a fundamental change in the development pathway for PICs. Under business as usual, the availability of nutritious animal protein (fish) per capita is projected to decline significantly because of climate change on fisheries production from coral reefs and associated coastal ecosystems. In addition, the relocation of tuna transshipping operations by the commercial tuna fleet in response to the redistribution of tuna (and associated fishing activity as transshipment locations close to the fishing grounds are preferred for economic and logistic reasons), and population growth, exacerbate malnutrition in some areas, and the broad scale consumption of low-quality food with the associated elevated incidence of non-communicable diseases. [some editing undertaken] Component A is designed to address the barriers inhibiting increased access and utilisation of the region's tuna resources to contribute to impending threats to national food security and make tuna a cornerstone of national food security in the 14 PICs.

The second Component, Component B, will support an improved ability to provide forecasts (<10 years) and projections (>15 years) for changes in the distribution of tuna at the regional and national level. This will be achieved through an improvement in the collection, resolution and quality of information from the Programme's Advanced Warning System (AWS). This will enable PICs to secure the essential economic and social benefits from the region's most valuable renewable resource that they have historically benefitted from. In the absence of a reliable climate information system to provide forecasts and projections for the future distribution of tuna, the economic and social

development of PICs will be increasingly retarded at a time when it is imperative to increase the resilience of those vulnerable communities and economies.

In addition, the AWS will provide the evidence that countries, and the regional agencies that support them, need in order to pursue options for maintaining the rights of PICs to regional tuna resources that underpin these vulnerable national economies.

The ToC also demonstrates how the proposed investments will contribute strongly to two of GCF's four adaptation results areas: 'A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions' and 'A2.0 Increased resilience of health and well-being, and food and water security'.

The assumptions which have been considered in developing the ToC include the following external factors:

- That Programme interventions will be effective when appropriately designed - e.g. fishers will utilize FADs and reduce reef fishing; the availability of tuna and by-catch to urban and peri-urban communities will be boosted and, by providing improved data and analysis, the management of tuna stocks and negotiation for fishing license revenue will be strengthened
- Large-scale climate events, natural disasters (cyclones, tsunamis, etc.), or public health calamities (e.g., COVID-19) do not significantly disrupt programme activities for extended periods
- Global economy and political situation in participating countries remain stable
- Governments/communities continue their willingness to support and participate in the Programme
- Data generated by AWS will be effectively utilized and applied to produce required policy change and behavioural change
- EPO stakeholders engage with WCPO counterparts on formalizing practical mechanisms to collaborate
- The 30x30 initiative⁴⁵ does not adversely affect transshipment and unloading operations by the commercial tuna fleet
- FAD-sourced and transhipped tuna and other pelagic species are priced competitively with imported alternatives (affected by exchange rates and market forces), and
- The cost of FAD acquisition and deployment remain economically viable.

Of the assumptions listed above, 2-4 reflect large-scale events which could potentially affect the implementation of the Programme. The latter five are more narrowly focused and Programme-specific, and potentially would have a clearer effect upon the transition from Programme outputs to outcomes and impact. In general, if the assumptions which have been made prove to be false, this will result in adverse effects for the Programme. To ensure Programme effectiveness, it will be important to monitor the assumptions for adaptive management.

4.2.3.2. Logical Framework (Logframe)

In addition to describing the Programme outcomes, outputs, activities, and deliverables, the logframe also establishes Programme-specific Indicators, Means of Verification (MoV) and targets, by which Programme performance will be measured as part of Programme monitoring and evaluation (M&E) functions (Table 4.4). Indicators will be used to measure progress toward reaching established targets as compared to baseline values. The full list of Programme indicators and targets are included in the Funding Proposal text, section E.

The Programme will be implemented over a 7-year period of performance. A workplan, which includes a Programme timetable and key milestones, has been prepared, and is presented at **Annex 5** of the Funding Proposal.

The ToC (**Error! Reference source not found.**) illustrates the interlinkages between programme activities and outputs, and how these will lead to achieving the desired outcomes, co-benefits, and ultimately, greater resiliency to climate change threats, the overarching transformational paradigm shift of the Programme. The Logical Framework (**Table 4.4**) describes the activities that will be supported by the RTP to achieve its overall Goal and how Programme impacts will be monitored and evaluated.

The Programme is designed to overcome the barriers identified in **Section 4.2.1** and **FP Section B.1.** to bring about a paradigm shift in the way that tuna stocks—the most valuable food resource across the vast Pacific region—are assessed, managed, and utilized. The Programme will ensure that countries whose economies are dependent on the revenue generated from commercial tuna fisheries will be capable of adapting to climate change-driven redistribution of tuna stocks, thereby enabling them to continue to have access to the resource and the accompanying benefits for improved food security, health, livelihoods, and the inclusive economic opportunities they confer.

Table 4.4 Simplified Presentation of the Logical framework for the Regional Tuna Programme

Output	Activity	Sub-Activity	Deliverables
Output 1: Increased national capacity to access tuna and other pelagic fish for coastal communities	Activity 1.1: Provide technical and logistical support, including equipment, to implement National FAD programmes.	1.1a. Audit progress towards requirements for scaling-up national FAD programmes in the 14 participating countries.	1.1a-1. Audit reports against criteria specified in the SPC Policy Brief 31/2017
		1.1b. Develop work plans for scaling-up national FAD programmes based on the audit.	1.1b-1 Work plans
		1.1c. Review national policies and regulations to identify barriers to the equitable and sustainable use of FADs.	1.1c-1 FAD Management Plans that reflect revised policies and regulations to remove barriers to the equitable and sustainable use of FADs in 14 Participating Countries.
		1.1d. Design and implement capacity development activities to augment the skills of national staff to implement FAD programmes.	1.1d-1. Increased numbers of skilled staff designated to implement strengthened National FAD Programmes in 14 countries through train-the-trainer programmes.
		1.1e. Design and implement a gender-responsive consultative stakeholder engagement strategy for national fisheries agencies to utilise in consultations with communities to identify suitable FAD deployment sites.	1.1e-1. Stakeholder engagement strategy applied during consultations for identifying FAD locations in 14 countries based on bathymetric analysis and past catch information from communities.
		1.1f. Procure materials to expand and maintain national FAD programmes.	1.1f-1. Materials required to construct, deploy and maintain FADs are procured.
		1.1g. Enable small-scale fishers to catch tuna and other pelagic fish around FADs that integrate traditional knowledge.	1.1g-1. Train-the-trainer courses in effective FAD-fishing methods for use in 14 countries.
		1.1h. Improve the capacity of national FAD programmes to effectively collect and utilize catch data.	1.1h-1. Records of target fish catches from FADs. Records of non-target species interactions in FAD fisheries. FAD-related deployment and catch data for improving FAD design.
		1.1i. Establish/strengthen national response mechanisms to natural disasters affecting small-scale fishers using FADs.	1.1i-1. Improved response plans in 14 countries.
	Activity 1.2: Augment national safety-at-sea initiatives	1.2a. Conduct a needs analysis for improved vessel safety for small-scale fishers using FADs.	1.2a-1. Needs analyses for improved vessel design for 14 countries; tested designs for safer and more efficient vessels; options for promoting improved vessel design uptake among coastal fishers, including training of local boat builders.
		1.2b. Establish the enabling conditions for national meteorological services to provide improved weather and extreme event warnings to small scale fishers.	1.2b-1. Improved systems for accessing natural disaster and meteorological forecasts via mobile phones and other methods for small-scale fishers in 14 countries.
		1.2c. Support procurement and delivery of boating safety equipment, linked to vessel registration where practical.	1.2c-1. Materials required to support safer fishing around FADs from both canoes and motorised vessels procured.
		1.2d. Increase national capacity to regulate and provide training in the use of the boating safety equipment.	1.2d-1. Train-the-trainer courses for small-scale fishers in the use of boating safety equipment in 14 countries. 1.2d-2. Review and needs analysis of national regulations on boat safety.
	Activity 1.3: Strengthen post-harvest practices and improve market opportunities for FAD-caught fish	1.3a. Provide training courses for subsistence households and MSMEs to improve preservation of FAD-caught fish using post-harvest methods, e.g., drying, smoking and bottling, incorporating traditional knowledge.	1.3a-1. Train-the-trainer courses that result in utilisation of post-harvest methods to increase storage life and value of FAD-caught fish in 14 countries.
		1.3b. Provide coastal communities with basic equipment to apply post-harvest methods, including practical options for cold storage where appropriate.	1.3b-1. Basic equipment for drying, smoking or bottling FAD-caught fish utilised in selected countries, and operational cold storage for fish established at selected sites.
		1.3c. Identify and promote market opportunities for FAD-caught fish.	1.3c-1. Market opportunities for FAD-caught tuna for MSMEs identified and tested.
		1.3d. Conduct communication campaigns to raise awareness of coastal communities about the impacts of climate change on coral reef fish and the need to consume more FAD-caught tuna for community food security.	1.1.3d. Integrated, multi-media campaigns that raise awareness of climate-related impacts on coral reef ecosystems, and promote FAD-caught fish as an alternative food source, in targeted coastal communities.

Output	Activity	Sub-Activity	Deliverables
Output 2: Increased supply of bycatch and tuna from industrial fishing operations for urban/peri-urban communities	Activity 2.1: Implement strategies to deliver more transhipped and unloaded bycatch and tuna to urban/peri-urban communities	2.1a. Assess the supply of bycatch and tuna available for offloading at each transhipping and unloading port.	2.1a-1. Assessments of the availability of bycatch and tuna.
		2.1b Evaluate the projected shortfalls in the supply of fish needed for the food security of urban and peri-urban communities by 2030 and in following decades.	2.1b-1 Projected shortfalls in supply to meet future demand for fish by urban and peri-urban communities where transhipping and unloading occurs.
		2.1c. Use the Advanced Warning System (A/WS) (see Activity 3.11 below) to assess the implications of tuna biomass redistribution for transhipping and unloading activities across the region.	2.1c-1. Projected changes in location and frequency of transhipping and unloading operations identified for the countries where these activities occur.
		2.1d. Build national capacity to conduct policy analysis on current and future transhipment and unloading of bycatch and tuna.	2.1d-1. Policy analyses for current and future transhipment and unloading of bycatch and tuna for the countries where these activities occur, including increased capacity for local staff to undertake the required policy analysis.
		2.1e Develop procedures and regulations to increase availability of transhipped and unloaded bycatch and tuna where needed to fill the gap in fish supply.	2.1e-1 Procedures and regulations to increase the supply of transhipped and unloaded bycatch and tuna suitable for human consumption and/or production of animal feed and fertiliser.
	Activity 2.2: Strengthen/develop post-harvest practices and improve market opportunities to distribute bycatch and tuna from transhipping and unloading operations to urban/peri-urban communities	2.2a. Provide training for urban communities to improve/develop post-harvest processing techniques for bycatch and tuna from transhipping and unloading operations.	2.2a-1. Train-the-trainer courses in post-harvest methods to extend shelf life and add value to transhipped brined bycatch and unloaded frozen tuna.
		2.2b. Pilot alternative marketing mechanisms to support increased trade in bycatch and tuna in urban areas.	2.2b-1. Novel post-harvest products and evaluations of the success of mechanisms to market them to support increased trade in bycatch and tuna.
		2.2c. Conduct communication campaigns to raise awareness of urban/peri urban communities about the impacts of climate change on coral reef ecosystems and the need to consume more bycatch and tuna to meet future nutrition	2.2c-1. Integrated, multi-media awareness campaigns to raise awareness of climate-related impacts on coral reef ecosystems, and promote bycatch and tuna as an alternative food source, in targeted urban/peri-urban communities.
		2.2d. Provide fish market outlet designs at various scales for countries where transhipping and unloading occurs.	2.2d-1. Fish market outlet designs
Output	Activity	Sub-Activity	Deliverables
Output 3: Improved forecasts and projections for climate-driven tuna redistribution which facilitate effective adaptations for all stakeholders	Activity 3.1: Develop and deliver an Advanced Warning System (AWS) for climate-driven tuna redistribution.	3.1a. Transition existing fisheries and ocean monitoring systems to produce higher-resolution forecasts and projections of tuna biomass redistribution.	3.1a-1. High-resolution version of the SEAPODYM tuna-climate model suitable for EEZ-scale analyses of changes in tuna biomass distribution.
		3.1b. Establish baselines and indicators for quantification of climate change impacts on distribution of tuna biomass.	3.1b-1. Geographical boundary and absolute population size baselines for each Pacific tuna stock, and population census information needed for optimisation of the SEAPODYM tuna-climate model.
		3.1c. Enhance collection and curation of physical oceanography and micronekton data to inform the modelling of climate-driven redistribution of tuna biomass.	3.1c-1. Baseline sub-surface ocean state observations to validate the SEAPODYM tuna-climate model.
	Activity 3.2: Assess and socialise the impact of tuna biomass redistribution identified by the AWS	3.2a. Conduct bio-economic and fleet dynamics modelling to estimate changes in tuna catch, and associated socio-economic benefits.	3.2a-1. Fully functional A/WS, producing national and regional economic and resource outlooks.
		3.2b. Assemble evidence for Pacific Island countries to use in negotiations at regional and global scales to address the impacts of climate-driven tuna redistribution.	3.2b-1. Documented evidence for 14 countries and their regional agencies to use in negotiations.
	Activity 3.3: Provide AWS-related training to national institutions to negotiate in regional and international forums to address socio-economic losses due to the	3.3a. Academic and vocational training to increase the number of Pacific Island fisheries and climate staff with enhanced capabilities to negotiate to retain the national benefits received from tuna.	3.3a-1. Trained and fully competent national officers in A/WS operations for sustainability of the A/WS.
		3.3b. Assemble evidence for Pacific Island countries to use in negotiations at regional and global scales to address the impacts of climate-driven tuna redistribution.	3.3b-1. Documented evidence for 14 countries and their regional agencies to use in negotiations.

Collectively, the Programme's activities will result in two Outcomes:

- i) Improved food security for vulnerable communities in participating countries, and
- ii) Strengthened capacity of tuna-dependent Pacific Island nations to negotiate benefits from climate redistribution of tuna stocks.

These Outcomes are closely aligned to GCF's fund level indicators. These Programme Outcomes are:

- i) 'Strengthened institutions capable of implementing effective adaptations, especially National FAD Programmes, to increase access to tuna (A5.0)';
- ii) 'Increased awareness of threats to reef fish supply from climate change and the need to use more tuna for domestic food security (A8.0)';
- iii) Increased generation and use of climate information to identify future tuna distribution with confidence (A6.0); and
- iv) 'Strengthened capacity of PICs to reduce exposure of their economies to climate-driven tuna redistribution by negotiating for the retention of present-day benefits received from tuna (A7.0)'

Component A: Adaptation to harness tuna for food security of Pacific Island communities as coral reefs are degraded by climate change.

The purpose of Component A is to implement adaptative measures to harness tuna to improve food security for communities across the Pacific islands. These measures are needed in order to offset the reduced availability of coral reef-dwelling species of fish—long the preferred source of dietary protein for Pacific Island communities—which is occurring as a result of the impacts of climate change.

Improved food security of vulnerable communities in the 14 PICs will be achieved through two streams of activity under Component A that deliver:

i) *Output 1: increased national capacity to access to tuna and other pelagic fish for vulnerable coastal communities:*

The first set of activities under Component A is aimed at strengthening national programmes to employ artisanal fish aggregating devices (FADs) for the sustainable harvest of tuna and associated pelagic fish species by coastal communities. Principal beneficiaries for this set of activities are residents of coastal communities across the participating PICs. The activities that will contribute to this output include:

- a). institutional support for the strengthening of national artisanal FAD programmes (Activity 1.1),
- b). strengthening practices, both formal (such as policies, regulations, deterrent actions) and informal (such as awareness raising, and training workshops), to improve safety at sea for fishers operating around FADs (Activity 1.2), and
- c). supporting initiatives to improve the post-harvest preservation, distribution and utilisation of tuna and bycatch among rural communities (Activity 1.3).

Safety at sea activities will be implemented by SPC utilising procured expert services under SPC's procurement procedures. The primary objective will be to research and test designs for small scale fishing vessels that can be used with relative safety by small scale fishers operating around FADs. SPC will implement the remaining activities under this component.

ii) *Output 2: Increased supply of bycatch and tuna from industrial fishing operations for urban and peri-urban communities.*

a).

A second set of activities under Component A is also designed to provide greater access to tuna and other high-protein pelagic fish, but in this case, the source is through the transshipping and off-loading of tuna and bycatch from industrial fishing vessels in PIC ports. Because transshipment and unloading

ports are located in larger population centres, this activity set will serve urban and peri-urban populations.

Through the implementation of this set of activities, the programme will:

- Implement strategies to deliver more transhipped and unloaded bycatch and tuna to urban/peri-urban communities (Activity 2.1); and
- Strengthen and develop post-harvest practices and improve market opportunities to distribute bycatch and tuna from transshipping and unloading operations to urban/peri-urban communities (Activity 2.2).

Achievement of Outputs 1 and 2 will lead to the realization of ***Outcome 1: improved food security of vulnerable communities in participating countries.***

Component B: Adaptation to reduce risks to Pacific Island economies from climate-driven tuna redistribution

Component B is focused on improving the understanding of the oceanography of the WCPO and the impacts of changes in oceanic environmental variables as a consequence of climate change. SPC will be responsible for the implementation of all activities to deliver this output under this Component:

Output 3: Science-based forecasts and projections that reduce uncertainty in climate-driven tuna redistribution are available to all stakeholders.

Current projections suggest that in coming years, due to the expected effects of climate change on sea surface temperatures and related oceanographic environmental variables, there will be a trend towards eastward (and a less pronounced poleward) relocation of major tuna stocks across the Pacific. As a result, a large portion of these stocks will be found less frequently, and in reduced numbers, within the Exclusive Economic Zones (EEZs) of the PICs where they currently occur. These PICs are heavily dependent upon tuna for revenue generation (through the collection of licensing fees) and for meeting the food security needs of their populations. Instead, tuna will be more commonly found in the high seas areas of the Pacific, and possibly within the EEZs of countries further to the east.

Improved scientific knowledge generated under this Component will be applied to forecast (<10 years) and project (>15 years) the response of the region's valuable tuna resources to changes in the oceanography of the WCPO. This will have direct implications for PICs whose economies depend on the commercial tuna fisheries supported by this major ocean ecosystem services. As an implementing partner, FFA will be responsible for associated economic assessments to provide PICs with forecasts for revenue implications associated with changes in behaviour of the commercial tuna fleets as tuna redistribute. A second implementing partner will be the Commonwealth Scientific and Industrial Research Organisation (CSIRO) based in Australia. CSIRO will take responsibility for much of the genetic tissue analysis required to better delineate stocks and model changes in the distribution of tuna in response to changing oceanographic conditions at their state-of-the-art biological laboratories in Hobart, Tasmania.

