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National Strategy on Aquatic **Biosecurity** for the **Solomon Islands** 2018–2023



Prepared by the Solomon Islands Ministry of Fisheries
and Marine Resources
with assistance from the Pacific Community and
supported by the New Zealand Aid Programme



F A M E
DIVISION

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Abbreviations

BSI	Biosecurity Solomon Islands
DDA	Deputy Director Aquaculture
ICLARM	International Center for Living Aquatic Resources Management
IRA	import risk assessment
MAL	Ministry of Agriculture and Livestock
MECDM	Ministry of Environment Climate Change Disaster Management and Meteorology
MFMR	Ministry of Fisheries and Marine Resources
MHMS	Ministry of Health and Medical Services
OIE	World Organisation for Animal Health
RSIPF	Royal Solomon Islands Police Force
SINU-ITMS	Solomon Islands National University– Institute of Technology and Marine Studies Technology
SNRAS	School of Natural Resources and Applied Science
SPC	The Pacific Community
SOP	standard operating procedures

Foreword

I am pleased to present to Solomon Islands, this National Strategy on Aquatic Biosecurity Strategy, 2018–2023. The strategy is a document that will safeguard the sustainable management and development of the aquaculture sector for the next five years.

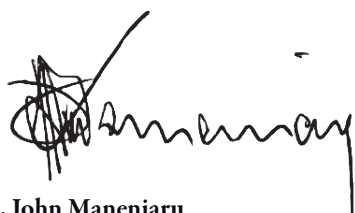
Aquatic biosecurity is a top priority for Solomon Islands because of the need to protect the health of our aquatic environment, and domestic and commercial species from biological risks such as the risk of pathogens and invasive species. Furthermore, the advent of foreign governments to impose new and stringent health regulations have placed stricter measures on the export of live aquatic organisms and products from Solomon Islands.

This strategy will be the first-ever aquatic biosecurity document for Solomon Islands, and will create a legal framework to fully implement biosecurity measures at the national level down to the farm level. Until now, the Ministry of Agriculture and Livestock has been responsible for matters relating to biosecurity. However, the scope of the existing biosecurity framework is limited to terrestrial animals and plants only, leaving a gap in aquatic biosecurity. The entry of aquatic pathogens, diseases and invasive species into Solomon Islands can be minimised by the Ministry of Fisheries and Marine Resources (MFMR) through biosecurity surveillance measures at pre-border, border and post-border points.

With the strategy, I am confident that MFMR can fully develop and manage aquaculture sustainably in an environment free from disease-causing pathogens and invasive species. This strategy will enable Solomon Islands to prevent, eradicate and effectively manage the risks posed by pests and diseases to the national environment, human health and national economy. Biosecurity is not just about preventing entry of pathogens at the border, but has a broader approach that covers the protection of our aquatic resources and businesses from the introduction, exacerbation or spread of pathogens or diseases. It is the responsibility of all aquaculturists and managers to undertake good biosecurity practices.

I wish to acknowledge and convey my sincere appreciation and thanks to the Aquaculture Section of the Pacific Community's Fisheries, Aquaculture and Marine Ecosystems Division for providing financial and technical support, and drafting this strategy. Furthermore, I thank the Solomon Island ministries, stakeholders, private sector enterprises, non-governmental organisations who offered their valuable time and contributions during the consultations that lead to the development of this National Aquatic Biosecurity Strategy for 2018–2023.

Finally, I thank my hardworking staff at MFMR for their commitment and determination in taking the lead to develop aquaculture in a sustainable and beneficial way for all Solomon Islanders.



Hon. John Maneniaru

Minister for Fisheries and Marine Resources of Solomon Islands

Executive summary

Biosecurity is a significant and extremely important component in the trade and movement of aquatic organisms and food products. The strong emphasis on controlling the spread of viruses and other pathogens from one area to another to safeguard the health of animals, humans and the economy makes biosecurity the highest priority for governments and countries.

In Solomon Islands, the Biosecurity Solomon Islands (BSI) department, under the Ministry of Agriculture and Livestock, has been mandated to deal with all of the country's biosecurity matters. BSI has legal instruments and frameworks that guide the movement, control and management of terrestrial plants and animals within Solomon Islands. The major legal instruments currently in force are the Biosecurity Act 2013 and the Biosecurity Regulations 2015. These regulatory frameworks have limitations in terms of addressing the technical components that directly deal with aquatic organisms and products.

