



Food and Agriculture
Organization of the
United Nations

FISH4ACP

Unlocking the potential
of sustainable fisheries and aquaculture
in Africa, the Caribbean and the Pacific

ANALYSIS AND DESIGN REPORT

The purse seine tuna fishery value chain in the Marshall Islands

January 2023



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Acknowledgements

The authors of this report would like to thank the following and acknowledge their important contributions to the report: Sergio Bolasina (FISH4ACP Project Officer in the Marshall Islands), the staff of the Marshall Islands Marine Resources Authority (Glen Joseph, Berry Muller, Beau Bigler, Aquina Pyanne and Laurence Edwards) for their support and engagement with the Value Chain Analysis team; peer reviewers of this report (David Neven, Michael Griffin, Eva Galvez Nogales, Heiko Bammann and Omar Penarubia); individuals from the private sector who gave their time to meet with the Value Chain Analysis team and provide information; and staff in the FISH4ACP Project Management Unit who provided technical and administrative support (Gilles van de Walle and Steven Ciocca).

Citation

This report should be cited as follows: Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M., Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

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Abbreviations and acronyms

ACP	Africa, the Caribbean and the Pacific
ATC	airtight container
BET	bigeye tuna
CA	Competent Authority
CFR	cost and freight
CMM	conservation and management measure
CoC	chain of custody
CPUE	catch per unit of effort
DWFN	distant water fishing nation
EC	European Commission
EEZ	Exclusive Economic Zone
ENSO	El Niño/Southern Oscillation Index
EPA	Environmental Protection Agency
EPA	Economic Partnerships Agreements (between the European Union and OACPS countries)
ETP	endangered, threatened or protected
FAD	fish aggregating device
FAO	Food and Agriculture Organization (of the United Nations)
FFA	Pacific Islands Forum Fisheries Agency (FFA)
F _{MSY}	the rate of fishing mortality that results in the maximum sustainable yield
FOB	Free onboard
FSM	Federated States of Micronesia
FSMA	Federated States of Micronesia Arrangement
FV	Fishing vessel
GDP	gross domestic product
GHG	greenhouse gas
GRT	gross registered tonnage
HACCP	hazard analysis and critical control point
Horeca	hotel restaurant catering
IAEA	International Atomic Energy Agency
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IUU	illegal unreported and unregulated (fishing)
JICA	Japan International Cooperation Agency

KMI	Kwajalein Marshall Islands
kW	kilowatt
LRP	Limit Reference Point
MCS	monitoring, control and surveillance
MIDA	Marshall Islands Development Authority
MIFV	Marshall Islands Fishing Venture (longline company)
MIMFIS	MIMRA Fisheries System

Glossary

Carbon footprint	Calculated as the kg CO ₂ e/year per at actor level, functional level, core VC level, and per kg of end product
Clean renewable energy	Refers to renewable energy that is produced through methods that do not release greenhouses or other pollutants such as solar or wind power.
Container stuffing	The process whereby fish are loaded into containers.
Containerisation	The loading of fish from fishing vessels or shore-based facilities into containers (typically either 20ft or 40ft in length).
Contribution to GDP (of VC)	100 * (total value added over national GDP), expressed as a percentage (%)
Designated port	Ports specified by government authorities as ports into which fish can be landed or in which transhipments can take place
Direct value added	The sum of net profits (after taxes) for the companies, net wages for their workers, and government revenue in the form of taxes and fees.
Dry fish	Fish kept in a cold store onshore before being stuffed into containers.
Electricity use	Calculated as the kWh/year at actor level, functional level, core VC level, and per kg of end product
Exclusive Economic Zone (EEZ)	The area adjacent to a coastal state which encompasses all waters between: (a) the seaward boundary of that state, (b) a line on which each point is 200 nautical miles (370.40 km) from the baseline from which the territorial sea of the coastal state is measured (except when other international boundaries need to be accommodated), and (c) the maritime boundaries agreed between that state and the neighbouring states
First sale/ex-vessel value	The value of fish (usually measured in USD per tonne or kg) the first time that it is sold by a fishing vessel, before later sales further down the value chain which may involve increases in sales prices.

Fish Aggregating Device	Artificial or natural floating object placed on the ocean surface, often anchored to the bottom, to attract several schooling fish species underneath, thus increasing their catchability
Fishing pressure	Refers to the level of fishing efforts (active fishing licenses or boats, number of days fishing, number of hooks a day, yield per day, etc.) that the fish stock is subject to.
Flag state (of a fishing vessel)	The State having registered a vessel under the national flag
Food loss and waste	Refers to the quantitative and qualitative loss of aquatic products that have been intended for human consumption but have either suffered due to, e.g. poor transportation and processing practices, and are thus no longer fit for human consumption, or have been discarded by different actors based on, e.g. consumer preferences and demands. To measure food loss, the quantities of aquatic products lost along the value chain, from production up to, but not including, retail are calculated. Food waste refers to the aquatic food lost in the retail and consumption functions of a value chain.
Free school	Fish not caught using a fish aggregating device
Fuel consumption	Calculated as MJ/year at actor level, functional level, core VC level and per kg of end product
Fulltime equivalent (FTE) jobs	The total number of 8-hour working days divided by 230 (days)
Indirect value added	The cost of the domestic goods and services that the VC actors purchase from outside of the core VC (therefore does not include the cost of raw materials (whole tuna) sold/bought along the VC)
Katsuobushi	A boiled dried and smoked skipjack flake, used in Japan for making stock, as a topping for noodles and rice, and as a snack
Longline	A fishing gear in which short lines carrying hooks are attached to a longer main line at regular intervals. Longlines are laid on the bottom or suspended horizontally at a predetermined depth with the help of surface floats. The main lines can be as long as 150 km and have several thousand hooks (e.g. in tuna fisheries).

Maximum sustainable yield	The highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing (average) environmental conditions without significantly affecting the reproduction process. Also referred to sometimes as Potential yield
Net impact on balance of trade (of VC)	Calculated by deducting imports from exports (in USD) for all products related to the VC, including both the VC's products and the inputs/services used in the VC.
Net impact on public funds	The net impact on public funds is expressed in USD and equals taxes plus fees minus subsidies.
Overfished	A stock is considered overfished when exploited beyond an explicit limit beyond which its abundance is considered "too low" to ensure safe reproduction. In many fisheries for the term is used when biomass has been estimated to be below a limit biological reference point that is used as the signpost defining an "overfished condition".
Overfishing	A term used to refer to the state of a stock subject to a level of fishing effort or fishing mortality such that a reduction of effort would, in the medium term, lead to an increase in the total catch. Often referred to as overexploitation and equated to biological overfishing.
Pole and line fishing	A fishing technique in which surface schooling fish are attracted to the vessel and driven into very active feeding behaviour by throwing live or dead bait into the water and spraying water onto the sea surface to simulate the escape behaviour of small preys. The fish lured with a line and a hook attached to a pole and pulled off the water by manual or powered devices. This fishing method is used worldwide to capture surface-swimming tuna such as yellowfin and skipjack
Pouch	Form of soft packaging using polymer film and foil, requiring lower temperatures during the packing process to kill bacteria than is required when packing into cans
Profit	Revenues minus costs
Purse seine	Nets characterized by the use of a purse line at the bottom of the net. The purse line enables the net to be closed like a purse and thus retain all the fish caught. The purse seines, which may be very large, are operated by one or two boats.

Rate of integration	The rate of integration (expressed as a percentage) indicates how much the VC is part of the national economy. It is calculated as $100 * (\text{total VA} / (\text{total VA} + \text{imported consumables}))$.
Reefer container	A refrigerated container, used for chilled or frozen goods.
Return on investment	$100 * (\text{operating profit over total cost})$, expressed as a percentage (%)
Return on sales	$100 * (\text{net profit over total revenues})$, expressed as a percentage (%)
Spawning biomass	The total weight of all sexually mature fish in the population
Stevedoring	Activities related to the loading and unloading of cargo
Stock status	The stock status refers to the biomass (B) of fish in the water and provides information on whether a stock is overfished, maximally sustainably fished or underfished. The amount of biomass (B) that produces the maximum sustainable yield (MSY) is referred to as BMSY. If the biomass of fish in the water is below BMSY, the stock is overfished. If the amount of fish in the water is more than what would produce MSY, the stock is underfished.
Target reference point	Corresponds to a state of a fishery and / or a resource which is considered desirable. Management action, whether during a fishery development or a stock rebuilding process should aim at bringing and maintaining the fishery system at this level. In most cases a TRP will be expressed in a desired level of output for the fishery (e.g. in terms of catch) or of fishing effort or capacity and will be reflected as an explicit management objective for the fishery
Total value added	The sum of direct value added and indirect value added
Total value of outputs	The total value of the output (in USD/year) of all VC actors. This equals the sum of the value of production (sales + self-consumption), minus losses.
Transshipment	The loading of fish from fishing vessels onto carrier vessels without being brought onto the shore. Transshipped fish does not constitute a landing into, or an export from, the country where transshipment takes place.

Trolling	A surface and sub-surface fishing method in which lines with baits or lures are dragged by a vessel at a speed of 2-10 knots. Trolling is used to catch tuna and tuna-like fish
Tuna loining	The process to cut flesh from the backbone lengthwise and normally into quarters.
Ultra Low Temperature Vessel Day Scheme	Fish held on vessels at -35 degrees, and which can be sold into the sashimi market because of its quality A scheme where vessel owners can purchase and trade days fishing at sea in places subject to the Parties to the Nauru Agreement (PNA).
Wet fish	Fish loaded direct from fish wells onboard fishing vessels into containers or carrier vessels.
WCPO Convention Area	The Area of Competence of the Western and Central Pacific Fisheries Commission. The Convention Area runs 60° south to 60° north and 125° West to 140° East

Executive Summary

FISH4ACP is an initiative of the Organization of African, Caribbean and Pacific States (OACPS) to support sustainable fisheries and aquaculture development. The five-year value chain (VC) development programme (2020–2025) is implemented by the Food and Agriculture Organization of the United Nations (FAO) with funding from the European Union (EU) and the Germany's Federal Ministry for Economic Cooperation and Development (BMZ).

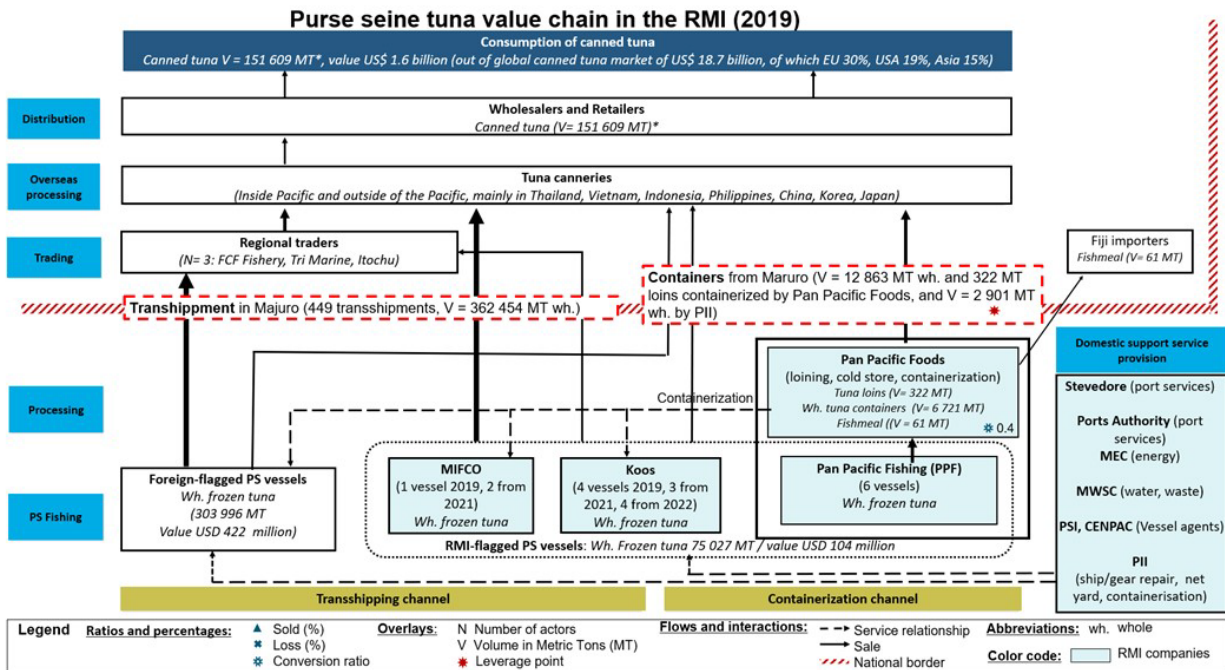
The purse seine (PS) tuna value chain in the Republic of Marshall Islands (RMI) is one of 12 value chains competitively selected from over 70 proposals worldwide for support from the FISH4ACP programme. This report presents the outputs of design work completed during 2021 to complete a functional analysis of the VC, assess its sustainability and resilience, develop an upgrading strategy to which the FISH4ACP programme will contribute, and plan for full implementation from January 2022.

The **methodology** used by a small team of FAO consultants to complete the work included: review of more than 110 reports, publications, and databases; primary research and consultations with stakeholders within and outside of Marshall Islands using a variety of methods (e.g. focus groups, observational visits, and interviews); and a series of stakeholder workshops during 2021 to introduce the work, validate emerging findings, and agree on an upgrading strategy for the VC. The methodology used a participatory approach with the private sector, government, other donors, civil society, and regional organisations. The consultants were supported throughout their work by the Marshall Islands Marine Resources Authority (MIMRA). The structure of this report, and the basis for assessing and scoring the VC's economic, social and environmental sustainability (and resilience) followed and adhered to the FISH4ACP methodology.

The **functional analysis** enabled the preparation of the VC map presented below. The core VC actors in Marshall Islands are few in number, with three catching sector companies (with a combined total of 12 vessels) and one processing company, relying on catches of skipjack tuna and smaller amounts of yellowfin and bigeye tuna.

As revealed by the VC map, the small quantity of catch landed and/or processed in the Marshall Islands for export (c.a. 15 000 MT of containerized tuna products) is of strategic importance for potential upgrading of the purse seine value chain, given the large volume of catches being transshipped through Marshall Islands (c.a. 360 000 MT in 2019) which are not considered as exports, and which generate little on-shore added-value in the Marshall Islands. While the end market for purse seine catches in the VC is the global canned tuna market, tuna canneries and tuna brokers are the

principal market for actors in the VC based in the Marshall Islands, as well as for PS vessels flagged to other countries which transship catch in Majuro. Of strategic importance to potential VC upgrading are the high prices of canned tuna in the European Union compared to many other global markets and the fact that without an European Union approved competent authority (CA) catches landed in Marshall Islands cannot be processed for sale in the European Union markets. Also important is that canneries pay higher prices for larger yellowfin when sorted from catches of smaller species mixed.



Note: 1) All data for 2019. 2) The map depicts the canned tuna deriving from the skipjack, yellowfin and bigeye tuna landed or transhipped in Majuro. 3) *: Assuming a conversion rate of loins to whole round weight of 40%, the amount of canned tuna at the Distribution and Consumption levels is 40% of the sum of RMI-flagged and foreign-flagged catches (75 027 MT + 303 996 MT).

The VC operates within a supportive enabling environment, with good regional arrangements for the management and conservation of fish stocks on which the VC relies, for example through the Western Central Pacific Fisheries Organisation and the Parties to the Nauru Agreement. At the national level, legislation is fit for purpose, and dock infrastructure largely sufficient, although shore-side space is limited and competition for access to quay wall space can create delays for fishing vessels to unload and for carrier vessels to be filled. Several donors and technical agencies (e.g. World Bank, Japan International Cooperation Agency, Asian Development Bank, The Nature Conservancy, FAO, Forum Fisheries Agency) support the fisheries sector in Marshall Islands.

An **assessment of the economic performance of the VC** reveals a heavy reliance on government support in the form of access fee concessions (costing the government around USD 7 million a year in lost vessel day revenue) and poor economic performance of core VC actors in 2019. Specifically, the three catching sector companies generated USD 5.6 millions of profit in 2019 representing poor

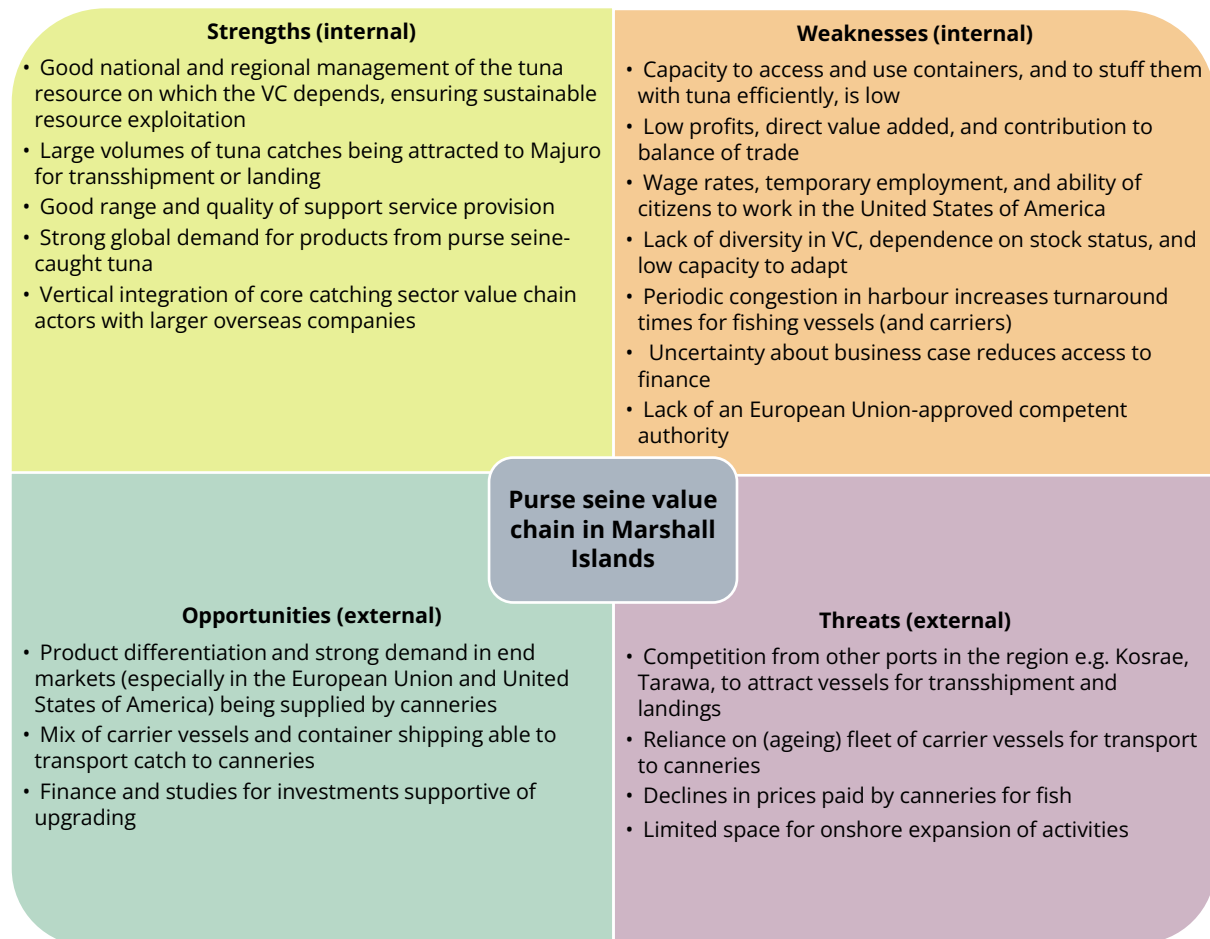
returns on sales of between -0.1 percent and 13 percent. The processing company in the VC generated a significant loss of USD 1.8 million and a return on sales of -103 percent. This may be largely explained by depressed international prices for tuna used as raw material inputs by canneries in 2019 (for all core VC companies) and the challenges related to labour (for the processing company). The VC also has a negative net impact on the balance of trade due to significant imports of inputs (e.g. fuel), with low levels of exports valued at USD 11 million in 2019 (as transshipped fish are not categorised as exports). Also of concern is that two-thirds of the total employment in the core VC, especially higher-ranked and higher-paid positions, is for non-Marshall Islands residents. This, along with foreign ownership of some Marshall Islands based companies in the VC contributes to 'economic leakage' of benefits from the VC from Marshall Islands. More positively, the core VC generates around USD 20 million in 2019 in direct value-added, which made up 20 percent of national GDP in that year. Over USD 14 million of the direct value-added is fees and taxes to the government, implying that the broader society may benefit thanks expenditure by government made possible by revenues from the VC. The value-added from the VC is higher when also considering support service providers to the VC, which contributed an additional USD 25 million of indirect value-added. In terms of employment for Marshall Islands residents, the core VC provides employment for 164 people (both full-time and part-time), with an additional 573 employed in related support services.

Analysis of the social performance of the VC demonstrates that social sustainability is good in terms of a lack of discrimination and child labour, companies being formally registered and complying with national employment laws, and the presence of employment contracts (although the latter is not universally the case). And while the VC makes no significant contributions to direct food security as virtually no catches from Marshall Islands flagged vessels or those transshipping in Majuro are sold on the domestic market, it contributes to indirect food security by enabling those employed in the VC to purchase food. However, the social assessment highlighted 'hotspots' in relation to: i) an unbalanced distribution of wages and employment in favour of non-RMI nationals compared to Marshall Islands nationals; low wages for lower-skilled employees of around USD 3.5 per hour, only just about the minimum wage of USD 3 per hour; ii) the temporary nature of much employment reducing the attractiveness of working in the VC; iii) potential concerns about poverty among workers; and iv) a small share of value added captured by women and few women holding decision-making roles compared to men (women account for only around one-third of the Marshall Islands resident full-time and part-time workers in the core VC and are mostly employed to work in the loining plant as unskilled or low-skilled workers).

In assessing the environmental sustainability of the VC it is noted that VC actors use only around 3 percent of the mains Majuro water supply. In terms of energy, while onshore companies in the VC (including the processing company and support service providers) maintain their own backup diesel generators and fuel storage to minimize disruptions due to inconsistent grid supply, most rely on mains electricity supply. No companies yet use renewable sources of energy such as solar power for their electricity needs. The high fossil fuel use by purse seine vessels is however the most significant source of climate impact by the VC, but fuel emissions by core VC actors are low in comparison to those of the fleet operating in Marshall Islands' exclusive economic zone (173 in 2019) or the Western Pacific as a whole (285 in 2019), and also low per tonne of animal protein generated when compared to other forms of fishing methods. Since catches by Marshall Islands flagged vessels are less than 4 percent of catches in the Western Central Pacific Ocean (WCPO) over the period 2015 – 2018, it can be inferred that their operation has limited impacts on the regional (WCPO) tuna stocks. In addition, the stocks of skipjack, yellowfin and bigeye caught by vessels in the VC are not assessed as being overfished. The purse seine fishery is a very 'clean' fishery with little bycatch (c.a. <1 percent by volume), although there is some bycatch of sharks and marine mammals, and concern over North Pacific Striped Marlin, which is assessed as being in an overfished state.

Six potential shocks to the VC are considered mostly likely to test its **resilience**: i) fluctuations in the price of fish paid by traders and canneries; ii) an increase in the price of vessel days; iii) a decline in fish catches; iv) an increase in fuel costs; v) reduced availability of reefer vessels for transport of catches from Marshall Islands and vi) reduced levels of transshipments in Majuro. The small number of actors in the VC and catching sector companies, being part of larger vertically integrated companies, increases the VC's resilience to shocks. However, concerns over the resilience of the VC arise from the highly competitive nature of the business sector which potentially reduces collaboration, low levels of diversity in the VC, and a low ability to change activities given the levels of investments made in purse seine vessels. Shocks to the VC could therefore have significant impacts on profits, revenues to government, employment, and wages.

Considering the VC and shifting from analytical complexity to strategic simplicity, an analysis of the strengths, weaknesses, opportunities and threats of the VC to inform the upgrading strategy is provided below.



Informed by the SWOT analysis, the sustainability assessments, the VC map, and stakeholder interests as reflected during consultations, an overall objective for the upgrading strategy is developed with stakeholders in the form of **a vision statement** as follows:

“In 2031, the Marshall Islands will have strengthened its position as a leading hub for tuna through transshipment and containerisation, with value-addition through a sustainable value chain that will generate local employment and increase its resilience.”

The specific timeframe specified in the vision is based on the need to move quickly while allowing sufficient time for the strategies to support the vision to be put into place. Specific and measurable **targets** associated with the vision (by 2031) are:

- 30 percent of tuna flows in Marshall Islands will be in containers and 70 percent transshipped.
- Tuna purse seine export values of USD 55 million a year will be generated by Marshall Islands -based fishing companies.
- Direct value added from the VC will be USD 33 million.
- There will be over 1 075 jobs in the core and extended VC within Marshall Islands.
- 3 percent of mains water used by VC actors (unchanged from 2021).
- 5 companies in the VC will be using some form of renewable energy in their operations.

The narrative for the upgrading strategy for the Marshall Islands purse seine value chain represents an integrated approach to realise the vision. Through grants and other supporting measures (such as trainings), Marshall Islands-based companies will be incentivized to shift to a new and more efficient technology in the form of loading machines for filling containers with tuna. This technology will have two effects. First, it will bring down the cost of stuffing and shipping tuna in containers. Second, it will allow for the fish to be sorted. These changes will in turn incentivize the fishing companies to shift to containerisation, as revenues will be higher as they will be able to secure a higher price for the sorted fish. Increased demand for containerisation, will generate the revenues and economies of scale to make containerisation more profitable over time. At the same time, outputs such as upgraded laboratory facilities, assessments of investments needed to improve vessel and shore-based fish hygiene, and a Competent Authority that is European Union certified will allow fish landed in Marshall Islands to be exported to the European Union market where higher prices can be obtained by the canneries buying tuna landed in the country. This will also contribute to an increase in the price that fishing companies can get for their fish and thus further increase their incentive to shift to containerisation. Furthermore, outputs such as detailed feasibility analysis and designs of expanded cold storage facilities, could provide justification for and facilitate an increase in cold storage capacity which would allow for even higher levels of sorting and therefore higher prices. The increase in containerisation and sorting will generate jobs and tax revenues for the Marshall Islands and will allow the country to strengthen its position as a major hub for tuna landings and transshipments. Various outputs such as detailed analysis and designs will introduce practices and technologies that will assure that social and environmental hotspots such as labour availability and the needs for more use of renewable energy are addressed, and that risks and challenges such as increased power requirements for plug-ins needed for containers are fully considered.

The proposed strategy to bring about the vision has four major elements:

1. *Increased containerisation of purse seine caught tuna for sale to canneries (or traders)* primarily in whole round frozen form having been sorted/graded, but potentially also following processing onshore into loins. This element exploits Majuro's position as a major hub for transshipment with large volumes of raw material flowing through Majuro port, to attract an increased proportion of existing catch that is currently transshipped to be containerized.
2. *Increased landings in Marshall Islands, enabled by an approved and functioning Competent Authority (CA) and resulting in increased exports.* A CA is critical to allow fish landed in Marshall Islands by Marshall Islands and non- Marshall Islands flagged vessels to enter European Union markets (via canneries to which vessel owners sell their catch), following sufficient sanitary approvals. Improvements in the fish hygiene and food safety standards of the private sector operators running fishing vessels and onshore facilities in Marshall Islands will also be necessary.
3. *Greater levels of storage and sorting of tuna in Marshall Islands prior to export, facilitated by increased cold storage capacity.* Facilities would enable catches to be landed, sorted and stored in Marshall Islands prior to export in containers, and potentially for container stuffing to be completed in a temperature-controlled environment. As costs and benefits of construction and operation of such a cold store could be considerable, and the environmental and social impacts of such an investment have not been fully explored during the analysis and design phase of the project, the viability of this component remains uncertain and will be further explored early in the implementation phase.
4. *Social and environmental sustainability improvements* to be realised through addressing the most critical 'hotspots' identified in the social and environmental sustainability assessments.

Successful implementation of the upgrading strategy would result in upgraded business performance of VC actors, an enhanced enabling environment from the presence of an approved CA and upgraded governance with increased levels of containerisation enabling catching sector companies to increase the level of sales made direct to canneries, rather than needing to rely on sales to traders.

The key economic, social and environmental performance indicators under current and upgraded practices, aggregated at the VC level, are provided below (on an annual basis).

Economic indicators	Current situation	With upgrading by 2030
Total revenues (USD)	122 160 173	136 680 834
Total profits (USD)	3 771 843	12 642 984
Direct value added (USD)	19 840 177	32 973 874
Number of jobs in core and extended VC	737	1 079
Total value of net wages for RMI residents (USD)	1 647 796	4 472 310
Total value added (USD)	44 345 350	61 194 581
Share of value added in national GDP (%)	36.3%	44.8%
Net impact on the balance of trade (USD)	-51 699 619	-5 012 207
Social indicators	Current situation	With upgrading
Net wages (for residents) as share of direct value added (%)	8%	12%
No. of FTE jobs for women in core VC	47	102
Share of direct value added captured by women (%)	1.0%	1.2%
Proportion (%) of RMI resident labour in VC having employment contracts	74%	100%
Environmental indicators	Current situation	With upgrading
Proportion (%) of mains Majuro water supply used by VC actors	3%	3%
Number of companies in the VC having increased their use of solar or other renewable forms of energy	n/a	5

Bringing about these performance improvements, and realization of the four elements of the upgrading strategy will require many activities to be funded and implemented. **FISH4ACP, the government, the private sector, and other donors will all have a role to play in funding and implementing activities.** Activities have been articulated to support specific outputs under each of the four elements of the strategy. For each activity a text description has been provided to help implementation, along with an indication of timing, funding source, and type of investment. A total **investment cost of USD 10.6 million is estimated** for a variety of plants and equipment, facilitation and studies, training, and infrastructure. Costs related to element 1 of the strategy account for 13 percent of total predicted costs, element 2 accounts for 30 percent of total costs, element 3 for 48 percent of total costs, and element 4 for 8 percent of costs. This means that if the cold store feasibility study advises against proceeding with cold store investments, total costs to

implement the strategy would be significantly reduced. FISH4ACP is budgeted to provide around USD 1 million over 2022–2025.

Early recruitment of a national project officer for the upgrading strategy, along with a Letter of Agreement between FAO and MIMRA for MIMRA's role in supporting implementation of the strategy, will both be important, as will **a 3-month inception period at the beginning of 2022** to further plan and launch the main implementation phase.

A number of **risks to successful implementation of the upgrading strategy** have been identified and assessed for their likelihood and potential impact. Mitigating strategies have been defined but risks cannot be completely avoided, as indicated in the table below.

Risk description	Likelihood (1-5)	Impact (1-5)	Overall Risk (1-25)	Mitigation
Container shipping costs and container availability reduce competitive position of container transport vis-à-vis carrier vessels	3	5	16	Working closely with container shipping companies
Economic leakage from Marshall Islands of the benefits from the upgrading strategy due to foreign ownership of core VC actors	4	4	16	Activities involving Marshall Islands based/owned service support providers, and Government capturing benefits through taxes and fees
Private sector unwilling/unable to invest in container stuffing machines	3	4	12	Specification of suitable grant mechanism and further assessment of containerisation viability
COVID-19 impacts on implementation of upgrading strategy activities	3	4	12	Re-assessment of risks during project inception, and adapted implementation methodologies
EU (DG SANTE) do not approve RMI CA based on current legislation and associated fish hygiene control standards	3	4	12	Work with CA and supporting organisations and projects (PEUMP, FFA, World Bank) to take steps required by DG SANTE
Investments in cold store are not financially (or environmentally or socially) viable	5	2	10	Feasibility study to be completed prior to investments
Lack of stakeholder enthusiasm for strategy post FISH4ACP	3	3	9	Participatory nature of FISH4ACP methodology, creation of Task Force
Renewable energy not financially viable	3	3	9	Feasibility studies, grants provided by FISH4ACP
Continued difficulties in attracting labour to work in the sector	2	2	4	Activities in strategy aimed at addressing social hotspots
Climate change impacts threaten investments	4	1	4	Appropriate siting and climate-proofing investments

1 Introduction

1.1 Background and objectives

This report was developed under the FISH4ACP programme, an initiative of the Organization of African, Caribbean and Pacific States (OACPS) to support sustainable fisheries and aquaculture development. FISH4ACP is a value chain (VC) development programme implemented by the Food and Agriculture Organization of the United Nations (FAO) with funding from the European Union (EU) and the Germany's Federal Ministry for Economic Cooperation and Development (BMZ). Adopting a holistic approach to sustainability, FISH4ACP seeks to promote investments into fisheries and aquaculture value chains with the goal of stimulating inclusive growth, poverty reduction and improving food and nutrition security, while at the same time ensuring the sustainability of marine and aquatic resources.

FISH4ACP aims to achieve the sustainable development of aquatic product value chains through five outcomes:

- i) Improved stakeholder understanding of the value chain and participative development of a value chain upgrading strategy.
- ii) Increased micro, small and medium-sized enterprises (MSMEs) economic performance.
- iii) Improved inclusiveness and social sustainability throughout the value chain.
- iv) Enhanced management of natural resources and consideration for climate change.
- v) Facilitated MSMEs access to finance and investment.

FISH4ACP is a five-year programme (2020–2025) implemented in 12 countries Africa, the Caribbean and the Pacific (ACP). Twelve value chains (one per country) were competitively selected from over 70 proposals for programme implementation.¹ The year 2020 was devoted primarily to the development of the methodological tools and

¹ These 12 value chains are: the mahi-mahi VC in the Dominican Republic; the Atlantic seabob VC in Guyana; the oyster VC in Senegal; the farmed tilapia VC in Cote d'Ivoire; the farmed catfish VC in Nigeria; the Lake Tanganyika sardine, sprat and lates VC in United Republic of Tanzania; the farmed tilapia VC in Zimbabwe; the shrimp VC in Cameroon; the pelagics VC in Sao Tome and Principe; oyster in The Gambia, small lake pelagics in Zambia, and the purse seine tuna VC in the Marshall Islands.

approaches to be used by the FISH4ACP project as a whole and to mobilisation in the 12 countries. The year 2021 has been used to conduct value chain analyses and the development of value chain upgrading strategies in the 12 countries. These upgrading strategies will be implemented in years 2022–2025 of the programme. This report was developed in this context and thus presents an outcome of the work conducted in the Marshall Islands (RMI) in 2021.

1.2 FISH4ACP in the Marshall Islands (RMI)

In the country proposal for development of the capture fisheries purse seine (PS) tuna value chain submitted by the Marshall Islands Marine Resources Authority (MIMRA) for inclusion in the FISH4ACP project, focus was on the need to bring transshipment trade of tuna (notably of skipjack tuna and yellowfin tuna) onshore and to increase both domestic participation and value addition onshore in the Marshall Islands. The proposal also included facilitating access to the European Union market, primarily by the establishment of a Competent Authority (CA) to guarantee European Union food safety requirements for exports. These combined efforts are expected to bring about increased income and employment opportunities and food security² for the Marshall Islands thanks to increased tuna exports, onshore value addition and government revenues. The country proposal also indicated the need for support to conduct a thorough analysis to verify the feasibility of certain interventions and investments in the purse seine tuna value chain, the design of upgrading business models, and the facilitation of access to finance to implement the upgrading interventions. This value chain assessment report was developed to respond to this need.

1.3 Methodology

In the context of the FISH4ACP Programme, FAO has joined forces with the European Commission (EC), the OACPS and Agrinatura, to develop a VC analysis (VCA) and development approach based on FAO's Sustainable Food Value Chain (SFVC) and Agrinatura's Value Chain Analysis for Development (VCA4D) methodologies (FAO, 2014; Agrinatura, 2017). The FISH4ACP methodology, applicable across all countries included in the project, has four main components: functional analysis; sustainability assessment; upgrading strategy development; and implementation planning

² both direct and indirect food security.

(activities and investments). The approach is highly participatory, involving value chain stakeholders from the public and private sector from the outset in order to ensure national ownership of all four components, thereby increasing the likelihood of success of the project interventions.

The **functional analysis** looks at the current structure of the VC, the dynamics that explain how and why this structure is changing, and the capacities and incentives that drive behaviours of VC actors. It starts with the identification of end-market opportunities, as the economic performance of the VC is ultimately determined by its ability to capture value in an end-market. Based on the in-depth analysis of a wide range of primary and secondary data, the functional analysis presents a detailed VC map and systematically analyses the nature of the various VC elements across four layers, namely: (1) actors in the core VC, (2) input and service providers, (3) the societal environment, and (4) the natural environment. This analysis includes the constraints and opportunities associated with the various VC elements and their linkages. The analysis is explicitly based on understanding the behaviour of the VC actors and the governance mechanisms that create incentives or disincentives for the observed behaviour. Through this in-depth and systemic approach, the functional analysis helps to identify the binding constraints in the VC and their root causes, as well as the leverage points for maximum impact that will inform the development of an upgrading strategy to bring about the desired economic, social and environmental impacts.

The **sustainability assessment** then uses a range of quantitative and qualitative indicators to measure the performance of the value chain in terms of its economic, social and environmental dimensions. This assessment includes: six economic sustainability domains (i.e. profitability, employment, value added, effects on the national economy, international competitiveness, and value for end-consumers); six social sustainability domains (i.e. inclusiveness, gender equality, food and nutrition security, decent employment social and cultural capital, and institutional strength); and seven environmental sustainability domains (i.e. climate impact, water footprint, fish stock sustainability, biodiversity and ecosystems, animal health and welfare, toxicity and pollution, and food loss and waste). The sustainability assessment identifies sustainability 'hotspots', which help to determine which opportunities should be pursued for upgrading, alongside government priorities and private sector ambitions. The assessment also includes the value chain's resilience to shocks, such as those caused by COVID-19.

The **upgrading strategy development**, the next step in the approach, starts with the development of a common vision based on the findings from the functional analysis and sustainability assessment. With facilitation by the project, VC stakeholders themselves develop this common vision, along with an associated set

of targets to measure improvements in VC performance over a given time-period. The vision and targets are then used to devise an upgrading strategy. The upgrading strategy aims to address the binding constraints, sustainability hotspots and their root causes, and builds on the strengths and opportunities in the VC as identified in the functional analysis and sustainability assessment. Various upgrading options are considered in three categories: upgraded business models (elements), upgraded governance (linkages), and upgraded enabling environment (organizations, infrastructure, institutions, socio-cultural elements). These upgrading options are either derived from global best practices adapted to the situation at hand, or represent unique solutions prepared by experts in the particular upgrading area. The validity of these solutions typically needs to be assessed during the early stages of the activity plan implementation. A holistic approach to sustainability is included throughout this vision and strategy development process in order not to overlook any potential adverse impacts of the proposed upgrading interventions and to assure maximum resilience to shocks (such as those caused by COVID-19).

The **implementation planning**, as the final step in this process, translates the upgrading strategy into an activity and investment plan for each VC to be implemented during 2022– 2025. The plans detail a sequence of activities that need to be conducted, and investments that need to be made, to implement the identified upgrading strategy. To ensure the sustainability of FISH4ACP’s interventions, both the development of the plans (part of this report) and their implementation require an approach which facilitates local stakeholders’ active participation and encourages stakeholders to take on their roles and to develop a sense of ownership of the development of the VC.

In the Marshall Islands, the standard FISH4ACP methodology was applied in an adapted manner, in response to the travel restrictions associated with the COVID-19 pandemic, and capacity limitations of organisations in Marshall Islands able and willing to take on the data collection exercise. As a result, data collection was primarily completed by a small team of international experts (one of whom was based in Marshall Islands) who were contracted to the project, rather than by a national partner organisation (as generally the case in other countries that are part of the FISH4ACP project). Because most of the international members of this small VCA team were not able to travel to the Marshall Islands, data collection and analysis approaches were adjusted to focus more on remote methods of data collection (e.g. using virtual meetings or phone calls), and on issues of priority relevance/importance to the VC and the proposed upgrading strategy in the country proposal. All findings from the data collection exercise and implications for the potential upgrading strategy and implementation plan were, however, fully discussed with stakeholders

in the country during workshops³ organised by MIMRA and facilitated by the VCA team. This adaptation ensured overall compliance with the FISH4ACP methodology while allowing for the practical application of the methodology in a challenging context where data collection was constrained.

Table 1 shows the key events and activities associated with the preparation of this report, while a list of stakeholder consultations is provided in Annex 1: Primary and secondary data collection.

TABLE 1: KEY EVENTS AND ACTIVITIES IN THE PREPARATION OF THIS REPORT

Date	Event / Activity
January 2021	Informal launch of project in RMI by MIMRA, with selected stakeholders (in-person)
February 2021	Review of secondary literature, stakeholder mapping, and preparation of all primary data collection tools by FAO-contracted VCA team
March 2021	Project inception meeting by MIMRA and FAO VCA team with Government representatives (remote)
February – May 2021	Primary data collection by VCA team using key actor and informant interviews, focus groups, and site/observation visits (mix of in-person and remote)
May 2021	Completion of sustainability assessment tools and drafting of sections 1-3 of report by FAO VCA team
June 2021	Peer review of sections 1-3 of report by internal FAO reviewers
June 2021	First stakeholder validation workshop to discuss and validate sustainability assessment and contents of sections 1-3 of report (mix of in-person and remote). Workshop hosted/organised by MIMRA and facilitated by FAO VCA team.
July – September 2021	Drafting of upgrading strategy and implementation plan (sections 4 and 5 of report) by VCA team
September 2021	Review of sections 4 and 5 of report by internal FAO peer reviewers and by MIMRA
October 2021	Second stakeholder workshop to discuss and validate upgrading strategy and implementation plan (mix of in-person and remote). Workshop hosted/organised by MIMRA and facilitated by FAO VCA team
November – December 2021	Report quality assurance (FAO) and finalization (FAO VCA team)

Note: this version of the design report includes some minor changes made in 2022

³ These included an informal project launch, an inception meeting of government organisations, a validation workshop with all VC stakeholders, and an activity planning workshop with all VC stakeholders.

1.4 Brief introduction to the Marshall Islands, and the history and overview of the value chain

Following periods of Japanese and then American administration during the 20th century, the Marshall Islands became independent in 1979. The country lies in Oceania in the Pacific Ocean about halfway between Hawaii and Australia; the atolls and islands (numbering more than 1 000) are situated in two, almost-parallel island chains - the Ratak (Sunrise) group and the Ralik (Sunset) group. While the country's land area is small (181 km²), it has a large exclusive economic zone (EEZ) of almost 2 million km². The country has a population of just under 80 000, with more than two-thirds living on the atolls of Majuro and Ebeye. Unemployment levels are high (around 35 percent, and more than 50 percent for youth and young adults) but literacy rates are high (>98 percent). Gross Domestic Product (GDP) in 2019 was around USD 240 million with GDP per capita of around USD 4 000. The country relies heavily on financial assistance from the United States of America through the Compact of Free Association (which provides for USD 1.5 billion over 2004 – 2024).⁴ In the Marshall Islands, fisheries make significant contributions to various socio-economic domains, particularly in terms of residents' diets, gross domestic product (GDP), trade, employment and rural development (Gillett, 2016; FAO, 2018). Within the fisheries sector, tuna is the predominant commodity, accounting for almost all national production and exports (FAO, 2018; UNDP, 2020). Prior to 1900, tuna fishing in the Marshall Islands was restricted to small-scale fishing; and not until World War I was industrial tuna fishing initiated in the country (Gillett, 2007). The historical evolution of the tuna industry during the last century in the Marshall Islands bears much similarity with that of other Pacific islands, as described in detail by Gillett (2007).

As narrated by Gillett (2007), during and up to 25 years after World War I, the Marshall Islands and other Pacific Islands, which had previously been German territories, were under Japan's control. During this period, the Japanese made substantial investments to promote the tuna industry in this region, with a focus on pole-and-line and longline fishing. Pole-and-line fishing was introduced to the Marshall Islands in the 1920s, followed by longlining in the 1930s. Japan also established two tuna processing plants onshore in the region for processing of the tuna into tuna products such as canned

⁴ [Marshall Islands - The World Factbook \(cia.gov\)](https://www.cia.gov/library/publications/the-world-factbook/docs/00ad01.html) / <http://www.seaaroundus.org/>

tuna and "katsuobushi" which were later shipped to Japan. All these Japanese-driven operations came to a halt during World War II, when much of the tuna infrastructure was destroyed and the Japanese repatriated. With the United States of America assuming control of the Pacific islands after the World War II, Japanese fishing activities in the Pacific region were largely restrained until 1952, when post-war geographic restrictions were relaxed, allowing the Japanese to return and to gradually resume their dominance in fishing in the region. Meanwhile, the United States of America had also started to venture into tuna fishing in the Pacific islands in the late 1940s, using pole-and-line and purse seine vessels; and then expanded their operations with the establishment of canneries in the region in the 1950s-1960s. As Japan and the United States of America maintained and expanded their influences during the 1960s and 1970s, other countries such as Korea and Taiwan Province of China also started tuna fishing in the region and then expanded their activities since the mid-1980s (Poseidon et al., 2013, Havice et al., 2019). From the late 1970s, several Pacific nations, including the Marshall Islands, started to establish government-owned tuna fishing companies.

Even though introduced much later than the pole-and-line and longline fishing, purse seine fishing quickly gained popularity thanks to its economic competitiveness. It gradually overtook longline and pole-and-line fishing in importance, and since the late 1980s has consistently made up the major share of the total tuna catches in the Pacific islands, including the RMI (Gillett, 2007; MIMRA, 2018). In the RMI, in an attempt to establish domestic purse seine fishing, between 1989 and 1991, the government – through the Marshall Islands Development Authority (MIDA) - entered a joint-venture with a US company to purchase and operate two purse seine vessels; but both operated at a loss due to low catch rates and insufficient revenues to cover costs (FAO, 2002; Barclay and Cartwright, 2007). After this failure, the government adjusted its focus to providing an enabling environment for businesses, commercial operations to the private sector (Barclay and Cartwright, 2007). Thanks to this adjustment and other factors, the development of the industry in the Marshall Islands since the mid-1990s has been "relatively successful", with profitable private investments resulting in income to government (Ibid.). Over the years, the number of Marshall Islands-flagged purse seiners has increased (see later discussion on ownership of these vessels and why foreign-owned vessels choose to register in and fly the flag of RMI); and so, has their share in the total catch by purse seiners in the RMI's waters (Gillett, 2016).

Nowadays, both national and international players (e.g. Marshall Islands companies, Japan, the Republic of Korea, Taiwan Province of China, and recently China) are present in the tuna industry in the Marshall Islands. They conduct offshore fishing at industrial scale using industrial purse seine, longline, and pole-and-line gear (FAO,

2018), with Japan being the only country engaged in pole and line fishing in Marshall Islands waters. Particularly, China – despite being a relatively late-comer – is now a key player in the RMI tuna industry, as six out of 11 RMI-flagged purse seine vessels are associated with the Pan Pacific Foods Ltd., which is Chinese-owned (Havice et al., 2019) (also see later discussion). Small-scale fishing still exists, with small-scale fishers carrying out coastal fishing mainly using small skiffs and troll fishing gear (FAO, 2002, Gillett and Tauati, 2018). With relatively simple techniques and equipment, small-scale fishers and recreational fishers can catch only small amounts of fish (FAO, 2002), most of which is used for their own consumption with some limited sales in domestic markets (Gillett, 2016). Thus, almost all tuna catch in the Marshall Islands comes from offshore (industrial) fishing, with purse seining being the most dominant form.

Increases in tuna catches in the Marshall Islands Exclusive Economic Zone (EEZ) and/or made by the Marshall Islands flagged fishing vessels thanks to the development in fishing operations, have not been matched by proportionate increases in locally-based post-harvest and processing capacity. Several efforts have been made over the years by both the private and public sector to establish tuna processing facilities in the Marshall Islands, but many failed for a variety of reasons including the availability and cost of labour and other inputs. Today a single operational processing facility exists (Pan Pacific Foods) for tuna loins in the Marshall Islands, but processing capacity is low and not fully utilised (see later discussion). With the exception of a small volume of loins being processed by Pan Pacific Foods, most of the PS-caught tuna is transhipped from purse seiners to carrier vessels for onward transport to processing plants, outside of the RMI, such as in Thailand (MIMRA, 2018).

With a transshipment system in place since the late 1990s thanks to reforms in fishery management that allow the port of Majuro to be used for transshipping tuna, transshipment of tuna through Majuro quickly increased (FAO, 2002; Barclay and Cartwright, 2007), and Majuro is now the world's busiest tuna transshipment port (MIMRA, 2018). Transshipments generate revenue for the Marshall Islands' government and create jobs thanks to transshipment-related services (MIMRA, 2018). MIMRA collects transshipment fees and is the major Marshall Islands government beneficiary from the transshipment activity. Marshall Islands Ports Authority also collects pilotage, anchorage, and wharfage fees.

The current low level of post-harvest processing in RMI implies more jobs and income opportunities for residents could be created should it be possible to expand fish onshore operations, including processing (loining) and other onshore operations such as cold storage and containerisation, in the RMI (RMIPA, 2014). The remaining sections of this value chain assessment report explore and analyse the challenges

and opportunities for improving and expanding purse-seine related tuna activities in Marshall Islands.

FIGURE 1: TYPICAL PURSE SEINE TUNA VESSEL



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2 Functional analyses

This section describes the structure of the purse seine (PS) VC in the Marshall Islands. Four analytical steps were completed, each of which is presented in a specific sub-section:

1. VC mapping to provide a general picture of the value chain from production to consumption, indicating the functions, the actors, the linkages between them, and the main channels (sub-section 2.1).
2. End-market analysis to consider current and potential end market opportunities (sub-section 2.2).
3. Analysing the elements of the VC, in terms of the actors in the core VC, the input suppliers and service providers in the extended VC, the societal enabling environment, and the natural environment (sub-section 2.3).
4. Analysing the governance and linkages in the system to consider how well the VC functions as a whole (sub-section 2.4).

2.1 VC mapping

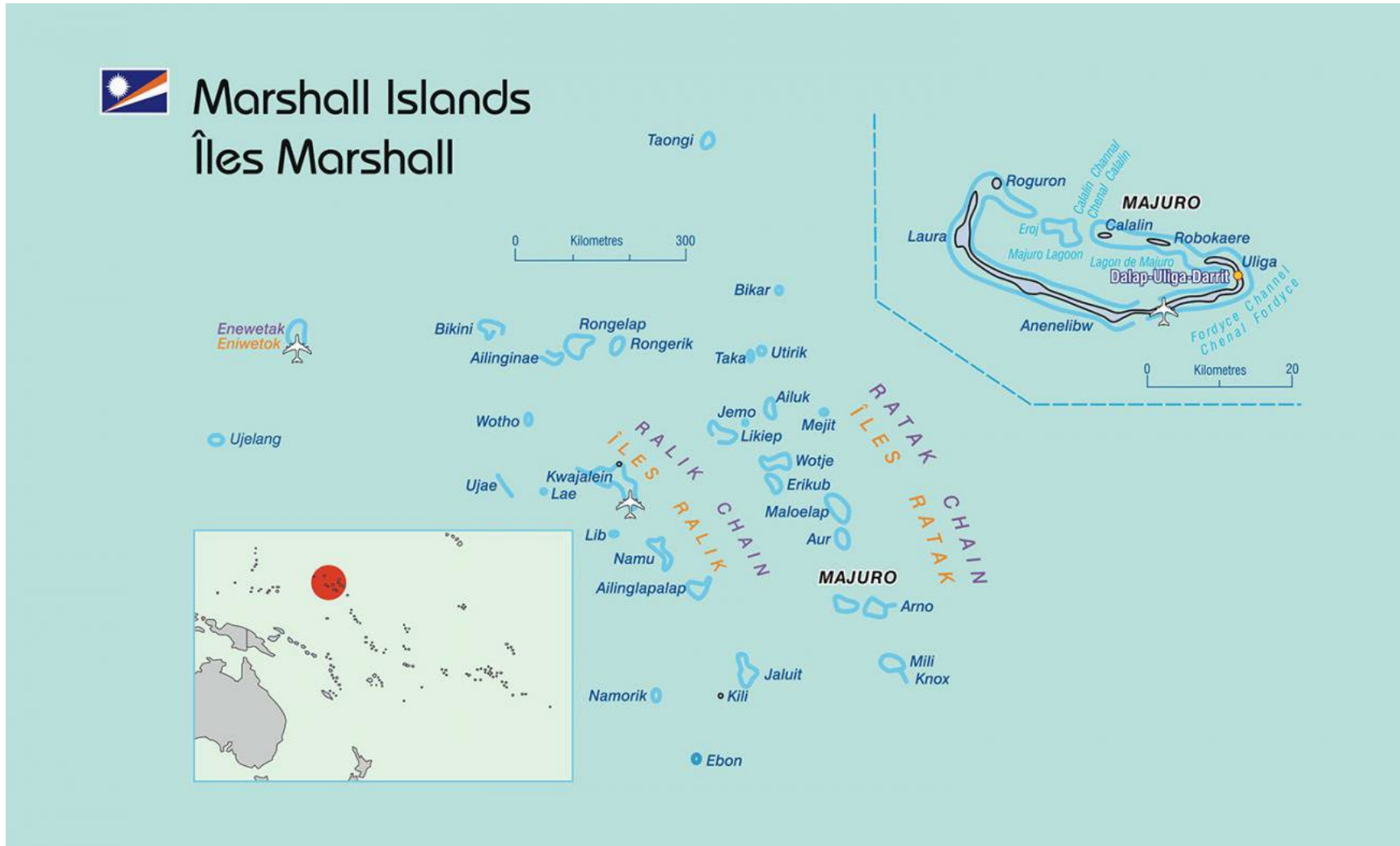
This value chain analysis studies the tuna purse seine sector (tuna that is landed in or transshipped through Majuro, and which can be caught by both Marshall Islands flagged and foreign-flagged vessels in the Marshall Islands or the wider Western Central Pacific Ocean (WCPO) (Figure 3). The Marshall Islands value chain under consideration is based on the purse seine fishery for: Skipjack (*Katsuwonus pelamis*), Yellowfin (*Thunnus albacares*), and some catches of Bigeye (*Thunnus obesus*).

FIGURE 2: SKIPJACK TUNA, THE MAIN SPECIES CAUGHT IN PURSE SEINES



photo credit (c) Graeme Macfadyen

FIGURE 3: MAP OF THE MARSHALL ISLANDS



Source: Pacific community. 2023. Our members. Cited:12 January 2023. <https://www.spc.int/our-members/marshall-islands/details> . Complies with United Nations Geospatial Clearmap (2020).

Catches by the Marshall Islands-flagged purse seine vessels in the WCPO convention area at around 95 000 tonnes per year represent less than 5 percent of 2 million tonnes a year of purse seine catches in the WCPO over the period 2015 – 2019. Catches by Marshall Islands vessels mirror the balance of species more broadly within the WCPO convention area, with skipjack representing more than 80 percent of RMI catches.⁵ Catches by Marshall Islands-flagged vessels in the WCPO convention area, are provided below (Table 2) for the last five years. Prior to 2015, catches increased steadily from just under 40 000 tonnes in 2001 to a peak of over 90 000 tonnes in 2011. There are three purse seine fishing companies in the RMI, the Marshall Islands Fishing Company (MIFCO)⁶, the Taiwan Province of China-owned Koo’s Fishing Company Limited (Koo’s), and Pan Pacific Fishing Inc. (PPF), which is connected to the Pan Pacific Foods processing and cold storage company through its Chinese ownership. Individual vessels catch around 8 000 tonnes per year per vessel.⁷

⁵ Own calculations using data from MIMRA (2019, 2020), as in Table 1, and FFA (2020). Total purse seine landings in the Western Central Pacific Ocean (WCPO) have consistently been nearly or just above 2 million tonnes a year during the last five years (<https://www.ffa.int/node/425>) with total first sale/ex vessel WCPO purse seine catches are valued at USD 2.73 billion in 2016, USD 3.42 billion in 2017, and USD 3.26 billion in 2018 (based on Poseidon 2020).

⁶ Note that this acronym used in Marshall Islands is the same as the one used in the Maldives for the Maldives Industrial Fishing Company.

⁷ Pers. Comm., MIFCO/Koo’s March 2021, and Poseidon (2019).

TABLE 2: ANNUAL CATCH ESTIMATES FOR THE MARSHALL ISLANDS-FLAGGED PURSE SEINE VESSELS 2015–2019, BY SPECIES (TONNES), IN THE WCPFC CONVENTION AREA (INCLUDING THE MARSHALL ISLANDS' EEZ ZONE) AND IN THE MARSHALL ISLANDS' WATERS ALONE

Year	WCPFC				RMI's waters (bigeye, skipjack, yellowfin)
	Bigeye	Skipjack	Yellowfin	Total	
2015	2 506	76 554	7 809	86 869	3 621
2016	2 313	49 858	8 309	60 480	9 021
2017	4 555	48 845	11 385	64 785	7 924
2018	3 039	60 212	9 429	72 680	6 224
2019	616	84 253	10 654	95 523	1 657

Source: MIMRA 2020, Table 1 and Table 6. Vessels discard around 250 – 750 tonnes of tuna catch each year in line with WCPFC Conservation and Management Measure 2009-02 which allows tuna to be discarded if they are unfit for human consumption or caught during the final set of a trip when there is insufficient well space to accommodate all fish caught in that set. Very small quantities of shark (typically 50 – 200 tonnes, mostly of silky shark) are also discarded. Discarded volumes not included in the figures in this table.

PS catches in the Marshall Islands zone are relatively small compared to other PNA countries, even though Marshall Islands' EEZ at over 2 million square km is the fourth largest of Pacific Island countries in the WCPFC.⁸ This may be in part due tuna migrations which have a strong bearing on where purse seine fishing takes place and/or the comparative charges levied by different PNA countries for days allocated under the vessel days scheme (VDS) (see later discussion). Additionally, the waters and currents in the northern waters where Marshall Islands is situated are rougher which makes it more difficult to make sets due to the generally rougher waters and currents. Another reason is the Marshall Islands decision to create a 50-mile purse seine exclusionary zone around Majuro and Arno, likely because of sportfishing interests. Finally, catches in the Marshall Islands zone are a function of the number of vessel day scheme (VDS) days allocated to the Marshall Islands (see more discussion in section 2.3.5, on regional organisations and rules).

RMI licenses foreign-flagged purse seine vessels to fish in its EEZ, and the number of vessels involved (typically 180 – 190 each year (MIMRA, 2020)) are considerable compared to the number of RMI-flagged purse seine vessels (i.e. 11).⁹ **Catches per year in the Marshall Islands EEZ by foreign-flagged purse seine vessels**, almost certainly all transshipped in Majuro, are provided in the table below and only averaged just under 27 500 tonnes per year over the last five years (compared to 362 000 tonnes transshipped through Majuro in 2019 – see below), although inter-year

⁸ EEZ data from <http://www.searoundus.org>. See more in Annex 2, Figure 25 for catch data.

⁹ Pers. Comm. with Koo's, MIFCO and PPF in March 2021.

variations for all species can be considerable (Table 3). The increase in catches in 2016 compared to other years may be explained by 2016 being an El Niño year and that much of the tuna fishery in that year in the WCPO shifted from PNG and FSM to Nauru, Marshall Islands, and Kiribati.

TABLE 3: CATCHES BY FOREIGN-FLAGGED PURSE SEINE VESSELS IN THE MARSHALL ISLANDS EEZ, 2015– 2019 (TONNES)

Species	2015	2016	2017	2018	2019
Skipjack	18 849	63 592	15 770	20 655	3 219
Bigeye	115	534	567	217	359
Yellowfin	3 759	5 620	2 193	1 749	46
<i>Total</i>	<i>22 723</i>	<i>69 746</i>	<i>18 530</i>	<i>22 621</i>	<i>3 624</i>

Source: Extracted from MIMRA (2020) Table 6.

Significant volumes of tuna caught both within and outside of Marshall Islands waters are transshipped in Majuro.

Most of the catches made by Marshall Islands -flagged purse seine vessels (~90-100 percent),¹⁰ and by foreign-flagged vessels fishing in Marshall Islands waters, are transshipped in whole round frozen form to carrier vessels for onward supply to tuna canneries.¹¹ But due to its location at times of the year close to fishing grounds outside of the Marshall Islands -EEZ, Marshall Islands has also become a major transshipment hub in the WCPO not just for catches made in the Marshall Islands -EEZ by Marshall Islands¹² and foreign-flagged vessels but also for catches made in other EEZs and in high seas areas.¹³ Other reasons supportive of transshipment (and potentially of containerisation) in Marshall Islands include: a natural deep-water lagoon allowing easy access to vessels and safe sheltered anchoring, good port infrastructure, a relative lack of crime in Majuro, good air freight services for getting spare parts, and rest and recreation facilities.

Due to limitations on transshipments at sea in the WCPO, as specified under

¹⁰ Pers. Comm., MIFCO/Koos and PPF, March and April 2021. In most years, but depending on changing catch location, MIFCO/Koo’s vessels offload all catch to reefer vessels or for containerisation in Majuro, even though part of yearly catches are made in the waters of other PNA countries under the FSM Arrangement (see later).

¹¹ These transshipments typically take around 5 days for a vessel’s catch of around 900-1000 tonnes (Pers. Comm., focus group discussion with purse seine fishermen, March 2021).

¹² A large proportion of catches made by RMI-flagged purse seine vessels are transshipped in Majuro, with 83 out of 112 transshipments in 2019 by RMI-flagged vessels made in Majuro, with 2 in Pohnpei, 16 in Tarawa, and 11 in Christmas Island (MIMRA 2020).

¹³ Hosch *et al.* (2019) reported that in 2017, Majuro was the world’s second most visited ports foreign vessel (with 1168 foreign vessel visits), and the world’s largest port in terms of foreign fishing vessel hold size (i.e. “a combination of offload ports where fishing vessels transfer fish to fish carriers and terminal ports where fish is offloaded”, with total capacity of 943 000 m³).

conservation and management measure (CMM) 2009-06¹⁴ transshipment at sea by purse seine vessels is prohibited except where exemptions are granted by the WCPFC.¹⁵ Transshipments made in port must be made in designated ports. Information on the number of transshipments and volumes in the WCPO convention area involved is provided to the WCPFC, and over 2015 – 2017 totalled around 1 300 transshipments a year, with 950 000 tonnes transshipped in 2017 (MRAG 2019). Majuro port is the only designated port for transshipment in the Marshall Islands and is in most years the most important of 33 transshipment ports in the WCPO. Over 2015 – 2017 it accounted for 37 percent of all transshipments in the WCPO region (MRAG 2019). Transshipments through Majuro of PS-caught product have been around 350 000 tonnes a year in recent years, and MIMRA reported 449 transshipments of over 362 000 tonnes to carrier vessels in 2019 (MIMRA 2020). The table below provides a breakdown for 2019 of the number of transshipments in Majuro and volumes by species and flag. Transshipment numbers in 2020 were significantly down on 2019 however, numbering only 180,¹⁶ due to the COVID-19 pandemic and related measures put in place in Marshall Islands.

¹⁴ <https://www.wcpfc.int/doc/cmm-2009-06/conservation-and-management-measure-regulation-transshipment-0>

¹⁵ For group seine operations of small purse seine vessels from PNG and Philippines operating under certain conditions, and for New Zealand-flagged domestic vessels catching and transshipping in New Zealand.

¹⁶ Article in the Marshall Islands Journal, 8th January 2021.

TABLE 4: PURSE SEINE TRANSSHIPMENTS IN MAJURO PORT, MARSHALL ISLANDS IN 2019 (NUMBER AND TONNES)

Flag	Number of purse seine transshipments	Skipjack	Yellowfin	Bigeye	Total
Taiwan Province of China	141	98 072	10 140	1 362	109 574
Marshall Islands	83	62 896	4 199	406	67 501
Federated States of Micronesia	58	44 664	3 920	343	48 927
United States of America	54	40 603	3 167	426	44 196
Papua New Guinea	32	24 725	2 896	52	27 673
Nauru	32	25 982	1 428	48	27 457
China	15	7 422	1 141	169	8 732
Solomon Islands	10	7 709	910	37	8 656
Republic of Korea	7	5 280	427	246	5 953
Philippines	8	5 194	605	4	5 803
Vanuatu	5	3 596	590	25	4 211
Kiribati	2	1 809	56	5	1 870
New Zealand	1	942	10	-	952
Tuvalu	1	940	10	-	950
Total	449	329 833	29 499	3 123	362 454

Source: MIMRA (2020). Note transshipments do not constitute landings, imports or exports to/from Marshall Islands

FIGURE 4: PURSE SEINE TRANSSHIPMENT IN MAJURO



©FAO/Chewy Lin

In terms of tuna exports from the Marshall Islands, in 2019, the Pan Pacific Foods, which engages in tuna loining¹⁷, cold store and containerisation operations, exported around 13 246 tonnes of tuna in containers, of which 12 863 MT were whole tuna (~25-26 tonnes per 40ft container), 322 MT were tuna loins (the part of the fish cut from the backbone lengthwise and normally into quarters), and 61 MT were fishmeal (the by-product from tuna loining).¹⁸ Tuna loins were derived from 805 MT of whole tuna, assuming a conversion rate from whole to loins of 40 percent. Pan Pacific Foods loining plant sources 'about 90 percent of its raw material from its own fleet' (Gillett and Tauati, 2018, p.155). Of the whole fish in containers, around half is fish containerized by Pan Pacific Foods for other parties (at a fee), and the other half derives from PPF's catch. Additionally, of the whole fish in containers, around 25 percent is 'stuffed' (the term usually used to denote loading) into containers as 'wet

¹⁷ Pan Pacific Foods processes whole tuna into tuna loins, which are later sold to canneries for canning.

¹⁸ MIMRA (2020) and Pan Pacific Foods, Pers. Comm., March 2021.

fish'¹⁹ i.e. from fishing vessels, and the balance going to the company's cold storage (for later stuffing as whole 'dry fish')²⁰ or to the loining plant. MIFCO and Koo's rely on Pan Pacific Foods for containerisation of small amounts of their catch, typically only larger yellowfin tuna, which are stuffed into containers as 'dry fish' from the cold store rather than directly from fishing vessels.²¹ Pacific International Inc. (PII), another Marshall Islands-based company (see section 2.3), are also reported to have exported 2 901 tonnes in 2019, but all of this was catch by foreign-flagged purse seine vessels.²² The figures for 2019 for Marshall Islands -catches (95 500 tonnes – see Table 2), Marshall Islands -catches that are transshipped in Majuro (67 500 tonnes – see Table 4) and Marshall Islands -catches exported in containers (16 000+ tonnes) imply that virtually no catch landed in Marshall Islands by Marshall Islands -flagged purse seine vessels is destined for the local market and for domestic consumption.²³ Some very small amounts of catch (a few hundred tonnes at most) of purse-seine caught tuna from transshipment operations and/or for landing/processing in Marshall Islands (especially of damaged fish and/or of fish provided to crew/workers), along with some rejects of small tuna from locally-based longline vessels (not quantified by the study as long-line vessels are not the subject of the value chain analysis), are available for **consumption or local sales** (through local markets or direct to hotels/restaurants, provided to crew working on vessels) to complement the small volumes (around 45 tonnes a year)²⁴ of catches of tuna and other large pelagic fish made by locally-based small-scale vessels. However, consultations suggest that rejects from longline catches are more important than from purse seine catches in terms of product ending up on the local market (and thus competing with domestic troll fishermen).²⁵ A small amount of sun-dried fish jerky from tuna and marlin for local sale is produced by the Outer Islands Fish Market operated by MIMRA in Majuro

¹⁹ "Wet fish" is fish loaded direct from brine fish wells onboard fishing vessels into containers during transshipment, with water from brine freezing tanks or thawing during the process potentially resulting in fish freezing together into blocks of fish in the container, which creates difficulties for processing at the canneries. "Dry fish" means the fish are first frozen and then kept in a cold store onshore, and thus, are dry when stuffed into containers thus reducing the risk of fish freezing to each other in containers (Pers. Comm., Thai Union, March 2021).

²⁰ Pan Pacific Foods, Pers. Comm., March 2021.

²¹ MIFCO/Koo's, Pers. Comm., March 2021.

²² Pers. Comm., MIMRA, July 2021.

²³ The remaining of the catch by RMI purse seine fleets are transshipped in other ports in WCPO area (MIMRA, 2020).