This Component will develop and deploy an Advanced Warning System that reduces the uncertainty relating to the redistribution of tuna in response to climate-induced changes in the WCPO marine ecosystem. PICs will have access to improved, higher resolution, data that will be used to forecast and project the economic implications for the redistribution of tuna through changes in the demand for access to EEZs to fish by the commercial fishing industry. The AWS will also generate benefits for the fishing industry and help inform their future investment decisions.

Recent advances in oceanographic analytical methods, such as SEAPODYM⁴⁶ modelling, analytical genetic techniques, such as close-kin genetic studies,⁴⁷ and other new technologies are expected to deliver more accurate predictions for-describing the response of climate-affected tuna stocks. This information will provide the foundation for creating an Advanced Warning System (AWS) that can be used to assess the climate-induced movement and distribution of stocks of major species of tuna across the Pacific.

Creation of the AWS will depend in part upon genetic analysis of tuna tissue samples collected across the Central and Western Pacific Ocean (WCPO). By cooperating with industrial fishing companies, major cost savings in conducting the sampling to gather the necessary scientific information can be realized.

The data gathered through the AWS will be disseminated through reports, notifications, and advisories, which will be issued to the participating countries at regular intervals, or as conditions require. In addition, AWS data will provide a foundation for exploring a range of international legal arrangements, to construct and put into force agreements that will secure the historical rights of the tuna-dependent countries of the Western Pacific, into the future.

Concurrent with efforts to establish multilateral agreements, measures will be undertaken to ensure that these agreements will be effectively implemented. Successful implementation will depend upon high-level country and regional representatives, as the key actors, having a clear understanding of how such agreements would ensure that the rights of the participating countries are upheld and respected. This will be achieved through design and implementation of several targeted training modules, plus provision of technical and legal support for the drafting of the multilateral agreements. As defined in the Programme framework, the activities included within Component B are designed to:

- develop and deliver an Advanced Warning System (AWS) for forecasting and projecting tuna redistribution (Activity 3.1);
- assess the impact of tuna biomass redistribution identified by the AWS on national economies at all levels (Activity 3.2); and
- provide AWS-related training to national institutions to engage in regional and international negotiations relating to impacts of climate change on tuna (Activity 3.3).

Successful implementation of these activities will lead to the realization of Output 3: improved forecasts and projections for climate-driven tuna redistribution which facilitate effective adaptations for all stakeholders.

Achievement of this output leads to the higher-level target articulated in Outcome 2: strengthened capacity of tuna- dependent Pacific Island nations to negotiate for benefits from climate redistributed tuna stocks.

4.2.3.3. Programme activities, sub-activities and deliverables

Programme activities, their constituent sub-activities, and deliverables, are presented in detail in this section. A summary of the participation of each of the 14 GCF countries in each Regional Tuna Programme activity is provided in the table below.

Table 4.5 A summary of the participation of each of the 14 GCF countries in each Regional Tuna Programme activity.

Country	Activity							
	1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3
Cook Is								
Fiji								
FSM								
Kiribati								
Marshall Is								
Nauru								
Niue								
Palau								
PNG								
Samoa								
Solomon Is								
Tonga								
Tuvalu								
Vanuatu								



Purse-seine

bycatch



Longline

bycatch



Tuna-dependent

countries



Subtropical

countries

4.2.3.3.1 Output 1: Increased national capacity to access tuna and other pelagic fish for coastal communities.

The activities, sub-activities and deliverables of Output 1 are summarised in [Table 4.4](#).

Activity 1.1: Provide technical and logistical support, including equipment, to strengthen national FAD programmes:

The purpose of expanding the use of anchored, artisanal fish aggregating devices (sometimes called FADs but hereafter simply referred to as FADs⁴⁸) is to provide the infrastructure needed to increase access to fish required for food security of vulnerable coastal communities,⁴⁹ due to degradation of coral reefs and population growth.⁵⁰ Increasing the number of FADs in small island countries is widely recognised as a practical way of providing a greater number of small-scale fishers with the opportunity to catch tuna and other pelagic fish species (hereafter 'tuna') efficiently and safely.⁵¹ This Activity will commence by updating the assessment of the gaps to be filled to increase access to tuna for the target number of beneficiaries in each country conducted during Study 3.⁵² National FAD programmes will then be strengthened to the level required to meet the standards identified and promoted by SPC, as described in Technical Study 3⁵³, through provision of the materials, equipment, training, and capacity-building needed to ensure that the required number of additional FADs are appropriately constructed, deployed, utilized and maintained, and that small-scale fishers are equipped to harness the full potential of FADs safely.

Across the 14 participating countries, 333 FADs will be operational, and routinely replaced when required through this Activity. Furthermore, train-the-trainer sessions will be conducted with staff from national fisheries agencies in FAD rigging and deployment, and FAD-fishing methods. More than 200 staff from national fisheries agencies will be trained in each of these two areas. In turn, these trainers will pass on the skill sets to at least 800 small-scale fishers/community members across the region in each of the two areas. Regular monitoring of the performance of the FAD infrastructure, in terms of catch rates and possible interactions between non-target species and FADs/FAD fishing, and the quantify the level of benefits per target beneficiary, in terms of additional fish meals provided per month, will also be included in this Activity.

Consideration will be given to the different roles played by men and women in increasing access to tuna for domestic food security so that national FAD programmes are augmented in a gender-responsive manner.

The sub-activities within Activity 1.1 described below will be implemented by staff from the national fisheries agency via a direct grant and/or SPC's Coastal Fisheries and Aquaculture Programme, or through subcontracted consultants or service providers utilising SPC's procurement procedures, including ESS screening and monitoring. Collectively, these sub-activities will lay the foundation for ongoing, strengthened national FAD programmes, sustained by recurrent national budget expenditure, that provide the infrastructure and training of small-scale fishers to harness the potential of FADs to increase access to tuna for the food security of coastal communities. In the smaller participating countries, this Activity will supply additional tuna to the entire population. In the larger countries, where the target beneficiaries are only a subset of the national population, it will create the platform for further expansion of FAD infrastructure supported by allocations from the national budget or other development partners.

Sub-activity 1.1a: Audit progress towards requirements for scaling-up national FAD programmes in the 14 participating countries.

This sub-activity will provide a thorough update of the audit undertaken in the 14 participating countries between October 2022 and March 2023 during preparation of Technical Study 3⁵⁴. The purpose of updating the audit is to determine the extent of any progress made in strengthening of national FAD programmes prior to implementation of the Programme. This information is essential for re-assessing the gaps to be filled and making any necessary changes to the design and implementation of Activity 1.1. to avoid duplication of efforts to fill the gaps identified in the original audit.

The audit will use the same method described in Study 3,⁵⁵ which was based on the “*Matrix for assessing progress towards a sustainable FAD Programme*” in SPC Policy Brief No. 31/2017.⁵⁶ This matrix covers four themes; capacity (technical and operational capacity), management (policy, institutional administrative and managerial support), end-user engagement (partnerships, communication and awareness-raising) and funding (government, donor and possible cost-sharing). The original audit of national FAD programmes identified that the following weaknesses were common in the majority of countries (the number of countries with each weakness is shown in brackets).

- A lack of staff with the necessary skills for FAD rigging and deployment (13).
- Insufficient equipment suitable for deploying FADs successfully (13).
- Poor governance arrangements for supporting a national FAD Management Plan (13). Examples of the essential contents of such Plans include: mechanisms for retaining staff with FAD skills; a system for registering FADs; effective mechanisms for communication between

fishers and national fisheries administrations; conflict resolution protocols for FAD fishers; and specifications for the flags, lights and radar reflectors to be installed on FADs to clearly mark their positions.

- Absence of suitable monitoring and data collection systems for reporting the status of FADs and the fish catches made around them (13).
- Lack of awareness-raising about the rationale for FADs and the national FAD Programme (12).
- Poor history of providing training for fishers in FAD-fishing methods (12).
- Insufficient allocation of national funding for construction, installation and maintenance of FAD infrastructure (14).
- Limited partnerships for cost sharing FAD deployments (14).

The audit will be conducted by staff from SPC's Coastal Fisheries and Aquaculture Programme and the national fisheries agencies including the Programme-supported national FAD Officer. Pacific Island Fisheries Professionals (PIFP) to be trained under sub-activity 1.1d will also participate in the audit. The audit (which will be more comprehensive than previous audits by including a more detailed gap and needs analysis inclusive of legislative and policy reviews (see sub-activity 1.1c), lessons from past initiatives, capacity assessments, (managerial, technical, financial), broad stakeholder engagement and partner opportunities) is expected to commence in the second half of Year 1 and be complete by the end of Year 3. Implementation of many of the important field-based sub-activities, e.g. 1.1e, 1.1f, 1.1g, will not be affected by the duration of the audit because participating countries have already agreed to many aspects of Activity 1.1 such as the number of FADs to be deployed (see above regarding November 2023 consultations with the 14 participating countries).

Deliverables: Updated audit reports against criteria specified in the SPC Policy Brief 31/2017 to clearly identify the gaps remaining to be filled to strengthen national FAD programmes during implementation of the Programme.

Sub-activity 1.1b: Develop work plans for scaling-up National FAD Programmes based on the audit.

Once the outcomes of the audit are in hand, Programme staff and the national fisheries agency will develop work plans for each country. These plans are expected to differ considerably among countries due to the number of targeted beneficiaries (Section 4.4.4.1 and Annex 23), and the status of the national FAD programme. The work plans will be developed iteratively over the first three years of the Programme. Initially, they will include those tasks that can commence in Years 1 and 2, based on the discussions held with all participating countries described above. The work plans will then progressively integrate the tasks involved in filling all the gaps in the national FAD programme, so that they eventually include plans for implementing all the sub-activities for Activity 1.1 described below by the end of Year 3. The workplans will also encompass the planning of the communications needed to raise awareness of the benefits of the national FAD programme, and the procedures needed for efficient knowledge management. The finalised work plans will ensure that effective FAD Management Plans⁵⁷ are developed to implement the steps needed to strengthen all national FAD programmes to the level where a clear pathway is established for expanding and managing FAD infrastructure to increase access to tuna for food security for the target coastal community beneficiaries. The development of the work plans will take account of previous or future planned interventions relating to FADs supported by other development assistance partners to add value and avoid duplication.

This sub-activity will be conducted by staff from SPC's Coastal Fisheries and Aquaculture Programme and the national fisheries agencies including the national FAD Officer. Pacific Island Fisheries Professionals (PIFP) to be trained under sub-activity 1.1d will also participate in this sub-activity.

Finalised work plans will also be reviewed by these staff annually and modified if necessary, e.g., to ensure harmony with initiatives by other development partners that may decide to assist the national fisheries agencies to increase FAD infrastructure for the benefit of more coastal communities.

Deliverables: Work plans (FAD Management Plans), reviewed annually.

Sub-activity 1.1c: Review national policies and regulations to identify barriers to the equitable and sustainable use of FADs.

In each country, staff from the national fisheries agency will collaborate with staff from SPC and specialist consultants to review national legislation and regulations needed to underpin the establishment, expansion and use of FAD infrastructure. Expert consultants will either be contracted by a direct grant to the participating PIC or through SPC's procurement services. Pacific Island Fisheries Professionals (PIFP) to be trained under sub-activity 1.1d will also participate in the review process for selected countries to build national capacity. The emphasis of this review will be to provide the basis to support national agencies in establishing that there are 1) appropriate legal frameworks for expanding and managing FAD infrastructure to create a clear pathway for increased access to tuna for the food security of coastal communities; and 2) that there are no impediments to submission of FAD Management Plans to national government planning authorities, and ultimate approval of these plans by governments.

The review will incorporate the outcome of stakeholder engagement to be conducted per the SEP, and the outcomes from sub-activity 1.1e. The review will also incorporate the recommendation from Study 12 regarding the need for national legislation and regulations for small craft (less than 12 m) to enable fishing around FADs to occur safely (see also Activity 1.2). The review, and submission of recommended changes to government legislation and regulations in those countries where it is deemed to be required, are expected to be complete by the end of Year 3 (on the understanding that it may take longer for the revised legislation and regulations to come into force due to the time required to work through government processes).

This sub-activity will be coordinated by staff from SPC's Coastal Fisheries and Aquaculture Programme and the national fisheries agencies, including the national FAD Officer. Pacific Island Fisheries Professionals (PIFP) to be trained under sub-activity 1.1d will also participate in this sub-activity.

Deliverables: FAD Management Plans that reflect revised policies and regulations to remove barriers to the equitable and sustainable use of FADs in 14 Participating Countries.

Sub-activity 1.1d: Design and implement capacity development activities to augment the skills of national staff to implement FAD programmes.

This large sub-activity, which will be implemented during all years of the Programme, will facilitate expansion of FAD infrastructure and continued improvements to FAD designs, harnessing the benefits available from fishing around FADs to increase access to tuna for coastal communities. 'Train-the-trainer' programmes will be the main vehicle for achieving these aims. These programmes will increase the capacity of national fisheries staff, including Pacific Island Fisheries Professionals, to select sites for FADs, and rig and deploy FADs, based on the manual published by SPC.⁵⁸ This training which will be used during consultation with communities as described in sub-activity 1.1e, requires the purchase of deep-water echo-sounders, GPS plotters and materials for constructing FADs in all 14 participating countries, and barges for deploying FADs in a subset of countries (Study 3) under sub-activity 1.1f. Procurement of this equipment will either be through a direct grant to participating countries or through SPC's procurement services.

The 'train-the-trainer' courses will be conducted over a 10-day period by expert staff from SPC's Coastal Fisheries and Aquaculture Programme. Staff from the national fisheries agency in each country will be trained in this way, resulting in the training of more than 220 trainers across the region (note, that no training will be conducted in Papua New Guinea because staff at the national fisheries training college in Kavieng have already been trained in these skills by SPC).

To enhance the scope for 'south-south' learning, SPC will also organise for selected, trained national staff to attend a regional workshop each year to share lessons learned.

This sub-activity will be closely co-ordinated with sub-activities 1.1e so that the trainers provide effective training to community members. This sub-activity will also prepare and disseminate materials to raise the awareness of communities, and school students about the importance of national FAD programmes and the benefits of eating tuna. It will also implement recommendations from Study 6 about how to catalyse the recognition by communities and school students that there needs to be behavioural change related to fish consumption.⁵⁹ In those countries with a preference for eating reef fish, there needs to be a progressive switch to tuna, given the projected decrease in per capita availability of reef fish as a result of coral reef degradation and human population growth.

This sub-activity will be conducted by staff from SPC's Coastal Fisheries and Aquaculture Programme in consultation with staff from national fisheries agencies. Pacific Island Fisheries Professionals (PIFP) to be trained under sub-activity 1.1d will also participate in this training.

Deliverables: Increased numbers of skilled staff designated to implement strengthened national FAD programmes in 14 countries development of criteria and materials for train-the-trainer courses and change behaviour training delivered.

Sub-activity 1.1e: Design and implement a gender-responsive consultative stakeholder engagement strategy for national fisheries agencies to utilise in consultations with communities to identify suitable FAD deployment sites.

The SEP has been designed to ensure that national fisheries agencies, including the Programme supported national FAD Officer, are able to consult effectively with representatives of the targeted beneficiary communities when developing the national FAD Management Plan to incorporate the traditional knowledge and needs of communities in the following gender sensitive ways. First, by seeking advice from communities about the general areas close to their villages where they have traditionally experienced good tuna catches. A 1 x 1 km area can then be selected and surveyed (using the methods developed by SPC) at those locations by national fisheries staff trained in these skills under sub-activity 1.1d, and by community members trained by these trainers, to identify the most appropriate place to install a FAD (noting that a relatively flat site is needed to ensure that the FAD anchor does not move and the ropes attaching the FAD to the anchor do not rub against any structures). The discussions with communities to use their traditional knowledge to select the general areas for installation of FADs will take into consideration SPC's recommendation that FADs should generally be placed ~5-10 km apart, so that they do not interfere with each other's fish-aggregating ability. This means that in coastal areas with relatively high population densities it may be necessary to consult with several adjacent communities simultaneously to identify mutually acceptable FAD-sharing arrangements and minimise the potential for conflict.

Second, to provide opportunities for women to fish for small pelagic fish (mackerel, anchovies, pilchards, sardines and scads) around FADs.⁶⁰ Although the strong emphasis of the Programme is on increasing access to tuna, this opportunity needs to be explored with communities that enquired about this use of FADs to catch small pelagic fish during the stakeholder consultations held in 2023

(see 4.1.1). Such FADs will need to be placed in relatively calm water close to shore so that women can fish around them at night using lights. This is likely to involve a limited number of FADs and will only be practical in Melanesia and Micronesia (FSM, Fiji, Kiribati, Marshall Islands, Palau, Papua New Guinea, Solomon Islands and Vanuatu), where the coastal waters support higher densities of small pelagic fish, e.g., due to the runoff of nutrients from the high islands, and where sheltered areas are more common due to the nature of coastal geomorphology.⁶¹

This activity will be implemented across four years of the Programme by staff from national fisheries agencies, including the Programme-supported national FAD Officer, in consultation with staff from SPC and consultants specialising in social, gender and economic activities at the community level. It will introduce communities to the processes used to implement sub-activity 1.1c so that communities are aware of the legal frameworks and legislation and regulations associated with the use of FADs. Pacific Island Fisheries Professionals will also engage with this important sub-activity.

Deliverables: Gender-responsive stakeholder engagement strategy applied during consultations to identify FAD locations in 14 countries based on bathymetric analysis and past catch information from communities.

Sub-activity 1.1f: Procure materials to expand and maintain national FAD programmes.

To assist participating countries build their capacity to operate national FAD programmes independently, national fisheries agencies will be encouraged to purchase and maintain the equipment and materials described in sub-activity 1.1d (and in more detail in Technical Study 3) needed for selecting FAD sites (echo-sounders and GPS), constructing and deploying FADs (floats, ropes anchor systems), fishing effectively around FADs (fishing gear) and experimenting to increase the performance of FADs, under Subsidiary Agreements with SPC through a direct grant or utilising SPC's procurement services.

Based on SPC's experience, there have been few problems with the supply chains for the various materials needed to build FADs. However, the relatively infrequent visitation of cargo vessels to some countries needs to be taken into account when scheduling the delivery of equipment and materials in the work plan (sub-activity 1.1b). This sub-activity is expected to continue throughout the Programme because participating countries are expected to procure materials at different times in the initial years, and because some materials will need to be re-ordered to make routine replacements, e.g., FADs constructed and deployed in the early years will need to be replaced after four years, based on the average longevity of a FAD.

This sub-activity will be coordinated by staff with expertise in FAD fishing, FAD management and maintenance from SPC's Coastal Fisheries and Aquaculture Programme in consultation with staff from national fisheries agencies, including the national FAD Officer.

Deliverables: Equipment and materials to construct, deploy, maintain and improve FADs are procured.