Having a strategy on aquatic biosecurity in place will enable Solomon Islands to have an effective biosecurity system in the fisheries and aquaculture sector. Aquatic biosecurity is extremely important in mitigating the risk of introduction and/or the spread of aquatic diseases, viruses and pathogens because the strategy contains protocols regarding pre-border introductions, border inspections and post-border quarantine and surveillance measures, and any other measures to mitigate the risk of disease entry or spread.

A five-year biosecurity strategy for Solomon Islands has been developed. The Ministry of Fisheries and Marine Resources (MFMR) will establish a taskforce and implementation committee within the Aquaculture Division, which will include key local partners who are involved in aquatic biosecurity.

Specific activities, targets and indicators have been developed and these will be monitored regularly, and progress toward these will be reported on in the MFMR annual report.

1. Background

1.1 General overview of the aquaculture sector in Solomon Islands

Aquaculture is a relatively new activity in Solomon Islands, and was introduced by private companies and individuals with the purpose of making a profit. These early aquaculture pioneers had observed and assessed aquaculture operations throughout the Asia-Pacific region, noting the economic benefits that were reaped. During that period, monetary profit was the main driver of most aquaculture activities.

The Solomon Islands Aquaculture Division, within the Ministry of Fisheries and Marine Resources (MFMR), is mandated to sustainably manage the development of inland and coastal aquaculture for the livelihood and income of rural Solomon Islanders and the national economy. The growth and development of aquaculture has been through many challenges in its history: from political will, commitment of resources, gaps in technology and capacity, and even disputes and ethnic conflict. All of these challenges have shaped the initial establishment of earlier aquaculture activities and the status of national aquaculture today.

Aquaculture in Solomon Islands initially came about when an Australian business entrepreneur first established the culture of pearl oyster, *Pinctada maxima*, at Wagina, Choiseul Province in the late 1960s. Unfortunately, his operations ceased 10 years later because of marginal profit.

After that, aquaculture development was dormant until the 1980s and onwards, when private investors activated activities once again. Despite the unsuccessful pearl operations in the 1960s, another Australian private entrepreneur established the South Pacific Aquaculture Company in west Guadalcanal to culture the giant fresh water prawn, *Macrobrachium rosenbergii*. In 1988, the seaweed *Kappaphycus alvarezii* was introduced from Fiji into Solomon Islands, and was first trialled in Vona Vona Lagoon in the Western Province. The initial introduction was unsuccessful because of heavy grazing from herbivorous fish that devastated the trial farms. This put a halt to the distribution of seaweed farming to nearby coastal communities and the rest of Solomon Islands.

Aquaculture's potential was realised when the International Centre for Living Aquatic Resources Management (ICLARM), now known as WorldFish, was established in 1984 in Solomon Islands, which contributed significantly towards aquaculture development.

Later, in 1994, a local Chinese executive established a second prawn farm to culture the tiger prawn, *Paeneid monodon*, at Ruaniu in west Guadalcanal.

The ethnic conflict that occurred in Solomon Islands in the early 2000s delivered a huge blow to the local aquaculture developments. Consequences included the theft and vandalism of the ICLARM centre, the closure of the Ruaniu prawn farm, and the cessation of other mariculture activities such as seaweed farming. Little to no aquaculture activities were occurring during the height of the ethnic tension. Fearing for their safety, expatriates, scientists and researchers were forced to evacuate, leaving behind infrastructures in ruin.