²⁴ Based on survey conducted August 2018 to July 2019 by the Marshall Islands Conservation Society. LL vessels sometimes partly pay workers with offcuts of fresh LL tuna, which they sell on the roadside.

²⁵ Pers. Comm., focus group discussion with troll fishermen, April and May 2021.

from catches by industrial vessels. Tuna from industrial vessels ending up on the local market or provided to workers for direct consumption without being sold, can thus contribute to food security. However, it can also have impacts on the marketing of catch by locally based small-scale vessels.

It is the large volume of products being transshipped through the Marshall Islands (i.e. around 362 000 MT) compared to the small quantities of catch being processed in the Marshall Islands (i.e. over 16 000 MT of containerized tuna products), which is of most strategic importance for this project and for potential upgrading of the purse seine value chain in the Marshall Islands. Tuna being transshipped in Majuro generates only limited amounts of value added in the Marshall Islands in the form of: i) port inspections, ii) entry fees, and iii) services and provisions such as labour (stevedores for unloading/loading, vessel agents) and vessel supplies. Attracting increased proportions of catches to be landed for a variety of sorting, grading, cold storage and primary loining activities in the Marshall Islands could form the basis for an upgrading strategy for the sector and allow for exports by container of loined or graded product, rather than by carrier vessels (or in containers but not graded). Such a strategy could be expected to increase value added and employment in the Marshall Islands. Attracting more raw material product to be landed and processed in the Marshall Islands could also increase the potential of the purse seine value chain to contribute to food and nutrition security if smaller/lower grade quality fish are then available for sale on the domestic market rather than being transshipped to canneries overseas (but noting the possible concerns over competition with and impacts on other locally-based small-scale fishers and fish sellers).

All the PS-caught tuna exported from the Marshall Islands in containers, or transshipped in Majuro, is destined for the canned tuna market, except for the 60 MT of fishmeal – the by-product from tuna loining – that is exported, mainly to Fiji (see Table 5) (Gillett and Tauati, 2018).²⁶ All of the small volume (322 MT) of tuna loined in the Marshall Islands (discussed above) is sold to canneries as a semi-processed input to the canning process. PS-caught tuna transshipped to carriers and sent from the Marshall Islands to canneries overseas is sold directly to canneries²⁷, or to one of three large tuna trading companies that dominate trade in raw material product from the region: Tri Marine; Itochu; and FCF Fishery Co. Ltd. (Poseidon 2016,

²⁶ No large bigeye are picked out of the catch during brailing operations and deep frozen for low grade sashimi ('purse seine special') as happens for some purse seine catch landed in other countries in the WCPO (Poseidon 2016)

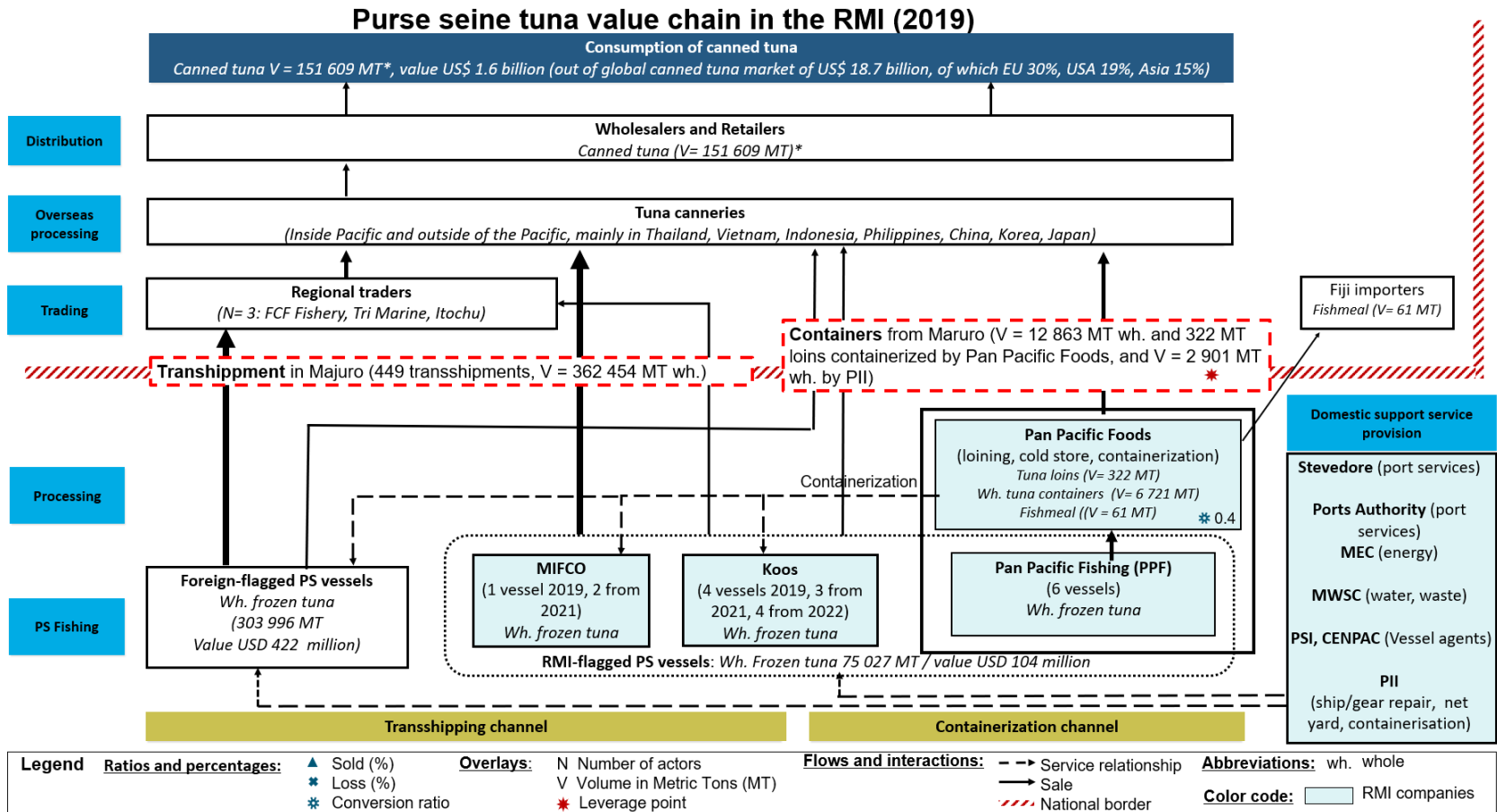
²⁷ Pers. Comm., MIFCO, Koo's, and PPF, 2021.

MRAG 2019). Ownership of purse seine catch generally transfers from the seller (i.e. the purse seine company) to the buyer (i.e. the trading company or tuna canneries), once it crosses the rail of the carrier vessels (McCoy 2012). The bulk (90 percent+) of the purchase price is paid upon physical transfer of the fish, with the balance paid upon receipt of the cannery out-turn report which details the precise volumes, species composition and size grades of the load (MRAG 2019). Most tuna transshipped in the Marshall Islands is destined for processing in canneries in Thailand, Viet Nam, Philippines, China, Korea and Japan, but some shipments within the region include delivery to Papua New Guinea, Fiji, Solomon Islands and American Samoa for processing (MIMRA 2018).²⁸

A value chain map, capturing the main elements of the description above, and using data for 2019, is provided overleaf.

²⁸ A new development being initiated in RMI in 2021 called the Pacific Islands Tuna Provisions (PITP), a project implemented by The Nature Conservancy (TNC), could involve some changes to the existing tuna value chain, and potentially increased landings in RMI if successful. End buyers (mainly in the United States of America markets) will be expected to pay a premium for product associated with certain social and environmental standards. Ownership of tuna will be retained by PITP throughout the VC (from vessel operations, to dockside offloading, shipping, processing, delivery, and up to retailer) with economic benefits shared partly by value chain partners, and partly invested in in conservation efforts, climate resilience and coastal communities. (see more in section 2.3.5).

FIGURE 5: MARSHALL ISLANDS PURSE SEINE FISHERY VALUE CHAIN MAP



Note: 1) All data for 2019. 2) The map depicts the canned tuna deriving from the skipjack, yellowfin and bigeye tuna landed or transhipped in Majuro. 3) *: Assuming a conversion rate of loins to whole round weight of 40%, the amount of canned tuna at the Distribution and Consumption levels is 40% of the sum of RMI-flagged and foreign-flagged catches (75 027 MT + 303 996 MT).

2.2 End-market analysis

As discussed above, the canned tuna market is the end market for almost all tuna caught by Marshall Islands -flagged tuna purse seine vessels, processed into loins or exported in whole round form in containers from the Marshall Islands, or transshipped in Majuro (except for very small volumes of around 60 MT a year of fishmeal produced as a by-product from loining in the Marshall Islands). Globally the final sales values for the canned tuna market have been estimated at USD 18.7 billion in 2018, representing 55% of total final consumed values of all tuna sales globally (Poseidon 2020).

For both exports from the Marshall Islands and transshipped product, it is potentially as important to consider the intermediate market of the tuna canneries themselves, as well as tuna traders. In this section, sub-section 2.2.1 therefore considers briefly the end market for canned tuna (to which canneries respond), while sub-section 2.2.2 focusses on tuna canneries as an intermediate market, which for practical purposes represent the end market for the Marshall Islands purse seine value chain. The section concludes with sub-section 2.2.3 which considers market opportunities.

'Canned' tuna is considered in this report to include not just traditional product offerings produced by canneries from purse seine caught fish i.e. tuna in aluminium cans, but also other products derived from purse seine catches, such as tuna in jars and pouches.

2.2.1 Market demand for canned tuna and market entry requirements

Hamilton (Hamilton *et al.*, 2011)²⁹ suggest that the shares of the European Union, the United States of America and Asia of total global consumption of canned tuna are around 30 percent, 19 percent, and 15 percent respectively, and combined represent 64 percent of global consumption of canned tuna. The dominance of the European Union and the United States of America markets in global consumption of canned tuna has been maintained over the years, and more recent data confirm the market share for the European Union of 30 percent of total global sales in 2017, followed in order of importance by North America, Latin America, Asia-Pacific, and the Middle East and African regions. However, the market for canned tuna in the Middle East is

²⁹ Hamilton et al., 2011. Market and industry dynamics in the global tuna supply chain.

growing compared to other markets, driven by low import tariffs compared to those applied by the European Union and the United States of America.³⁰

Some key facts and trends with regards to **demand** in these end markets are:

- Canned tuna products are consumed by retail buyers (mainly in super- and hyper-markets in the European Union and United States of America markets), and in the food service sector. According to a market analysis by Tri Marine in 2019,³¹ retail consumption accounted for nearly 80 percent of the US tuna market in 2018, and food services just over 20 percent.
- In 2018, European Union imports of canned tuna were close to EUR 3 billion and 639 000 tonnes, with just under 40 percent of the volume originating in the European Union Members States i.e. intra- European Union trade, and around 60 percent imported from third countries. The main extra- European Union imports of canned tuna come from canneries in Ecuador, accounting for 25% of the total volume, followed by Seychelles, Philippines and Mauritius, which altogether supply 36% of extra-EU imports (EUMOFA, 2020a).
- In the EU, tuna consumption per capita increased from around 2.8 kg in 2016 to around 3.05 kg in 2017 and 2018, largely driven by the consumption of canned tuna (skipjack and yellowfin (EUMOFA, 2020b).
- According to FAO Globefish, in 2019 the value of imports to the United States of America of prepared and/or preserved (including canned tuna and loins for canning) was USD 1.1 billion (from a total import value for all tuna products of USD 1.86 billion), with Thailand accounting for 47% of imports (USD 511 million), Ecuador and Viet Nam both 11%, Fiji 6%, China 1% and others combined 24% (FAO 2020b).
- According to a market analysis by Tri Marine,³² during the last two decades the US tuna market has demonstrated an increasing trend in terms of sales value (from USD 1.3 billion in 1998 to USD 1.6 billion in 2008 and USD2 billion in 2018) but an opposite trend in terms of sales volume (from over 44 million

³⁰ Egypt, Saudi Arabia, and Israel are the largest importers of tuna in the Middle East, accounting for 21%, 19%, and 11% of Middle East imports respectively (<https://www.transparencymarketresearch.com/canned-tuna-market.html>).

³¹ <https://www.undercurrentnews.com/2019/09/17/tri-marine-us-tuna-sales-will-grow-500m-by-2028-despite-further-drop-from-cans/>.

³² <https://www.undercurrentnews.com/2019/09/17/tri-marine-us-tuna-sales-will-grow-500m-by-2028-despite-further-drop-from-cans/>

cases of canned tuna, tuna pouches, and other ready-to-eat products in 1998, to 33.5 million cases in 2008 and 31 million cases in 2018).

- The United States of America and European Union markets show a trend to increased sales of pouches and (also produced by/in canneries).
- European Union and United States of America markets show an increasing demand for tuna sourced from fishing methods perceived as being more sustainable, such as pole-and-line fishing, and from sustainably managed fisheries (as verified through certification schemes such as the Marine Stewardship Council). From 2012 to 2017, there was a fourfold increase in the sales of pole-and-line-caught canned albacore and skipjack tuna in the USA (Lecomte et al., 2017).
- Shelf prices for canned skipjack and yellowfin tuna (the main PS-catch in the Marshall Islands) are typically higher in the European Union than in the United States of America,³³ suggesting potential strategic interest of the European Union as a final end market (with high demand and relatively high prices).

There is demand for a wide range of different canned tuna product offerings in end markets, with resulting significant variability in price, which the Marshall Islands purse seine value chain could potentially look to exploit strategically in collaboration with canneries and traders. Developed countries typically have a wider range of products (and therefore prices) for those products than less developed countries.³⁴ A survey of retail shelf-prices of canned tuna completed in 2019 by Poseidon revealed canned prices ranging from less than USD5/kg to more than USD 50/kg for different canned tuna product offerings. Different product offerings (and prices) vary mainly based on:

- The species being canned (e.g. skipjack, yellowfin, albacore, longtail, etc), with higher prices for yellowfin- and albacore-specific products. The Poseidon survey in 2019 found average prices of canned tuna of USD18-19/kg for yellowfin and albacore canned products, and USD 12-13/kg for skipjack and bigeye canned products;
- can sizes ranging from 70 grammes to 3 kg, but most commonly 140 – 180 g;

³³ unpublished survey completed by Poseidon in 2019, and consisting of more than 700 individual records/prices in the European Union, United States of America, and Asian countries.

³⁴ Based on an unpublished survey of canned tuna products conducted by Poseidon in 2019 in 12 countries in the European Union, United States of America, Asia, and Africa, consisting of records of prices for more than 700 individual products

- the liquids used (e.g. sunflower and olive oil, spring water, brine, sauces);
- types of tuna meat e.g. flakes, chunks or mince;
- the packaging e.g. can, pouch or jars;
- sustainability assurances e.g. Marine Stewardship Council or dolphin-free certification, pole and line caught.

Product differentiation (and thus, also price differentiation) is also the result of tuna branding, with canneries (the principal market for the Marshall Islands value chain actors - see later discussion) having specific relationships with different wholesale and branding companies. The brands themselves tend to focus on specific markets. An indication of the geographical market focus of different brands is provided in Table 47 in Annex 2, and while not comprehensive in terms of either country coverage or the brands being sold in each country, shows the very large number of companies involved in the global canned tuna market.

Key **market entry requirements** include:

- Both the European Union and the United States of America enforce strict regulations to ensure food safety of their imports. Fish entering European Union markets for example can only do so from establishments authorised by a Competent Authority (CA) in the exporting country, which verifies sanitary standards. It is, therefore, of strategic importance for the Marshall Islands to establish the Competent Authority if the country is to facilitate the export of tuna (in whole or loined form in containers) to canneries producing for the European Union market.
- Both the main global markets for canned tuna (the European Union and the United States of America) also impose requirements on exporting countries to ensure that fish from illegal sources does not enter their markets. All fish imported to the European Union³⁵ must be accompanied by a catch certificate and third countries are required to have a Competent Authority (not necessarily the same organisation as the CA for food safety) to assure the information in the catch certificate. For PS-caught tuna to be exported to the US market an International Fisheries Trade Permit (IFTP) is required.³⁶ This

³⁵ Except for products as exempt as listed in Annex 1 here <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:057:0010:0018:EN:PDF> (note tuna is not exempt)

³⁶ <https://www.fisheries.noaa.gov/national/marine-mammal-protection/noaa-fisheries-tuna-importation-requirements>.

permit is granted and annually renewed on the condition that products meet all the criteria for entering the US market, including IUU ones. However, there is no involvement by any authority in the Marshall Islands in this process with information provided by the exporter to the importer.

- The European Union applies a tariff escalation policy for tuna products depending on the level of processing, largely to protect its canning sector. At the same time, preferential tariffs are also applied according to specific trade agreements in place, either unilateral, bilateral or multilateral. For the OACPS countries to which the RMI belongs, the OACPS Economic Partnership Agreements (EPA) trade preference system in place allows for duty-free access and simplified rules of origins for the tuna products from ACP countries when being imported to the EU, provided that the tuna is “wholly obtained”³⁷ in the beneficiary countries (Lecomte et al., 2017).
- In terms of tariffs, the United States of America also applies a tariff escalation policy for tuna products like the EU, with zero tariff on round tuna imports as opposed to 35% tariff for canned tuna imports (Lecomte et al., 2017). The Marshall Islands (together with the Federated States of Micronesia and Palau) is provided with duty-free treatment under the Freely Associated States (FAS) preference program with the United States of America, which allows the exports of tuna in airtight containers under the heading 1604.14.22 of the Harmonized Tariff Schedule (HTS) of the US (i.e. tuna in airtight container, not in oil), from the Marshall Islands to the US to be exempt from duty at quantities up to 10 percent of apparent US consumption of tuna in airtight container during the immediately preceding calendar year³⁸. Tuna loins, however,

³⁷ The tuna is “wholly obtained” if it meets the following conditions. First, the tuna is automatically “wholly obtained” if it is caught within the territorial waters of the beneficiary country. Second, if the tuna is caught outside of the territorial waters of the beneficiary country, it is considered “wholly obtained” if: (i) it is caught by a vessel registered in or flagged by the beneficiary country, and (ii) the vessel is at least 50%-owned by nationals of the beneficiary country, or the vessel is owned by a company whose head office and main activities are located in the beneficiary country or in a EU member state and which is at least 50%-owned by nationals of the beneficiary country. Third, for processed tuna, the tuna must be processed in canneries located in the territory of the beneficiary country (Lecomte et al., 2017).

³⁸ Section 242 (b) (p.26) of the Compact of Free Association – Agreement between the United States of America and the Marshall Islands. Amending the Agreement of June 25, 1983, concerning the Compact of Free Association, as amended. Signed at Majuro April 30, 2003 (also available at <https://2009-2017.state.gov/documents/organization/173999.pdf>).

belong to another HTS heading (1604.14.4000 and 1604.14.5000),³⁹ and thus, are not granted duty-free treatment.

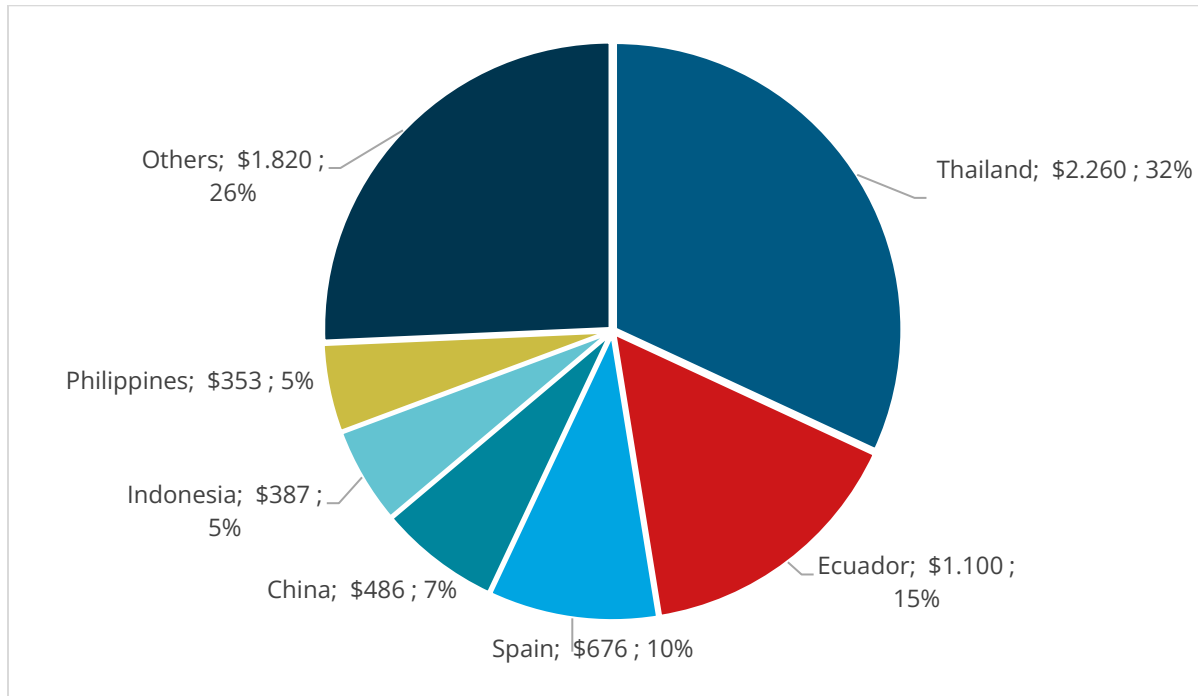
2.2.2 Tuna canneries as an intermediate market

Where are the main canneries located and which markets do they supply?

At the global level, over 70% of the tuna caught is canned or prepared/preserved (CBI, 2019). Global exports of canned tuna (including tuna loins for canning) in 2018 are shown in the Figure 6 below, indicating which countries represent main potential markets for catches made by the global purse seine fleet, and the dominance of Thailand in the canning sector. There has been a trend over recent years towards loining/canning in developing countries given the lower labour costs compared to developed countries.

³⁹ <https://www.fisheries.noaa.gov/national/marine-mammal-protection/harmonized-tariff-schedule-selected-tuna-and-tuna-products>.

FIGURE 6: GLOBAL EXPORTS OF PREPARED AND/OR PRESERVED (INCLUDING LOINS) TUNA PRODUCTS, 2018 (USD MILLIONS)



Source: using data from FAO 2020b

If the Marshall Islands value chain actors are to think strategically about accessing specific end markets, it is helpful to understand which intermediate markets (in the form of canneries) have good links and are supplying them. FAO (FAO 2020b), EU data (EUMOFA 2020 a and b; CBI, 2019), and US data (NOAA 2020) show that:

- Thailand’s main export markets in value terms for canned tuna are (in order of value) the United States of America, Japan, Australia, Libya, Egypt, Saudi Arabia, and Canada.
- Ecuador’s main markets are Spain, Netherlands, United States of America, Italy, Colombia, the United Kingdom, Germany and Argentina. Ecuador is the number one supplier (by volume) of tuna loins into the European Union; loins go primarily to Spain and Italy for further processing into cans for the European Union market.
- China’s main export markets are Spain, Thailand, Portugal, Algeria, Mexico, and the United States of America.
- The European Union-based canneries import raw material in both whole and loined form, with a trend over the last 15 years towards imports of more and more precooked frozen tuna loins and less frozen whole tunas, partly due to the higher labour costs for processing raw materials (e.g. fish gutting and

cleaning) in Europe as compared to elsewhere. During 2015–2018, skipjack loins consistently accounted for the largest share (over half) of the European Union’s tuna loins imports in terms of volume, followed by yellowfin (around 40 percent) and other tuna loins such as albacore and bigeye loins (less than 10 percent).⁴⁰ Since 2015, the import volume of skipjack loins has been increasing as opposed to the declining trend of the imports of yellowfin and other tuna loins. The leading tuna loin suppliers to the European Union is Ecuador, both in terms of skipjack and yellowfin loins. Other main suppliers are China, Papua New Guinea (PNG), Philippines and Indonesia for skipjack loins; and Mauritius, PNG, Solomon Islands and Philippines for yellowfin loins.

- The European Union-based canning sector is significant, especially in Spain, Italy and France. Spain - with major brands such as Jealsa, Frinsa, and Group Calvo - is the leading canned tuna producer in Europe, producing 374 000 tonnes on canned tuna in 2017, which accounted for over 60 percent of the total European Union production that year. Canned tuna products from Spain are mainly for intra-European Union trade (to Italy, France, Portugal, Netherlands, and Germany). Italy - with the Bolton Food Group being the country’s largest processor - is the second largest canned tuna producing country in Europe, making up over 20 percent of total European Union canned tuna production in 2017. Notably, Bolton’s acquisition of the tuna trader company Tri Marine in July 2019⁴¹ is expected to bring about further integration to Bolton’s supply chain as well as brand expansion.
- In terms of imported tuna species for canning, the US market exhibits stronger preference for higher value tuna species (such as albacore) than the European Union, whose imports largely consist of skipjack and yellowfin (as mentioned above).

At a more regional level, in the WCPO a rough estimation of the flow of purse seine product to different canneries is provided in Poseidon (2013): 37% (around 700 000 MT) is transshipped to Thai canneries; 50% is transshipped to other canning or loining plants in Ecuador, Philippines, United States of America mainland, and Republic of Korea; and 13% is loined or canned in the WCPO region.’ The major

⁴⁰ See more in Figure 26, Annex 2: Supporting figures and tables.

⁴¹ <http://www.boltongroup.net/asset/index.php?idelement=2682>

loining/canning facilities in the Pacific Island countries (apart from in the Marshall Islands) and the main markets they supply are (Poseidon 2016):

- PNG: RD in Madang (daily throughput of around 130 tonnes; loins and cans for European Union markets, and Philippine-owned), Frabelle in Lae (70-80 tonnes/day for loins and cans for the European Union, and Philippine-owned), and South Seas in Wewak (around 40 tonnes/day for loins for the United States of America).
- Solomon Islands: The Soltai cannery in Noro (throughput of around 10 000 t per year for loins for the European Union, and cans for European Union and regional markets).
- Fiji: The Pafco facility in Levuka (daily throughput of around 120 tonnes, and a major supplier of albacore loins for canning in the United States of America as well as some canning for domestic and regional markets), and a few small canneries in the Suva area that also occasionally process tuna.
- American Samoa: Starkist (supplying the United States of America market with a total annual throughput of around 84 000 tonnes of whole round tuna and 11 000 of frozen loins), and Tri-Marine which opened a cannery and fresh tuna processing facility in plant previously run by Chicken of the Sea International before it relocated to the American mainland in 2009. The Tri-Marine facility in Pago closed in 2017.

With respect to other mainland processing facilities in the WCPO, all of the main catching nations (e.g. China, Indonesia, Philippines, Japan, Republic of Korea, Taiwan Province of China) have canneries, and in addition to transshipments to Thai canneries, fleets show a strong link with canneries in their country of origin. For example, for Indonesian PS- catches around 60% goes to domestic canneries, 20% to other canneries in whole form e.g. Thailand and Philippines, and around 20% is loined in Indonesia for canning elsewhere in ASEAN Countries, EU and other countries (Poseidon 2016).

Specifically, with respect to purse seine tuna leaving the Marshall Islands as exports or transshipped product for canneries, most product is currently processed in Thailand, Viet Nam, Philippines, China, Korea and Japan, but some shipments within the region include delivery to Papua New Guinea, Fiji, Solomon Islands and American Samoa for canning (MIMRA 2018). For Marshall Islands-flagged catches, most skipjack transshipments are processed in Thailand, with much of the larger

containerized yellowfin destined for Viet Nam ⁴² and Indonesia. ⁴³ Purse seine exports from the Marshall Islands (which do not include fish transshipped in Majuro) by product and destination in 2019 are provided in the Table 5 below. These exports are the tuna products containerized by Pan Pacific Foods.⁴⁴ Around 50 percent of the whole tuna presented in this table were derived from PPF's catch and the remaining were the fish that Pan Pacific Foods containerized for other parties (mainly vessels from Taiwan Province of China).⁴⁵

TABLE 5: PURSE SEINE EXPORTS FROM THE MARSHALL ISLANDS IN 2019 BY PRODUCT AND DESTINATION (TONNES)

Destination	Processed loins (skipjack)	Whole (skipjack/yellowfin)	Fishmeal
Thailand	248	10 553	0
Fiji	74	0	61
Taiwan Province of China	0	535	0
Indonesia	0	50	0
Japan	0	25	0
PNG	0	305	0
Viet Nam	0	1 395	0
Total	322	12 863	61

Source: MIMRA 2020 (Table 12)

Pan Pacific Foods ships its processed products by container using refrigerated for frozen and cooked loins, and in dry containers for fish meal. Shipping costs thus determine to a large extent the markets that can be accessed. At one time there was demand from Papua New Guinea for blood meat, the red meat from tuna loin processing that is used for fish meal, and Pan Pacific Foods shipped frozen bags there for processing but this practice has been discontinued due to high freight costs that resulted, and blood meat is now used as an input to fish meal in the Marshall Islands.

Prices of raw material product paid by tuna canneries

Prices paid by canneries are strongly determined by catches and volumes of supply, and show variations based primarily on management regulations impacting on catches, natural fluctuations in stock abundance, and impacts of specific natural events that has impact on fishing practices and catch rates. Raw material product supplied to canneries is a 'commodity product' with a strong degree of integration

⁴² Pers. Comm., MIFCO/Koo's, March 2021

⁴³ Pers. Comm., Pan Pacific Foods, March 2021

⁴⁴ PII also exported around 2 900 MT of tuna products in 2019, all of which were catch by foreign vessel. These amounts were not included in MIMRA's report in 2020 (Per. Comm., MIMRA, July 2021).

⁴⁵ Pers. Comm., Pan Pacific Foods and MIMRA, July 2021.

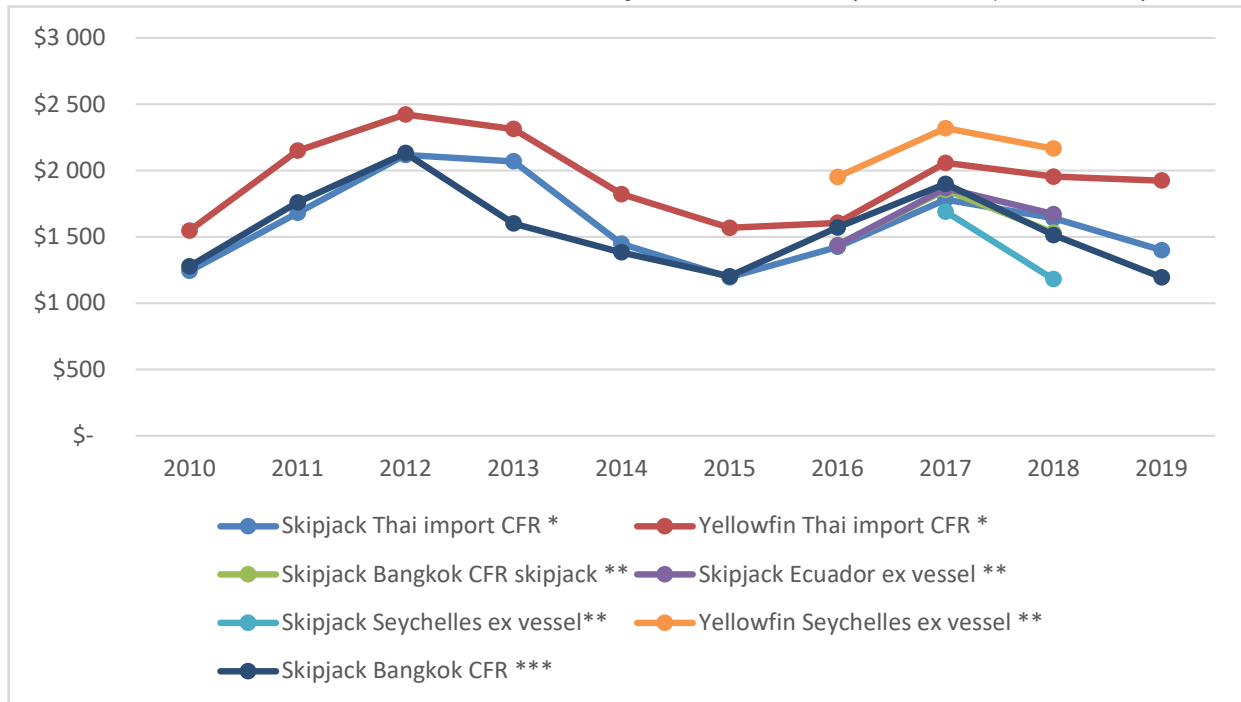
between market prices paid by canneries in different locations as well as similar patterns of market prices paid for different tuna species. This point is supported by the figure below (Figure 7). The figure shows prices for frozen yellowfin being consistently above those for frozen skipjack, even though the two follow similar price trends. Long-term time series show prices rising and falling, with prices in 2019 for both whole round frozen skipjack and yellowfin declining compared to 2017 and 2018.⁴⁶ Prices of frozen cooked tuna loins paid by Spanish and Italian canneries show a similar pattern in terms of fluctuations in recent years.⁴⁷ However, while logic would suggest that the loin price paid by tuna traders and canneries in the region for loins from the Marshall Islands should be just the current/spot whole frozen fish price + conversion cost + freight + margin, the reality is that buyers often take a big position and buy when the fish price is low, for loins to be processed and delivered later, so loin price trends/movements may differ compared to spot prices for whole frozen fish.⁴⁸

⁴⁶ <http://www.fao.org/3/ca9280en/ca9280en.pdf>

⁴⁷ FAO Globefish.

⁴⁸ Pers. Comm., Thai Union, May 2021.

FIGURE 7: RAW MATERIAL PRICES FOR FROZEN SKIPJACK AND YELLOWFIN (USD/TONNE, 2010–2019)



Source: * FFA <https://www.ffa.int/node/425> ** atuna.com *** FAO Globefish. Notes. 1/ all prices for whole round frozen tuna, 2/ Atuna.com data for Bangkok, Ecuador and Seychelles skipjack size 1.8kg+, 3/ CFR = ‘cost and freight’ and means that prices incorporate around USD250 to USD370 /tonne paid by vessels for the cost of transport to canneries by carrier vessels depending on distance.

These average prices, and those shown in Table 6 below, indicate the general pattern of canneries paying

- low prices for small fish;
- similar prices irrespective of species for fish under 3.4 kg, as fish of this size tends to be a mix of juvenile yellowfin and bigeye tuna, with skipjack tuna. This is usually/often catch fished on fish aggregating devices (FADs), which has a much higher proportion of small juvenile catch compared to free school caught tuna; and
- higher prices for larger yellowfin due to the potential to create canned tuna products from yellowfin tuna for sale at higher end market prices than for skipjack products (see discussion above on end market prices), and because of higher yields from larger yellowfin compared to skipjack.

In general tuna for canning is a bulk commodity, with any price differences determined primarily by species and size, and then by quality. The ability to differentiate species is usually largely a result of fishing method, with catches made

on free schools likely to contain larger fish and fewer juvenile yellowfin. There is little premium paid for size until you get to larger fish for premium species, and in general terms this means yellowfin above around 10 kg.

TABLE 6: CANNERY MARKET CATEGORIES AND PRICES (USD/MT)

Cannery category	Bigeye	Skipjack	Yellowfin
0 - 1.4 kg	1 083	1 083	1 083
1.4 - 1.8 kg	1 283	1 283	1 283
1.8 - 3.4 kg	1 433	1 433	1 433
3.4 - 9.1 kg	1 483	1 483	2 300
> 9.1 kg	1 483	1 483	2 350

Source: SPC (2019b). Note: Values obtained from average 2018 Bangkok weight-based pricing

Differences in prices for individual species paid by canneries based on size and quality, and especially the higher prices paid for large yellowfin, provide one of the potential strategic opportunities of potential interest for this project and the value chain upgrading strategy for PS-caught tuna – containerisation of catch rather than transshipment and transport by carrier vessels would allow for catch to be sorted by species, quality and size, with product then split into containers and sold to different canneries based on their individual processing requirements at different times and therefore price differentials that may exist between canneries. Finally, demand for tuna, and thus prices for raw material product, can be affected by short-term factors, such as the COVID-19 pandemic. The reduction in processing capacities due to working and travel restrictions of staff, coupled with remaining raw material inventories in tuna canneries, implies tuna canneries’ demand for raw materials decreased in 2020, thereby contributing to a drop in the price of raw material observed in March-April 2020, despite the rise in demand for canned tuna products (as noted above) (Mereghetti, 2020).

2.2.3 Market opportunities

The European Union and the United States of America canned tuna markets represent the end market of interest to the Marshall Islands value chain, given their high demand (in terms of volume), good shelf prices (generally higher than in many other markets), and wide range of products on offer, which could potentially be exploited by the Marshall Islands purse seine VC. A specific market opportunity in these end markets is the demand for sustainably sourced tuna by the European Union and United States of America consumers. This opportunity is already being

exploited by other countries in the region through Pacifical⁴⁹ (see Section 2.4 for more on this) and the PNA MSC-certified tuna purse seine fishery (but not by vessels landing tuna in the Marshall Islands or by Marshall Islands-flagged vessels due to the lack of an established CA in the Marshall Islands). The Pacific Islands Tuna Provision (PITP) project (see later Table 11) in the Marshall Islands is also planning to capitalise on demand for sustainably sourced tuna (primarily and initially focussing on the United States of America market).

But it is the canneries as the market for raw material to the canning process that supply these end markets that are of most strategic importance to the Marshall Islands purse seine VC, given their ability to supply the main end markets. Canneries in different locations exhibit different raw material requirements (by species and size, and for whole or loined product) as a result of their general trading links/patterns and as a result of short-term requirements. The main requirement to exploit these differentials and to obtain resulting higher selling prices for fish catch is therefore to sort catches from fishing trips by species and size, and to 'break' catches from fishing trips and send parts of the catch to different canneries by containers rather than relying on carrier vessels to send all of the catch from a specific fishing trip to a single cannery. This would open sales opportunities to more of the processing locations listed earlier (in the European Union, United States of America, Ecuador, Asia and the Pacific region).

Of special interest, given prices paid, is the ability to sort **large yellowfin** from the catch to be sold in **whole round frozen form** to:

- European Union canneries for processing in the European Union into higher value products in jars/pouches.
- Canneries in the Asia Pacific region producing yellowfin-specific canned tuna products.
- Canneries/loining plants in Ecuador, Asia and the Pacific supplying European Union and United States of America canneries with loins.
- Indian Ocean canneries given concerns over yellowfin resource sustainability in the Indian Ocean, which may reduce raw material availability to canneries in the Indian Ocean (in Seychelles and Mauritius).
- Processors (e.g. in Viet Nam), for frozen yellowfin steaks.⁵⁰

⁴⁹ <https://www.pacifical.com/>

⁵⁰ One trader suggested a price for yellowfin in 2020 of USD 2 400 for 10+kg yellowfin, and USD 2 550 for 20+kg (Pers. Comm., Regional trader, May 2021).

The demand by canneries for frozen or cooked loined skipjack or yellowfin tuna rather than whole fish could be construed as a market opportunity. However, this is unlikely to provide a real opportunity for the Marshall Islands to upscale its loining activities given the comparative costs of loining in the Marshall Islands compared to elsewhere.

Other specific marketing opportunities which could arise from sorting and containerisation of catch could include:

- The requirements of canneries for different sizes of skipjack.
- Sales to Japan of skipjack suitable (in terms of fat content and therefore likely from free school catches) for processing into high value *katsuobushi*.

If catches can be sorted and sent to different canneries based on their specific requirements (and which therefore display a willingness to pay different/higher prices), this should result in higher prices received by vessel owners for their catch. The use of container transport could also reduce reliance on tuna trading companies, also potentially resulting in higher prices for catches being paid to vessel owners without margins being made by tuna traders on product being sold to canneries i.e. by cutting out the trading companies.

However, these market opportunities can only be realised by the Marshall Islands if:

- i. Tuna passing through the country can be landed and sorted, in particular to separate out larger yellowfin.
- ii. A Competent Authority is established in the Marshall Islands to support access to European Union end markets, following sufficient sanitary approvals, placing the requirement to ensure food safety on the Marshall Islands.
- iii. Suitable handling, processing and storage exists in Marshall Islands.
- iv. Catches can be transported to canneries in reefer containers (as well as by carrier vessel).
- v. Canneries to which product is sold pay higher prices for sorted/processed product from the Marshall Islands than for fish transhipped through the Marshall Islands and have the ability and market linkages to produce and sell higher value products into end markets.
- vi. Prices paid by canneries to Marshall Islands-actors for catch when sorted and/or processed are high enough to offset onshore costs associated with the landing, sorting and processing, when also taking into consideration any differentials between sending fish to canneries by carrier vessel or by container.

2.3 Analysing the elements of the value chain

There are only 2 main groups of core VC actors in the Marshall Islands involved with the PS-fishing value chain (as described in Section 2.3.1):

- The **purse seine catching sector** unloading or transshipping fish in Majuro
 - Marshall Islands flagged vessels
 - Non- Marshall Islands flagged vessels
- **Companies in the Marshall Islands engaged in onshore processing (e.g. loining), cold storage and containerisation**

Other important value chain stakeholders outside of the Marshall Islands (and therefore not 'core actors' in terms of the FISH4ACP methodology, but which hold/own tuna at some point until final sale) are (as described in Section 2.3.2):

- **Tuna trading companies**
- **Vertically integrated companies** with interests in the Marshall Islands i.e. parent companies of the entities that own catching/processing companies active in the Marshall Islands, and those that have made (and/or are contemplating) making onshore investments in several Pacific Island countries (including Marshall Islands) to be assured of access to fishing grounds
- **Tuna canneries**
- Canned tuna **wholesalers**
- **Retail and food service sector businesses** as the end market for canned tuna

Additionally, support service providers in the extended value chain in the Marshall Islands i.e. providing inputs/services to core value chain actors (discussed in Section 2.3.3) and therefore contributing indirect value-added to the Marshall Islands from value chain activities are:

- Providers of **stevedore and port services**
- Providers of **fuel, and vessel and fishing gear repair** services
- Providers of **utilities**
- Operator of the **purse seine net yard** in Majuro

- **Vessel agents** in the Marshall Islands working on behalf of foreign-flagged purse seine vessels landing or transshipping in the Marshall Islands

Other support service providers outside of the Marshall Islands not contributing value added in the Marshall Islands but which can influence the core value actors and the profitability of their operations, and which are potentially important for the proposed upgrading strategy are (as discussed in Section 2.3.4):

- **Fishing vessel, gear, fuel and equipment suppliers**
- **Shipping lines** with container vessels servicing Marshall Islands
- **Carrier vessel companies**

The activities and operations of these groups are strongly influenced by several regional fisheries institutions and management arrangements, as well national institutions and legislation, which are discussed in Section 2.3.5.

2.3.1 Actors in the core value chain

Catching sector

The purse seine catching sector operational in the Marshall Islands consists of: i) Marshall Islands-flagged vessels, ii) foreign flagged vessels licensed to fish in the Marshall Islands EEZ, and iii) foreign vessels not licensed to fish in the Marshall Islands waters but which transship catch in Majuro.

The core value chain actors in Marshall Islands are the Marshall Islands-flagged purse seine vessels that are managed and operated by three companies:

- Marshall Islands Fishing Company (MIFCO): 49 percent owned by MIMRA and 51 percent owned by Koo's.
- Koo's Fishing Company Limited (Koo's).
- Pan Pacific Fishing (RMI) Inc (PPF) (which has the same Chinese ownership as Pan Pacific Foods processing and cold storage company).

The WCPFC vessel database⁵¹ records 11 PS-vessels as flagged to Marshall Islands, six of which are registered to PPF, three to Koo's and two to MIFCO. In 2020, the *Fishing Vessel (FV) Koo's 107* was acquired by MIFCO and renamed *FV Marshalls 202* and started operating at the beginning of 2021 as a MIFCO vessel. *FV Koo's 107* will

⁵¹ <https://www.wcpfc.int/record-fishing-vessel-database>, accessed May 2021.

be replaced in the Koo's fleet by a new vessel which is currently under construction and scheduled to begin operating towards the end of 2021⁵² i.e. the Marshall Islands-flagged fleet will grow to 12 vessels in 2021. The six PPF vessels range between 67 and 72m in length. The vessels are between 1 350 and 2 100 Gross Registered Tonnage (GRT), with five vessels having an engine power of 2 350 – 2 650 kilowatts (kW) and one 3 650 kW. All vessels have brine freezer units onboard. The Koo's and MIFCO vessels are all similar in specification being around 62m in length, and 1 150 GRT, 2 350 kW. Koo's vessels are capable of holding a portion of the catch at -35°C (known as ultra low temperature [ULT]) for possible yellowfin sashimi use. Vessel investment/purchase costs are around USD20 million per vessel.⁵³ Data on foreign-flagged vessels are provided in the table below (Table 7).

TABLE 7: FOREIGN-FLAGGED PURSE SEINE VESSELS LICENSED TO FISH IN THE MARSHALL ISLANDS EEZ, 2015–2019

Flag	2015	2016	2017	2018	2019
<i>Vessel numbers</i>					
Federated States of Micronesia Arrangement ⁵⁴	54	76	76	49	55
Japan	29	30	25	25	26
Republic of Korea	5	25	26	24	25
Taiwan Province of China	25	26	27	23	24
United States of America	39	33	31	31	24
Philippines	0	0	0	13	10
China	7	0	6	8	9
Kiribati	0	0	0	5	0
New Zealand	2	0	0	0	0
Tuvalu	1	0	1	1	0
Total	162	190	192	179	173

Source: MIMRA, 2020 (Table 5)

⁵² Pers. Comm., MIFCO/Koo's, May 2021.

⁵³ Pers. Comm., PPF, April 2021.

⁵⁴ An agreement which allows parties' domestic vessels who are licensed under the arrangement, to access the fishing resources of other parties for reduced fees.

Over 100 purse seine vessels operate in the WCPO that were not licensed to fish in the Marshall Islands waters in 2019, but which may transship tuna through Majuro.⁵⁵

The purse seine gear involves 'a long wall of netting framed with floatline and leadline (usually, of equal or longer length than the former) with purse rings hanging from the lower edge of the gear, through which runs a purse line made from steel wire or rope which allow the pursing of the net. It is the most efficient gear for catching large and small pelagic species that are shoaling'⁵⁶ (see Figure below), and fishing nets on a single vessel can cost in the order of USD1.5 million.⁵⁷ Separation of tuna from any bycatch is attempted as far as is possible, both on deck before fish is sent down the hatches into the storage compartments, and also in port when moving fish to carrier vessels. But otherwise, and with the exception of keeping Marine Stewardship Council (MSC) catch separate, there is little sorting of tuna onboard although in some cases some larger yellowfin may be sorted from other catch. ⁵⁸

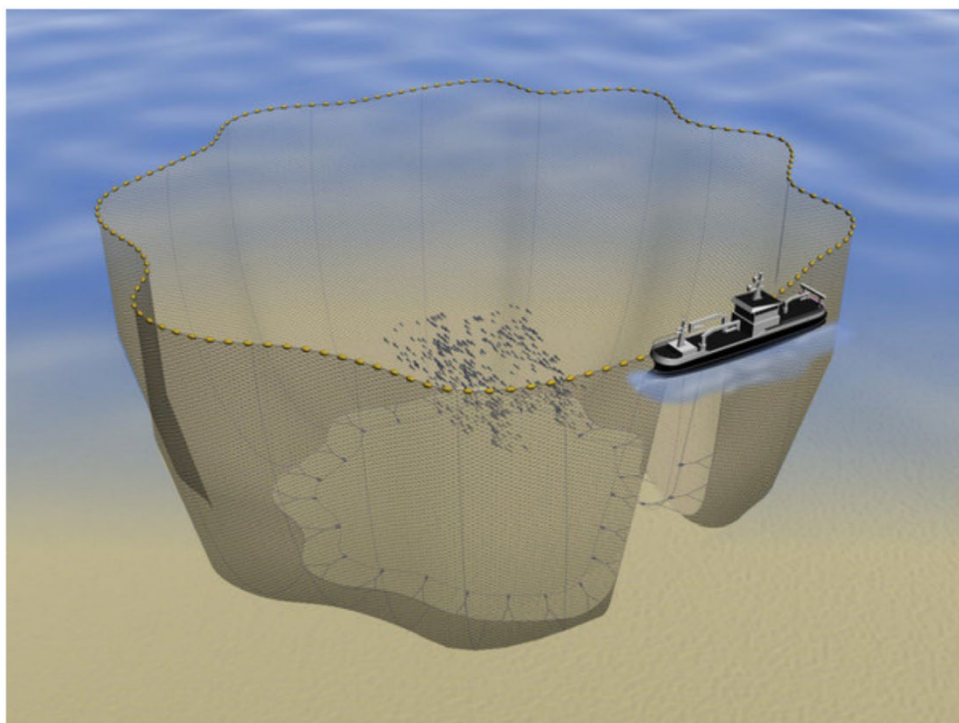
⁵⁵ In 2019, there were 285 purse seine vessels fishing in the WCP-conservation area region (Williams and Ruaia (2020, p.4)), and 173 foreign-flagged purse seine licensed to fish in the RMI waters (MIMRA (2020, Table 5)). Therefore, in 2019, there were 112 foreign-flagged purse seine vessels operating in the WCP-conservation area but not licensed to fish in the RMI.

⁵⁶ <http://www.fao.org/fishery/geartype/249/en>.

⁵⁷ Pers. Comm., PPF, April 2021.

⁵⁸ Pers. Comm, focus group discussion with purse seine fishermen, May 2021 and Pers Comm., MIFCO/Koo's/PPF March 2021.

FIGURE 8: TYPICAL PURSE SEINE FISHING GEAR



Source: He et al, 2021 (from Seafish 2021) [Classification and illustrated definition of fishing gears \(fao.org\)](#)

Onshore processing and cold storage sector

This sector is the core one in the Marshall Islands value chain which the project will seek to support, and **critical strategic decisions relate to whether support under this project and the proposed upgrading strategy will focus on existing business activities or new ones.**

Pan Pacific Foods is involved with onshore processing into loins and containerisation of product. It took over and refurbished a defunct loining plant on leased land in Majuro that had gone bankrupt in 2004, with processing of loins starting in 2009 following refurbishment and expansion of the plant. The company has joint Chinese ownership with Pan Pacific Fishing company and has assets of a 2 000 tonne cold store, and a tuna loining plant with a capacity of around 80-100 tonnes per day (with 4 processing lines, of which 3 lines are currently in use).⁵⁹ Pan Pacific Foods is owned by Shanghai Kaichuang Marine International Co. Ltd, a

⁵⁹ Pers. Comm., PPF, March 2021

company that is controlled by Bright Food (Group) Co. Ltd., a large Shanghai-based state-owned enterprise, with annual sales over USD 1 billion from seafood alone. According to Havice *et al.* (2019, pp.51-52) and consultations completed as part of this project the Pan Pacific Foods loining plant only processes fish from the company's Marshall Islands-flagged purse seiners. Operation of the plant is largely undertaken to assure access to fishery resources in the Marshall Islands as well as high seas and elsewhere under the FSM Arrangement for Regional Fisheries Access administered by the PNA. The plant does not operate at full capacity due to difficulties in obtaining both labour - the company finds it difficult to operate two shifts per day due to insufficient available labour (600 people would be required for two shifts when operating at full capacity, rather than the 350 required when operating a one shift practice). Pan Pacific Foods reported processing around 3 000 tonnes of loins in 2019 but production fell significantly in 2020 to just 400 tonnes due to the Covid-19 pandemic which reduced vessel arrivals to Majuro.⁶⁰

In addition to the loining plant, Pan Pacific Foods operates a container packing service. According to consultations, the container service is mainly used for the tuna catch by purse seine vessels owned by Shanghai Kaichuang Deep Sea Fisheries Co, but occasionally by others. The primary motivation is to save freight costs, but containers also allow purse seine vessels to grade and sort their catch and sell to different markets.⁶¹ The ability to expand the containerized activity is constrained for any product ultimately destined for the European Union market either directly or via canneries in third countries, as there is currently no European Union Competent Authority in the Marshall Islands. In 2019, Pan Pacific Foods shipped about 600 containers (typically of around 25-26 tonnes although some customers request containers with only 19-23 tonnes), or around 15 000 tonnes of tuna products, of which whole fish accounted for more than 90 percent and processed loins the balance.⁶² As noted earlier, whole fish is stuffed into containers as 'wet fish' direct from fishing vessels or as 'dry fish' from the cold store. 'Wet fish' in containers is not the preference of the canneries - their ability to handle fish stuffed as 'wet fish' is lower as fish removed from containers is frozen together taking more time to separate fish before processing and resulting in higher rejects from broken fish.⁶³ The choice of whether to stuff as wet or dry fish is partly determined by the backbone

⁶⁰ Pers. Comm., PPF, March 2021

⁶¹ Pers. Comm., PPF, March 2021.

⁶² Pers. Comm., PPF, March 2021.

⁶³ Pers. Comm., Thai Union, March 2021.

temperature (BBT) of fish coming off vessels. If not cold enough, fish are moved into cold storage to bring temperature down to the requisite temperature of at least minus 14 degrees Celsius for container stuffing. But taking fish into the cold store also allows for better sorting, as sorting when stuffing wet fish is difficult due to the primary need to get fish into the container quickly.

Stuffing a container with 26 tonnes of fish can take around 2-3 hours, and the company uses a chute (designed by the company) to move fish into the container.⁶⁴ This compares with the ability of more sophisticated loaders, such as used by Tri Marine in other countries, to stuff up to 35 tonnes per hour.⁶⁵ In 2020, due to COVID-19, only around 6 000 tonnes of tuna, of which around 300 tonnes were loins, were exported in containers.⁶⁶

In 2008, **Koo's** built an office and a small processing plant consisting of a processing room and freezer storage capable of ULT temperatures with estimated capacity of about 75 to 100 tons as well as its own generator and water storage. The location is away from the waterfront without direct access to a dock or wharf. The processing facility has never been put into operation and currently serves as a warehouse and storage area.

Another company, **Pacific International Inc. (PII)** has also more recently (2018) begun to engage with containerized trade with fish containerized largely for sale to FCF (see section 2.3.2). All container trade is of whole rather than loined fish, and all fish is stuffed into containers as 'wet fish' direct from vessels rather than from any cold storage facility (as PPI does not have one at the PII landing dock where the containerisation take place). Capacity to stuff containers based on labour availability and speed of stuffing is reported as being around 200 tonnes per day (or 3+ hours to stuff 26 tonnes of fish in a container) but has at times reached 300 tonnes in a day (~2 hours per container). This dock area is privately owned by PII and is currently being upgraded (see section 2.3.5, part National infrastructure).⁶⁷

⁶⁴ Pers. Comm., PPF, March 2021

⁶⁵ Pers. Comm., Tri Marine, March 2021. Although volumes per hour may be much lower depending on the speed of unloading the vessel.

⁶⁶ As discussed during MIMRA Competent Authority Industry and Stakeholder Workshop in January 2021 to introduce the Fish Processing and Export Regulation 2020 and Schedules.

⁶⁷ Pers. Comm., PII, March 2021.

2.3.2 Stakeholders in the value chain outside of the Marshall Islands

Tuna trading companies

As noted earlier in Figure 5, PS-catch can be either exported by Marshall Islands-based companies (having been landed in Marshall Islands) or transshipped in Majuro port. Subsequent actors in the downstream value chain will not be the focus of any upgrading strategy for the project but will nevertheless play a key role in influencing the successful implementation of the upgrading strategy. This may be true of the three large tuna trading companies operating in the WCPO, which purchase tuna that is containerized or transshipped in Majuro port. Along with canning companies, these traders are the direct market for PS-caught tuna from or transshipped in the Marshall Islands.

Kaohsiung-based FCF Co., Ltd. (FCF) is the world's largest trader of cannery grade tuna and was founded in 1972. In volume terms its global business is more than the other two main traders combined at around 500 000 tonnes of purse seine fish and 50 000 tones of longline fish, with the WCPO accounting for about 90 percent of FCF's tuna throughput. Tuna volumes sourced from Marshall Islands as transshipments are highly variable, but in recent years have been around 100 000 - 120 000 tonnes from Marshall Islands -flagged and foreign-flagged vessels combined.⁶⁸ There are around 50-60 purse seine vessels which transship to its fleet of 16 chartered carrier vessels (mostly Panama-flagged, with some Korean and Chinese flagged), and Taiwan Province of China vessels provide around 20 percent of purchases in the Marshall Islands. Thai canneries are the main destination for product from the WCPO generally and from RMI, with smaller amounts also going to Viet Nam, Philippines, China, PNG, Indonesia, and South America.⁶⁹

The **Tri Marine Group** is based in the United States of America and is the second largest trader of cannery grade tuna, purchasing around 250 000 tonnes of purse seine caught tuna from the WCPO annually (Hamilton *et. al*, 2011). It has a fleet of 6-8 carriers, mostly flagged to Panama and all of which are chartered rather than owned.⁷⁰ The number of transshipments per year are estimated around 180-200 (MRAG 2019). It trades and produces whole frozen tuna, frozen tuna loins and finished tuna products, and the WCPO is a principal source, with the volume of

⁶⁸ Pers. Comm, FCF, February 2021.

⁶⁹ Pers. Comm, FCF, February 2021.

⁷⁰ Pers. Comm., Tri Marine, March 2021.

product emanating from Majuro fluctuating, and depending on the location of fishing fleets that supply the company.⁷¹

Itochu is the world's third largest tuna trader, purchasing around 200 000 tonnes of purse seine caught tuna from the WCPO annually (Hamilton *et. Al* 2011). Hamilton *et. al* (2011) reported that around 75 percent of Itochu's purchases are from Taiwan Province of China vessels, with the remaining 25 percent from other fleets (Japan, Republic of Korea, Philippines). The company entered the tuna trading business in 1980 and canneries in Thailand and the Philippines are the main destination for its product, with some also sent by container to Indonesia (MRAG 2019).

All three companies have stables of PS-vessels which regularly provide product to them, as well as purchasing from others who 'float' between the different companies (MRAG 2019). The tuna trading companies typically lease carrier vessels for a defined period of time (e.g. one year), or for a specific voyage/space (known as a 'spot' charter) when they 'buy' space on a carrier for a voyage at a time. Carriers typically bunker and re-provision in the unloading port as fuel and provisions are cheaper in Asian ports than ports in the Pacific Island countries (MRAG 2019).

Trading companies generally take title/ownership of the fish from PS-fishing companies at the point of loading into carrier vessels (with partial payment usually made subsequent to completion of loading onboard carries) and sell product to processing companies and canned tuna brands. However, in some cases ownership of fish may be transferred upon unloading at the cannery destination.⁷² A key requirement for these companies is to minimize the time taken to fill up and unload carrier vessels.

The cost of transport by carrier vessel from the point of transshipment to the overseas cannery may be borne by the trading company and in this case is known as 'free on board' (FOB), with the supplying vessel free of responsibility for shipping costs once the fish are loaded onto the receiving vessel. Alternatively, the supplying vessel is responsible for arranging and paying for transportation to the destination port, known as a 'cost and freight' (CFR) basis. The different arrangements are factored into the purchase price of the fish paid to the purse seine fishing companies by the trading companies, with freight costs typically around USD 250 per tonne⁷³ to main cannery locations in Thailand, but potentially up to USD 370 per tonne

⁷¹ Pers. Comm., Tri Marine, March 2021.

⁷² Pers. Comm., Tri Marine, March 2021.

⁷³ Pers. Comm., Thai Union, May 2021.

depending on the location of transshipment and destination port, and how many ports are visited.

Vertically integrated companies

In addition to the three large fish trading companies profiled above, a number of larger companies and corporate groupings own and operate both harvesting and carrier vessels, with operations integrated to varying degrees and with commercial interests also in post-harvesting facilities (MRAG 2019).

The **Shanghai Kaichuang group** is a group of 2 800+ state-owned companies underneath the umbrella of the Shanghai State Owned Assets Supervision and Administration Commission. The group includes the Shanghai Fisheries General Corp Group, which incorporates Shanghai Deepsea Fisheries Co., Ltd and Shanghai Kaichuang Marine International Co., Ltd. The group is of strategic interest to the Marshall Islands value chain, as it owns Pan Pacific Fishing (RMI) Inc, which as already noted operates six RMI-flagged purse seiners, and Pan Pacific Foods (RMI) Inc. which operates the loining plant in Majuro (MRG 2019). It also operates three carriers owned by Shanghai Deep Sea Fisheries Co., Ltd, and seven purse seine vessels owned by Shanghai Kaichuang Deep Sea Fisheries Co., Ltd and two owned by Shanghai Deepsea Fisheries Co., Ltd.

The **Koo's group** operates three Panamanian-flagged carriers through its Taiwan Province of China registered company, Koo's Shipping Company S.A. The group also operates the five Marshall Islands-flagged Koo's purse seiners (see earlier information). The operation of their carriers and seiners are tightly coordinated and the three carriers exclusively pick up fish from the company's seiners with fish sold to processors in Bangkok or at auction in Makurazaki, Japan,⁷⁴ but that due to capacity issues its fishing vessels also offload to other carriers where necessary.

Other vertically integrated companies⁷⁵ in the region may also have significant strategic importance for the Marshall Islands value chain upgrading strategy given their involvement with carrier vessels, foreign-flagged vessels fishing in the Marshall Islands waters or transshipping in Majuro, and onshore processing facilities in other

⁷⁴ MRAG 2019, and confirmed by Pers. Comm., focus group discussion with purse seine fishermen, May 2021

⁷⁵ Dongwon (Korean); The Shandong Zhonglu group (Chinese); China National Fisheries Corporation (Chinese); Ningbo Yongfa Ocean Fisheries Co., Ltd (Chinese); The Fair Well Fishery Group (Taiwan Province of China); Fong Kuo Fishery Group (Taiwan Province of China); Frabelle Group (Philippines); Trans-Pacific Journey Fishing Corporation (Philippines); RD Corporation (Philippines)

countries. These relationships and operations may incentivise vessels to transship to company-operated carriers or to land fish for processing in establishments outside of the Marshall Islands with which they have business relationships or investments, and mean they would be reluctant to alter practices and sell fish for processing in the Marshall Islands.

Tuna canneries

Tuna canneries have been discussed above in Section 2.2.2, so this section just considers the technology involved with canning. For raw material entering canneries in loined rather than whole form (ie. currently, and potentially more so in future from the Marshall Islands given the potential upgrading strategy), several steps involved with sorting and grading, gutting, and cleaning can be avoided, hence the interest of canneries to receive loins as an input:⁷⁶

There is a processing yield conversion factor from whole tuna to tuna in cans of an average of around 40 percent,⁷⁷ with 40 percent of the weight (the loins) of the whole fish canned for human consumption, 20 percent as discarded waste, and 40 percent being by-products of the canning/loining process that typically, then enter another value chain, either: i) transformed into fish meal for use in fish feed, or ii) sold for use in pet food manufacture (Poseidon 2016). The 20% that is typically totally discarded is often referred to as 'drip loss' as it is comprised largely of the weight of blood and water produced during processing (Poseidon 2016).

Tuna wholesalers

There are many wholesale companies that brand canned tuna product, processed in canneries for import and sale in the retail and food service sectors (see Table 47 in Annex 2). Canneries process under contract to these tuna brands, with individual canneries having established relationships with different wholesalers/brands.

⁷⁶ See <https://www.youtube.com/watch?v=9jjiispK7yVw> for video of this process, and <https://www.suppliercannedtuna.com/2018/01/step-by-step-understanding-canning-tuna.html> for a description.

⁷⁷ "the average recovery rate for a large yellowfin is 48.5%, but it can reportedly go up to 51%, whereas for skipjack it ranges from 37-40%" (Hamilton et al 2011).

Retail and food service sector

The final actors in the purse seine canned tuna value chain from the Marshall Islands are the retail and food service businesses that sell/use canned tuna in the end markets discussed earlier in Section 2.2. Given its long shelf life and affordability, it is probably fair to say that canned tuna products can be found in retail outlets in almost all countries of the world.

In the retail sector, most canned tuna is sold in supermarkets and hypermarkets rather than in specialist fish retailers (who tend to focus on sales of fresh high-quality fish) and reflecting general market trends the market share for hypermarkets/multiple retailers has increased significantly over the past decade or so. Reliable data on the share of the end market represented by the food service sector as opposed to the retail sector are not available but given the low value nature of canned tuna and the focus in the hotel and restaurant sub-sectors of high-quality fresh fish, it is likely that only a small proportion of total end market consumption for canned tuna is through the food service sector channel, for example in sandwich preparations and salads. Tri Marine estimated the food service sector as accounting for around 20 percent of canned tuna sales in the United States of America in 2018.⁷⁸

2.3.3 Support service providers in the extended value chain in the Marshall Islands

The **Majuro Stevedore & Terminal Co (MSTC)** is a private company (with around 200 shareholders) and the terminal operator at Delap Dock. It is a private company operating under a concession agreement with Marshall Islands Ports Authority. Its current lease lasts for another ten years. Its core business and revenue-generating activity is stevedoring and providing container lift and plug-in. The company does not provide services to offload fish from fishing vessels. Current facilities allow for 50 reefer containers to be plugged in, but there are plans to increase capacity by an additional 100 plug-in points. The transformer providing electricity from the island's grid could accommodate 100 container plug-ins, but a transformer pad already exists which could increase capacity through either an additional transformer or a replacement one with higher capacity. The power requirement of 50 plug-in containers is estimated at 1 megawatt. MSTC also has a portable generator that can accommodate just under 50 reefer containers as a back-up. Container plug-in is

⁷⁸ <https://www.undercurrentnews.com/2019/09/17/tri-marine-us-tuna-sales-will-grow-500m-by-2028-despite-further-drop-from-cans/>.

charged by MSTC at USD 85 per container per day,⁷⁹ with other charges being levied for lifting containers (USD 80 per container), and delivery (~USD 85 per container).⁸⁰ The **Marshall Islands Ports Authority** provides services, and generates fees, from pilotage, boarding parties, port entry, anchorage, wharfage, light dues, crew changes/disembarkation, port entry passes, security, dockage and throughput on fuel bunkering sales (see Table 48 in Annex 1, for table of tariffs and fees generated there within the tuna VC across purse seiner vessels, reefers/carrier vessels, and container vessels).

Pacific International Inc. (PII) is primarily a construction company that was founded in 1976 in Majuro, Marshall Islands.⁸¹ It provides a range of marine, ship and gear repair and shipping vessel services, through the Majuro Net Yard which it operates. PII has more recently (since 2018) engaged with containerisation⁸² and has been developing a privately owned fishing dock ('the Kramer dock'). To increase its business, the company is striving to make the dedicated fisheries dock a one-stop-shop providing fuel, repairing nets, other chandlery and repair services to visiting vessels, and a hotel and restaurant. Previous plans for investment in cold storage at the site have not come to fruition due to problems with financing.⁸³

The **Marshall Energy Company (MEC)** was granted corporate charter in 1984. MEC's principal lines of business are the generation and transmission of electricity, and the buying and selling of petroleum products. Other lines of business include the rental of equipment and accommodation facilities. The principal markets for the generation and transmission of electricity are government agencies, businesses (including the purse seine sector), and residential customers located on the atolls of Majuro, Jaluit and Wotje. MEC is the sole producer of distributed electricity in Majuro, so other private entities can produce their own electricity but cannot distribute it to other entities through MEC's network. Annual operating revenues are around USD 34 million per year (when considering 2017–2019). Overall operating profits are typically negative, requiring government subsidy, with fuel sales generating some profit but electricity being provided at a loss. Over 2018–2020 average annual sales values of diesel to MIFCO/Koo's/PPF vessels were USD 2.6 million, and total diesel sales to all fishing vessels USD 8.7 million. Data on sales of electricity to the fishing sector specifically and how much of the total electricity supply on Majuro is consumed by

⁷⁹ Based on electricity usage per container and costs of power charged by MEC, MSTC may be making a small financial loss from container plug-ins.

⁸⁰ Pers. Comm., MSTC, April 2021. And based on an invoice from MSTC (March 2021).

⁸¹ <http://www.piimajuro.com/>.

⁸² Containerisation services are charged at around USD55/tonne.