Sub-activity 1.1g: Strengthen the skills of small-scale fishers to catch tuna and other large pelagic fish around FADs through train-the-trainer programmes and integration of traditional knowledge.

'Train-the-trainer' programmes will be used to increase the capacity of national fisheries staff to teach effective FAD-fishing methods to small-scale fishers from coastal communities, based on the manual by Bertram et al. (2023) published by SPC.⁶²

The 'train-the-trainer' courses will be conducted over a 10-day period by expert staff from SPC's Coastal Fisheries and Aquaculture Programme. Staff from the national fisheries agency in each

country, including the national FAD Officer, will be trained in this way, resulting in the training of more than 220 trainers across the region (note, that no training will be conducted in Papua New Guinea because staff at the national fisheries training college in Kavieng have already been trained in these skills by SPC). These courses require on-the-water demonstrations of how to use the fishing gear most effectively, and purchase of the fishing gear (for training purposes only) and GPS echo sounder buoys to assist small-scale fishers and community members to monitor fish beneath FADs.

Once the national fisheries staff have been trained using the SPC manual on fishing techniques, they will pass on the knowledge about how to fish around FADs to small-scale fishers through 5-day workshops at a range of locations in each country. The main fishing techniques that will be presented to trainees are surface and sub-surface trolling, mid-water line fishing, and drop lining. Trained national fisheries staff are expected to formally train at least 800 small-scale fishers across the region over the duration of the Programme. Many more fishers are expected to learn how to fish more effectively around FADs through peer-to-peer learning.

Pacific Island Fisheries Professionals will also participate in the train-the-trainer workshops and community training. To enhance the scope for 'south-south' learning, SPC will organise for selected, trained national staff to attend a regional workshop each year to share lessons learned.

This sub-activity will also involve the preparation and dissemination of materials to raise the awareness of communities, and school students, about the importance of national FAD programmes and the benefits of eating tuna. The awareness raising will incorporate recommendations from Study 6 about how to catalyse the recognition by communities and school students that there needs to be behavioural change related to fish consumption. For those countries with a preference for reef fish, this will involve a progressive switch to tuna, given the projected decrease in per capita availability of reef fish as a result of coral reef degradation and human population growth.

Expert staff from SPC's Coastal Fisheries and Aquaculture Programme will coordinate the delivery of this training in consultation with staff from national fisheries agencies.

Deliverables: Training courses in effective FAD-fishing methods developed and delivered in 14 countries.

Sub-activity 1.1h: Establish and maintain FAD-related catch data collection systems and processes, including through train-the-trainer programmes.

To help raise awareness of the benefits of FADs, and to progressively establish a nationwide understanding of the nature of catches from FADs and any interactions between FADs/FAD fishing and non-target species, national staff will be trained in the use of SPC's data collection application IKASAVEA.⁶³ This application which is designed for computer tablets and mobile phones allows fisheries surveyors to collect market, landing and socio-economic data offline and synchronise it with SPC's [Coastal Fisheries](#) web portal for further analysis and report extraction. The training will be done by expert staff from SPC's Coastal Fisheries and Aquaculture Programme. Trained staff from the national fisheries agency will be provided with computer tablets and use of the IKASAVEA throughout the Programme. The modality for using this data collection application is expected to vary among countries, depending on local context and the data collection priorities of the national fisheries agency related to monitoring catches from FADs, interactions between FADs/FAD fishing and non-target species, and the need to improve the selection of FAD sites and FAD design. Where appropriate, national fisheries staff will also train communities and other interested stakeholders to expand the collection of data.

In addition, there will be targeted capacity building in measuring the level of benefits received by the targeted beneficiaries of strengthened national FAD programmes in each country. This will be done by convening experts, primarily from SPC FAME staff, to design a monitoring programme to produce robust estimates of the average annual catch from FADs in each country, and then appointing, training and supporting two national staff to implement the monitoring programme in each country over a 4-year period. Once the average annual catch per FAD has been identified with confidence, it will be converted to number of fish meals per person per month, as a practical way of measuring the average level of benefit for individual target beneficiaries (see Section 4.4.2.1 and Annex 23). This task is not only essential for the monitoring and evaluation of Component A of the Regional Tuna Programme (see [Funding Proposal, Annex 11](#)), the robust information collected on the average annual catch from FADs converted to the number of fish meals per person per month is expected to assist national fisheries agencies to make the case to national planning authorities for FAD programmes to be included in recurrent government budgets, and to support applications to other development partners to contribute to continued expansion of FAD infrastructure (see [Chapter 5](#)).

Pacific Island Fisheries Professionals attached to the Programme will have the opportunity to engage in all aspects of this sub-activity.

Expert staff from SPC's Coastal Fisheries and Aquaculture Programme will support the development and maintenance of the systems for the assimilation of data collected including its integration to national coastal fisheries data systems utilising SPC's IKASAVEA application. SPC will also work with national fisheries agencies to oversee the tasks of the two data enumerators per country.

Deliverables: Records of fish catches from FADs; records of non-target species interactions in FAD fisheries; FAD-related deployment and catch data for improving FAD design.

Sub-activity 1.1i: Establish/strengthen national response mechanisms to natural disasters affecting small-scale fishers using FADs.

In Fiji, Tonga and Vanuatu, the countries where the greatest number of coastal communities are impacted by cyclones, SPC will assist the national fisheries agency to build resilience to these natural disasters. National fisheries agencies, with the advice of SPC experts, will establish cyclone-proof storage for spare FAD materials in appropriate locations so that FADs lost due to extreme storm surge can be replaced quickly. This will involve securing 40' shipping containers on concrete footings in appropriate locations and storing sufficient materials to construct at least 20 FADs following a severe cyclone. The advantage of using 40' containers is that the boats/barges needed for deploying FADs can also be stored there securely when a cyclone is approaching. This investment will assist communities to catch tuna within weeks of a cyclone passing, at a time when food crops will have been destroyed and when lengthy delays in the delivery of food aid can occur.⁶⁴ It will also make a significant contribution to recovery efforts including lessening demand on government and aid agency services for immediate support to meet local dietary needs.

Staff from national fisheries agencies and experts arranged by SPC will review response mechanisms to natural disasters in each participating country to assess whether the important role that FADs can play in providing food for communities affected by natural disasters is recognised and whether provisions have been made to quickly expand the target number of beneficiaries and FAD infrastructure under such circumstances. This review will help inform the Programme about the possible need to include other cyclone-prone countries in this sub-activity, and how best to assist communities affected by other natural disasters, e.g., volcanic eruptions and tsunamis.

The importance of such planning is illustrated by the eruption of the volcano on the island of Ambae in Vanuatu in 2017, resulting in the relocation of the entire population to the nearby islands, including Santo and Pentecost, and the use of spare FAD materials stored at the fisheries centre on Santo to deploy FADs to provide the fish needed by the relocated populations. The occurrence of several tsunamis in the region in the past few decades (e.g., Rabaul, PNG 1994, Solomon Islands in 2007, Samoa 2009) points to the need to plan to install FADs rapidly in areas where tsunamis have destroyed coral reefs.

This sub-activity will be implemented throughout the Programme and make provision to include Pacific Island Fisheries Professionals.

SPC will arrange for international experts to undertake the risk assessments associated with the impact of severe weather events on coastal fishers reliant on FADs and develop appropriate response options. The experts will be commissioned utilising SPC's procurement services.

Deliverables: Response plans in 14 countries acknowledge and support the role of FADs in community recovery following a natural disaster and procurement and establishment of FAD storage and reserve FAD materials.

Activity 1.2: Augment national safety-at-sea initiatives:

The Programme places a strong emphasis on safety at sea, given that i) some FADs will be a considerable distance (up to 7 km) offshore; and ii) the experience of many existing small-scale fishers encouraged to fish around FADs has been largely limited to targeting coral reef fish within lagoons and relatively sheltered inshore coastal waters. Accordingly, this activity will ensure that the risks for small-scale fishers operating around FADs are reduced in three important ways to augment national safety-at-sea initiatives. First, by evaluating the suitability of small vessels currently used for fishing around FADs and providing governments with improved vessel designs, and practical options for constructing/purchasing such vessels, where needed. Second, by upgrading forecasts of sea conditions by national meteorological agencies and disseminating the information effectively to small-scale fishers from coastal communities by mobile phone and other methods for their use in planning fishing trips to FADs. Third, by providing training for small-scale fishers in the use of the boating safety equipment recommended by SPC. The three sub-activities comprising Activity 1.2 are described below.

Sub-activity 1.2a: This work centres around producing a 'Needs analysis' for improved vessel safety for small-scale fishers using FADs.⁶⁵ It will be commissioned by SPC over a 4-year period utilising SPC's procurement procedures. The key tasks to be completed for the needs analysis are given below:

- An assessment of the suitability of vessels currently used by small-scale fishers in each country for operating safely and effectively around FADs placed up to 7 km offshore.
- Identification of practical modifications to existing vessels, where there are concerns that these vessels pose undue risks to small-scale fishers visiting FADs, to optimise improvements in safety, reductions in fuel costs and emissions, and sanitary storage conditions for the catch.
- Development of new vessel designs capable of meeting basic safety, fuel-efficiency, emissions and storage criteria for use in countries where modifications to existing vessels are considered to be impractical, bearing in mind the limited financial resources typically available to small-scale fishers. Two prototype designs will be produced: one for single-day trips to FADs, and another for 2- to 3-day trips to transport larger catches made around FADs to more distant local markets. Boat builders from participating countries will be trained in

the construction of the prototype vessels through attachments to the enterprise commissioned to build these boats.

- Testing of the prototypes over a 12-month period under commercial conditions in two participating countries to verify the suitability of the vessels and document the operating costs.
- Provision of information from these tests to national governments so that they can assess the cost-benefit of the prototypes and, if favourable, promote their uptake by coastal FAD fisheries including by seeking bilateral support to construct/purchase the vessels with these specifications for use by small-scale fishers.
- Compilation of other information to assist governments and other stakeholders to provide access to safer vessels for small-scale fishers, including: 1) the most appropriate sources of finance available to modify existing vessels or purchase the new design; and ii) a database of national/regional boat builders, shipyards, mechanics, and other expertise in boat building, capable of constructing/maintaining modified or new vessels once the necessary funding has been obtained.

In consultation with participating countries, SPC will implement this sub-activity utilising SPC's established procurement procedures.

Deliverables: Needs analyses for improved vessel design for 14 countries documented; tested designs for safer and more efficient vessels; options for promoting improved vessel design uptake among coastal fishers.

Sub-activity 1.2b: Customize meteorological and natural disaster forecasts to inform small-scale fishers and deliver the information nationwide via mobile applications.

Although the ultimate aim of this sub-activity is to provide small-scale fishers using FADs with the timely forecasts of sea conditions via mobile phones and other methods for remote locations so that they plan safe fishing trips, it will begin by laying the foundation needed to develop and maintain the customized early warning systems (EWS) required to deliver this service reliably nationwide for all PICs across the region.⁶⁶ Initially, this involves establishing a strong platform to help coordinate disaster response, reduction and management in the fisheries sector through the Regional Pacific Food Security Cluster (rPFSC) working group on fisheries and aquaculture. Once established, this platform will be used to i) integrate Anticipatory Action (AA) into ongoing disaster risk management initiatives in the Pacific, including the strengthening of EWS communications; 2) initiate a repository for best practices on preparedness; and 3) introduce early EWS into safety-at-sea guidance and training. The responsibility for this rests with SPC, utilising expert contracted services as required.

SPC will conduct a series of workshops to review disaster risk reduction plans and EWS relevant for the fisheries sector for each country, build awareness of EWS and develop action plans for improving preparedness and AA in the fisheries sector, and share best practices for emergency response, preparedness, AA and EWS for the fisheries sector. Three workshops in each country will be facilitated to improve awareness of, and access to, emergency preparation, response and recovery systems for fishers and fishing communities at the national level.

The sub-activity will then explore two ways to develop and expand the EWS for fishers and fishing communities. First, SPC, with the support of contracted communications experts, will review mobile phone applications and other communication channels (e.g. VHF) that have succeeded in improving safety and EWS for small-scale fishers within the Pacific Island region and in other jurisdictions by connecting warnings to disaster preparation and recovery. This review will underpin proposals to

donors and national Governments to develop and trial an improved mobile application through rPFSC. Second, SPC or its contracted experts will work with mobile phone companies and relevant Government agencies to identify lower-cost options for extending Government of private sector mobile phone coverage at sea in 2-3 selected Pacific Island countries, as the basis for providing governments in all 14 participating countries with the information needed to commission such services. Forecasts sourced from meteorological services to fishers will be delivered across the extended mobile phone coverage.

In consultation with participating countries, SPC will manage this sub-activity utilising SPC's established procurement procedures. It will be completed by the end of Year 4.

Deliverables: Systems for providing natural disaster and meteorological forecasts generated by Government meteorological services, via mobile phones for small-scale fishers in 14 countries.

Sub-activity 1.2c: Support procurement and delivery of boating safety equipment, linked to vessel registration where practical.

To ensure that the boating safety equipment recommended by SPC⁶⁷ for the train-the-trainer programmes described in sub-activity 1.2d is available for the training of staff from national fisheries agencies, and then for training the small-scale fishers from coastal communities, the Programme will purchase this equipment in the form of 'safety grab bags' containing all the necessary items utilising SPC's established procurement services. A total of 350 safety grab bags will be acquired: 70 for use by SPC in conducting the training for 14 countries (5 per country), and 20 per country for use by the national fisheries staff in training small-scale fishers. The national fisheries agencies will be encouraged to purchase the safety grab bags for their use under Subsidiary Agreements with SPC. SPC will be able to provide advice about reliable suppliers, based on its experience with purchasing grab bags in recent years and the essential equipment for both canoes and motorised vessels.

The Programme will also purchase three other types of equipment to improve safety at sea for small-scale fishers operating around FADs. Sufficient small vessel 'tracking devices' to trial the use of such equipment in selected countries as an aid to locating small-scale fishers reported as being lost at sea. If successful, governments will be encouraged to provide these tracking devices as an incentive for small-scale fishers to comply with the national vessel registration scheme. Such devices have also proved to be a useful addition to monitoring the use of FADs by small-scale fishers and promise to assist with the implementation of sub-activity 1.1h.⁸⁹ To assist with sub-activity 1.2b, the Programme will also purchase electronic equipment for weather monitoring to be attached to FADs (e.g., buoys to measure wave height, and acoustic doppler current profilers). VHF radios will also be purchased for each national fisheries agency so that contact can be maintained with small-scale fishers who also have VHF, particularly those on remote islands with mobile phone service. All equipment will be sourced utilising SPC procurement procedures.

Deliverables: Materials required to support safer fishing around FADs are procured.

Sub-activity 1.2d: Provide train-the-trainer courses in the use of boating safety equipment.

Experts from SPC's Coastal Fisheries and Aquaculture Programme will use 'train-the-trainer' programmes, designed with the assistance of a sea safety consultant, to build the capacity of staff from fisheries agencies in all countries to teach small-scale fishers from coastal communities to use all the equipment in a boating safety grab bag. This will result in more than 220 national trainers across the region (note, that no training will be conducted in Papua New Guinea because staff at the national fisheries training college in Kavieng have already been trained in these skills by SPC). Once the national

fisheries staff have been trained, they will pass on the knowledge about how to use boating safety equipment to more than 800 small-scale fishers through workshops at a range of locations in each country.

Expert staff from SPC's Coastal Fisheries and Aquaculture Programme will coordinate the delivery of this training in consultation with staff from national fisheries agencies. The services of an expert contracted through SPC's procurement procedures will assist in this regard.

Deliverables: Training courses for small-scale fishers in the use of boating safety equipment in 14 countries.

Activity 1.3: Provide training on post-harvest practices and improve market opportunities for FAD-caught fish:

This Activity will be designed to provide train-the-trainer courses to national officials, beneficiary households, and MSMEs in post-harvest methods for tuna and associated species caught around FADs, and to develop supply chains and market opportunities for these fish. The main aims of improving the handling of tuna catches from FADs are to i) extend the shelf life of the fish for communities catching tuna and other pelagic fish for subsistence, and (ii) add value and thus generate more revenue for MSMEs engaged in the marketing of FAD-caught fish. Design of the training programme will commence with a needs assessment to determine the specific aspirations of the subsistence households and MSMEs receiving tuna from FADs. Training will incorporate information for a variety of processing methods, including traditional knowledge where appropriate. Training will then be tailored to meet the specific needs and conditions prevalent in the target communities.

Processing methods may include, but are not limited to, increasing the supply of ice, freezing, drying, smoking, salting, pickling and canning. Consideration will also be given to value-adding through branding, certification, and similar mechanisms which may enhance the marketing of locally-processed FAD-caught tuna products. Recognizing the different roles which may be played by men and women in post-harvest handling activities, the training will be developed and conducted in a transparent and gender-sensitive manner. These training activities will be designed and delivered by SPC staff with contracted expert support, as required.

The four sub-activities to be supported under Activity 1.3 are described below.

Sub-activity 1.3a: Provide training courses for subsistence households and MSMEs to improve preservation of FAD-caught fish using post-harvest methods, e.g., drying, smoking and bottling, and incorporating traditional knowledge where appropriate.

A staff member from SPC dedicated to providing training in post-harvest processing, assisted by a specialist consultant, will provide training courses in FAD-caught fish processing methods to small-scale fishers/communities in all 14 countries over a 4-year period (3-4 countries per year). Training will be done at central locations in each country, with national fisheries agencies making arrangements to select representatives from a broad range of small-scale fishing groups/communities to attend the training. Training will commence by emphasising the importance of small-scale fishers taking ice on fishing trips to FADs to establish the 'cold chain'⁹⁰ (see sub-activity 1.3b for training in use of ice-making equipment) to ensure that the quality of the fish is maintained during throughout the day,

regardless of whether it is consumed fresh or processed.⁹¹ This will not only ensure that tuna used for post-harvest is in good condition, it will reduce the risk of histamine poisoning, also known as scombroid poisoning, in tuna consumed fresh.⁹² The training in each country will then progress to the range of simple, proven methods to increase the shelf-life and value of tuna (including drying, smoking and bottling and any appropriate traditional methods). Training in the use of these long-term preservation techniques, which will be particularly important for the many largely subsistence households throughout the region that do not have access to refrigeration, and also for MSMEs, will be based on a manual produced by SPC, and other relevant resources.⁹³ Depending on the size of the target population, multiple trainings will be held per country.

Deliverables: Training courses that result in the utilisation of post-harvest methods to increase the storage life and value of FAD-caught fish in 14 countries.

Sub-activity 1.3b: Provide communities with basic equipment to apply post-harvest methods, including practical options for cold storage where appropriate.