The post-ethnic tension brought a wave of change for aquaculture resurrection. In 2003, MFMR resolved to rejuvenate seaweed farming in Solomon Islands through the restoration of former trial sites. Seedlings for the start were collected locally from the wild. Funding was sought from the European Union to support seed collection, the purchase of planting materials, communications and other logistics. The intervention attained success when many farmers successfully cultured and produced commercial quantities of seaweed nationally. Additionally, commercial buying linkages and export systems were established. The European Union continued to expand its support towards seaweed development through funding the Commercialization of Seaweed Production in Solomon Islands project from 2005 to the end of 2008 (Solomon Islands Aquaculture Development Plan, 2009–2014).¹

Seaweed culture gradually gained momentum in 2009 when MFMR oversaw the management and development of seaweed aquaculture. Seeing the progress in seaweed production and its importance to many peoples' livelihood, the Mekem Strong Solomon Islands Fisheries programme provided additional funding that boosted the production of seaweed from 500 tons in 2009 to 1200 tons in 2012 (MFMR annual report 2016²). The significant importance of seaweed farming as an alternative livelihood activity and form of income generation was realised when the activity eventually expanded to the most remote coastal communities of Solomon Islands such as the Reef Islands (Temotu Province), Manaoba (Malaita Province), Wagina and Sarekana (Choiseul Province).

MFMR's initial approach to inland freshwater aquaculture development was to focus mainly on the development of *Oreochromis mossambicus* tilapia with selected communities from Guadalcanal and Malaita in 2009.

The strategy to begin with tilapia and selected communities had been adapted to address the availability of limited resources such as funding and the shortage of labour that MFMR had been facing. Most importantly, the two selected provinces are heavily populated compared with the other seven provinces.

¹ http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Anon_09_Solomon_Aquaculture_Plan.pdf

² MFMR 2016 Annual Report, Honiara (unpublished)

In addition to limited resources, there was a need to address the gap in knowledge of culture techniques such as broodstock management, larval rearing, feed production and feeding regime. Technically, tilapia is the best choice for initial trials because of its natural abundance and ability to survive under tough conditions. Tilapia's ability to thrive under poor nutrient and water quality is an advantage for farmers who lack the proper technical knowledge and skills. Even with limited knowledge, farmers can still raise tilapia successfully. Since 2009, backyard tilapia farming has gradually expanded into other communities with assistance from donors and government agencies. The Pacific Community provided technical assistance by developing a Solomon Islands tilapia aquaculture action plan: 2010–2015³ to give support and direction for the development of inland aquaculture.

Later, in 2010, WorldFish began expanding the activities that MFMR had initiated in Guadalcanal and Malaita provinces with more selected communities in freshwater tilapia aquaculture. With support from the Australian Centre for International Agricultural Research, MFMR and the Malaita provincial government, WorldFish established hubs for farmers in Auki, Malaita to carry out on-farm, grow-out trials with tilapia and milkfish. According to Sulu et al. (2016)⁴, the aquaculture of milkfish is not commercially viable for most farmers because of the high cost-to-benefit margin compared with wild harvesting, which makes more profit than farm-raised fish. Overall, WorldFish – in partnership with MFMR – has been instrumental in developing aquaculture-applied research projects that focus on marine commodities.

In 2012, the Japanese government, through the Oversea Fisheries Cooperation Foundation (OFCF), funded the mini mariculture hatchery for trialling the sea cucumber *Stichopus horrens* at MFMR.

The purpose of the trial was to investigate the life cycle of the sea cucumber *Stichopus horrens*. OFCF also provided a specialist who oversaw the trial project.

Likewise, MFMR provided a local counterpart to help with hatchery operations. Since 2012, progress has been made both in the hatchery and at the project re-seeding site. The lifecycle of *Stichopus horrens* was successfully cultured when hatchery-raised juveniles were produced and released into the wild. The survival rate of hatchery-raised juveniles released into the re-seeding site, increased from hundreds to about 5,000 (MFMR 2016 annual report).⁵ Marau, in east Guadalcanal, is the current project site where grow-out trials are conducted. Local monitors have been employed by MFMR to monitor and report on the growth performance of post-release juveniles. The community has signed a memorandum of understanding with MFMR to work in partnership in the delivery of the project. At a higher level, OFCF also signed a memorandum of understanding with MFMR.

The aquaculture section was part of MFMR's inshore division until 2017 when it finally separated into a division of its own. The new division now has its own Deputy Director of Aquaculture (DDA) who manages and advises on daily operations, planning and development of aquaculture in Solomon Islands. The division has a national aquaculture development plan, which encompasses the management and development of the aquaculture sector in Solomon Islands. Under the newly approved MFMR structure in 2017, the division is divided into three separate sections: 1) coastal section, 2) inland section, and 3) development section, which are all under the supervision of the DDA.