⁸³ Reasons for financing not being available are not clear/available.

the fishing industry are not available.⁸⁴ Amongst the companies in the Marshall Islands purse seine tuna VC, PPF is not connected to the national grid and has its own electricity supply, while other companies have back-up generators.⁸⁵ Energy security, and more specifically electricity supply, consistency and heavy dependence on imported diesel, is one area of concern for sustainability of the core VC.

Responsibility for water supply and sewerage operations on Majuro Atoll, rests with the **Majuro Water and Sewer Company (MWSC)**, which was established in 1989 as a wholly government owned company under the auspices of the Ministry of Public Works. The MWSC provides both water and sanitation services to the purse seine industry. Waste collected from vessels is transported via truck and disposed of into the sewer system station. A plan to install the sewer system pipeline on docks to accommodate fast and reliable waste disposal from vessels is in discussion. Water lines on docks are maintained to secure provision of water to vessels, and water is provided by trucks. Locally based fishing and service companies (PPF, PII etc.) have their own rain-fed water storage tanks and may also supply vessels.

Carrier companies, shipping lines running containers, and foreign fishing vessels rely on the services of a **local vessel agent** to handle local administrative and logistical arrangements once a decision has been made to send a vessel to Majuro. These include requesting approval from port authorities to transship more than 72 hours prior to loading, as well as handling all local immigration, customs, quarantine and other requirements. Where necessary, the agent sources provisions and other supplies for the vessel (MRAG 2019). There are around 7 main vessel agents in the Marshall Islands: Kwajalein Marshall Islands (KMI); Uliga Shipping; Central Pacific shipping (CENPAC); PII; MGAS; Twin Shipping; and Marshall Islands Shipping Services (MISS).⁸⁶

2.3.4 Support service providers outside of the Marshall Islands

Fishing vessel, gear, fuel and equipment suppliers

For the PPF and Koo's Marshall Islands-flagged vessels, given the integrated nature of these catching sector companies within the Shanghai Kaichuang and Koo's groups, major engine/vessel parts, repairs, and finance are sourced in China and Taiwan Province of China respectively. The vessels operated by PPF and Koo's were

⁸⁴ Pers. Comm., June 2021 and data provided by MEC as part of EPPSO GDP survey

⁸⁵ Pers. Comm., MEC, 2021.

⁸⁶ Pers. Comm. MIMRA, March 2021.

constructed by shipyards in China and Taiwan Province of China respectively, for example.

Fuel costs are the single most important operational cost for purse seine vessels, and for carrier vessels involved with transshipment. Fuel bunkering services for vessels operating or transshipping fish in the Marshall Islands are typically provided by Clipper Oil,⁸⁷ Marinoil, and SK (Singapore based).

Container shipping lines (servicing Marshall Islands)

There are three main shipping lines running container ships in/out of the Marshall Islands, and all have agents based in Majuro: Mariana's Express Line (MELL) with head office in Singapore (agent: Pacific Shipping Inc.); Kyowa Shipping Lines based in Japan (agent: CENPAC); and SWIRE, a subsidiary of The China Navigation Company (agent: maritime consultants). These companies are of critical strategic importance to the potential value chain upgrading strategy as they run the ships that would carry the reefer containers of PS-caught tuna from the Marshall Islands. The potential strategy is thus in part dependent on the shipping routes they operate, the availability of containers and frequency of vessel departures, and the transport costs for containerized fish compared to shipping tuna by carrier vessels to canneries.

MELL is the most active in terms of supporting trade in reefer containers of purse seine caught fish. Its shareholders are Pacific International Lines, and Luen Thai (based in Hong Kong). Its East Micronesia service is of strategic value to the value chain as it takes in Marshall Islands, and runs: Guam, Federated States of Micronesia (FSM: Chuuk, Pohnpei, Kosrae), Marshall Islands (Majuro and Ebeye), taking 1-2 weeks. Its South Pacific Service (taking 6-8 weeks) runs: Nansha (China), Hong Kong, Shekou (China), Lae (PNG), Honiaria (Solomons), Suva and Lautoka (Fiji), Majuro/ Marshall Islands, Kosrae and Pohnpei (FSM), and Nansha (China). MELL started fish containerisation in the Pacific in 2017, and works with both purse seine and longline catches, with Thai Union being its biggest customer/cannery destination. Reefer containers are maintained at -25 degrees Celsius.⁸⁸

Kyowa runs a service taking in various ports in Japan and then Guam, Micronesia (Chuuk, Pohnpei, Kosrae), Papua New Guinea (Lae, Rabaul Port Moresby, Yap), and the Marshall Islands (Majuro, Ebeye, Kwajalein). It also runs a service from various China and various SE Asia countries through Busan (Republic of Korea), and then to Guam, FSM, and the Marshall Islands.

SWIRE's southbound service includes Majuro and runs: China (Kaohsiung, Tainjin, Qingdao), Republic of Korea (Busan), Japan (Kobe, Nagoya, Yokohama), Majuro,

⁸⁷ https://www.clipperoil.com/port_locations/marshall-islands/.

⁸⁸ Pers. Comm., MELL, May 2021.

Kiribati/Tarawa, Solomons (Honiara), Vanuatu (Santo), Vanuatu (Port Vila), New Calendonia (Noumea), Fiji (Lautoka, Suva), Samoa (Apia), American Samoa (Pago Pago), and Tahiti (Papete).

Costs of shipping fish in reefer containers to cannery locations is of critical importance to the proposed value chain upgrading strategy (as compared to shipping fish by reefer vessel), and varies according to location, the availability of containers (which can be problematic in Majuro given the relatively small amounts of frozen inbound cargo and which can therefore require sending in empties), and changing and fluctuating rates of third party shipping companies required to move containers from the end point of shipping company routes to canneries.⁸⁹ Typical costs of shipping containers from Majuro (excluding all shore-based costs of stuffing containers, plug-in etc)⁹⁰ to canneries in Thailand and Indonesia are estimated to be in the order of USD 200-275/tonne. Over 2018–2021 the cost of shipping a 40ft container from Marshall Islands to both Bangkok and Jakarta by MELL ranged from USD 5 000 to USD 7 000, but an ‘average/typical’ cost was USD 5 500 (i.e. USD 211 per tonne if containers are stuffed with 26 tonnes, or USD 275 if only 20 tonnes is in a containers).⁹¹ Other quotes have recently been obtained for shipping containers from Majuro to Bangkok and General Santos in the Philippines for USD 4 752 per container i.e. less than USD 200 per tonne for 26 tonnes of fish in a container.⁹² Other indications are that shipping costs (including all shore-based costs) may typically be USD 300-350/tonnes.⁹³

Carrier vessel companies

Tuna trading companies favour chartering vessels as this involves no upfront and ongoing capital investment, and the number of carriers chartered can be increased or decreased relatively flexibly with changes in demand (MRAG 2019). There are over 400 ‘fish carrier’ vessels authorized under the WCPFC Record of Fishing Vessels, with the largest number of vessels flagged to Panama (123 vessels), Philippines (111) and Japan (85). Other key flag states include Korea (31 vessels), Liberia (21), Taiwan Province of China (16) and China (12). (MRAG, 2019). Over time, there has been an increasing movement towards registering reefer carriers with flag States operating open registries, or so called ‘flag of convenience’ (FOC) states (MRAG 2019). This is

⁸⁹ Pers. Comm. MELL, May 2021.

⁹⁰ But including insurance premiums that shipping companies pay to their insurers which are built into shipping costs, and which in turn are based on long-term assessment of any claims made against the shipping companies for damaged fish.

⁹¹ Pers. Comm., MELL, May 2021.

⁹² Pers. Comm., PITP, February 2021.

⁹³ Pers. Comm. Thai Union, FCF, and PPF, May 2021.

part of the reason why determining the beneficial ownership of chartered reefer vessels is problematic as noted by both McCoy (2012) and MRAG (2019). Vessels are 'often registered under offshore shell companies or through other means that mask the identity of actual owners'. (McCoy 2012, p.18) However, major companies owning carrier vessels are the Seatrade Group, GreenSea Chartering, Boyang Limited Chartering, Sein Shipping, Ji Sung Shipping, Kyoei Kaiun Kaisha, Ltd., and Frigoship Chartering (MRAG 2019). Carrier vessels are important not just in terms of their services to take fish from Majuro, but also in terms of what they bring in (e.g. food, parts, nets, bait, crew, etc).

Costs charged by carriers for the transport of fish to canneries in Thailand and other main destinations are also of critical strategic importance to the proposed value chain upgrading strategy, given proposals to divert/attract current transshipments for landing, processing and containerisation in Marshall Islands, and are USD 240-250 per tonne.⁹⁴

2.3.5 The societal enabling environment

The purse seine value chain in the Marshall Islands is supported and regulated through an enabling environment that can best be described at two levels: regionally, and nationally.

Regional organisations and institutional rules and arrangements

As noted in Poseidon (2013), the Pacific Island Countries (PICs) have for many years been characterized by a high degree of regionalism. The small size and limited capacity of most countries dictate that regional cooperation and integration are not options but necessities in many cases. Regionalism provides opportunities for harmonized responses to common or shared problems, exchange of information and experience, and efficiencies of scale'. The need to act regionally with regards to the management of fish stocks such as tuna, is further heightened by their migratory nature within the region, and the level of regional fisheries solidarity in the Pacific region is notable (Gillett, 2014).

Considerable detail on key organisations and institutions can be found in Annex 3 but a summary table is provided below (Table 8), highlighting their key strategic importance to the Marshall Islands value chain actors and the future FISH4ACP project interventions.

⁹⁴ Pers. Comm., FCF / PITP / PPF, March to May 2021.

TABLE 8: KEY REGIONAL ORGANISATIONS AND INSTITUTIONS OF RELEVANCE TO THE PROJECT

Organisation or institution	Key importance to the project
Western Central Pacific Fisheries Commission (WCPFC)	Conservation and Management Measures (CMM) place obligations on members, with the objective of supporting sustainable fisheries in the region.
Parties to the Nauru Agreement (PNA)	The purse seine vessel days scheme (VDS) sets an overall Total Allowable Effort (TAE) limit on the number of days fishing vessels that can be licensed to fish in PNA EEZs per year. The practice of concessions for locally-based companies, and the rates charged to foreign-flagged vessels, is of strategic importance for this project as it has an impact on: i) revenues to government, ii) fishing company profitability, and iii) fish catches made in/outside of the RMI EEZ (and to some extent therefore on the amounts of fish transshipped in Majuro and/or available to be attracted for Marshall Islands-based processing).
The Federated States of Micronesia Arrangement For Regional Fisheries Access (FSMA)	The rigor to which parties to the FSMA apply the criteria and the points systems is of strategic importance to the project purse seine value chain as impacts on: i) the interest by vessel owners to flag vessels in different countries, ii) revenues to Marshall Islands from its PAE, and iii) vessels activity in the RMI EEZ.
The Multilateral Treaty with the United States of America	The treaty allows US purse seine vessels to fish in the EEZs of the Pacific Island countries party to the treaty.
The Niue Treaty	Provides for cooperation in fisheries surveillance and law enforcement for FFA Members, except Tokelau. One notable sub regional agreement is between the Federated States of Micronesia, Republic of the Marshall Islands and Palau which provides for MCS asset sharing and extends the powers of fishery officers to cover all three country EEZs.
Forum Fisheries Agency	Provides advice on fisheries management and operations to members. FFA developed a set of 'Harmonized Minimum Terms and Conditions (HMTCs) for Foreign Fishing Vessel Access' to apply to licensed vessels in its member countries and territories which has been an important instrument for many years as the basis for the establishment of license conditions throughout the region.
The Pacific Community (SPC)	Provides technical and policy advice and assistance. The SPC Oceanic Fisheries Programme is the scientific information provider to the WCPFC, thus influencing CMMs, purse seine VDS total PAE, and other aspects of tuna fishery management in the region.
Pacific Islands Forum Secretariat (PIFS)	Was the lead regional agency in the PIC/EU economic partnership agreement (EPA) negotiations which has a major fisheries trade component, although only Papua New Guinea, Fiji and Samoa are parties to the EU/Pacific EPA.

National institutions and legislation

In the Marshall Islands, the Marshall Islands Revised Code 2012 is a set of re-codified law governing the Marshall Islands. The Title is the name given to a set of acts which are defined by individual chapters. For instance, Title 51 is Management of Marine Resources and all acts encompassing marine resources are grouped under Title 51 such as MIMRA Act, Fisheries Act, etc. The acts are passed by the *Nitijela* (Parliament) and regulations are adopted by the cabinet

Key legislation and regulations governing the activities of value chain actors are shown in Table 50 in Annex 2.⁹⁵ From the table it is apparent that there is no single legal act governing the purse seine tuna value chain per se, but rather a wide range of 'Titles' impacting on it. Moreover, the private contractual arrangements between parties in the value chain provide an important basis for governing the value chain in the Marshall Islands and the interactions between different stakeholders.

Through Titles and Chapters listed above, and application of the purse seine VDS, the purse seine catching companies based in the Marshall Islands incur expenses paid to Government associated with the following items:

- Purse seine VDS fees
- Fishing licenses
- Observer fees
- Transshipment fees
- Government direct tax
- Company tax
- Income tax and social security payments
- Import duties
- Ship registry fees
- Port dues
- Customs overtime charges
- Profit from a purse seine joint venture
- Fishing violation fees

⁹⁵ Available at <http://rmimimra.com/index.php/resources>

National infrastructure

Given the focus of the potential value-chain upgrading strategy under this project, harbour and shore-side infrastructure of current and potential use by the purse seine catching and onshore processing sector is of critical strategic importance. The state of such infrastructure, presented in more detail in Annex 3, plays a key role in the attractiveness of purse seine vessels to fish in the Marshall Islands EEZ, to land fish to processors, and to transship through Majuro. Key elements of national infrastructure used by and impacting on the VC include the harbour, the Delap dock and PII docks, and onshore infrastructure in the form of road/bridges/airport, and water, power and sewage/waste facilities.

FIGURE 9: DELAP DOCK



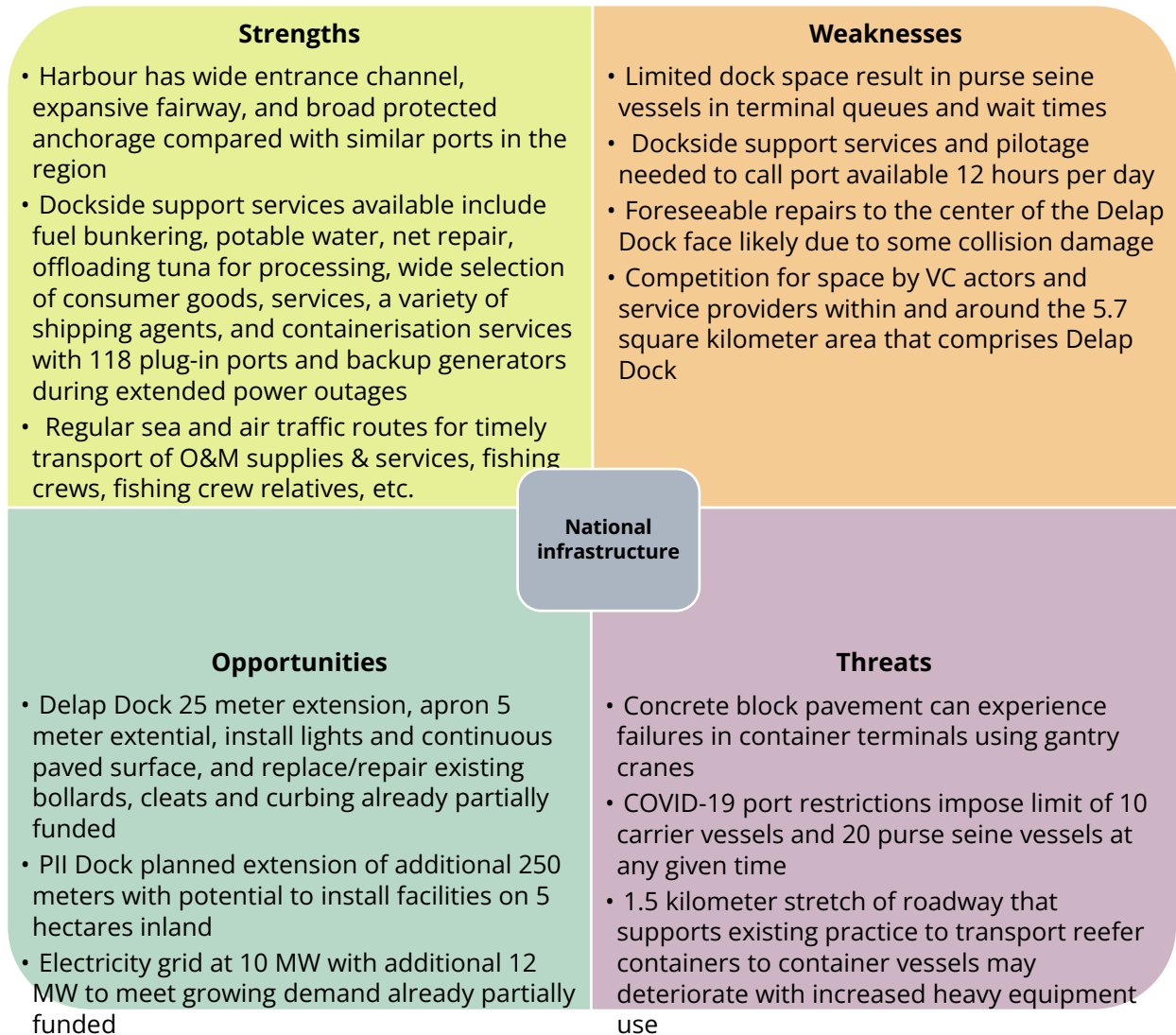
©FAO/Chewy Lin

FIGURE 10: PII DOCK



A summary of the strengths, weaknesses, opportunities and threats (SWOT) analysis of key national infrastructure of relevance to the purse seine VC is provided below (Figure 11), and the reader is directed to Annex 3 for further supporting information.

FIGURE 11: SWOT OF MAJURO PORT INFRASTRUCTURE OF RELEVANCE TO THE PURSE SEINE VALUE CHAIN



Organizations and cooperation (relevant projects)

Government Ministries and agencies

The principal Ministries and agencies of strategic relevance to the Marshall Islands purse seine value chain are provided in the table below (Table 9), along with the main roles.

TABLE 9: KEY MARSHALL ISLANDS GOVERNMENTS INSTITUTIONS AND THEIR ROLES

Government institution	Potential relevance to the project
Ministry	
Ministry of Justice, Immigration and Labour	Establish and enforce policies on foreign labour working in the fishing sector
Ministry of Finance	Administers all revenue and fiscal functions of the Government of RMI related to revenue tax and duty collection, accounting fund and treasury maintenance, budget control
Ministry of Health and Human services	Fish quality and hygiene, and involvement with steps to set up a competent authority (CA) in the Marshall Islands (there is no CA currently authorised by the European Union)
Ministry of Natural Resources and Commerce	Responsible for Agriculture, Energy, Trade and Investment in the Marshall Islands
Ministry of Foreign Affairs and Trade	Regulation of activities by foreign parties in RMI, donor projects, engagement of RMI with regional and international organisations and arrangements, declaration of baselines, maritime zones and outer limits
Ministry of Works, Infrastructure and Utilities	Policies related to onshore fisheries-related infrastructure developments
Agency	
Marshall Islands Marine Resources Authority (MIMRA)	Established by Act in 1997 and mandated with the management of all marine resources in the RMI (previously the responsibility of Ministry of Natural Resources and Commerce). See table below. Anticipated role as competent authority for exports to the European Union
RMI Customs	Control of foreign nationals/vessels/goods in/out of the Marshall Islands
Environment Protection Authority	The EPA is the key environmental enforcement agency in the country. The main regulatory responsibilities include environmental permits, development approval, environmental impact assessment (EIA) and compliance and enforcement
Marshall Islands Ports Authority	RMIPA has charge of and oversees the two main seaports, the Delap and Uliga Ports. Delap Port is used primarily as the country's main international cargo facility, while Uliga dock is primarily used for inter-island cargo and passenger vessels
The Marshall Islands Office for Commerce & Investment	The investment and trade promotion agency of the RMI, created in 2013. It is mandated to promote and facilitate exports and investment to boost economic growth and improve the welfare of the people and to assist investors to develop and diversify their businesses. Facilitates implementation of investment projects and improvements in the investment and business climate
Majuro Water and Sewage Company	Established in 1989 as a wholly government owned company under the auspices of the Ministry of Public Works. Its main purpose is to protect water and sewer lines and related facilities and appliances from unauthorized alteration, damage, and contamination, and ensure access to safe water. MWSC provides both water and sanitation services to the purse seine industry. Waste collected from vessels is transported via vacuum truck and disposed of into sewer system station.

Marshall Energy Company	The Marshall Energy Company (MEC) was granted corporate charter in 1984. MEC's principal lines of business are the generation and transmission of electricity, and the buying and selling of petroleum products, including to the purse seine sector
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Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Since 1997 MIMRA⁹⁶ has been mandated with the management of all marine resources in the Marshall Islands. MIMRA has four main divisions with key responsibilities as described in the table below (Table 10).

TABLE 10: MIMRA DIVISIONS AND RESPONSIBILITIES

Division	Main functions and responsibilities
Coastal Fisheries Division	<ul style="list-style-type: none"> development and management of community-based projects coordination and consultation with traditional leaders and local government councils community or public awareness of MIMRA policies/plans/regulations community fisheries capacity development
Oceanic Division	<ul style="list-style-type: none"> management and regulation of the commercial tuna fishery in RMI waters, as mandated under Title 51 of the Marshall Island Revised Code administration and issuance of fishing licenses monitoring, control and surveillance (MCS) activities using various tools and programmes (e.g. vessel monitoring systems, observer programme, electronic reporting, transshipment monitoring and arriving vessel intelligence analyses) to ensure compliance with national, sub-regional and regional management measures implementation of port state measures collection of scientific and compliance information necessary for the conservation and management of the key tuna stocks. management, approval and data collection on foreign vessel arrivals and transshipments competent authority (when established)
Finance Division	<ul style="list-style-type: none"> overseeing all transactions and revenues from MIMRA's various fisheries activities that involve funds and/or money(s) in payment for fishing d under the purse seine VDS, fishing rights, and fishing vessel licenses and transshipments maintaining appropriate financial records and supporting documentation of all transactions to meet external audit requirements preparation of short-term annual planning and/or budget
Legal Division	<ul style="list-style-type: none"> legal advice to the Board and Management of MIMRA review national fisheries laws for coherence with regional and international requirements based on RMI involvement with organisations such as the WCPFC, PNA, etc

⁹⁶ <http://rmimimra.com/>

	<ul style="list-style-type: none"> • legal representation in court for prosecution against fishing vessels or companies • in-house training is also provided to compliance and enforcement officers • drafting of Bills, Resolutions, Regulations, Bilateral Access Agreements, and Local Government Ordinances
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Source: based on information provided at <http://rmimimra.com/>

Donors

The table below (Table 11) provides an overview of several projects of relevance to the Marshall Islands tuna value chain and FISH4ACP’s work on developing the value chain. The preparation phase of FISH4ACP has communicated with lead implementing partners for the projects, and the main FISH4ACP project phase will need to maintain close collaboration and communication with the projects to ensure synergies and avoid duplication.

TABLE 11: PROJECTS IN MARSHALL ISLANDS OF RELEVANCE TO THE FISH4ACP PROJECT

Project title	Lead implem enter	Status	Short description	Relevance to FISH4ACP
Pacific Island Tuna Provision (PITP)	The Nature Conservancy (TNC)	Ongoing (since 2019)	PITP is an initiative implemented by TNC using a cooperative model whose membership includes Pacific Island nations who contribute (sell) VDS days to PITP. PITP aims to develop and operate a tuna supply chain which delivers sustainable products in a manner that is transparent and cost-competitive in order to generate profits for Pacific Island nations and investment in conservation and climate resilience in Pacific Island communities. The target market is the United States of America. ¹	PITP and FISH4ACP are highly complementary. Both projects work towards the sustainable development of the RMI tuna value chain; but PITP focuses on supply chain management outside of the RMI and targeting US market, while FISH4ACP also explores the opportunities for onshore activities inside the RMI and has a stronger focus on increasing access to the European Union market for catch landed in the Marshall Islands.
Marshall Island Maritime Investment Project (MIMIP)	RMI Ports Authority	Ongoing (2020–2024)	MIMIP (USD 33.1 million), funded by the World Bank, is managed by the RMI Ports Authority. A key outcome of this project is the Marshall Islands Port Strategic Development Plan (MIPSDP) for Delap and Uliga Docks in Majuro. The MIPSDP will provide a clear strategic direction to improve the operational efficiency, productivity, safety, and profitability of maritime infrastructure and port operations in the Marshall Islands. The project also includes a	Synergies can be built between FISH4ACP and MIMIP in terms of the infrastructural development and improving waste management at the port, with a view to support container operations, which is a key aspect to consider when promoting onshore activities in the RMI. Delap

			<p>component for improving infrastructure for container operations including reefer containers at the Delap dock. This component is planned for 2022 and will pay for the pavement of container yard, installation of lights, and expansion of the Delap dock westward to allow for 2 container ships to berth at a time. No underwater works are anticipated in this component, but potential future components. MIMIP phase II is being discussed, with a 10-year horizon.²</p>	<p>dock improvements are already earmarked for investment in the short-term, with potentially more infrastructural investments in the medium-term.</p>
<p>The Pacific Islands Regional Oceanscape Program (PROP) Project</p>	<p>World Bank and MIMRA</p>	<p>2015-2020</p>	<p>PROP, funded by the World Bank and the Global Environment Facility (GEF), is a series of national but complementary projects in the FSM, Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu and the RMI. PROP's objective is to strengthen the national and regional institutions responsible for shared management of oceanic and coastal fisheries. In the RMI, PROP has been working on supporting the establishment of seafood safety legislation, standards and operating procedures to enable MIMRA to function as the Competent Authority (CA) for compliance of RMI fish export products with the European Union market requirements. The next phase of PROP (probably starting in 2022) in the RMI is being designed and will build on what has been done in this phase.³</p>	<p>FISH4ACP can build on the work on institutional strengthening for CA done under the existing PROP. A lot more potential synergies can be created with the next phase of PROP in terms of CA, for example with PROP providing capital investment for lab facilities and FISH4ACP providing training, facilitation and technical assistance. Additional potential areas of synergies may be food security and sovereignty through the improving of cold storage.</p>
<p>Offshore Fisheries Adviser Project</p>	<p>MIMRA</p>	<p>Aug 2017 to Dec 2021</p>	<p>Provision of a Fisheries Adviser who is involved with capacity development and institutional strengthening, technical advice on the sustainable development and management of the offshore fishery to create improved livelihood, technical advice on systems to implement improved Port State</p>	<p>May be able to provide useful/relevant information</p>

			Measures and traceability systems to combat fish IUU fishing. ⁴	
Enhancing livelihoods and food security through fisheries with nearshore fish aggregating devices in the Pacific (FishFAD)	FAO	Ongoing (since 2019)	FishFAD is funded by the Government of Japan (USD 4.636 million) and will run for three years in Pacific Islands countries including Fiji, Kiribati, Marshall Islands, Palau, Samoa, Tuvalu and Vanuatu. The project seeks to strengthen existing FAD programmes or develop and pilot new programmes, strengthen fishers' associations and cooperatives, improve safety at sea for FAD fishers, and promote alternative livelihood activities for Pacific Island countries. In the RMI, FishFAD is involved in deploying FADs, training fishers in pelagic fishing techniques, and in assisting the organization of fisher associations.	Considerations should be made regarding the interactions between artisanal and purse seine fisheries, as well as the potential impacts of onshore upgrading on the end-market of fish caught by artisanal fisheries in the RMI.
Pacific Ocean Advisory Programme	World Bank	Planned	This project aims to map the tuna value chains in the Pacific region and to calculate the added value and added value distribution among various stakeholders. The mapping includes, among others: main products and their flow, technical and organizational functions, quantification of consumption, market channels, actors, linkages, and production systems. Countries of implementation include Fiji, Kiribati, Marshall Islands, FSM, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.	May provide information of use to FISH4ACP and vice versa
Project for Improvement of Water Reservoir	JICA	Ongoing (since 2020)	A 15m water reservoir to increase water storage capacity is planned for construction in 2022.	This JICA project will increase sustainability of the Majuro water utility's water supply, which may benefit the VC and its supporting

in Majuro Atoll				service providers given their need for water
Sustainable Energy Development Project	World Bank	Dec 2017 to Dec 2022	SEDP, funded by the World Bank, is a USD 34 million project that aims to carry out renewable energy investments in the RMI, supply and install new generator and engine sets for Majuro and Ebeye to enhance the reliability of electricity supply and improve energy efficiency, and application of energy efficiency and loss reduction program on Majuro and Ebeye. SEDP's objective is to increase the share of renewable energy generation in the RMI and enhance the reliability of electricity supply and improve energy efficiency. ⁵	Additional genset 5 MW and renewable energy 3 MW load capacity added to Majuro grid will be able to accommodate increased use of food safety refrigeration facilities and equipment including reefer containers and cold storage facility.
ADB Climate change water project	ADB	Planned	Desalination plants and increase water catchment capacity for existing reservoirs valued at USD22.5 million.	This ADB project will increase sustainability of the Majuro water utility's water supply, which has historically been an underutilized water source for the RMI tuna fishery shore-based operations.
Pacific European Union Marine Partnership Programme ⁶	EU	Ongoing	The Pacific-European Union (EU) Marine Partnership (PEUMP) programme promotes sustainable management and sound ocean governance through a holistic and multi-sectoral approach contributing to social, economic and environmental development in the Pacific, as well as biodiversity protection and promoting the sustainable use of fisheries and other marine resource	Several key result areas have relevance to the potential strategy presented later in this report, most importantly: <ul style="list-style-type: none"> • Result area 2 Sustainable Fisheries • Result area 6 Capacity Building • Gender social inclusion and human rights

Source: 1 Personal conversation with PITP personnel. 2 Pers. Comm. With MIMRA and RMI Port Authority in 2021. 3 <https://www.ffa.int/prop>. And meeting with PROP officers. 4 Personal conversation with the project's adviser. 5 World Bank project website <https://projects.worldbank.org/>. 6 Home | PEUMP <https://www.peump.dev/>.

Socio-cultural elements

A number of socio-cultural factors in the Marshall Islands can affect—either positively or negatively—the incentives of value chain actors to invest and to behave in certain ways, and their capacities, for example on their ability to access services (e.g. compliance worker absenteeism or tardiness) or inputs (e.g. MSME not able to access finance). These socio-cultural factors are difficult to change as they often have deep historical roots. Any upgrading strategy proposed by the project will have to take these socio-cultural elements into consideration. In particular, two key socio-cultural elements that may influence an actor's behaviour within the VC is access to land and labour, both of which are not entirely straightforward and require one to be able to “bend with the customs and work ethic”.⁹⁷

Access to Land: Marshall Islands' land is governed by a pluralistic legal system in which customary and statutory systems overlap. Statutory systems involve written, codified rules dictating who has access and to what; customary systems are more informal, based on community understanding and tradition. Access to land may be through inheritance, pleading, marriage, sharecropping or renting, the latter of which is often the case for major investments within the VC.

While there are legal and regulatory systems in place to protect renters or lease holders, customary law and social norms can undercut these formal guarantees especially when the principles of customary land ownership in the Marshall Islands are not known to all interested parties in a land transaction. This causes uncertainty to surround many land transactions, and the parties involved can wind up disputing the legal effects of such transactions. As a result, a significant portion of the case load handled by the Marshall Islands courts regards disputed land titles and rights.⁹⁸ In some instances, government/public lands have been reabsorbed into customary land ownership and now rent is charged for previously considered public land use. One such case is generally known to affect the Delap Dock area. While that area is held by the Marshall Islands Government under a 1970s land quitclaim purchase and is supposedly lease free due to the quitclaim conditions, some Delap Dock area

⁹⁷ Pers. Comms., PII, April 2021

⁹⁸ de Bie, G., 2004. Private Lands Conservation in the Republic of the Marshall Islands.

occupants have buckled to landowner requests and been paying annual leases to the descendant landowners.⁹⁹

From the perspective of the VC actors including PPF and Koo's as well as support service providers including PII and others, much of this complication appears to have already been addressed in that the land areas that they presently occupy are secure. It remains to be seen however if the same can be said regarding land that might be needed for VC upgrading strategies, in which case the role of the Marshall Islands Government can provide a pathway forward. The Government has already evidenced a supportive stance in this regard, with notable efforts including passage of the Land Recording and Registration Act 2003 which created the Land Registration Authority (LRA) controlled and managed by a Board of Directors. It will be important to consider opportunities to highlight shared benefits and motivations for building consensus around key infrastructure.

Access to Labour: The Marshall Islands workforce is estimated at 11 066 in 2017, with public administration, wholesale and retail trade, extra-territorial organizations, transport/storage and communication, and fisheries being the industries with the highest numbers of workers.¹⁰⁰ Notably, around one-third (32.6 percent) of the country's labour force is unemployed in 2017¹⁰¹. Unemployment rates among youth and young adults are high and estimated to be as high as 50–60 percent in 2019.¹⁰² While one would suspect that this would lead towards a strong push towards employment within the fisheries sector, VC actors cite the scarcity of labour as a challenge affecting their operations.¹⁰³

The scarcity of labour can partly be explained within the context of the Compact of Free Association, wherein Marshallese citizens are entitled to live, attend school, and work in the United States visa-free as “nonimmigrant residents.” Accordingly, both skilled and unskilled workers may—and often do—choose to migrate to the US for its higher wages and standards of living. Among VC workers, especially for labour at the PPF tuna loining plant, high wages at poultry processing plants can also appear attractive after gaining several years of experience. As such, lower skilled labour from in the Marshall Islands often move to work in the US.

Another factor in the VC actor's ability to access sufficient labour inputs in the Marshall Islands has been worker absenteeism. The PPF loining plant can employ up to 600

⁹⁹ Pers. Comm., June 2021

¹⁰⁰ RMI (2018b). Statistical Yearbook 2017.

¹⁰¹ Ibid.

¹⁰² <https://www.state.gov/reports/2020-investment-climate-statements/marshall-islands/>

¹⁰³ Pers. Comms., PPF, May 2021

people but has only been able to secure around 350 on a regular basis.¹⁰⁴ Oftentimes a worker in these lower-income positions will have extended family and community (e.g. church) obligations that have the effect of reducing their already minimum wage earners salary to even less. There is also a sentiment held by some in the local community that the purse seine industry is connected to the sex trade with primarily low paying jobs for uneducated segments of the population. Altogether or apart, these perceptions can lead to a disincentive to continue to work, and instead focus on a subsistence livelihood, which itself is considered by society as worthwhile; or to continue to work, but with the intent of saving sufficient funds to eventually migrate to alternate employment where the salary is nearly as great (e.g. four times greater in the State of Arkansas at USD11.00 per hour¹⁰⁵ than that of the Marshall Islands at USD 3.00+ per hour). From the perspective of the VC actors, these conditions have led in some instances to seeking labour that is less likely to migrate given their non-Marshallese status under the Compact of Free Association.¹⁰⁶

One compensating element to the above local labour market conditions is that the Marshall Islands Government and its educational institutions have invested considerably into higher paying employment within the VC. This includes the Maritime Vocational Training Centre (MVTC) at the College of the Marshall Islands, which aims to recruit and train apprentices with the knowledge, skills, attitudes and values, safety-oriented and effective workers in domestic, regional and international maritime shipping and fisheries industries. The MVTC provides maritime courses in the areas of Standards of Training, Certification and Watch-Keeping for Seafarers, Crewmember Training, SPC Basic Fisheries Observer Program and the Maritime Apprentice Program.¹⁰⁷ MIMRA actively invests and seeks donor support for this and other domestic training programmes, evidencing the importance of the VC in society.¹⁰⁸

2.3.6 The natural environment

¹⁰⁴ Pers. Comms., PPF May 2021

¹⁰⁵ Arkansas Department of Labor and Licensing <https://www.labor.arkansas.gov/divisions/labor-standards/minimum-wage-and-overtime/>

¹⁰⁶ Pers. Comms., PPF, May 2021

¹⁰⁷ CMI Website https://cmi.edu/college_programs/maritime-vocational-training-center/

¹⁰⁸ Pers. Comms., MIMRA, April 2021

Key **oceanographic characteristics** of the Marshall Islands EEZ are presented below.

BOX 1: OCEANOGRAPHIC CONDITIONS IN THE EEZ OF THE MARSHALL ISLANDS

The Marshall Island's EEZ is traversed by three main current systems — the westward-flowing North Equatorial Current (NEC) in the north of Marshall's EEZ, the eastward-flowing North Equatorial Counter Current (NECC) that flows through the southern part of Marshall's EEZ, and the westward-flowing South Equatorial Current (SEC) in the very south of Marshall's EEZ. The eastward-flowing NECC generally strengthens in the first and second quarters and shifts southward during the third quarter of the year. The opposite westward-flowing SEC is generally strongest in the south-eastern portion of the region during the first and the second quarter of the year.

The northern part of Marshall's EEZ is at the edge of the North Pacific Tropical Gyre where waters are generally poor in nutrients. This province is characterised by downwelling and low nitrate concentrations in deeper waters. The southern part of Marshall's EEZ is two times more productive. Productivity is increased by the rich chlorophyll waters coming from the PNG coastal upwellings. Seasonal variability is also modulated by the intrusion of productive waters coming from the convergence area in the south-eastern part of the EEZ during the first and second quarters of the year

Most of the interannual environmental variability in the Marshall EEZ seems to come from El Niño. Generally, during an El Niño event, the overall current direction in the southern part of the Marshall's EEZ is eastward. During La Niña periods, the SEC strengthens and may push into the south-eastern region of the Marshall's EEZ, converging with the westward flowing NECC, which decreases in strength.

Source: SPC (2005). Oceanography and climate variability in the Marshall Islands EEZ. Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Tuna fishing in the Marshall Islands is affected by the oceanographic conditions described in Box 1 in two main ways:

- Longline fishing is concentrated in the southern half of the RMI zone, while purse seine fishing is concentrated in the southern third of the RMI zone (SPC, 2016)
- El Niño events affect tuna habitat and their distribution in the Pacific Ocean. In general, the longitudinal distribution of the catch of skipjack tuna during El

Niño moves to the east in the equatorial Pacific towards the Marshall Islands (SPC 2014)

These oceanographic conditions provide the forage base for the large stocks of tuna that occur throughout the WCPO. Tuna catches are made throughout the longitudinal range of the WCPFC Convention Area (CA) and most often between 20°N to 20°S, and the geographical distribution of the purse seine fishery is even more tightly concentrated in the equatorial band, with the highest catches in the zone 5°N – 10°S but declining towards the eastern side of the conservation area (WCPFC 2019b, page 147).

The movements of tuna, responding to these changes in the natural environment have an important impact on the activities of purse seine vessels and fleet movements, with vessels moving areas during the year to maximize catch rates. Management measures, and in particular the FAD closure in the WCPO under CMM 2008-01, also have an important bearing on the location of vessel activity for those vessels using different types of FADs.

Climate change is expected to result in an eastward redistribution of skipjack and yellowfin tuna as well as forage availability for tunas, which can be expected, over the longer term, to reduce the total tuna catch within the EEZs of the Pacific Island Countries (PICs), such as RMI (SPC 2019a). Other results of climate change over the longer-term could include changes to sea temperatures, salinity, ocean circulation and coastal upwelling, and ENSO one to two-year duration events (Poseidon 2013). All of these potential changes could impact on the timing and success of physiological, spawning and recruitment processes, primary and secondary production, and fish distributions (Macfadyen and Allison, 2009), and could in turn negatively impact not just on catch rates for value chain actors, but also on the contributions that tuna fishing access fees make to the government revenues of many PICs, such as Marshall Islands. However, at a regional level fishing pressure will continue to be far more important than climate change in impacting on stock status, and climate change impacts are not expected to negatively impact on total catches until after 2050 (SPC 2019a).

Like other Pacific Island atolls, given the lack of any rivers in Marshall Islands and its reliance on rainfall, availability of potable **water** (both supply and access/distribution) is an ongoing challenge of critical importance for Majuro. Existing seasonal variations are expected to become more extreme due to climate change and are therefore very real and potential sources of future shocks to the VC, and the Marshall Islands more broadly. Noting the water insecurity of Majuro, onshore companies in the VC actors (e.g. PPF, PII, KMI) have their own water storage facilities including reverse osmosis (RO) water creation and rainwater harvesting systems to

reduce reliance on MWSC water and ensure adequate supply for their operations. Koo's and MIFCO vessels have their own RO systems onboard for daily water production, although this is sometimes supplemented by external sources during times of equipment failure.¹⁰⁹

2.4 Governance analysis (linkages)

The Marshall Islands purse seine tuna value chain is coordinated between value chain actors in a number of ways, making it possible to bring tuna from primary production to end use. And while not directly reflecting vertical or horizontal coordination of core value chain actors, the high levels of regional organisation between governments for management of the purse seine fishery, as documented in Section 2.3.5, should be emphasized as this is also critically important for overall management of the purse seine fishery. This regional coordination has produced unified positions on such items as access fees, observer requirements, in port transshipment and proposals for WCPFC CMMs. Especially important is the coordination among FFA countries for formulating management measures prior to meetings of WCPFC.

Vertical linkages between actors at different stages of the chain include the coordination of activities within the vertically integrated companies discussed in Section 2.3.2. PPF and Koo's, based in Marshall Islands and owning/managing tuna purse seine vessels that are flagged in Marshall Islands, coordinate with other companies and business activities within the Shanghai Kaichuang and Koo's groups respectively on issues related to transport of catch to canneries outside of Marshall Islands. Foreign-flagged vessels transshipping in Marshall Islands also coordinate with tuna trading companies and other vertically integrated companies operating in the region on logistics associated with the transshipment of catch to carrier vessels for onward delivery to processing plants.

Tuna brokers and vertically integrated companies organising the transport of product by carrier vessels or containerised transport, coordinate with canneries receiving product about volumes and types of raw material product being supplied to the canneries (based on cannery requirements which in turn are dependent on inventory in cold stores and orders by wholesalers/brands), and on logistical issues related to the unloading of product.

¹⁰⁹ Pers. Comm., Koo's, 2021.

Tuna canneries coordinate activities with wholesalers/brands for whom they process tuna into canned product. This coordination relates to a wide variety of issues such as ensuring quality, processing volumes and delivery schedules from canneries to overseas markets.

In terms of horizontal linkages, most notable is the coordination between the purse seine tuna catching sector of PNA countries to have achieved Marine Stewardship Council (MSC) certification of purse seine free school skipjack and yellowfin tuna caught within PNA waters.¹¹⁰ Complying with the MSC standard to a level sufficient to gain certification involved coordination of various activities by the purse seine sector in PNA countries to ensure that the standard was met. It also involved coordination with PNA and national governments on various management changes that needed to be made to achieve certification. In order to sell MSC-labelled products in end markets, the MSC also requires a process of certification of the downstream value chain, known as chain of custody (CoC) certification. This involves checking that raw material product from sources outside of the certified fishery is not entering the supply chain during processing and trading and being sold as certified product. This therefore requires vertical coordination of activities between downstream actors during the CoC certification process itself, and during the normal business of processing and selling tuna into end markets.

A related initiative involving vertical linkages associated with MSC certification has been the establishment of Pacifical. Pacifical is a tuna market development company jointly set up by the eight PNA countries (including the Marshall Islands) in 2011 to promote the catch, production, distribution and marketing of the MSC-certified sustainable free school skipjack and yellowfin tuna caught within PNA waters. The company serves to organize supply chains in cooperation with its partners to promote, develop, and monitor the global supply chain of PNA's MSC certified skipjack and yellowfin tuna. It operates as an umbrella company over the entire supply chain and offers a wide range of services related to market development, tuna sourcing, and traceability and transparency.

¹¹⁰ <https://fisheries.msc.org/en/fisheries/pna-western-and-central-pacific-skipjack-and-yellowfin-unassociated-non-fad-set-tuna-purse-seine/>

3 Sustainability assessment

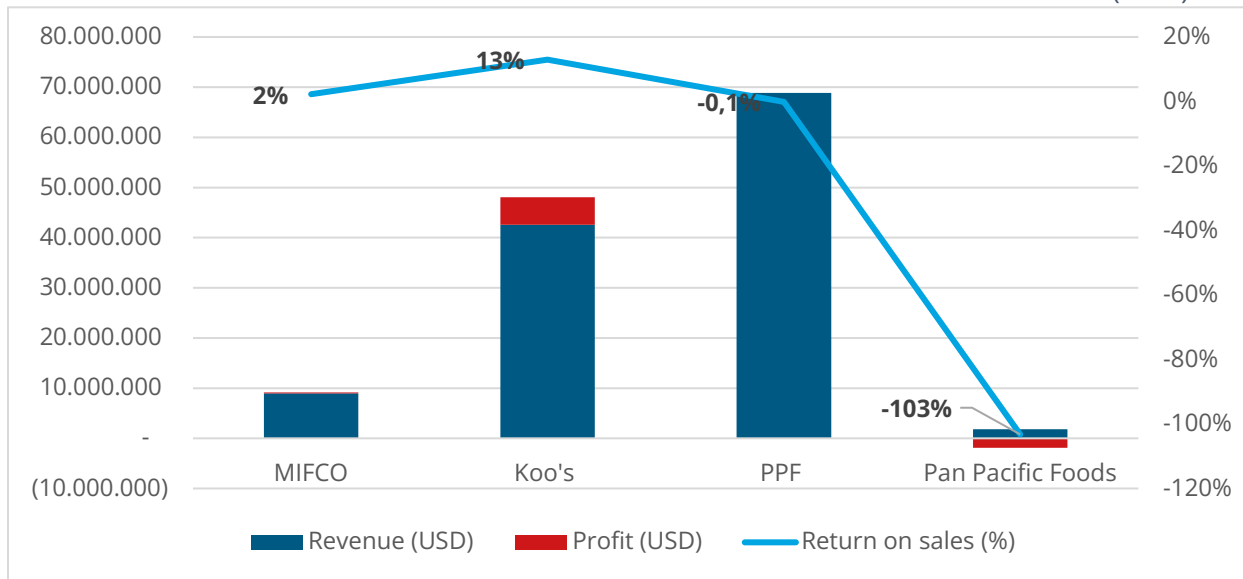
In this section the performance of the VC is assessed in terms of its economic, social and environmental impacts. This section reflects the five main parts of the FISH4ACP's sustainability analysis and is structured accordingly into five main sub-sections. The first three sub-sections (3.1, 3.2, and 3.3) consider the economic, social and environmental impacts specifically. Sub-section 3.4 considers resilience of the VC as a meta-dimension of sustainability: how vulnerable is the VC to various potential external shocks such as an economic crisis or a natural disaster? The final sub-section (3.5) presents a 'heat map' which provides an overview of the overall sustainability performance of the VC, and which feeds into the upgrading strategy development in Section 4).

3.1 Economic analysis (economic snapshot)

3.1.1 Profitability

As discussed in section 2, the purse seine tuna value chain involves various actors from within and outside of the Marshall Islands. Within the scope of this VC analysis, the profitability assessment only covers the VC actors in the Marshall Islands, namely MIFCO, Koo's and PPF (all fishing companies) and Pan Pacific Foods (onshore processing). The operating accounts of these four companies were developed based on various data obtained from stakeholder consultations in 2021 as well as past studies and reports (e.g. audit reports). An overview of the profitability of the companies in 2019 is provided in Figure 12, while the operating accounts, the returns on sales, and the returns on investment of individual companies are provided in Table 31-34 in section 4.3.2.

FIGURE 12. PROFITABILITY ASSESSMENT OF THE MARSHALL ISLANDS PURSE SEINE TUNA VALUE CHAIN (2019)



Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Among the three fishing companies, Koo's demonstrated the strongest performance by far, which may partially be explained by the fact that among the three companies, Koo's is also the biggest user of Vessel Day Scheme (VDS) days outside of the RMI's EEZ¹¹¹, where purse seine catches are higher (see discussion in section 2.1). Despite having the same management as Koo's, MIFCO demonstrated far weaker economic performance, with an operating profit of nearly USD 200 000, a 2 percent return on sales¹¹², and a 2 percent return on investment.¹¹³ Two possible explanations for this poor performance might be that MIFCO's vessel was still not fully operational after the incident in 2018¹¹⁴ and because Koo's has lower unit costs thanks to the economies of scale (Koo's has four vessels as opposed to MIFCO having only one, given that the vessels are of similar quality and catch capacity, and that some unit costs (e.g. overhead) can be reduced with a larger number of vessels). PPF made a loss of around USD 90 000, or a -0.1 percent return on sales and -0.1 percent return on investment in 2019, even with a doubling in the number of vessels (from 3 to 6 in 2019), potentially due to the reduction in fish price in 2019 coupled with increased

¹¹¹ Poseidon (2019) (confidential audit report produced for MIMRA).

¹¹² Return on sales = 100 * (net profit over total revenue), expressed as a percentage (Methodological guide).

¹¹³ Return on investment = 100 * (net profit over total cost), expressed as a percentage (Methodological guide).

¹¹⁴ In 2018, the vessel ran aground into Majuro and suffered major damage (Pers. Comm. with MIFCO in 2021).

depreciation costs of newly acquired vessels, which could not be immediately offset by increased catch. Indeed, the financial performance of all three fishing companies in 2019 was negatively affected by declining fish prices in 2019 (see Figure 7), compared to preceding years. Other reports (Poseidon 2019, confidential) examining the performance of the three companies over 2016– 2018 based on analysis of company financial statements, showed significantly better financial performance (i.e. the average returns on sale of three companies during 2016– 2018 ranged from 24 to 35 percent). The year 2020 is also expected to be a poor one for MIFCO and Koo's given significantly reduced catch volumes (32 percent reduction as compared to 2019) for its vessels due to periods of dry docking for 4 vessels totally 16 months (which was due to the impacts of COVID-19 resulting in various restrictions on vessel and crew port entries), and catches falling to around 25 000 tonnes for the five vessels operating in 2020.¹¹⁵

Pan Pacific Foods, which engages in loining, cold storage and containerisation operations, operated at a significant loss in 2019 (-103 percent return on sales, and -51 percent return on investment). Currently, Pan Pacific Foods only uses less than 40 percent of its processing capacity (3 out of 4 processing lines are used, for only one instead of two shifts), partially due to the challenges in finding sufficient labour¹¹⁶, as well as due to the low labour productivity and limited cold storage capacity.¹¹⁷ These factors help to explain the low financial performance of the company.

Based on the scoring guidance of FISH4ACP methodology¹¹⁸, the profitability indicators of the VC are assessed as below:

- *Net profits*: According to FISH4ACP methodology, this indicator should be rated as unsustainable (red) because two out of four actors had negative profits in 2019. However, given the high level of price fluctuations on tuna market and other related markets (e.g. fuel), the near break-even economic performance of PPF in 2019 (-0.1 percent return on sales), and given that PPF had positive profits in preceding years (2016–2018), this indicator can be considered as

¹¹⁵ Based on catch data for 2020 provided by MIFCO/Koo's.

¹¹⁶ Pers. Comm, PPF, 2021.

¹¹⁷ Poseidon (2019) (confidential audit report produced for MIMRA).

¹¹⁸ A score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each economic indicator, with 1 (red) means unsustainable, 2 (yellow) means concerning, and 3 (green) means sustainable. See more in Annex 5: Extracts from FISH4ACP methodological guide.

concerning (yellow) rather than unsustainable (red). This rating is thus adjusted to be concerning (yellow) at the VC level.

- *Trend in net profits*: Unsustainable (red) because the net profits of all four VC actors decreased in 2019 as compared to preceding years.
- *Return on sales*: According to FISH4ACP methodology, this indicator should be rated as unsustainable (red) because two of four VC actors have negative returns. However, it is adjusted to concerning (yellow) for the same reason as with the '*net profits*' indicator.
- *Return on investment*: According to FISH4ACP methodology, this indicator should be rated as unsustainable (red) because two of all four VC actors have negative returns. However, it is adjusted to concerning (yellow) for the same reason as with the '*net profits*' indicator.

3.1.2 Employment

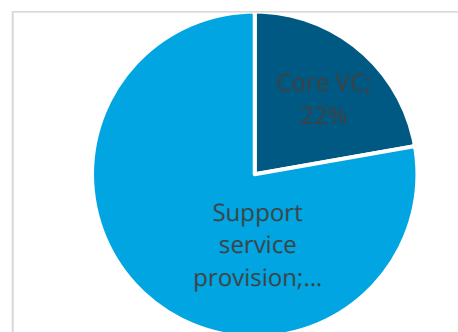
Employment in the Marshall Islands purse seine tuna VC includes employment in the core VC (i.e. by MIFCO, Koo's, PPF and Pan Pacific Foods) and in the extended VC, which also includes support service providers (as discussed in section 2.3). An overview of the VC's employment, including both Marshall Islands residents and non-Marshall Islands residents from a fiscal/legal perspective¹¹⁹, is provided in Table 12, Figure 13 and Figure 14.

¹¹⁹ RMI residents are those who reside in the RMI and whose wages and salaries are subject to RMI taxes, regardless of their nationalities.

TABLE 12. NUMBER OF MARSHALL ISLANDS -RESIDENT AND NON-MARSHALL ISLANDS RESIDENT EMPLOYEES IN THE VALUE CHAIN (ANNUAL AVERAGE)

	RMI resident employees	Non-RMI resident employees	Total
MIFCO ¹	10	27	37
Koo's ¹	32	107	139
PPF ¹	30	162	192
Pan Pacific Foods ¹	92	0	92
Core VC¹	164	296	460
Support services ³	573	n/a	n/a
Whole VC²	737	n/a	n/a

FIGURE 13. MARSHALL ISLANDS - RESIDENT EMPLOYEES IN THE (CORE AND EXTENDED) VC ¹



Sources and notes:

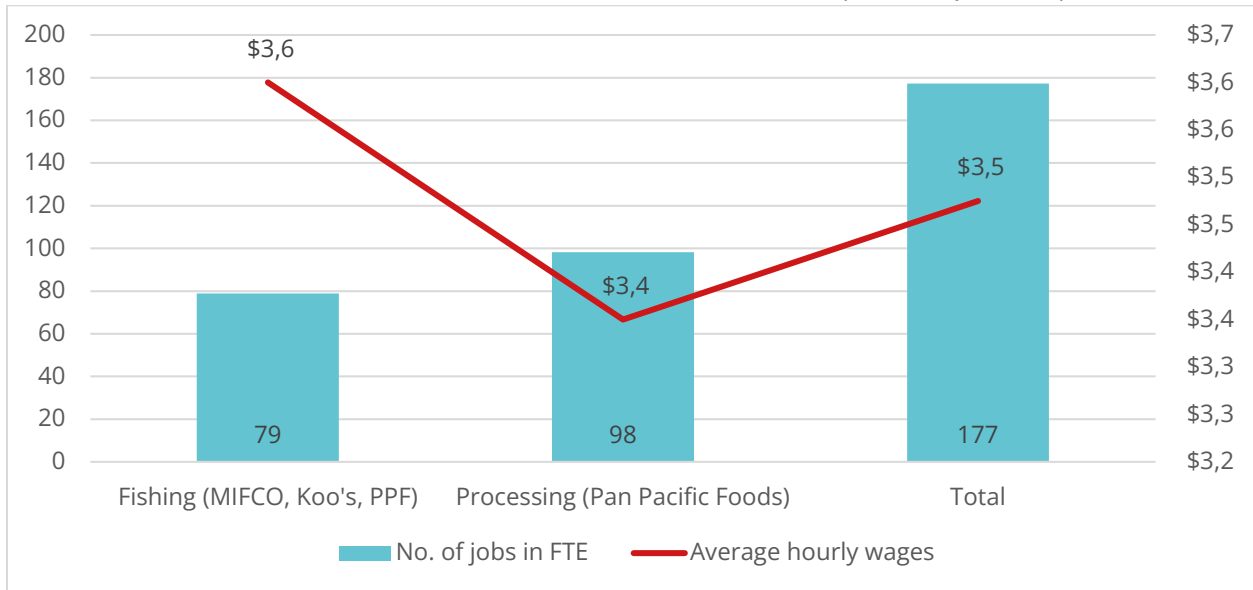
¹ Own analysis based on consultations with VC actors in 2021. For Pan Pacific Foods, only loiners and cold store/container workers are included in this table, while supervisors (who are relatively few and whose exact number was not obtained from consultations) are not.

² Graduate School (2021). The figure refers to total fisheries employment, including fishing, shore-based fish processing and vessel support services. Part time workers may be significant.

³ Own analysis. It should be noted that this number may be slightly overestimated because it was estimated based on the total number of jobs in *fisheries sector*, as provided by the Graduate School (2021), which includes purse seine and other fisheries activities, such as longline. However, given that the share of longline in the Marshall Islands' fisheries sector is insignificant as compared to purse seine¹²⁰, it can be assumed that almost all fisheries jobs are related to purse seining.

¹²⁰ Own analysis using FFA (2017) data show that purse seining accounted for nearly 100% of total catch quantity and between 90% and nearly 100% of total catch value by the RMI's national fleets in 2013–2016.

FIGURE 14. OVERVIEW OF THE EMPLOYMENT OF MARSHALL ISLANDS RESIDENTS, IN FTE EQUIVALENT, IN THE CORE VC



Sources: Own analysis based on consultations with VC actors in 2021. The average wage of the workers in the fishing companies is the average wage of Marshall Islands residents working in the fishing crew (i.e. not including onshore employees – who are relatively few, and non-Marshall Islands resident employees). For Pan Pacific Foods, only loiners and cold store/container workers are included in Figure 14, while supervisors are not.

Number of employees: Table 12 provides the estimated annual averages of the number of employees in the core and extended VC. Averages are presented because of fluctuations in employment numbers during and between the years due to the significant number of employees in the VC who do not work every day¹²¹ and the high turnover rate at Pan Pacific Foods and other onshore operations.¹²² **In the three fishing companies,** only local (Marshallese) crew and onshore staff are considered Marshall Islands residents (and thus, are subject to Marshall Islands taxes on wages and salaries), while non-Marshallese employees are not.¹²³ As indicated from Table 12, there are 72 Marshall Islands residents hired by three fishing companies, of which around 62-63 people are fishing crew members (all are male) and around 9-10 are onshore staff (4-5 are female). Marshallese nationals working on fishing vessels are most often hired as deckhands rather than as engineers or in more senior crew positions.¹²⁴ **In onshore operations at Pan Pacific Foods,** all employees are

¹²¹ Pan Pacific Foods' loining plant operates around 120-180 days/year in a normal (typical, non-pandemic) year. In 2019, the plant operated in 114 days (Pers. Comm., PPF, 2021).

¹²² Confidential report.

¹²³ Pers. Comm., with PPF, Ministry of Finance, and Marshall Islands Social Security Administration, 2021.

¹²⁴ Pers. Comm., PPF, 2021, and focus group discussion with Koo's fishing crew, 2021.

considered Marshall Islands residents regardless of their nationalities.¹²⁵ In these operations, Marshallese nationals are often hired for processing tuna loins (around 50 people, over half of whom are loiners (all are female), and nearly half are hired for supporting tasks such as skinning, cleaning up, and packing loins (around 85 percent are female)¹²⁶), and as workers for offloading fish, stuffing containers, and cold store operations (around 40 people, of which 2 are female).¹²⁷ The number of employees at Pan Pacific Foods has been in decline since 2011, reflecting increasing difficulties faced by the company to recruit and maintain labour.¹²⁸ The remaining Marshall Islands-resident employees in fishing and processing companies, mainly Marshallese nationals but some are non-Marshallese, are hired for administration, management/supervision, and quality assurance tasks.

Another notable finding is that **non- Marshall Islands residents** account for around two-thirds of the total employment generated by the core VC and are dominant in the fishing function (making up around 80 percent of the employees in three fishing companies), as deduced from Table 12. Furthermore, since the non- Marshall Islands residents (who are also non- Marshall Islands nationals) are often hired as engineers or for more senior crew positions, it can be implied that the benefits from existing employment opportunities in the core VC, especially the ones with better conditions, mostly flow offshore rather than being captured by the Marshall Islands.

As seen from Table 12, in the core VC, over half of the employment for Marshallese residents is in processing at Pan Pacific Foods. This finding is consistent with previous studies, for example Barclay (2010), which indicate that most of the employment opportunities for Marshall Islands nationals in the Marshall Islands tuna VC come from the loining factory, whereas fishing vessels employ fewer Marshall Islands residents.¹²⁹ Moreover, when looking at the whole VC (i.e. including support service provision), it appears that nearly 80 percent of the employment opportunities for Marshallese residents in the VC are derived from the support service provision, which includes onshore operations such as stevedoring, net yard services, and vessel support services. These findings are of strategic importance to the potential upgrading strategy under this project, as it implies that upgrading focussing on

¹²⁵ Pers. Comm., PPF, 2021.

¹²⁶ In 2019, the loining plant employed 27 loiners and 25 supporting staff. Currently (in 2021, at the time of interview), the plant employs around 45-50 people (Pers. Comm, Pan Pacific Foods, 2021).

¹²⁷ Pers. Comm., PPF, 2021.

¹²⁸ Per. Comm., Pan Pacific Foods and PPF, 2021.

¹²⁹ According to the focus group discussion with Koo's fishing crew in 2021, the number of Marshallese members on a typical purse seine vessel ranges between 5-8 in a crew of 25 members (excluding Fishing Master, Captain, Chief Engineers). Pers. Comm. with PPF in 2021 shared similar numbers (5 Marshallese in a fishing crew of 32 people).

onshore activities (rather than the catching sector) would have the most significant positive impact on employment creation for the Marshall Islands.

Number of FTE jobs for Marshall Islands residents: Three fishing companies employ Marshallese residents across their fishing and onshore operations. The number of fulltime equivalent (FTE) jobs¹³⁰ for Marshallese residents in three fishing companies is around 79, mostly as part of the fishing crew. This number of FTE jobs is higher than the number of people employed because fishing crew typically work for 200-230 days a year and around 10 hours a day.¹³¹ The Marshallese residents employed by Pan Pacific Foods are fulltime workers,¹³² working 11.5-12 hours/day for around 120-180 days/year at the loining plant¹³³ and for 335 days/year at cold store/containerisation operations.¹³⁴ Therefore, the number of fulltime equivalent (FTE) jobs in 2019 is estimated to be around 98 FTE jobs, which is slightly higher than Pan Pacific Foods's number of employees (92), as shown in Table 12.

Wages: The VC workers who are Marshall Islands residents – including fishing crew, loining workers, cold store, and containerisation workers – get relatively low wages (gross wages from around USD 3.3 to USD 4/hour, with fishing crew earning slightly more per year than onshore workers)¹³⁵, or around USD 7 200/year (gross) if working around 200 days/year and 8-10 hours/day (as in the case of the Marshallese fishing crew). This is 40-45 times lower than the wages of those employees who have decision-making and supervising roles, who are mostly non- Marshall Islands residents, such as the Fishing Master (the captain of the fishing vessel) who has the highest pay on the fishing vessel of as much as USD 250 000 – USD 300 000/year.¹³⁶

Government employees involved in purse seine operations: Apart from the employment generated by the private sector companies in the core VC and support service provision, there are also government staff whose employment is closely linked to the purse seine VC. These include the observers and port monitoring staff

¹³⁰ Number of FTE jobs equals the total number of full days (8 hours/day) that all workers work per year divided by 230 (days) (FISH4ACP methodological guide).

¹³¹ Focus group discussion with Koo's fishing crew in 2021.

¹³² Some being Marshallese citizens, and many others being from China and the Philippines

¹³³ Around 120 – 180 operational days/year are according to Pan Pacific Foods' annual *planned* budget; but in 2019, the *actual* number of working days was lower than planned (114 days) (Pers. Comm., PPF, 2021).

¹³⁴ Per. Comm., Pan Pacific Foods and PPF, July and August 2021.

¹³⁵ Own analysis and triangulation from consultations, including focus group discussion with the workers in Pan Pacific Foods, PII, Koo's and MIFCO in 2021, Pers. Comm. with PPF in 2021, and Pers. Comm. with KMI (PS vessel agent) in 2021.

¹³⁶ Pers. Comm., KMI (PS vessel agent), 2021.

hired by MIMRA to monitor purse seine transshipments and containerisation activities to ensure catches being offloaded tally with those recorded in catch reporting and transshipment records. There are 49 observers (of which 1 is female) and 49 port monitoring staff.¹³⁷

Based on the scoring guidance of FISH4ACP methodology, the employment indicators of the VC are assessed as below:

- *Number of jobs expressed in FTE term (in the core VC):* According to the FISH4ACP methodology, this indicator should be rated as sustainable (green) because the number of jobs is significantly higher than the number of actors. However, considering the high share of non- Marshall Islands residents in the total employment in the core VC, the score is adjusted to be concerning (yellow) to reflect the low level of employment benefits captured by Marshall Islands residents.
- *Number of wage or salaried jobs (in the core and extended VC):* Sustainable (green) because all the jobs are wage or salaried jobs.
- *Average gross wage paid to hired workers:* According to the FISH4ACP methodology, this indicator should be rated as sustainable (green) because the average hourly wage at VC level (USD 3.5) is more than 10% higher than the minimum wage level (USD 3/hour, according to RMI (2018)), and average wage is not below the minimum wage at any node in the VC. However, considering the specific context of the VC, with significant differences between the wages of resident and non-resident employees, the score is adjusted to be concerning (yellow).

Total value of net wages: According to the FISH4ACP methodology, this indicator should be rated as unsustainable (red) because the net wages of resident employees constitute less than 10 percent of the direct value added (see section 3.1.3 below). However, it must be noted that government revenue constitutes a major share of direct value added (see section 3.1.3 below), which implies the Marshall Islands society, including VC workers, may benefit from the VC's direct value added in other forms apart from wages and salaries (e.g. through government spending that benefits the society and environment). This score is thus adjusted to be concerning (yellow).

¹³⁷ Pers. Comm., MIMRA, 2021.

3.1.3 Value added

The (financial) value added is assessed at two levels: (i) the *direct value added*, which includes net profits (after taxes) for the companies (MIFCO, Koo's, PPF, and Pan Pacific Foods), net wages for their workers who are Marshall Islands residents¹³⁸, and government revenue in the form of taxes and fees, and (ii) the *indirect value added*, which is embedded in the domestic goods and services that the VC actors (MIFCO, Koo's, PPF, and Pan Pacific Foods) purchase from outside of the core VC.¹³⁹ The generation of direct value added, the distribution of this value added, and the total value of outputs (i.e. tuna products in whole and loin forms, and fishmeal as a by-product from loining) are therefore calculated from the operating accounts of the core VC actors and are summarized in Table 13 and Figure 15 below.