Based on the outcomes of the training in sub-activity 1.3a, the post-harvest specialist staff member from SPC will consult with national fisheries agencies to identify the groups of small-scale fishers/communities to engage in pilot projects to develop cold chains and establish enterprises to apply post-harvest methods to extend the shelf life of FAD-caught fish and add value to these fish. The criteria for selecting the participants will include, among others, the local demand for tuna and proximity of markets for post-harvest products. The following types of equipment will be purchased by SPC to support the pilot projects on an as needs basis: solar-powered ice making machines, solar freezers, smokers, fish dryers and the tools needed for bottling/canning fish to a safe standard.⁶⁸ Given the interest in post-harvest expressed during stakeholder meetings across the region during the national consultations, this sub-activity will be implemented over six years in all 14 countries. However, it will focus on the subset of countries where the target beneficiaries have limited access to electricity and where post-harvest will help to maximise access to safe tuna for domestic food security on a regular basis.

Deliverables: Basic equipment for drying, smoking or bottling FAD-caught fish utilised in selected countries, and operational cold storage for fish established at selected sites.

Sub-activity 1.3c: Identify and promote market opportunities for FAD-caught fish.

In countries where tuna catches are likely to exceed the needs for fresh fish of the target beneficiaries from time to time, and where communities demonstrate that they can produce high-quality post-harvest products, the Programme will commission consultants to assist prospective MSMEs in these communities to assess the nature and size of nearby markets for post-harvest products. This assistance will focus on training in quality control, and on marketing trials and promotion of products. This sub-activity will be done in close liaison with the Pacific Island Ocean Cluster (PIOC) once it is operational.⁶⁹ PIOC is dedicated to assisting communities and MSMEs to develop ways of using 100% of each tuna caught based on, and guided by, the successful Ocean Cluster in Iceland.⁷⁰

Deliverables: Market opportunities for FAD-caught tuna for MSMEs identified and tested.

Sub-activity 1.3d: Conduct communication campaigns to raise awareness of coastal communities about the climate change impacts on coral reef fish and the need to consume more FAD-caught tuna to for community food security.

This sub-activity is designed to raise awareness of coastal communities about the decreasing supply of reef fish per capita due to climate-driven degradation of coral reef ecosystems and population

growth, and the need to progressively replace reef fish in diets with tuna. Given that tuna is already a prominent part of the diet in several of the participating countries, sub-activity 1.3d will focus only on the seven countries where communities still have a strong preference for reef fish (Fiji, FSM, Kiribati, PNG, Samoa, Solomon Islands and Vanuatu). The actions to be undertaken in each of these countries will help to ensure that as the availability of reef fish per person declines it is replaced by tuna, rather than the range of high-energy, nutritionally poor foods pervading the region and exacerbating the incidence on non-communicable diseases. Under guidance of a behavioural change and social marketing specialist contracted to the Programme using SPC's procurement procedures, and in collaboration with the PMU's communications officer, this sub-activity, which will be implemented in each of the countries over a 6-year period will identify high-level barriers to tuna consumption and interventions to catalyse behavioural change in relation to existing patterns of fish consumption and provide planning guides and targets for monitoring and evaluation. The specific actions to be implemented during this sub-activity include:

- Broadcasts using radio, news media and social media to reach a large proportion of target audiences with information about the problem and solutions;
- Targeted engagement - frequent, low-cost opportunities to engage target audiences with key messages;
- Outreach to schools;
- Widespread dissemination of an information toolkit, inclusive of digital and printed products suitable for sharing on social media, e.g. Facebook and WhatsApp groups; and
- Direct engagement through national agencies, local partners and champions, to coordinate trainings in National/Provincial/District centres and demonstration sites in villages.

Deliverables: Integrated, multi-media awareness campaigns that raise awareness of climate-related impacts on coral reef ecosystems in targeted coastal communities.

4.2.3.3.2 Output 2: Increased supply of bycatch and tuna from industrial fishing operations for urban and peri-urban communities.

The activities, sub-activities and deliverables of Output 2 are summarised in the Table 4.4 .

Activity 2.1: Implement strategies to deliver more transhipped and unloaded bycatch and tuna to urban/peri-urban communities:

This activity is designed to identify and address weaknesses in the entire supply chain for fish that come ashore from industrial tuna-fishing vessels while they are in port. This fish can provide urban and peri-urban communities with a nutritious source of protein at low cost, provided the quality of the fish is maintained throughout delivery and sale. It is comprised of bycatch caught by purse-seine fishing, i.e., fish that is not accepted by tuna canneries because they are too small, damaged or not the desired species. These fish are separated from the high-quality tuna when these vessels tranship their catch to carrier vessels in regional ports, and lower-value fish from longline vessels that is also offloaded in port. The main transshipping ports are in Federated States of Micronesia, Kiribati, Marshall Islands, Solomon Islands and Tuvalu (and PNG, see below).⁷¹ Unloading of bycatch from longline vessels also occurs in some of these ports and is also common in Fiji, Tonga and Vanuatu.

The trade in bycatch from purse-seine vessels has arisen as a result of WCPFC's requirement that transshipping must occur within regional ports, not at sea. However, the current availability is insufficient to make a significant contribution to fish consumption of rapidly-growing urban populations in some countries, e.g., Solomon Islands.⁷² In other countries, the volume of bycatch exceeds local demand for food but provides the opportunity to improve food security indirectly through use as a major ingredient in feeds for chickens and pigs, and in fertilisers to improve the quality of soil for market gardening in atoll nations. In all cases, improvements to the volume of bycatch available will deliver important socio-economic benefits to urban communities. The various sub-activities in Activity 2.1 will identify and remove barriers to the supply of bycatch and tuna, paving the way to maximise the benefits from this resource.

Purse-seine bycatch is also offloaded in PNG when tuna is delivered for canning in Lae, Madang and Wewak. However, there are few barriers to full utilization of the resource in these places – it is already distributed effectively from the landing sites. In Rabaul, where large volumes of tuna are transshipped, the volume of bycatch available exceeds the basic needs of the local population.⁷³ Therefore, the Programme is not planning to include PNG in Activity 2.1. It will, however, be included in Activity 2.2.

SPC will lead the implementation of this Activity and will be supported by FFA, PNAO, CSIRO, and services provided by a university. Maritime, port and municipal authorities from the participating countries will also join implementation.

Sub-activity 2.1a: Assess the supply of bycatch and tuna available for offloading at each transshipping and unloading port.

This sub-activity is designed to deliver a much more reliable estimate of the volume of bycatch available for offloading during transshipping and unloading operations in regional ports. It will commence with a review of current WCPFC Data Collection Committee (DCC) requirements for lodgement of transshipment data, and the refinements in existing data systems used by all relevant countries. These reviews will identify methodological and data collection revisions needed to ensure that the accuracy of reports on the breakdown, quantities and value of transhipped and unloaded fish entering local supply chains is improved.

Expert legal staff will also review national legislation obligating vessels to supply required data, and then oversee the implementation/revision of such legislation to support more accurate reporting of the volume of bycatch and tuna available for offloading. Train-the-trainer workshops will be organised to build the capacity of national fisheries agencies to apply the relevant legislation to collect and assimilate the required transshipping data. Observers and/or monitoring personnel onboard purse-seine and longline vessels will also be required to record the quantity and value of transhipped and unloaded fish entering local supply chains. This sub-activity will be undertaken by SPC in collaboration with FFA and the PNAO. This will enable SPC to assemble robust estimates of the volume of bycatch available to contribute to the food security of urban and peri-urban populations in those ports where transshipping and unloading occurs.

Deliverables: Assessments of the availability of bycatch and tuna for local utilisation.

Sub-activity 2.1b: Evaluate the projected shortfalls in the supply of fish needed for the food security of urban and peri-urban communities by 2030 and in following decades.

The purpose of this sub-activity is to identify 1) the size of the gap in fish supply for the target urban populations by 2030 to enable realistic projections of the extent to which maximising the availability of bycatch and tuna can help to fill the gap; and 2) the size of the remaining gap to be targeted by governments planning to increase access to other sources of protein. The four key parts of this sub-activity, to be implemented over four years, are:

- 1) Collaborate with SPC's Statistics for Development Division to generate reliable estimates of the projected sizes on the urban and peri-urban populations for all ports where transshipping is expected to occur in 2030.
- 2) Quantify the fish protein needs of these target populations, based on the recommendations of the World Health Organisation (WHO) that average daily protein intake should be 0.7 g per kg of body weight, and the recommendation from SPC's Public Health Division that 50% of this protein intake will need to be derived from fish, given the relatively limited range of protein sources per capita in many Pacific Island countries.
- 3) Assemble estimates for the quantity of all sources of fish protein expected to be available to the target urban communities, e.g., fresh tuna caught by local small-scale fishers, average fish catches from coral reefs and other coastal habitats, and canned tuna, to calculate the size of the gap in recommended supply of fish per capita to be filled by bycatch (and by higher-quality tuna where practical (see sub-activity 2.1e).
- 4) Use data collectors appointed to national fisheries agencies under the Programme to verify that the identified quantity of bycatch and tuna from sub-activity 2.1a is available to consumers. If this is not the case, identify whether the shortage is due to lack of compliance with legislation developed under sub-activity 2.1a or to other causes, e.g., effects of the El Niño Southern Oscillation (ENSO) on the distribution of tuna and patterns of transshipping, wastage due to spoilage from poor handling onboard vessels during offloading and onshore, or by inadequate data available from vendors.

Deliverables: Report on current transshipment rates and projected shortfalls in supply to meet the future demand for fish by urban and peri-urban communities where transshipping and unloading occurs.

Sub-activity 2.1c: Use the Advanced Warning System (AWS) (see Activity 3.1.1 below) to assess the implications of tuna biomass redistribution for transshipping and unloading activities at ports in participating countries.

At present, the frequency of transshipping in those ports across the region where it occurs varies considerably from year to year due to the effects of ENSO on the distribution of tuna.⁷⁴ For example, there is typically less transshipping in Solomon Islands, and more in Kiribati, Marshall Islands and Tuvalu, during El Niño events when the abundance of the skipjack tuna targeted by purse-seine fishing is greater in the east of the region than in the west. Given that the effects of ocean warming are projected to result in a significant shift in the biomass of tuna, similar in many ways to the distribution of skipjack tuna under present-day strong El Niño conditions but on a more permanent basis, there is the likelihood that the availability of bycatch from transshipping operations will decline progressively in some countries, particularly in Solomon Islands. This sub-activity will use the results of the AWS to develop transshipment and unloading dynamics models for Pacific Island countries that account for the influence of economic and climatic variability on the prime locations for both purse-seine and longline fishing. This modelling will enable national fisheries agencies to identify likely changes in transshipping

and unloading activity in all ports currently used for these operations, and the likelihood of other locations becoming practical venues for transshipping and unloading. This information can then be used by countries such as Solomon Islands to develop policies to specify a minimum frequency of transshipping and unloading in their licencing arrangements with fishing fleets to maintain the local supply of bycatch and tuna (see Sub-activity 2.1e).

The modelling will be done by expert staff from FFA and SPC, in close consultation with senior staff from the policy and licencing section of the fisheries agencies in countries where transshipping occurs.

Deliverables: Report documenting projected changes in location and frequency of transshipping and unloading operations across participating countries, including those where no transshipment or unloading currently occurs.

Sub-activity 2.1d: Build national capacity to conduct policy analysis on current and future transshipment and unloading of bycatch and tuna.

This sub-activity will commence with a 'needs analysis' to assess whether the national fisheries agencies in countries where transshipping and/or unloading of bycatch and tuna occurs have policies, or policy capacity-building initiatives, in place to maximise the food security benefits available from transshipment and unloading operations. Where there is an absence of suitable policies, or scope for improvement in existing policies, the needs analysis will identify the national policy gaps to be filled, and the capacity-building required. In such countries, initiatives to build the relevant capacity for staff from national fisheries agencies will then be designed to address the identified needs for effective policies to harness the full potential of fish available from transshipping and unloading operations for the food security of urban and peri-urban populations. The necessary training to increase national capacity will be delivered by fisheries policy experts from the Pacific Islands Forum Fisheries Agency (FFA) through regional or national training courses, mentoring arrangements and/or fellowships.

Deliverables: Policy analyses for current and future transshipment and unloading of bycatch and tuna for the countries where these activities occur including increased capacity for local staff to undertake the required policy analysis.

Sub-activity 2.1e: Develop procedures and regulations to increase availability of good-quality transhipped and unloaded bycatch and higher-quality tuna where needed to fill the gap in fish supply.

This sub-activity will support the appointment of a maritime legal officer at FFA, and national maritime legal specialists within national fisheries agencies, to draft revised, or create new, legislation and regulations governing transshipment and unloading operations to support the implementation of the policies identified as a result of sub-activity 2.1d.

Such legislation and regulations may need to include measures to obligate vessels to comply, via licencing arrangements, with national requirements to maximise the supply of bycatch and tuna for urban communities. In some circumstances, for example where climate-driven redistribution of tuna reduces the frequency of transshipping operations in a port, these obligations may specify a minimum number of transshipments per year. Under circumstances where the supply of bycatch falls well short of making a meaningful contribution to filling the gap in fish supply identified under sub-activity 2.1b, the obligations may extend to offloading a percentage of higher-quality tuna in addition to bycatch. Revision of regulatory arrangements will consider the need for national fisheries agencies to facilitate the use of a collection vessel to transfer bycatch and tuna from transshipment operations to market areas in Kiribati, Solomon Islands and Tuvalu, where the fish are offloaded from anchored purse-seine vessels often some distance from the shore.

In addition, the revised legislation is expected to specify the conditions for private sector engagement in the processing and distribution of tuna and bycatch from transshipment and unloading operations outlined in Activity 2.2, including measures to 1) ensure the quality of the fish is maintained throughout delivery and sale to prevent any health problems associated with consumption of the fish; and 2) minimise the effects of large landings of transhipped bycatch and tuna on the traditional market for fresh tuna and reef-associated fish caught by small-scale fishers who regularly sell their catch in urban areas.

Deliverables: Procedures and regulations to increase the supply of transhipped and unloaded bycatch and higher-quality tuna.

Activity 2.2: Strengthen/develop post-harvest practices and improve market opportunities to distribute bycatch and tuna from transshipping and unloading operations to urban/peri-urban communities:

This Activity will be designed in a similar way to Activity 1.3, but focusing on providing training in post-harvest methods, and expanding markets, for bycatch and tuna landed in transshipping and unloading operations across the region. main purposes of improving the handling of bycatch and tuna from these operations are to i) extend the shelf life of the fish, and (ii) add value to bycatch and tuna sold by MSMEs. Design of the training will commence with a needs analysis to determine the specific aspirations of the MSMEs within the improved supply chains for bycatch and tuna resulting from Activity 2.1. The training will incorporate the processing methods requested by MSMEs and provide some of the equipment they need to process fish. Nevertheless, the range of post-harvest methods available for bycatch and tuna from transshipping operations are expected to be more limited than those for unloaded frozen tuna, and those under Activity 1.3, because the fish from purse-seine vessels are stored in brine. The different roles played by men and women in post-harvest processing activities will be taken into consideration and the training will be developed and conducted in a transparent and gender-sensitive manner.

Activity 2.2 will also support three other sub-activities expected to increase demand for bycatch and tuna from transshipping and unloading activities. These sub-activities centre around developing pilot marketing mechanisms, conducting communication campaigns about the benefits of bycatch and tuna, and providing governments with fish market outlet designs at various scales that they can use to seek financial support to improve the sanitary conditions under which the fish are sold.⁷⁵ Details of the sub-activities are given below. National governments will support the implementation of this Activity by facilitating access and introductions to local networks, responsible government agencies and fisher groups including market authorities.

Sub-activity 2.2a: Provide training to urban communities improve/develop post-harvest processing techniques for bycatch and tuna from transshipping and unloading operations.

This activity will be implemented by expert staff from FFA's Fisheries Development Division, including a Tuna Industry Adviser, Investment Facilitation Manager, Post-Harvest Processing Specialist, and a MSME Financing and Business Development Specialist. It will be focused on training selected MSMEs in those ports where transshipping and unloading takes place. The financing and Business Development Specialist at FFA will assist the Investment Facilitation Manager to identify candidate businesses for training to improve/develop post-harvest processing techniques for brined bycatch and frozen tuna. Once the needs analysis has been completed for the selected MSMEs to identify the types of training offering the most practical benefit, the training courses will be designed appropriately. The training courses will also include the skills needed for financial literacy and business management and involve

researching and piloting novel products. The equipment purchased to support this training is expected to include freezers, dryers and smokers, among other post-harvest, fish-processing tools. Methods to document subsequent uptake of the post-harvest training by MSMEs will then be developed and applied.

Deliverables: Development and delivery of training courses in post-harvest methods to extend shelf life and add value to transhipped brined bycatch and unloaded frozen tuna.

Sub-activity 2.2b: Pilot alternative marketing mechanisms to support increased trade in bycatch and tuna.

The purpose of this sub-activity is to identify and pilot additional ways of using bycatch and tuna from transshipping and unloading operations, over and above the post-harvest products that have already been made from fish in the Pacific Island region, e.g., dried, smoked and bottled fish. Novel products will not be limited to those for direct human consumption – they will also include those expected to be in demand from the agricultural sector (e.g fertilizer and feed stock).

In collaboration with the Pacific Island Ocean Cluster, the FFA Investment Facilitation Manager will conduct an options (and business) assessment for supply of novel, edible preserved tuna and bycatch products in urban and peri-urban markets. Trials will then be undertaken to assess the appeal of the novel products prepared from brined bycatch and frozen tuna to these markets in all countries where transshipping and unloading operations occur.

Parallel options (and business) assessments will also be made for animal feeds and plant fertilizers produced from brined bycatch unfit for human consumption, or surplus to the food security needs of the target population, to complement the existing production of fish meal from the waste products from tuna canneries in the region. Fish meal and other ingredients for animal/aquaculture feeds⁷⁶ and fertilizers produced from bycatch are in demand both locally and in international markets. Locally-produced animal feeds and fertilisers are expected to be of particular interest to atoll nations where transshipping occurs (Kiribati, Marshall Islands and Tuvalu), and where imported fertilizers and animal feed is expensive and soils are poor.

Once the most promising novel products have been developed and tested, strategies for marketing them to target audiences will be implemented, using social media, celebrity chefs and expositions etc., and through supermarket and agriculture/aquaculture supply chains. Methods to document subsequent uptake of the post-harvest training by MSMEs will also be developed by the expert staff at FFA and applied in collaboration with national fisheries agencies.

Deliverables: Novel post-harvest products and evaluations of the success of mechanisms to market them to support increased trade in bycatch and tuna.

Sub-activity 2.2c: Conduct communication campaigns to raise awareness of urban/peri urban communities about the impacts of climate change on coral reef ecosystems and the need to consume more bycatch and tuna to meet future nutrition requirements.