TABLE 13. GENERATION OF DIRECT VALUE ADDED (IN USD) IN THE MARSHALL ISLANDS PURSE SEINE TUNA VALUE CHAIN (2019)

Direct value added	2019
Fishing (MIFCO, Koo's, PPF)	6 040 371
Net profits (for companies)	5 629 915
Net wages (for resident employees)	410 456
Processing (Pan Pacific Foods)	-620 732
Net profits (for company)	-1 858 072
Net wages (for resident employees)	1 237 339
Government (taxes, fees)	14 420 538
Direct value added (in core VC)	19 840 177
Total value of outputs (i.e. total revenue)	122 160 173
Direct value added as proportion of outputs	16.2%

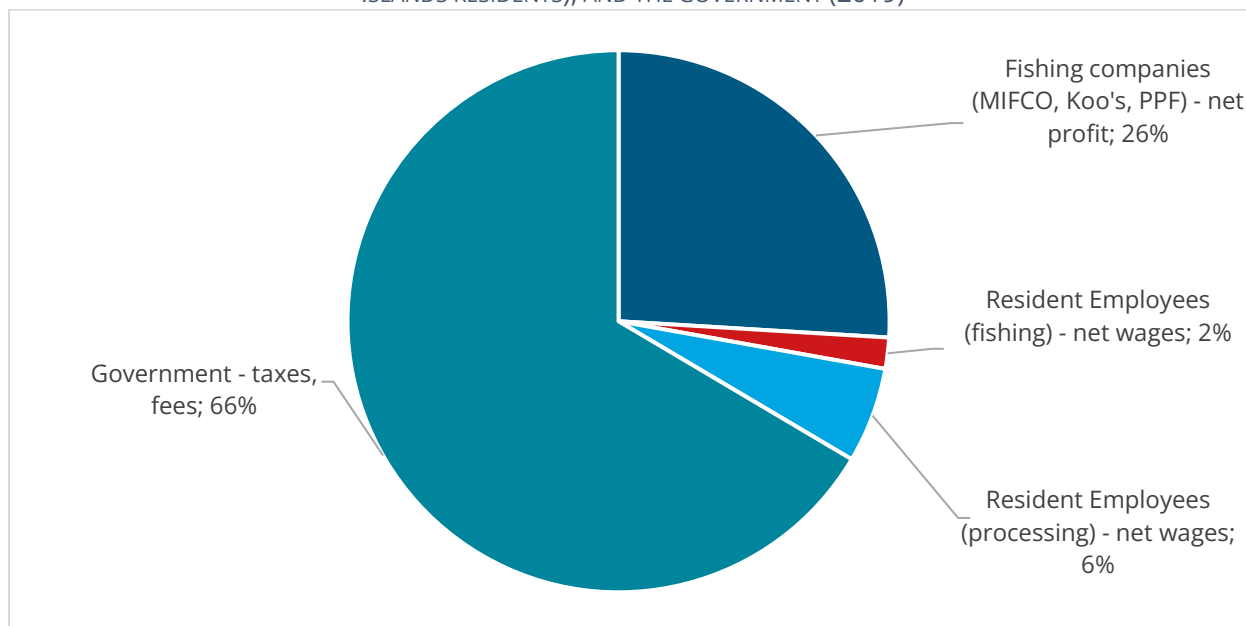
Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Note: Direct value added refers to the value that is retained in the Marshall Islands. Therefore, only the wages for Marshall Islands residents are included in the calculation of direct value added, while the wages of non- Marshall Islands residents are not. It should be noted that the foreign ownership of many VC actors results in high levels of economic leakage of benefits from Marshall Islands.

¹³⁸ The wages that non-resident employees get are not part of the value added that is retained in the RMI because this value flows offshore.

¹³⁹ FISH4ACP full methodological guide.

FIGURE 15. DISTRIBUTION OF DIRECT VALUE ADDED CAPTURED BY CORE VC ACTORS, THEIR WORKERS (MARSHALL ISLANDS RESIDENTS), AND THE GOVERNMENT (2019)



Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

In 2019, the direct value added from the VC was mainly captured by the Marshall Islands government (mainly through VDS fees, Gross Revenue Tax¹⁴⁰, taxes on wages and salaries¹⁴¹, and transshipment-related fees) and the three fishing companies (in the form of net profits), with the government capturing around two-thirds of the direct value added and the fishing companies over one-quarter. Pan Pacific Foods made a loss (as discussed in section 3.1.1) and thus, does not capture any share of the VC's direct value added. The Marshall Islands residents employed to work at the

¹⁴⁰ GRT (Gross Revenue Tax, or gross receipt tax) is 3% of the value of the fish caught in RMI waters (or total revenue) and is charged to Koo's and MIFCO. PPF, on the other hand, is provided with a tax holiday until 2031. (Pers. Comm., Koo's, MIFCO and PPF, 2021).

¹⁴¹ According to interviews in 2021 with PPF and officials from the Ministry of Finance and the Marshall Islands Social Security Administration (MISSA), the employees of VC actors who are RMI residents are taxed on their wages and salaries. For fishing companies, only the local crew (who are Marshallese citizens) pay tax on wages and salaries (8 percent of the wages). The local crew in Koo's and MIFCO also pay a social security tax (MISSA tax, of 16 percent of the wages) and make Health Fund contribution (7 percent of the wages). For Pan Pacific Foods, all the employees, regardless of nationalities, are subject to tax on wages and salaries, MISSA tax, and Health Fund contribution. However, the loining workers, who were estimated to work around 23 days in 2019 to produce 322 MT of loins, are considered low-income workers (earning less than USD 5 200/year) and thus, are granted a tax exemption according to the RMI Income Tax Act 1989.

fishing and processing¹⁴² (including loining, containerisation, cold store) companies in the VC captured around 8 percent of the direct value added, with processing employees having higher share (6 percent as opposed to 2 percent), which is due to the higher number of processing workers as compared to fishing workers. This distribution of direct value added is reflective of the low profitability level of Pan Pacific Foods as compared to the fishing actors and the absence of high-salaried positions for Marshall Islands residents in the core VC. Not reflected in Figure 15 (because not part of the value added retained in Marshall Islands) but important to mention is the salaries and wages captured by non-resident employees of fishing and processing companies, whose total gross wages and salaries were estimated to be nearly 7 times higher than that of the Marshall Islands-resident employees.¹⁴³ While this represents an opportunity to shift from hiring expats to locals for these jobs to capture more value added, there are various challenges related to the labour supply in the Marshall Islands, as discussed in section Socio-cultural elements, that must be tackled to realize this opportunity.

The indirect value added is calculated by extracting the costs of domestic goods (inputs) and services from the total operating costs of core VC actors. In the Marshall Islands purse seine VC, that means several cost items are removed from the total operating costs to obtain an estimate of the VC's indirect value added – these include, for example, the cost of fuel and oil (which is imported¹⁴⁴) and the shipping costs (which are paid to foreign shipping companies). The total value added (see Table 14) equals the sum of the direct value added (see Table 13) and the indirect value added (also shown in Table 14). To provide a clearer picture of the contribution of each VC function (i.e. fishing and onshore processing) to total value added, the direct and indirect value added are broken down by VC functions in Table 14.

¹⁴² It must be noted that the processing employees in Pan Pacific Foods, as included in this calculation, include both workers and supervisors/managers in the company, all of whom are considered RMI residents.

¹⁴³ Own estimate based on interviews with Koo's, MIFCO, and PPF, 2021.

¹⁴⁴ RMI-flagged purse seine fishing vessels mostly bunker at sea, buying fuel from foreign suppliers (Pers. Comm., MIMRA, August 2021). Additionally, a smaller part of the fuel used by RMI purse seine vessels is supplied by MEC (Pers. Comm., MEC, 2021).

TABLE 14. TOTAL VALUE ADDED (IN USD) IN THE MARSHALL ISLANDS PURSE SEINE TUNA VALUE CHAIN (2019)

	USD	Share in VC's total outputs (total revenue)
Direct value added (core VC)	19 840 177	16.24%
Fishing (MIFCO, Koo's, PPF)	6 040 371	
Processing (Pan Pacific Foods)	-620 732	
Government (taxes, fees)	14 420 538	
Indirect value added	24 505 172	20.06%
Fishing (MIFCO, Koo's, PPF)	23 583 893	
Processing (Pan Pacific Foods)	921 279	
Total value added	44 345 350	36.3%

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

There are two main findings from Table 14. *First*, almost all the (direct and indirect) value added is generated by the fishing companies (also in the form of taxes and fees paid to the government), while the contribution of the processing company (Pan Pacific Foods) is almost negligible. However, it is worth noting that the insignificant contribution of onshore processing is due to the underdeveloped state of the onshore processing sub-sector in the Marshall Islands. As discussed in Section 2, this represents untapped opportunities for the upgrading of the purse seine tuna value chain under the project. Such upgrading has the potential to bring about benefits not only in terms of value added and GDP contributions but also employment generation, as already noted in the section 3.1.2 above. *Second*, over half of the total value added of the VC is not generated and captured by the core VC (MIFCO, Koo's PPF, Pan Pacific Foods), but by the support service providers of the VC (e.g. stevedore, net yard services) in the form of indirect value added. This finding highlights that support service providers play essential roles in the VC, and thus, represent a potential strategic entry point for improving the economic sustainability of the VC.

It is also important to note that since the companies in the core VC are largely foreign owned, existing direct value added may mostly flow offshore (i.e. 'economic leakage') and improvements in the performance of these companies thanks to VC upgrading may not necessarily generate additional direct value added that is retained in the Marshall Islands, unless captured by increased government revenues from taxes and/or fees. This finding reemphasizes the importance of the domestic companies providing support services to the VC, thanks to whom indirect value added from the VC can be accrued by Marshall Islands nationals. This risk is further highlighted in the final section of this report (Section 5.4 Risk Analysis)

Based on the scoring guidance of FISH4ACP methodology, the value-added indicators of the VC are assessed as below:

- *Direct value added*: Concerning (yellow) because direct value added makes up 16 percent (i.e. between 10 percent and 25 percent) of the total value of output at VC level.
- *Indirect value added*: Sustainable (green) because indirect value added makes up 20 percent (i.e. more than 10 percent) of the total value of output at VC level.
- *Total value added*: Sustainable (green) because total value added makes up 36 percent (i.e. more than 35 percent) of the total value of output at VC level.

3.1.4 Effects in the national economy

The effects of the purse seine tuna value chain on the Marshall Islands' national economy can be assessed mainly in terms of the value chain's contribution to national GDP, the balance of trade, and public finances.

The **contribution of the VC to the Marshall Islands' GDP** is calculated as the share of the total value added in the VC (Table 14 above) in the national GDP. As such, in 2019, the purse seine tuna VC made up around 20 percent of the national GDP (USD 220 million¹⁴⁵). Given that the VC contributed to less than 7 percent of total national employment in 2019¹⁴⁶, its significant share in the national GDP shows the importance of purse seine industry in the economy as well as the industry's relatively high profitability as compared to other industries in the Marshall Islands. Almost all the VC's contribution to GDP came from three fishing companies while the contribution of the processing company – Pan Pacific Foods – is zero, given its negative profit.

This estimated GDP contribution of the VC triangulates well with the data obtained from previous analyses. As seen from a synthesis using data from FFA (2017) and Graduate School (2019b) (see Table 51 in Annex 4), the share of tuna fishing and tuna processing in the Marshall Islands' GDP during 2013–2016 ranged between around one-quarter and one-third. The reason for this slightly higher estimate (as compared to 20 percent according to this report) is because the Graduate School (2019b)'s estimates consider both purse seine and longline fishing, with longline fishing contributing to a few additional percentage shares.

The **net impact of the VC on the Marshall Islands' balance of trade** is calculated by subtracting the value of imports of intermediate consumables (i.e. goods and

¹⁴⁵<http://unctadstat.unctad.org/countryprofile/generalprofile/en-gb/584/index.html>

¹⁴⁶ Own analysis based on Graduate School (2019b), which indicates that in 2019, the total number of jobs in all industries in the RMI was 11 309 and the number of jobs in fisheries was 737.

services) from the value of exports of tuna products.¹⁴⁷ In the case of the Marshall Islands, tuna exports include the whole tuna in containers, tuna loins in containers and the export of fishmeal - a by-product from loining. While tuna loins and fishmeal are products processed and exported by Pan Pacific Foods, whole tuna are containerized by Pan Pacific Foods and by PII. In 2019, Pan Pacific Foods containerized nearly 13 000 MT in 2019, of which around 50 percent are PPF's fish and the remaining are fish caught by other vessels (mainly Taiwanese ones) and a small amount of fish, mainly big yellowfin, caught by Koo's/MIFCO.¹⁴⁸ As for PII, in 2019, the company containerized around 2 900 MT in 2019, all of which are fish caught by foreign vessels.¹⁴⁹ Table 15 presents the volume and value of tuna exports in the Marshall Islands in 2019, which include the tuna loins and fishmeal (from Pan Pacific Foods) and the whole tuna containers derived from the catch by domestic fleets (around 6 700 MT). Meanwhile, the whole tuna that Pan Pacific Foods and PII containerized for other parties (as a service) is not counted as the export value captured by the Marshall Islands.

TABLE 15. MARSHALL ISLANDS PURSE SEINE TUNA EXPORTS (2019)

	Processed loin (SKJ)	Whole (SKJ/ YFT)	Fishmeal
Total (MT) ¹	322	6 721 ²	61
Total value, per exported product (USD) ³	1 384 922	9 377 337	61 244
Total value (USD)³	10 823 503		

Source and notes:

¹ Total volumes of purse seine tuna exports are based on from MIMRA (2020, Table 12) and consultation with PPF in 2021.

² Whole tuna exports are the tuna caught by PPF and Koo's/MIFCO and then containerized by Pan Pacific Foods.

³ Total value of purse seine tuna exports are own analysis, using these prices: USD 4 301/MT for processed skipjack (SKJ) loins, USD 1 925/MT for whole yellowfin (YFT) tuna in containers, USD 1 316/MT for whole SKJ tuna in containers, and USD 1 004/MT for fishmeal. These are estimates based on consultations in 2021, FFA (2020), and Thai Tuna Industry Association (2020).

Purse seine tuna exports, however, could not offset the cost of importing intermediate consumables (i.e. the inputs and support services) used by core VC actors, most notably fuel and oils (for fishing vessels and for running electricity

¹⁴⁷ FISH4ACP methodological guide (internal project document).

¹⁴⁸ Pers. Comm. with PPF, Koo's, MIFCO, and MIMRA, 2021.

¹⁴⁹ Pers. Comm., MIMRA, 2021.

generators) and shipping services (which are provided by foreign shipping companies). Table 16 shows an estimate of the costs of fuel, oils and shipping services used in the VC, as well as the negative net impact of the VC on the Marshall Islands' balance of trade in 2019. It should also be noted that for fishing vessels, fuels are mostly bunkered at sea and sourced from foreign suppliers¹⁵⁰ and thus, hardly any value from selling these fuels is retained in the Marshall Islands. Meanwhile, for Pan Pacific Foods, its generators are run using diesel that is imported (to be explained more in section 3.3.1), but the indirect value added generated by MEC's operations is too insignificant¹⁵¹ to consider.

TABLE 16. MARSHALL ISLANDS PURSE SEINE TUNA VALUE CHAIN'S NET IMPACT ON THE BALANCE OF TRADE (2019)

	USD
Imports of intermediate consumables (USD)	62 523 122
Fuel and oils	39 838 192
Shipping costs	22 684 930
Tuna export value (USD)	10 823 503
Net impact of the VC on the balance of trade (USD)	-51 699 619

Source and notes:

¹ Costs of fuel and oils are estimated based on from Poseidon (2019), confidential report prepared for MIMRA, and interviews with VC actors in 2021.

² Shipping costs are assumed to be USD 250/MT for transshipments and USD 300/MT for containers (Pers. Comm. With VC stakeholders in 2021).

This negative net impact on the balance of trade is largely due to the fact that most of the catches made by Marshall Islands-flagged purse seine vessels (~90-100 percent) and by foreign-flagged vessels fishing in Marshall Islands waters are transhipped to carrier vessels for onward supply to tuna canneries (see section 2.1) and thus, are not counted as exports. This negative net impact, therefore, represents an opportunity for increasing the value added and captured by the Marshall Islands VC stakeholders through attracting more raw material products to be landed and processed in Marshall Islands for exports, rather than being transshipped to canneries overseas.

The VC's rate of integration measures how much the VC is part of the national economy and is calculated based on the total value added (see Table 14) and the

¹⁵⁰ Pers., Comm., MIMRA, August 2021.

¹⁵¹ According to FISH4ACP methodology, this means the cost item represents less than 20% of the total cost. In case of Pan Pacific Foods, the cost of fuels makes up less than 1 percent of its total cost.

value of imported consumables, i.e. inputs and services (Table 16).¹⁵² As such, the VC's rate of integration is 41.5 percent, which is considered as concerning according to the methodology.

The **contribution of the VC to public funds** is mainly in the form of fishing license and access fees. According to the Deloitte (2020) audit of MIMRA, in 2019 the MIMRA revenue deriving from purse seine tuna fishing was nearly USD 35 million, which includes VDS fees, fishing rights, observer fees, transshipment fees, fishing violations, boat charter fees, and other fees (MIMRA, 2020). Of this, the domestic fleets (Koo's, MIFCO, PPF) contributed USD 11.9 million, or over one-third of MIMRA's revenue.

It is important to evaluate the VC's contribution to government revenues in relation to the **government expenditures spent on supporting the VC**. Firstly, these include the government expenses in providing support and services to the VC (i.e. including government costs for staff, utilities...). Using the data from the Deloitte (2020) audit report of MIMRA and consultations with MIMRA (2021), it is estimated that in 2019 MIMRA's costs related to the VC was around USD 2.5 million.¹⁵³ This includes the staff cost for the Oceanic Division and other support staff (main), and the costs related to boarding and observer, transshipment inspection, and other operational/utility costs. In addition, government costs also include the concession in terms of access fees¹⁵⁴ that the Marshall Islands government provides to the domestic (Marshall Islands-based) fishing companies (as discussed in section 2.3.5). Effectively, this concession can be considered as a subsidy to the domestic fishing companies and represents lost revenue to the government. An estimated loss in vessel day revenue is presented in Table 17 below, assuming the numbers of VDS days allocated to MIFCO, Koo's and PPF in 2019 are similar to those in 2020 and assuming the opportunity cost for the Marshall Islands government is USD11 000/day.

¹⁵² Rate of integration = $100 * (\text{total VA} / (\text{total VA} + \text{imported consumables}))$ (FISH4ACP methodological guide).

¹⁵³ See detailed estimates in Table 52 in Annex 4: Detailed economic calculations.

¹⁵⁴ Access fee of USD 7 000/day for domestic-based companies, as compared to USD 11 000/day for pooled days and the cost charged to DWFN vessels of USD around 12 000/day.

TABLE 17. ESTIMATED LOSS IN VESSEL DAY REVENUE DUE TO CONCESSION GIVEN TO DOMESTIC COMPANIES (2019)

	MIFCO	Koo's	PPF	Total
No. of allocated VDS days ¹	180	575	949	1 704
VDS fee paid at concession rate ²	1 260 000	4 025 000	6 643 000	11 928 000
Opportunity cost at USD 11 000/day ²	1 980 000	6 325 000	10 439 000	18 744 000
Estimated loss in vessel day revenue²	720 000	2 300 000	3 796 000	6 816 000

Source and note: ¹ Pers. Comm., MIMRA, December 2020. ² Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

In addition to VDS concession, the Marshall Islands government provides PPF and Pan Pacific Foods with a tax holiday until 2031 whereas Koo's and MIFCO are charged the Gross Revenue Tax (as discussed in section 3.1.3). In 2019, this represents a further loss of government revenue of over USD 2 million (i.e. 3 percent of PPF and Pan Pacific Foods' revenue). The net impact of the core VC on public funds is, therefore, calculated by subtracting the government expenditure (and lost revenue) from government revenues (in the form of fees and/or taxes), as shown in Table 18 below.

TABLE 18. ESTIMATED CORE VALUE CHAIN'S NET IMPACT ON PUBLIC FUNDS (2019)

Government revenues ¹	14 420 538
Government expenditures ²	11 391 535
Net impact on public funds	3 029 004

Source and note:

¹ Government revenues mainly consist of VDS fees and Gross Revenue Tax paid by MIFCO, Koo's and PPF, and the taxes on wages and salaries for their Marshall Islands-resident employees. Total VDS fees in 2019 is taken from Deloitte (2020). Gross Revenue Tax and taxes on wages and salaries are own analysis based on interviews with MIFCO, Koo's and PPF, 2021.

² Government expenditures mainly consist of government expenses in providing support/services to the VC, and the lost government revenues due to VDS concession provided to MIFCO, Koo's and PPF, and the tax holiday provided to PPF and Pan Pacific Foods.

While this assessment shows a positive contribution of the core VC to the Marshall Islands' public funds, it is important to assess the benefits of access fee concession and tax holiday for domestic companies (e.g. thanks to employment generation in these companies) against the opportunity cost of these measures.

Based on the scoring guidance of FISH4ACP methodology, the indicators related to the effects of the VC in the national economy are assessed as below:

- *Contribution to GDP*: Sustainable (green) because the VC's contribution to the national GDP is significant and is much higher than its share in the national employment.
- *Net impact on the balance of trade*: Unsustainable (red) because the VC's net impacts on the Marshall Islands' balance of trade is negative.
- *Rate of integration*: Concerning (yellow) because the VC's rate of integration is 41 percent, which is between 25 and 50 percent which is considered as concerning.
- *Net impact on public funds*: Sustainable (green) because the VC's net impacts on public funds is positive.

3.1.5 International competitiveness

Onshore processing: While onshore processing has a great potential for employment generation in the Marshall Islands (as discussed above), there are various challenges that make the country uncompetitive in terms of tuna processing as compared to other locations. Terawasi and Reid (2017) highlight various challenges to the international competitiveness of the Marshall Islands, as well as other Pacific islands countries (FFA members), in terms of tuna processing and value-adding activities. Despite their proximity to raw materials (fish), Pacific Island countries (PICs), including the Marshall Islands, are less competitive than their Asian competitors when it comes to tuna processing due to various country-specific and regional constraints, ranging from logistical shortages and inefficiencies, the lack of infrastructure limiting market access, and the lack of economies of scale resulting in relatively high unit costs.

Terawasi and Reid (2017) illustrated this lack of international competitiveness through comparing the costs of tuna processors based in Pacific islands and those of competitors in Asia, namely Thailand, China, Viet Nam and Indonesia. Specifically, the average costs of labour, electricity, fuel and water per unit of processed tuna product in five Pacific islands countries (Solomon Islands, The Federated States of Micronesia, Fiji, Papua New Guinea, and the Marshall Islands) were assessed as being between 2.4 or over 7 times higher than those average costs in Asian countries. Furthermore, processors in the Pacific islands seem to adopt less efficient technologies, for example cleaners that can clean smaller amounts of tuna per 8-hour shift than those used by Asia-based processors, and therefore it takes a slightly longer time to process a tonne of tuna.

Insufficient labour supply coupled with low labour productivity are one of the main constraints to the competitiveness of the Marshall Islands purse seine tuna VC. Pan

Pacific Foods, whose loining facilities are designed for 2 shifts per day, has difficulties in finding sufficient labour (600 people) to operate 2 shifts per day to realize its full processing capacity and production potential.¹⁵⁵ Low labour productivity rate compared with competing countries (such as PNG, Thailand, Philippines)¹⁵⁶ and high personnel turnover rate in the loining plant¹⁵⁷ pose additional challenges. High turnover rate, in particular, contributes to lower tuna recovery rate (i.e. the rate of loins from whole tuna) in the Marshall Islands than in Asia because newly hired workers are less proficient as experienced ones.

Transshipment and containerisation: Interviews with VC actors and other key informants (e.g. regional traders, shipping companies) suggest that in terms of transshipment and containerisation operations, the Marshall Islands, specifically Majuro, is as competitive as other ports in the Pacific region when considering port locations, port infrastructure and the policy enabling environment. Specifically, Majuro's location is good (in the middle of the ocean, "as good as Kosrae and Apia"¹⁵⁸, so shipping costs from Majuro are similar to other ports, and sometimes even cheaper¹⁵⁹), and the port infrastructure, such as plug-in points, in Majuro is suggested to be sufficient for the current level of operations.¹⁶⁰ Additionally, VC stakeholders generally perceive the policy enabling environment in the Marshall Islands as supportive of their (transshipment and containerisation) operations, albeit port clearance of vessels is suggested to be rather slow and could be improved.¹⁶¹

However, when considering the potential upgrading opportunities of increased containerisation and other onshore operations, the Marshall Islands faces several challenges that limits its competitiveness as compared to other ports. The most cited challenge is related to the lack of a Competent Authority (CA) which could enable the Marshall Islands' exports to the European Union. This lack of a European Union-approved CA suggested to put the Marshall Islands at a big disadvantage when compared to Kiribati, who has been able to establish a CA.¹⁶² In addition, existing port/dock infrastructure, although sufficient for the current level of operations,

¹⁵⁵ Pers. Comm, PPF, 2021.

¹⁵⁶ Poseidon (2019), confidential report prepared for MIMRA, which is confirmed by Pers. Comm., PPF, 2021.

¹⁵⁷ Confidential report.

¹⁵⁸ Pers. Comm., Mariana Express Line (MELL), 2021.

¹⁵⁹ The cost of shipping containers from Majuro could be advantageous, for instance when compared to shipping from Pago Pago from which shipping route can be twice as long (Pers. Comm., SWIRE, 2021).

¹⁶⁰ Pers. Comm., Mariana Express Line (MELL), 2021.

¹⁶¹ Pers. Comm. with Koo's, MIFCO, PPF, and FCF, 2021.

¹⁶² Pers. Comm. with Koo's, MIFCO, PII, Tri Marine, and FCF, 2021.

would need to be improved to support an increased level of containerisation and cold storage. The lack of dock space and limited space for increased operation further exacerbates the challenges.¹⁶³

In terms of containerisation specifically, there is a lack of qualified technicians who can support efficient containerisation operations in the Marshall Islands¹⁶⁴, which makes the country less competitive than others (e.g. Philippines) when it comes to increasing and improving containerisation services. That said, interviews also indicated that some of these challenges can be overcome through training and improvements in technical know-how.¹⁶⁵

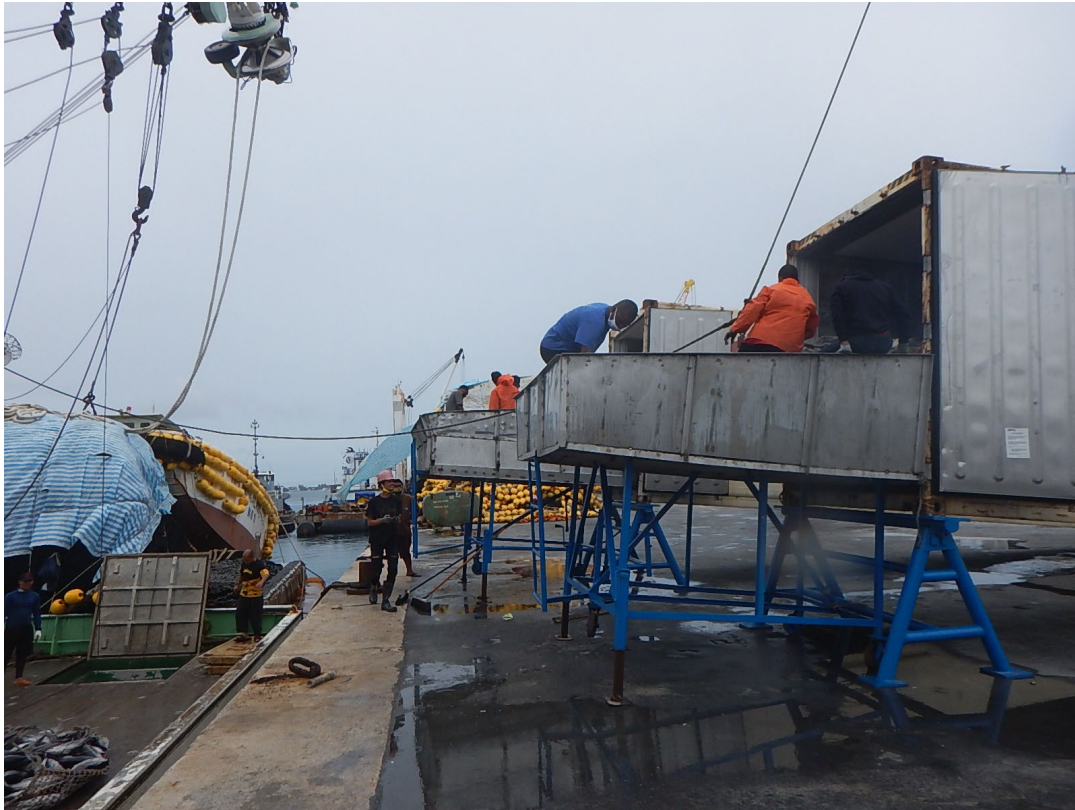
In addition, existing equipment for 'stuffing' tuna into containers is rudimentary relying on gravity feeding tuna into the containers and is not optimal in terms of reducing water entering containers or maintaining the quality of product prior to shipping.

¹⁶³ Pers. Comm. with Koo's, MIFCO, Tri Marine, MELL, and SWIRE, 2021.

¹⁶⁴ Pers. Comm, Mariana Express Line (MELL), 2021.

¹⁶⁵ Pers. Comm, Mariana Express Line (MELL), 2021

FIGURE 16: EXISTING EQUIPMENT USED FOR STUFFING CONTAINERS WITH TUNA



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Based on the analysis above, the VC's international competitiveness is rated as yellow (concerning).

3.1.6 Economic analysis overview

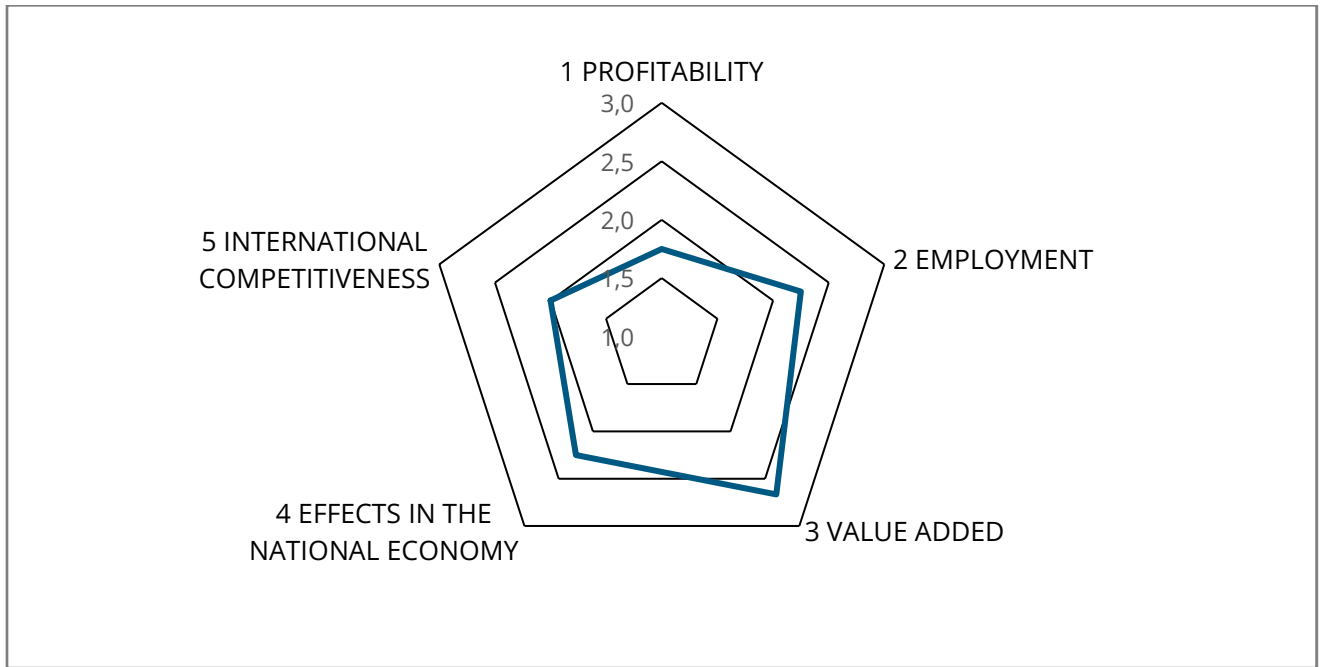
Based on the analytical assessment of economic performance as discussed above, and using the FISH4ACP economic assessment tool, an overview of economic performance for the Marshall Islands purse seine VC is provided in Table 19 and Figure 17 below. A score in the range 1 – 3 (with 1 means unsustainable (red), 2 means concerning (yellow), and 3 means sustainable (green)) is given to each sub-domain of the five economic sustainability domains (i.e. profitability, employment, value added, effects in the national economy, and international competitiveness), as seen below. The scoring was conducted by the VCA team, following the FISH4ACP methodology guide (see Annex 5: Extracts from FISH4ACP methodological guide), and then was revised to incorporate feedbacks from VC stakeholders at the validation workshop.

TABLE 19. ECONOMIC SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN (2019)

1 PROFITABILITY		
Net profits	2	Concerning
Trend in net profits	1	Unsustainable
Return on sales	2	Concerning
Return on investment	2	Concerning
Average	1.8	Concerning
2 EMPLOYMENT		
No. of jobs in FTE (in core VC)	2	Concerning
No. of salaried jobs (in core and extended VC)	3	Sustainable
Average gross wage for hired workers	2	Concerning
Total value of net wages	2	Concerning
Average	2.3	Concerning
3 VALUE ADDED		
Direct value added at core VC level	2	Concerning
Indirect value added at VC level	3	Sustainable
Total value added at VC level	3	Sustainable
Average	2.7	Sustainable
4 EFFECTS IN THE NATIONAL ECONOMY		
Contribution to GDP	3	Sustainable
Net impact on the balance of trade	1	Unsustainable
Rate of integration	2	Concerning
Net impact on public funds	3	Sustainable
Average	2.3	Concerning
5 INTERNATIONAL COMPETITIVENESS		
Average	2	Concerning

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

FIGURE 17. ECONOMIC SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN



Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO. Key issues, recommendations, risks, and mitigating measures flowing from the assessment of performance are provided in Table 20.

TABLE 20. KEY ISSUES, RECOMMENDATIONS, RISKS, AND MITIGATION MEASURES – ECONOMIC SUSTAINABILITY

Key issues	Main recommendations
<ul style="list-style-type: none"> • Low level of economic performance of core VC actors, resulting in limited direct value added by core VC actors • Low level of employment benefits captured by RMI residents, since nearly two-thirds of the total employment in the core VC, especially higher-ranked and higher-paid positions, is for non-RMI residents • Negative net impact on the balance of trade due to imports of inputs and services • Reliance on government support in the form of access fee concessions and tax holiday • Insufficient labour supply and low labour productivity undermines the VC's international competitiveness. 	<ul style="list-style-type: none"> • Provision of training and capacity building on technical skills for RMI nationals (both on vessels and in onshore operations) • Revision/improvement of national policies related to the recruitment of locals/residents by RMI-based companies (potentially as a requirement and/or through incentives for companies) • (Re)assessment of the benefits and costs of providing government support to domestic firms
Main risks	Mitigating measures
<ul style="list-style-type: none"> • Since the companies in the core VC are largely foreign owned and since higher-ranked employees in these companies are mostly non-RMI residents, improvements in the performance of these companies thanks to VC upgrading may not necessarily generate additional direct value added that benefits the RMI. 	<ul style="list-style-type: none"> • Improving/designing a mechanism to better capture increased value added in the form of government revenues from taxes and/or fees

3.2 Social analysis (social profile)

3.2.1 Inclusiveness

Wages and employment distribution: The purse seine tuna VC provides income and employment opportunities to the Marshall Islands residents through various business activities associated with the companies in the core VC and support service provision, as described in section 3.1.1. As indicated by the consultations with VC actors (companies) and their workers, there is no discrimination (or anti-discrimination policies) in terms of employment opportunities¹⁶⁶ and thus, everybody can access these opportunities, should they wish to. Nevertheless, due to the lack of highly qualified locals, the higher-paid jobs are often taken by non-Marshallese residents, leaving those jobs which are rather manual and low-paid (e.g. loining, stuffing containers, tuna offloading) for the Marshallese residents.

Value added distribution: As discussed in section 3.1.3 (Figure 15), the Marshall Islands government and fishing companies capture most of the direct value added of the VC, while Pan Pacific Foods captures zero. This is partially due to the bigger sizes (volume, value) of the fishing companies as compared to Pan Pacific Foods, and partially due to the low economic performance of Pan Pacific Foods. Despite being high in number, the Marshall Islands -resident workers engaged in fishing, loining, containerisation and cold store operations capture negligible shares of the direct value added, which is reflective of their low pay. Not reflected in Figure 15 (distribution of direct value added) but important to mention is the value added that flows offshore and captured by non- Marshall Islands resident employees. This value – in the form of wages and salaries - is significantly higher than those captured by Marshall Islands resident employees¹⁶⁷, which raises concern related to the low level of benefits from the VC that are retained in the Marshall Islands.

Two-thirds of the value-added from the VC is captured in the form of Marshall Islands government revenues obtained through fishing licenses and access fees. This implies the broader society *may* benefit from the value added from the VC thanks to increased public spending and investments, for example on social development and natural conservation activities/initiatives. According to Barclay (2010), since the late 1990s, some national tuna development plans in Pacific Islands countries have

¹⁶⁶ In the focus group discussion with Koo's fishing crew in 2021, the crew members indicated that the company does not have any policies to prevent discrimination, but they "practice it".

¹⁶⁷ On average, just roughly 20% of the fishing crew (i.e. 5-8 people in a crew of 25-30 people) are Marshallese nationals (Pers. Comm, MIFCO, Koo's and PPF, 2021). Additionally, those employees who have decision-making and supervising roles on the vessels (e.g. fishing master/boat captains, engineers) and receive higher wages are usually not Marshallese (Focus group discussion with Koo's fishing crew, and Pers. Comm. with KMI (PS vessel agent) in 2021).

specified a part of the tuna fishing licenses that goes into a fund for rural coastal development projects. In the Marshall Islands, this plan has been implemented (which was not the case in most other Pacific Islands countries in 2005). As such, it is possible that communities in the Marshall Islands can capture part of the value-added, or resource rent, from the tuna industry. Initiatives driven by other stakeholders, rather than the government, also have the potential to contribute to increased and equitable distribution of the VC's value added. For example, an important component of the TNC/PITP project, as mentioned in section 2.3.5, plans to use some of the profits generated to support outer islands conservation efforts.

Poverty and vulnerability: In the RMI, there is no official national poverty line (UNICEF, 2017), which makes it difficult to systematically assess the poverty and vulnerability of the hired workers in the VC. However, consultations with VC stakeholders completed in 2021 reveal some insights about the poverty status of the stakeholders, especially the workers. An interview suggested that up to 90 percent of the PPF workers and/or their families are experiencing poverty (as represented by the quality of their housing).¹⁶⁸ The workers engaged in fishing, loining, cold store, and container stuffing operations also often have a low level of education and thus, are not qualified for better-paid jobs such as quality control and supervising positions, which require at least a high school diploma.¹⁶⁹ However, these few indicators (housing, education level) are insufficient to allow for a good assessment of the poverty and vulnerability of the VC workers, especially given the lack of official statistics and primary data collected during consultations as well as the particularity of the Marshall Islands society, where many residents receive remittance from family relatives from overseas. An in-depth poverty and vulnerability analysis may thus be needed to better understand the poverty situation of the workers employed in the VC, as also suggested by the VC stakeholders at the FISH4ACP validation workshop.

Discrimination: Discrimination does not appear to be an issue in the Marshall Islands purse seine tuna VC. Focus group discussions with the employees/workers, both male and female, on fishing vessels and in onshore facilities (cold store and engaged in containerisation) show that the workers do not perceive discrimination as a problem at their workplaces. However, Marshallese employees shared that they are sometimes “yelled at” or “not spoken to nicely”, and that the non-Marshallese employees are “bossy” to them. Although this form of discrimination against the

¹⁶⁸ Pers. Comm., PPF, 2021.

¹⁶⁹ Ibid.

Marshallese crew can be considered as rather mild, it may have an impact on the distribution of roles and wages between Marshallese and non-Marshallese employees, with those having supervising roles and higher wages are often non-Marshallese residents.

Based on the scoring guidance of FISH4ACP methodology¹⁷⁰, the four ‘inclusiveness’ subdomains of the VC are assessed as below:

- *Wage and employment distribution*: This subdomain is rated as “moderate concerns”, averaged score is 2.67, based on the assessment of three questions:
 - How equitable are the wages between workers hired by the different types of value chain actors? – Score 2 – unequitable, due to the different wages between resident and non-resident workers in the companies.
 - To what extent is the value chain contributing to national employment with equal opportunity jobs (through core and extended value chain)? – Score 3 - moderate contribution, because fishing companies do not employ many Marshall Islands residents.
 - To what extent are vulnerable and marginalised groups capturing jobs in the sector and receiving equitable wages? – Score 3 – some vulnerable and marginalized groups included in the VC and receiving an equitable share of income.
- *Value added distribution*: This subdomain is rated as “moderate concerns”, averaged score is 3.3, based on the assessment of three questions:
 - How equitably is value added distributed between the different types of VC actors and stakeholders? – Score 3 – somewhat equitable, because there are some concerns related to the value added retained in Marshall Islands.
 - Is direct net value added equitably distributed between small and large VC actors? - Score 3 – somewhat equitable, because there are some concerns related to the value added captured by Marshall Islands residents.
 - How equitable are the net profits of the VC actors distributed between VC functions? - Score 4 – equitable, because the net profit distribution reflects the scales and economic performances of the companies.

¹⁷⁰ Each social subdomain is assessed based on a few key questions. A score ranging from 1 – 5 is provided to each question under the subdomains, with 1 (red) means “very concerning” and 5 (dark green) means “no concerns”. The score of each subdomain is the average of the scores of the questions under that subdomain. See more in Annex 5: Extracts from FISH4ACP methodological guide.

- *Poverty and vulnerability*: This subdomain is rated as “minor concerns”, averaged score is 3.67, based on the assessment of three questions below. However, the score is later adjusted to 3.4 (“moderate concerns”) because poverty is a potential issue among VC workers that should be further studied.
 - What is the prevalence of poverty across the value chain amongst VC participants (comparing incomes to national poverty line)? - Scoring 3 - moderate poverty, because there is no national poverty line, but there is an indicator of poverty (poor housing)
 - What is the prevalence of extreme poverty across the value chain amongst VC participants (comparing incomes to the international poverty line of USD1.9/day)? – Score 5 - no to very low poverty, because all workers get paid more than USD1.9/day.
 - To what extent do impoverished VC participants diversify income to reduce the risk of poverty (e.g. ownership of assets, production/catch of multiple species)? – Score 3 - moderate or 40-60 percent have 2 or more income sources, because many Marshall Islands residents receive other sources of finance, e.g. remittance.
- *Discrimination*: This subdomain is rated as “no concerns”, averaged score is 4.67, based on the assessment of three questions:
 - Application of national/ international laws preventing discrimination in the workplace across the value chain – Score 5 - laws are well-respected and enforced
 - Application of formal or informal business-level standards or practices to prevent discrimination in the workplace across the value chain – Score 5 - most or >90 percent of firms have standards in place to prevent workplace discrimination
 - How do value chain actors influence sociocultural norms related to workplace discrimination (based on age, gender, ethnic group, migration status, etc.)? – Score 4 - positive influence

3.2.2 Gender equality

Women’s economic involvement: In the Marshall Islands purse seine tuna VC, women account for around one-third of the Marshall Islands -resident fulltime and parttime workers in the core VC; and are mostly employed to work in the loining plant

as unskilled (or low-skilled) workers to process the fish.¹⁷¹ Even though there are women involved in the administration/logistics/management tasks in the core VC and the support services of the VC (e.g. vessel agents), as well as in the VC's enabling environment (e.g. governmental fisheries offices (e.g. as observers), research institutions, and environmental NGOs), there are not many of those jobs and most are occupied by men.¹⁷² Furthermore, the jobs in the private sector that involve management roles and/or scientific work (e.g. lab work, quality control) are often recruited from overseas because very few RMI residents, especially women, possess these skills (Tuara and Passfield, 2012). Most of the job opportunities available to Marshallese women, therefore, are low paid manual jobs in the processing plant. Women's share of the VC's direct value added is 1 percent, mainly for loining the fish¹⁷³ and can be a bit higher if also considering women doing administrative/management and supporting roles in fishing companies. Almost all value added from the VC and the decision-making roles in the VC, therefore, are captured by men.

Gendered division of labour: Traditional perceptions and gender stereotypes limit women's participation in the value chain, as opposed to their male counterparts. According to Tuara and Passfield (2012) who studied gender issues in fisheries in the Solomon Islands, Tonga and the Marshall Islands, women in these countries are wedded to the traditional roles of being the wife and mother of the household and thus, are responsible for the household's domestic work. Meanwhile, men are traditionally considered as the main income earner and decision-maker of the household. There are also cultural perceptions that science and technology are the domain of men while women are "not technically minded". These gender stereotypes not only restrain women's participation in fisheries but also inhibit women from

¹⁷¹ As mentioned in section 3.2.1, in the VC, there are over 50 women employed for the loining work at Pan Pacific Foods processing plant, and around 4-5 women involved in onshore operations of three fishing companies. This makes up around one-third of the total number of people employed to work in the core VC (i.e. 164).

¹⁷² As noted in section 3.1.2 on Employment, there are around 100 MIMRA staff hired as observers and/or port monitoring staff to monitor purse seine transshipments and containerisation; but almost all of them are male. When considering all the functions of MIMRA (including those not directly linked to the purse seine VC), there are 93 staff, of which 20 are female (Pers. Comm., MIMRA, 2021).

¹⁷³ Of the value captured by all Pan Pacific Foods' employees (including loining, containerisation and cold store operations) which is 6 percent as calculated in section 3.1.3 (Figure 15), women's share is mainly in the form of wages and salaries for loiners (who are mostly female), while the remaining value is captured by male workers in containerisation and cold store operations and by supervisors, most of whom are men.

furthering their career in fisheries because they are traditionally tied to numerous household tasks that men are not. In the core purse seine VC a traditional bias towards men, at least in the catching sector which dominates the core VC may be partially be justified by the physically demanding nature of work onboard fishing vessels), and thus, women's participation is mainly limited to the processing stage.

Gendered access to productive resources (including information): According to Tuara and Passfield (2012), in the Marshall Islands, women generally have fewer chances to access education and information than men. There are fewer girls than boys receiving education, and the dropout rate for girls is higher than that of boys due to teen pregnancy and family obligations. This more limited access to education for girls may have contributed to the small share of women taking on the higher-skilled and higher-paid jobs, such as management and supervising jobs, in the VC.

Women's decision-making and leadership: In the purse seine tuna value chain in the Marshall Islands, women have little participation and power in terms of decision-making and leadership. As mentioned above, the majority of women employed in the value chain are low-paid manual workers in processing, who have little voice in decision-making. In fisheries governmental offices, research institutes and NGOs, women comprise a minor share of the staff and most management positions are held by men (Tuara and Passfield, 2012). For example, in MIMRA in 2021, women made up just over 20 percent of all the staff (20 out of 93); but a positive sign is that over 60 percent (8 out of 13) of the supervisor/management positions are held by women.¹⁷⁴

Based on the scoring guidance of FISH4ACP methodology, the four 'gender equality' subdomains of the VC are assessed as below:

- *Women's economic involvement:* This subdomain is rated as "moderate concerns", averaged score is 2.67, based on the assessment of three questions:
 - To what extent are women economically involved across the value chain overall, and by VC function (considering also support services)? – Score 4 - 25-50 percent women
 - How equitable is the share of value added (wages and profits) captured by women VC participants compared to men? – Score 1 – very unequitable

¹⁷⁴ Pers. Comm., MIMRA, 2021.

- Does gender discrimination prevent women from actively engaging in VC activities? Score 3 - moderate gender discrimination
- *Gendered division of labour*: This subdomain is rated as “moderate concerns”, averaged score is 2.67, based on the assessment of three questions:
 - Are overall domestic workloads of women and men VC participants in the value chain equitably distributed (including domestic work and child/elderly care)? – Score 1 - highly unequal share of time spent on domestic work between women and men
 - Are VC activities equitably distributed between men and women VC participants by the level of effort (considering time, technology, transport, and working conditions, etc.)? – Score 2 – unequal level of effort for VC activities conducted by women and men
 - To what extent are the jobs and businesses that women are engaged in equal to men in terms of formality (business registration and employment contracts) across the value chain? – Score 5 - equal formality between women and men
- *Gendered access to productive resources (including information)*: This subdomain is rated as “moderate concerns”, averaged score is 3, based on the assessment of two questions:
 - To what extent do women VC actors have equal access to formal finance as men? – Score 3 – somewhat equal
 - To what extent do women VC actors have equal access to non-financial support services as men? – Score 3 – somewhat equal
- *Women’s decision-making and leadership*: This subdomain is rated as “moderate concerns”, averaged score is 2.5, based on the assessment of two questions:
 - To what extent do women have equal control over spending of income earned or decisions related to shared assets at the household level? – Score 3 – somewhat equal
 - Are women VC actors equally involved in leadership/ decision-making positions as men in the VC? – Score 2 – unequal share

3.2.3 Food and nutrition security

Availability of food: For the Marshall Islands population, particularly the coastal communities and those who live in the outer islands, fish is the main source of daily nutrition (Gillett and Tauati, 2018). In the context of coral reef degradation due to climate change, it is expected that localized shortages of reef fish may occur, and thus, tuna may become more important as a source of food supplies and local livelihoods (SPC, undated).

In the Marshall Islands, some of the tuna catches by industrial fleets end up being sold in the domestic market, but this generally only happens with longline fishing (by Marshall Islands Fishing Ventures – MIFV), whereas there is hardly any leakage from the purse seine tuna VC to the domestic market.¹⁷⁵ Nevertheless, there may be some impacts from the purse seine tuna VC on the availability of tuna for domestic consumption in the Marshall Islands. Due to the declining coastal fisheries resources and thanks to development initiatives which aim at supporting small-scale fishers to go offshore, coastal fishers are moving further offshore (James *et al.* 2018). Consequently, there have been recorded interactions between industrial vessels (including both longline and purse seine) and small-scale fishers at sea, and industrial and small-scale fisheries are found to catch “similar sized fish” of the same fish stock, notably skipjack tuna (James et al. 2018, SPC (undated)).¹⁷⁶ Focus group discussion with domestic troll fishermen in April/May 2021 confirmed similar findings, as the fishermen also perceived that purse seining has depleted their fishing grounds. Even though the direct impact of purse seine vessels on the catch of artisanal and subsistence fishers are not yet well-researched, the fact that the two fisheries are increasingly operating in the same sea areas and targeting the same fish stock implies there is competition in resource use and thus, resulting in more limited fish availability for artisanal and subsistence fishers to catch. Less fish availability, in turn, implies fewer livelihoods and income opportunities for artisanal fishers as well as more limited food sources for subsistence fishers and local communities.

Based on the scoring guidance of FISH4ACP methodology, the ‘food and nutrition security’ domain of the VC is assessed based on one subdomain – *Availability of food (tuna)*, as below:

- This subdomain is rated based on the assessment of the question: “How does trade of this commodity (imports/ exports) impact national food security?”, which is scored as 4 – supportive because the VC operations enable those employed in

¹⁷⁵ Focus group discussion with domestic troll fishermen and market sellers in 2021.

¹⁷⁶ A SPC report (undated) recognizes the issue of interactions between artisanal and purse seine fisheries in the RMI; and suggests that skipjack tuna is the main species shared between the two fisheries in the RMI. The report estimated that skipjack tuna made up over half of the artisanal catch by weight and over 80% of the purse seine catch in the area around Majuro; and indicated that skipjack probably also dominated the catch of artisanal fishers throughout RMI (SPC. undated. Potential interactions between industrial and artisanal tuna fisheries in the Marshall Islands. Issue-Specific National Report 5-MH. SPC-OFP. Appendix A).

the VC to purchase food, and thus indirectly enhance national food security. However, there are minor concerns due to the reduced fish availability for local fishers and communities; thus, the subdomain is rated as “minor concerns”.

3.2.4 Decent employment

Respect of labour rights: There are obvious differences between onshore facilities and fishing companies in terms of work contracts for their workers. Specifically, all the core workers in Pan Pacific Foods and PII (a service provider) have written contracts while the Marshallese crew members in the fishing companies do not (except for PPF crew).¹⁷⁷ An explanation is that the Marshallese fishing crew are considered as casual labour, who can “jump on and jump off whenever the seiners come into Majuro”¹⁷⁸, whereas onshore workers are considered as more permanent workers who can stay with the companies for years. At the same time, it is also noted that fishing companies are working on putting in place written contracts for all their fishing crew this year, as part of audit and/or certification/standards requirements.¹⁷⁹ As for the onshore facilities (Pan Pacific Foods and PII), only the core employees in these companies have written contracts, while temporary (part-time) workers (both Marshallese and from overseas, e.g. Kiribati) do not.¹⁸⁰

Compared to onshore workers, the Marshallese fishing crew appear to have longer employment duration per year (e.g. over 200 days for the fishing crew as opposed to 120-180 days for loining workers) and slightly higher wages per hour (e.g. approximately USD3.6 for the fishing crew as opposed to USD 3.3 for loining workers).¹⁸¹ This higher number of working days per year and hourly wage can thus partially offset the crew’s relatively higher job insecurity as compared to onshore workers due to the absence of written work contracts. Additionally, the provision of ‘free’ food while on board fishing vessels is considered a considerable benefit by crew as they do not to buy (and prepare) food while at home.

¹⁷⁷ Pers. Comm. with PPF, Koo’s and MIFCO in 2021, and focus group discussions with the workers in PPF, Pan Pacific Foods and PII in 2021.

¹⁷⁸ Pers. Comm. Koos and MIFCO, 2021.

¹⁷⁹ Pers. Comm., PPF, Koo’s and MIFCO, 2021.

¹⁸⁰ Focus group discussion with PPF and PII’s workers in 2021.

¹⁸¹ Focus group discussion with PPF’s workers and Koo’s fishing crew in 2021.

According to the focus group discussions with the VC workers¹⁸², all the workers (for fishing, loining, cold store and containerisation) perceive their working conditions as acceptable, “not that hard”, even though they may be working up to 12 hours/day, including night shifts. For both fishing and onshore operations, breaks are included in the working hours, and the workers operate on a rotational basis to avoid fatigue and for the cold store workers, also to keep warm. Access to bathroom/toilet facilities and provision of food and drinking water are generally considered as adequate, except for the drinking water on some old fishing vessels, which is sometimes “cloudy with rust” if the water is kept in a holding tank in the boat which is rusty. The remuneration for workers is higher than national minimum wage (USD 3/hour, according to RMI (2018), and is considered by the workers as comparable to other paid work.

In summary, consultations with the VC stakeholders (companies and their employees) indicate that the companies in the Marshall Islands purse seine tuna VC generally show good respect of labour rights. Nevertheless, there is still room for improvement of the companies’ compliance with labour rights, especially in terms of providing written contracts to workers and improving working conditions.

Child and forced labour: Child and forced labour is not a concern in the Marshall Islands purse seine tuna VC, based on consultations with the VC stakeholders (companies and their employees).¹⁸³ The workers reported that they have never seen or experienced any incidence of child and forced labour at their workplaces. While there is currently no minimum age for labour under the Child Rights Protection Act, exploitation of children, including the worse forms of child labour, is prohibited. In relation to seamen, the minimum age to work is 16 years old under the Seamen's Protection Act. The exception is where someone under 16 years old can be employed on ships/boats operated by family members.¹⁸⁴

Job safety and security: There are no serious job safety issues in the Marshall Islands purse seine tuna VC. Within the fishing function, hand injuries during the process of unfurling the nets and floats are the most common, but they can be avoided just by handling the work carefully.¹⁸⁵ All the three fishing companies provide their fishing crew with health/accident insurance, but there have been hardly any

¹⁸² Focus group discussion with PPF’s workers, PII workers and Koo’s fishing crew in 2021.

¹⁸³ Focus group discussion with PPF’s workers, PII workers and Koo’s fishing crew in 2021.

¹⁸⁴ Pers. Comm., Office of the Attorney General, 2021.

¹⁸⁵ Focus group discussion with Koo’s fishing crew in 2021.

insurance claims for serious injuries or death in the last 15 years.¹⁸⁶ For onshore processing facilities, the job safety concerns mainly relate to the difficulties when working in cold temperature without any special clothing in the cold storage, frequent sore muscles for the container stuffing workers, and the risk of accidents during container stuffing process such as falling fish or being stabbed by fish bones or spines. There are not many written sets of measures or company policies to ensure occupational safety, but the workers practice them. These include, for instance: (i) wearing rubber gloves, rubber boots and for the fishing crew, also construction hats (provided by the companies), (ii) working on a rotational basis to avoid fatigue and for the cold store, also to keep warm, and (iii) the experienced workers mentoring and/or providing training to the newer ones.¹⁸⁷ According to the workers, these practices, combined with good team formation, task repetition, built-up experience, and the predictability of the work, generates a generally safe working environment, although there is room for improvements.¹⁸⁸ In addition, it is noted that Pan Pacific Foods has safety training which they conduct for their loining plant, containerisation, and cold storage staff, and they also conduct annual first aid training and refresher courses with Marshall Islands Red Cross Society.¹⁸⁹

Job security, on the other hand, represents an area where improvement is needed. The absence of written contracts in some cases, both in the fishing function and onshore operations, poses job insecurity (and thus, income) risks to the workers. In turn, this limited job security reduces the attractiveness of employment opportunities in the VC (discussed below) and partly contributes to the difficulties related to labour recruitment and retention facing companies in the VC (as discussed in section 3.1.5).

Job attractiveness: From the focus group discussions with the VC workers, it is noted that the workers earn relatively low wages (from around USD 3.3/hour up to USD 4/hour), which are just above the national minimum wage (USD 3/hour, according to RMI (2018a)), and that this pay is not sufficient for their families' needs.¹⁹⁰ National statistics (Marshall Islands Statistical yearbook 2017) also confirm the relative low wages of workers involved in fishing and shore-based operations, which is just above half of the national average wage of employees/workers across

¹⁸⁶ Pers. Comm., PPF, Koo's and MIFCO, 2021.

¹⁸⁷ Focus group discussions with the workers of Pan Pacific Foods and PII in 2021.

¹⁸⁸ Ibid.

¹⁸⁹ Pers. Comm., PPF, 2021

¹⁹⁰ Focus group discussion with PPF's workers and Koo's fishing crew in 2021.

all industries. The low wages, combined with the nature of the jobs (which are mainly manual, involving repetitious and physically demanding tasks) and limited job security, make employment opportunities in the tuna VC unattractive to many Marshallese nationals, as showed through the challenges facing Pan Pacific Foods in terms of labour recruitment and retention.¹⁹¹ Besides, insufficient labour willing to work can partly be attributed to the fact that Marshallese citizens have access to much better-paid and more comfortable employment options, such as in the United States of America, where Marshallese citizens can live and work without visas or work permits.¹⁹² It may also be that family members working overseas (especially in the United States of America), and their remitted earnings back to Marshall Islands, reduce incentives for Marshall Islands nationals to take up low-paid work in the Marshall Islands.

Based on the scoring guidance of FISH4ACP methodology, the four 'decent employment' subdomains of the VC are assessed as below:

- *Respect of labour rights*: This subdomain is rated as “minor concerns”, averaged score is 4.3, based on the assessment of three questions:
 - To what extent do firms respect national labour laws on the right to organise and collective bargaining? – Score 5 - >90 percent of firms respect national laws on the right to organize and collective bargaining
 - To what extent do firms respect national labour laws regarding working conditions? – Score 5 - >90 percent of firms respect national laws on working conditions
 - 1 To what extent do workers benefit from enforceable and fair employment contracts? – Score 3 - 25-65 percent of workers have fair and enforceable contracts, because fishing workers do not have written contracts.
- *Child and forced labour*: This subdomain is rated as “no concerns”, averaged score is 5, based on the assessment of three questions:
 - To what extent are firms respecting national labour laws with regards to child labour (e.g. minimum age for employment)? – Score 5 - >90 percent of firms respect child labour laws
 - What is the prevalence of child labour across the value chain, particularly where children are missing school to participate in VC activity or support

¹⁹¹ Pers. Comm., PPF, 2021.

¹⁹² Pers. Comm., PPF, 2021.

- HH activities in VC households (SADD)? – Score 5 - none or 0 percent of workforce is child labour
 - Is forced labour, including debt bondage and trafficking for labour exploitation, an issue across the VC? – Score 5 - no forced labour in the value chain
- *Job safety and security*: This subdomain is rated as “minor concerns”, averaged score is 4.3, based on the assessment of three questions:
 - To what extent do firms across the value chain implement and enforce formal workplace safety standards? – Score 5 - >90 percent of firms implement and enforce safety standard
 - What is the prevalence of occupational injuries across the value chain? – Score 5 - none to very low
 - To what extent do VC actors and workers persist in the VC (turnover)? – Score 3 - moderately high turnover, because there is high turnover in the processing function
- *Job attractiveness*: This subdomain is rated as “concerning”, averaged score is 2.3, based on the assessment of three questions:
 - To what extent are remunerations fair and competitive based on national standards (e.g. living wage and social benefits)? – Score 2 - uncompetitive remunerations, because wages are indicated to be insufficient for the needs of the workers' families.
 - To what extent are the business opportunities and activities along the value chain attractive? – Score 2 - a little attractive, because employment opportunities in the VC are not attractive to the Marshall Islands residents given their alternative options.
 - To what extent are technologies, practices or innovations adopted, particularly to reduce strenuous activities across the value chain? – Score 3 - moderate rates, because the loining plant facilities are old.

3.2.5 Social and cultural capital

Collective action (horizontal linkages): The right to collective bargaining and freedom of association is understood and effectively practiced by the workers along the VC. Focus group discussions with workers in fishing companies and onshore facilities show that there are virtually no restrictions on collective bargaining, which can be in the form of written demands/requests or strikes. The workers shared accounts of their past collective action to successfully demand better working conditions, such as better (more respectful) treatment by other crew members and

installation of bathrooms.¹⁹³ However collective bargaining as such in the form of workers negotiating consistent wages or employment conditions across different companies through union representation, is not explicitly practiced in the VC. In the meantime, there is a high level of collective action between VC actors (horizontal linkages), as seen through the coordination between the purse seine tuna catching sector of PNA countries to have achieved Marine Stewardship Council (MSC) certification (see section 2.4).

Coordination of transactions (vertical linkages): As discussed in Section 2.4, there is a high level of vertical coordination along the Marshall Islands purse seine tuna VC, with the VC actors being formally registered companies who completed transactions with each other on contractual basis, either as individual companies or as part of vertically integrated groups (i.e. PPF in Shanghai group, and Koo's in Koo's group). At the regional level, there are also high levels of coordination between national governments for the management of the purse seine fishery (e.g. PNA, WCPFC, FFA) and for the promotion/marketing of the MSC-certified tuna caught within PNA waters (i.e. Pacific). These high levels of vertical coordination in the VC are supportive of, and important to, the promotion of more sustainable practices (e.g. MSC), the enhancement of VC transparency and traceability, the development of markets for PNA tuna, as well as the improvement of fishery management in the Pacific region, including the Marshall Islands.

Social cohesion: According to the FISH4ACP methodology, the social cohesion in a VC can be assessed based on the private sector (VC actors') contributions to decision-making on public policies, VC actors' engagement in networking and information sharing; and public-private sector collaboration. As assessed against these factors, the Marshall Islands purse seine tuna VC is supportive of social cohesion, as evidenced by the high level of coordination and interaction between the public and private sectors in the VC (as discussed in section 2.4 and in the point above on coordination of transactions). Specifically, the private sector actors in the VC perceive that the Marshall Islands has an "open government policy", which enables them to approach policy-makers to discuss industry-related policies (as it is "easy to approach people and get the work done").¹⁹⁴ As evidenced by consultations, companies in the VC are well-informed about efforts made towards the establishment of a Competent Authority (CA) to enable exports to the European Union, and they can actively

¹⁹³ Focus group discussions with Koo's and MIFCO's fishing crews and Pan Pacific Foods and PII's workers in 2021.

¹⁹⁴ Pers. Comm., PPF, 2021.

participate in the discussion and in driving these efforts, together with MIMRA.¹⁹⁵ Public-private collaboration exists in the form of open public-private policy dialogues as well as public-private partnerships (PPP), such as MIFCO (a joint venture between MIMRA and Koo's) and the Majuro Stevedore & Terminal Co (MSTC) (which is operating under a concession agreement with the Marshall Islands Ports Authority). Such public-private collaborations are generally perceived as beneficial for the purse seine industry; and some VC actors are also open to the idea of having more PPP arrangements in the future to support the industry's development.¹⁹⁶ However, the tuna business is by nature highly competitive, and thus, there is a high level of competition within the private sector actors at all levels of the value chain. To some extent, this serves to reduce experience sharing within the private sector.

Cultural tradition: While the development of the purse seine tuna VC builds on and is supportive of the traditionally and historically importance of tuna fishing to the Marshall Islands residents, there are some socio-cultural issues of concern associated with the VC, at least as noted by some research which is now rather dated. This earlier research suggested that RMI residents perceive the presence of fishing vessels in Majuro and transshipment as associated with social problems such as prostitution, smuggling, drug use and trafficking (Vunisea, 2006), based on residents' witnessing crew members, after being at sea for months, spending their time onshore on "hard partying", involving alcohol, drugs, and sex workers (Barclay, 2010; Vunisea, 2006). For safety reasons, rules have been introduced to forbid fishing crews from buying and selling alcohol.¹⁹⁷ While the consultations with VC stakeholders conducted under the scope of this VC analysis do not reveal serious socio-cultural issues associated with the VC, more specialized social studies may be needed to generate better understanding of the VC's potential impacts on the Marshall Islands' cultural traditions.

Based on the scoring guidance of FISH4ACP methodology, the four 'social and cultural capital' subdomains of the VC are assessed as below:

- *Collective action:* This subdomain is rated as "no concerns", averaged score is 5, based on the assessment of three questions:

¹⁹⁵ Pers. Comm., Koo's, MIFCO and PPF, 2021.

¹⁹⁶ Pers. Comm., Koo's, MIFCO, and PII, 2021.

¹⁹⁷ Focus group discussion with Koo's fishing crew in 2021.

- To what extent are value chain actors organized into cooperatives or producers' organizations, industry associations, trade unions, etc.? – Score 5 - 85 – 100 percent are organized into groups, as described in section 2.4 on horizontal linkages.
- To what extent does participation in such organizations result in improved socioeconomic gains for members (benefits)? – Score 5 - very good benefits
- Do VC actors work together to share resources, or engage in joint advocacy for the sector for mutual benefit? – Score 5 - Almost all VC actors work together
- *Coordination of transactions:* This subdomain is rated as “no concerns”, averaged score is 4.67, based on the assessment of three questions:
 - To what extent do VC actors have contracts or agreements at the functional level - for product procurement and sales (SADD) – Score 5 - 85 - 100 percent have contracts
 - To what extent do VC actors report reliable and secure access to markets? – Score 5 - Almost all VC actors report secure access to markets
 - To what extent are the relationships between value chain actors perceived as trustworthy? – Score 4 - Majority of VC actors indicate relationships are trustworthy
- *Social cohesion:* This subdomain is rated as “no concerns”, averaged score is 4.67, based on the assessment of three questions:
 - To what extent are VC actors able to contribute to decision-making processes that affect the sector? – Score 5 - Almost all VC actors contribute to decision-making
 - To what extent do VC actors engage in networking and information sharing for the benefit of the VC? – Score 5 - Almost all VC actors engage in regular networking and information
 - To what extent do value chain actors collaborate with the public sector (e.g. public-private collaboration)? – Score 4 - good public-private collaboration
- (a) Cultural tradition:** This subdomain is rated as “moderate concerns”, averaged score is 3, based on the assessment of one question:
 - a.** How do VC activities impact sociocultural norms (e.g. gender norms)? – Score 3 - neither positively nor negatively

3.2.6 Institutional strength

Policy and regulations: There is good compliance with national and regional policies and regulations, with all the VC actors being formally registered companies in the Marshall Islands which operate individually but in close coordination with each other, with support service companies, and with related national and regional organisations. As discussed in section 3.2.5, this high level of coordination (both horizontally and vertically) at a national level in the Marshall Islands but also at the Pacific regional level is crucial in having enabled PNA countries to have achieved and maintained Marine Stewardship Council (MSC) certification (which itself assess compliance with polices and regulations as part of the assessment criteria). In addition, the institutional setting in the Marshall Islands supports and provides opportunities for business growth and the development of the whole VC because it is “open” and “makes it easy to approach people” (policy-makers) (as discussed in on social cohesion). There are a few policy areas that can potentially be improved to be more supportive of businesses, for example the Majuro’s 14-day port access restrictions due to COVID-19 (see additional discussion in section 3.4), and the port clearance of vessels, which is perceived as rather lengthy and involving various government departments.¹⁹⁸

Access to finance, natural resources and information: The catching sector companies in the VC generally indicate they have sufficient cash flow for their operations and do not have real difficulties in accessing finance (potentially explained by their being part of vertically integrated and larger corporate entities). However, a constraint is land not being accepted as loan collateral, causing difficulties in accessing finance, and some service support companies (e.g. PII) reported that planned investments in the VC were hindered by cash flow constraints.¹⁹⁹

Access to natural resources, in the case of the Marshall Islands purse seine tuna VC, is mainly related to access to the tuna resource in the Marshall Islands and Pacific region’s waters (for fishing) and to land and water resources (for onshore operations). The former is mainly regulated by the VDS scheme, whereby fishing companies are allocated a certain number of days per year to fish in the PNA waters (as discussed earlier). During the VC stakeholder consultations in 2021, fishing companies reported no difficulties in complying with the VDS as well as in acquiring fishing days. The only concerns raised by the stakeholders regarding the VDS scheme related to the increased cost of fishing days, which can be tenfold higher than the pre-VDS period.²⁰⁰ However, this increase in cost of access fees (fishing days) is

¹⁹⁸ Pers.Comm., MIFCO, Koo’s and PPF, 2021.