This sub-activity is similar to sub-activity 1.3d, but targeted at urban and peri-urban communities around the ports in countries where transshipping and unloading of tuna occurs, and where there is a strong preference for reef fish (Fiji, FSM, Kiribati, PNG, Solomon Islands and Vanuatu). It is designed to raise awareness of the urban and peri-urban communities about the decreasing supply of reef fish per capita due to climate-driven degradation of coral reef ecosystems and population growth, and the need and opportunity to progressively replace reef fish in diets with tuna. Sub-activity 2.2c will help to ensure that as availability of reef fish per person declines it is replaced by tuna and tuna products,

rather than the range of high-energy, nutritionally-poor foods that are contributing to the high incidence on non-communicable diseases in the region. It is designed to catalyse behavioural change in relation to existing patterns of fish consumption, and to provide planning guides and targets for monitoring and evaluation. The specific actions to be implemented during this sub-activity include:

- Broadcasts using radio, news media and social media to reach a large proportion of target audiences with information about the problem and solution options;
- Targeted engagement - frequent, low-cost opportunities to engage target audiences with key messages;
- Outreach to schools;
- Widespread dissemination of an information toolkit, inclusive of digital and printed products suitable for sharing on social media, e.g. Facebook and WhatsApps; and
- Direct engagement through national agencies, local partners and champions, to coordinate trainings in National/Provincial/District centres and demonstration sites in urban centres.

This sub-activity will be implemented under the guidance of a behavioural change and social marketing specialist contracted to the Programme using SPC's procurement procedures, and in collaboration with the PMU's communications officer.

Deliverables: Development and delivery of integrated, multi-media awareness campaigns to raise awareness of climate-related impacts on coral reef ecosystems in targeted urban/peri-urban communities.

Sub-activity 2.2d: Provide fish market outlet designs at various scales for countries where transshipping and unloading occurs.

The overall aim of this sub-activity is to assist the governments of participating countries where transshipping and unloading operations occur to develop proposals to development partners to build the marketplace infrastructure required to improve the conditions under which bycatch and unloaded tuna are sold. Such facilities are needed to make it easier for urban communities to purchase the fish; improve the period during which the quality of the fish can be maintained by vendors; and prevent histamine (scombrid) poisoning and other health risks associated with poor handling of tuna and other large pelagic fish. To assist governments to construct these important public facilities to support increased access to bycatch and tuna for local food security, the Programme, through structural engineers engaged by FFA, will provide the plans for practical market buildings needed to estimate the cost of the infrastructure and submit proposals to support their construction.

This sub-activity will be co-ordinated by the Investment Facilitation Manager at FFA, who will contract experts to consult with the relevant countries to:

- Assess the facilities needed to market bycatch and tuna based on best fish market design practice in the region to date, including bespoke designs previously commissioned by FFA;
- Produce practical designs and associated budgets for the construction of marketplaces for bycatch and tuna, taking into account 1) socio-economic and demographic considerations at proposed priority sites, 2) constraints caused by limited fish landing space at public wharves and other facilities at priority locations; 3) the need to display offloaded bycatch and tuna under hygienic conditions; and 4) the scope for storing and processing tuna for use at times when transshipping and unloading is not occurring at the port;

- Provide advice on potential sources of funding to construct the recommended marketplace designs; and
- Complete an assessment of options and needs for supporting the distribution of bycatch and tuna from landing points to peri-urban and more distant communities/markets.

Deliverables: Fish market outlet designs.

4.2.3.3.3 Output 3: Science-based forecasts and projections that reduce uncertainty in climate change-driven tuna redistribution and facilitate effective adaptations for all stakeholders

The activities, sub-activities and deliverables of Output 3 are summarised in the [Table 4.4](#).

Activity 3.1: Develop and deliver an Advanced Warning System (AWS) for climate-driven tuna redistribution

This Activity will be designed to harness the latest in big data analyses, communications and climate and fisheries sciences to deliver an advanced warning system (AWS) that provides the decision-ready technical tools for Pacific Island administrations to develop adaptations that protect their economies from disruptions to income streams and oceanic food systems caused by the redistribution of tuna biomass away from their EEZs due to climate change (see Activities 3.2 and 3.3).

This activity will focus on increasing the capability of national administrations and their regional agencies to provide tailored information to 1) assist Pacific Island countries (individually and collectively) to prepare for and respond to the impacts that climate change will impose on their oceanic ecosystem, and 2) negotiate mechanisms to reduce the disruptions to their economies and global mitigation options that minimise the severity of climate change. Significant co-benefits will be derived from the AWS, including the long-term conservation of Pacific tuna stocks and oceanic biodiversity through improved stock assessments and Conservation and Management Measures adopted by WCPFC and the Inter-American Tropical Tuna Commission (IATTC).

SPC will lead implementation of all sub-activities within Activity 3.1. Participating governments will contribute technical and logistical support to field operations in ports or at sea in relation to the collection, storage and dispatch of biological or oceanographic information collected under access arrangements with industrial scale fishing vessels operating with their authorisation. Industrial fleets will also participate in the collection of data and information during at-sea operations serving effectively as ships-of-opportunity. This will be regionally supported through existing collaborative arrangements with regional and sub-regional institutions including FFA and the PNAO. Analytical support will be provided through Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). Contractors or service providers, such as universities may be engaged to support policy- and legal-related research and training associated with jurisdictional matters relating to highly migratory fish stocks. FFA will also provide the supporting economic analysis required to assess the implications for national revenues as tuna and related species redistribute to the high seas and to the east.

Sub-activity 3.1a. Transition existing fisheries and ocean monitoring systems to produce higher-resolution forecasts and projections of tuna biomass redistribution.

The purpose of this sub-activity is to downscale existing tuna-climate models to resolutions that allow for EEZ-scale impacts to be identified. Current tuna-climate models⁷⁷ are only appropriate for broad ocean basin-wide trends to be identified. The downscaling will utilise 1 degree and higher-resolution CMIP 6 climate models to prepare the SEAPODYM tuna-climate model for high-resolution optimisation

and estimation of biomass distributions for skipjack, yellowfin, bigeye, and south Pacific Albacore tuna suitable for interpreting biomass changes within the EEZs of Pacific Island countries. In addition to preparing for this high-resolution version of the SEAPODYM tuna-climate model, sub-activity 3.1a will establish the protocols and procedures for future updating of the climate forcings used in the SEAPODYM model.

In parallel, fisheries monitoring will be transitioned to provide information to validate the accuracy of the SEAPODYM model. This will include the application of genomic tools that will be used in Activity 3.1b to establish the geographical boundaries of tuna stocks in the Pacific Ocean and provide absolute estimates of stock size. The latter estimate is essential for calculating accurate and precise changes in fishable biomass that can be attributed to climate change and those that can be attributed to fishing. Activities will be focused on scaling-up the existing fisheries monitoring systems (observer and port) to include the capacity for collecting the tuna tissue samples needed for genomic analyses. Digitalisation of fisheries monitoring will also be undertaken through transition to e-reporting of fisheries observations. Digitalisation will fast-track access to fisheries catch information, which is critical for effective forecasting of shorter-term impacts of climate variability and change on fisheries resources in each EEZ. Pacific Island scientific and technical officers will be trained by SPC to ensure the sustainability of this activity after the implementation period for the Programme.

Deliverables: High-resolution version of the SEAPODYM tuna-climate model suitable for EEZ-scale analyses of changes in tuna biomass distribution.

Sub-activity 3.1b. Establish baselines and indicators for quantification of climate change impacts on distribution of tuna biomass.

This sub-activity will complete the work required to estimate the baseline geographical boundaries needed to quantify the extent of climate-driven distributional changes in tuna biomass. Such changes will impact the national income derived from the tuna industry for each Pacific Island country, and can also be expected to disrupt the current international agreements for tuna management in the Pacific Ocean.⁷⁸ The genomic analyses proposed will quantify stock distributions and the genetic signatures of stocks. The essential parameters necessary for modelling the dynamics of tuna populations at high resolution (age census, sex census, reproductive potential, and population census) will be estimated using an approach that integrates genomics with traditional fisheries science. These parameters will be applied in ‘close-kin-mark-recapture’ (CKMR) methodologies to estimate absolute abundance of populations. The CKMR absolute abundance estimate provides a baseline scalar for the SEAPODYM model to accurately forecast and project future changes in stock distributions and abundance. It also provides the baseline against which future changes can be attributed to the impacts of climate change. Pacific Island scientific and technical officers will be trained to ensure the sustainability of this activity following the conclusion of GCF support for the Programme.

Deliverables: Geographical boundary and absolute population size baselines for each Pacific tuna stock, and population census information needed for optimisation of the SEAPODYM tuna-climate model.

Sub-activity 3.1.c Enhance collection and curation of physical oceanography and micronekton data to inform modelling of climate-driven tuna biomass redistribution.

This sub-activity will establish the ocean monitoring infrastructure needed to support the forecasting capability of the AWS. The forecasting skill of the SEAPODYM model is dependent on the availability of information on the present-day state of the ocean. Existing technologies provide high-resolution information on conditions at the surface of the ocean, however, sub-surface measurements of ocean

state are presently only available at coarse resolution, unsuitable for forecasting EEZ-scale changes. Sub-activity 3.1c will harness sub-surface information on ocean state from instrumentation used by fishing and other vessels operating in the equatorial Pacific Ocean, which is capable of measuring tuna prey in the water column (via ship-based acoustics), and sub-surface ocean currents and temperature profiles. This information will be used to validate the tuna prey component of the SEAPODYM tuna-climate model.

The primary activities will include: 1) establishing the legal platforms for this information to be collected and retained by vessels (currently not included in licensing agreements); 2) enlisting vessels to participate in the sampling at key locations; 3) post-collection processing of measurements and curation in oceanographic information portals for use in validating the SEAPODYM model; and 4) validation of the model. Pacific Island technicians from participating PICs will be trained to facilitate the sustainable collection of the information needed for the forecasts to be produced by the AWS.

Deliverables: Baseline sub-surface ocean state observations to validate the SEAPODYM tuna-climate model.

Activity 3.2: Assess and socialise the impact of tuna biomass redistribution on national economies

This Activity will couple tuna fisheries economics to the SEAPODYM tuna-climate model, providing the AWS with the capability to perform bio-economic analyses. This capability provides the AWS with all the component parts needed to simulate short-term and long-term changes in the productivity and locations of Pacific tuna fisheries under all future climate variability and climate change scenarios. Evaluation of these simulations by national and regional fisheries agencies will inform their management processes and allow options to be developed to secure the national benefits derived from the tuna industry.

Sub-activity 3.2a. Conduct bio-economic and fleet dynamics modelling to estimate changes in tuna catch and associated socio-economic benefits.

This sub-activity will develop the economic and fleet dynamics component of the AWS necessary for generation of national economic and resource forecasts and outlooks, and the evaluation of the resilience of WCPFC's current and potential Conservation and Management Measures designed to protect tuna resources from the impacts of climate change. National training in collection and administration of economic data will be undertaken to facilitate access to the information necessary to develop the fleet dynamics model. In addition to the technical work to couple this bio-economic component to the SEAPODYM tuna-climate model, a major work area of this sub-activity will be the upskilling the climate awareness of Pacific Island countries to develop management options and adaptations for evaluation by the AWS. National- and regional-level outlooks will be produced annually (or on request) once the fully coupled AWS is operational.

Deliverables: Fully functional AWS in the form of regionally serviced models developed and maintained by SPC, producing national and regional economic and resource outlooks. Outputs will be available in various forms including through on-line repositories and in detailed and summary format presented to regional and sub-regional fora.

Activity 3.3: Provide AWS-related training to national institutions to negotiate in regional and international forums to address economic losses due to the impacts of climate change on tuna distribution.

This Activity will operationalise the AWS within national administrations and regional agencies. Operationalisation will focus on training national counterparts with the capacity to use the AWS to develop and evaluate adaptation options that minimise the risk to Pacific Island economies from the impacts of climate-driven tuna redistribution (this includes attribution and adaptation evaluations), and the capability to prepare national forecasting and resource outlooks. In parallel, the AWS will be used to assemble the information necessary for Pacific Island countries to contribute significantly to the ocean impacts section of the IPCC Assessment Report 7 cycle, and to assemble the evidence necessary to prepare and prosecute UNFCCC 'Loss and Damage' proceedings.

Sub-activity 3.3a. Academic and vocational training to increase the number of Pacific Island fisheries and climate staff with enhanced capabilities to negotiate to retain the national benefits received from tuna.

This sub-activity will focus on providing Pacific Island Fishery Professional (PIFP) placements both at SPC and FFA (as the lead technical agencies for preparing the AWS). Training will focus on building capability across all domains of the AWS (Activities 3.1 through 3.2 and 3.3b). Twelve PIFP placements (12-month duration each) will be offered to relevant Government staff in the participating PICs to build national capabilities. PIFP's will work directly with the technical teams to understand the AWS and its uses. Additional academic and vocational training opportunities are planned to support all components of the AWS – designed to ensure the sustainability of the AWS beyond the timeframe of the GCF Programme.

Attribution and adaptation analyses will be a priority for the PIFP's, thereby providing capacity for national generation of advice derived from the AWS. This capacity will be essential for future negotiation in WCPFC and UNFCCC arenas. Similarly, PIFP's will be trained in using the AWS to prepare national forecasting and resource outlooks. These are necessary components for national governments to integrate climate change into their regular business and economic planning.

Deliverables: Trained and fully competent national officers in AWS operations for sustainability of the AWS. Increased pool of trained Pacific Island technical and policy personnel contributing to regional and international negotiations concerning climate change impacts on Pacific regional tuna fisheries.

Sub-activity 3.3.b. Assemble evidence for Pacific Island countries to use in negotiations at regional and global scales to address the impacts of climate-driven tuna redistribution.

This sub-activity will focus on assembling the information needed by Pacific Island countries to 1) contribute significantly to the ocean impacts section of the IPCC Assessment Report 7 cycle, and 2) assemble the evidence necessary to prepare and prosecute UNFCCC 'Loss and Damage' proceedings. The latter will include consultation to ensure all participating countries have a full appreciation of the evidence and associated uncertainties. National staff trained in the AWS will undertake detailed (and peer-reviewed) analyses for inclusion in the 7th Assessment Cycle of the IPCC. Inclusion of information and outlooks in the 7th IPCC Assessment Report will facilitate a greater presence of Pacific Island countries within UNFCCC processes. It will also strengthen the commitment of WCPFC to integrate climate change impacts in its management of tuna and western Pacific oceanic ecosystems, and the Biodiversity Beyond National Jurisdictions (BBNJ) processes in the region.

Deliverables: Documented evidence for 14 countries and their regional agencies to use in negotiation.

4.3 Paradigm shift and results against performance indicators

The interventions to be implemented under the RTP are focused on producing a range of positive economic, social, environmental and gender-sensitive development results, which are captured under

the Programme's two outcomes and two defined co-benefits. As illustrated in the ToC diagram (**Error! Reference source not found.**), at the highest level, all outcomes and co-benefits will contribute to the overarching Goal of the Programme, thus supporting the realization of a paradigm shift.

The Goal statement for the Programme describes a clear cause-and-effect relationship between Programme actions, accomplishment of the overarching Goal, and attainment of a paradigm shift. The **"IF"** phrase of the statement refers to programme outputs and activities; the **"THEN"** phrase references the impact and paradigm shift; and the **"BECAUSE"** phrase refers to an "intermediate state" which is represented by the Programme outcomes.

The Programme will contribute to a paradigm shift for sustainable food security under Component A by strengthening two streams of work which have been identified as opportunities to address food insecurities of the region arising from increasing human populations and decreased capability of coral reefs to provide daily protein requirements. The shift will involve increased utilisation of tuna and associated species by coastal communities in 14 PICs by institutionalising national FAD programmes and processes to improve the utilisation of tuna and bycatch transhipped or unloaded in PIC ports for the long term. This will address increasing gaps in the need for dietary protein in these countries as populations increase and the productivity of traditional sources of fish protein from coral reefs is adversely impacted by climate change. In addition, Component B of the Programme will provide the 14 PICs with the information required to respond to challenges and opportunities associated with the redistribution of tuna on to the high seas and to the east because of altered oceanic environmental conditions associated with climate change.

The Programme will support PICs in their efforts to diversify their sources of protein derived from fish and maintain the high levels of fish consumption traditionally sourced from coral reefs as those reefs degrade as a result of climate change by (i) strengthening national aFAD programmes to increase access to tuna and associated oceanic pelagic fish for coastal communities, and (ii) transshipping and unloading operations in PIC ports to source tuna and bycatch for processing, marketing and distribution to peri-urban and urban communities. These two streams capitalise on the region's rich tuna resources without threatening the status of tuna stocks, all of which are currently sustainably managed under the auspices of the WCPFC (see Chapter 1, **Section 7.3**).⁷⁹

Innovations for meeting per capita dietary animal protein requirements of rapidly-growing Pacific Island communities will be complemented by widespread campaigns to raise awareness of the need to rely more heavily on tuna and associated species for food security. Programme Outcomes 1 and 2 result in increased food security, by promoting reliable access to tuna and related pelagic species as a locally-available source of nutritious dietary protein. This in turn will lead to improved public health outcomes and reduce national demands for imported substitutes which history demonstrates for PICs are generally of low nutritional value and high in sugars.⁸⁰ In addition to increased health benefits, increased local utilisation of tuna and associated pelagic species will confer enhanced livelihoods, employment and resilience to communities – benefits that would otherwise have been seriously diminished due to the effects of climate change on coral reefs, climate-driven redistribution of tuna, new patterns of industrial fishing, and population growth.

Component B of the Programme will result in another paradigm shift to improved ecosystem knowledge and use of that knowledge through the establishment of an 'advanced warning system' (AWS) to inform PICs about the risks posed to their economies from climate-driven tuna redistribution, and the most appropriate adaptations to address this threat. The AWS will (i) empower PICs to secure equitable access to tuna resources as climate change alters the distribution of tuna; ii) manage the economic implications related to changes in fishing behaviour as the industry responds to

the redistribution of tuna driven by altered oceanographic conditions due to climate change, and (ii) provide the foundation for revisions to co-operative fisheries management arrangements documenting the changing spatial structure of tuna resources and identify what are expected to be new sets of stakeholders for some stocks.

The AWS will provide reliable, timely and accurate information and advisories on expected changes in the timing and extent of tuna catches in the EEZs of PICs, and pave the way for these countries to retain access rights to the shared fisheries resources that underpin their economies by increasing their capacity to negotiate for solutions founded on science and evidence-based decision making. In addition, enabling PIC governments to engage more effectively in the often-difficult discussions of loss and damage will help to ensure that more equitable outcomes are achieved for a vulnerable region and its populations.

The AWS will complement other processes associated with the assessment of the status and trends of tuna as a key component of the WCPO large marine ecosystem, the dynamics of industrial fisheries targeting those tuna resources and the socio-economic implications for changes in the redistribution of those tuna resources in response to climate change. As such, it will integrate to established national, sub-regional and regional institutional processes supporting scientific research and fishery assessments that underpin decisions relating to sustainable use, conservation and management that are refined on an on-going basis as new knowledge and information becomes available. These processes complement processes in other fora that also have implications for the WCPO large marine ecosystem relating to coastal area protection, marine debris and pollution.