¹⁹⁹ Pers. Comm., MIFCO, Koo’s, PPF and PII, 2021.

²⁰⁰ Pers.Comm., MIFCO, Koo’s and PPF, 2021.

justified on the grounds of tuna stock preservation and revenue generation by governments in the reform of resource rents.

In terms of access to land and water resources in the Marshall Islands, the general sentiment from consultations is that there is some space for increased onshore operations (e.g. cold store, containerisation); but there are only a few locations relevant for these operations and the space in those locations is also limited.²⁰¹ Water access presents another constraint due to the water shortage in Marshall Islands and insufficient access to safe, affordable water, especially during the dry season (the first 5 months of the year).²⁰² This limited access to land and water has implications for any potential upgrading options involving increased onshore operations (which in turn, require land and water use).

Access to information does not appear to be a problem to the VC stakeholders, largely thanks to the high level of coordination amongst the VC stakeholders (as discussed above).

Based on the scoring guidance of FISH4ACP methodology, the four 'institutional strength' subdomains of the VC are assessed as below:

- *Policy and regulation*: This subdomain is rated as “no concerns”, averaged score is 5, based on the assessment of three questions:
 - b. To what extent is a sustainable fisheries management/aquaculture development plan implemented and enforced? – Score 5 - plan in place, up-to-date and enforced
 - c. To what extent are value chain activities formally registered/licensed across the value chain? – Score 5 - 85 – 100 percent are formally registered
 - d. To what extent are public policies and sector standards supportive of business growth in the sector? – Score 5 - very supportive
 - *Access to finance*: This subdomain is rated as “no concerns”, averaged score is 4.5, based on the assessment of two questions:
 - To what extent do VC actors have access to finance? – Score 5 - >90 percent of actors have access to finance
 - To what extent are measures (e.g. insurance) used to reduce the risk of lending to firms along the VC? - Score 4 - good measures used
- (b) *Access to natural resources*: This subdomain is rated based on the assessment of two questions. The average score is 4 (or “minor concerns”) but is adjusted to 3.4

²⁰¹ Pers. Comm., MIFCO, Koo's, PPF, PII, PSI (shipping agent)

²⁰² Pers. Comm. Majuro Water & Sewage Company, 2021.

(“moderate concerns”) due to the concern about water scarcity that is not covered in the FISH4ACP guiding questions.

- a. To what extent are VC actors adhering to national land/fishing tenure policies, and international best practices on tenure? – Score 4 – 70-90 percent of VC actors adhere to national tenure policies
 - b. To what extent do value chain actors report security of land/fishing tenure? - Score 4 - 70-90 percent of VC actors have secure land/fishing tenure
- (c) *Access to information*: This subdomain is rated as “no concerns”, averaged score is 5, based on the assessment of two questions:
- a. What is the national capacity for providing accurate and timely data on fisheries/aquaculture? - Score 5 - very good capacity for data collection
 - b. To what extent do VC actors have access to market information? – Score 5 - >90 percent of actors have access to market information

3.2.7 Social analysis overview

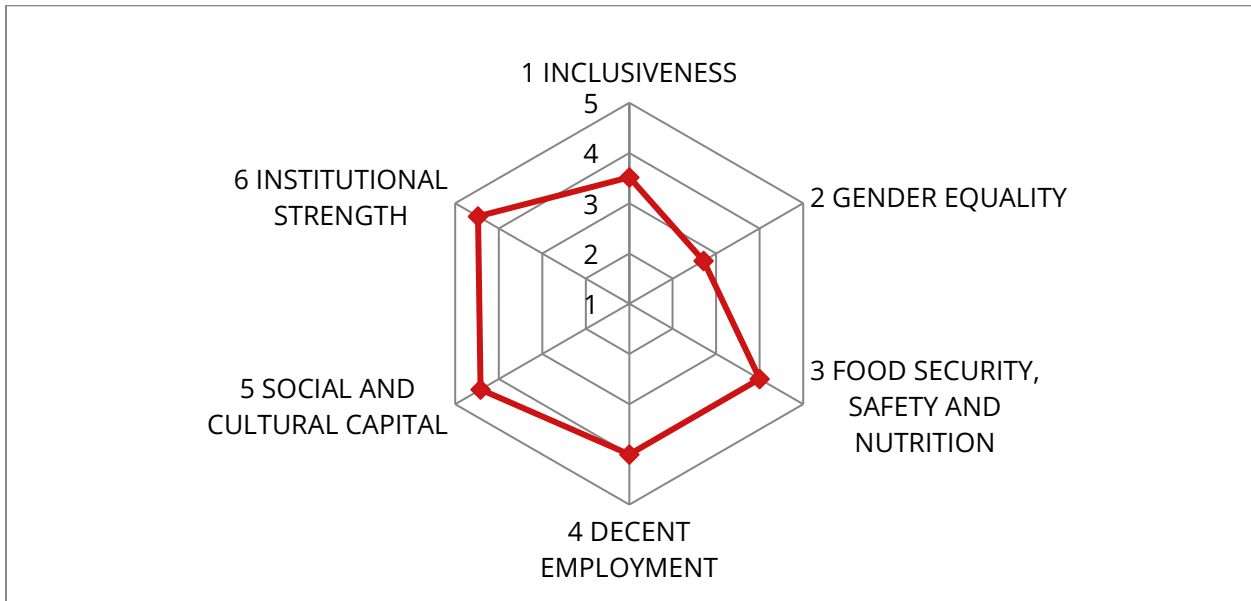
Based on the analytical assessment of social performance as discussed above, and using the FISH4ACP social profiling tool, an overview of social performance for the Marshall Islands purse seine VC is provided in Table 21 and Figure 18 below. A score in the range 1 – 5 (with 1 means “highly concerning” (red) and 5 means “not concerning” (green)) is given to each sub-domain of the six social sustainability domains (i.e. inclusiveness; gender equality; food security, safety and nutrition; decent employment; social and cultural capital; and institutional strength). The scoring was conducted by the VCA team, following the FISH4ACP methodology guide (see Annex 5: Extracts from FISH4ACP methodological guide), and then was revised to incorporate feedbacks from VC stakeholders at the validation workshop.

TABLE 21. SOCIAL SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN

1 INCLUSIVENESS		
1.1 Wages and employment distribution	2.67	Moderate concerns
1.2 Value added distribution	3.33	Moderate concerns
1.3 Poverty and vulnerability	3.40	Minor concerns
1.4 Discrimination	4.67	No concerns
Average	3.52	Minor concerns
2 GENDER EQUALITY		
2.1 Women's economic involvement	2.67	Moderate concerns
2.2 Gendered division of labour	2.67	Moderate concerns
2.3 Gendered access to productive resources	3.00	Moderate concerns
2.4 Women's decision-making and leadership	2.50	Moderate concerns
Average	2.71	Moderate concerns
3 FOOD SECURITY, SAFETY AND NUTRITION		
3.1 Availability of Food (tuna)	4.00	Minor concerns
Average	4.00	Minor concerns
4 DECENT EMPLOYMENT		
4.1 Respect of labour rights	4.33	Minor concerns
4.2 Child and forced labour	5.00	No concerns
4.3 Job safety and security	4.33	Minor concerns
4.4 Job attractiveness	2.33	Concerning
Average	4.00	Minor concerns
5 SOCIAL AND CULTURAL CAPITAL		
5.1 Collective Action (horizontal linkages)	5.00	No concerns
5.2 Coordination of transactions (vertical linkages)	4.67	No concerns
5.3 Social Cohesion	4.50	No concerns
5.4 Cultural Traditions	3.50	Minor concerns
Average	4.42	Minor concerns
6 INSTITUTIONAL STRENGTH		
6.1 Policy, regulations and standards	5.00	No concerns
6.2 Access to finance	4.50	No concerns
6.3 Access to natural resources	3.40	Minor concerns
6.4 Access to information	5.00	No concerns
Average	4.48	Minor concerns

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

FIGURE 18. SOCIAL SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN



Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Key issues, recommendations, risks, and mitigating measures flowing from the assessment of performance are provided in Table 22.

TABLE 22. KEY ISSUES, RECOMMENDATIONS, RISKS, AND MITIGATING MEASURES – SOCIAL SUSTAINABILITY

Key issues	Main recommendations
<ul style="list-style-type: none"> • Unbalanced distribution of wages and employment between RMI and non-RMI nationals and between workers and senior employees • Potential concerns about poverty among workers • Limited share of value added captured by women and few women holding decision-making roles • Absence of work contracts in some cases • Worker wages are not always sufficient for the needs of the workers’ families • Low level of job attractiveness due to low wages and temporary employment, which contributes to insufficient labour willing to work in the VC • Potential negative impacts on the availability of tuna for local artisanal fishermen and residents • Limited availability of and access to land and water 	<ul style="list-style-type: none"> • Conduct of an in-depth employment/social study to understand the root causes of labour-related problems in the VC • Provision of training and capacity building on technical skills for RMI nationals • Revision/improvement of national policies related to the recruitment of locals and of women by RMI-based companies (both in terms of requirements and incentives for companies) • Revision/improvement of national policies related to worker wages, taking into consideration the cost of an acceptable living standards (living wage)²⁰³
Main risks	Mitigating measures
<ul style="list-style-type: none"> • Since companies in core VC are largely foreign owned and higher-ranked employees are mostly non-RMI nationals, improvements in these companies thanks to VC upgrading may not necessarily generate additional direct value added that benefits RMI nationals. 	<ul style="list-style-type: none"> • Improving/designing a mechanism to better capture increased value added in the form of government revenues from taxes and/or fees

3.3 Environmental analysis (ecological footprint)

3.3.1 Climate impact

Electricity use: Electricity in Majuro is generated almost entirely by diesel generators and accounts for about 54 percent of national GHG emissions.²⁰⁴ Onshore VC actors maintain their own backup diesel generators and fuel storage to minimize

²⁰³ There are different methods used to measure the cost of an acceptable living standard; but most are based on estimates of food costs and non-food costs, taking into consideration household size (Anker, 2011, pp.37-49).

²⁰⁴ Mersmann, 2018

disruptions due to inconsistent grid supply.²⁰⁵ The Pan Pacific Foods processing facility is not connected to the grid at all and instead purchases diesel to power generators, which produce all their electricity needs including operating the cold storage, loining plant and reverse osmosis (RO) system. Within the core VC, the PPF facility accounts for the largest onshore consumption of fuel.

Inconsistent and inadequate grid power supply is largely due to harsh operating conditions (e.g. a saltwater environment), ageing infrastructure, lack of finance to upgrade production and distribution networks, and lack of technical expertise for alternative renewable power generation such as solar.²⁰⁶

Renewable energy, although currently not used by any companies in the VC, is a high priority for the Marshall Islands government and the National Climate Change Policy Framework has a goal relating to energy security and a low-carbon future to increase the share of renewable energy from about 3.5 percent in 2012 to 20 percent in 2020.²⁰⁷ There is at least one project being implemented to increase the solar electricity generation capacity of Majuro to 1 MW.²⁰⁸ Most of the projects in the energy sector have been delayed or postponed due to the COVID-19 pandemic.

Fuel consumption: All VC actors are dependent on petroleum fuels to meet their energy demands. Onshore actors either produce their own electricity using diesel generators, or purchase electricity from the grid which is also predominantly powered by diesel

In addition to managing the electricity grid, MEC is also the primary distributor of fuel in the Marshall Islands. MEC makes direct sales of diesel to core VC actors as well as non-Marshall Islands flagged fishing vessels that transship in Majuro. Although sales are recorded, it is not possible to calculate fuel consumption based on MEC sales alone because purse seine vessels also bunker at sea. Nevertheless, secondary data and consultations suggest that the purse seine fishing VC actors are heavily dependent on petroleum fuel for energy supply.

GHG emission: The high fossil fuel use of purse seine vessels, and to a lesser extent the onshore processing facility, is the most significant source of climate impact from the VC. It is however less concerning when considered in the context of Marshall Islands' total and per capita contributions to global carbon emissions, or when compared to the carbon footprints of most other fisheries and land-based production of animal protein.²⁰⁹

²⁰⁵ Pers comm, MEC, May 2021

²⁰⁶ Pers comm, MEC, May 2021

²⁰⁷ Mersmann, 2018

²⁰⁸ Pers. Comm., MEC, 2021.

²⁰⁹ 1.1kg CO₂ / kg tuna according to Parker et al 2014

Mersmann (2018) notes that although RMI's emissions have more than doubled since 1990, they are still relatively low overall and RMI have also committed to ambitious GHG per capita emissions reductions of 45 percent (from 2010 levels) by 2030 and net zero emissions by 2050. The Marshall Islands intends to reduce emissions from electricity generation by 66 percent by 2030; transport by 27 percent by 2030, waste by 20 percent by 2030, and cooking and lighting by 15 percent by 2030.

While the carbon footprint of core VC actors is difficult to quantify due largely to a lack of data and variability in of vessel behaviour and fishing strategy within the fleet, the GHG emissions are not considered to be significant for the following reasons:

- 11 Marshall Islands flagged purse seine vessels account for a small share of the WCPO fleet (less than 4 percent of catches);
- less than one-fifth of the catch that is typically transhipped in Majuro lagoon comes from Marshall Islands flagged vessels; and
- purse seine caught tuna is less carbon intensive than most other wild capture fisheries including longline fisheries and significantly better than land-based animal protein production.²¹⁰

Based on the scoring guidance of FISH4ACP methodology²¹¹, the climate impacts of the VC are assessed as below:

- *Electricity Use*: Sustainable (Green) as electricity use is lower than 0.2kWh/kg of end product.
- *Fuel consumption*: Sustainable (Green) because fuel consumption is lower than 20MJ/kg of end product.
- *Carbon footprint*: Sustainable (Green) because carbon footprint is lower than 2kg CO₂e/kg of end product.
- *Renewable clean energy use*: Unsustainable (Red) because less than 20 percent of total electricity is generated from renewable clean energy sources.

3.3.2 Water footprint

²¹⁰ Parker *et al.* (2014)

²¹¹ A score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each environmental indicator, with 1 (red) meaning unsustainable, 2 (yellow) meaning concerning, and 3 (green) meaning sustainable. See more in Annex 5: Extracts from FISH4ACP methodological guide.

Water consumption: While there are some concerns around water supply and distribution in Majuro²¹², particularly during periods of drought, the Majuro Water & Sewage Company (MWSC) estimates that the VC actors (both core actors – fishing vessels and Pan Pacific Foods and onshore support service providers such as PII) only consume about 3 percent of the total MWSC water supply.²¹³ None of the core VC actors are entirely dependent on MWSC for water – all actors meet the majority of their water needs by harvesting rainwater or producing fresh water through RO systems or a combination of both.

Water pollution and wastewater treatment:

Laws regulating water pollution and wastewater treatment are in place but not currently fully enforced. According to EPA, Majuro lagoon is regularly polluted by illegal discharges of sewage and oil from vessels but there is a lack of capacity to effectively monitor pollution discharges from vessels in Majuro lagoon or enforce laws.²¹⁴ All of the sewage running through the MWSC sewage line, including the PPF plant, is discharged untreated through an outfall pipe on the ocean-side.

Using the FISH4ACP methodology environmental tool, the water footprint of the VC was assessed as below:

- *Water and ice consumption:* Concerning (Yellow) because although water consumption is below 5m³/kg of end product, there are some concerns about the water supply (0.5).
- *Water pollution and waste water treatment:* Sustainable (Green) because there are standards in place and although there are enforcement concerns, there does not appear to be a water pollution issue in Majuro as a result of core VC activities.

3.3.3 Fish stock sustainability

Stock status: The Marshall Islands -flagged purse seine vessels target the tuna stock in the WCPO region. However, as the catches by Marshall Islands-flagged vessels in the WCPO are relatively small (e.g. representing less than 4 percent of catches in the WCPO over the period 2015 – 2018), it can be inferred that the operations of Marshall Islands -flagged purse seine vessels have limited impacts on the regional (WCPO)

²¹² Around 25% of households in Majuro currently receive water supplied by MWSC (Pers. Comm., MWCS, 2021).

²¹³ Pers. Comm., MWCS, 2021.

²¹⁴ Pers. Comm., EPA, 2021.

tuna stocks. This sub-section, therefore, looks at the tuna stock status of the whole WCPO region and does not focus specifically on the part of the regional stocks targeted by Marshall Islands -flagged vessels.

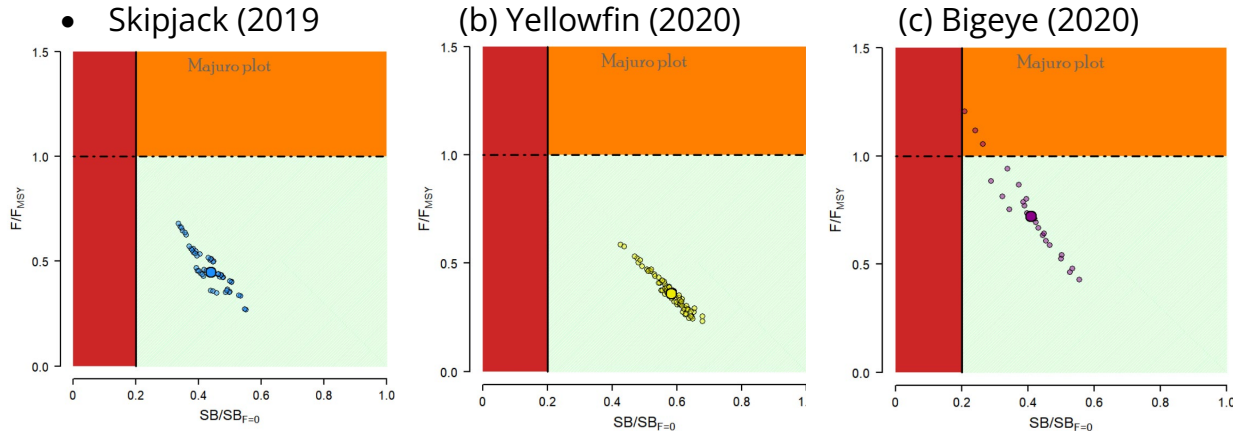
The status of the stocks of tuna caught by purse seine vessels – skipjack, yellowfin and bigeye²¹⁵– in the WCPO waters are regularly assessed. The last stock assessments of skipjack, bigeye and yellowfin tunas in the WCPO waters were conducted in 2019, 2020 and 2020 respectively (Hare et al, 2021). A summary of the stock status of three species (skipjack, yellowfin, bigeye) caught by purse seine vessels in the WCPO waters is provided in Table 23 and Figure 19.

TABLE 23. SUMMARY STOCK STATUS OF TUNA SPECIES CAUGHT BY PURSE SEINE VESSELS IN THE WCPO

WCPO stock	Latest Assessment	Overfished	Overfishing
Bigeye tuna (<i>Thunnus obesus</i>)	2020 (SC16)	No (100%) ²¹⁶	No (87.5%) ²¹⁷
Yellowfin tuna (<i>Thunnus albacares</i>)	2020 (SC16)	No (100%)	No (100%)
Skipjack tuna (<i>Katsuwonus pelamis</i>)	2019 (SC15)	No (100%)	No (100%)

Source: Hare et al, 2021 and [Overview of Stocks of Interest to the WCPFC | WCPFC](#). Notes: The determination of overfished and overfishing is a likelihood not a firm statement – where a percentage is provided that indicates probability

FIGURE 19. STOCK STATUS OF SKIPJACK, YELLOWFIN AND BIGEYE TUNA IN THE WCPO, DISPLAYED USING MAJURO PLOT



Source: Hare *et al.* (2021). Notes: The plots represent estimates of stock status in terms of spawning biomass (SB) depletion (horizontal axis) and fishing mortality (vertical axis). The red zone corresponds to SB levels lower than the agreed limit reference point. The orange region corresponds to fishing mortality greater than F_{MSY} .

²¹⁵ Bigeye, yellowfin and skipjack are three of the four main tuna stocks in the WCPO waters, with the fourth being albacore, which is not included in this VC

²¹⁶ 100% probability of being $SB/SB_{F=0} > LRP$

²¹⁷ 87.5% probability of being $F < F_{MSY}$

From the above table and figure, it can be concluded that it is unlikely for any of the stocks to be overfished (or for their spawning biomasses to fall below the Limit Reference Point); or for the stocks to be experiencing overfishing (or the fishing mortality to be above the F_{MSY} - the fishing mortality level associated with Maximum Sustainable Yield).

Nevertheless, the spawning biomasses of all three tuna stocks have shown a long continuous decline from the 1950s to the 2000s, thereby implying a declining trend in the stocks' reproductive capacity (Brouwer *et al.* 2019; WCPFC 2019a, c, d). This is the case even for skipjack, which is "fast-growing" and "has a rapid population turnover" as compared to yellowfin and bigeye (Poseidon *et al.*, 2013). For all the three stocks, the fish mortality on both adult and juvenile fish has increased in recent years (WCPFC 2019a, c, d), and the spawning biomasses of skipjack "reached the historical lowest level" in 2019, despite its relatively healthy status and resilience to fishing effort (WCPFC 2019a).

To address increasing fishing mortality and declining spawning biomass, the WCPFC-SC 15th recommended that the WCPFC should consider adopting measures to address these problems, especially fisheries that take juveniles and fisheries that operate in the equatorial and western Pacific region, where catches are especially high and the tuna stocks are most exploited, mainly due to purse seine fishery (Brouwer *et al.* 2019, WCPFC 2019a, c, d). As the Marshall Islands belongs to this region inside the WCPO, similar situations of and implications for the tuna stocks in the Marshall Islands waters can be implied.

Fishing pressure: Because the WCPO tuna stocks are healthy and "performing at a high level" compared to stocks in other regions (some of which are overfished), there is increasing demand by foreign fleets to fish in the WCPO.

Despite this pressure, there were fewer vessels in PNA fishery in 2019 compared to 2010 and a relatively stable catch per unit of effort (CPUE) across species, although it is acknowledged that it is difficult to draw any conclusions based on CPUE because of the many variables including hyperstability, vessel length, technology improvements, FAD fishing, and seasonal variations etc.

Based on the scoring guidance of FISH4ACP methodology, the fish stock sustainability of the VC are assessed as below:

- *Stock status and stock dynamics:* Sustainable (Green) because the target fish stocks are underfished.
- *Fishing pressure:* Sustainable (Green) because underfishing is happening

3.3.4 Biodiversity and ecosystems

Impacts on associated species/stocks: In the WCPO waters, tuna generally represent around 98 percent to nearly 100 percent of the fish caught by purse seine vessels.²¹⁸ Bycatch compared to total catch in the tuna purse seine fishery is negligible. There have been limited or rare interactions between the purse seine fishery and associated species, including protected ones, such as whale sharks, manta rays, sea turtles and seabirds (Brouwer *et al.* 2019). A similar situation is experienced in the Marshall Islands. Catches of North Pacific Striped Marlin, which is currently overfished²¹⁹ are negligible.

According to MIMRA (2020), most interactions with species of special interest resulted in zero or very few deaths for the species of special interest, except for interactions with bottle-nose dolphins and rough-toothed dolphins which saw a total of 7 and 33 deaths respectively (MIMRA, 2020). All purse seine vessels in the region have 100 percent observer coverage.

TABLE 24: OBSERVED INTERACTIONS WITH SPECIES OF SPECIAL INTEREST (SEABIRDS, TURTLES, AND MARINE MAMMALS) ON MARSHALL ISLANDS PURSE SEINE VESSELS, IN 2019

	Species	Number of incidents	No. alive	No. dead	Unknown
Marine mammals	Bottle-nose dolphin	7	0	7	0
	Bryde's whale	5	5	0	0
	False killer whale	12	25	7	1
	Rough-toothed dolphin	3	5	33	0
	Sei whale	1	1	0	0
	Short-finned pilot whale	1	8	0	0
	Spinner dolphin	2	12	0	0
Marine reptiles	Loggerhead turtle	2	2	0	0
Whale sharks	Whale shark	27	20	6	1

Source: MIMRA (2020)

When it comes to sharks, the main species constituting bycatch by the Marshall Islands' purse seine fleet,²²⁰ the number of incidents and mortality rates are higher. Three species of particular concern due to their endangered, threatened or protected (ETP) status are the oceanic whitetip shark, silky shark and whale shark.

²¹⁸ Brouwer *et al.* (2019)

²¹⁹ ISC (2019)

²²⁰ MIMRA (2009) data cited by Haas *et al.* (2014) and Vianna *et al.* (2020) show that silky shark and other sharks/rays made up the largest shares (21.9% and 36.9% respectively) of the bycatch by industrial fishery in the RMI.

According to MIMRA (2020), the number of oceanic whitetip and silky sharks caught by RMI-flagged purse seine vessels in 2019 was 61 and 3 145 respectively. Although all were released, less than half were alive (MIMRA, 2020).

The overall impacts of the Marshall Islands fleet on silky and oceanic whitetip stocks are small when considered in the context of all fleets in the WCPO, and/or compared to longliners which have much higher catch rates of sharks. While whale shark interactions are also relatively low (27 in 2019), they are afforded additional protection including prohibition to set on a school of tuna associated with a whale shark. In the event a set is unintentionally made on a whale shark, the Fishing Master is required to ensure that all reasonable steps are taken to ensure its safe release.

The level of shark-finning, in the PNA tuna fishery (to which the Marshall Islands belongs), in recent years has been “very low” and progress has been made towards improving the performance of the fishery.²²¹ The performance of the PNA fishery, therefore, is “appropriate” according to the MSC’s shark-finning requirements under Principle 2.

Based on the scoring guidance of FISH4ACP methodology, the Biodiversity and Ecosystems of the VC are assessed as below:

- *Impact on associated species:* Unsustainable (Red) because although bycatch is less than 1 percent and all fishers have measures in place to reduce bycatch, one of the bycatch species (North Pacific Striped Marlin) is in an overfished state.
- *Status of vulnerable ecosystems:* Sustainable (Green) because less than 10 percent of surface/area of vulnerable ecosystems is harmed as a result of VC activities and there is nothing to suggest irreversible harm of any vulnerable ecosystems as a result of VC activities.
- *Status of ETP species:* Concerning (Yellow) because although all vessels have measures in place to reduce detrimental effects on ETP species, catches of ETP species (particularly silky sharks) are not insignificant.

3.3.5 Animal health and welfare

²²¹ Blyth-Skyrme *et al.* (2019)

Appropriate animal husbandry and handling: None of the firms in the VC (or WCPO purse seine fishery more broadly) apply the appropriate slaughter techniques as defined by OIE. The WOAHA approved slaughter techniques are not feasible for purse seine operations which catch large quantities of fish at one time and aim to move catch out of the net and into brine wells onboard as quickly as possible. Based on the scoring guidance of FISH4ACP methodology, Animal Health and Welfare in the VC are assessed as below:

- *Application of biosecurity measures:* Sustainable (Green) because all firms have biosecurity measures in place.
- *Appropriate animal husbandry and handling:* According to FISH4ACP methodology, this indicator should be rated as Unsustainable (Red) because none of the firms use appropriate slaughter techniques according to OIE. However, we have adjusted it to Concerning (Yellow) because the prescribed techniques are neither practical nor feasible for the fishery.

3.3.6 Toxicity/pollution

Solid waste pollution: The waste discharged by industrial fishing vessels is a challenging issue in PNA waters (including the RMI) (Richardson et al., 2017; Blyth-Skyrme et al., 2019). According to Richardson et al. (2017), the majority of the marine pollution incidents in the WCPO reported by fisheries observers between 2003 and 2015 were pollution incidents caused by purse seine vessels (i.e. over 10 000 incidents reported on purse seine vessels as opposed to around 200 on longline vessels). Although this data is concerning, the overall contribution of purse seiners to marine pollution relative to longliners is perhaps overstated and more indicative of the low level of observer coverage and therefore lack of data available for longline vessels (which have less than 5 percent observer coverage compared to 100 percent coverage on purse seiners)²²². Of all the reported marine pollution incidents, 6 percent occurred in the RMI's EEZ (Richardson et al., 2017).

In 2019, the WCPFC implemented CMM 2017-04 which explicitly prohibits vessels from discharging any plastics, but the CMM falls short in other regards as it only "encourage[s]" WCPFC members to prohibit fishing vessels from discharging into the sea other wastes such as oil or fuel or oily residues, garbage, fishing gears, food

²²² This is because a significant amount of longline activities take place on the high seas, where observer coverage is low compared to the EEZ. Besides, data coverage may also largely vary across different observer programmes, implying potential biases when reporting pollution incidents (Richardson et al., 2017).

waste, domestic waste, incinerator ashes, cooking oil, and sewage (Blyth-Skyrme et al., 2019).

Purse seiners (including Marshall Islands-flagged vessels) have onboard incinerators (oil drum) in which most solid wastes are incinerated at sea.²²³ The remainder (comprised mainly of paper, cans, plastic) are brought ashore at the end of a fishing trip. Waste oil is returned ashore, some of which is resold locally. MEC also offers a waste oil disposal service for a fee, but this service has not been taken up by many fishing vessels in recent times.²²⁴

In addition to the enforcement issues mentioned in section 3.3.2, the lack of waste disposal facilities in the WCPO ports (Richardson et al., 2017), and in Majuro in particular, presents challenges for reducing the discharge of waste at sea. The limited space in the Majuro landfill is perhaps the biggest constraint to the controlled disposal of waste onshore by fishing vessels and may be partly responsible for waste collection issues in Majuro port including the limited waste receptacles provided by Port Authority and limited waste collection services identified by Bulman (2018). It is understood that foreign flagged purse seiners are encouraged to take their waste to other ports.^{225 226}

Lost or abandoned FADs can also have a range of detrimental effects including harming marine life (entanglement), damaging marine and coastal ecosystems during beaching events, or acting as habitat for the spread of invasive species (Richardson et al., 2017). The Marshall Islands, as a member of the PNA, is actively working to mitigate the impacts of FADs by requiring the registration and tracking of all FADs deployed in PNA waters, as well as pushing for development of non-entangling and biodegradable FAD designs to the extent possible.

Air pollution: National standards on air pollution²²⁷ are only partially in place and there does not appear to be any regular monitoring of air pollution. However, controls on the quality of fuel imported, including its maximum sulfur content²²⁸, help mitigate to some extent the negative impacts of emissions from the Marshall Islands

²²³ Pers. Comm., Koo's and PPF, 2021.

²²⁴ Pers. Comm., MEC, 2021.

²²⁵ Pers. Comm., EPA, 2021.

²²⁶ An assessment of fishing vessels plastic waste generation in the WCPO region and potential measures to improve waste management in the fleet can be found here: <https://www.ffa.int/system/files/Plastics%20from%20Fishing%20Vessels%20Study%20Final.pdf>

²²⁷ RMI have ratified MARPOL Convention Annex XI relating to prevention of air pollution from ships however this has yet to be implemented in national legislation.

²²⁸ Pers. Comm., EPA, 2021.

fleet, as well as the more localised air pollution from the fishing vessels transshipping catch in Majuro lagoon.

Fish waste disposal: According to Barclay (2010), in Pacific Islands countries, solid fish waste (such as bones, skin) from canneries are often dried and crushed into fishmeal, which can be sold to generate income. This is also the case for the Marshall Islands, with the PPF processing by-products from tuna loining into fishmeal for export to Fiji, as mentioned in Section 2. The remaining liquid waste (made up of water, blood and fish oils) is discharged untreated by PPF.

Based on the scoring guidance of the FISH4ACP methodology, the Toxicity and Pollution from the VC are assessed as below:

- *Responsible use of chemicals:* Concerning (Yellow) because although chemical application regulations are in place, the level of enforcement is unclear.
- *Air pollution:* Sustainable (Green) because there are no air pollution issues.
- *Inorganic solid waste pollution:* Although all firms have controlled disposal of plastic and inorganic solid waste, this subdomain was assessed as Concerning (Yellow) because there is some pollution at sea including from lost or abandoned FADs, and the limited space in the Majuro landfill presents a number of challenges for the ongoing onshore disposal of waste by fishing vessels.
- *Organic solid waste pollution:* Sustainable (Green) because all firms have controlled disposal of organic solid waste and at least 20 percent of firms reuse some of their organic solid waste (e.g. bycatch retained for crew consumption onboard, fish waste into fishmeal etc.).

3.3.7 Food loss

From the consultations with VC stakeholders conducted in 2021, no concerns were raised regarding any losses of tuna in the VC. In 2019 discards of target catch were less than 1 percent of retained catch. Fishing vessels are required to retain all catch of skipjack, yellowfin and bigeye on board unless fish is not fit for human consumption or if it is the final set of a trip and there is insufficient space onboard to store all catch from the set.²²⁹ Liquid waste from the loining plant that is currently discharged as waste could potentially be value added however this is currently not economically feasible.

Based on the scoring guidance of FISH4ACP methodology, Food Loss from the VC is assessed as below:

²²⁹ PNA 3IA; WCPFC CMM 2009-02

- *Food loss: Sustainable (Green)* because less than 10 percent of total production is lost.

3.3.8 Environmental analysis overview

Based on the analytical assessment of environmental performance as discussed above, and using the FISH4ACP environmental assessment tool (which uses a score range of (1-3), with 1 being “Unsustainable” and 3 being “Sustainable”), a summary of performance for the Marshall Islands purse seine VC is provided in Table 25 and Figure 20 below.

TABLE 25: ENVIRONMENTAL SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN

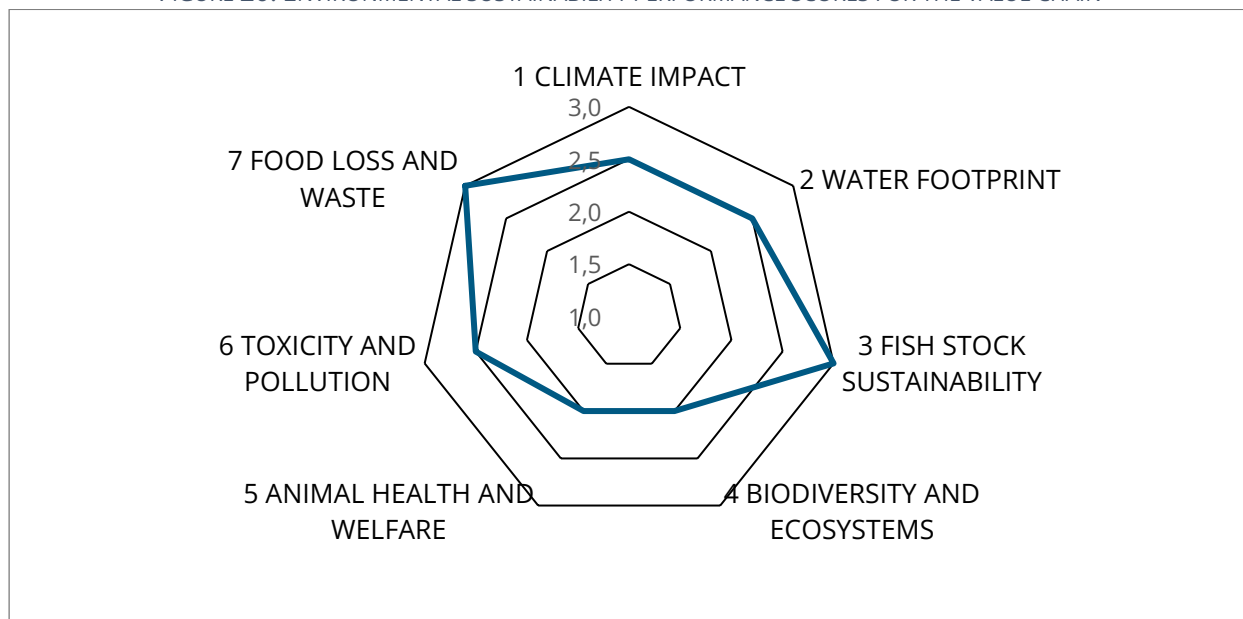
1 CLIMATE IMPACT		
1.1 Electricity use	3.00	Sustainable
1.2 Fuel consumption	3.00	Sustainable
1.3 Carbon footprint	3.00	Sustainable
1.4 Renewable clean energy use	1.00	Unsustainable
Average	2.5	Sustainable
2 WATER FOOTPRINT		
2.1 Water and ice consumption	2.00	Concerning
2.2 Water pollution and wastewater treatment	3.00	Sustainable
Average	2.5	Sustainable
3 FISH STOCK SUSTAINABILITY		
3.1 Stock status and stock dynamics (for three species caught by purse seine vessels in the VC)	3.00	Sustainable
3.2 Fishing pressure	3.00	Sustainable
Average	3.00	Sustainable
4 BIODIVERSITY AND ECOSYSTEMS		
4.1 Impact on associated species	1.00	Unsustainable
4.2 Status of vulnerable ecosystems	3.00	Sustainable
4.3 Status of ETP species	2.00	Concerning
Average	2.00	Concerning
5 ANIMAL HEALTH AND WELFARE		
5.1 Application of biosecurity measures	3.00	Sustainable
5.2 Appropriate animal husbandry and handling	2.00	Concerning²³⁰
Average	2.50	Sustainable

²³⁰ This indicator is Red (1) based on the FAO methodological tool, however we have assessed it as Yellow (2) because none of the WOAHA approved slaughter techniques are feasible for tuna purse seiners.

6 TOXICITY AND POLLUTION		
6.2 Responsible use of drugs and chemicals	2.00	Concerning
6.3 Air pollution	3.00	Sustainable
6.4 Inorganic solid waste pollution	2.00	Concerning
6.5 Organic solid waste pollution	3.00	Sustainable
Average	2.50	Sustainable
6 FOOD LOSS AND WASTE		
7.1 Food loss	3.00	Sustainable
Average	3.00	Sustainable

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

FIGURE 20: ENVIRONMENTAL SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN



Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Key issues, recommendations, and risks of the potential VC upgrading strategy, flowing from the assessment of performance are provided in Table 26.

TABLE 26: KEY ENVIRONMENTAL ISSUES, RECOMMENDATIONS, RISKS, AND MITIGATING MEASURES – ENVIRONMENTAL SUSTAINABILITY

Key issues	Main recommendations
<ul style="list-style-type: none"> • Lack of renewable energy use and heavy dependence on diesel. • Water scarcity in Majuro, particularly during periods of drought. Although all VC actors harvest and produce at least part of their water demand themselves, they are still to some extent dependent on limited water resources. • Lack of landfill space • Impact of VC actors on biodiversity and ecosystems is low relative to other fisheries and to the total impact from the fishery. All RMI flagged vessels have measures in place to mitigate impacts on ETP and associated species. However, catches of some ETP species such as silky shark are not insignificant. • Lack of monitoring and enforcement of laws and regulations related to water pollution, air pollution and responsible use of chemicals. 	<ul style="list-style-type: none"> • Backup or independent power generation • Solar power or other renewable energy to supplement primary power supply • Water security be integrated as a matter of priority in any upgrading strategy i.e. VC actors harvest and store rainwater; and produce their own water with RO systems • Better monitoring and enforcement of environmental laws and standards • More formal and regular stock assessments be undertaken for bycatch species • WCPFC reports should be based on observer reports rather than vessel logsheets (which may underreport catches)
Main risks	Mitigating measures
<ul style="list-style-type: none"> • Vulnerability to fuel supply shocks • Vulnerability to water issues and drought which may become more extreme due to climate change • Lack of formal stock assessments for all bycatch species 	n/a

3.4 Resilience (and Covid-19 impacts)

Resilience is a meta-dimension of sustainability that entails how are economic, social and environmental sustainability aspects, which relate to performance under normal circumstances, affected by shocks. As recognised in the FISH4ACP methodology, assessing resilience implies taking a dynamic, longitudinal perspective, i.e. how the normal development trends of the system were affected by past shocks to it, and from this historical perspective, how the current structure would respond to a variety of potential future shocks. This requires considering relevant shocks, assessing how resilient the VC (primarily the firms within it) is to them, and assessing sustainability impact pathways of shocks. This potential resilience, or lack therefore, determines

the economic impacts on firms, and resulting impacts on employment (potentially in terms of numbers and levels of earnings), and government revenues.

3.4.1 Potentially relevant shocks

Considering the likelihood of occurrence (re-occurrence) and the (potential) severity of impact, the following six potential shocks are considered the most relevant to the Marshall Islands purse seine VC based on stakeholder consultations and secondary information. Text in brackets indicates the type/nature of the potential shock.

- Fluctuations/decline in the price of fish paid by traders and/or canneries (economic shock, potentially resulting from increased catches depressing prices, levels of raw material inventory at canneries, or factors affecting end market demand being passed back up the value chain).
- Increase in the price of vessel days (economic shock, resulting from PNA allocations and the Marshall Islands government decisions about the costs to be charged per vessel day).
- Fluctuation/decline in fish catch (environmental shock, potentially due to either natural fluctuations in stock abundance or to overfishing).
- Increase in fuel costs (economic shock, with fuel being the single most important variable cost item).
- Reduced availability of reefer vessels (and/or container vessels) for transport of catches from the Marshall Islands (market shock, potentially resulting from reefers being backed up at canneries and container logistics).
- Reduced levels of transshipments in Majuro by foreign-flagged fishing vessels (economic shock, potentially itself resulting from a health shock such as Covid-19 or from competition for transshipment business from other ports in the region).

3.4.2 Resilience of the VC to potential shocks

A rapid qualitative assessment based on six domains results in the resilience sustainability heat map shown in Table 27. Text following the table explains the colour coding.

TABLE 27: RESILIENCE DOMAINS

Resilience domains		
Structural resilience domains		
Redundancy	Diversity	Connectivity
Behavioural resilience domains		
Collaboration and governance	Learning and adaptation	Participation and inclusion

Hotspot classification		
Not concerning	Concerning	Highly concerning

Note: **Structural domains** evaluate the presence and nature of certain structural elements that may contribute to resilient value chains. **Behavioural domains** refer to how actors and other stakeholders' behavioural patterns interact in ways that may contribute to resilient value chains.

Redundancy: The three fishing companies in the Marshall Islands (MIFCO, Koo's and PPF) are unable to retain any catch/stocks as a buffer to shocks due to the hunting nature of their activity, the perishable nature of their product, and the limited amount of cold storage capacity available in the Marshall Islands (which is owned by Pan Pacific Foods). Pan Pacific Foods can store raw material products for processing/export in its cold storage facility, but the facility is limited in size (2 000 tonnes). The small number of actors in the core VC also means that resilience to shocks is reduced. However, the fact that companies are part of large vertically integrated business entities may, however, mean that savings from these larger companies can be used to provide resilience to shocks.

Diversity: The level of diversity in the VC is extremely low. While purse seine tuna may end up in a variety of different geographical markets, the end market for PS-caught tuna is almost exclusively for sale in cans (or pouches or jars) apart from a

small niche market for larger yellowfin tuna. While there are a multitude of different canned product forms (e.g. different sauces, oil/water contents, packaging) any market impacts on the canned tuna market are likely to impact on all products. There are few core actors in the Marshall Islands value chain (MIFCO, Koo's, PPF, Pan Pacific Foods), few large tuna traders (Tri Marine, Itochu, and FCF), and a limited number of canneries to which they sell, all indicating a lack of diversity at each link in the value chain. Production systems in the VC in the form of fishing vessel characteristics and methods (all using purse seines and vessels of similar specifications) are generally standardised with few alternatives for catching schooling fish caught by purse seines, using other fishing methods. Inputs to fish catching operations in the form of vessels, gear, fuel, etc. have few alternatives.

Connectivity. The lack of diversity described above, however means that levels of connectivity are high in the VC, increasing resilience by helping to ensure that actors can quickly identify problems and needs, facilitate recovery, and attenuate the effects of shocks on any given component. There are good social and organizational linkages between the private sector and government organisations (e.g. MIMRA), close and long-established relationships between companies in the Marshall Islands and the downstream/extended VC in tuna trading and processing companies, a high level of organisation at the regional level (e.g. through the PNA). However, and of critical importance, the Marshall Islands' location as a small island developing state in the Pacific Ocean and its distance from markets, as well as its reliance on marine based transport for products coming in and out of the country, reduces its connectivity to markets and input suppliers outside of the Marshall Islands, thereby reducing resilience.

Collaboration (vs. competition). Collaboration enhances resilience capacities since risks are shared among stakeholders and since the VC stakeholders as a group have a better picture of the risks and how to manage them. Given the nature of the Marshall Islands as a small island nation, one might expect good levels of experience sharing, however within the private sector, the tuna business is highly competitive, with significant levels of competition for raw material product at all levels of the value chain from catching sector through to final consumption. This serves to reduce experience sharing within the private sector. However, collaboration between government sector organisations is assessed as being generally good, as is collaboration between public and private sectors given the small number of companies involved with the purse seine VC.

Learning and adaptation. Levels of flexibility and innovation in the VC, for example with respect to past shocks cannot be easily assessed given the rapid appraisal methodology used in the Marshall Islands, even qualitatively to determine if the value

chain's resilience is gradually strengthening or weakening. One can imagine that the small number of actors involved and close levels of collaboration between the private and government sectors should allow for good levels of experimenting and innovation (pro-activeness vs re-activeness) and quick response to shocks, and that good information gathering at national and regional level (for example by PNA, FFA, etc) and informally between actors in the VC should facilitate the monitoring of key variables.²³¹ However, and critically, the ability for core actors in the VC in the Marshall Islands to adapt and engage in activities less subject to shocks is virtually nil i.e. purse seine catching sector companies in the Marshall Islands cannot switch to other activities in the Marshall Islands.

Participation and inclusion. The small number of actors in the VC in the Marshall Islands means that participation (referring to the empowerment and engagement of the full range of VC stakeholders) can be assessed as high. There are no 'vulnerable' groups amongst the core VC actors (being larger commercial companies), and risks are likely to be equally experienced by all actors in the VC and by support service companies. However, the low level of inclusion of women and the poor, unskilled/low-skilled workers in the VC (as discussed in section 3.2.1) implies that this group of relatively vulnerable stakeholders is also the one that is highly susceptible to the negative impacts of shocks on the VC.

3.4.3 Sustainability impact pathways of potential shocks

The impact pathways from the shocks highlighted in section 3.4.1 are as follows:

- i. Decline in the price of fish paid by traders and/or canneries:
 - Reduced profitability of PPF, MIFCO, Koo's and Pan Pacific Foods from reduced sales prices.
 - Reduced earnings for crew on fishing vessels for the part of their earnings based on a share of vessel profitability.
 - Reduced government tax revenues from private sector companies due to their reduced profits
- ii. Increase in the price of vessel days:
 - Reduced profitability of PPF, MIFCO, and Koo's from increased costs of fishing operations

²³¹ Consultations did not reveal the extent to which actors do actually collaborate and share information

- Increased government revenues
- iii. Decline in fish catch:
- Reduced availability of catches resulting in reduced revenues for PPF, MIFCO, and Koo's (assuming reductions in catch are not experienced at a regional level and result in increases in prices for whole frozen fish offsetting reduced catches).
 - Reduced earnings for crew on PPF, MIFCO, and Koo's fishing vessels for the part of their earnings based on a share of vessel profitability.
 - Reduced raw material product and therefore profitability from onshore processing/containerisation by Pan Pacific Foods and PII and reduced exports
 - Reduced employee earnings and labour usage by Pan Pacific Foods and PII.
 - Reduced government tax revenues from private sector companies due to their reduced profits
- iv. Increase in fuel costs:
- Reduced profitability for PPF, MIFCO, and Koo's resulting from increased variable costs of fishing operations.
 - Reduced earnings for crew on fishing vessels for the part of their earnings based on a share of vessel profitability.
 - Reduced government tax revenues from private sector companies due to their reduced profits
- v. Reduced availability of reefer vessels:
- Increased turn-around time for vessels resulting in reduced fishing time and therefore reduced profitability
 - Reduced government tax revenues from private sector companies due to their reduced profits, and reduced transshipment-related fees
- vi. Reduced levels of transshipment in Majuro:
- Reduced levels of business activity, profits, and labour usage (and earnings) in Marshall Islands-based support service companies e.g. PII, vessel agents, fuel suppliers, etc.
 - Reduced government revenues from transshipment-related fees.

3.4.4 COVID-19 impacts

The COVID-19 pandemic has impacted the fisheries sector all around the globe, with indirect and negative impacts being felt in fisheries sector value chains which rely on cross border movements of labour and fishing vessels, international movements of fish to markets, and the international sourcing of inputs, all of which have been

impacted by COVID-19 related restrictions put in place by governments. The shock to the purse seine VC in the Marshall Islands has been significant and provides an example of a shock, resilience, and impacts in action. The analysis completed as part of this project has generated some relevant information which is presented below. COVID-19 has highlighted the risks to the Marshall Islands and its businesses in terms of ability to recover from shocks given the heavy reliance on the tuna purse seine VC.

COVID-19 restrictions, guidance and government action

The PNA designed COVID-19 Operating Protocols for the fishing sector in the Pacific.²³² The protocols were developed to assist and guide the fishing sector, flag States, coastal and island State governments to manage the health and economic impacts of COVID-19 on the fishing industry in the Pacific islands region. The protocols seek to guide practices that prevent the transmission of COVID-19 on and between fishing vessels and at port and offer protection for both the ships' crew and local populations at port.

In the Marshall Islands, travel advisories are issued by the National Disaster Committee (NDC) every month spelling out the rules surrounding national restrictions, which are communicated to the fishing partners by MIMRA. The government was quick to react to the pandemic by closing the borders in March 2020, which significantly affected the fishing vessels, carriers, reefers that were using Majuro port for transshipment, and restrictions have involved considerable periods of prohibition of international travel into the country, or quarantine requirements to do so.

The government of RMI established a Pandemic COVID-19 Economic Relief Program (PCERP)²³³ to provide relief to businesses affected by the pandemic. Workers can also apply for COVID-19 unemployment subsidy under this programme (this is the case of, for example, workers hired by Pan Pacific Foods).²³⁴ MIMRA also developed the MIMRA Fisheries System (MIMFIS)²³⁵ app for vessel pre-arrival applications for government agency boarding parties. MIMRA send a list of 'exempt' vessels to the NDC.

Impacts on fishing, exporting, and support service companies

For the fishing catching sector, strict travel restrictions, flight cancellations and port closures put in place to control the outbreak posed difficulties such as stranded crew members, difficulties in implementing observer rules, and port entry.

²³² <https://pnatuna.com/sites/default/files/Fisheries%20-%20COVID-19%20-%20Operating%20Protocols.pdf>

²³³ https://drive.google.com/file/d/1hlojdXPJc_oY-TRugnt6f20bL7TT6DG2/view

²³⁴ Pers. Comm., PPF, 2021.

²³⁵ MIMFIS (MIMRA Fisheries System) – MIMRA Database

For businesses in the Marshall Islands relying on transshipment activity, in 2020 there was a 60-70 percent reduction in the tuna transshipment activity compared to 2019 due mainly to the COVID-19-related 14-day port access restrictions put in place.²³⁶ Availability of reefer carriers was also compromised due to longer than normal turn-around times.²³⁷ COVID-19 thus affected businesses in the Marshall Islands relying on providing support to vessels transshipping their catch and which thus visit the Marshall Islands. PII for example, whose activity provides supplies and support services (e.g. net repair) to foreign vessels reported very significant negative impacts on its business,²³⁸ as did MSTC²³⁹, and shipping agents were impacted considerably.²⁴⁰ The low transshipment numbers and restrictions on changing crew also had a negative impact on the wider local economy as well, with reduced provisioning and demand from shops, and lower spend by visiting crews onshore in restaurants, hotels, etc.

Processing and exports of containerized fish by Pan Pacific Foods (and PII) have also been impacted as noted in Section 2.3.1 with fewer containers exported in 2020 compared to 2019, due COVID-19 impacts on demand for tuna loins from canneries, fewer foreign vessel visits, and a reduced availability of containers due to international disruption to container shipping routes. Pan Pacific Foods reported problems enticing labour back to work because of unemployment subsidies being provided.²⁴¹

Impacts on VC markets for tuna

Short-term drivers of demand have been affected by the COVID-19 pandemic, which has affected demand (and supply) for canned tuna. Global demand for shelf-stable canned tuna products rose in the first half of 2020 (in place of more perishable food products) as consumers stocked up food in response to lockdowns and physical movement restrictions (Toito'ona, 2020; Aqorau, 2020). According to Campling *et al.* (2020), in Italy, sales of canned tuna products (in water and in oil) rose by around 30-40 percent in late February-early March 2020; and in the United States of America during the week of 14 March 2020, sales of canned and pouched tuna rose by 150 percent - the highest spike among shelf-stable seafood products. These changes did not however have significant impacts on fish prices paid by canneries²⁴² due to

²³⁶ Pers. Comm. KMI Shipping Agency, June, 2021, and Marshall Islands journal article, April 2021

²³⁷ Pers. Comm., FCF, Feb 2021.

²³⁸ Pers. Comm., PII, 2021

²³⁹ Pers. Comm., MSTC, May 2021. MSTC has applied to the PCERP but is awaiting a response.

²⁴⁰ Pers. Comm. KMI Shipping Agency, June, 2021

²⁴¹ Pers. Comm., PPF, March 2021.

²⁴² Pers. Comm., Tri Marine, March 2021.

cannery inventory of raw material product²⁴³ and stocks of finished product held by retailers.

Food security (local population/consumers)

At the national level, fish is important to food security, especially given the RMI's reliance on the supply of imported goods which is susceptible to shocks (Gillett and Tauati, 2018), such as the recent COVID-19 pandemic. The pandemic caused disruptions in the shipping of food to the islands (Pacific Humanitarian Team, 2020). However, most Marshallese consume fish caught locally rather than from imports (or from the purse seine VC) so the pandemic is not thought to have had a significant impact on the supply of fish (and its important contribution to protein and micronutrients).

3.5 Sustainability heat map

A sustainability heat map below provides a synthesis of the economic, social and environmental sustainability assessment and the resilience analysis (see sections 3.1, 3.2, 3.3, and 3.4).

²⁴³ Pers. Comm., FCF, Feb 2021

FIGURE 21. THE MARSHALL ISLANDS PURSE SEINE TUNA VALUE CHAIN SUSTAINABILITY HEAT MAP

Economic Sustainability	Social Sustainability	Environmental
Net profits	Wages and employment distribution	Electricity use
Trend in net profits	Value added distribution	Fuel consumption
Return on sales	Poverty and vulnerability	Carbon footprint
Return on investment	Discrimination	Renewable clean energy use
No. of jobs in FTE	Women's economic involvement	Water and ice consumption
No. of salaried jobs	Gendered division of labour	Water pollution
Average wage for hired workers	Gendered access to productive	Stock status and dynamics
Total value of net wages	Women's decision-making &	Fishing pressure
Direct value added at core VC	Availability of food (tuna)	Associated species
Indirect value added at VC level	Respect for labour rights	Vulnerable ecosystems
Total value added at VC level	Child and forced labour	ETP species
Contribution to GDP	Job safety and security	Biosecurity measures
Net impact on the balance of	Job attractiveness	Animal husbandry
Rate of integration	Collective action	Chemicals use
Net impact on public funds	Coordination of transactions	Air pollution
International competitiveness	Social cohesion	Inorganic waste pollution
	Cultural traditions	Organic waste pollution
	Policy, regulations and standards	Food loss
	Access to finance	
	Access to natural resources	
	Access to information	

Resilience		
Redundancy	Diversity	Connectivity
Collaboration	Learning and adaptation	Participation and inclusion

Key:

Not concerning	Concerning	Highly concerning
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Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Economic sustainability score²⁴⁴:	59%
Social sustainability score:	76%
Environmental sustainability score:	75%
Resilience score:	33%
Overall sustainability score:	67%
Number of highly concerning hotspots (red):	7

²⁴⁴ According to the FISH4ACP methodological guide, "the (sustainability scores) indexes are calculated by adding up across sub-domains (1 for green, 0.5 for yellow, 0 for red) and dividing this by the number of subdomains, expressed as a percentage".

The main conclusions to be drawn from the heat map when viewed in totality are that there is mixed performance across all three sustainability dimensions and resilience. Social and environmental sustainability are the areas where the VC demonstrates the best performance, while resilience is the weakest area. There are 7 hotspots in terms of the VC's sustainability performance and resilience, or over 10 percent of all sub-domains under consideration. However, the number of "concerning" (yellow) areas is high (26 areas, or over 40 percent of all the sub-domains).

With respect to each dimension of sustainability, economic sustainability can be assessed as the weakest, with the main concerns being the low profitability levels of core VC companies (two out of four, i.e. PPF and Pan Pacific Foods, operated at a loss, particularly Pan Pacific Foods made a huge loss) and the declining net profits of the core VC companies. The high level of dependence on imported inputs (fuel, oil) and services (shipping) together with the low volume (and thus, value) of fish exports pose additional concerns to the economic sustainability of the VC.

The social sustainability performance of the VC is better than its economic performance. The main social concerns are related to the unequal employment and wage distribution between the Marshall Islands -residents and non-Marshall Islands residents in the core VC, the relatively weak participation of women in the VC (especially in decision-making and/or leadership roles), the low level of job attractiveness to the Marshall Islands nationals (mainly due to relatively low wages while alternative better employment options are also available), and the limited availability of and access to water posing constraints to the development and sustainability of the VC. In addition, the issue of poverty among the VC workers and their families requires more in-depth studies to generate a better understanding of the situation.

The VC performs relatively well with regards to environmental sustainability. Water scarcity is an issue in Majuro, particularly during periods of drought, however all VC actors meet most of their water demands themselves by either harvesting rainwater, using RO systems or a combination of both. There are some impacts associated with non-target species and ETP species which are concerning; however, the impact is low relative to other fisheries (e.g. longline) and compared to the total impact from the purse seine fishery. Animal welfare impacts are due to the slaughter methods not meeting the WOA standards, however, the prescribed methods are neither feasible for the fishery nor practiced by any tuna purse seiners globally. Pollution impacts are largely due to ineffective monitoring and enforcement of existing laws and regulations and the lack of records of chemical use although chemical use is limited to those used for cleaning. Lack of renewable energy use within the VC is also of some concern.

When considering resilience, the assessment is cause for considerable concern. All six domains are either concerning or highly concerning. Of most concern are the domains of redundancy and diversity. The lack of resilience displayed by the VC is strongly linked to the small number of actors in the VC, their reliance on external factors outside of their control, the competitive nature of businesses operating in the VC, the geographically remote and island-based nature of the Marshall Islands, and the few opportunities for core VC actors to adapt their operations into other business activities to reduce the impacts of shocks.

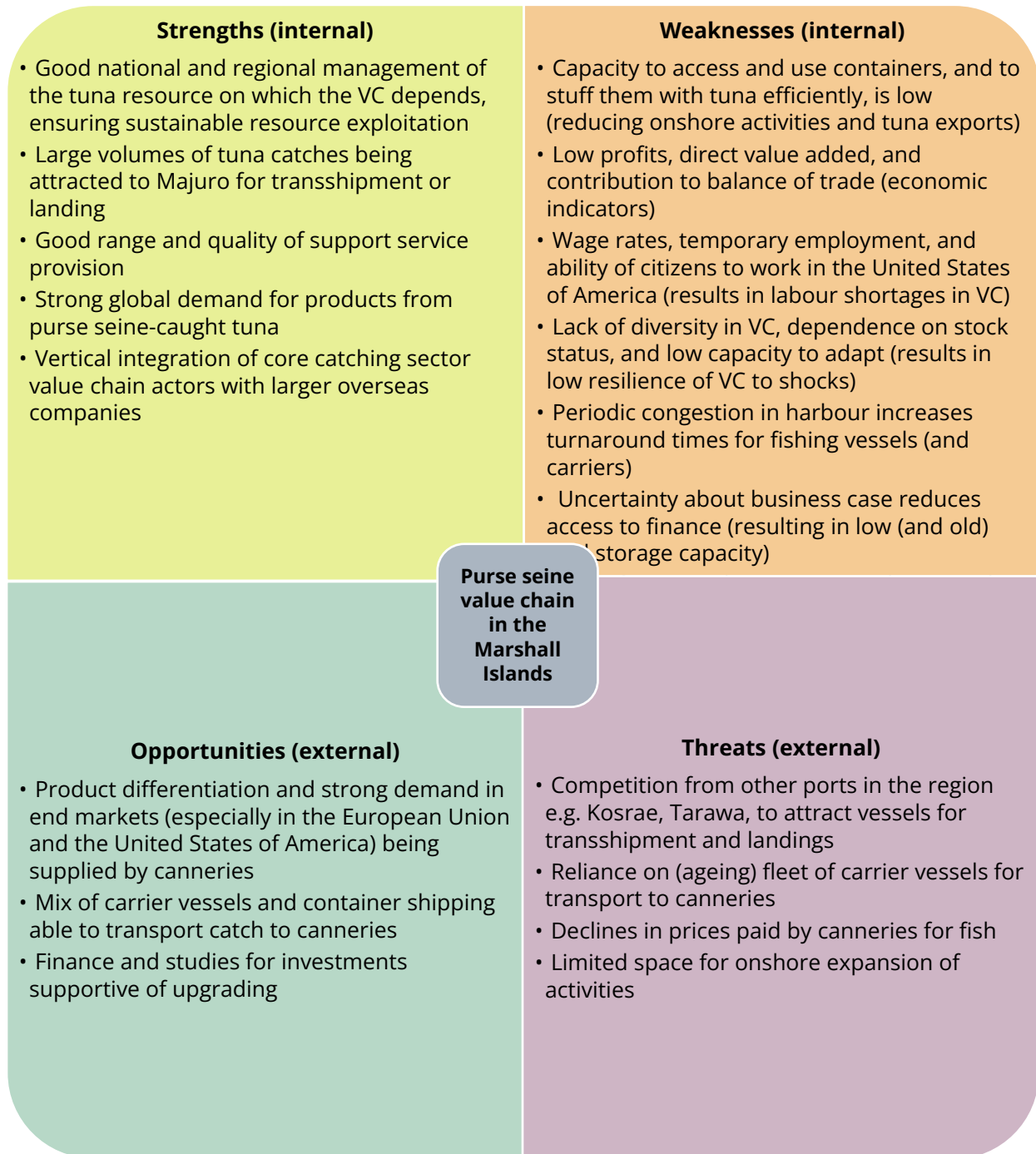
4 Upgrading strategy

This section of the report draws on the analysis presented in Sections 2 and 3 to develop an upgrading strategy for the purse seine value chain in the Marshall Islands. It starts with a SWOT analysis to begin the process of moving from analytical complexity to strategic simplicity (sub-section 4.1). Informed by the SWOT analysis, the sustainability heat-map (see earlier, Figure 21), the VC map (see earlier, Figure 5), and varied stakeholder interests as reflected during consultations, an overall objective for the upgrading strategy is developed in the form of a vision statement (co-developed with VC stakeholders based on the SWOT). The vision statement includes concrete targets, and will be realised through four main elements, or outcomes of an upgrading strategy, brought about by a range of activities and outputs which are presented graphically in a theory of change (section 4.2). Sub-section 4.3 presents assumptions about factors that will change under the upgrading strategy, and then business models, the enabling environment and governance arrangements under the baseline situation and following upgrading. Sub-section 4.4 builds on preceding sub-sections to develop an assessment of the sustainability impact the upgrading strategy it is expected to have.

4.1 SWOT analysis

A SWOT analysis of the purse seine VC in the Marshall Islands is provided in the Figure below (Figure 22).

FIGURE 22: SWOT OF THE MARSHALL ISLANDS PURSE SEINE VALUE CHAIN



The strengths of the VC are that it relies on a well-managed and abundant resource, that is not currently exhibiting signs of being over-fished or subject to overfishing. Demand for products from purse seine caught fish in end markets in the European Union and the United States of America, and therefore from tuna traders and canneries as intermediate markets, is strong. Majuro is already a major

transshipment hub in the Pacific, supported by the good range of service provision on offer for domestic and visiting vessels. The fact that core VC actors in the form of catching sector companies are part of larger vertically integrated companies is also a strength in terms of the financial, technical, and managerial support that these larger companies can provide to VC actors.

However, despite the large volumes of product passing through Majuro port, weaknesses of the VC include the fact that only a small proportion of catches are landed. This reduces onshore generation of value-added and employment, and negatively impacts on the ability of the VC to contribute to direct value added and contribute to the national balance of trade (as transshipments are not exports). The failure to sort and grade significant quantities of tuna when being transshipped to the extent that it could/can be when landed, in turn means that larger sized fish, and yellowfin in particular, are not being sent to canneries in whole or loined form to exploit product differentiation in end markets, impacting negatively on prices paid for catches. Other key weaknesses are low availability and productivity of labour in shore-based operations (especially for loining), low cold storage capacity which compromises the ability to sort and store catches and to maintain quality (and loined product) prior to exports, low speeds of stuffing containers thereby compromising fish quality, and low resilience of the VC actors to potential shocks. A major weakness at present is the inability of the VC to export to the European Union (with its strong demand and good prices) due to the lack of a certified competent authority (CA) but also potentially due to food safety standards on vessels and in onshore facilities which the CA would be monitoring.

Considering potential opportunities for the VC, these revolve most strongly around selling catch that is better sorted by species and size (especially for larger yellowfin tuna) to allow canneries to produce higher value and differentiated products for end markets (e.g. yellowfin-specific). This in turn should enable canneries and traders to pay better prices for catch provided to them by vessels landing catch in the Marshall Islands. But to do so requires exports in containers to better enable sorted catches to be sent to different canneries with different requirements and therefore paying different prices. Given the vertical integration within the VC, opportunities also exist to capitalize on the ability of parent companies to provide finance, and to provide blended finance which would mix project finance with that from private sector parties and other potential investors (e.g. public sector, impact investors, investment funds) to support value chain upgrading investments. Enabling finance for specific VC investments can also be supported by detailed studies demonstrating the financial viability of such investments.

Looking to the future, it is important to consider the threats to the VC. These include the potential for other ports in the region to attract transshipment and landings away

from the Marshall Islands. This is also of concern as it could jeopardise benefits (in economic and employment terms) to the Marshall Islands currently being generated by both the Government (through transshipment fees) and the support service sector. This threat could be more likely to materialise if the Marshall Islands does not gear up to better provide for container exports, if other ports do (to capitalize on a potential increase in container trade), leaving the Marshall Islands to rely on transshipment by a reportedly ageing fleet of reefer vessels.

Key **strategic options** emerge from the SWOT and revolve around the listed opportunities and threats as follows:

- Given the large volumes of tuna catch passing through Majuro (strength), address the small proportion of catches that are landed for sorting/grading/processing (weakness) and low levels of profits and direct value added (weakness), by sorting/grading catches to allow catches to be better used to generate differentiated products for end markets (opportunity).
- Address the periodic congestion in the harbour,²⁴⁵ which compromises vessel turnaround times (weakness), and the reliance on carrier vessels (threat), by expanding the use of containerized transport to canneries (opportunity).
- Combat the competition from other ports (threat) by building on the quality and range of support service provision (strength) supporting efforts to increase the ability of the Marshall Islands to effectively service and grow container services providing tuna trading companies and owners of fishing vessels with more choice and better mix of options (opportunity) to transport catches to canneries.
- Address the inability to export to the European Union (threat) by supporting the approval of a competent authority and enhancements in food safety standards on vessels and in onshore facilities, to capitalize on the demand for tuna in end markets and particularly in the European Union and United States of America (strength) and address the poor contribution of the value chain to the balance of trade (weakness).
- Address the low labour availability and productivity when stuffing containers (weakness) and the age of cold storage capacity (weakness) by making

²⁴⁵ Especially during July to September during the FAD closure

employment in the VC more attractive, and by providing blended finance to support investments in container stuffing equipment and conducting studies to investigate and support cold storage investments (opportunity), building on the linkages of value chain actors with vertically integrated companies (strength) that could also be expected to provide finance.

4.2 Vision, upgrading strategy and theory of change

A **shared and agreed vision** for the purse seine sector that is considered achievable and realistic, following successful implementation of the upgrading strategy, has been developed together with stakeholders during the validation and activity planning workshops. This vision is:

“In 2031, the Marshall Islands will have strengthened its position as a leading hub for tuna through transshipment and containerisation, with value-addition through a sustainable value chain that will generate local employment and increase its resilience.”

The specific timeframe specified in the vision is based on the need to move quickly while allowing sufficient time for the strategies to support the vision to be put into place.

Specific and measurable targets associated with the vision (by 2031) are:

- 30 percent of tuna flows in the Marshall Islands will be in containers and 70 percent transshipped.
- Tuna purse seine export values of USD 55 million a year will be generated by Marshall Islands -based fishing companies.
- Direct value added from the VC of USD 33 million.
- Over 1 075 jobs in the core and extended VC within the Marshall Islands.
- 3 percent of mains water used by VC actors (not changed from 2021).
- 5 companies in value chain using some form of renewable energy in their operations.

The vision statement also recognises a desire and belief by stakeholders that both economic and social benefits can be achieved. The changes to be realised by bringing about the vision would have no impact on or incentives to increase fish catches, so the vision does not refer to the sustainability of catches. However, recognising the importance of environmental objectives, the vision statement (and its targets) refers to a ‘sustainable value chain’, reflecting the need to guard against the potential impact that more onshore processing and containerisation could have on the environmental footprint of the VC in terms of its impact on water supply in the

Marshall Islands (identified as a particular hotspot in the sustainability assessment), and Green House Gas (GHG) emissions /carbon footprint.

The vision is coherent with, and relevant to, national needs and policies²⁴⁶ to increase exports and employment. The vision will also support and be consistent with:

- vii. SDG 6 Clean water and sanitation, and its goal of 'ensure availability and sustainable management of water and sanitation for all'.
- viii. SDG 8 Decent work and economic growth, and its goal to 'promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all'.
- ix. SDG 12 Responsible consumption and production, and its goal to 'ensure sustainable consumption and production patterns'
- x. SDG 14 Life below water, and its goal to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development.

As a small nation in the front line of a changing climate, Marshall Islands' own emissions are negligible compared to other global emitters, but the Government has nevertheless made commitments to reduce Marshall Islands' own GHG emissions and has made progress in several areas. Examples include Marshall Islands' Electricity roadmap and green energy, ratification of the Kigali amendment to the Montreal Protocol, and segregation of organic waste at landfill. Existing and future strategies of the Government are expected to offset any increased emissions from this project as more and more innovative technologies become available.²⁴⁷

The underlying narrative for the upgrading strategy for the Marshall Islands purse seine value chain represents an integrated approach to realise the vision. Through grants and other supporting measures (such as trainings), companies will be incentivized to shift to a new and more efficient technology for loading containers with tuna. This technology will have two effects. First, it will bring down the cost of stuffing and shipping tuna in containers. Second, it will allow for the fish to be sorted. These changes will in turn incentivize the fishing companies to shift to containerisation, as revenues will be higher as they will be able to secure a higher price for the sorted fish. Increased demand for containerisation, will generate the revenues and economies of scale, to make containerisation more profitable over time. At the same time, outputs such as upgraded laboratory facilities, assessments of investments needed to improve vessel and shore-based fish hygiene, and a

²⁴⁶ National Strategic Plan. Draft National Exports Strategy.

²⁴⁷ RMI EPA, Pers. Comm., 12/10/2021

Competent Authority that is European Union certified will allow fish landed in the Marshall Islands to be exported to the European Union market where higher prices can be obtained by the canneries buying tuna landed in the country. This will also contribute to an increase in the price that fishing companies can get for their fish and thus further increase their incentive to shift to containerisation. Furthermore, outputs such as detailed feasibility analysis and designs of expanded cold storage facilities, could provide justification for an increase in cold storage capacity which would allow for even higher levels of sorting and therefore higher prices. The increase in containerisation and sorting will generate jobs and tax revenues for the Marshall Islands and will allow the country to strengthen its position as a major hub for tuna landings and transshipments. Various outputs such as detailed analysis and designs will introduce practices and technologies that will assure that the water footprint of the VC within the Marshall Islands, a particular environmental 'hotspot', will not increase, that other social and environmental hotspots such as labour availability and the needs for more use of renewable energy are addressed, and that risks and challenges such as increased power requirements for plug-ins needed for containers are fully considered.

FIGURE 23: EXAMPLE OF IMPROVED EQUIPMENT FOR STUFFING CONTAINERS WITH TUNA



©Bennett's Engineering (Pty) Ltd.

The proposed strategy has **four major elements or outcomes to bring about the vision:**

- 1 **Increased containerisation of PS-caught tuna for sale to canneries (or traders)** primarily in whole round frozen form having been sorted/graded, but potentially also following processing onshore into loins. This should allow tuna to be sold to canneries at higher prices, with related onshore costs in the Marshall Islands being offset by those higher prices. This element exploits Majuro's position as a major hub for transshipment with large volumes of raw material flowing through Majuro port, to attract an increased proportion of existing catch that is currently transshipped to be containerized.
- 2 **Increased landings in the Marshall Islands, enabled by an approved and functioning Competent Authority (CA) and resulting in increased exports.** This will require the provision of training to CA staff, and to private sector operators of vessels and onshore facilities in improved fish hygiene standards. A CA is critical to allow fish landed in the Marshall Islands by the Marshall Islands and non- Marshall Islands flagged vessels to enter European Union markets (via canneries to which vessel owners sell their catch), as fish landed in Majuro must be subjected to appropriate sanitary approvals. The European Union market provides specific opportunities as discussed earlier. However, having a European Union-approved CA would not be sufficient on its own to guarantee exports to the European Union would be approved; improvements in the fish hygiene and food safety standards of the private sector operators running fishing vessels and onshore facilities in the Marshall Islands, which would be inspected/verified by the CA, could also be necessary and could potentially involve significant investments.
- 3 **Greater levels of storage and sorting of tuna in the Marshall Islands prior to export, facilitated by increased cold storage capacity.** Facilities would enable catches to be landed, sorted and stored in the Marshall Islands prior to export in containers, and potentially for container stuffing to be completed in a temperature-controlled environment. There is currently one cold store facility of 2 000 tonnes capacity in Majuro,²⁴⁸ but it is generally fully utilized, old and in need of almost complete reconstruction. *Costs of construction and operation of such a cold store could be considerable and have not been fully explored during this preparatory phase of the FISH4ACP project, and the viability of this component thus remains uncertain. Likewise, consultations revealed divergent views as to whether cold storage is a necessary requirement for levels of containerized exports to be increased and for market opportunities to be realised. While the main project would not itself provide financing for cold storage, an early activity of the main project*

²⁴⁸ Owned by Pan Pacific Foods

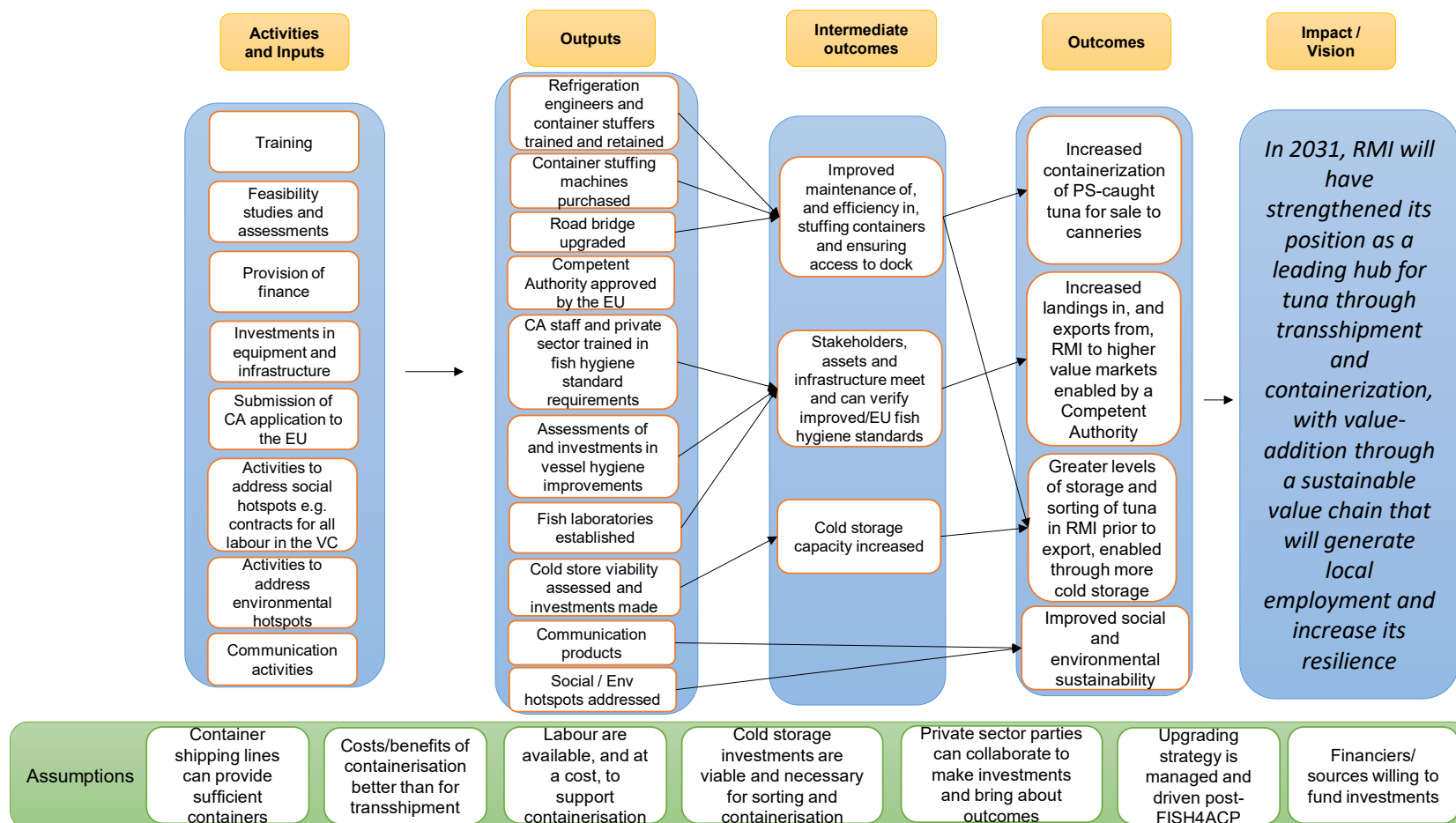
phase (in 2022) will be to explore the financial viability and relevance more fully, with the financial feasibility study report being of potential benefit to stakeholders when applying to sources of finance (which the study would also itself more fully explore). Other supportive activities in the form of technical assistance are envisaged on the assumption that the financial feasibility study indicates viability.

- 4 **Social and environmental sustainability improvements** to be realised through addressing the most critical 'hotspots' identified in the social and environmental sustainability assessments presented in Section 3 of this report.

These four elements are strongly inter-linked. For owners of fishing vessels currently transshipping fish through Majuro to get better prices from canneries, fish must be landed and sorted/graded, and/or processed. Transport from the Marshall Islands to canneries would then need to take place using containers rather than by carrier vessel. This in turn could (subject to further investigations into the relevance) require cold storage to hold product prior to transport to canneries. And if fish is landed in the Marshall Islands rather than being transshipped, for container exports to be eligible for the European Union market exports would have to be vetted and approved by an established CA. Social and environmental sustainability improvements are cross-cutting in nature rather than fitting neatly under any of the three elements above, and combined, will serve to support the vision and minimize any risks of increased economic activity under elements 1-3 having an adverse social or environmental impact.

Progress towards realizing elements 1, 2 and 4 should begin to be evident within approximately 2-3 years. Work in support of element 3 in the form of a more detailed feasibility assessment will start immediately, however results/outcomes under this element will take longer to become visible (approximately 5 years) given the time required to identify finance and construct additional cold storage facilities (if viable). A range of **activities (e.g. studies, trainings) and investments** by different stakeholders including government, the private sector (core VC actors and service providers), the FISH4ACP project, and other donors (discussed in detail in Section 5), will produce **outputs**. These outputs will in turn bring about **intermediate outcomes**, in support of the outcomes and thereby the vision. The explanatory text above is presented graphically in the Theory of Change (ToC) overleaf. The ToC covers the **whole** upgrading strategy (whose implementation may go beyond the scope of FISH4ACP project) rather than being specific to the FISH4ACP project. Assumptions contained in the ToC are indicative and not linked directly to specific levels of the ToC (i.e. outputs, outcomes, etc) - the more detailed logframe for the upgrading strategy contains assumptions that are specific to different levels of the logframe.

FIGURE 24: THEORY OF CHANGE FOR THE OVERALL UPGRADING STRATEGY OF THE MARSHALL ISLANDS PURSE SEINE VALUE CHAIN



4.3 Upgrading activities

4.3.1 Assumptions about changes from upgrading

The **key assumptions** underpinning and impacting on the assessment of current and future VC performance relate to economic factors, but also to the key societal and governance conditions and arrangements as discussed in Section 2. The key assumptions for factors that are expected to change with implementation of the upgrading strategy, are provided in the table below (Table 28), and relate to business models, the enabling environment, and governance arrangements, which are the subject of the following sub-sections.

TABLE 28: KEY ASSUMPTIONS – CURRENT AND UNDER UPGRADING

Item	Current situation (2019)	Upgrading elements 1, 2 & 4	Upgrading elements 1-4	Justification
	Unit or cost	Unit or cost (change from current in bracket)	Unit or cost (change from current in bracket)	
Volume of whole tuna (MT)				
Total (transshipment and containerisation)	379 023	379 023 (0%)	379 023 (0%)	Landings depend more on where vessels are fishing rather than onshore facilities
Transshipment	362 454	303 218 (-16%)	265 316 (-27%)	
Containerisation	16 569	75 805 (357%)	113 707 (586%)	20% of total volume under Upgrading 1, 2 & 4, and 30% under Upgrading 1 - 4
Prices (USD)				
Outputs (revenues)				
Whole tuna (containers - yellowfin) (USD/MT)	1 925	2 021 (5%)	2 021 (5%)	5% increase thanks to higher prices on European Union market and increase in direct sales to canneries in different locations

Whole tuna (containers - bigeye) (USD/MT)	1 665	1 748 (5%)	1 748 (5%)	Same as row above
Whole tuna (containers - skipjack) (USD/MT)	1 315	1 381 (5%)	1 381 (5%)	Same as row above
Loins (containers) (USD/MT)	4 301	4 516 (5%)	4 516 (5%)	Same as row above
Containerisation service fee (USD/MT)	55	50 (-9%)	50 (-9%)	Cheaper with Star Loader. Cost-saving for vessels, and profitable for containerisation business.
Inputs for catching sector (costs)				
Shipping costs (containers) - onshore costs included (USD/MT)	300	250 (-17%)	225 (-25%)	The bigger quantity sent, the cheaper the cost. Cold store helps to reduce cost further.
Inputs for post-harvest sector (costs)				
Containerisation total costs (USD/MT)	55	41 (-25%)	41 (-25%)	Currently not making money with containerisation, but will be more efficient and thus, more profitable with Star Loaders
Labour cost (containerisation) (USD/MT)	8.5	4 (-53%)	4 (-53%)	Decreased with Star Loader and training
Other operational costs, excluding labour (USD/MT)	46.5	37 (-20%)	37 (-20%)	Decrease thanks to economies of scale

Star Loader cost (USD/machine)	0	450 000	450 000	Private sector interested in investing. Quoted cost of Star Loader is USD 590 350/machine including shipping to and assembling in RMI; but based on consultation with Star Loader's manufacturer, this cost can be negotiated to be lower. ²⁴⁹
Star Loader lifespan	n/a	15	15	Information provided by Star Loader's manufacturer
Labour cost (cold store) (USD/MT of fish containerized)	19.7	16 (-19%)	16 (-19%)	Decrease with training and economies of scale
Labour				
Time taken to stuff one 40ft reefer container (hours)	2	1 (-50%)	1 (-50%)	Decreased thanks to Star Loader

²⁴⁹ Note also that other models of container loading machines may be available at lower cost (see

Table 53 in Annex 2). The cost estimate assumed in the analysis is chosen to be precautionary.

Number of workers in core and extended VC (labour availability)	737	939 (27%)	1 079 (46%)	Labour availability, thanks to improved job security (contracts) and job attractiveness (reduced hardship thanks to Star Loaders, potential increased wages)
Number of FTE jobs for women	47	80 (70%)	102 (116%)	Labour availability. Increased containerisation/cold store jobs can be taken by women.
Materials and equipment				
Mechanical container stuffing equipment	Zero	2 Star Loaders	2 Star Loaders	2 machines are sufficient to handle the increased containerisation volume. Private sector interested in investing.
Societal environment				
Approved competent authority (CA)	No	Yes	Yes	
Governance				
Average proportion of products sold by VC vessel owners directly to canneries rather than to tuna traders (%)	65	70 (8%)	75 (15%)	Containerisation and sorting enable more direct sales to canneries

Note: Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from the Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in the Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

4.3.2 Upgraded business models

Business model for companies providing containerisation services

Under the assumption that grants and other supporting outputs (such as training) will be available, Pan Pacific Foods and PII will be incentivized to shift to more efficient technology using Star Loaders for loading containers with tuna. Assuming the volume of containerized tuna will increase to over 110 000 MT in 2031 thanks to improved containerisation services (Table 28) and given the technical specifications of Star Loaders (Table 29), two Star Loaders would be needed to handle the increased amount of tuna. Given the high investment costs for Star Loaders (USD 450 000/machine), it is assumed that Pan Pacific Foods would invest in/handle one machine and PII the other machine. Using Star Loaders as opposed to the current practices (i.e. largely manual stuffing) implies the operational cost per unit (USD/MT) of stuffing tuna in containers will be lower as stuffing capacity per hour increases. Lower operational costs incurred to Pan Pacific Foods and PII will then enable these companies to offer containerisation services at lower prices.

In the upgraded business model, it is assumed that the total cost for containerizing tuna would be reduced from the current 55 USD/MT to 41 USD/MT in the upgraded situations, which in turn allows for the reduction of containerisation service fees (charged to fishing companies) from the current 55 USD/MT to 50 USD/MT in upgraded situations. The assessments of the profitability of the containerisation

business, with support from two Star Loaders, are provided in Table 30 (for Pan Pacific Foods and PII combined) and Table 31 (for Pan Pacific Foods alone). Both assessments show that the containerisation business, with support from two Star Loaders, can be profitable as opposed to the current situation in which companies are not making any profits from providing the services. It should be noted that the profitability assessments are precautionary, using a relatively high cost of loading machines, while other loading machine models may be available at lower cost (see Table 53 in the Annex), which compares two loader models). If cheaper loading machines are purchased, the profitability of containerisation business would be higher.

TABLE 29. JUSTIFICATION FOR THE NEED FOR TWO STAR LOADERS FOR UPGRADED PRACTICES

Item	Unit	Value	Justification
Hours of stuffing possible per day	hours	12	Possible to operate for longer but assumed 12 hours to avoid overtime costs and working at night time
Capacity per hour per loader	MT	25	Based on assumptions (Table 28)
Number of loaders	number	2	Based on assumptions (Table 28)
Combined capacity per hour	MT	50	
Combined capacity per day	MT	600	
Operational days of stuffing	days	208	Based on 4 days per week, but there will not be even flow of product to be containerised during the year.
Maximum yearly capacity for stuffing	MT	124 800	Exceeds assumption of maximum volume required under upgraded situations based on assumptions in Table 28

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

TABLE 30. PROFITABILITY OF THE CONTAINERISATION BUSINESSES (CONTAINERISATION COMPANIES COMBINED)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading element 1 - 4 (change from current in bracket)
Revenues (USD)	911 295	3 790 230 (316%)	5 685 345 (524%)
Costs (USD), including labour, other operational expenses, and investment cost of 2 Star Loaders	911 295	3 782 989 (315%)	5 336 983 (486%)
Profits (USD)	0	7 241	348 362
Return on sales	0%	0.2%	6%
Return on investment	0%	0.2%	7%

Note: Three assumptions are made here: (i) the cost of 1 Star Loaders is USD 450 000, including shipping to and assembling in the Marshall Islands, (ii) 2 Star Loaders are sufficient to handle the increased containerisation volume (as justified by Table 29), and (iii) the cost of buying 2 Star Loaders is shared with FISH4ACP (25 percent by FISH4ACP, 75 percent by companies), at a rate that ensures that containerisation does not itself result in negative return on sales.

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

TABLE 31. OPERATIONAL ACCOUNTS FOR PAN PACIFIC FOODS, CURRENT AND UNDER UPGRADED SITUATIONS (IN USD)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from current in bracket)
Revenues	1 799 899	4 478 350 (149%)	5 994 442 (233%)
Fishmeal	61 244	61 244	61 244
Loins (containers)	1 384 922	1 384 922	1 384 922
Containerisation service fee	353 733	3 032 184	4 548 276
Costs	3 657 970	7 627 145 (109%)	10 437 502 (185%)
Fish cost for loining	857 728	857 728	857 728
Loiners (resident) - gross wages	234 749	234 749	234 749

Electricity for loining	12 880	12 880	12 880
Fuel for loining	32 200	32 200	32 200
Water for loining	9 660	9 660	9 660
Repairs and maintenance for loining	22 540	22 540	22 540
Depreciation (loining)	25 760	25 760	25 760
Labour (containerisation) - gross wages	112 591	244 107	365 394
Other operational costs for containers, excluding labour	615 939	2 257 987	3 379 895
Depreciation (1 Star Loader)	0	22 500	22 500
Labour (cold store) - gross wages	260 525	976 427	1 461 576
Other operational costs for cold store, excluding labour	234 500	234 500	234 500
Depreciation (cold store)	0	0	0
Supervisor staff for all functions (residents) - gross wages	1 145 064	2 619 508	3 711 095
Shipping costs (containers)	93 835	76 600	67 025
Operating profits	-1 858 072	-3 148 795 (-69%)	-4 443 060 (-139%)
Return on sales	-103%	-70% (-32%)	-74% (-28%)
Return on investment	-51%	-41% (-19%)	-43% (-16%)

Note: (1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from the Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in the Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

(2) The cost of improved cold store is not factored in the last column of this table because this is subject to the feasibility study on cold storage (which may end up being funded by other parties such as PII). This table, hence, assumes Pan Pacific Foods does not invest in improved cold store under the upgrading 1-4.

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

Business model for catching sector VC actors

Under the assumption that grants and other supporting outputs (such as training) will be available for Pan Pacific Foods and PII to shift to more efficient technology using Star Loaders for loading tuna into containers, catching companies will also shift to using more containerisation services for their fish (as opposed to mainly using transshipments as in the current situation). It is assumed that there will not be any increases in the total catch volume landed or transshipped in the Marshall Islands

(because fish landings depend more on where vessels are fishing rather than onshore facilities); but there will be a shift of tuna from the transshipment channel to the containerisation channel (see Table 28). The use of Star Loaders for stuffing containers will reduce the costs that catching companies pay for stuffing containers from the current 55 USD/MT to 50 USD/MT in upgraded situations. Additionally, with the possibility for increased sorting of fish, catching companies will be able to secure higher prices for the sorted fish and thus, obtain higher revenues. Reduced costs (thanks to the reduction in containerisation service fee) and increased revenues (thanks to higher fish prices) will lead to higher profits for catching firms. The assessments of the profitability of three catching companies in the Marshall Islands, with increased use of containerisation, are provided in Table 32-34. The assessments show that with increased use of containerisation (to 20 percent and 30 percent of the total volume of all the fish that is transshipped or landed in the Marshall Islands), catching companies in the Marshall Islands will become more profitable than currently with transshipments accounting for over 95 percent of all the fish transshipped or landed in the Marshall Islands.

TABLE 32: OPERATIONAL ACCOUNTS PPF, CURRENT AND UNDER UPGRADED SITUATIONS (IN USD)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from current in bracket)
Revenues	68 826 406	70 414 584 (2%)	71 063 495 (3%)
Whole tuna (containers - yellowfin)	990 451	2 532 222	3 376 296
Whole tuna (containers - bigeye)	214 169	547 552	730 069
Whole tuna (containers - skipjack)	7 614 574	19 467 690	25 956 920
Whole tuna (transshipment)	59 149 484	47 009 393	40 142 483
Whole tuna sales for PPF loining plant	857 728	857 728	857 728
Costs	68 916 593	68 165 750 (-1%)	67 382 750 (-2%)
Tax on revenue	0	0	0
Fuel & oils	26 248 223	26 248 223	26 248 223
Gross wages & Salaries for Resident employees	216 000	216 000	216 000
Gross wages & Salaries for non-resident employees	8 239 192	8 239 192	8 239 192
Shipping costs (transshipment)	11 240 875	8 933 750	7 628 750
Shipping costs (containers)	1 575 718	3 132 000	3 654 000
Other running costs	14 796 586	14 796 586	14 796 586

Depreciation	6 600 000	6 600 000	6 600 000
Operating profits	-90 186	2 248 834	3 680 745
Return on sales	-0.1%	3.2%	5.2%
Return on investment	-0.1%	3.3%	5.5%

Note: (1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

TABLE 33: OPERATIONAL ACCOUNTS FOR MIFCO CURRENT AND UNDER UPGRADED SITUATIONS (IN USD)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from current in bracket)
Revenues	8 977 000	9 940 211 (11%)	10 421 816 (16%)
Whole tuna (containers - yellowfin)	0	2 758 611	4 137 916
Whole tuna (containers - bigeye)	0	0	0
Whole tuna (containers - skipjack)	0	0	0
Whole tuna (transshipment)	8 977 000	7 181 600	6 283 900
Costs	8 777 671	9 118 872 (4%)	9 238 292 (5%)
Tax on revenue	269 310	298 206	312 654
Fuel & oils	3 568 108	3 568 108	3 568 108
Gross wages & Salaries for Resident employees	73 296	73 296	73 296
Gross wages & Salaries for non-resident employees	1 353 013	1 353 013	1 353 013
Shipping costs (transshipment)	1 706 005	1 364 804	1 194 204
Shipping costs (containers)	0	341 201	460 621
Other running costs	1 254 092	1 566 397	1 722 550
Depreciation	553 846	553 846	553 846
Operating profits	199 329	821 339 (312%)	1 183 523 (494%)
Return on sales	2.2%	8.3% (272%)	11.4% (411%)
Return on investment	2.3%	9.0% (297%)	12.8% (464%)

Note: (1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from Marshall Islands thanks to an approved and functioning

CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

TABLE 34: OPERATIONAL ACCOUNTS FOR KOO'S, CURRENT AND UNDER UPGRADED SITUATIONS (IN USD)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from current in bracket)
Revenues	42 556 869	46 927 436 (10%)	49 201 081 (16%)
Whole tuna (containers - yellowfin)	558 142	13 023 318	19 534 977
Whole tuna (containers - bigeye)	0	0	0
Whole tuna (containers - skipjack)	0	0	0
Whole tuna (transshipment)	41 998 727	33 904 118	29 666 104
Costs	37 036 096	37 152 716 (0.3%)	36 979 305 (-0.2%)
Tax on revenue	1 276 706	1 407 823	1 476 032
Fuel & oils	9 989 661	9 989 661	9 989 661
Gross wages & Salaries for Resident employees	233 568	233 568	233 568
Gross wages & Salaries for non-resident employees	4 841 770	4 841 770	4 841 770
Shipping costs (transshipment)	7 981 514	6 443 200	5 637 800
Shipping costs (containers)	86 983	1 610 800	2 174 580
Other running costs	10 513 764	10 513 764	10 513 764
Depreciation	2 112 130	2 112 130	2 112 130
Operating profits	5 520 773	9 774 720 (77%)	12 221 775 (121%)
Return on sales	13.0%	20.8% (61%)	24.8% (91%)
Return on investment	15%	26.3% (76%)	33.1% (122%)

Note: (1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from the Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in the Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

4.3.3 Upgraded enabling environment

The upgrading strategy will result in an upgraded enabling environment with a Competent Authority (CA) approved by the European Union being able to verify the quality of fish products being exported from the Marshall Islands. The costs of the CA, housed within MIMRA, will be comprised primarily of its staff complement. The CA is already part-staffed, with staff having received training by the World Bank-financed PROP project and by the FFA. Additional staff, while not yet specified in terms of numbers, may need to be recruited with additional training being provided to ensure that their skills and expertise is sufficient to underpin this upgraded enabling environment. Improved laboratory facilities (microbiology, radiation, chemical) constructed and equipped to be able to verify the hygiene standards of fish being landed in and exported from the Marshall Islands, are also a critical aspect of approvals by the European Union for exports from the Marshall Islands to the European Union. The CA and laboratories will enable product landed in the Marshall Islands and then processed in canneries in Asia or further afield to be sold into high value European Union markets. The CA and the running costs of laboratories are expected to be self-financing. The fees from verification/certification of operations of fish being exported including testing in laboratories can be passed on to private sector fishing companies.

Additionally, the upgrading strategy incorporates activities which will result in an improved social environment for, and within which the VC operates. Examples include:

1. communication activities to increase the attractiveness of the sector to labour

2. communication and awareness raising with high-level politicians about the importance of the VC, in turn generating increased political support for the sector
3. a VC Task Force which will be comprised of government and private sector representatives, and which will 'champion' the VC and the upgrading strategy.

4.3.4 Upgraded governance

Thanks to the upgrading strategy, increased levels of containerisation are expected to enable catching sector companies to increase the level of sales made direct to canneries, rather than needing to rely on sales to/through one of the three large tuna brokers operating in the region. This will increase the first-sale value of their sales. Direct sales are already a common feature of tuna sales by the Marshall Islands-based catching sector companies exporting fish in containers but are expected to increase further with greater levels of containerisation. And increased levels of direct sales are also expected for foreign-flagged vessels increasing landing fish into the Marshall Islands for export in containers.

4.4 Anticipated sustainability impact

To complete the upgrading strategy development, the upgrading strategy is linked in this sub-section back to the sustainability impact it is expected to have, with sustainability encompassing economic, social and environmental aspects. Three questions are explored in this section:

1. Will the strategy lead to the realization of the vision and deliver impact at scale?
2. Will the strategy generate important positive or negative economic, social or environmental externalities?
3. Will the strategy increase the resilience of the VC?

4.4.1 Results of realising the vision

The **key economic, social and environmental performance indicators** under current and upgraded conditions are shown in the table below. These indicators clearly show the positive impacts of the upgrading strategy across the three elements of sustainability, particularly in terms of increased profitability and job generation, while causing no additional pressure on the main water and energy supply in Majuro.

The **aggregated current and future operational accounts of core VC actors** (see Table 36), and an analysis of containerisation activities (refer back to Table 30), show in more detail the economic sustainability impacts, again demonstrating positive impacts of upgrading.

TABLE 35: KEY ECONOMIC, SOCIAL, AND ENVIRONMENTAL PERFORMANCE INDICATORS UNDER CURRENT AND UPGRADED PRACTICES (AGGREGATED AT VC LEVEL)

Economic indicators	Current situation	Upgrading element 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from baseline in brackets)
Total revenues (USD)	122 160 173	131 760 581 (8%)	136 680 834 (12%)
Total profits (USD)*	3 771 843	9 696 097 (157%)	12 642 984 (235%)
Direct value added (USD)*	19 840 177	28 246 306 (42%)	32 973 874 (66%)
Number of jobs in core and extended VC	737	939 (27%)	1 079 (46%)
Number of FTE jobs in core VC for residents*	177	313 (76%)	410 (131%)
Total value of net wages for RMI residents (USD)	1 647 796	3 280 814 (99%)	4 472 310 (171%)
Total value added (USD)	44 345 350	55 069 533 (24%)	61 194 581 (38%)
Share of value added in national GDP (%)	36.3%	41.8% (15%)	44.8% (23%)
Net impact on the balance of trade (USD)*	-51 699 619	-21 623 788	-5 012 207
Net impact on public funds (USD)	3 029 004	3 749 862 (24%)	4 274 096 (41%)
Social indicators	Current situation	Upgrading element 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from baseline in brackets)
Net wages (for residents) as share of direct value added (%)	8%	10% (38%)	12% (57%)
No. of FTE jobs for women in core VC*	47	80 (70%)	102 (116%)
Share of women in total FTE jobs in the core VC (%)	27%	26% (-4%)	25% (-6%)

Share of direct value added captured by women (%)	1.0%	1.1% (13%)	1.2% (20%)
Proportion (%) of RMI resident labour in VC having some improvements in their employment conditions	74%	100% (34%)	100% (34%)
Proportion of products sold by RMI vessel owners direct to canneries rather than to tuna traders (%)	65	70 (8%)	75 (15%)
Environmental indicators	Current situation	Upgrading element 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from baseline in brackets)
Proportion (%) of mains Majuro water supply used by VC actors	3%	3% (0%)	3% (0%)
Number of companies in the VC having increased their use of solar or other renewable forms of energy	n/a	5	5

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Notes to table:

(1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from the Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in RMI, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

(2) Indicators shown with an * are those which are being measured across all FISH4ACP VCs.

(3) On “Net impact on public funds”: In upgrading situations, assume the same government revenue from VDS, the same government costs for transshipment and containerisation and assume that the lost transshipment fees will be compensated by increased container-related costs. The changes in this indicator will therefore come from increased government tax on increased profits from VC actors and increased government tax on wages/salaries from employees.

(4) On “Share of women in total FTE jobs in the core VC (%)” and “Share of direct value added captured by women (%)”: In upgrading situations, assume the number of jobs for women in core VC to increase by 15 (with upgrading elements 1, 2, & 4) and 25 (with all upgrading elements) as compared to baseline. As these new jobs will require working more than 8 hours/day, the increase in the number of FTE jobs will be higher than the increase in the number of jobs.

(5) Assumed national GDP stays the same as in baseline

(6) Assumed Pan Pacific Foods does not engage in improving cold store

(7) Assumed that increased electricity use by VC actor (Pan Pacific Foods) and support service providers (PII) due to increased containerisation and cold store would require increased supply from MEC and/or companies’ own supply. At the planning workshop, companies in the VC expressed a commitment to making investments to meet their own electricity needs so it can be expected that there will not be additional pressure on the main grid. Additionally, increased electricity generation by companies in the VC from renewable sources is expected.

Current **revenues, costs and profits at an aggregated level for core VC actors**, and those in the future based on upgrading strategies are as shown below.

TABLE 36: PROFITABILITY ASSESSMENT OF CORE VC ACTORS (AGGREGATED AT VC LEVEL), CURRENT AND UNDER UPGRADING (IN USD)

Item	Current situation	Upgrading elements 1, 2 & 4 (change from current in bracket)	Upgrading elements 1 - 4 (change from current in bracket)
Revenues	122 160 173	131 760 581 (8%)	136 680 834 (12%)
Gross revenue tax (GRT)	1 546 016	1 706 029 (10%)	1 788 687 (16%)
Costs	118 388 330	122 064 484 (3%)	124 037 849 (5%)
Operating profits	3 771 843	9 696 097 (157%)	12 642 984 (235%)
Return on sales	3%	7% (138%)	9% (200%)
Return on investment	3%	8% (149%)	10% (220%)

Notes: Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from the Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in the Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

4.4.2 Potential externalities

Potential externalities of the proposed upgrading strategy may be both positive and negative.

Potentially negative externalities include:

- Increase electricity use, leading to increased fuel use (as the increased use of renewable energy will not be able to meet the increased electricity demand, at least in the short- to medium term (a transition to renewables may take 10-20 years)). This increase in fuel use will lead to increased Green House Gas emissions, at least in the first 5-10 years. However, the VC needs

to be considered in the broader context of the Marshall Islands as a nation, and as noted earlier the government is making plans to offset increased emissions.

2. Increased sewage and other waste due to more vessels landing fish for containerisation. This externality is not however considered a high risk as the upgrading strategy does not assume increases in total vessel numbers visiting the Marshall Islands, rather just a shift in the balance of product being transshipped and containerized, with increased levels of containerisation expected at the expenses of fish being transshipped.
3. Impacts on domestic marketing of fish by local troll tuna vessels, if the sorting of purse seine tuna catch in RMI during the containerisation process results in quantities of rejected PS-caught tuna entering the local market, thereby distorting local market prices of tuna. Although currently, there is hardly any PS-caught tuna sold on the domestic market²⁵⁰, the potential leakages from the purse seine tuna VC to the domestic market due to increased containerisation will need to be monitored, with arrangements made to ensure any such rejects (if safe for consumption) provide the basis for new businesses (such as processing into tuna jerky) rather than impacting on existing domestic tuna fishermen.
4. Displacement of labour from other sectors of the economy as working in the tuna purse seine VC becomes more attractive. This externality is unlikely to be a serious concern, given that existing levels of unemployment in the Marshall Islands mean increased labour can be sourced from those currently out of work.

Potentially positive externalities include:

4. An increased volume and reduced cost of goods being brought into the Marshall Islands in the containers required to send tuna out of the Marshall Islands to canneries. Reefer containers may be used as 'dry' containers for the import of goods, and with increased levels of container traffic resulting from the demand by the VC, freight costs for the import of goods should decline.

²⁵⁰ Focus group discussion with domestic troll fishermen and market sellers in 2021.

5. Increased wages (as companies in the VC adjust their employment policies to attract more labour) and job opportunities in the VC (thanks to increased containerisation operations) may encourage some Marshall Islands citizens currently working in the United States of America to return to the Marshall Islands. This would generate economic multiplier effects in the economy and positive social benefits from returning citizens.
6. Increases in the use of renewable energy by the VC actors, may provide the catalyst for other sectors/businesses to consider investing in such energy systems.
7. If the financial viability of a cold store is demonstrated, it could be used for the storage of non-fish items, thus reducing the need for additional freezing capacity in the Marshall Islands. This eventually may however be limited given the convenience for store owners in the Marshall Islands of having their own reefer containers close to their stores to provide easy access to goods.

4.4.3 Resilience

Increased profits generated through the upgrading strategy, and a broader range of options for the VC in terms of modes of transporting fish from the Marshall Islands (more containerisation along with transshipment) and access to new buyers (e.g. direct sales to canneries) and markets (European Union), will contribute towards increasing the resilience of the VC.

When reflecting on the key domains of resilience discussed earlier in Section 3.4, it is expected that resilience of the VC will be enhanced by the cold store (if constructed) as it would allow for increases in 'redundancy' i.e. the ability of VC actors to retain catches in the Marshall Islands and to act as a buffer against fluctuations in supply to market due to catch variations.

Resilience will also be enhanced through implementation of the upgrading strategy, as its implementation will imply/require increased levels of connectivity and collaboration between the VC actors and the extended value chain.

Activities in the upgrading strategy related to increasing the levels of women's participation in the VC and ensuring that the VC is attractive for unskilled/low-skilled labour, will increase levels of 'participation and inclusion', thereby increasing resilience.

5 Implementation plan for the upgrading strategy

In this final section of the report, the upgrading strategy presented in Section 4 is translated into a VC upgrading implementation plan. This section includes four main components: (1) a logframe for the whole upgrading strategy, which will be used to monitor and evaluate the implementation and results of the strategy; (2) specification of the activity and investment plans for sustainably developing the value chain. This also covers the whole set of activities all VC stakeholders will have to engage in, as well as those specifically by the FISH4ACP project; (3) a detailed FISH4ACP project design (i.e. the role of the project in the overall plan); and (4) a risk analysis which reflects on the risks that could prevent the achievement of the envisioned impact, and which develops associated mitigation strategies affecting both the overall and project-specific plans.

5.1 Logframe for VC upgrading

A logframe for the VC upgrading is provided below. As with all logframes, it should be seen as a living framework to monitor and evaluate progress towards achieving the stated vision and upgrading strategy.

The logframe will be further discussed, validated, and refined (with missing indicator targets added) during an inception phase for the project at the beginning of 2022 (as discussed in Section 5.3)

Aspects of the logframe design to note include:

- vi) The impact reflects the vision statement.

- vii) Four outcomes reflect the four upgrading elements.
- viii) All outputs are attached to one outcome only.
- ix) Assumptions in the logframe at one level are those that must hold true to support result at the next level up i.e. an assumption at output level should be that which if holds true means a related outcome will be achieved.
- x) Interim targets are specified for the end of 2025, which would be the end of the FISH4ACP project, and will coincide with implementation of upgrading elements 1, 2 and 4 of the strategy.

TABLE 37: OVERALL LOGFRAME FOR VC UPGRADING

Impact	Impact indicator 1	2019 baseline		2025 target	2031 target	Assumptions
Increased exports from, and value addition and job creation in, the tuna purse seine (PS) value chain (VC) in the Marshall Islands (RMI)	Annual value in USD of exports from RMI purse seine vessels ²⁵¹	10 823 503	Planned	39 775 558	55 182 344	n/a
			Achieved			
			MoV	MIMRA records		
	Impact indicator 2	2019 baseline		2025 target	2031 target	
	Number of FTE jobs in tuna purse seine core VC in RMI (gender disaggregated)	177 (47 women)	Planned	313 (80 women)	410 (102 women)	
			Achieved			
			MoV	Survey of core value chain		
	Impact indicator 3	2019 baseline		2025 target	2031 target	
	Net impact of VC on balance of trade (USD)	-51 699 619	Planned	-21 623 788	-5 012 207	
			Achieved			
			MoV	Export statistics		
	Impact indicator 4	2019 baseline		2025 target	2031 target	
	Direct value-added at VC level (USD)	19 840 177	Planned	28 246 306	32 973 874	
			Achieved			
MoV			Survey of core value chain			
Impact indicator 5	2019 baseline		2025 target	2031 target		
Net impact of VC on public funds (USD)	3 029 004	Planned	3 749 862	4 274 096		
		Achieved				

²⁵¹ Note that this indicator relates only to exports by RMI-flagged vessels. Total exports of from RMI are expected to be USD 170 million by 2031 from containerized exports of 113 707 MT. These will be comprised of (1) whole tuna containerized, including catches by RMI and foreign-flagged, (2) Tuna loins from Pan Pacific Foods (converted to whole round weight), and (3) fishmeal from Pan Pacific Foods.

Outcome 1	Outcome indicator 1	2019 baseline	MoV	2025 target	2031 target	Assumptions (necessary for impact to be achieved)
Increased containerisation of PS-caught tuna for sale to canneries	Annual volume of PS-caught tuna leaving RMI in containers	16 000	Planned	75 000	110 000	<p>Container shippers can provide the necessary numbers of empty reefer containers</p> <p>Containerizing product makes financial sense given comparative costs of transport by reefer vessels and prices paid by canners/traders for fish</p> <p>Labour availability is not a constraint on increasing exports and increased containerized exports generate new jobs through the VC</p> <p>Tuna traders and canners support growth in containerized exports</p> <p>Containerisation facilitates higher prices paid by canneries, and therefore profits in VC</p> <p>Sufficient plug-in points are made available in the Marshall Islands</p>
			Achieved			
			MoV	MIMRA records		
Output 1.1	Output indicator 1.1	2019 baseline		2025 target	2031 target	Assumptions (for outcome 3 to be achieved)
Feasibility study conducted and	A grant mechanism (manual) in place	0	Planned	1	1	Current and potential containerisation companies will require, and be
			Achieved			

grant mechanism in place for blended finance for stuffing machines			MoV	Grant mechanism (manual). Star Loaders purchased.	interested in, blended finance with FISH4ACP to fund Star Loaders	
Output 1.2	Output indicator 1.2	2019 baseline		2025 target	2031 target	Assumptions (for outcome 1 to be achieved)
Container loading/stuffing machines are operational (and speed of stuffing containers therefore improved)	2 container stuffing machines are operational	0	Planned	2	2	Stuffing machines are a necessary requirement to improve the quality of fish being loaded into containers and therefore the demand for containerized exports
			Achieved			
			MoV	Visual inspection		
	Number of hours taken to stuff one container	2	Planned	1	1	Increased speed of stuffing containers maintains quality of fish and therefore demand by canneries for containerized product
			Achieved			
			MoV	Visual inspection/monitoring		
Output 1.3	Output indicator 1.3	2019 baseline		2025 target	2031 target	Assumptions (for outcome 1 to be achieved)
Reefer container engineers trained	Number of RMI-based engineers (gender disaggregated) trained in reefer maintenance	0	Planned	5 (X women - tbd)	10 (X women - tbd)	Containers can be maintained effectively
			Achieved			
			MoV	Records of training completed		

Output 1.4	Output indicator 1.4	2019 baseline		2025 target	2031 target	Assumptions (for outcome 1 to be achieved)
HACCP plans for containerisation are prepared	Number of companies with HACCP plans for containerisation in place	0	Planned	2	2	Companies engaged in containerisation will need to demonstrate hygiene standards to canneries if product destined for the European Union markets
			Achieved			
			MoV	HACCP plan documents		
Output 1.5	Output indicator 1.5	2019 baseline		2025 target	2031 target	Assumptions (for outcome 3 to be achieved)
Transport infrastructure linking shore-based facilities is upgraded	Number of infrastructure reconstructed/re-enforced	n/a	Planned	tbd	tbd	Repair of infrastructure may be necessary to ensure that containers can leave PII site and be transported to main dock for export
			Achieved			
			MoV	Engineering documentation and visual inspection		
Outcome 2	Outcome indicator 2	2019 baseline		2025 target	2031 target	Assumptions (necessary for impact to be achieved)
Increased landings in, and exports from, RMI to higher value markets	Volume of fish (MT) landed in RMI	16 000	Planned	75 000	110 000	New end markets (e.g European Union) and immediate markets (canners and traders) generating increased value added result from the CA approval and landings and sorting in RMI
			Achieved			
			MoV	MIMRA records		
Output 2.1	Output indicator 2.1	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
CA mandate provided by the European Union	CA mandated by DG SANTE	No	Planned	Yes	Yes	CA approval a requirement to incentivize landings by RMI and non-RMI flagged vessels in Majuro. If CA not initially approved based on current legislation and standards, additional activities to address DG SANTE requirements could be necessary.
			Achieved			
			MoV	Letter from DG SANTE		

Output 2.2	Output indicator 2.2	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
CA and private sector staff are trained in fish hygiene	5 CA and 40 private sector staff (gender disaggregated) received training	n/a	Planned	35 (X women tbd)	45 (X women tbd)	Quality of training provided is sufficient to result in the European Union approvals
			Achieved			
			MoV	Training records		
Output 2.3	Output indicator 2.3	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
Fish laboratories established	3 laboratories established	0	Planned	3	3	Quality of laboratory is sufficient to result in the European Union approvals for export to the European Union markets
			Achieved			
			MoV	Visual inspection		
Output 2.4	Output indicator 2.4	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
Fish laboratory Standard Operating Procedures (SOPs) prepared	10 SOPs prepared for different aspects of lab operations	0	Planned	10	10	Laboratory operations need to be to a standard to ensure hygiene and satisfy European Union approval
			Achieved			
			MoV	SOP documents		

Output 2.5	Output indicator 2.5	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
Audits of hygiene standards and investment requirements of RMI-flagged vessels and shore-based facilities are completed	12 vessels and 1 loining plant assessed for current standards and investment requirements	0	Planned	13	13	Vessels and onshore processing facilities may need to improve hygiene standards to be approved by CA for export to European Union markets
			Achieved			
			MoV	Audit reports		
Output 2.6	Output indicator 2.5	2019 baseline		2025 target	2031 target	Assumptions (for outcome 2 to be achieved)
Vessel and shore-based upgrades and improvements in processes made to meet hygiene standards	12 vessel and 1 loining plant investments made	0	Planned	13	13	Vessels and onshore processing facilities may need to improve hygiene standards to be approved by CA for export to European Union markets
			Achieved			
			MoV	Visual inspection and documentation of investments		
Outcome 3	Outcome indicator 3	2019 baseline		2025 target	2031 target	Assumptions (necessary for impact to be achieved)
Greater levels of storage and sorting of tuna in RMI prior to export	Volume of cold storage capacity in RMI (in MT)	2 000	Planned	2000	tbd based on studies	Cold storage is necessary to increase exports after sorting/storage and generates additional jobs Investment appraisal required to specify required capacity
			Achieved			
			MoV	Records of specifications for cold storage construction and visual inspection		

Output 3.1	Output indicator 3.1	2019 baseline		2025 target	2031 target	Assumptions (for outcome 3 to be achieved)
Cold storage feasibility study is completed	1 feasibility study completed	0	Planned	1	1	Investment appraisal indicates viability for expanded cold storage capacity in RMI
			Achieved			
			MoV	Feasibility study		
Output 3.2	Output indicator 3.2	2019 baseline		2025 target	2031 target	Assumptions (for outcome 3 to be achieved)
Financing sources are made available to fund cold store investments	MoU signed by financiers	0	Planned	1	1	Private sector likely to require external sources of finance (e.g. banks, IFC) to fund cold storage capacity increases
			Achieved			
			MoV	MoU from financiers		
Output 3.3	Output indicator 3.1	2019 baseline		2025 target	2031 target	Assumptions (for outcome 3 to be achieved)
Cold storage investment is made	Finance provided for cold store investments (USD)	n/a	Planned	0	tbd by studies	Greater levels of storage and sorting require increased cold storage capacity. Availability of electricity, water and fuel for cold store operations.
			Achieved			
			MoV	Financing documents		
Outcome 4	Outcome indicator 4	2019 baseline		2025 target	2031 target	Assumptions (necessary for other outcomes and overall impact to be achieved)
Improved social and environmental sustainability of the value chain	Share of the net wages for resident employees in direct value added (%)	8%	Planned	10%	12%	Achievement of outcomes 1-3 and the vision can all be supported by addressing social and environmental sustainability hotspots
			Achieved			
			MoV	Survey of companies in the VC		
	Number of KW produced by companies in the VC using solar power	0	Planned	Tbd	tbd	
			Achieved			
			MoV	Survey of companies in the VC		

Output 4.1	Output indicators for 4.1	2019 baseline		2025 target	2031 target	Assumptions (for outcome 4 to be achieved)
Research to address social hotspots completed	Number of communication products and events targeting youth and women to be attracted to work in the VC	n/a	Planned	tbd	tbd	Communication around VC upgrading required to support its implementation, to ensure youth are attracted to work in the VC, and to increase the status of the VC in national policy dialogue
			Achieved			
			MoV	Communication products (videos, flyers, etc)		
	Number of RMI companies in the VC making additional investments to increase job safety and reduce worker's compensation liability based on insurance carrier's standards	n/a	Planned	5	5	Better employment and working conditions will result in increased interest of labour to work in the VC
			Achieved			
			MoV	Survey of companies and employees and visual inspection of working conditions		
	Number of companies for which a cultural and gender audit has been completed	0	Planned	5	5	Benchmarking current performance allows companies to identify areas of improvements to increase female participation (a current social hotspot)
			Achieved			
			MoV	Audit reports		

Output 4.2	Output indicators for 4.2	2019 baseline		2025 target	2031 target	Assumptions (for outcome 4 to be achieved)
Research to address environmental hotspots completed	Number (5) of VC companies audited for water and energy use, grant mechanisms (1) to fund investments specified, and studies (1) completed aimed at increasing renewable energy	0	Planned	7	7	Benchmarking current performance allows companies to identify areas of improvements to reduce resource use and introduce renewable energy technology. Addressing the key environmental hotspots identified (low level of renewable energy use, water and electricity demands) would contribute to improved environmental sustainability of the VC.
			Achieved			
			MoV	Audit reports and study documents		
	Number of companies (5) having introduced energy efficiencies and having invested in solar or other renewable energy	0	Planned	5	5	
			Achieved			
			MoV	Site visits/observations		
	Number (1) of port studies completed assessing potential environmental improvements	0	Planned	1	1	
			Achieved			
			MoV	Port study document		

Output 4.3	Output indicators for 4.3	2019 baseline		2025 target	2031 target	Assumptions (for outcome 4 to be achieved)
Upgrading strategy Task Force established and functioning	Number of purse seine VC Task Force established	0	Planned	1	1	Task Force will need to be established from 2022 and to take over responsibility for driving implementation of strategy on completion of FISH4ACP. Necessary to engender support for the realization of social and environmental gains and risk mitigation, and to support overall implementation of the upgrading strategy

Notes: MoV = means of verification. Tbd = to be determined. There may be potential to use harmonized surveys (and other data collection methods) for various indicators in this logframe and those used for different country VCs

5.2 Activity and investment plans

For all outputs specified in the logframe above, one or more activities will need to be implemented for the outputs to be realised. In most (but not all cases), these activities will require associated costs/investments. The table below (Table 38) provides a summary list of activities in support of the different outputs. Some costs included in the table will need to be revised based on studies examining in more detail the feasibility and need for investments, and refinement of the cost estimates. It should also be noted that the level of investments identified in the table below is indicative and will have to be confirmed by the various parties involved.

Following the summary table below, information is provided for each activity on the key stakeholders involved, the costs/investments, the timing, along with a short description to aid with implementation.

The activity and investment plans in this section, in line with the logframe above, are for the whole upgrading strategy, rather than being FISH4ACP-specific.

TABLE 38: SUMMARY OF UPGRADING ACTIVITIES AND INVESTMENTS (IN USD)

In the table below:

- Activities to be funded by FISH4ACP are shaded in green²⁵²
- Activities to be funded by private sector are shaded in orange
- Activities to be funded by donors are shaded in yellow
- Activities to be funded by the government are shaded in grey
- Activities to be funded from blended sources (FISH4ACP and private sector) shaded in pink

Outcome 1: increased containerisation of PS-caught tuna for sale to canneries		Funding source	Total Costs (USD)	Type of cost	Timing (by)
Outputs	Activities				
Output 1.1 Feasibility study conducted and grant mechanism in place for blended finance for stuffing machines	Activity 1.1.1 Feasibility study and development of grant mechanism for acquiring container stuffing machines	FISH4ACP	25 000	Facilitation / studies	Jun 2022
Output 1.2 Container loading/stuffing machines are operational and speed	Activity 1.2.1 Purchase container loading machines	FISH4ACP and private sector	900 000	Plant and equipment	Mar 2023

²⁵² Based on current proposals. Contact between FISH4ACP and other donors may enable other donors picking up funding for some activities currently allocated for FISH4ACP funding

of stuffing containers improved					
Output 1.3 Reefer container engineers trained	Activity 1.3.1 Training reefer container engineers	FISH4ACP	25 000	Training	Sep 2022
Output 1.4 HACCP plans for containerisation prepared	Activity 1.4.1 Prepare HACCP plans for containerisation	FISH4ACP	25 000	Facilitation / studies	Sep 2022
Output 1.5 Infrastructure linking PII site to main port is upgraded	Activity 1.5.1 Conduct inspection and determination of need for upgrading transport infrastructure linking shore-based facilities	Government (Ministry of Works) ²⁵³	150 000	Facilitation / studies	Dec 2022
	Activity 1.5.2 If necessary, complete civil engineering works to increase/ensure structural integrity of transport infrastructure linking shore-based facilities	Government (Ministry of Works) ²⁵⁴	300 000	Infrastructure	Dec 2024
Outcome 2: Increased landings in, and exports from, the Marshall Islands to higher value markets					
Outputs	Activities				
Output 2.1 CA provided mandate by European Union	Activity 2.1.1 Send legislation and completed questionnaire to DG SANTE	MIMRA	n/a	Facilitation / studies	Dec 2021
Output 2.2 CA and private sector staff are trained in fish hygiene	Activity 2.2.1 Training provided for CA staff in fish hygiene issues	FISH4ACP	35 000	Training	Mar 2023
	Activity 2.2.2 Training provided for private sector in fish hygiene issues	FISH4ACP	40 000	Training	Jun 2023
Output 2.3 Fish laboratories are established	Activity 2.3.1 Construct and equip microbiology, radiation, and chemical and labs	MIMRA	2 300 000	Plant / equipment	Jun 2023
Output 2.4 Fish laboratory SOPs prepared	Activity 2.4.1 Prepare laboratory SOPs	Donor or FFA	35 000	Facilitation / studies	Jun 2023

²⁵³ Possible involvement and funding from JICA, but not yet certain

²⁵⁴ Possible involvement and funding from JICA, but not yet certain

Output 2.5 Audits of hygiene standards and investment requirements of RMI-flagged vessels and shore-based facilities are completed	Activity 2.5.1 Complete 12 vessel audits, investment specifications, and benefit-cost analysis of investments	FISH4ACP	40 000	Facilitation / studies	Mar 2023
	Activity 2.5.2 Complete audit of Pan Pacific Foods loining plant, and sites being used by existing or potential containerisation companies	FISH4ACP	25 000	Facilitation / studies	Mar 2023
Output 2.6 Vessel and shore-based upgrades and improvements in processes made to meet hygiene standards	Activity 2.6.1 Investments made in RMI-flagged vessels to meet European Union hygiene standards	Private sector	600 000	Plant / equipment	Dec 2023
	Activity 2.6.2 Investments made in loining plant to meet European Union hygiene standards	Private sector	100 000	Plant / equipment	Dec 2023
	Activity 2.6.3 Prepare vessel and shore-based Sanitary Standard Operating Procedures	FISH4ACP	35 000	Facilitation / studies	Dec 2022
Outcome 3: Greater levels of storage and sorting of tuna in RMI prior to export					
Outputs	Activities				
Output 3.1 Cold storage feasibility study is completed	Activity 3.1.1 Complete feasibility study of potential cold store in RMI	FISH4ACP	100 000	Facilitation / studies	Dec 2022
Output 3.2 Financing sources are available to fund cold store investments (if viable)	Activity 3.2.1 Agree arrangements for provision of finance from financiers to private sector for cold store investments	FISH4ACP	30 000	Facilitation / studies	Dec 2023
Output 3.3 Cold storage investment is made	Activity 3.3.1 Design, construct and put into operation cold storage facility	Private sector	5 000 000	Plant / equipment	Dec 2025
Outcome 4: Improved social and environmental sustainability of the VC					
Outputs	Activities				
Output 4.1 Research to address social hotspots completed and improvements actioned	Activity 4.1.1 Develop and disseminate communication products for social sustainability aspects of the upgrading strategy	FISH4ACP	70 000	Facilitation / studies	Jun 2025
	Activity 4.1.2 Investments made that help to prevent worker injuries and reduce worker's	Private sector	n/a	Facilitation / studies	Jun 2022

	compensation liability within current operations and shore-based facilities based on insurance carrier's standards				
	Activity 4.1.3 Complete cultural and gender audit of companies and provide guidance on interventions to improve cultural/gender sensitivity and job attractiveness of current operations and facilities	FISH4ACP	25 000	Facilitation / studies	Dec 2022
Output 4.2 Research to address environmental hotspots completed and improvements actioned	Activity 4.2.1 Complete energy and water audits of companies and provide guidance on interventions to improve sustainability of current operations and facilities	FISH4ACP	25 000	Facilitation / studies	Jun 2022
	Activity 4.2.2 Investments made in onshore facilities to improve energy and water sustainability and reliability of current operations	Private sector	250 000	Plant and equipment	Jun 2023
	Activity 4.2.3 Development of grant mechanism for acquiring off-grid solar power systems and hybrid solar diesel systems by/for the private sector	FISH4ACP	15 000	Facilitation / studies	Dec 2023
	Activity 4.2.4 Purchase of off-grid solar power systems and hybrid solar diesel systems by/for the private sector	FISH4ACP and private sector	250 000	Plant and equipment	Dec 2024
	Activity 4.2.5 Complete a study aimed at assessing port development needs, and increasing the use of renewable energy to meet the electricity needs of onshore VC activities within the Delap and PII port areas	FISH4ACP	35 000	Facilitation / studies	Mar 2024
Output 4.3 Upgrading strategy Task Force established	Activity 4.3.1 Organisation of a workshop to specify Task Force establishment	FISH4ACP	n/a	Facilitation / studies	Jun 2022
	Activity 4.3.2 Hold Task force bi-annual meetings	FISH4ACP	175 000	Facilitation / studies	Jun 2025

In the descriptions below, costs to be funded by FISH4ACP are indicated with an * under the line 'Costs and investments'. Costs for other activities will be financed by the stakeholders identified in the row above (Stakeholders and catalysts involved).

Activity number and name: Activity 1.1.1 Feasibility study and development of grant mechanism for acquiring container stuffing machines

Stakeholders or catalysts involved: FISH4ACP (working with local parties involved with containerisation)

Costs and investments: USD 25 000 *

Category of investment: Facilitation / studies

Timing: by June 2022

Description: Under this activity, the draft feasibility model included in this VC report will be further developed as part of a more detailed financial and technical feasibility study (working with the actors as appropriate) to assess the feasibility and impact of investment in the loading machines to be used when stuffing containers, with viability being a conditionality of grant funding. On the condition that the feasibility study demonstrates financial and technical viability of the loading machine(s), the activity would then develop a grant mechanism for the purchase of the loading machine(s), which includes the number of machine(s) to be supported under the grant mechanism, the criteria and processes for the selection of grantees, as well as the conditionalities for the management, maintenance and use of the machine(s). A potential financing option is that local operators would fund a certain percentage of the machines and co-investors (which may be FISH4ACP) provide finance for the remaining. Such co-financing options would aim to pilot test and demonstrate the benefits of using loading machine(s), which will in turn facilitate further adoption by the industry. Operating procedures (e.g. for the selection of suppliers, payment of matched contributions (by local operators), disbursement of funds (by co-investors), and reporting/monitoring of the use of the equipment) will also be prepared.

Activity number and name: Activity 1.2.1 Purchase container stuffing machines

Stakeholders or catalysts involved: FISH4ACP and companies engaged in containerisation

Costs and investments: USD 225 000 * (up to 25 percent of investment cost of USD 450 000 x 2). Private sector USD 775 000. Note: likely that advance payment will be required with balance on delivery. Given time to ship machines from South Africa, it is assumed that 50 percent of costs will be in 2022 and 50 percent in 2023.

Category of investment: Plant and Equipment

Timing: by March 2023

Description: Following the completion of Activity 1.1.1, stuffing/loading machines will be purchased from suppliers, potentially using blended finance (a grant mechanism), with arrangements made for shipping and provision to the Marshall Islands. Depending on the number of Star Loaders required and the finance required, and the funds available from FISH4ACP, it may be that some machines are provided with part grant funding from FISH4ACP based on a competitive bidding process, while others might be purchased solely by the private sector.

Activity number and name: Activity 1.3.1 Training reefer container engineers

Stakeholders or catalysts involved: FISH4ACP, shipping companies, companies engaged in containerisation

Costs and investments: USD 25 000 *

Category of investment: Training / TA

Timing: by September 2022

Description: Locally based engineers (around 5 in number initially) will be selected and trained in the loading and maintenance of refrigerated containers. Shipping companies may offer to provide training for locally based engineers, who will potentially be sent overseas (e.g. Philippines) for a 2-week training course. Or engineers could be trained in the Marshall Islands by trainers recruited on a short-term contract for this purpose. Training will enable engineers in the Marshall Islands to better maintain containers to reduce the risks of refrigeration failure and resulting spoilage of fish. Additional engineers may be trained over-time based on requirements resulting from increased levels of containerisation, and any loss of trained engineers (e.g. out-migration from the Marshall Islands of those trained). This will ensure a sufficient number of trained engineers to maintain reefer containers. This activity is critical for minimizing the risk of container freezing units malfunctioning, which in turn would result in fish spoilage and companies sending fish by container failing to meet supply contract obligations with traders and canners.

Activity number and name: Activity 1.4.1 Prepare HACCP plans for containerisation

Stakeholders or catalysts involved: FISH4ACP assisting companies engaged in containerisation

Costs and investments: USD 25 000 *

Category of investment: Facilitation / studies

Timing: by September 2022

Description: The preparation of HACCP plans for containerisation does not fall under MIMRA's mandate, and the private sector will be expected to put such plans in place to ensure fish hygiene standards as an integral part of the uptake in containerisation. FISH4ACP will provide an expert in HACCP to work with the private sector to help with the development of HACCP plans, which will be documented, and/or to review any plans already in place.

Activity number and name: Activity 1.5.1 Conduct inspection and determination of need for upgrading transport infrastructure linking shore-based facilities²⁵⁵

Stakeholders or catalysts involved: Government (Ministry of Works) (possible involvement of JICA)

Costs and investments: USD 150 000 (Government engineers to complete)

Category of investment: Facilitation / studies

Timing: by Dec 2022

Description: Infrastructure connecting the PII landing site with the main dock from which containers would leave the Marshall Islands, needs to be sufficient in terms of quality and structural integrity to handle the weight of lorries with containers filled with tuna. Containers when stuffed with tuna typically contain 23-26 tonnes of tuna, excluding the weight of lorries. Poor infrastructure is a risk to smooth container operations and movement of containers to/from the PII dock. This activity, along with Activity 1.5.2, will mitigate this risk. This activity would involve an assessment by structural engineers of the need for repair, upgrade, or a complete re-construction of infrastructure and associated costs (if any investments are necessary). The assessment report resulting from the activity will provide the basis for determining whether Activity 1.5.2 is necessary, and if so the specific budget necessary.

²⁵⁵ This activity may not be necessary if container ships are given authorisation to stop at the PII dock to collect containers, preventing the need for them to be moved by road to Delap dock

Activity number and name: Activity 1.5.2, If necessary, complete civil engineering works to increase/ensure structural integrity of transport infrastructure linking shore-based facilities ²⁵⁶

Stakeholders or catalysts involved: Government Ministry of Works (possible involvement of JICA)

Costs and investments: tbd based on activity 1.5.1 but assumed for the purpose of the investment table below to be USD 300 000

Category of investment: Infrastructure

Timing: by Dec 2024

Description: This activity is dependent on the assessment report from Activity 1.5.1 concluding that engineering works, in some capacity, are required to mitigate the risk of infrastructure failure at some point in the future.

Activity number and name: Activity 2.1.1 Send legislation and completed questionnaire to DG SANTE

Stakeholders or catalysts involved: MIMRA

Costs and investments: n/a

Category of investment: Facilitation and studies

Timing: by December 2021

Description: For DG SANTE to decide whether legislation in the Marshall Islands is sufficiently worded and provides the basis for MIMRA to have the mandate to be Competent Authority (CA), a copy of the legislation, along with a completed questionnaire, must be sent to the European Union. The European Union is then obliged to review the legislation and questionnaire and provide formal acknowledgement (or rejection) that MIMRA can be the CA with respect to fish hygiene and safety standards. While this does not mean that exports to the European Union can begin, as several other steps are required in terms of approving the CA processes and approving specific vessels and exporting establishments as compliant with European Union standards, it is an important first step. It is understood that the questionnaire has already been completed by the MIMRA CA, and that it will shortly be sent to DG SANTE along with the relevant legislation. If DG SANTE respond suggesting/requiring amendments to legislation as necessary, additional activities will need to be added to the strategy's implementation plan.

²⁵⁶ This activity may not be necessary if container ships are given authorisation to stop at the PII dock to collect containers, preventing the need for them to be moved by road to Delap dock

Activity number and name: Activity 2.2.1 Training provided for CA staff in fish hygiene issues

Stakeholders or catalysts involved: FISH4ACP (supporting CA staff)

Costs and investments: USD 35 000 *

Category of investment: Training / TA

Timing: by March 2023

Description: Staff in the CA have already received several trainings under the World Bank PROP project, and some staff already have significant capacities to fulfil the functions and requirements of a CA. These will include carrying out audits and inspections of vessels and on-shore facilities and having the capacity to do that as well as the associated paperwork. However, additional staff may need to be recruited and trained, and existing staff may benefit from additional refresher training on specific issues. This activity will thus provide budget from FISH4ACP for relevant training, to be determined in more detail at the outset of the implementation phase of FISH4ACP.

Activity number and name: Activity 2.2.2 Training provided for private sector in fish hygiene issues

Stakeholders or catalysts involved: FISH4ACP, (supporting private sector companies in the Marshall Islands, with additional support possible from World Bank)

Costs and investments: USD 40 000 *

Category of investment: Training / TA

Timing: by June 2023

Description: For fish to be approved for export to final markets in the European Union, private sector parties (owners of vessel owners, onshore companies engaged in containerisation, and any cold storage and/or loining operations) will need to ensure that their own staff are sufficiently trained to be able to ensure that European Union fish hygiene standards are complied with, so that their vessels and establishments are included on lists of those certified as being able to export fish to European Union markets. Even for product not entering European Union markets, there may be a need to improve fish hygiene standards. Some training has already been recently provided (under the WB PROP project), but additional and refresher training is required. This activity will thus involve and require detailed training programmes to be further specified early in 2022 in consultation with the private sector to determine need in more detail and those to be the focus of training (e.g. containerisation foremen), with a training programme then implemented. It will on earlier training already provided.