In implementing climate adaptation programmes, it is often the case that the overarching impact and paradigm shift will not be realized during the life of the programme. This is usually because natural processes (e.g., changes related to climatic trends) often unfold over a longer timeframe than a typical project or programme can accommodate. In such cases, the ToC provides a useful yardstick by which the probability of achieving the projected paradigm shift in the future can be accurately gauged. This requires establishing the enabling environment that will be needed to support the attainment of the paradigm shift. Therefore, if all enabling conditions are put in place by the conclusion of the Programme, it is highly probable that the overarching Goal for achievement of the paradigm shift can be attained. (Additional discussion of the paradigm shift is presented in [Sections D.2](#) and [E.2](#) of the Funding Proposal).

4.3.1 Contributions to GCF's Integrated Results Management Framework (IRMF)

A detailed description of Programme impacts and outcomes with regards to the GCF IRMF is included in sections E.3 and E.4 of the Logframe within the Funding Proposal. It is briefly summarized below in relationship to the two Programme components:

4.3.1.1 ARA1 Most vulnerable people and communities

Component A addresses the urgent need to provide greater access to tuna as a reliable source of dietary protein, for the most vulnerable populations of the 14 Pacific Island countries (PICs) participating in the Programme. These populations are highly vulnerable due to a multitude of causes, including (among others): (i) exposure to climate change-related sea level rise, which threatens to inundate low-lying island areas; (ii) high levels of poverty; and (iii) in many cases, dependency upon tuna as the sole source of foreign exchange revenue to support economic and social services. The availability of traditional sources of fish protein, primarily by capture from near-shore coral reefs, will

be reduced due to anticipated impacts of climate change (e.g., ocean warming and acidification), pollution, and increased fishing pressure due to population growth. Programme improvements will be achieved through (i) strengthening of national FAD programmes that will enable increased tuna catches to supply coastal communities, as well as (ii) increased transshipment and offloading of by-catch and tuna from industrial fishing operations in urban transshipment and unloading ports. An important co-benefit to be realized through the implementation of Component A will be an increase in livelihood opportunities for vulnerable (refer [Figure 4.1](#)), especially relating to increased activities for post-harvest handling, processing and distribution of tuna at the household level. Improvements in livelihoods are in turn expected to lead to improved household welfare which will provide greater opportunities for improved education, health care, and other social services. These improvements will enable more households to become more adaptive, able to cope and resilient to the impacts of climate change.

The benefits achieved in this regard will be monitored through periodic surveys of household income and expenditure incorporating the contribution of locally sourced seafood to household diets relative to imported substitutes, health statistics particularly in relation to NCDs, and local fishing practices including catch rates associated with fishing around FADs.

4.3.1.2 ARA2 Health, well-being, food and water security

At the same time that Component A addresses issues significantly affecting vulnerable people in the PICs (discussed above), it has a specific focus on improving food security. Reducing exposure to climate change among these vulnerable groups is directly linked to, and depends upon, improving food security. This will be accomplished through increasing the access to supplies of fresh or preserved tuna by both coastal (rural) and urban/peri-urban populations, and their utilisation of that fish as a source of nutritious dietary protein. Programme interventions designed to improve post-harvest storage, handling, processing and distribution of by catch and tuna will prolong shelf life and ensure that tuna and other fish products retain quality and nutritional value, thus strengthening the health benefits to island populations.

The benefits will largely be reflected in health statistics in coastal, peri- and urban communities. It will also be reflected in trends in the contribution of imported foods to local diets relative to locally sourced by catch and tuna.

4.3.1.3 ARA4 Ecosystems and ecosystem services

The main objective of Component B is to establish an Advanced Warning System (AWS) designed to track and predict changes in tuna distribution across the Pacific, brought about through the expected increasing effects of climate change. Data obtained through the AWS will be used primarily to enable PICs to more effectively negotiate for the retention of their rights to tuna resources which have migrated outside of their historic locations within waters under the jurisdiction of the 14 PICs participating in the Programme. Such negotiations will be mediated through the Western and Central Pacific Fisheries Commission (WCPFC) and other regional entities such as the FFA and the PNA. In addition, data obtained through the AWS will also be used to improve the conservation and management of tuna stocks, especially in relation to industrial tuna-fishing activities. An important co-benefit of Component B will therefore be strengthened management of industrial tuna fisheries by regional and national coordinating and regulatory agencies. It is expected that strengthened management will secure the sustainability of regional tuna stocks and the viability of fisheries dependent on that resource.

This Component will enhance existing scientific processes that have established WCPO tuna fisheries as among the best managed of the world's tuna fisheries. This will be achieved by reducing

uncertainties associated with information relating to climate change impacts on WCPO fisheries that will be available to support decisions relating to sustainable harvests. The primary beneficiaries will be the 14 PICs participating in the Programme whose economies are dependent on fisheries targeting regional tuna resources. Trends in revenue generated by fisheries access arrangements, and through linked benefits such as shore-based employment, will provide indicators for the monitoring of these impacts. Additionally, the tuna industry itself will be a beneficiary as a consequence of improved knowledge and understanding of the implications for climate-driven changes on the redistribution of tuna and consequent decisions relating to commercial investments in the fishery.

4.3.2 Scale, replicability and sustainability

To assist with monitoring and assessing how the Programme contributes to the paradigm shift three dimensions are assessed: scale, replicability, and sustainability. For each assessment dimension the current state (baseline), the potential scenario (target) and rate the current state (baseline) is described using a three-point-scale rating (low, medium, and high). The contribution of the Programme to the transformation under respective assessment dimensions (scale, replicability and sustainability) is also assessed.

Preliminary assessment of the three parameters demonstrates that the Programme offers good prospects for bringing about a paradigm shift. Descriptions of how these three dimensions of the paradigm shift will be expressed, are provided at **Error! Reference source not found.** in the Funding Proposal:

4.3.2.1 Scalability

The Programme will ensure that FAD technology will be adopted and scaled up under Component A by:

- Embedding technical and financial capacity building, regulatory and institutional strengthening at local, national and regional levels
- Filling the gaps in support required to enable the participating PICs to fulfil their adaptation and investment plans to implement national FAD programmes in an environmentally friendly and safe way at the scale required based on SPC guidelines
- Ensuring that support for FAD programmes is integrated into national recurrent budget planning for the operation and maintenance of existing FADs and for future upscaling beyond the GCF Programme
- Leveraging private sector resources (industrial fishing vessels) to help deploy FADs
- Raising awareness about impacts of climate change on nearshore coral reef fisheries and the need to catch tuna around FADs and use tuna and bycatch from transshipping and unloading operations to fill the gap in fish supply will be scaled up through public awareness campaigns.

Under Component B, the Programme will leverage the science needed to build the AWS to operate at the temporal and spatial scales to serve all PICs across the WCPO.

4.3.2.2 Replicability

Under Component A, the Programme will support the replication of FAD technology by:

- enhancing technical and financial capacity, and strengthening institutions at provincial, national and regional levels
- converting lessons learned from the implementation of FAD activities into knowledge and communication products and services and disseminating them widely, including cross-training, peer-to-peer training, communities of practice and knowledge transfer as part of its awareness raising activities.

Through these mechanisms, it is expected that FAD interventions, which will be carried out at a set of selected sites initially, will gradually be replicated at other sites within the target PICs, and possibly, extending beyond the region. This will be achieved through initiatives of the participating PICs, either independently or in partnerships with others including development assistance partners.

In relation to Component B, as a region-wide system, the AWS will cover all of the 14 participating countries of the Programme (with particular focus on the 9 tuna-dependent countries). Given the large scale of the system, the mechanisms by which data generated through the AWS are applied in supporting multi-lateral agreements for access rights to tuna, will be rolled out in tranches, i.e., with some countries coming on-line earlier than others. Replication of lessons learned and improvements made during the earlier tranches, can be applied to those countries coming on-line in the later stages. Although it may be used in different ways, because the underlying data requirements and supporting modelling will be standardized across different oceanographic contexts, the application of the AWS will be transposable to other ocean regions and adapted to forecast and project changes in the behaviour of tuna in other oceans in response to climate change.

4.3.2.3 Sustainability

The Programme will sustain the use of FADs established under Component A by ensuring that they are adopted as part of the national infrastructure for food security, and that the operation and maintenance of expanded national FAD programmes is included within ongoing national development plans and annual recurring budgets. The Programme will incorporate measures to ensure quick recovery and re-deployment of FADs following cyclones and other extreme weather events, thus improving sustainability of this initiative and reduce pressures on traditional sources of assistance following extreme weather events. Strong measures for awareness-raising and outreach, which are built into the Programme, will also help to improve overall sustainability.

Depending on the context of the participating country, these measures can also be supplemented by (among others):

- Public private partnerships (PPPs) between commercial fishing companies and governments to provide technical and financial assistance with FAD deployment and maintenance as part of Corporate Social Responsibility programmes
- Creating legislation to prosecute actions that lead to the willful destruction or damage to FADs, or violate community-based FAD rules; and
- Promoting models for community contributions to maintaining the national FAD infrastructure, e.g., through fisher association-based fees.

Greater distribution of tuna and bycatch to urban communities will be sustained through Improvements to transshipping and unloading operations, product processing, marketing and improving supply chains. These operations, in turn, will be sustained by providing long-term incentives for MSMEs and PPPs to participate in tuna transshipping and unloading operations to urban and peri-urban communities, and processing of surplus bycatch and tuna for export to neighbouring countries experiencing shortages in fish supply. As an example, assistance could be provided to MSMEs and PPPs

to access ‘Performance-based climate resilience grants’ administered by the United Nations Capital Development Fund (UNCDF).

Under Component B, sustainability of the AWS will be strengthened through increased integration of AWS outputs into analysis undertaken to support decision-making in relevant RFMOs. As the outputs of the AWS are increasingly drawn upon to inform scientific advice provided to the decision-making bodies of RFMOs there will be a case for RFMOs to make financial contributions to on-going support for the AWS as an integral component of scientific services contracted by RFMOs. In addition, an improvement in the resolution of forecasts and projections will lead to an improvement in the confidence of advice concerning EEZ-scale implications of tuna redistribution as a result of climate change, as opposed to the current basin-scale application. Because this will have significant economic implications for participating PICs, there will be motivation for the PICs themselves to financially contribute to the sustainability of the AWS. Revenue raised from access fees is one possibility in this regard. An additional motivation for PICs to assume some of the financial responsibility for the AWS relates to the use of the AWS to secure historical rights to the tuna resources for the participating PICs in the region even if tuna re-distribute beyond EEZs on to the high seas. Also, the operation of the AWS will catalyse enhanced cooperation between WCPFC and the Inter-American Tropical Tuna Commission (IATTC) to ensure that tuna harvests can be sustained, even with a greater proportion of tuna eventually translocated to high-seas areas further to the east, outside the combined jurisdictions of FFA member countries. See [Chapter 5](#) for additional detail on sustainability considerations.

4.4 Country Ownership

Country ownership is critical and fundamental to the design and implementation of the RTP. Considering the innovative approaches being undertaken to promote significant environmental, economic, and social improvements in response to the effects of climate change on redistribution of tuna biomass in the waters of PICs, and to make their responses more climate resilient, engagement with a wide range of national and regional stakeholders is required to ensure the sustainability and success of the proposed interventions. The engagement process was initiated during the conceptualisation and development of the Funding Proposal and will continue throughout the implementation of the Programme ([see Section 4.1.1](#)).

As the Executing Entity (EE) for the programme, the Pacific Community (SPC) has built strong relationships and trust with its members and their national stakeholders as their regional technical agency over more than 70 years. SPC uses its extensive technical capacity to support sustainable development by applying a people-centred approach to science, research and technology across all of the Sustainable Development Goals (SDGs). SPC serves its members by interweaving and harnessing the nexus of climate, ocean, land, culture, rights and good governance. As stewards of a vast Pacific Ocean domain, SPC is actively involved in mobilising its members to respond with urgent collective action to the threat of climate change. SPC’s Fisheries, Aquaculture and Marine Ecosystem (FAME) Division is internationally recognised for the calibre of its research on tuna. It is exceptionally well-placed to implement the Programme, given its in-depth knowledge of the fisheries sector and the work that needs to be done to build the resilience of tuna-dependent communities and economies.

During the conceptualisation and development of this Funding Proposal, considerable efforts were made, on a frequent and regular basis, to engage and consult with the Heads of Fisheries (HoFs), the NDAs, and a wide range of stakeholders living and working within the target countries or associated with a range of development initiatives active in these countries ([see Section 4.1.2](#) and [Annex 07](#)). These efforts have enabled stakeholders to (i) understand the structure of the Programme; (ii)

contribute to the identification and design of interventions to assist their tuna-dependent communities and economies adapt to climate change, and (iii) appreciate the nature of the funding that will be provided to support the key actions needed to enhance their capacity to adapt to climate change. The views and requirements of the country stakeholders have been fundamental in shaping the framework and activities of the Programme.

Furthermore, in-depth country engagement has focused attention specifically on how the Programme aligns with national NDCs, development plans, policies, strategies, and programmes. The Programme will assist many Pacific Island countries to implement their NDCs—10 of the 14 participating countries have included the need for adaptation to the effects of climate change on the ocean and coastal marine habitats in their NDCs. The Programme’s contribution to achieving climate goals identified in key climate change strategy documents in each participating country is summarised at [Appendix 4-E](#). Further detail on climate policies and strategies of each country can be found in [Annex 24](#).

The 14 participating countries that have delivered their no-objection letters (NOLs) have duly followed their respective no-objection procedures as established by each country. The delivery of the NOLs represents the culmination of constructive engagement and collaboration with the countries, setting a foundation for effective implementation of the tuna adaptation programme.⁸¹

Through the efforts described above, the framework for the Programme, together with the key components and activities, have been designed to support the countries’ national efforts to embed climate resiliency at the core of their planning to maximise the sustainable socio-economic benefits they derive from their tuna resources. During Programme implementation, it is anticipated that strong country ownership will be further expressed through their co-financing of some activities, commitment of personnel, openness to public-private partnership arrangements, and mainstreaming of climate change adaptation into national policies, plans, and legislation—all of which will support successful outcomes for the RTP.

Pacific Island countries have also demonstrated their commitment to strengthening resiliency to climate change impacts, through their support of the following goals of the Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) [15]: i) ‘Strengthened adaptation and risk reduction to enhance resilience to climate change, including managing risks caused by climate change within social and economic development planning processes’; and ii) ‘Strengthened preparedness, response and recovery to natural disasters caused by climate change’.

In addition, through extensive consultation and engagement, PICs have entered into a comprehensive series of agreements which reflect regional priorities for managing regional fisheries resources (see [Section 2.4](#)), and at the same time, addressing significant climate change challenges. The relevant agreements include:

- Western and Central Pacific Fisheries Commission (WCPFC) Resolution on Climate Change as it Relates to the Western and Central Pacific Fisheries Commission (Resolution 2019-01⁸²),
- Western and Central Pacific Fisheries Commission (WCPFC) Resolution on Aspirations of Small Island Developing States and Territories (Resolution 2008-01⁸³),
- Regional Roadmap for Sustainable Pacific Fisheries⁸⁴ designed to improve sustainability of tuna resources, add value to tuna catches, increase employment, and provide better access to tuna for food security, as well as building resilience of coastal habitats (by progressively shifting fishing effort from coral reefs to tuna),

- A New Song for Coastal Fisheries – Pathways for Change,⁸⁵ an innovative regional approach to maintain the benefits of small-scale fisheries in the face of declining coastal ecosystems and associated fish stocks, and
- The Parties to the Nauru Agreement (PNA) Vessel Day Scheme,⁸⁶ which supplies 95% of tuna caught in the region.

Finally, it is important to note that the HoFs and NDAs in each of the 14 participating countries have acknowledged the high level of engagement, led by CI and SPC, which has been undertaken in the preparation of the GCF Funding Proposal. More than 50 institutions, including national agencies, NGOs, CSOs, academia, associations, community groups and indigenous peoples' groups, comprising over 450 individual stakeholders within the 14 partner countries, have been consulted and received an overview of the Programme and the associated presentations and documentation. In addition, efforts have been made to ensure that a proportionate percentage of women have been involved in the consultative process; of the total number of persons consulted, 35% were women. During these consultations aimed at creating awareness about the Programme, stakeholders were provided with opportunities to share their views and stakeholder feedback has been used throughout the process to refine the Programme design. This process clarified the roles of key stakeholders in Programme development and implementation, ensuring that Programme components and activities incorporate country ownership and support from stakeholders and host communities. These efforts complement the regular dialogue and collaboration with NDAs.

4.4.1 Component A: FAD and bycatch programme

4.4.1.1 FADs

The GFC FAD programme will support the 14 participating countries in the regularisation of the FAD programme into their national budgetary arrangements with allocation of sufficient funds to maintain the FAD programme in the future after the replacement FADs allocated in the GFC Programme have been utilised. Success of the FAD programme will encourage the replication and deployment of FADs in other coastal areas leading to an increase in the number of FADs over and above the number initially supported by the GFC Programme and the move away from the ad hoc donor supported FAD programmes of the past.

The activities proposed in this RTP represent a highly efficient way of building the resilience of 14 PICs with an extraordinary dependence on tuna for food security and/or economic development. The activities described in Component A (approximately 53% of the requested grant budget for operating activities) will increase access to nutritious animal protein for up to 795,000 people living within 5 km of the coast from all participating countries by 2035. The estimated cost of this benefit is \$70 per person over a seven-year period, i.e., \$10 per person per year. In addition, the proposed mechanisms for sustaining national FAD programmes for coastal communities, and distribution of tuna from transshipping and unloading operations for urban communities, will ensure that the food security benefits of this investment will continue well beyond the life of the Programme.

From the perspective of the individual participating countries the FAD programme has the potential to generate a high economic return from the initial GFC grant-funded support and the ongoing FAD maintenance/replacement which is the responsibility of the PICs, which will be an incentive to support the programme.

The training and capacity building for fisheries officers will support the sustainability and skills developed will make the deployment and maintenance of FADs more efficient and timely. Support to

the design and implementation of FADs will result in cost savings in the procurement of FADs components and their construction and deployment.

The implementation of the monitoring programme of a sample of FADs to measure the catch rates and performance of FADs to support an assessment of relative performance relating to location and depth, will allow future FAD programmes to be fine-tuned and to be more effective. Quantification of the output of FADs and publication of the results will also reinforce the importance and cost-benefit of FADs and increasing the awareness of the importance of FADs to increasing coastal fish production. More effective fishing and improved CPUE rate will reinforce the desirability of FADs and provide a groundswell impetus for governments to support the FAD programme.