Activity number and name: Activity 2.3.1 Construct and equip microbiology, radiation, chemical labs

Stakeholders or catalysts involved: MIMRA, with technical support from USP and IAEA (International Atomic Energy Agency, for radiation lab)

Costs and investments: tbd, but assumed for the purpose of the investment table below (Table 39) to be USD 2.3 million

Category of investment: Plant and equipment

Timing: by June 2023

Description: Having laboratories constructed and equipped to be able to verify the hygiene standards of fish being landed in and exported from the Marshall Islands, is a critical aspect of approvals by the European Union for exports from the Marshall Islands to the European Union. Ground has already been broken as part of the construction work to build three laboratories. A combination of funding sources and technical support are being accessed for the construction and equipping of these labs. Labs may need to be ISO17025 accredited as part of the formal sign-off process on completion of their construction.

Activity number and name: Activity 2.4.1 Prepare laboratory SOPs

Stakeholders or catalysts involved: Donors or FFA

Costs and investments: USD 35 000

Category of investment: Facilitation / studies

Timing: by June 2023

Description: Following construction and equipping of the labs, as per the activity above, processes must be agreed and followed for the maintenance and running of the laboratories, to ensure that they are well run and can suitably verify hygiene standards for all approved vessels and establishments being used as the basis for exports of fish. The construction and equipping of laboratories on their own will not be sufficient. Standard Operating Procedures will need to be developed in a standard format, which can be followed, and updated over time (with careful documentation of change processes). These SOPs may be numerous in number, and some very technical in nature as related to the chemical and micro-biological tests to be conducted, with others being related more to management arrangements for the labs. It is expected that SOPs used in CA labs in other countries can be taken and adapted for use in the Marshall Islands to reflect any special requirements and conditions. While not yet confirmed, a future WB-financed PROPER project may fund this activity, or alternatively support may be accessed from FFA.

Activity number and name: Activity 2.5.1 Complete 12 vessel audits, investment specifications, and benefit-cost analysis of investments

Stakeholders or catalysts involved: FISH4ACP (supporting MIMRA and catching sector companies in the VC)

Costs and investments: USD 40 000 *

Category of investment: Facilitation / studies

Timing: by March 2023

Description: For fish to be approved for export to final markets in the European Union, private sector parties (owners of vessel owners) will need to ensure that their vessels are sufficient in terms of the specification and standards of equipment onboard, to be

able to ensure that European Union fish hygiene standards are complied with. There will be a requirement for their vessels and establishments to be included on lists of those certified as being able to export fish to European Union markets, as approved by the CA. Audits of Marshall Islands-flagged vessels will be completed to benchmark current equipment and infrastructure against those necessary to meet European Union standards. Each company will be provided with a list of investments requirements necessary to meet European Union standards. The activity will include an outline of the benefits/costs of making such investments to aid companies with decision-making as to which and whether specific investments make commercial sense.

Activity number and name: Activity 2.5.2 Complete audit of loining plant facilities, and sites being used by existing or potential containerisation companies

Stakeholders or catalysts involved: FISH4ACP (supporting companies involved in loining and containerisation)

Costs and investments: USD 25 000 *

Category of investment: Facilitation / studies

Timing: by December 2023

Description: This activity follows the same logic as that for vessels (Activity 2.5.1) but focusing on potential investments necessary in shore-based facilities to meet European Union standards.

Activity number and name: Activity 2.6.1 Investments made in Marshall Islands-flagged vessels to meet European Union hygiene standards

Stakeholders or catalysts involved: Companies in the VC

Costs and investments: tbd based on Activity 2.5.1, but assumed for the purpose of the investment table below to be USD 50 000 per vessel (or USD 600 000 for 12 vessels)

Category of investment: Plant and Equipment

Timing: by December 2023

Description: Following Activity 2.5.1, companies would then need to make their own assessments as to whether making those investments are sensible from a financial perspective given the positive impacts that selling to end markets in the European Union could have on sales prices paid by canneries, and therefore their profitability. However, the assumption is that at least some of the VC catching sector actors would choose to do so. This would involve procuring and installing new equipment onboard vessels or making equipment improvements/upgrades to existing equipment onboard.

Activity number and name: Activity 2.6.2 Investments made in loining plant and containerisation sites to meet European Union hygiene standards

Stakeholders or catalysts involved: Companies in the VC

Costs and investments: tbd based on Activity 2.5.2, but assumed for the purpose of the investment table below to be USD 100 000

Category of investment: Plant and Equipment

Timing: by December 2023

Description: Following Activity 2.5.2, relevant companies would then need to make their own assessments as to whether making those investments are sensible from a financial perspective given the revenues resulting from loining, and containerisation, operations. However, the assumption is that at least some of the VC catching sector actors would choose to do so.

Activity number and name: Activity 2.6.3 prepare vessel and shore-based Sanitary Standard Operating Procedures

Stakeholders or catalysts involved: FISH4ACP (in collaboration with companies in the VC)

Costs and investments: USD 35 000 *

Category of investment: Facilitation / studies

Timing: by Dec 2022

Description: Processes must be agreed, documented, and followed for vessels and shore-based plant, to ensure that they are well run and comply with good hygiene standards. It is expected that SOPs used for such purposes in other countries can be taken and adapted for use in the Marshall Islands to reflect any special requirements and conditions.

Activity number and name: Activity 3.1.1 Complete feasibility study of potential cold store in the Marshall Islands

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 100 000 *

Category of investment: Facilitation / studies

Timing: by Dec 2022

Description: A full and comprehensive feasibility study of a potential cold store will involve an assessment of the investment in a range of different sizes of cold store (potentially from 5 000 to 10 000 tonnes of cold storage capacity). The study will look at the financial viability of such investment, as well as the infrastructure and architecture aspects of the cold store (e.g. to be climate resilient) and potential operation/management model(s) for the cold store. The assessment will make detailed forecasts of operating accounts, balance sheets, and cash flow forecasts for the cold store; and will provide calculation of net present values and both economic and financial internal rates of return. Consideration could also be given to developments in a phased and modular form with expansion over time as/if demand is realised and increases. Additionally, the feasibility study will also include an assessment of the potential social and environmental impacts (positive and negative) of any future investment, consideration of optimal siting, integration of renewable energy and environmentally friendly design to the full extent possible, and clear articulation of major risks associated with any future investment. Given this envisioned scope, the conduct of the study will require strong collaboration with the private sector in data collection and identification of recommendations.

Activity number and name: Activity 3.2.1 Agree arrangements for provision of finance from financiers to private sector for cold store investments

Stakeholders or catalysts involved: FISH4ACP (working with finance providers and private sector)

Costs and investments: USD 30 000 *

Category of investment: Facilitation / studies

Timing: by Dec 2023

Description: Subject to positive results of the feasibility study completed during Activity 3.1.1, this activity will investigate and agree a range of potential sources of finance and the conditionalities on which finance could be provided. Financiers may include development banks such as the International Finance Corporation, or other innovative sources of funding such as sustainability/green investment funds. The activity would involve FISH4ACP playing a brokering role between potential private sector investors in the Marshall Islands and potential financing sources.

Activity number and name: Activity 3.3.1 Design, construct and put into operation cold storage facility

Stakeholders or catalysts involved: Private sector investors and financiers

Costs and investments: tbd but assumed for the purpose of the investment table below (Table 39) to be USD 5 million)

Category of investment: Plant and equipment

Timing: by Dec 2025

Description: This activity is contingent on completion of activity 3.1.1 and 3.2.1, and private sector operators deciding to proceed with investments. It would involve detailed design work, construction, and installation of all cold store equipment by a relevant private sector party. As noted above, if viable and financing sources are identified, developments could take place on a modular basis to test demand for use of cold storage space as containerisation business increases.

Activity number and name: Activity 4.1.1 Develop and disseminate communication products for social sustainability aspects of the upgrading strategy

Stakeholders or catalysts involved: FISH4ACP (in association with MIMRA, and national NGO Institutes e.g. Jibron Ae, Women United Together Marshall Islands

Costs and investments: USD 70 000 *

Category of investment: Facilitation / studies

Timing: ongoing 2022 to June 2025

Description: This activity entails producing at least four communication products (videos, flyers, etc) and three community events (dialogues, training workshops, awareness raising events, etc), altogether aimed to ensure youth are attracted to work in the VC, to advocate for improvements in women's position in and benefits from the VC, and to increase the status of the VC in national policy dialogues. All materials and events will be developed and organized in partnership with national institutes to strengthen their capacity in supporting VC development. Funding will provide to produce physical and digital communication products, and the hosting of events to be convened as fora including an inaugural VC forum in 2022 and a second VC forum in 2024. Scheduling will be determined based on the optimal availability of targeted participants and key facilitators. One of the events will be a facilitatory workshop on shore-based employment opportunities in quality assurance and management as well as entrepreneurial possibilities within the VC upgrading strategy, and which will target Marshallese immigrants presently living and working in the meat processing industry abroad as well as members of the domestic private sector, in particular women and youth entrepreneurs. The products and events will contain standard FISH4ACP and MIMRA visual identity elements, and complement the FISH4ACP Communications and Visibility Plan in 2022 and 2023.

Activity number and name: Activity 4.1.2 Investments made that helps to prevent worker injuries and reduce worker's compensation liability within current operations and shore-based facilities based on insurance carrier's standards

Stakeholders or catalysts involved: Private sector companies

Costs and investments: n/a

Category of investment: Facilitation / studies

Timing: by June 2022

Description: This process will be completed by all private sector companies operating in the VC in the Marshall Islands, in association with their staff. Even those labour not employed on a permanent basis in the VC as employees but rather recruited on a more informal and part-time basis in an environment of reduced safety risk and job security. Private sector companies will investigate ways to reduce safety risks and make associated investments to do so.

Activity number and name: Activity 4.1.3 Complete cultural and gender audit of companies and provide guidance on interventions to improve cultural/gender sensitivity and job attractiveness of current operations and facilities

Stakeholders or catalysts involved: FISH4ACP (in collaboration with companies in the core and extended VC)

Costs and investments: USD 25,000 *

Category of investment: Facilitation / Studies

Timing: by Dec 2022

Description: Locally-based culture and gender sensitivity experts will conduct audits of companies' onshore operations and facilities. The audits will cover social hotspots identified during the value chain analysis (limited number of locals and women in supervisory positions, high employee turnover) and identify areas of operations that might provide opportunities for targeted interventions to improve the accessibility and attractiveness of employment within the value chain. The aim of the audit will be to identify a list of measures that each company can take to improve employee efficiency and the reliability of their operations. It is expected that some of the measures identified, when successfully implemented, will also result in greater productivity and value. Companies would make their own assessments as to whether making any of the recommended changes to operations is appropriate from an operational and financial standpoint.

Activity number and name: Activity 4.2.1 Complete energy and water audits of companies and provide guidance on interventions to improve sustainability of current operations and facilities.

Stakeholders or catalysts involved: FISH4ACP in collaboration with companies in the core and extended VC

Costs and investments: USD 25 000 *

Category of investment: Facilitation/studies

Timing: by June 2022

Description: This activity will involve conducting environmental sustainability audits of companies' onshore operations and facilities. The audits will cover environmental hotspots identified during the value chain analysis (energy use, water use, and waste management) and any other areas of operations that might provide opportunities for targeted interventions to improve the reliability and environmental sustainability of operations. The aim of the audit will be to identify a list of measures that each company can take to improve resource efficiency and reliability of their operations and reduce their environmental impacts. It is expected that some of the measures identified, when successfully implemented, will also result in some financial savings. Companies would make their own assessments as to whether making any of the recommended changes to operations is appropriate from an operational and financial standpoint.

Activity number and name: Activity 4.2.2 Investments made in onshore energy and water facilities to improve sustainability and reliability of current operations.

Stakeholders or catalysts involved: Companies in the VC

Costs and investments: tbd based on Activity 4.2.1 but assumed for the purpose of the investment table below (Table 39) to be USD 250 000

Category of investment: Plant and Equipment

Timing: by June 2023

Description: Following Activity 4.2.1, companies would then need to make their own assessment as to whether making those investments/interventions are sensible from a financial and operational perspective. However, the assumption is that at least some of the companies would choose to do so.

Activity number and name: Activity 4.2.3 Development of grant mechanism for acquiring off-grid solar power systems and hybrid solar diesel systems by/for the private sector

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 15 000 *

Category of investment: Facilitation/Studies

Timing: by December 2023

Description: Following Activity 4.2.1 and to support Activity 4.2.4, this activity would develop a grant mechanism for the purchase of solar power systems, which includes the number of system(s) to be supported under the grant mechanism, the criteria and processes for the selection of grantees, as well as the conditionalities for the management, maintenance and use of the system(s). A potential financing option is that companies (PPF, Pan Pacific Foods, MIFCO, Koo's, PII) would fund a certain percentage of the systems and FISH4ACP provide finance for the balance. Such co-financing options would aim to pilot test and demonstrate the benefits of using solar power systems to meet electricity needs which will in turn facilitate further adoption by the industry. Operating procedures (e.g. for the selection of suppliers, payment of matched contributions (by local operators), disbursement of funds (by co-investors), and reporting/monitoring of the use of the equipment) will be prepared.

Activity number and name: Activity 4.2.4 Purchase of off-grid solar power systems and hybrid solar diesel systems by/for the private sector

Stakeholders or catalysts involved: FISH4ACP working with companies engaged in their own power production

Costs and investments: USD 87 500 * (up to 35 percent of total investment cost of USD 250 000). Balance (USD 162 500) to be invested by companies

Category of investment: Plant and Equipment

Timing: by Dec 2024

Description: Following the completion of Activity 4.2.3, solar power systems / hybrid solar diesel power systems will be purchased from suppliers, potentially using blended finance (a grant mechanism), with arrangements made for shipping, installation and training in the Marshall Islands. Depending on the number of systems and the finance required, and the funds available from FISH4ACP, it may be that some systems are purchased with part grant funding from FISH4ACP based on a competitive bidding process, while others might be purchased solely by the private sector.

Activity number and name: Activity 4.2.5 Complete a study aimed at assessing port development needs and increasing the use of renewable energy to meet the electricity needs of onshore VC activities within the Delap and PII port areas.

Stakeholders or catalysts involved: FISH4ACP (in collaboration with National Energy Office)

Costs and investments: USD 35 000 *

Category of investment: Facilitation / studies

Timing: by March 2024

Description: Increases in containerisation and a changed pattern in the usage of dock space at Delap and PII may require associated upgrades in port infrastructure and equipment, which will be assessed through this study. The study will also involve a full and comprehensive feasibility of options for increasing renewable energy within the Delap dock area, from meeting a portion of individual company energy demands through to servicing all or part of the various functions of upgraded port facilities (e.g. containerisation operations, cold store, waste management, lights, offices etc.). The study will look at several options including increasing in-house solar power production at company level and feasibility of an independent power producer (e.g. standalone corporation or cooperative) using solar power in combination with another renewable energy or a hybrid solar-diesel system. It will look at the legal (where relevant), financial and technical viability of all options and will include detailed consultations with relevant government ministries, make forecasts of power generating capacity, operating accounts, balance sheets, and cash flow forecasts, and will provide a calculation of economic and financial rates of return. Consideration could also be given to developments in a phased and modular form with expansion over time if demand is realised and increases. Additionally, the feasibility study will also include an assessment of the potential social and environmental impacts (positive and negative), as well as financing options including green bonds/loans.

Activity number and name: Activity 4.3.1 Organization of a workshop for establishing Task Force composition/membership

Stakeholders or catalysts involved: FISH4ACP and MIMRA

Costs and investments: n/a

Category of investment: n/a

Timing: by June 2022

Description: The Task Force will play a critical role in overseeing, driving and helping to facilitate implementation of the whole upgrading strategy, both during the FISH4ACP project and thereafter. A stakeholder workshop will be held to discuss the Terms of Reference for its operation and functioning to include aspects related to its mandate (e.g. support the sustainable development of the VC for the benefits of the society and the natural environment, promote and kick-start business innovative ideas/solutions to address VC's constraints), its composition (selected from relevant and defined stakeholders in governmental and private sector organisations, but likely to be around five in number), its principal office holders (specification of any specific positions in the Task Force (e.g. Chairman, etc), the duration that office holders should retain their positions and arrangements for approval of new individuals to the Task Force over time should it be necessary, and individual and collective responsibilities and obligations. These obligations may include the requirement to meet at specified intervals (likely to be at least twice a year and potentially more frequently), reviewing the implementation status of the upgrading strategy to identify any problems and identify solutions, reporting outputs from meetings in terms of meeting minutes, and actively engaging in other activities and projects to support the VC that have not so far been identified. Agreement over the ToR will represent an important output of the workshop and should also include arrangements for covering costs for the Task Force's activities.

Activity number and name: Activity 4.3.2 Hold Task Force bi-annual meetings

Stakeholders or catalysts involved: FISH4ACP / Task Force members

Costs and investments: USD 175 000 * (USD 50 000 per year 2022-24 and USD 25 000 for first 6 months of 2025)

Category of investment: n/a

Timing: Ongoing from June 2022 to June 2025

Description: Once appointed and being guided by the ToR developed by Activity 4.3.1 above, the Task Force will meet at the required frequency to provide its oversight and direction for the upgrading strategy. As implied/suggested above, meetings are likely to take place at least every six months, and will be briefly documented through meeting minutes, which should provide practical solutions and direction to address any problems or issues arising with strategy implementation but also more widely within the VC. Additionally, the Task Force will be expected to function as a 'think tank' to discuss additional ideas for VC improvements over time that may not have yet been articulated. This activity also provides for MIMRA's involvement not just in the Task Force but also more broadly in engaging with and overseeing implementation of strategy.

Drawing on the information provided above, the investment table (Table 39) below provides an overview of the investments needed to realize the vision and how these investments are expected to be financed. The table also illustrates how blended finance strategies can be applied to fund investment in the upgraded business models identified in the VC strategy. Costs related to element 1 of the strategy account for 13 percent of total costs, element 2 accounts for 30 percent of total costs, element 3 for 48 percent of total costs (with USD 5 million estimated for cold store investments, subject to the findings of the feasibility study), and element 4 for 8 percent of costs. This means that if the cold store feasibility study (Activity 3.1.1) advises against proceeding with cold store investments, total costs to implement the strategy would be significantly reduced.

TABLE 39: VC UPGRADING INVESTMENT TABLE (USD)

In USD	Financing sources				Total
Type of investment	Donors	FISH4ACP	Government	Private sector	Totals by type
Equipment		312 500	2 300 000	6 537 500	9 150 000
Facilitation/studies	40 000	625 000	150 000	0	815 000
Training		100 000			100 000
Infrastructure			300 000	250 000	550 000
Totals by source	40 000	1 037 500	2 750 000	6 787 500	10 615 000

Note: 1/ A 10 percent contingency on FISH4ACP investments is recommended. 2/ some investments dependent on studies providing sufficient justification and more detailed costings. 3/ FISH4ACP investments do not include costs of national project officer or PMU costs in FAO/Rome supporting project implementation. 4/ costs currently allocated to the Government related infrastructure linking shore-based facilities, may be picked up by JICA and so could potentially be allocated to donors.

TABLE 40. KEY STAKEHOLDERS AND CATALYSTS INVOLVED IN THE UPGRADING STRATEGY AND ITS FOUR ELEMENTS

Upgrading strategy elements	Key stakeholders and catalysts involved
Increased containerisation (of PS-caught tuna for sale to canneries)	<ul style="list-style-type: none"> • MIFCO, Koo's and PPF (core VC actors in catching sector) • Pan Pacific Foods and PII, and MIFV²⁵⁷ (all currently engaged with containerisation) • Majuro Stevedore & Terminal Co (MSTC) (operator at Delap Dock, with container plug-in points) • FISH4ACP project for blended finance for container stuffing machines, and training of refrigeration engineers and shore-side labour • Container shipping companies • Government and possibly JICA for assessing (and if necessary) upgrading infrastructure linking shore-based facilities
Increased landings in RMI (and exports to higher value markets)	<ul style="list-style-type: none"> • CA staff in MIMRA (some staff already recruited, others to be appointed) • Private sector owners of fishing vessels and onshore facilities who may require training and support to improve fish hygiene and food safety standards, and who may need to make investments • FISH4ACP and other donors such as the World Bank providing financial resources for studies, training, and laboratory investments
Greater levels of storage and sorting of tuna in RMI prior to export	<ul style="list-style-type: none"> • FISH4ACP project to finance detailed investment appraisal / financial feasibility study • Pan Pacific Foods (operator of existing 2000 MT capacity cold store) • PII (interested in establishing a cold store at the 'Kramer' dock) • Financiers
Improved social and environmental sustainability of the value chain	<ul style="list-style-type: none"> • MIFCO, Koo's and PPF (core VC actors in catching sector) • Pan Pacific Foods and PII • Service/inputs companies based in RMI

To aid with implementation and planning, a provisional scheduling and drawn-down of FISH4ACP funds is provided in the table below (only for those activities to be funded by FISH4ACP) over the life of the project (2022– 2025). The draft scheduling will be reconsidered on project initiation in the Marshall Islands as part of the short 'inception period' discussed below (see Section 5.3). The scheduling of activities and budget will also need to reflect the ability of the PMU in FAO/Rome to provide management and support across the whole FISH4ACP programme i.e. 12 countries and value chains, without bottlenecks in implementation being experienced.

²⁵⁷ A longline fishing company but currently containerizing catch for some purse seine vessels in Majuro

TABLE 41: PROPOSED PHASING OF FISH4ACP INVESTMENTS, 2022 – 2025 (USD)

Activity	2022	2023	2024	2025	USD total
Increased containerisation of PS-caught tuna for sale to canneries					
Activity 1.1.1 Feasibility study and development of grant mechanism for acquiring container stuffing machines	\$ 25 000	\$ -	\$ -	\$ -	\$ 25 000
Activity 1.2.1 Purchase container stuffing machines *	\$ 112 500	\$ 112 500	\$ -	\$ -	\$ 225 000
Activity 1.3.1 Training reefer container engineers	\$ 25 000	\$ -	\$ -	\$ -	\$ 25 000
Activity 1.4.1 Prepare HACCP plans for containerization	\$ 25 000	\$ -	\$ -	\$ -	\$ 25 000
Increased landings in, and exports from, RMI to higher value markets					
Activity 2.2.1 Training provided for CA staff in fish hygiene issues	\$ -	\$ 35 000	\$ -	\$ -	\$ 35 000
Activity 2.2.2 Training provided for private sector in fish hygiene issues	\$ -	\$ 40 000	\$ -	\$ -	\$ 40 000
Activity 2.5.1 Complete 12 vessel audits and investment specifications	\$ -	\$ 40 000	\$ -	\$ -	\$ 40 000
Activity 2.5.2 Complete audit of loining plant facilities, and sites being used by existing or potential containerization companies	\$ -	\$ 25 000	\$ -	\$ -	\$ 25 000
Activity 2.6.3 Prepare vessel and shore-based Sanitary Standard Operating Procedures	\$ 35 000	\$ -	\$ -	\$ -	\$ 35 000
Greater levels of storage and sorting of tuna in RMI prior to export					
Activity 3.1.1 Complete feasibility study of potential cold store in RMI	\$ 100 000		\$ -	\$ -	\$ 100 000
Activity 3.2.1 Agree arrangements for provision of finance from financiers to private sector for cold store investments	\$ -	\$ 30 000	\$ -	\$ -	\$ 30 000
Improved social and environmental sustainability of the value chain					
Activity 4.1.1 Develop and disseminate communication products for social sustainability aspects of the upgrading strategy	\$ 20 000	\$ 20 000	\$ 20 000	\$ 10 000	\$ 70 000
Activity 4.1.3 Complete cultural and gender audit of companies and provide guidance on interventions to improve cultural/gender sensitivity and job attractiveness of current operations and facilities	\$ 25 000	\$ -	\$ -	\$ -	\$ 25 000
Activity 4.2.1 Complete energy and water audits of companies and provide guidance on interventions to improve sustainability of current operations and facilities	\$ 25 000	\$ -	\$ -	\$ -	\$ 25 000
4.2.3 Development of grant mechanism for acquiring offgrid solar power systems and hybrid solar diesel systems by the private sector	\$ -	\$ 15 000	\$ -	\$ -	\$ 15 000
Activity 4.2.4 Purchase of off-grid solar power systems and hybrid solar diesel systems	\$ -	\$ -	\$ 87 500	\$ -	\$ 87 500
Activity 4.2.5 Complete a study aimed at increasing the use of renewable energy to meet the electricity needs of onshore VC activities within the upgraded Delap and PII port areas	\$ -	\$ -	\$ 35 000	\$ -	\$ 35 000
Activity 4.3.2 Task force meetings and upgrading oversight	\$ 50 000	\$ 50 000	\$ 50 000	\$ 25 000	\$ 175 000
Total	\$ 442 500	\$ 367 500	\$ 192 500	\$ 35 000	\$ 1 037 500

* assumes 50% advance payment required end of 2022 with balancing payment on delivery early 2023

Note: FISH4ACP investments in this table do not include costs of national project officer or PMU costs in FAO/Rome supporting project implementation

5.3 FISH4ACP project activities and modalities

5.3.1 Project onboarding / start up

The intention is for the main project phase of FISH4ACP in the Marshall Islands to continue seamlessly from the design phase and the completion of this report, without any interruption. Delays in start-up would jeopardise the momentum that has been gained towards the end of the design phase, especially through the planning workshop, and could negatively impact implementation.

Most critically and urgently in achieving this is a need in **February 2022** to:

- Recruit a national project consultant. This individual will be based in the Marshall Islands.
- Negotiate and sign a Letter of Agreement (LoA) with MIMRA. This LoA will specify MIMRA's role in supporting the FISH4ACP project along with its obligations to deliver activities specified in the implementation plan (notably Activity 4.3.2).

The main project phase is expected to start in **2022**, and to run until **February 2025**, which is the overall FISH4ACP programme will finish.

The project will start in January with an **inception phase**, which will run from January to April 2022. This phase is critical for additional planning and stakeholder engagement prior to the implementation of upgrading strategy activities. During the inception period the following tasks will be completed, through a collaborative approach between the national project consultant, the PMU in Rome, and MIMRA.

1. Insert targets into the logframe where currently not provided (e.g. gender-based targets).
2. Re-consider/confirm the proposed phasing of activities to be funded by FISH4ACP in light of the requirements of the overall FISH4ACP programme to support VCs in other countries and the ability of the PMU to effectively backstop activities in the Marshall Islands without delays.
3. Obtain approval from key public and private stakeholders on this design report and the implementation plan (and any amendments based on tasks 1 and 2 above).
4. Complete launch activities. These may involve joint FAO/MIMRA press releases and launch workshops in which relevant stakeholders to make endorsements of the strategy and their proposed involvement in it through the activities.

5. Obtain additional reports and background literature²⁵⁸ that may be relevant to the upgrading strategy, particularly those that may have covered similar ground to activities proposed. For example, if feasibility studies of investments have been completed before, they may either provide the starting point for activities and studies proposed in the implementation plan, or mean that some activities/studies may not be necessary as would be duplicative.
6. Identification of Task Force members (Activity 4.3.1).
7. Preparation of a project implementation manual. This will elaborate on the contents of this report and provide more practical information for the national project consultant and MIMRA about arrangements for implementation. Its contents should include at a minimum:
 - Specification of institutional arrangements
 - General processes for consultant recruitment
 - Draft ToR templates
 - Procurement details/rules
 - Arrangements for monitoring and evaluation
 - Financial management requirements

²⁵⁸ These may include, but are not limited to, any documents/studies from JICA and WB (or others) about port infrastructure, infrastructure linking shore-based facilities, cold storage, and the CA work and investments needed for constructing/equipping the labs.

5.3.2 Non-financial resources, partners and pre-conditions for FISH4ACP supported activities

For those activities detailed above in Section 5.2 which involve the FISH4ACP project, additional information is provided below on the non-financial resources required, the partners, and pre-conditions that will be required. Activity numbering uses the same numbering as in Section 5.2 above, meaning that activity numbers not involving the FISH4ACP project are excluded.

In all cases where activities require as a pre-condition that ToR are prepared and approved, ToR will be developed by the national project consultant – see more below, before being approved by both the PMU and the potential partners involved in the activity. This will ensure that the work carried out meets the needs of the partners/beneficiaries.

TABLE 42: FISH4ACP PROJECT DESIGN

Activity number and name description	Resource required (non-financial)	Potential partners	Pre-conditions for support being provided
Activity 1.1.1 Feasibility study and development of grant mechanism for acquiring container stuffing machines	Finance and legal experts	Private sector investors	Confirmed interest in principle from potential private sector actors to commit their own resources. ToR for study prepared and approved.
Activity 1.2.1 Purchase container stuffing machines	Procurement experts	Private sector investors, providers of container stuffing machines	Activity 1.1.1 (more detailed feasibility study) confirms initial financial viability of container stuffing machines contained in this report Confirmed interest from potential private sector actors to commit their own resources for the balance of costs not provided by FISH4ACP. Legal agreements in place between FISH4ACP and beneficiaries covering use and maintenance of equipment provided with FISH4ACP funds. Suppliers commit to penalties in the form of reductions to payments for any late supply.

Activity number and name description	Resource required (non-financial)	Potential partners	Pre-conditions for support being provided
Activity 1.3.1 Training reefer container engineers	Reefer container engineers	Container shipping companies to provide trainers	Engineers in RMI identified and available for training. ToR for trainers prepared and approved.
Activity 1.4.1 Prepare HACCP plans for containerisation	HACCP and fish hygiene experts	Companies involved in container business	Companies involved in container business provide written confirmation of interest in developing plans. ToR for experts prepared and approved.
Activity 2.2.1 Training provided for CA staff in fish hygiene issues	HACCP and fish hygiene experts and trainers	CA staff/MIMRA	Previous training provided articulated to avoid duplication or justify need for refresher training, with training focusing on capacity gaps identified. ToR for trainers prepared and approved.
Activity 2.2.2 Training provided for private sector in fish hygiene issues	HACCP and fish hygiene experts and trainers	VC actors	As above, and written confirmation from companies of interest in receiving training. ToR for experts prepared and approved.
Activity 2.5.1 Complete 12 vessel audits and investment specifications	Vessel engineers/HACCP experts and financial analysts	RMI-based catching sector companies with RMI-flagged vessels	Written confirmation from companies of interest in being audited. ToR for auditors prepared and approved.
Activity 2.5.2 Complete audit of loining plant facilities, and sites being used by existing or potential containerisation companies	HACCP and fish hygiene experts with experience of onshore facilities	Loining company	As above

Activity number and name description	Resource required (non-financial)	Potential partners	Pre-conditions for support being provided
Activity 2.6.3 Prepare vessel and shore-based Sanitary Standard Operating Procedures	HACCP and fish hygiene experts	RMI-based catching and loining companies	Written confirmation from companies of intention to implement SOPs. ToR for experts prepared and approved
Activity 3.1.1 Complete feasibility study of potential cold store in RMI	Financial analyst and cold store engineer	Existing cold store operators, potential new investors	Expressions of potential interest in investing in cold store by private sector judged as genuine. Contributions in kind committed by potential investors to contribute to study, and written commitment to share relevant data/information.
Activity 3.2.1 Agree arrangements for provision of finance from financiers to private sector for cold store investments	Finance and procurement experts	Financiers, private sector investors	Feasibility study indicates viability and sustainability (financial environmental and social). And as above.
Activity 4.1.1 Develop and disseminate communication products for social sustainability aspects of the upgrading strategy	Communication experts	Locally-based communications companies and civil society organisations	Articulation of a communications strategy, preparation and approval of ToR for development of communications products.
Activity 4.1.3 Complete cultural and gender audit of companies and provide guidance on interventions to improve cultural/gender sensitivity and job attractiveness of current operations and facilities	Social/gender experts	Companies in core and extended VC	Companies provide written confirmation of willingness to engage with audits, share information, provide access to staff, and interest in principle to implement recommendations. ToR for experts prepared and approved.

Activity number and name description	Resource required (non-financial)	Potential partners	Pre-conditions for support being provided
Activity 4.2.1 Complete energy and water audits of companies and provide guidance on interventions to improve sustainability of current operations and facilities	Sustainability and energy experts	Private sector companies in VC	Companies provide written confirmation of willingness to engage with audits, share information, provide access to staff, and interest in principle to implement recommendations. ToR for experts prepared and approved.
Activity 4.2.3 Development of grant mechanism for acquiring off-grid solar power systems and hybrid solar diesel systems by the private sector	Finance and legal experts	Private sector companies in VC	Confirmed interest in principle from potential private sector actors to commit their own resources. ToR for study prepared and approved.
Activity 4.2.4 Purchase of off-grid solar power systems and hybrid solar diesel systems	Procurement experts	Private sector companies in VC, suppliers of new systems	Confirmed interest from potential private sector actors to commit their own resources for the balance of costs not provided by FISH4ACP. Legal agreements in place between FISH4ACP and beneficiaries covering use and maintenance of equipment provided with FISH4ACP funds. Suppliers commit to financial penalties for late supply. Financial viability of investments justified
Activity 4.2.5 Complete a study aimed at increasing the use of renewable energy to meet the electricity needs of onshore VC activities within the upgraded Delap / PII port area	Sustainability and energy experts	RMIPA, Stevedore	Written confirmation of willingness to engage with audits, share information, provide access to staff, and interest in principle to implement recommendations. ToR for experts prepared and approved.

Activity number and name description	Resource required (non-financial)	Potential partners	Pre-conditions for support being provided
Activity 4.3.1 Organization of a workshop for establishing Task Force composition/membership	Workshop organizers	MIMRA, potential Task Force members, and other stakeholders	Appropriate stakeholders identified and invited to workshop, with workshop concept note prepared and agreed in advance specifying the objectives and intended outputs of the workshop.
Activity 4.3.2 Hold Task Force bi-annual meetings	Task Force members (gov and private sector representatives)	Task Force members	Task Force members identified through activity 4.3.1, with ToR for its functioning developed and agreed. Written minutes of meetings provided following each Task Force meeting.

5.4 Risk analysis

This final section considers key risks associated with the proposed activities, along with the mitigation measures to ameliorate them. For each risk articulated, comment is also provided on the likelihood of the risk occurring, as well as its potential impact on successful implementation of the upgrading strategy. Text description is provided first, before presenting a summary risk analysis table (Table 43).

Shipping tuna by containers may not be cost competitive compared to transshipping to canneries by carrier vessels due to unavailability of containers, a continued surge in container-shipping costs, and high onshore costs.

The increased interest by the catching sector owners in shipping tuna by containers to canneries is premised on the assumption that container shipping costs in the future will be competitive with costs of transport by carrier vessels (as well as higher prices paid by canneries for sorted/containerized fish). At present, due to post-COVID-19 interruptions to container traffic and supply chains globally, costs of containerized transport are high and access to empty containers problematic. This is especially the case in the Marshall Islands where the demand for incoming goods to be shipped in containers is low given the small size of the domestic economy and its low demand for imports. It is assumed that over the short-term (1-2 years) problems related to global supply chains will be ironed out, bringing down costs. However, the low demand for goods to be imported by container will remain, necessarily placing the Marshall Islands at a cost disadvantage in terms of container shipping costs from the Marshall Islands, as shipping companies have to build into their costs the need to bring empty containers into the country. The strategy assumes that over-time increases in tuna exports by container will generate economies of scale for shipping companies bringing down costs of transport by containers. There is a risk however of a chicken-and-egg situation however, in which shipping companies do not provide sufficiently attractive prices and shipping routes, thus preventing an uptick in containerisation, thereby preventing these economies of scale from being realised. The result could be container shipping costs that do not compare favourably with shipping by carrier vessel. This would mean the commercial viability of increased levels of containerisation would rest solely on the assumed increase in prices from more/better sorting of catch for sale to canneries with specific species/size requirements. This risk will be mitigated by continuing to engage shipping companies in discussions over the upgrading strategy, and by attempting to obtain statements of intention by private sector catching and containerisation companies in the Marshall Islands over volumes of containerized product needing to be shipped, so

that shipping companies can plan accordingly with respect to container logistics. However, should the risk be realised, its impact on the upgrading strategy would be very serious.

Other risks to the cost competitiveness of shipping by container relate to the onshore costs of electricity, and the ability of reefer containers to be maintained while in the Marshall Islands. The feasibility study for the containerisation assumes a reduction over time of the on-shore costs related to containers thanks to economies of scale, but this assumption needs to be further validated (and is therefore the subject of more detailed assessment during the initial stages of the project). A risk of poor maintenance of containers, while relatively low in terms of likelihood and impact, is mitigated through an activity to train locally-based reefer container engineers in maintenance.

Economic leakage from the Marshall Islands of the benefits from the upgrading strategy

Levels of foreign ownership of companies in the VC are a contributory factor in much of the employment (and therefore wages) in the VC being for non- Marshall Islands residents (along with the availability of qualified labour in the Marshall Islands). Additionally, profits generated by foreign-owned VC actors may not be retained in the Marshall Islands for re-investment but rather flow offshore. There is a risk (considered high and with a potentially large negative impact) that the benefits of the upgrading strategy demonstrated earlier in terms of employment creation and increased financial performance of VC actors, may thus flow to foreign interests rather than to the Marshall Islands. This risk is mitigated to the extent possible through activities in the strategy to support locally-owned service support companies. And as noted earlier, a part of the financial benefits of the strategy can be accrued to Government through taxes and fees levied on VC companies operating in the Marshall Islands. Consideration may also be given to national policies related to the recruitment of locals and residents by VC actors (either as requirements and/or through incentives for companies to do so).

The private sector in the Marshall Islands is unwilling or unable to contribute to the costs of container stuffing machines

The strategy to increase levels of containerisation and of tuna exports hinges to a strong extent on the ability to improve the efficiency in stuffing containers, thereby reducing costs and improving the quality of fish sold to canneries. This in turn is dependent on the purchase, use and maintenance of new container stuffing machines (Star Loaders). The strategy assumes that blended finance, from FISH4ACP and the private sector, would provide the funds for purchase. The private sector indicated during the design phase their willingness to make such investments, but whether they really will do so is not known. A failure by the private sector would undermine the strategy for upgrading. This risk has been mitigated by discussing with Star Loader suppliers whether costs can be reduced (and obtaining an indication that they can). Indications are that there is some room for negotiation over prices, and that a cheaper version of the Star Loaders is available, with little difference in performance, could be provided (see Table 53 in Annex 2). The risk of the private sector failing to invest will be further mitigated through the activity to justify the investments in container stuffing machines in more detail. The likelihood of this risk is thus considered medium-low, although its impact would be high.

COVID-19 impacts and restrictions will hamper implementation of upgrading strategy activities

Many of the activities proposed in support of the upgrading strategy will require inputs in the Marshall Islands by experts not based in the country. Should the COVID-19 pandemic result in continued or increased difficulties in travel to Marshall Islands by foreign nationals, this may result in delays to implementation of many activities, and thus to delivery of the FISH4ACP investments over the project timeframe. Obviously, this would pose a risk in turn to the success of the upgrading strategy. This risk cannot be fully mitigated, but the inception period may need to revisit the scheduling of activities, inputs and investments by FISH4ACP, and to think about alternative implementation modalities to mitigate this risk. The risk can be considered as moderately likely with a moderate to high impact.

EU (DG SANTE) do not approve the Marshall Islands CA based on current legislation and associated fish hygiene control standards

While MIMRA have sent the relevant questionnaires and legislation to DG SANTE, it is not yet known if DG SANTE will provide a determination that current fish hygiene legislation and the fish hygiene control system provides the basis for formal approval of the CA. If they do not, this would preclude exports of tuna from the Marshall Islands ending up in European Union markets, potentially compromising the strategy (although sales would still be possible to non-European Union markets). Mitigating activities in such an eventuality would be for the CA to take the steps deemed necessary by DG SANTE (if necessary with support from relevant organisations such as FFA, World Bank, PEUMP).

Upgrading investment costs may exceed the economic benefits, particularly in the case of cold store investments

Table 35 in Section 4 provides data on the impacts of implementing the upgrading strategy on direct value-added. The table shows that the increase in the direct value-added of upgrading elements 1, 2 and 4 from the baseline situation would be USD 8.4 million. This compares with investment costs above in Table 38 and Table 39 of USD 5.49 million for elements 1, 2 and 4 (i.e. excluding costs related to element 3 and potential investment in a cold store). This suggests a benefit-cost ratio of 1.53 of elements 1, 2 and 4 combined, justifying these potential investments on purely economic grounds, when only considering direct value-added, and when not considering the positive social and economic impacts that would also result from upgrading. It should be noted of course that this ratio is based on assumptions as provided earlier in Section 4 Table 28. However, these assumptions are precautionary in nature. Additionally, when also considering the indirect value-added generated by VC upgrading (not included in the benefit-cost ratio above as it is not

possible within the scope of this report to provide quantitative estimates) the economic benefit-cost ratio can be expected to be considerably higher.

When taking all investments costs across elements 1-4 (with cold store investment included) and comparing with an increase in direct value-added of USD 13.1 million, the benefit-cost ratio is still positive but reduced at an estimated at USD 1.24. This is explained by the fact that when considering the investment costs in element 3 of USD 5.09 million²⁵⁹ alone and their impacts on direct value-added, a benefit-cost ratio for element 3 is estimated at less than 1 (0.92) highlighting the risks associated with potential investments in the cold store. While a more detailed investigation of cold store feasibility is included as an activity in the upgrading strategy as mitigation, the risk of investment in a cold store not making economic sense is considered very high, added to which are the potential negative environmental impacts of constructing and running the cold store given its impact on CO₂ emissions and water usage during construction and operation. The proposed feasibility study will enable a more detailed financial, social and environmental assessment to be made of investment in a cold store, and if not considered sensible it will be dropped from the upgrading strategy. The potential impact on the overall strategy of this however would be low, as other elements and their assumed positive impacts are not contingent on the cold store. And as noted above, other investments generate positive benefit-cost ratio on their own without requiring investments in the cold store.

The figures referred to above can be found in Table 56 in Annex 4: Detailed economic calculations.

Stakeholders' enthusiasm for the upgrading strategy will not continue post-FISH4ACP

The FISH4ACP methodology attempts to build and verify stakeholder support for a long-term vision (to 2031) and upgrading strategy, which continues past the project's lifespan (2022 – 2025). There is a risk that once FISH4ACP funding and technical support finishes, enthusiasm for continued implementation of the strategy wanes. Mitigating this risk has been attempted by making sure stakeholders understand that they have a role to play in the longer-term implementation of the strategy, rather than relying on a 'project-based' approach through FISH4ACP. The risk will be further mitigated by the establishment of the proposed Task Force, made up of local government and private sector representatives, to drive the upgrading strategy from the beginning and post-FISH4ACP involvement. These strategies imply that the

²⁵⁹ Investment costs in a potential cold store are broad estimations only given that they will need to be specified as part of the feasibility study proposed.

likelihood of this risk occurring is medium-low. The impact of this risk can also be considered relatively low as considerable gains are expected to be realised during the first four years of the upgrading strategy.

Solar/renewable energy sources are not viable or financially competitive as alternative diesel generated electricity, so private sector unwilling to take up new technology

The viability and financial competitiveness of renewable energy, compared to current/traditional methods of energy generation using diesel, is currently unclear and with developments likely to face challenges.²⁶⁰ If renewable energy sources cannot compete commercially, the private sector will be unlikely to take up new technology, which in turn would mean that the negative impact on greenhouse gas emissions of the upgrading strategy and its increasing requirement for electricity would not be mitigated. The risk that the private sector will not take up new renewable energy technology will be mitigated through the feasibility study of such investments, inviting solar power suppliers to the Marshall Islands to demonstrate technology, and through FISH4ACP providing grant funding for companies. Nevertheless, this risk is considered moderately likely, and moderate in terms of impact.

It will continue to be difficult to attract labour to work in the upgraded VC

The strategy assumes that current challenges faced by the private sector in recruiting labour will be reduced through the potential to provide more permanent employment, and potentially at higher wage levels. While the levels of unemployment in the Marshall Islands suggest that making the sector more attractive to work in should reduce problems over labour availability, the United States of America will continue to provide competition for labour, given the right of the Marshall Islands citizens to work there. The United States of America economy is currently expanding rapidly as part of a post-COVID-19 recovery with increased levels of employment. This could in turn reduce the pool of unemployed labour available in the Marshall Islands. Likewise, economic growth in the Marshall Islands could result in increased competition with the tuna VC for labour by other sectors. These risks may require mitigation through increased wages in the VC being paid by VC actors (but would in turn have an impact on profits). The likelihood of this risk occurring given the activities included in the strategy are considered low, and its impact would also be relatively low in terms of its impact on the overall success of the strategy.

²⁶⁰ https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_RRA_Marshall-Islands_2015.pdf

Climate change impacts threaten investments made

The Marshall Islands is at the forefront of climate change risks, through its low-lying land mass and vulnerability to increased severity and frequency of extreme weather events.²⁶¹ Investments made in the VC by all parties therefore need to be 'climate-proofed' against climate change impacts to the extent possible. This will require by way of mitigation careful siting of investments in physical assets, equipment and infrastructure. While the effects of climate change are already being felt, impacts are likely to be longer-term in nature, so their impacts on the upgrading strategy (implemented over a ten-year period to 2031) will be low.

²⁶¹ [Rising sea levels threaten Marshall Islands' status as a nation, World Bank report warns | Marshall Islands | The Guardian](#)

TABLE 43: SUMMARY RISK ANALYSIS TABLE

Risk description	Likelihood (1-5)	Impact (1-5)	Overall Risk (1-25)	Mitigation
Container shipping costs and container availability reduce competitive position vis-à-vis carrier vessels	3	5	16	Working closely with container shipping companies
Economic leakage from RMI of the benefits from the upgrading strategy due to foreign ownership of core VC actors	4	4	16	Strategy involves support also to RMI-based/owned service support providers and Government capturing benefits through taxes and fees
Private sector unwilling/unable to invest in container stuffing machines	3	4	12	Specification of suitable grant mechanism and further assessment of containerisation viability
COVID-19 impacts on implementation of upgrading strategy activities	3	4	12	Re-assessment of risks during project inception, and adapted implementation methodologies
EU (DG SANTE) do not approve RMI CA based on current legislation and associated fish hygiene control standards	3	4	12	Work with CA and supporting organisations and projects (PEUMP, FFA, World Bank) to take steps required by DG SANTE
Investments in cold store are not financially (or environmentally) viable	5	2	10	Feasibility study to be completed prior to investments
Lack of stakeholder enthusiasm for strategy post FISH4ACP	3	3	9	Participatory nature of FISH4ACP methodology, creation of Task Force
Renewable energy not viable and financially competitive	3	3	9	Feasibility studies, grants provided by FISH4ACP
Continued difficulties in attracting labour to work in the sector	2	2	4	Activities in strategy aimed at addressing social hotspots
Climate change impacts threaten investments	4	1	4	Appropriate siting and climate-proofing investments

Note: overall risk calculated by multiplying risk likelihood and risk impact. Scores are necessarily subjective and the views of the consultants. Overall risk = likelihood x impact

Annex 1: Primary and secondary data collection process

Primary and secondary data collection was completed by a small team of five international experts (one of whom was based in the Marshall Islands). Secondary data collection (desk research) was conducted in 2020, covering over 110 reports, publications, and databases (including confidential reports). This was followed by primary data collection, conducted during 2021 with all relevant stakeholders, including VC actors and other stakeholders in the Marshall Islands, as well as important players outside the country such as tuna canneries, tuna traders, shipping companies, and regional fisheries management organisations. Various primary data collection methods and means were utilized, including observational visits and focus group discussions (carried out in person), and key informant interviews (carried out in person and online). All primary data collection was completed using detailed checklists of the information to be obtained, questionnaires, or interview/focus group guides. In several cases, consultees were re-approached on an iterative basis during the study following the initial primary data collection, to help answer emerging questions, respond to data requests, and to validate emerging proposals with regards to the contents of the upgrading strategy.

A detailed list of the stakeholder consultation is provided below.

TABLE 44. LIST OF STAKEHOLDERS CONSULTED DURING PRIMARY DATA COLLECTION

ID	Method	Type	Organisation
OV 1	Observational visit	Existing transshipment / port operation. Potential/current container and cold storage site	Delap dock
OV 2	Observational visit	Onshore ancillary support to purse seine catching sector, existing container site, and potential cold store site	PII
OV 3	Observational visit	Domestic fish market	
OV 4	Observational visit	Existing container operations, and existing cold storage	Pan Pacific Foods
FGD 1	Focus group discussion	Purse seine fishermen and captain	Koo's/MIFCO
FGD 2	Focus group discussion	Small-scale troll fishermen and domestic sellers	
FGD 3	Focus group discussion	Containerisation employees	PII

FGD 4	Focus group discussion	Cold store employees	Pan Pacific Foods
AI 1	Actor interview	RMI flagged purse seine catching	Koos
AI 2	Actor interview	RMI flagged purse seine catching	PPF
AI 3	Actor interview	RMI flagged purse seine catching	MIFCO
AI 4	Actor interview	Shore based facilities	PII
KII 1	Key informant interview	Tuna trader	Tri Marine
KII 2	Key informant interview	Tuna trader	FCF
KII 3*	Key informant interview	Tuna trader	Itochu
KII 4	Key informant interview	Regional organisation	PNA
KII 5	Key informant interview	Regional organisation	FFA
KII 6	Key informant interview	Government organisation	MIMRA
KII 7	Key informant interview	Government organisation	RMI Competent Authority
KII 8*	Key informant interview	Government organisation	Ministry of Justice, Immigration, and Labour
KII 9	Key informant interview	Government organisation	Environmental Protection Agency
KII 10	Key informant interview	Overseas processor	Thai Union (Bangkok)
KII 18a	Key informant interview	Vessel agent	CENPAC
KII 18b	Key informant interview	Vessel agent	KMI
KII 19	Key informant interview	Government organisation	Office of Commerce, Investment, and Tourism (OCIT)
KII 20	Key informant interview	Government organisation	Marshall Energy Company (MEC)
KII 21	Key informant interview	Government organisation	Majuro Water & Sewage Company
KII 22	Key informant interview	Shipping company	Kyowa
KII 23	Key informant interview	Shipping company	Mariana's Express Line
KII 23b	Key informant interview	Vessel agent for MELL and Pacific Direct Line	Pacific Shipping Inc. (PSI)
KII 24	Key informant interview	Vessel agent (for SWIRE)	maritime consultants / SWIRE
KII 25	Key informant interview	Government organisation	Port Authority
KII 26	Key informant interview	Service company	Majuro Stevedore & Terminal Co

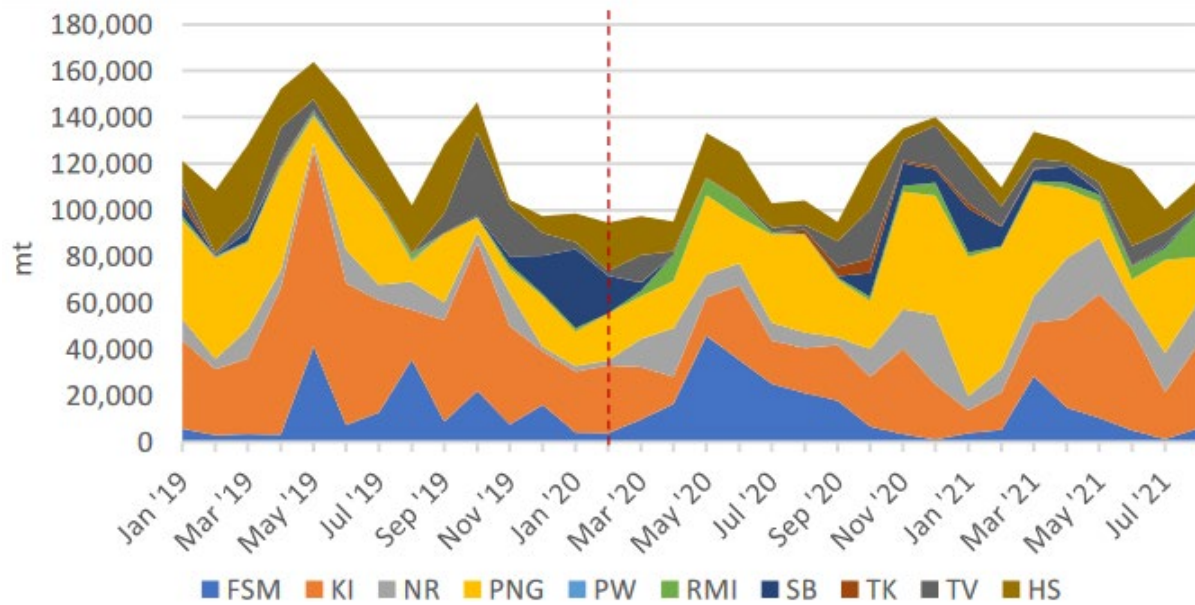
Note: * stakeholders were contacted by the VCA team for consultation, but no interviews could be organized.

Additionally, bilateral meetings were conducted with related projects and partners (i.e. with TNC on PITP, with World Bank on PROP project) to explore synergies between FISH4ACP and these projects.

The main challenges experienced during the data collection process included: i) stakeholders not responding to meeting requests (in a small number of cases), and ii) private companies being hesitant to share financial data and other information. To some extent this may have been due to difficulties in completing in-person interactions during the COVID-19 pandemic, preventing the team from building trust and explaining the potential benefits of the project to consultees. However, the presence of one team member in the Marshall Islands and the fact that other team members had experience from previous work of working in the Marshall Islands and with stakeholders mitigated this problem. Perhaps of more importance in explaining a hesitancy in providing some data is the highly competitive nature of the tuna sector, meaning that private sector operators are naturally hesitant about sharing information of potential benefit to their competitors. Nevertheless, most stakeholders provided the information requested by the consulting team and showed patience in responding to a series of iterative requests where this was necessary. In cases where the consulting team felt it would be problematic to explore in detail commercially sensitive data, secondary sources of information were sometimes useful (e.g. published accounts of some catching sector companies from which it was possible to generate the operational accounts used in the study). Additionally, it can be noted that due to the short VC and few actors involved, the consulting team were able to engage directly with all VC actors, preventing any need to scale up data from a sample frame, and thereby increasing the robustness of the data collected.

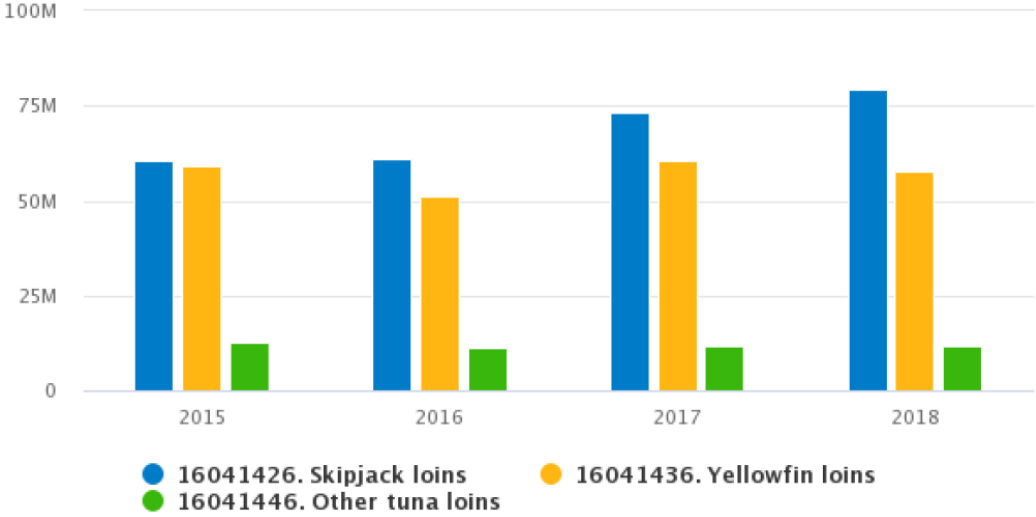
Annex 2: Supporting figures and tables

FIGURE 25. DISTRIBUTION OF CATCH (EEZs + HIGH SEA) (JAN 2019 – JUL 2021)



Source: PNA COVID-19 Purse seine dashboard, September 2021, available at <https://www.pnatuna.com/sites/default/files/PNA%20COVID%20Dashboard%20-%20September%202021%20-%20PS.pdf>

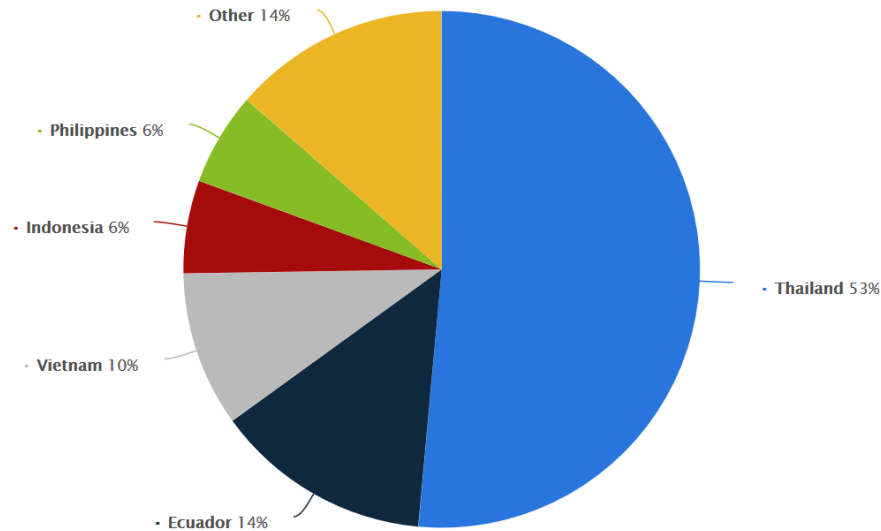
FIGURE 26. EUROPEAN TUNA LOIN IMPORTS 2015 – 2018



Source: Eurostat (2019)

Source: CBI (2019), Figure 1.

FIGURE 27. DISTRIBUTION SHARE OF THE US IMPORT VOLUME OF CANNED TUNA IN 2018



Source: Statista (2020), also available at <https://www.statista.com/statistics/197267/us-imports-of-canned-tuna-from-major-exporters-by-volume/>

TABLE 45. US TUNA IMPORTS 2018 – 2020 BY PRODUCT TYPES (IN VOLUME, VALUE AND SHARE)

a)

Imports	2018		2019		2020 (up to May)	
	Kg	USD	Kg	USD	Kg	USD
Fresh	23 002 352	250 783 266	22 784 267	252 574 424	6 221 661	68 697 286
Frozen	41 94 379	457 373 573	50 141 128	539 709 303	16 872 788	189 578 281
Tuna in ATC, excl. albacore	123 240 918	576 918 474	128 447 458	568 903 433	69 824 387	273 136 141
Tuna albacore in ATC	33 397 853	189 063 952	31 980 119	208 682 765	18 468 041	112 025 087
Others	51 178 698	298 704 326	48 721 449	305 843 132	24 835 289	136 144 361
Grand total	272 766 200	1 772 843 591	282 074 421	1 875 713 057	136 222 166	779 581 156

b)

Shares in tuna imports	2018		2019		2020 (May)	
	Kg	USD	Kg	USD	Kg	USD
Fresh	8%	14%	8%	13%	5%	9%
Frozen	15%	26%	18%	29%	12%	24%
Tuna in ATC, excl. albacore	45%	33%	46%	30%	51%	35%
Tuna albacore in ATC	12%	11%	11%	11%	14%	14%
Others	19%	17%	17%	16%	18%	17%
Grand total	100%	100%	100%	100%	100%	100%

Note: "ATC" refers to airtight container, e.g. canned, jarred, pouched, prepared or preserved, balls and cakes, or pet food. "NSPF" means not specifically provided for. "Others" refer to tuna NSPF not in ATC. "Fresh" and "frozen" refer to fresh and frozen tuna of different species, namely albacore, bigeye, bluefin, skipjack, yellowfin, and NSPF tuna.

Source: own calculations based on data from NOAA (2020).

TABLE 46. US TUNA IMPORTS 2018 – 2020 BY TUNA SPECIES (IN VOLUME, VALUE AND SHARE)

a)

Imports	2018		2019		2020 (May)	
	Kg	USD	Kg	USD	Kg	USD
Albacore	34 968 598	199 439 428	33 314 579	216 821 374	18 725 568	114 007 425
Bigeye	3 434 746	31 766 252	4 973 798	35 536 678	785 357	7 524 382
Bluefin	2 327 346	49 515 776	2 651 379	58 763 519	732 260	15 009 531
Skipjack	101 311	192 310	11 357	32 155	3 957	9 598
Yellowfin	20 126 832	201 520 573	19 695 154	197 149 211	5 508 993	55 900 825
Tuna NSPF	211 807 367	1 290 409 252	221 428 154	1 367 410 120	110 466 031	587 129 395
Grand total	272 766 200	1 772 843 591	282 074 421	1 875 713 057	136 222 166	779 581 156

b)

Shares in tuna imports	2018		2019		2020 (May)	
	Kg	USD	Kg	USD	Kg	USD
Albacore	13%	11%	12%	12%	14%	15%
Bigeye	1%	2%	2%	2%	1%	1%
Bluefin	1%	3%	1%	3%	1%	2%
Skipjack	0.037%	0.011%	0.004%	0.002%	0.003%	0.001%
Yellowfin	7%	11%	7%	11%	4%	7%
Tuna NSPF	78%	73%	78%	73%	81%	75%
Grand total	100%	100%	100%	100%	100%	100%

Note: "NSPF" means not specifically provided for. The tuna species are imported in the forms of fresh (all species), frozen (all species), in ATC (only with albacore and tuna NSPF), and not in ATC (only with tuna NSPF).

Source: own calculations based on data from NOAA (2020).

TABLE 47: EXAMPLES OF CANNED TUNA BRANDS FOUND IN SELECTED END MARKETS

Geographical market (selected countries only)	Common brands
United States of America	Starkist, Chicken of the Sea, Safe Catch, Wild Planet, Bumble Bee, Sustainable Seas, Tonnino, Genova, Open Nature, Regal, Celebrity, Portofino, American tuna, Callipo, Crown Prince, Ortiz, Raincoast Trading
UK	John West, Princes, Heritage, the Reel Fish co, Charles Basset, Ortiz
France	Petit Navire, Connetable, Saupiquet, Captain Cook, Odyssee, Le Savoureux, Ribiera, Reflets de France
Germany	Seaside, Followfish, Fontaine, Pan do Mar, Saupiquet, Hawesta, Ribiera, Fish Tales, Vier Diamanten, La Contesse, Fjord Krone, Vigilante, Ortiz, Gourmet, La Gondola, Santa Catarina
Italy	As do mar, Palacio de Oriente, Angelo Parodi, Rizzoli, Nostromo, Consorcio, Moro, Rio Mare, Maruzella, Mareblu, Auriga, Puerto Dorado, Natura Felice, Almare seafood, La Paloma,
Poland	Princes, Graal, Giana, Lisna, Meg, Kaiser Josef, Superfish, Calvo, Rio Mare, Giana, Mister ton,
Spain	Conservas dardo, Ortiz, Cuca, Puerto Grande, Pay Pay, Palacio de Oriente, Consorcio, Realmar, Maratlantis, Calvo, Albatros, Campos, Friscos Mariñeira, Pescamar, Ribiera, Albo, Diamir, Cortizo, Isabel, Salvora,
Indonesia	Ayam, Cip, Sunbell, Kingfisher, Maya, Vinisi, Deho, Wilmond, Sunbell
Malaysia	Rex, Marina Tuna, TC Boy, Ayam, Bumble Bee, Captains Catch,
Liberia	Maxims, Siblou, Startkist, Northern Catch, Bumble Bee

Source: survey of canned tuna in supermarkets conducted by Poseidon in 2019 (unpublished). Note: excludes 'own brand' labels of supermarkets.

TABLE 48. MARSHALL ISLANDS PORT AUTHORITY TABLE OF TARIFFS

Present Tariff:				Revised
				Effective June 2011
Foreign Entry Fee			Old Rate	New Rate
	0-1000 GRT		60 Minimum	80 Min
	Over 1000 GRT		0.06 Per GRT	0.08 Per GRT
Dockage Fee - International				
	0-1000 GRT		60 Minimum	60 Min
	Over 1000 GRT		0.06 Per GRT	0.08 Per GRT
	Or Length over all whichever			
		is greater		
	0-100 ft		60 Minimum	60 Min
	101-300 ft		1 per ft	1 per ft
	301-400 ft		1.05 per ft	1.05 per ft
	401-500 ft		1.1 per ft	1.1 per ft
	over 500 ft		1.2 per ft	1.2 per ft
Light Dues			30 flat fee	40 flat rate
Wharfage	Minimum		3 per RT	3 per RT
	Cargo other than petroleum		3 per RT	3 per RT
	Petroleum products		3 per MT	3 per MT
Wharfage - domestic				
	Minimum Charge		2 per RT	2 per RT
	Cargo other than petroleum		2 per RT	2 per RT
Bunkering				
	Fresh water		0.003 per gal	0.0003 per gal
	Fuel & Other petroleum			
		First 100,000 gals	0.16 per barrel	0.18 per barrel
		Over 100,000 gals	0.08 per barrel	N/A per barrel
Pilotage	Pilot fee		225 Minimum	300 per trip
		3000 & Over GRT	0.075 per GRT	0.1 Per GRT
	Pilot Boat		250 per move	300 per trip
	Pilot Boat	per shifting	New	75 per trip
	Pilot Boat	boarding party fee	New	75 per trip
	Line Boat		150 per occasion	150 ea
Anchorage fee			0.02 per GRT	0.05 per GRT
Disembarking/Change crew			5 per person	7 per head
User's Fee (domestic) Dockage				
	LOA 0-30 ft		50 per month	50 per month
	LOA 31-50 ft		60 per month	60 per month
	LOA 51-100 ft		80 per month	80 per month
	LOA Over 100 ft		120 per month	120 per month
	All Class/Length		0.2 per ft per day	0.2 per ft per day
Port Entry Pass	Vehicle Pass		15 per annum	15 per annum
	Personnel Pass		10 per annum	10 per annum
	Short pass		2 per day	2 per day
Navigational chart			23 per copy	23 per copy
Port Security Improvement Fee			New	50 per trip

Source: Pers. Comm., RMI Ports Authority (2021)

TABLE 49: MARSHALL ISLANDS PORTS AUTHORITY REVENUES WITHIN THE TUNA VC IN 2019 (IN USD)

Description		Purse Seine	Reefers/Carrier	Containers
Boarding Party Fee				85,950
Port Security Improvement Fee		5,550	31,700	1,500
Pilotage Fee		431,400	396,190	46,892
Entry-Domestically based Vessel				165,230
Wharfage Fee Domestic		983		12,723
Domestic Dockage Fee per LOA				
	all classes of boats			1,560
	Over 100 feet			13,440
	51-100 feet			4,400
	31-50 feet			5,400
	0-30 feet			6,300
Int'l Dockage Fee per LOA		600	97,648	3,715
Int'l Dockage Fee per GRT			141,209	29,409
Anchorage Fee				75,716
Wharfage Fee International				
	Petroleum Products			128,417
	Minimum			1,977
	Cargo other than Petroleum		55,210	412,809
Foreign Vessel Entry Fee		4,060	214,199	
Light Dues				
	Cargo Vessel			4,480
	Fishing Vessel	46,680		
	Tanker vessel			920
	Others			280
Pilot Boat Usage Fee		291,150	83,700	92,850
Bunkering Fee				26,994
Total		780,423	1,019,856	1,120,962

Source: Pers. Comm., RMI Ports Authority (2021)

TABLE 50: KEY NATIONAL LEGISLATION IMPACTING ON THE PURSE SEINE VALUE CHAIN IN THE MARSHALL ISLANDS

Legislations and regulations	Actors in value chain affected
<p>Title 51 – Management of Marine Resources Chapter 1 – Marshall Islands Marine Resources Authority Act Chapter 2 – Fisheries Act Chapter 3 – Management And Development Of Local Fisheries Act Chapter 4 – Fishing Access And Licensing Act (Subsection 411) Fish Processing and Export Regulation 2020 Chapter 5 – Fisheries Enforcement Act</p>	<p>Fishing Vessels Vessel Owners National Authority State – Custodian of Resource Exporting companies Competent Authority</p>
<p>Title 33 – Marine Zones And Protection Of Mammals Chapter 1 – Maritime Zone Declaration Act Chapter 2 – Marine Mammal Protection Act Chapter 3 – Tuna And Game-Fish Conservation Zone Act</p>	<p>Shipping Fishers Fishing Vessels National Authority State – Custodians of Resource</p>
<p>Title 48 – Taxation Chapter 1 – Income Tax Act Chapter 2 – Import Duties and Licenses Act Chapter 3 – Tax Collection Act Chapter 4 – Tax Information Exchange Agreement Act</p>	<p>Treasury Business operators National Authority</p>
<p>Title 52 – Associations Law Parts</p> <p>3. Business Corporations Act II. Revised Partnership Act III. Limited Partnerships Act IV. Limited Liability Companies Act V. Other Forms of Associations</p>	<p>Business Operators National Authority</p>
<p>Title 8 – Quarantine and Protection of Endangered Species Chapter 1 – Quarantine Restrictions Act Chapter 2 – Export Meat Inspection Act Chapter 3 – Endangered Species Act</p>	<p>Business Operators Airline and Ship Industry National Authority</p>
<p>Title 35 – Environment Chapter 1 – Environmental Protection Authority Act Chapter 2 – Littering Act Chapter 3 – Coast Conservation Act Chapter 4 – Office of Environmental Planning and Policy Coordination Act</p>	<p>Business Operators Resource Owners National Authority</p>

Title 36 – Securities and Investment Chapter 1 – Securities and Investment Act Chapter 2 – Foreign Investment Business License Act Chapter 3 – Investment Incentive Agreement Act	Foreign Investors Business Operators
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Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

TABLE 51. CONTRIBUTION OF TUNA FISHING AND TUNA PROCESSING TO GDP IN THE MARSHALL ISLANDS

	<i>Unit</i>	2008	2009	2010	2011	2012	2013	2014	2015	2016
Harvest sector only ¹	<i>USD mill</i>	27.6	26.5	37.7	63.9	83.9	78.0	63.1	52.2	41.9
Combined harvest and onshore processing ²	<i>USD mill</i>	na	na	na	na	na	65.0	66.9	64.7	49.0
GDP ³	<i>USD mill</i>	153.1	151.8	162.2	174.3	182.9	187.7	184.7	184.6	200.6
Share in national GDP by harvest sector only	%	18%	17%	23%	37%	46%	42%	34%	28%	21%
Share in national GDP by harvest sector and onshore processing combined	%	na	na	na	na	na	35%	36%	35%	24%

Notes: na not available.

¹ Derived using value added ratios, with value-added being “the difference between the value of goods and the cost of materials or supplies used in producing them” (Terawasi and Reid, 2017)

² Derived using per tonne contribution. ³ GDP Current price estimates, EPPSO/Graduate School Source: Data on the tuna industry is taken from FFA (2017). Data on national GDP is taken from Graduate School (2019b). Shares in national GDP are own calculations based on FFA (2017) and Graduate School (2019b).

TABLE 52. ESTIMATE OF MIMRA'S EXPENSES RELATED TO THE SERVICES PROVIDED TO THE TUNA VALUE CHAIN

	Total expenses¹	Costs of services provided to the VC (USD)²
Salaries and wages	2 069 591	921 729
Depreciation and amortization	343 414	152 946
Boarding and observers fees	316 273	316 273
Training	307 364	136 890
Rent	292 723	130 369
Membership dues and subscription	269 401	119 983
Professional fees	200 219	89 171
Transshipment inspection	192 400	192 400
Travel	191 427	85 255
Contributions	131 748	58 676
Repairs and maintenance	117 055	52 133
Utilities	99 516	44 321
Insurance	59 653	26 568
Petroleum, oil and lubricants	54 201	24 139
PNA administrative fee	45 354	20 199
Communications	36 959	16 460
Supplies	34 556	15 390
Advertising	33 205	14 788
Freight	16 580	7 384
Entertainment	13 300	5 923
Miscellaneous	57 811	25 747
Total Operating Expense	4 882 750	2 456 746

Source: ¹Deloitte (2020) audit report of MIMRA financial statements in 2018 and 2019 (p.9).

²Own estimates based on Deloitte (2020) audit report and consultations with MIMRA (2021).

TABLE 53. COMPARING TWO STAR LOADER MODELS

	"Mark 2" model	"Mark 7" model
Price	Quoted cost of Star Loader is USD 590 350/machine including shipping to and assembling in RMI; but based on consultation with Star Loader's manufacturer, this cost can be negotiated to be lower. Assuming that the lower cost that can be obtained would be USD 450 000/machine.	60% of the price of "table 53 " model
Structure	Telescopic boom. Retracted length 10m long. Holding space when not in use is small and it is easier to tow around confined spaces.	Fixed boom. Fixed 18m long. Slider bed is in 316 st.st, which is suitable for contact with fish.
Weight	All in 316 st.st, and weigh 12 tons	Half the weight of "Mark 2" model
Control system	Hydraulically driven and controlled	Electrical controlled and driven
Time taken to stuff one 40ft reefer container	35 to 45 minutes, when well trained	Same as of "Mark 2" model
Maximum number of hours operating per day	Up to 24 hours	Same as of "Mark 2" model
Life span	The manufacturer has some loaders running in Seychelles since 2007	Around 10 years with good maintenance. The manufacturer has loaders running in Seychelles for 7 years now.
Number of workers (container stuffers) needed to stuff one 40ft reefer container	Operation would require two persons on the loading hopper, one person operating the control pendant and another spare maybe watching the feed inside the container, (the pendant controller can do this). Naturally, the ship's crew can operate the crane with the net of tuna loading into the loading hopper.	Same as of "Mark 2" model
Compatibility with handling tuna	Compatible with handling tuna	As good as "Mark 2" model

Note: The "Mark 2" model is used in the profitability assessments, for precautionary reason.

Source: Email exchange with a manufacturer of Star Loaders – Bennett's Engineering (Pty) Ltd. in October-November 2021.

Annex 3: Additional supporting text

Regional organisations and institutions

Western Central Pacific Fisheries Commission (WCPFC). The WCPFC has 26 members from the Pacific Islands and the wider region as well as participating distant water fishing nations (DWFN), ²⁶² seven participating territories, ²⁶³ and eight cooperating non-members²⁶⁴ which agree to comply with WCPFC measures, participate as observers, and which are entitled to authorise their vessels to fish in the WCPO within set limits. Conservation and Management Measures (CMMs) are approved in the annual sessions of the Commission by consensus and with the support of Scientific Committee and Technical and Compliance Committee meetings. The principle objective of the CMMs, and WCPFC Resolutions, is to ensure that tuna stocks are maintained at levels capable of producing their maximum sustainable yield (MSY). **CMMs and Resolutions are thus of significant strategic importance for the Marshall Islands purse seine value chain.** CMMs cover a wide range of issues related to purse seine effort limits and longline catch limits, observer coverage, fish aggregating devices (FADs), catch retention, vessel marking and identification, transshipment, compliance and illegal unreported and unregulated (IUU) fishing, managing ecosystem and bycatch interactions, and research (see <https://www.wcpfc.int/conservation-and-management-measures> for the full list of CMMs).

Parties to the Nauru Agreement (PNA). PNA Members are Federated States of Micronesia, Kiribati, the Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu, with the agreement being a regional one based on an alliance of the Pacific island states involved. Parties have worked collaboratively since 1982 to manage the tuna stocks within their national waters through the Agreement. The EEZs of the Parties collectively account for a significant proportion of the WCPO

²⁶² Australia, China, Canada, Cook Islands, European Union, Federated States of Micronesia, Fiji, France, Indonesia, Japan, Kiribati, Republic of Korea, the Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Taiwan Province of China, Tonga, Tuvalu, United States of America, Vanuatu. <https://www.wcpfc.int/about-wcpfc>

²⁶³ American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau, Wallis and Futuna. <https://www.wcpfc.int/about-wcpfc>

²⁶⁴ Curacao, Ecuador, El Salvador, Nicaragua, Panama, Liberia, Thailand, Vietnam. <https://www.wcpfc.int/about-wcpfc>

region's tuna catch, and around 50 percent of the global supply of skipjack tuna, the most commonly canned tuna.²⁶⁵

The PNA secretariat is based in the Marshall Islands, and its objectives are to: enhance regional solidarity; and promote economic control and participatory rights over the tuna resources in PNA waters. Its primary focus is to: maximise the profitability of the fishery and ancillary industries within the PNA; develop initiatives to maximise the sustained direct and indirect economic benefits to the Parties;²⁶⁶ and develop strategic fisheries conservation and management initiatives.

A major focus of PNA activity, and the work of its Secretariat, is the purse seine Vessel Day Scheme (VDS), implemented by the PNA since 2007 (Gillett and Tauati, 2018), whereby PNA members agree on a limited number of fishing days for the year, based on scientific advice about the status of the tuna stocks. The introduction of the purse seine VDS represented a transition towards a rights-based system (and away from a system previously in place which was based on vessel numbers), whereby the fishing rights (i.e. the fishing, or vessel, days) are limited (Gillett and Tauati, 2018). **The purse seine VDS is of huge strategic importance to the proposed purse seine value chain upgrading strategy in the Marshall Islands** as it sets an overall Total Allowable Effort (TAE) limit on the number of days fishing vessels that can be licensed to fish in PNA EEZs per year. Each country is allocated a share of the TAE for use in its zone each year (referred to as Party Allowable Effort – PAE). The allocation of PAE for each country is based on the average level of purse seine effort in the water of each party and the relative biomass within each party's EEZ (Poseidon et al., 2013). Countries can choose if they want their PAE based only on historical fishing effort in zone or use 60 percent effort and 40 percent based on EEZ area (which is a proxy for biomass in zone). These purse seine VDS days can be used by each country (party) for its own fleet, traded between countries in cases where a country has used up all its days while another has spare days, or sold to foreign-flagged vessels under license agreements (Yeeting et al., 2016; Gillett and Tauati, 2018). For the PAE allocation under the purse seine VDS, parties should give priority to the Federated States of Micronesia Arrangement (FSMA) and the US Tuna Treaty (UST) – the two multilateral agreements to be detailed below – before allocating the remaining days for selling to bilateral fishing partners (Yeeting et al., 2018). Under the purse seine VDS, one fishing day varies according to the size of the vessel, i.e. one fishing day counts as 0.5 purse seine VDS day for a purse seine vessel with overall length of less than 50 metres, 1

²⁶⁵ <https://pnatuna.com/About-Us>

²⁶⁶ In 2011 PNA set up Pacifica a joint venture between Pacifica and the Netherlands based company Sustunabe bv., to promote PNA and actively trade their MSC-certified sustainably caught free school skipjack tuna.

purse seine VDS day for a purse seine vessel of overall length between 50 metres and 80 meters, and 1.5 purse seine VDS days for a purse seine vessel of over 80-metre length overall (Blyth-Skyrme et al., 2019).

Parties have harmonized the terms and conditions of access for distant water fishing vessels/fleets through a series of Implementing Arrangements, for example in relation to licensing conditions/standards, vessel catch and location reporting, minimum percentages for PNA crews employed as part of total crewing complement, FAD closures, observer coverage, gear specifications, and prohibitions on fishing in 'high seas pockets' (areas of high seas enclosed by EEZs of the parties) and other high seas areas. They also grant preferential access to their own vessels to encourage domestic participation in the fishing industry; and apply a minimum benchmark price for purse seine VDS day sold to foreign vessels (Gillett and Tauati, 2018). According to Gillett and Tauati (2018), by putting a limit to the number of fishing (vessel days), the purse seine VDS creates competition over the use of the vessel days, thereby increasing the value of each day. The price of a fishing day before purse seine VDS for non-FSMA foreign vessels (see below) was roughly USD 1 350; but after the purse seine VDS, increased to USD 5 000 in 2011 and USD 12 000 in 2016 since when it has remained constant.

In the case of the Marshall Islands, significant concessions have been provided by national authorities to purse seine fishing companies based in the Marshall Islands in terms of access fees. Access fees of USD 11 000/day in 2020 for pooled days and USD 7 000/day for domestic-based companies, were well below the cost charged to DWFN vessels of USD around 12 000/day.²⁶⁷ Marshall Islands-based companies accounted for 1 704 (54 percent) of the total 3 185 fishing days sold from the Marshall Islands' Party Allowable Effort (PAE) in 2020 (data provided by MIMRA). **This practice of concessions for locally-based companies, and the rates charged to foreign-flagged vessels, is of strategic importance for this project as it has an impact on: i) revenues to government, ii) fishing company profitability, and ii) fish catches made in/outside of the Marshall Islands EEZ (and to some extent therefore on the amounts of fish transshipped in Majuro and/or available to be attracted for Marshall Islands-based processing).** Clearly the Marshall Islands government must think carefully about the rates it charges for both local and foreign vessels for its fishing days, given rates (concessionary and not) charged by other Parties, as rates charged may causes vessels to switch to other EEZs.

²⁶⁷ Based on data in Deloitte (2020)

At a regional level, the 2018 PNA TAE was 44 033 days (a decrease from 44 890 days in 2016 and 44,605 days in 2017),²⁶⁸ and this effort of 44 033 was retained for 2021 and provisionally also for 2022 and 2023.²⁶⁹ An additional 1000 days of TAE are allocated for Tokelau²⁷⁰ for each year over 2020 to 2023.²⁷¹ The total number of TAE may differ from the number actually sold, and again from the number used. And prices paid by bidders for use of days varies from year to year. In 2016, the demand for days and the price of days generally flattened after strong growth in recent years (PNA 2017).

The Marshall Islands is also part of a five-party pooling system of fishing days. The Marshall Islands, Nauru, Solomon Islands, Tokelau and Tuvalu allocate a small number of their PAE days into a pooling system (356 days by the Marshall Islands in 2020 based on MIMRA data). This allows purchasing vessels access to all zones under the pooling arrangement, and as a result generates additional price premiums for the five parties of around USD 4 000 per vessel day compared to charges for domestic vessels.

The Federated States of Micronesia Arrangement For Regional Fisheries Access (FSMA). Parties to the FSMA are FSM, Kiribati, the Marshall Islands, Nauru, Palau, PNG, Solomon Islands, and Tuvalu. The FSMA offers preferential conditions for domestic and locally-based vessels to access the fishing resources of other parties, provided that they meet certain criteria (Poseidon et al., 2013, Yeeting *et al.* 2018). The vessel days are currently charged at a concession rate of USD 4 000/day. Under the Arrangement, qualifying vessels are issued with a regional access license, subjected to a number of conditions related to reporting, transshipments, licensing, area restrictions, and observers (FSMA 2013). FSMA qualification standards include an assessment of suitability based on a number of criteria, used in a points system, based on: equity, party vessel flag, nationals employed, local offloading, local fuel usage, license fee revenues, and onshore investment. In order to meet their obligations under the FSMA, to provide for fishing effort by FSMA vessels fishing outside the waters of their Home Parties, PNA Parties set aside a pool of fishing days from the Total PAE (390 by Marshall Islands in 2020 based on MIMRA data). **The rigor to which parties to the FSMA apply the criteria and the points systems is of strategic importance to the project purse seine value chain as impacts on: i)**

²⁶⁸ http://www.pnatuna.com/sites/default/files/Purse%20Seine%20VDS%20TAE%20for%202018-2020_1.pdf

²⁶⁹ <https://www.pnatuna.com/vds>

²⁷⁰ Tokelau is part of the VDS although it is not part of the PNA TAE. It has its own TAE, which it brings to the VDS and which is transferable with PNA members.

²⁷¹ <https://www.pnatuna.com/vds>

the interest by vessel owners to flag vessels in different countries, ii) revenues to the Marshall Islands from its PAE, and iii) vessels activity in the Marshall Islands EEZ.

The Multilateral Treaty with the United States of America. The South Pacific Tuna Treaty²⁷² is an agreement between the United States and 16 Pacific Island countries.²⁷³ The treaty has been in existence for more than 30 years and allows US purse seine vessels to fish in the EEZs of the Pacific island countries party to the treaty. As with the FSMA, the PNA Parties set aside a pool of fishing days from the Total PAE (128 by the Marshall Islands in 2020 based on MIMRA data) to provide for fishing effort by US purse seine vessels.

The Niue Treaty. The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement was adopted in 1993 and all FFA Members, except Tokelau, are parties. The Agreement is legally a stand-alone Agreement although it was adopted directly in response to Article 5 of the FFA Convention (calling for the promotion of intra-regional coordination and cooperation in fisheries surveillance and law enforcement). The Treaty is an Agreement on cooperation between FFA members on monitoring, control and surveillance (MCS) of fishing, and includes provisions on exchange of information and procedures for cooperation in monitoring, prosecuting and penalizing illegal fishing vessels. One notable sub regional agreement is between the Federated States of Micronesia, Republic of the Marshall Islands and Palau which provides for MCS asset sharing and extends the powers of fishery officers to cover all three country EEZs (Poseidon 2013).

The Forum Fisheries Agency (FFA). Based in Honiara, Solomon Islands, FFA²⁷⁴ was established to help its 17 members²⁷⁵ sustainably develop and manage fishery resources within their EEZs. It is an advisory body only, and provides expertise, technical assistance and other support to its members who make sovereign decisions about their tuna resources and participate in regional decision making on tuna management as discussed above. Its support for its members focusses on:

²⁷² <https://www.fisheries.noaa.gov/pacific-islands/international-affairs/south-pacific-tuna-treaty>

²⁷³ Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, United States, Vanuatu

²⁷⁴ <https://www.ffa.int/>

²⁷⁵ FFA's 17 members are Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.

- a) Fisheries management – providing policy and legal frameworks for the sustainable tuna management;
- b) Fisheries development – developing the capacity of members to sustainably harvest, process and market tuna to create livelihoods; and
- c) Fisheries operations – supporting monitoring, control and surveillance of fisheries as well as treaty administration, information technology and vessel registration and monitoring.

FFA developed a set of ‘Harmonized Minimum Terms and Conditions (HMTCs) for Foreign Fishing Vessel Access’ to apply to licensed vessels in its member countries and territories which has been an important instrument for many years as the basis for the establishment of license conditions throughout the region. (Poseidon 2013)

The Pacific Community (SPC). SPC is an intergovernmental organization that provides technical and policy advice and assistance in a variety of fields (including fisheries) to its Pacific island members. The SPC was established as an international organization in 1947 and has 26 member countries and territories.²⁷⁶ Of most importance to the project’s Marshall Islands purse seine value chain, is The Oceanic Fisheries Programme (OFP) which is part of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of the SPC, and is the Pacific Community’s regional centre for tuna fisheries research, stock assessment and data management. The SPC/OFP is the scientific information provider to the WCPFC, thus influencing CMMs, purse seine VDS total PAE , and other aspects of tuna fishery management in the region.

Pacific Islands Forum Secretariat (PIFS). Pacific Islands Forum Secretariat (PIFS) deals primarily with regional policy and economic matters, and mainly leaves fisheries-related work to FFA. However, the governing body of PIFS (i.e. the political leaders of the region) periodically addresses fisheries policy matters, and other regional agencies (including FFA and the PC) regularly provide progress reports to the Forum and take guidance from it. This was the lead regional agency in the PIC/EU economic partnership agreement (EPA) negotiations which has a major fisheries trade component, although only Papua New Guinea, Fiji and Samoa are parties to the EU/Pacific EPA.²⁷⁷

²⁷⁶ American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji Islands, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu and Wallis and Futuna.
<https://www.spc.int/>

²⁷⁷ <https://ec.europa.eu/trade/policy/countries-and-regions/regions/pacific/>

National infrastructure

Harbour

All commercial fishing vessels that call at port in the Marshall Islands must enter Majuro Lagoon through the north facing Calalin Channel, guided by channel markers assembled of pylons, platform, day boards, and solar powered rotating beacons (RMIPA 2014). The overall channel is about 3.4 kilometres long while the channel width ranges roughly between 350 and 450 meters. Depths within this channel generally range from approximately 34 to 45 meters; although, the shallowest sounding in the channel is approximately 23.5 meters.²⁷⁸

Once through the channel, an expansive port fairway capable of two-way vessel traffic leads to the designated anchorage area on the southeast side of the lagoon. The depth of the anchorage area ranges between 27 and 47 meters, while its size has historically contracted and expanded with the variable number of arriving and departing fishing vessels. While no terminal capacity limits are maintained by the Marshall Islands Ports Authority, specific anchorage locations are determined based on the size and location of other vessels, as well as the potential need for dock access and other shore side services.²⁷⁹ Moreover, present COVID-19 port restrictions impose a limit of 10 carrier vessels and 20 purse seine vessels at any given time, while pre-COVID-19 maximum numbers were typically 20 carrier vessels and 30 purse seine vessels.²⁸⁰

Shore-side infrastructure

Commercial fishing vessels ordinarily use the Delap Dock managed by the Republic of the Marshall Islands Ports Authority (RMIPA), and sometimes a private dock owned and managed by Pacific International Incorporated (PII). The two docks are located on the southeast side of Majuro Lagoon 1.5 kilometres distant from each other.

Delap Dock

The Delap Dock was constructed in the mid to late 1970s utilizing sheet piles driven into the seafloor with a concrete bulkhead constructed atop of the sheet piles. A series of tieback rods from the steel sheet piles extend back into the soil behind the quay face and attach to an anchor in the soil for additional support. East to west, the Delap Dock extends about 308 meters, with the quay face ranging between 11.5 and 13.0 meters in depth at low tide. Twenty-one double bitt bollards and twenty cleats with concrete curbing are installed at 15-meter intervals along the northern edge of the dock. The dock apron is constructed of concrete blocks and stretches 13-15

²⁷⁸ National Geospatial Intelligence Agency. April 9, 2011. Nautical Chart 81782 for Majuro Atoll. OceanGrafix, LLC. St. Paul, Minnesota.

²⁷⁹ RMIPA. (2014) Republic of the Marshall Islands Port Master Plan

²⁸⁰ Pers. Comms., August 2021

meters from the bollards and bitts to a chain-link fence. Two gates provide vehicular access for cargo handling equipment used by local stevedores. Another vehicular access point used by the broader public is located on the far eastern end of Delap Dock, and is monitored by full-time RMIPA security.²⁸¹ The surrounding area is a mix of industrial, residential, and commercial.

An underwater inspection of the sheet piles and concrete bulkhead conducted in July 2013 noted foreseeable repairs to the centre of the dock face likely due to some collision damage, as well as need for cathodic protection installed along the sheet piling.²⁸² All bollards and cleats and various sections of the concrete curbing are also slated to be replaced and/or repaired, especially to support berthing of larger international cargo and military vessels. Moreover, RMIPA is seeking to expand the apron another 5 meters, while noting that while the use of concrete block pavements may often be more economical than asphalt or rigid concrete pavements, these types of pavements have experienced failures in container terminals using heavier container handling equipment such as gantry cranes.²⁸³ Notably shoreside infrastructure at Delap Dock does not include a dockside gantry crane for loading and unloading intermodal containers from container ships.

Dockside bunkering services are available 12 hours per day via a manifold located inside the secured apron area, and which leads to three import/export underground pipelines that pass through the Majuro Stevedore and Terminal Company (MSTC) container yard and to the Marshalls Energy Company (MEC) tank farm. The Majuro Water and Sewage Company (MWSC) provide sewage waste collection services via vacuum truck, with transport and disposal into the Majuro sewer system station. MWCC records from 2018 – 2019 suggest that it supplies fishing vessels nearly 650,000 gallons of potable water per annum.²⁸⁴ Existing potable water and saltwater fire suppression hydrants that connect to the MWSC distribution lines did not function properly when tested in May 2013 suggesting need of significant repairs or even replacement of the entire water system at Delap Dock.²⁸⁵ In more recent discussions with MWSC managers, the current practice of servicing fishing vessels via water delivery trucks was deemed sufficient to meet current demand from fishing

²⁸¹ RMIPA. (2014) Republic of the Marshall Islands Port Master Plan

²⁸² U.S. Navy, Underwater Construction Team. (2013) After Action Report UCT TWO Construction Diving Detachment Alfa Deployment FY13, May 13th 2013 to AUG 15th 2013 Pacific Partnership 2013, USS Pearl Harbor. Port Hueneme, California.

²⁸³ Pers. Comms., May 2021

²⁸⁴ Pers. Comm, MWSC April 2021 and July 2021.

²⁸⁵ RMIPA, 2014

vessels during normal rainfall periods between 2018 – 2020, however this may prove difficult to sustain during prolonged drought conditions.²⁸⁶

The MSTC container yard and MEC power plant comprises much of Delap Dock behind the security fence and gates, which stretches 180-190 meters inland and consists of various industrial buildings and facilities owned and/or operated by RMIPA, MEC, MSTC, and Tobolar Copra Processing Authority. The MSTC cargo handling and container storage area comprises roughly 3.2 hectares of land area used for the movement and storage of dry and refrigerated containers, general palletized cargo, and empty containers. Within this area, there are several structures that directly support the maintenance and repair of cargo handling equipment, as well as provide enclosed areas for stevedore rest and recreation²⁸⁷, which are also used by RMIPA personnel. The MSTC container yard is equipped with 43 reefer container plug-in points connected to the main grid, as well as a 20-foot converted container with 38 plug-in points used as a backup generator during extended power outages. At least three container handlers are in circulation during stevedoring operations.

Increasing activity by various Delap Dock users and service providers, as well as the build-up of adjacent office buildings, heavy equipment and shoreline operations under the Ministry of Works, Infrastructure and Utilities (WIU), the Marshall Islands Sea Patrol, and the Ministry of Finance Procurement Division warehouse have led to conditions where “everyone is competing for space”²⁸⁸ within and around the 5.7 square kilometre area that comprises Delap Dock. Among berthing purse seine vessels, they must cease dockside activities and return to anchorage when an international cargo ship calls to port, sometimes suspending activities multiple times when two container ships call port in close succession. Calls for better use of existing spaces and extending the length of the Delap Dock for commercial vessels are common among all dock users and service providers. In particular, the presence of various solid waste materials in selected areas of the overall cargo handling area significantly reduces the effective amount of area available for cargo handling. Another issue impacting the efficiency and cost of stevedoring operations is the lack of a continuous paved surface over the entire expanse of the cargo handling area.²⁸⁹ Addressing such issues would require dedicated interagency coordination, political will, and in the case of extending the length of the dock, significant capital

²⁸⁶ Pers. Comm, MWSC April 2021 and July 2021.

²⁸⁷ RMIPA, 2014

²⁸⁸ Pers. Comm., MSTC, May 2021

²⁸⁹ RMIPA, 2014

investment. Notably, a private dock for purse seine tuna containerisation activities has also developed in recent years as discussed below.

PII Dock

The PII dock offers berthed vessels 9 meters quay depth at low tide, and presently spans 170 meters east to west with an additional 250 meters extension intended upon completion. It is constructed using sheet piles with tieback rods to deadman anchors spaced 20 feet apart.²⁹⁰ The apron is concrete capped and extends 20-50 meters back from the dock face. The apron is used for the movement and storage of refrigerated containers as well as a net repair yard, and other cargo vessel traffic managed by PII. Land area presently comprising the fenced in portion of PII dock is approximately 1 hectare. The RMIPA maintains an MOU with PII to provide security within the fenced in COVID-19 restricted area whenever there is a purse seine operation taking place.²⁹¹

There are 75 plug-in ports for refrigerated containers with a backup generator on site, and although the site is connected to the main water distribution system, potable water is supplied via their own catchment system to vessels.²⁹² The surrounding area is a mix of industrial and residential with greater commercial and industrial use under development including a hotel development project and three eateries within walking distance. Purse seine support service equipment on site includes one container handler, one forklift, five container stands and shoots, and a flatbed truck needed to haul each packed container to the Delap Dock about 1.5 kilometres away. The MSTC flatbed truck is also regularly hired to transport refrigerated containers to and from the PII dock.

Surrounding the 1-hectare dock area is an additional approximately 5 hectares that PII uses for various industrial operations and heavy equipment storage. There is notably a significant amount of old equipment, however these are intended for removal to increase the effective amount of area available to expand on-shore purse seine support services at the PII dock.²⁹³

²⁹⁰ Pers. Comm., PII, June 2021

²⁹¹ Pers. Comm., RMIPA, May 2021

²⁹² Pers. Comm., PII, April 2021

²⁹³ Pers. Comm., PII, June 2021

Onshore infrastructure

Some additional onshore infrastructure contributes to the ability of support service providers in the Marshall Islands to meet present demands of the purse seine vessels. This includes the 1.5 kilometer stretch of roadway and associated bridge that connects the PII Dock to the Delap Dock given existing practice to transport reefer containers along this route.

In addition to the roadway, the Majuro electricity, water, and waste systems that traverses urban Majuro are key infrastructure. The Marshalls Energy Company (MEC) main power plant contains seven diesel-engine generators located at Delap Dock. The plant can comfortably produce about 10 MW, with current peak demand and output nearing 9.0 MW. The plant generation bus is operated at 4,160 volts; but, outside the plant, electricity is distributed using 15 kilovolt (KV) distribution arrangements. (RMIPA 2014). The existing transformer located at Delap Dock can accommodate MSTC with up to 75 reefer containers, but to do more would require adding another transformer at their site. MEC plans an additional 12 MW to meet growing demand, and this is already partially funded by the WB SeDEP project to meet 5 MW. The MEC notices bumps in power consumption which relate to the number of reefer containers being switched on to meet temperature requirements at certain times.²⁹⁴

And as noted earlier, Majuro Water and Sewage Company (MWSC) can provide sewage waste collection services via vacuum truck, with transport and disposal into the Majuro sewer system station. MWSC can also supply vessels potable water via water deliveries trucks.²⁹⁵

²⁹⁴ Pers. Comm., MEC, June 2021

²⁹⁵ Pers. Comm., April 2021

Annex 4: Detailed economic calculations

TABLE 54. PROFITABILITY ASSESSMENT OF THE MARSHALL ISLANDS PURSE SEINE TUNA VC (2016– 2019)

	MIFCO	Koo's	PPF	Pan Pacific Foods
	Average 2016–2019			
Total revenue	8 458 839	42 360 077	37 318 558	n/a
Total costs	6 526 214	30 027 194	32 545 820	n/a
Operating profit (gross income)	1 932 626	12 332 884	4 772 738	n/a
Return on sales (%)	23%	29%	13%	n/a
Return on investment (%)	30%	41%	15%	n/a
	2019			
Total revenue	8 977 000	42 556 869	68 826 406	1 799 899
Total costs	8 777 671	37 036 096	68 916 593	3 657 970
Operating profit (gross income)	199 329	5 520 773	-90 186	-1 858 072
Return on sales (%)	2%	13%	-0.1%	-103%
Return on investment (%)	2.3%	15%	-0.1%	-51%

Note: The average values for Pan Pacific Foods during 2016–2019 are not available due to data unavailability.

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report. Rome, FAO.

TABLE 55. EMPLOYMENT OF AND WAGES FOR THE MARSHALL ISLANDS RESIDENTS IN THE CORE VC

a) Overview

	Economic indicator	MIFCO	Koo's	PPF	Pan Pacific Foods	Total
Number of jobs in FTE	Ec5	11	35	33	98	177
Number of full-time jobs	Ec6	11	33	30	69	143
Number of wage/salaried (hired) jobs in FTE	Ec7	11	35	33	98	177
Average gross hourly wage (USD)	Ec9	3.6	3.6	3.6	3.4	
Total value of net wages per year (USD)	Ec11	50 574	161 162	198 720	1 237 339	1 647 796
Total taxes on salaries and wages + social security + health fund contribution (USD)		22 722	72 406	17 280	515 589	627 997

Note: Taxes on salaries include: (i) direct tax on salaries (i.e. a tax of eight percent (8%) upon the first USD 10 400 (Income Tax Act 1989, Part II, p.10), (ii) social security tax (MISSA tax, 16% of gross wages), and (iii) health fund contribution (7%). For fishing companies, the local fishing crew in MIFCO and Koo's pay all three kinds of taxes, while the PPF local crew only pays direct tax on salaries. For Pan Pacific Foods, all employees pay all three kinds of taxes.

b) PPF

	No. of jobs	Hours/day	Average days/person year	FT or PT	Total full days (8 hours/day) for all	Average hourly pay (USD, gross)	Total pay/year for all (USD, gross)	Taxes/year on gross wages (USD)	Total pay/year for all (USD, net)
Crew	30	10	200	FT	7 500	3.6	216 000	17 280	198 720
Total	30				7 500		216 000	17 280	198 720

c) MIFCO

	No. of jobs	Hours/day	Average days/person year	FT or PT	Total full days (8 hours/day) for all	Average hourly pay (USD, gross)	Total pay/year for all (USD, gross)	Tax/year on gross wages (USD)	Total pay/year for all (USD, net)
Onshore	4	8	230	FT	920	3.6	26 496	8 214	18 282
Crew	6.5	10	200	FT	1 625	3.6	46 800	14 508	32 292
Total	10.5				2 545		73 296	22 722	50 574

d) Koo's

	No. of jobs	Hours/day	Average days/person year	FT or PT	Total full days (8 hours/day) for all	Average hourly pay (USD, gross)	Total pay/year for all (USD, gross)	Tax/year on gross wages (USD)	Total pay/year for all (USD, net)
Onshore	7	8	230	FT	1 610	3.6	46 368	14 374	31 994
Crew	26	10	200	FT	6 500	3.6	187 200	58 032	129 168
Total	33				8 110		233 568	72 406	161 162

e) Pan Pacific Foods

	No. of jobs	Hours/day	Average days/person year	FT or PT	Total full days (8 hours/day) for all	Average hourly pay (USD, gross)	Total pay/year for all (USD, gross)	Tax/year on gross wages (USD)	Total pay/year for all (USD, net)
Loiners & support crew	52	12	114	FT	8 892	3.3	234 749	53 992	180 757
Supervisors in general				FT	-		1 145 064	354 970	790 094
Container stuffing & Cold storage workers FT	17	12	335	FT	8 543	3.4	232 356	74 253	158 103
Container stuffing & Cold storage workers PT	23	12	150	PT	5 175	3.4	140 760	32 375	108 385
Total	92				22 610		1 752 929	515 589	1 237 339

Note: "FT" refers to fulltime and "PT" refers to parttime.

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

TABLE 56. CHANGES IN DIRECT VALUE ADDED FROM UPGRADING ELEMENTS AND BENEFIT-COST RATIOS

	Direct VA (USD)	Change in DVA compared to baseline (USD)	Upgrading costs (USD)	B/C ratio
Baseline	19 840 177			
1,2 &4	28 246 306	8 406 129	5 485 000	1.53
1-4	32 973 874	13 133 697	10 575 000	1.24
3 only		4 727 568	5 090 000	0.93

Note: (1) Upgrading element 1 – Increased containerisation of PS-caught tuna. Upgrading element 2 – Increased landings in and exports from Marshall Islands thanks to an approved and functioning CA. Upgrading element 3 – Greater levels of storage and sorting of tuna in Marshall Islands, facilitated by increased cold storage capacity, Upgrading element 4 – social and environmental sustainability improvements (as discussed in section 4.2).

Source: Macfadyen, G., Duong, G., Steve, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2023. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report*. Rome, FAO.

Annex 5: Extracts from FISH4ACP methodological guide on scoring

Economic analysis – Scoring

To assess the economic domains, a score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each economic indicator, with 1 (red) means unsustainable, 2 (yellow) means concerning, and 3 (green) means sustainable. The scoring is done by the VCA team using multiple sources of information, and then reviewed based on feedbacks collected from the VC stakeholders at the validation workshop.

1. Profitability indicators

Ec1 Net profits at actor level

Revenues minus costs in USD.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If positive	If zero	If negative

Ec2 Trend in net profits at actor level

Reflecting on the last 5 years, simply one of three options (up/flat/down) as indicated by actor.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If growing significantly (e.g. 10% per year)	If flat or growing slowly (less than 10% per year)	If decreasing

Ec3 Net profit margin (or return on sales)

$100 * (\text{net profit over total revenues})$

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If significantly above the cost of capital (e.g. 20% above)	If around the cost of capital (e.g. less than 20% above or below)	If significantly below the cost of capital (e.g. less than 80% of the cost of capital) or even negative

Ec4 Return on investment

$100 * (\text{operating profit over total cost})$ as a %; i.e. $100*(14,645/166,705) = 9$ percent, in our example.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If significantly above the cost of capital (e.g. 20% above)	If around the cost of capital (e.g. less than 20% above or below)	If significantly below the cost of capital (e.g. less than 80% of the cost of capital) or even negative

2. Employment indicators

Ec5 *Number of jobs in FTE terms*

Expressed in FTE terms, i.e. the total number of working days divided by 230.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If the number of jobs is twice the number of actors	If the number of jobs is 25% to 200% of the number of actors	If the number of jobs is less than 25% of the number of actors

Ec7 *Number of wage/salaried (hired) jobs*

Total number of wage/salaried (non-family) jobs as indicated by the actor expressed in FTE terms.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
Above 50% of all jobs	Between 10% and 50% of all jobs	Below 10% of all jobs

Ec9 *Average gross wage paid to hired workers*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
Average wage at VC level is 10% or more above the living wage and/or minimum wage level, and average wage is not below these values at any node in the VC	Average wage at VC level is within 10% of the living wage and/or minimum wage level, and average wage is not below these values at any node in the VC	Average wage at VC level is more than 10% below the living wage and/or minimum wage level

Ec11 *Total value of net wages*

The total value of net wages, i.e. the wage after taxes on salary are removed.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If above 25% of net value added	If between 10% and 25% of net value added	If below 10% of net value added

3. Value added indicators

Ec12 *Direct value added*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If making up 25% or more of the total value of output (at all levels)	If making up between 10% and 25% of the total value of output (at VC level)	If making up less than 10% of the total value of output (at VC level)

Ec13 *Indirect VA at VC level*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If equivalent to more than 10% of the total value of output	If equivalent to between 5% and 10% of the total value of output	If equivalent to less than 5% or more of the total value of output

Ec14 *Total VA*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If equivalent to more than 35% of the total value of output	If equivalent to between 15% and 35% of the total value of output	If equivalent to less than 15% or more of the total value of output

Ec15 *Total value of output*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
Cannot be assessed as good or bad. Increase is good.		

4. Effects in the national economy indicators

Ec16 *Contribution to GDP*

The contribution of the VC to GDP is expressed as a percentage and requires the GDP value to be extracted from national statistics.

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
Cannot be assessed as good or bad. Increase (grows faster than other VCs, or shrinks slower) cannot be assessed as good or bad.		

Ec19 *Net impact on the balance of trade*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If positive	If zero	If negative

Ec20 *Rate of integration*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If above 50%	If between 25-50%	If below 25%

Ec21 *Net impact on public funds*

Hotspot classification (illustrative):

Sustainable	Concerning	Unsustainable
If positive	If zero or negative but small	If large and negative

Social analysis - Scoring

The objective of the social sustainability assessment is to measure the social impacts of the value chain activities (positive and negative) across six core social **domains**:

1. Inclusiveness
2. Gender equality
3. Food security, safety and nutrition
4. Decent employment
5. Social and cultural capital
6. Institutional strength

Each domain is broken down into four **sub-domains**, with key **questions** per sub-domain. Across the sub-domains, a number of indicators are measured to assist in the determination of the score for the subdomain questions.

Each subdomain question is given a rating (1-to-5 scores, with 1 means “very concerning” (or red) and 5 means “no concerns” (or dark green)) (see Table 57). These ratings of the questions are averaged out to obtain the scores at sub-domain level, which in turn are averaged out to obtain the score at the domain-level. The scoring is done by the VCA team using multiple sources of information, and then reviewed based on feedbacks collected from the VC stakeholders at the validation workshop.

TABLE 57. SCORING SYSTEM FOR SOCIAL SUSTAINABILITY QUESTIONS WITH ILLUSTRATION

5 - No concerns	4 - Minor concerns	3 - Moderate concerns	4 - concerning	5 -Very concerning
Specific conditions	Specific conditions	Specific conditions	Specific conditions	Specific conditions

Example question & scoring guidance				
3.1.1 To what extent does current national production meet national demand for this commodity?				
Meets > 90% of national demand	Meets 75-90% of national demand	Meets 50-75% of national demand	Meets 20-50% of national demand	Meets <20% of national demand

The following lists the domain and subdomain questions and their respective scoring guidance:

1. Inclusiveness: How equitably are the economic benefits distributed across the value chain?

1.1 Wages and employment distribution:

- 4.1.1 How equitable are the wages between workers hired by the different types of value chain actors?
Scoring guidance: 5- very equitable, 4 – equitable, 3 - somewhat equitable, 2 – unequitable, 1- very unequitable
- 4.1.2 To what extent is the value chain contributing to national employment with equal opportunity jobs (through core and extended value chain)?
Scoring guidance: 5 - very high contribution of jobs, 4 - high contribution, 3 - moderate contribution, 2 - low contribution, 1 - very low contribution of jobs
- 4.1.3 To what extent are vulnerable and marginalised groups capturing jobs in the sector and receiving equitable wages?
Scoring guidance: 5 - Very many vulnerable and marginalized groups included and receiving an equitable share of income, 4 – many, 3 – some, 2 – few, 1 - very few to no vulnerable and marginalized groups involved

1.2 Value added distribution:

- 1.2.1 How equitably is value added distributed between the different types of VC actors and stakeholders (i.e. Government, workers, firms and owners)?
Scoring guidance: 5 - very equitable, 4 – equitable, 3 - somewhat equitable, 2 – unequitable, 1 - very unequitable
- 1.2.2 Is direct net value added (after-tax wages and profits) equitably distributed between small vs. large VC actor types?
Scoring guidance: 5 - very equitable, 4 – equitable, 3 - somewhat equitable, 2 – unequitable, 1 - very unequitable
- 1.2.3 How equitable are the net profits of the VC actors distributed between VC functions?
Scoring guidance: 5 - very equitable, 4 – equitable, 3 - somewhat equitable, 2 – unequitable, 1 - very unequitable

1.3 Poverty and vulnerability:

- 1.3.1 What is the prevalence of poverty across the value chain amongst VC participants (comparing incomes to national poverty line)?
Scoring guidance: 5 - no to very low poverty or <5% below the national poverty line, 4 - low poverty or 5-20% , 3 - moderate poverty or 21-50%, 2 - high poverty or 51-80%, 1 - very high poverty or >80% below the national poverty line, N/A – no national poverty line
- 1.3.2 What is the prevalence of extreme poverty across the value chain amongst VC participants (comparing incomes to the international poverty line of USD1.9/day)?
Scoring guidance: 5 - no to very low poverty or <5% below the international poverty line, 4 - low poverty or 5-20% , 3 - moderate poverty or 21-50%, 2

- high poverty or 51-80%, 1 - very high poverty or >80% below the international poverty line

- 1.3.3 To what extent do impoverished VC participants diversify income to reduce the risk of poverty (e.g. ownership of assets, production/catch of multiple species)?

Scoring guidance: 5 - very good income diversification or >80% have 2 or more income sources; 4 - good or 60%-80% have 2 or more income sources; 3 - moderate or 40-60% have 2 or more income sources; 2 - low or 20-40% have 2 or more income sources; 1 - very low income diversification or <20% have 1 or more income sources; N/A - no impoverished actors

1.4 Discrimination:

- 1.4.1 Application of national/ international laws preventing discrimination in the workplace across the value chain.

Scoring guidance: 5 - laws are well-respected and enforced, 4 - laws could be better respected or enforced, 3 - laws not well-respected or enforced, 2 - laws are not respected or are unenforced, 1 - laws are not respected, unenforced or no laws in place

- 1.4.2 Application of formal or informal business-level standards or practices to prevent discrimination in the workplace across the value chain.

Scoring guidance: 5 - most or >90% of firms have standards in place to prevent workplace discrimination, 4 - many or 70-90%, 3 - some or 50-70%, 2 - few or 20-50%, 1 - very few or <20% of firms have standards in place to prevent workplace discrimination

- 1.4.3 How do value chain actors influence sociocultural norms related to workplace discrimination (based on age, gender, ethnic group, migration status, etc.)?

Scoring guidance: 5 - strongly positive influence, 4 - positive influence, 3 - neither positive nor negative, 2 - negative influence, 1 - strongly negative influence

2. Gender equality: How well does this value chain promote gender equality?

2.1 Women's economic empowerment:

2.1.1 To what extent are women economically involved across the value chain overall, and by VC function (considering also support services)?

Scoring guidance: 5 - About 50% are women, 4 - 25-50% women, 3 - 10-25% women, 2 - 5-10% women, 1 - <5% are women

2.1.2 How equitable is the share of value added (wages and profits) captured by women VC participants compared to men?

Scoring guidance: 5- very equitable, 4 – equitable, 3 - somewhat equitable, 2 – unequitable, 1 - very unequitable

2.1.3 Does gender discrimination prevent women from actively engaging in VC activities?

Scoring guidance: 5 - no gender discrimination, 4 - low gender discrimination, 3 - moderate gender discrimination, 2 - high gender discrimination, 1 - very high gender discrimination

2.2. Gendered division of labour:

2.2.1 Are overall domestic workloads of women and men VC participants in the value chain equitably distributed (including domestic work and child/elderly care)?

Scoring guidance: 5 - equal share of time spent on domestic work between women and men or 50%-50%, 4 - nearly equal share or 55%-45%, 3 - somewhat equal share or 60%-40%, 2 - unequal share or 70%-30%, 1 - highly unequal share or 80%-20%

2.2.2 Are VC activities equitably distributed between men and women VC participants by the level of effort (considering time, technology, transport, and working conditions, etc.)?

Scoring guidance: 5 - equal level of effort for VC activities conducted by women and men or 50%-50%, 4 - nearly equal or 55%-45%, 3 - somewhat equal or 60-40%, 2 – unequal or 70%-30%, 1 - highly unequal level of effort 80-20%, N/A - there are no differences in activities conducted by men and women

2.2.3 To what extent are the jobs and businesses that women are engaged in equal to men in terms of formality (business registration and employment contracts) across the value chain?

Scoring guidance: 5 - equal formality between women and men or 50%-50%, 4 - nearly equal or 55%-45%, 3 - somewhat equal or 60%-40%, 2 – unequal or 70%-30%, 1 - very unequal or 80%-20%

2.3 Gendered access to productive resources:

2.3.2 To what extent do women VC actors have equal access to formal finance as men?

Scoring guidance: 5 - equal access between women and men or 50%-50%, 4 - nearly equal or 55%-45%, 3 - somewhat equal or 60%-40%, 2 - unequal or 70%-30%, 1 - very unequal or 80%-20%

2.3.3 To what extent do women VC actors have equal access to non-financial support services as men?

Scoring guidance: 5 - equal access between women and men or 50%-50%, 4 - nearly equal or 55%-45%, 3 - somewhat equal or 60%-40%, 2 - unequal or 70%-30%, 1 - very unequal or 80%-20%

2.4 Women's decision-making and leadership:

2.4.1 To what extent do women have equal control over spending of income earned or decisions related to shared assets at the household level?

Scoring guidance: 5 - equal control between men and women or 50%-50%, 4 - nearly equal or 55%-45%, 3 - somewhat equal or 60%-40%, 2 - unequal or 70%-30%, 1 - highly unequal or 80%-20%

2.4.3 Are women VC actors equally involved in leadership/ decision-making positions as men in the VC?

Scoring guidance: 5 - equal share of men to women leaders 50%-50%, 4 - nearly equal share 55%-45%, 3 - somewhat equal share 60%-40%, 2 - unequal share 70%-30%, 1 - highly unequal share 80%-20%

3. Food Security, Safety and Nutrition: How does the value chain contribute to a secure, accessible, safe, nutritious and stable food supply?

3.1 Availability of Food:

3.1.2 How does trade of this commodity (imports/ exports) impact national food security?

Scoring guidance: 5 - trade is very supportive of national food security, 4 - supportive, 3 - somewhat supportive, 2 - unsupportive, 1 - not at all supportive, N/A - there are no impacts of trade on national food security, or no trade of this commodity

4. Decent Employment: How does this value chain ensure that working conditions are safe, secure and decent?

4.1 Respect of labour rights:

4.1.1 To what extent do firms respect national labour laws on the right to organise and collective bargaining?

Scoring guidance: 5 - >90% of firms respect national laws on the right to organize and collective bargaining, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of firms respect national laws on the right to organize and collective bargaining, N/A - there are no national labour laws on the right to organise and collective bargaining

4.1.2 To what extent do firms respect national labour laws regarding working conditions?

Scoring guidance: 5 - >90% of firms respect national laws on working conditions, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of firms respect national labour laws or there are no national labour laws on working conditions

4.1.3 To what extent do workers benefit from enforceable and fair employment contracts (SADD)?

Scoring guidance: 5 - 85 - 100% of workers have fair and enforceable contracts, 4 - 65-85%, 3 - 25-65%, 2 - 10-25%, 1 - <10%

4.2 Child and forced labour:

4.2.1 To what extent are firms respecting national labour laws with regards to child labour (e.g. minimum age for employment)?

Scoring guidance: 5 - >90% of firms respect child labour laws, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of firms respect child labour laws OR there are no national child labour laws

4.2.2 What is the prevalence of child labour across the value chain, particularly where children are missing school to participate in VC activity or support HH activities in VC households (SADD)?

Scoring guidance: 5 - none or 0% of workforce is child labour, 4 - very low or <5% with sporadic cases, 3 - moderate or 5-10% with regular occurrence in one or more VC segments, 2 - high or 10-15% with regular occurrence in one or more VC segments, 1 - very high or >15% with regular occurrence in one or more VC segments

4.2.3 Is forced labour, including debt bondage and trafficking for labour exploitation, an issue across the VC?

Scoring guidance: 5 - no forced labour in the value chain, 4 - very few cases of forced labour, 3 - some forced labour, 2 - high prevalence of forced labour, 1 - very high prevalence of forced labour

4.3 Job safety and security:

4.3.1 To what extent do firms across the value chain implement and enforce formal workplace safety standards?

Scoring guidance: 5 - >90% of firms implement and enforce safety standards, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of firms have safety standards in place

4.3.2 What is the prevalence of occupational injuries across the value chain?

Scoring guidance: 5 - none to very low, 4 - low, 3 - moderate, 2 - high, 1 - very high

4.3.3 To what extent do VC actors and workers persist in the VC (turnover)?

Scoring guidance: 5 - very low turnover, 4 - low turnovers, 3 - moderately high turnover, 2 - high turnover, 1 - very high turnover

4.4 Attractiveness:

4.4.1 To what extent are remunerations fair and competitive based on national standards (e.g. living wage and social benefits)?

Scoring guidance: 5 - very competitive remunerations, 4 - competitive remunerations, 3 - somewhat competitive, 2 - uncompetitive remunerations, 1 - very uncompetitive remunerations

4.4.2 To what extent are the business opportunities and activities along the value chain attractive?

Scoring guidance: 5 - very attractive, 4 - attractive, 3 - somewhat attractive, 2 - a little attractive, 1 - not at all attractive

4.4.3 To what extent are technologies, practices or innovations adopted, particularly to reduce strenuous activities across the value chain?

Scoring guidance: 5 - very high adoption rates across the VC, 4 - high rates, 3 - moderate rates, 2 - low rates, 1 - very low to no adoption of technology/innovation

5. Social and cultural capital: How are social and cultural capital protected and enhanced through this value chain?

5.1 Collective action (horizontal governance):

5.1.1 To what extent are value chain actors organized into cooperatives or producers' organizations, industry associations, trade unions, etc. (SADD)?

Scoring guidance: 5 - 85 - 100% are organized into groups, 4 - 65-85%, 3 - 25-65%, 2 - 10-25%, 1 - <10%

5.1.2 To what extent does participation in such organizations result in improved socioeconomic gains for members (benefits)?

Scoring guidance: 5 - very good benefits, 4 - good benefits, 3 - some benefits, 2 - few benefits, 1 - very few to no benefits

5.1.3 Do VC actors work together to share resources, or engage in joint advocacy for the sector for mutual benefit?

Scoring guidance: 5 - Almost all VC actors work together, 4 - Majority of VC actors work together, 3 - Minority of VC actors work together, 2 - Majority of VC actors do not work together, 1 - Few to no VC actors work together

5.2 Coordination of transactions (vertical governance):

5.2.1 To what extent do VC actors have contracts or agreements at the functional level - for product procurement and sales (SADD)

Scoring guidance: 5 - 85 - 100% have contracts, 4 - 65-85%, 3 - 25-65%, 2 - 10-25%, 1 - 0 <10%

5.2.2 To what extent do VC actors report reliable and secure access to markets?

Scoring guidance: 5 - Almost all VC actors report secure access to markets, 4 - Majority of VC actors report secure access to markets, 3 - Minority of VC actors report secure access to markets, 2 - Majority of VC actors report insecure access to markets, 1 - Almost all VC actors report insecure access to markets

5.2.3 To what extent are the relationships between value chain actors perceived as trustworthy?

Scoring guidance: 5 - Almost all VC actors indicate relationships are trustworthy, 4 - Majority of VC actors indicate relationships are trustworthy, 3 - Minority of VC actors indicate relationships are trustworthy, 2 - Majority of VC actors indicate relationships are untrustworthy, 1 - Almost all VC actors indicate relationships are untrustworthy

5.3 Social Cohesion:

5.3.1 To what extent are VC actors able to contribute to decision-making processes that affect the sector?

Scoring guidance: 5 - Almost all VC actors contribute to decision-making, 4 - Majority of VC actors contribute to decision-making, 3 - Minority of VC actors contribute to decision-making, 2 - Majority of VC actors do not contribute to decision-making, 1 - Few to no VC actors contribute to decision-making

5.3.2 To what extent do VC actors engage in networking and information sharing for the benefit of the VC?

Scoring guidance: 5 - Almost all VC actors engage in regular networking and information-sharing, 4 - Majority of VC actors engage in periodic information-sharing, 3 - Minority of VC actors engage in periodic networking and info-sharing, 2 - Majority of VC actors do not network or

share info, 1 - Few to no VC actors engage in networking and information-sharing

5.3.3 To what extent do value chain actors collaborate with the public sector (e.g. public-private collaboration)?

Scoring guidance: 5 - very good public-private collaboration, 4 - good, 3 - moderate, 2 - low, 1 - very low to no public-private collaboration

5.4 Cultural traditions:

5.4.2 How do VC activities impact sociocultural norms (e.g. gender norms, consumer habits, fishing as a business or entrepreneurship)?

Scoring guidance: 5 - very positively, 4 - positively, 3 - neither positively nor negatively, 2 - negatively, 1 - very negatively

6. Institutional strength: How are public and private institutions strengthened through this value chain?

6.1 Policy, regulations and standards:

6.1.1 To what extent is a sustainable fisheries management/aquaculture development plan implemented and enforced?

Scoring guidance: 5 - plan in place, up-to-date and enforced; 4 - plan in place and enforced, needs updating; 3 - plan in place, and somewhat enforced; 2 - plan in place, but not enforced; 1 - no plan in place

6.1.2 To what extent are value chain activities formally registered/licensed across the value chain?

Scoring guidance: 5 - 85 - 100% are formally registered; 4 - 65-85%; 3 - 25-65%; 2 - 10-25%; 1 - <10% are formally registered

6.1.3 To what extent are public policies and sector standards supportive of business growth in the sector?

Scoring guidance: 5 - very supportive; 4 - supportive; 3 - somewhat supportive; 2 - unsupportive; 1 - very unsupportive

6.2 Access to finance:

6.2.2 To what extent do VC actors have access to finance (SADD)?

Scoring guidance: 5 - >90% of actors have access to finance, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of actors have access to finance

6.2.3 To what extent are measures (e.g. insurance) used to reduce the risk of lending to firms along the VC?

Scoring guidance: 5 - very good measures used, 4 - good measures used, 3 - moderate measures used, 2 - few measures used, 1 - very few to no measures used

6.3 Access to natural resources:

6.3.2 To what extent are VC actors adhering to national land/fishing tenure policies, and international best practices on tenure?

Scoring guidance: 5 - >90% of VC actors adhere to national tenure policies, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of VC actors adhere to national tenure policies, N/A - no national tenure policies in place

6.3.3 To what extent do value chain actors report security of land/fishing tenure (SADD)?

Scoring guidance: 5 - >90% of VC actors have secure land/fishing tenure, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of VC actors have secure land/fishing tenure

6.4 Access to information:

6.4.1 What is the national capacity for providing accurate and timely data on fisheries/aquaculture?

Scoring guidance: 5 - very good capacity for data collection, 4 - good capacity, 3 - moderate capacity, 2 - low capacity, 1 - very low capacity

6.4.3 To what extent do VC actors have access to market information?

Scoring guidance: 5 - >90% of actors have access to market information, 4 - 70-90%, 3 - 50-70%, 2 - 20-50%, 1 - <20% of actors have access to market information

Environmental analysis – Scoring

To assess the environmental domains and sub-domains, a score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each environmental indicator, with 1 (red) meaning unsustainable, 2 (yellow) meaning concerning, and 3 (green) meaning sustainable. The scoring is done by the VCA team using multiple sources of information, and then reviewed based on feedbacks collected from the VC stakeholders at the validation workshop.

1. Climate impact: What is the climate impact of the value chain?

Electricity use

Indicator: Electricity use (kWh)/ kg of end product

Hotspot classification:

Sustainable	Concerning	Unsustainable
Electricity use is lower than 0.2 kWh/kg of end product	Electricity use is between 0.2 kWh and 0.5 kWh/kg of end product	Electricity use is higher than 0.5 kWh/kg of end product

Fuel use

Indicators: Fuel consumption (MJ) / kg of end product

Hotspot classification:

Sustainable	Concerning	Unsustainable
Fuel consumption is lower than 20 MJ/kg of end product	Fuel consumption is between 20 MJ and 85 MJ/kg of end product	Fuel consumption is higher than 85 MJ/kg of end product

Carbon footprint

Indicator: Carbon footprint (kg CO₂e)/kg of end product

Hotspot classification:

Sustainable	Concerning	Unsustainable
Carbon footprint is smaller than 2 kg CO ₂ e/kg of end product	Carbon footprint is between 2 kg CO ₂ e and 4 kg CO ₂ e/kg of end product	Carbon footprint is larger than 4 kg CO ₂ e/kg of end product

Renewable clean energy use

Indicators: Share (%) of renewable clean energy in total electricity consumption at actor level, functional level and core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
More than 50 % of total energy supply in the value chain is generated from renewable clean energy sources	Between 20 % and 50 % of total energy supply in the value chain is generated from renewable clean energy sources	Less than 20 % of total energy supply in the value chain is generated from renewable clean energy sources

2. Water footprint: What is the impact of the VC on the water footprint?

Water and ice consumption

Indicators:

- Ice consumption (kg)/kg of end product
- Water consumption (m³)/kg of end product
- Sustainability of water supply at core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Water consumption is below 1 m ³ /kg of end product and ice consumption is below 1 kg/kg of end product and water supply is sustainable	Water consumption is below or equal to 5 m ³ /kg of end product and ice consumption is equal to or higher than 1 kg/kg of end product and water supply is sustainable or concerning	Water consumption is above 5 m ³ /kg of end product or water supply is unsustainable

Water pollution and wastewater treatment

Indicators:

- Standards on wastewater treatment in place and well enforced at core VC level
- Proportion (%) of firms that treat and/or monitor wastewater at actor level, functional level and core VC level

- General water pollution issue or risk of water pollution from VC activities at core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
More than 80 % of firms treat and/or control wastewater and standards are in place and well enforced or no negative environmental impact due to water pollution	50 % of firms or more treat and/or control wastewater and standards are at least partially in place	Less than 50% of firms treat and/or control wastewater or standards are not in place

3. Fish stock sustainability: What is the impact of the VC on fish stock sustainability?

Stock status and stock dynamics

Indicators:

- Current fish stock status of target species
- Change over time of stock status

Hotspot classification:

Sustainable	Concerning	Unsustainable
Fish stock is underfished	Fish stock is maximally sustainably fished	Fish stock is overfished

Fishing pressure

Indicators:

- Level of fishing pressure
- Change over time of fishing pressure

Hotspot classification:

Sustainable	Concerning	Unsustainable
Underfishing is happening	Fishing effort is concerning	Overfishing is happening

4. Biodiversity and ecosystems: What is the impact of the VC on biodiversity and ecosystems?

Impacts on associated species

Indicators for fishery value chains:

- Current fish stock status of non-target species
- Share (%) of bycatch in the overall catch at actor level and functional level
- Proportion (%) of fishers with measures in place to reduce bycatch at actor level and functional level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Fishery: Less than 10 % of total catch is bycatch and more than 70 % of fishers have measures in place to reduce bycatch and non-target species stock is not overfished	Fishery: 30 % or less of total catch is bycatch and 50 % of fishers or more have measures in place to reduce bycatch and non-target species stock is not overfished	Fishery: More than 30 % of total catch is bycatch or less than 50% of fishers have measures in place to reduce bycatch or non-target species stock is overfished

Status of vulnerable ecosystems

Indicators:

- Share (%) of surface/area of vulnerable ecosystems harmed as a result of VC activities
- Share (%) of vulnerable ecosystems that is irreversibly harmed as a result of VC activities

Hotspot classification:

Sustainable	Concerning	Unsustainable
Less than 10 % of surface/area of vulnerable ecosystems is harmed as a result of VC activities and 0 % of vulnerable ecosystems is irreversibly harmed as a result of VC activities	20 % or less of surface/area of vulnerable ecosystems is harmed as a result of VC activities and 5 % or less of vulnerable ecosystems is irreversibly harmed as a result of VC activities	More than 20 % of surface/area of vulnerable ecosystems is harmed as a result of VC activities or more than 5 % of vulnerable ecosystems is irreversibly harmed as a result of VC activities

Status of endangered, threatened or protected (ETP) species

Indicators:

- Degree of detrimental effect on ETP species at actor level and functional level
- Proportion (%) of firms with measures in place to reduce detrimental effects on ETP species at actor level and functional level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Detrimental effect on ETP species is low and more than 80 % of firms have measures in place to reduce detrimental effects on ETP species	Detrimental effect on ETP species is low or medium and 40 % of firms or more have measures in place to reduce detrimental effects on ETP species	Detrimental effect on ETP species is high or less than 40 % of firms have measures in place to reduce detrimental effects on ETP species

Responsible use of aquatic genetic resources

Indicators:

- Regulations for the introduction of non-native species in place and well enforced at functional level
- Regulations for the hybridization of aquatic species in place and well enforced at functional level
- Change in presence of escaped non-native and/or genetically improved species in the natural environment over the past 5 years
- Proportion (%) of firms with measures in place to avoid escape of non-native and genetically improved species at actor level and functional level

Hotspot classification:

Sustainable	Concerning	Unsustainable
No records of genetically improved and/or non-native species in the natural environment and more than 80 % of firms with measures in place and regulations in place and well enforced	No records of genetically improved and/or non-native species in the natural environment or stable or decreasing presence and 50 % of firms or more with measures in place and regulations at least partially in place	Records of genetically improved and/or non-native species or less than 50 % of enterprises with measures in place or no regulations in place

5. Animal health and welfare: What is the impact of the VC on animal health and welfare?

Application of biosecurity measures

Indicators

- Proportion (%) of firms with measures in place to minimize risk of disease outbreak at actor level, functional level and core VC level
- Aquatic animal disease control plan in place and well enforced at core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
<p>Aquaculture: More than 80 % of firms have biosecurity measures in place and aquatic animal disease plan is in place and well enforced</p> <p>Fishery: More than 80 % of firms have biosecurity measures in place</p>	<p>Aquaculture: 50% of firms or more have biosecurity measures in place and aquatic disease plan is at least partially in place</p> <p>Fishery: 50% of firms or more have biosecurity measures in place</p>	<p>Aquaculture: Less than 50 % of firms have biosecurity measures in place or no aquatic animal disease plan in place</p> <p>Fishery: Less than 50 % of firms have biosecurity measures in place</p>

Appropriate animal husbandry and handling

Indicators for aquaculture and fishery value chains:

- Proportion (%) of firms applying appropriate slaughter techniques as defined by WOAHA at actor level, functional level and core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Fishery: More than 70 % of firms use appropriate slaughter techniques	Fishery: Between 50 % and 70 % of firms use appropriate slaughter techniques	Fishery: Less than 50 % of firms use appropriate slaughter techniques

6. Toxicity and pollution: What is the impact of the VC on toxicity and pollution?

Responsible use of chemicals

Indicators for aquaculture, fishery and downstream activities:

- Chemical application regulations in place and well enforced at core VC level
- Proportion (%) of firms with controlled and/or recorded use of chemicals at actor level, functional level and core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Fisheries VCs: More than 80 % of firms with controlled and recorded use of chemicals and chemical application regulations in place and well enforced	Fishery: 50 % of firms or more with controlled and/or recorded use of chemicals and chemical application regulations at least partially in place	Fishery: Less than 50 % of firms with controlled and/or recorded use of chemicals or no chemical application regulations in place

Air pollution

Indicators:

- Standards on air pollution in place and well enforced at core VC level
- Proportion (%) of firms with air pollution mitigation measures in place at actor level, functional level and core VC level
- General air pollution issue or risk of air pollution from VC activities at core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
More than 80 % of enterprises have measures in place to mitigate air pollution and standards are in place and well enforced or no air pollution issues	50 % of firms or more have measures in place to mitigate air pollution and standards are at least partially in place	Less than 50 % of firms have measures in place to mitigate air pollution or no standards in place

Inorganic solid waste pollution

Indicators:

- Proportion (%) of firms with controlled²⁹⁶ disposal of plastic and/or other inorganic solid waste at actor level, functional level and core VC level
- Proportion (%) of firms that reuse and/or reduce plastic and/or other inorganic solid waste at actor level, functional level and core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
More than 90 % of firms have controlled disposal of plastic and/or other inorganic solid waste and more than 20 % of firms reuse and/or reduce inorganic solid waste	70 % of firms or more have controlled disposal of plastic and/or other inorganic solid waste	Less than 70 of firms have controlled disposal of plastic and/or other inorganic solid waste

Organic solid waste pollution

Indicators:

- Proportion (%) of firms that reuse organic solid waste at actor level, functional level and core VC level
- Proportion (%) of firms with controlled²⁹⁷ disposal of organic solid waste at actor level, functional level and core VC level

²⁹⁶ Controlled disposal refers to waste that is disposed on official waste sites and not disposed of into the environment (e.g. directly into the sea, the beaches, or mangrove forests or buried around the production area).

²⁹⁷ Controlled disposal refers to waste that is disposed on official waste sites and not disposed of into the environment (e.g. directly into the sea, the beaches, or mangrove forests or buried around the production area)

Hotspot classification:

Sustainable	Concerning	Unsustainable
More than 80 % of firms have controlled disposal of organic solid waste and more than 20 % of firms reuse organic solid waste	60 % of firms or more have controlled disposal of organic solid waste	Less than 60% of firms have controlled disposal of organic solid waste

7. Food loss and waste: What is the impact of the VC on food loss and waste?

Food loss²⁹⁸

Indicators:

- Food loss (tons)/year at actor level, functional level and core VC level
- Food loss/year as a share (%) of total production at core VC level

Hotspot classification:

Sustainable	Concerning	Unsustainable
Less than 10 % of total production is lost	Between 10 % and 20 % of total production is lost	More than 20 % of total production is lost

²⁹⁸ To measure food loss, the quantities of aquatic products lost along the value chain, from production up to, but not including retail, need to be calculated to estimate what share of production does not reach the retail level (FISH4ACP methodological guide).

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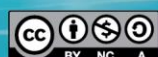
This report presents the results of the value chain analysis of the Lake Tanganyika sprat, sardine and perch value chain in The United Republic of Tanzania conducted from 2021-2022 by the value chain development programme FISH4ACP. This report contains a functional analysis of the value chain, assesses its sustainability and resilience, develops an upgrading strategy and an implementation plan to which FISH4ACP will contribute.

FISH4ACP is an initiative of the Organisation of African, Caribbean and Pacific States (OACPS) aimed at making fisheries and aquaculture value chains in twelve OACPS member countries more sustainable. It contributes to food and nutrition security, economic prosperity and job creation by ensuring the economic, social and environmental sustainability of fisheries and aquaculture in Africa, the Caribbean and the Pacific.

FISH4ACP is implemented by FAO with funding from the European Union (EU) and the German Federal Ministry for Economic Cooperation and Development (BMZ).



This document was produced with the financial assistance of the European Union (EU) and the German Federal Ministry for Economic Cooperation and Development (BMZ). The views expressed herein can in no way be taken to reflect the official opinion of the EU, the Organisation of African, Caribbean and Pacific States and BMZ.



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