The support to post-harvest activities for the processing of fish to increase their shelf life and the marketing of FAD-caught fish will increase the financial benefits to fishers and sellers and allow fish surplus to the immediate needs for consumption can be preserved for later use increasing the efficiency of fishing effort and minimisation of waste.

The associated safety-at-sea training and supply of essential safety equipment will result in fewer accidents and loss of productivity and improve fishers' attitudes and appreciation of safety at sea.

The GFC FAD programme is time-bound and scheduled over a seven-year period with no intention to provide on-going support to the FAD programme apart for the ongoing research and the continuing involvement of SPC. The exit strategy is well defined.

4.4.1.2 Bycatch

The verification of the potential volume of bycatch and tuna that could be available to supply the domestic demand for fish will add to the sustainability of the process by removing the uncertainty in the quantities available and help to set targets for the supply chain.

The establishment of quality standards for bycatch and the monitoring of the supply and enforcement of the standards will increase consumer confidence and acceptance of the fish as an alternative to other forms of animal protein and add to the sustainability of the programme.

Support and training for the handling and preservation techniques of brined bycatch and tuna fish through the downstream value chain will consolidate the supply and demand for the fish contributing to the sustainability post GFC support.

As the supply of bycatch is largely a private sector operation the implications for ongoing government funding to support the programme after the end of GFC support are relatively small which will help its sustainability and minimise the impact of the exit of GFC support to the programme.

4.4.2 Component B: Establishing an AWS

The implication of the AWS programme is important for the countries in provided more certainty on the predicted impact of climate change on the tuna resource in their EEZs and for negotiating for maintaining tuna revenue from access fees with the redistribution of the tuna resource eastwards and into the high seas.

The activities in Component B (approximately 46% of the requested grant budget for activities) will empower nine countries to prevent estimated combined losses of government revenue of \$90 million (range \$40–\$140 million) per year at today's value by 2050. These estimates will be adjusted as uncertainty in the tuna modelling is reduced through development of the AWS. Even so, the benefits

for tuna-dependent economies are expected to exceed the total grant request of ~\$50.3 million for Component B within a relatively low number of years, and are likely to exceed the total grant request for Component B each year within 10–20 years of completion of the Programme.

The economic returns from investing in the AWS and its potential role in maintaining an equitable share of the tuna resource rental is likely to be very high and embellished by the support from the GFC grant funded programme.

The industrial tuna fishing fleets will also benefit from the AWS in more accurately showing where the tunas are concentrated thereby adding to the ongoing acceptance and benefit of the programme and potentially contributing to the cost of the ongoing programme following the completion of GFC funding.

The regional Programme is also a sound investment because it will not only build the resilience of tuna-dependent communities and economies in 14 countries, it will also strengthen the capacity of SPC as the Science Service Provider to WCPFC, and to the other regional fisheries management agencies (FFA, PNA).

4.4.3 Impact potential

For millennia, coral reef fish have been a cornerstone of food security in the Pacific Island region. The effects of climate change on reefs and their resident fish populations are expected to have severe implications for the food security of coastal communities in PICs.

In the face of this challenge, Component A of the RTP will assist growing Pacific Island populations to continue to have access to fish for good nutrition through strengthening of national FAD programmes. FADs enable coastal communities to fish for tuna and other large pelagic fish (hereafter ‘tuna’) in safe and effective ways – something that will be progressively more important in maintaining access to fish for good nutrition as coral reefs are degraded by climate change and populations continue to grow. In the smaller PICs, the strengthening of national FAD programmes under Component A is expected to provide regular access to up to 10 tuna meals per person per month ([Annex 23](#)). However, in the larger countries (PNG, Solomon Islands, Vanuatu), the Programme will only be able to provide increased numbers of tuna meals for selected provinces due to their relatively large populations. In nine of the participating countries, the Programme’s FAD-related activities will be harmonised with the efforts that the World Bank PROPER project is also making to strengthen national FAD programmes ([See Chapter 1 and Section 4.1.2](#)). In the larger countries, the PROPER World Bank project will enable access to tuna to be increased in more provinces. The positive impact of the combined efforts of the GCF Programme and World Bank project in the larger countries is expected to incentivise the government to continue to expand their national FAD programme so that all provinces will progressively receive FADs. The Programme’s activities related to improving the distribution of bycatch and tuna are expected to provide up to four additional tuna meals per person per month in urban and peri-urban areas where transshipping of purse-seine catches occur ([Annex 23](#)). Unloading operations by commercial longliners in some ports (for example, Honiara, Majuro, Port Vila, Suva and Nuku'alofa) also offers potential to supplement supplies of tuna and bycatch for local consumption, albeit at a lower level than the offloading of bycatch from purse-seine vessels.

The tuna-dependent PICs have established a fisheries management system to deal with the effects of ENSO and climate change on the distribution of tuna within their combined EEZs. This mechanism – the Parties to the Nauru Agreement (PNA) ‘Vessel Day Scheme’ (VDS) – enables the eight participating countries (Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu) to share the economic benefits from tuna resources equitably, regardless of where the tuna are caught within their combined jurisdictions. The VDS is widely recognised as a

world-leading, climate-smart fisheries management framework. However, the VDS is currently unable to secure all the present-day benefits that PNA members will receive from tuna as the fish move progressively from their combined EEZs into high-seas areas, leaving these countries highly vulnerable. Climate-driven redistribution of tuna threatens to undermine the economies of the PNA member countries and Cook Islands, which obtain an average of 32% (range = 4–70%) of their total (non-aid) government revenue from tuna-fishing access fees (see Section 2.3.11). By 2050 under RCP8.5, the redistribution of tuna is projected to reduce the total fishing access fees for these nine countries by an average of ~\$90 million (range \$40–\$140 million) per year at today's prices. For several of these countries, the projected loss of fishing access fees is estimated to reduce total (non-aid) government revenue by 6–13% per year (range 2–9% to 11–18%). This significant reduction in government finance will have direct impacts on vulnerable populations in these countries, with fewer resources available for health, education, disaster preparedness and post-disaster recovery and other related essential social services. Tuna redistribution could also affect employment across the region, where tuna fishing and processing has created ~25,000 jobs.

Under Component B of the Programme, the priority adaptation for the tuna-dependent economies involves empowering them to negotiate for the right to retain access to the tuna resources that have historically occurred within their combined EEZs. For the 'subtropical' countries (Fiji, Niue, Samoa, Tonga and Vanuatu), preliminary modelling indicates that the more modest tuna resources that occur in their EEZs could increase. For these economies, adaptations centre on capitalising on any significant opportunities. To implement effective adaptations for both categories of Pacific Island economies, more reliable information on the timing and extent of possible tuna redistribution is essential.

Given the profound social and economic dependence of Pacific Island countries on tuna, the Programme is designed to be both regional and national in scope. The Programme is of regional significance because tuna are migratory fish species shared by PICs. Therefore, reliable information is needed on how tuna resources will respond to climate change and move across national jurisdictions, and from EEZs to high-sea areas. It is also relevant at the national level because adaptations to increase access to tuna for food security need to be customised for each country, due to varying food security contexts, and the wide differences in population size and location of Pacific Island nations.

4.4.4 Beneficiaries

Annex 23b provides details on beneficiaries of the RTP where beneficiaries are individuals with reduced climate vulnerability. Annex 23b:

- Specifies the number of people in each country expected to benefit from the activities to be implemented under both Components of the Programme; and
- Quantifies the level of benefit to be received by the target population in each country from strengthening national FAD programmes and improving the distribution of bycatch under Component A of the RTP.

4.4.5 Sustainable development

The interventions to be implemented under the RTP are focused on producing a range of positive economic, social, environmental and gender-sensitive development results, which are captured under the Programme's two outcomes and two defined co-benefits.

Programme **Outcomes 1 and 2** are expected to result in increased food security, by promoting reliable access to tuna and other fish as a locally-available source of nutritious dietary protein. This in turn will lead to improved public health outcomes.

For **Co-benefit 1**, positive results will include the following:

- Increasing livelihood diversification and access to markets, thus providing opportunities to boost household incomes in rural and urban/peri-urban communities.
- Increasing gender equality and opportunity by encouraging greater participation of women (i) in livelihood activities across the full spectrum of tuna value chain activities (e.g., harvesting, handling, processing, distribution and marketing); and (ii) in Programme- and climate-related decision-making forums.

For **Co-benefit 2**, expected results will include increasing the sustainability of ecosystem services by improving the management and sustainability of oceanic tuna and other pelagic fish stocks across the Pacific.

The Monitoring and Evaluation (M&E) system of the Programme will ensure that the co-benefits will be monitored throughout implementation of the Programme and integrated with monitoring systems of the relevant Ministries and other public authorities. These efforts will be coordinated through the Heads of Fisheries (HoFs) of the respective countries, and through SPC and other relevant regional entities. The M&E system, and the indicators to be monitored, are fully described in [Annex 11](#), the Monitoring and Evaluation Plan.

The Programme is fully consistent with the UN Sustainable Development Goals (SDGs), and will support the realization of the following goals and targets:

- Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture): Target 2.1
- Goal 5 (Achieve gender equality and empower all women and girls): Targets 5.5, Target 5.a, 5.b
- Goal 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all): Target 8.2
- Goal 12 (Ensure sustainable consumption and production patterns): Targets 12.2, 12.a
- Goal 13 (Take urgent action to combat climate change and its impacts): Targets 13.1, 13.2, 13.3, 13.b
- Goal 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development): Targets 14.2, 14.4, 14.6, 14.7, 14.a, 14.b, 14.c

From a global perspective, the PICs are among the countries that are most vulnerable to the impacts of climate change. In a recent survey conducted as part of the Notre Dame University Global Adaptation Initiative (ND-GAIN),¹⁰⁶ nearly 200 countries worldwide were assessed in terms of their vulnerability to climate change. Vulnerability measures a country's exposure, sensitivity and ability to adapt to the negative impacts of climate change. The ND-GAIN survey measured overall vulnerability by considering six life-supporting sectors – food, water, health, ecosystem services, human habitat and infrastructure. It was determined that, for the countries surveyed, the majority of the 14 PICs participating in the Programme fall within the most-vulnerable 25% quantile (i.e., within the bottom fourth of the countries surveyed). Clearly, the needs of this group of countries for assistance to combat the effects of climate change, and to strengthen resiliency, are great. Further details regarding the needs of the PICs for support in this regard, as well as a number of exacerbating factors, are presented here.

4.4.6 Absence of adequate financing

In general, the participating PICs are small economies which lack adequate financial resources to develop robust systems to support well-coordinated national FAD programmes, as well as a regional

AWS aimed at gathering critical data that would support the equitable sharing of tuna resources across the Pacific, as tuna stocks are redistributed due to climate change. The PICs are among a group of countries that are heavily reliant upon overseas development assistance (ODA) to fill gaps to meet their development needs.

The proposed GCF-supported RTP will help to provide the initial financial support needed to strengthen national FAD programmes, and to source bycatch and tuna from transshipping and unloading operations, to increase access to tuna for coastal and urban/peri-urban communities, launch the AWS, and enable participating countries to identify the costs of these initiatives for incorporation in national mechanisms to sustain the activities over the long term.

4.4.7 Need for strengthening institutions and capacity

As is the case for many countries worldwide, knowledge about climate change and the direct and indirect impacts on rural and urban populations needs to be strengthened further in the PICs participating in the GCF Programme. This includes raising awareness about projected climate change-induced redistribution of tuna resources, which will have a significant effect on tuna-dependent economies in the decades to come. Similarly, the general public in these countries, while heavily dependent on nearshore reef fish as their main source of dietary protein, may not be fully aware of the damaging impacts that climate change (coupled with increasing fishing pressure) has upon coral reef ecosystems and the fish species that they support. Further, these countries often struggle to obtain the financial resources needed to build the teams needed to manage the diversity of inter-related activities in the fisheries sector. Prominent challenges are managing (i) minimising the potential adverse impacts of fishing activities on targeted fish stocks and other marine resources; (ii) ensuring that the socio-economic benefits from sustainably managed fisheries are maximised and shared equitably;; (iii) raising awareness among both rural and urban communities about climate-related impacts on fisheries resources; and (iv) creating opportunities for greater participation of women and disadvantaged groups in livelihood opportunities within the fisheries sector. The Programme will work toward addressing all these requirements.

4.4.8 Economic and logistical limitations (high dependency on limited resource base)

Nearly all the PICs participating in the RTP are categorised as Small Island Developing States (SIDs). The SIDs are typically characterised as being limited in their economic development due in large part to the small size of their economies. In the case of the PICs, this condition is further exacerbated by their remoteness from major markets, and the non-diversified nature of their economies. For example, 9 of the 14 participating PICs are considered to be tuna-dependent economies, reflecting their reliance on this single resource for their economic well-being.

Taken collectively, the conditions described here lead to significant budgetary constraints. These budgetary constraints in turn make it difficult for these countries to adequately finance a range of vital social services and essential infrastructure, including for example education, health care, transportation infrastructure, and internet services (among many others). The factors mentioned here cannot be fully addressed through any single assistance programme. However, the RTP can make an important contribution towards addressing these barriers to some degree. Through the development of a regional AWS, the Programme will be supporting the main source of revenue generation for most of the participating countries, by enabling countries to maintain or improve their potential to collect licensing fees from industrial tuna fishing operations. It is anticipated that this will enable these countries to generate revenue that will better support investments in social programmes and infrastructure, that might not be possible in the absence of the Programme.

4.4.9 Limited access to markets, and consequences

Climate change is adversely affecting the WCPO large marine ecosystem, degrading its coral reefs and changing the distribution of tuna. The impacts on coral reefs are reducing the supply of reef fishing and threatening the food security of more than four million people that live along the coasts of the Programme's targeted 14 Pacific Island countries. In parallel to the threat to the food security of highly vulnerable populations, the redistribution of tuna will have profound implications for national economies that derive as much as 70% of their (non-aid) government revenue from tuna fishing, thereby dramatically reducing basic social services that are essential to the resilience of Pacific Island people. This Programme will: 1) increase supply of tuna for domestic consumption as an adaption to degradation of coral reefs and the resulting food insecurity for vulnerable populations; and 2) usher in the reforms needed to minimise the risks for citizens of countries with economies that are vulnerable to climate-driven redistribution of tuna.

4.5 Monitoring impact and evaluation plan

The Programme has a monitoring, evaluation, accountability and learning (M&E) framework (Annex 11), designed to measure the following main areas:

- Progress towards accomplishment of Programme-level outcomes and co-benefits, as articulated in the ToC and logframe; and
- Programme contributions toward achieving Fund-level outcomes, as measured by IRMF core indicators.

Programme-level monitoring and evaluation will be undertaken in compliance with the M&E systems and processes utilized by CI and SPC. Additionally, M&E for the Programme will be complementary to the applicable governmental M&E systems and policies of the 14 participant PICs.

The PMU's M&E officer will be responsible for designing initiatives to establish baselines, mid-term and final data for each Component of the Programme for:

- a). Fund-level core indicators and outcomes, and
- b). Programme-level results and indicators.

4.5.1 Monitoring

The establishment of the monitoring system for the Programme will require several steps which will be undertaken in a logical sequence. The primary responsibility for day-to-day Programme monitoring and implementation rests with the Programme Manager of the Project Management Unit (PMU) to be located at SPC HQ, Noumea. The Programme Manager, in consultation with key stakeholders, will develop annual work plans and associated budgets based on the Inception Report to ensure the efficient implementation of the Programme. A Programme Inception Workshop, involving CI, SPC, FFA, CSIRO, senior representatives of each of the 14 PICs, and other key stakeholders (such as the PNAO) will be held within the first six months of the official commencement of the Programme. The overarching objectives of the Inception Workshop will be to:

- a). assist the Programme team and stakeholders to understand and take ownership of the Programme implementation approach, objectives and outcomes and discuss any changes in the overall context that might influence Programme implementation;
- b). discuss the roles, support services and complementary responsibilities of the Programme team and the national government ministries including financial and narrative reporting and communication lines and conflict resolution mechanisms;
- c). review the results logical framework, re-assess baselines as needed, and discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E Plan, and
- d). establish the Project Steering Committee (PSC).

After the Inception Workshop, the EE will be responsible for convening an annual PSC. The Steering Committee, which will consist of senior officials representing each of the PICs, may adopt its own rules of procedure, if appropriate. The AE will participate in the PSC in an advisory capacity. Decision-making in the PSC will be the responsibility of the 14 PCs. The PMU will provide logistical and administrative support to the PSC.

Regional oversight will be achieved through annual reporting on Programme achievements and issues arising to SPC's Heads of Fisheries (HoF) meeting and to FFA's Forum Fisheries Committee (FFC). All 14 PICs are represented in these bodies at a head of agency/senior official's level. The PMU will coordinate national and regional reporting to these fora and report key outcomes to the AE.

The Programme team will ensure that the indicators included in the Programme results logical framework are monitored and reported on every six months and will objectively report progress. Programme components, including activities and outputs, will be monitored separately as well as in relation to the achievement of higher-level Programme results and overall GCF goals. In addition to monitoring progress against Programme-level goals, the Monitoring, Evaluation and Learning system will also measure progress against GCF level targets as well as enabling environment and paradigm shift targets as described in the Programme FP and logical framework.

Details of M&E implementation will be negotiated and included in the agreements between the CI GCF Agency as AE and the Executing Entity (SPC). Agreements between SPC and Implementing Partners (FFA, PNAO and the CSIRO) will include similar obligations.

4.5.2 Evaluation

The Programme's Mid-term Evaluation (MTE) process will include an internal Impact Evaluation and an independent Process Evaluation. An independent Final Impact Evaluation will take place no later than three months prior to operational closure of the Programme.

The evaluations will rely on key evaluation questions (to be developed during inception planning) to respond to the performance and impact of the Programme's completed activities, and will include assessment against OECD-DAC and GCF evaluation criteria. These may include the following: relevance; effectiveness of the programme and processes; the efficiency of processes; sustained impact and coherence in climate finance delivery; gender equity and inclusiveness; innovation and potential for paradigm shift; country ownership; coherence of climate finance; and potential for building scale and unexpected results (positive and negative). The Terms of Reference for the Evaluation will be developed and agreed between the EE and AE.

Overall, the evaluation will contribute to accountability and learning by reviewing emerging evidence on the performance and the impact and/or likelihood of impact of the Programme, and disseminating that evidence to Programme implementors, beneficiaries and stakeholders (including donors) to support evidence-based decision-making. The midterm evaluation will be instrumental in contributing – through operational and strategic recommendations – to improving implementation, setting out any necessary corrective measures for the remaining period of the programme. The final evaluation will assess the relevance of the intervention, its overall performance, as well as sustainability, scalability and replicability of results, differential impacts and lessons learned. The evaluation should also assess the extent to which the intervention has contributed to the Fund's higher-level goal of achieving a paradigm shift in adaptation to climate change with respect to the tuna resources of the Pacific.

4.5.3 Reporting

Annual monitoring will be based upon review and assessment of the indicators included in the Programme results logframe and will be reported in the Programme's Annual Performance Reviews submitted through the PSC to the AE.

The results of the independently produced Mid-term and Final Impact Evaluations will be reported first in draft reports, which will be reviewed and commented upon by the AE and other stakeholders, including the PSC. Mid-term and Final Impact Evaluation reports will be prepared taking into account the comments provided on the drafts. The full M&E Plan is available in [Annex 11](#).

Monitoring and Evaluation (M&E) processes for the Programme will ensure that the co-benefits will be monitored throughout implementation and integrated with monitoring systems of the relevant partner Ministries and other public authorities in each PIC. These efforts will be coordinated through the Heads of Fisheries (HoFs) of the respective PICs, and through SPC, FFA, PNAO and other relevant regional entities.

The M&E Plan is a living document and follows the templates specified by the GCF and focuses on measuring the delivery of outputs, outcomes and broader paradigm shift impact of the Programme ([Annex 11](#)). Additional context and detail will be added to the M&E Plan during the inception stage of the Programme (within the first 6 months of implementation) by a Programme M&E staff member and in collaboration with participating governments and local partners. Development of the full M&E Plan by the dedicated M&E officer will ensure that GCF, AE and EE M&E requirements are fully assimilated, that the Plan is owned by all stakeholders, and will be implemented effectively by the Programme Management Unit (PMU).

The full M&E Plan will build on the information provided in [Annex 11](#) but will elaborate in more detail the roles and responsibilities for data collection and management, information flows and reporting systems, monitoring protocols and tools, implementation plans and schedules, alignments and collaborations with existing national M&E systems and M&E resource availability. The detailed M&E Plan will include participatory methods for data collection and learning and an Impact Evaluation Plan that builds on the summary included in this document.

The M&E Plan is designed to monitor indicators relevant to each of the outcomes and outputs presented in the Programme Theory of Change (ToC) and logical framework (Logframe).

Appendices

[Appendix 4-A](#) List of Projects relevant to the GCF Tuna Programme

[Appendix 4-B](#) Project summaries

[Appendix 4-C](#) Barriers that are limiting increased access to tuna for the livelihoods, food security and healthy diets of coastal and urban communities

[Appendix 4-D](#) A description of each barrier preventing governments from understanding and responding to the implications of climate-driven tuna redistribution

[Appendix 4-E](#) Climate change policy documents in each participating country and contribution of the Programme

Endnotes:

¹ See Annex 07 for the Stakeholder Engagement Plan which includes a summary of national and regional consultations undertaken during Programme preparation.

² Available at: <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

³ Throughout this Proposal, the term Monitoring and Evaluation (M&E) has been used to refer to systems and procedures to monitor and measure the impacts of the Programme as implementation progresses. In this regard, it will include appropriate elements of Monitoring, Evaluation and Learning (MEL), which balances these monitoring needs with those of adaptive learning, or broader spectrum monitoring and assessment associated with Monitoring, Evaluation, Accountability and Learning (MEAL).

⁴ Detailed information was not always available for all the projects which made it difficult to determine relevance. By its nature climate change adaptation or resilience is invariably interlinked. This is generally reflected at the broad project description or at the objective level.

⁵ These projects and initiatives offer lessons and/or potential to build on results.

⁶ Component B of the RTP Proposal is an "Advanced Warning System" - but concerns forecasting and projections around the redistribution of tuna in the WCPO as a consequence of changing environmental variables associated with climate change.

⁷ Relevant projects that will have concluded by 2026 include the Palau Northern Reefs Project, the food security project in Kiribati, and the following current regional projects PEUMP and the FAO FishFAD project. The World Bank PROPER initiative will have 2 years remaining.

⁸ SPC. 2017. SPC Policy Brief #31: Sustainable national artisanal FAD programmes: what to aim for. Noumea, New Caledonia: Pacific Community. 4 pages. <https://purl.org/spc/digilib/doc/5hzi8>

⁹ Chapman L. *in prep*. Regional Report: Feasibility of scaling-up National Fish Aggregating Device (FAD) Programmes in all 14 participating countries. Technical Study prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). October 2023. Lindsay Chapman Consulting Pty Ltd, Brisbane, Australia. 92 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

¹⁰ FFA. 2022. Harmonised Minimum Terms and Conditions for Access by Fishing Vessels: Section 6. *Monitoring and Control of Transshipment*. Adopted by the Forum Fisheries Committee, May 2022. 26 pages.

¹¹ MRAG Asia Pacific. 2019. *WCPO Transshipment Business Ecosystem Study*, report prepared for the PEW Charitable Trust

¹² McCoy, M. 2012. *A Survey of Tuna Transshipment in Pacific Island Countries: Opportunities for Increasing Benefits and Improving Monitoring*. FFA Report, July 2012. <https://www.ffa.int/system/files/Transshipment%202012%20Report.pdf>.

¹³ MRAG Asia Pacific. *in prep*. Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Report prepared for the Pacific Community. 44 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

¹⁴ Johnson, J.E., Welch, D.J., Youngs, K., Basel, B., Tracey, D. and Sambrook, K. *in prep*. Assessment of the vulnerability of Pacific Island communities and economies to the effects of climate change on coastal fisheries. SPC/CI/GCF Technical Study 1. Secretariat of the Pacific Community, Noumea, New Caledonia.

¹⁵ Brewer T., Kottage H., Andrew N. *in prep*. Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

¹⁶ SPC 2019. Implications of climate-driven distribution of tuna on Pacific Island economies. SPC Policy Brief 32/2019. https://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon_19_PolicyBrief32_TunaClimate.html

¹⁷ See Attachment A, Table 2.

¹⁸ <https://cmm.wcpfc.int/resolution/resolution-2019-01>

¹⁹ Senina, I. et al. 2018. Impact of climate change on tropical Pacific tuna and their fisheries in Pacific Islands waters and high seas areas. Western and Central Pacific Fisheries Commission 14th Scientific Committee, Working Paper SC14-EB-WP-01 <https://www.wcpfc.int/node/30981>

²⁰ Bell, J.D., Senina, I., Adams, T., Aumont, O., Calmettes, B., Clark, S., Dessert, M., Gehlen, M., Gorgues, T., Hampton, J. and Hanich, Q. 2021. Pathways to sustaining tuna-dependent Pacific Island economies during climate change. *Nature sustainability*, 4(10), pp.900-910.

- ²¹ SPC. 2017. SPC Policy Brief #31: Sustainable national artisanal FAD programmes: what to aim for. Noumea, New Caledonia: Pacific Community. 4 pages. <https://purl.org/spc/digilib/doc/5hzi8>
- ²² Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ²³ Chapman L. *in prep.* Regional Report: Feasibility of scaling-up National Fish Aggregating Device (FAD) Programmes in all 14 participating countries. Technical Study prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). October 2023. Lindsay Chapman Consulting Pty Ltd, Brisbane, Australia. 92 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ²⁴ MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Report prepared for the Pacific Community. 44 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ²⁵ Source for the degree of urbanisation for population projections is extracted from Pacific Data Hub (SPC), available from: <https://stats.pacificdata.org/>, last updated 26 October 2022.
- ²⁶ Bell J.D., Johnson, J.E. and Hobday, A.J. 2011. *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change*. Chapter 2. pp. 49-100. Secretariat of the Pacific Community, Noumea, New Caledonia. 941 pages.
- ²⁷ Bell, J.D., Allain, V., Allison, E.H., Andréfouët, S., Andrew, N.L., Batty, M.J., Blanc, M., Dambacher, J.M., Hampton, J., Hanich, Q. and Harley, S., 2015. Diversifying the use of tuna to improve food security and public health in Pacific Island countries and territories. *Marine Policy*, 51, pp.584-591.
- ²⁸ MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Report prepared for the Pacific Community. 44 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ²⁹ Simple projection of transshipment volume under RCP 8.5 is based on percentage declines in catch forecasted in Bell et al. 2021 applied to the average volume transhipped in the 5-year period from 2017 to 2021 in **Error! Reference source not found.**
- ³⁰ Source for the degree of urbanisation for population projections is the Pacific Data Hub (SPC), available from: <https://stats.pacificdata.org/>, last updated 26 October 2022
- ³¹ Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 p. <https://purl.org/spc/digilib/doc/4aszp>
- ³² MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Report prepared for the Pacific Community. 44 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ³³ SPC (2008). Fish and Food Security. SPC Policy Brief 1/2008 <https://pacificdata.org/data/dataset/oai-wws-spc-int-ced24e95-7e0a-401a-9f0b-d79316c49cb0>
- ³⁴ Johnson, J.E., Welch, D.J., Youngs, K., Basel, B., Tracey, D. and Sambrook, K. *in prep.* Assessment of the vulnerability of Pacific Island communities and economies to the effects of climate change on coastal fisheries. SPC/CI/GCF Technical Study 1. Secretariat of the Pacific Community, Noumea, New Caledonia. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ³⁵ Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ³⁶ This Activity will also generate linked benefits for Component A particularly in relation to likely responses of the commercial purse seine fleets to changes in the distribution of tuna and the implications for in-port transshipment operations.
- ³⁷ Mallin, M.A.F., Stolz, D.C., Thompson, B.S. and Barbesgaard, M. 2019. In oceans we trust: Conservation, philanthropy, and the political economy of the Phoenix Islands Protected Area. *Marine Policy*, 107, p.103421.
- ³⁸ See: <https://www.waaittstitute.org/vanuatu>

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- ³⁹ Hampton, J., Lehodey, P., Senina, I., Nicol, S., Scutt Phillips, J. and Tiamere, K. 2023. Limited conservation efficacy of large-scale marine protected areas for Pacific skipjack and bigeye tunas. *Frontiers in Marine Science*, 9, p.2817.
- ⁴⁰ <https://www.aspistrategist.org.au/whats-behind-kiribatis-move-to-open-marine-reserve-to-fishing/>
- ⁴¹ Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁴² WCPFC Resolution 2019-01. <https://cmm.wcpfc.int/>
- ⁴³ <https://cmm.wcpfc.int/>
- ⁴⁴ Bell, J.D., Senina, I., Adams, T., Aumont, O., Calmettes, B., Clark, S., Dessert, M., Gehlen, M., Gorgues, T., Hampton, J. and Hanich, Q. 2021. Pathways to sustaining tuna-dependent Pacific Island economies during climate change. *Nature sustainability*, 4(10), pp.900-910.
- ⁴⁵ In December 2022, 30x30 was agreed at the COP15 meeting of the Convention on Biological Diversity, and became a target of the Kunming-Montreal Global Biodiversity Framework. The 30x30 concept refers to a target for at least 30 per cent globally of land areas and of sea areas, especially areas of particular importance for biodiversity and its contributions to people, to be conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.
- ⁴⁶ Lehodey, P., Senina, I., Nicol, S., Bell, J., Calmettes, B., Dessert, M., Forestier, R., Gorgues, T., Menkes, C., Hampton, J., Lengaigne, M., Sen Gupta, A. and Williams, P. Draft. December 2023. Vulnerability of oceanic fisheries in the tropical Pacific to climate change: An update from 2011 review. SPC document. 40 pages.
- ⁴⁷ Bell, J.D., Senina, I., Adams, T., Aumont, O., Calmettes, B., Clark, S., Dessert, M., Gehlen, M., Gorgues, T., Hampton, J. and Hanich, Q., 2021. Pathways to sustaining tuna-dependent Pacific Island economies during climate change. *Nature sustainability*, 4(10), pp. 900-910.
- ⁴⁸ Fish aggregating device (FAD) is a generic term that applies to a range of floating objects that aggregate fish. The industrial tuna surface fishery (purse seine and pole and line vessels) take advantage of fish aggregations beneath naturally occurring floating objects such as logs that are disgorged from rivers. The industrial purse seine fishery also deploys floating rafts that drift with the currents to aggregate tuna. Anchored FADs are also used by the industrial fleets. Coastal artisanal and commercial fishers almost always use anchored FADs to aggregate tunas and other neritic species. The subject of discussion here is anchored FADs used by artisanal fishers.
- ⁴⁹ Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Technical Study 2 prepared for the Pacific Community in support of the preparation of a Funding Proposal for the Green Climate Fund. 93 pages. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁵⁰ Johnson, J.E., Welch, D.J., Youngs, K., Basel, B., Tracey, D. and Sambrook, K. *in prep.* Assessment of the vulnerability of Pacific Island communities and economies to the effects of climate change on coastal fisheries. SPC/CI/GCF Technical Study 1. Secretariat of the Pacific Community, Noumea, New Caledonia. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁵¹ SPC 2012. Fish Aggregating Decices (FADs). SPC Policy Brief 19/2012. Pacific Community, Noumea. Bell et al. 2015. Optimising the use of nearshore fish aggregating devices for food security in the Pacific Islands. *Marine Policy* 56, 98-105.
- ⁵² Chapman L. *in prep.* Regional Report: Feasibility of scaling-up National Fish Aggregating Device (FAD) Programmes in all 14 participating countries. Technical Study 3 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). October 2023. Lindsay Chapman Consulting Pty Ltd, Brisbane, Australia. 92 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁵³ <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁵⁴ <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁵⁵ Chapman L. *in prep.* Regional Report: Feasibility of scaling-up National Fish Aggregating Device (FAD) Programmes in all 14 participating countries. Technical Study 3 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). October

2023. Lindsay Chapman Consulting Pty Ltd, Brisbane, Australia. 92 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁵⁶ Policy Brief No. 31/2017: Sustainable national artisanal FAD Programmes – what to aim for: Website: https://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon_17_PolicyBrief31_FAD_Programmes.pdf

⁵⁷ Chapman L. *in prep.* Regional Report: Feasibility of scaling-up National Fish Aggregating Device (FAD) Programmes in all 14 participating countries. Technical Study 3 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). October 2023. Lindsay Chapman Consulting Pty Ltd, Brisbane, Australia. 92 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁵⁸ Sokimi W. et al. 2020. Manual on anchored fish aggregating devices (FADs): An update on FAD gear technology, designs and deployment methods for the Pacific Island region. Pacific Community, Noumea.

⁵⁹ Edwards N.J. and Radway S. *in prep.* Mechanisms to produce behavioural change in fishing and consumption of tuna and other pelagic fish species by Pacific Island coastal communities. Technical Study 6 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). January 2024. cChange4Good, Brisbane, Australia. 45 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁶⁰ Roeger, J., Foale, S. and Sheaves, M. 2016. When ‘fishing down the food chain’ results in improved food security: evidence from a small pelagic fishery in Solomon Islands. *Fisheries Research* 174, 250–259.

⁶¹ Bell, J.D. et al. 2018. Adaptations to maintain the contributions of small-scale fisheries to food security in the Pacific Islands. *Marine Policy* 88, 303–314.

⁶² Bertram, I. et al. 2023. Nearshore fishing techniques: A manual for community fishers in the Pacific Islands. Pacific Community, Noumea.

⁶³ <https://fame.spc.int/resources/tools>

⁶⁴ Bell, J.D. et al. 2018. Operationalising access to oceanic fisheries resources by small-scale fishers to improve food security in the Pacific Islands. *Marine Policy* 88, 315–322.

⁶⁵ Lee, R. *in prep.* Needs analysis for safe small vessel designs for operating around nearshore FADs (GCF Study 12). Technical Study 12 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). 106 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁶⁶ Sanders J. et al. *in prep.* Disaster risk reduction in fisheries in the Pacific Islands: Review of the capacity of national administrations to manage the risks posed by natural disasters to small-scale fishers. Technical Study 4 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). January 2024. 31 p. + annexes. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁶⁷ <https://coastfish.spc.int/Fishing/Posters/Checklist.pdf>

⁶⁸ <https://www.fao.org/3/r6918e/R6918E05.htm>

⁶⁹ [The Pacific Islands Ocean Cluster \(conservation.org\)](https://www.pacificislandscluster.org/)

⁷⁰ <https://sjavarklasinn.is/en/>

⁷¹ MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Technical Study 5 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). 44 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁷² MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Technical Study 5 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). 44 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁷³ MRAG Asia Pacific. *in prep.* Adapting tuna dependent Pacific Island communities and economies to climate change: Existing and future needs and conditions for distributing tuna bycatch to urban and peri-urban areas (GCF Study 5). Technical Study 5 prepared for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF). 44 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>

⁷⁴ Lehodey, P. et al. 1997. [El Niño Southern Oscillation and tuna in the western Pacific | Nature](https://doi.org/10.1016/S0969-8298(97)00050-0)

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- ⁷⁵ Solo, M.K. et al. 2023. [Assessment of Postharvest Practices of Tuna Sold at the Honiara Fish Market in the Solomon Islands \(hindawi.com\)](https://doi.org/10.1155/2023/1319301)
- ⁷⁶ <https://www.sciencedirect.com/science/article/abs/pii/S0147651319301320>
- ⁷⁷ Goodman C., Azmi K., Davis R., Haas B., Hanich Q. *in prep.* Preliminary framework for joint management of redistributed tuna stocks by WCPFC and IATTC (GCF Study 8). Technical Study 3 prepared by the Australian National Centre for Ocean Resources and Security for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF), Wollongong, Australia, 2023. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁷⁸ Goodman C., Azmi K., Davis R., Haas B., Hanich Q. *in prep.* Preliminary framework for joint management of redistributed tuna stocks by WCPFC and IATTC (GCF Study 8). Technical Study 3 prepared by the Australian National Centre for Ocean Resources and Security for the Pacific Community as a contribution to a funding proposal being prepared for submission to the Green Climate Fund (GCF), Wollongong, Australia, 2023. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁷⁹ WCPFC. 2023. *2023 Tuna Fisheries Assessment Report*. <https://meetings.wcpfc.int/node/21445>
- ⁸⁰ Brewer T., Kottage H., Andrew N. *in prep.* Options for supplying dietary protein for growing Pacific Island populations. Report prepared for the Pacific Community. 93 p. <https://fame1.spc.int/documents-in-support-funding-proposal-green-climate-fund-regional-tuna-programme>
- ⁸¹ Note that this is proposed text for the final version of the FP. At this stage no NOLs have been provided. NOLs are only expected once the FP is complete and has been reviewed by the countries.
- ⁸² <https://cmm.wcpfc.int/resolution/resolution-2019-01>
- ⁸³ <https://cmm.wcpfc.int/resolution/resolution-2008-01>
- ⁸⁴ <https://pacific-data.sprep.org/dataset/future-fisheries-regional-roadmap-sustainable-pacific-fisheries>
- ⁸⁵ <https://coastfish.spc.int/component/content/article/461-a-new-song-for-coastal-fisheries.html>
- ⁸⁶ Clark, S., Bell, J., Adams, T., Allain, V., Aqorau, T., Hanich, Q., Jaiteh, V., Bahri, T., Vasconcellos, M., Welch, D. and Johnson, J. 2021. The Parties to the Nauru Agreement (PNA) 'Vessel Day Scheme': A cooperative fishery management mechanism assisting member countries to adapt to climate variability and change. *Fisheries and Aquaculture Technical Paper*, 667.