1.2 General overview of the status of aquatic biosecurity in Solomon Islands

Aquatic biosecurity has been defined as a set of standardised measures to deal with biological risks to aquatic environments, such as the risk of aquatic pathogens or the risk of invasive aquatic species. Although it is a term that has been used broadly for many years, it is still relatively new for the Pacific Islands region, where there is limited knowledge and skills on aquatic animal health, import and export requirements for aquatic species introductions, and food safety. The broad concept of 'aquatic biosecurity' has been considered to include three major components: 1) aquatic organisms health management, 2) import and export requirements for the movement of live aquatic organisms, and 3) food safety of seafood products.

In order to assess the status of aquatic biosecurity in Solomon Islands, and set the basis of the development of the present strategy, two major activities have been conducted:

1. completion of a questionnaire on the status of aquatic biosecurity by relevant national stakeholders; and
2. organisation of a national stakeholder consultation on aquatic biosecurity from 13 to 14 November 2017, with the participation of key national partners.

During the aforementioned consultation, a SWOT (strengths, weaknesses, opportunities and threats) analysis of the status of aquatic biosecurity in Solomon Islands was conducted, and the results are presented below. This analysis provides a very complete overview of the most important gaps in and limitations to this area of work.

³ http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Anon_10_Solomon_Tilapia_Plan.pdf

⁴ Sulu R. J., Vuto S.P., Schwarz A.-M. et al. 2016. The feasibility of milkfish (*Chanos chanos*) aquaculture in Solomon Islands. WorldFish.

⁵ MFMR 2016 annual report, Honiara, Solomon Islands (unpublished)

Table 1. SWOT analysis of the status of aquatic biosecurity in Solomon Islands, obtained during the national stakeholder consultation on aquatic biosecurity held in Honiara, Solomon Islands in November 2017.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> ● Strong government policies (national development strategies, Direct Coalition for Change Government, MFMR) ● High health status ● Local demand and strong local interest in aquaculture ● Funding support ● Stakeholder interest ● Enabling environment (water, land, labour) ● Scattered islands that can facilitate containment of out-breaks (isolation) ● Existing biosecurity legislation ● High biodiversity ● National laboratory exists ● Relationship between relevant authorities and institutions is strong ● International markets – Nile tilapia (Pacific countries) 	<ul style="list-style-type: none"> ● Enforcement of legal framework is difficult due to limited resources ● Limited facilities for aquatic animal health, such as laboratories and quarantine ● Limited knowledge and skills ● Financial system ● Monitoring and research very weak ● No skills on business management, entrepreneurial skills ● There is no framework or standards on aquatic biosecurity ● No clear investment guidelines to protect local business ● Land tenure policies do not assure long-term property ● No steady funding (Inconsistency of funding support) ● Current biosecurity actions and legislation are 100% on terrestrial organisms ● No competitive market at international level
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> ● Donor support very strong (funding and technical assistance) ● Laws and regulations – enabling environment ● Stakeholder collaboration ● Financial institutions ● Regional partners ● This is very timely ● Available information in-country ● This process can influence other agriculture sectors, which is very important ● Climate change adaptation ● Chance to promote freshwater products 	<ul style="list-style-type: none"> ● Land tenure system (same as above) ● Introduction of diseases ● Natural disasters ● Climate change ● Potential ethnic conflicts that can jeopardise aquaculture farms ● Political instability ● Corruption ● Illegal introduction of species into natural ecosystems ● Unknown interaction between predators and diseases ● No capacity to monitor tilapia at farm level

1.2.1 Regulatory framework on aquatic biosecurity

During the aforementioned consultation, a detailed assessment of existing regulatory instruments on aquatic biosecurity was conducted, in order to assess existing legal documents in place that are either directly or indirectly related to aquatic biosecurity and aquatic health management. Table 2 provides the legal instruments, their date of approval, scope and additional comments related to aquatic biosecurity.

Table 2. Legal instruments in Solomon Islands related to aquatic biosecurity and aquaculture

Legal instrument	Date of approval	Scope	Comments
Fisheries Management Act	2015	Fisheries and aquaculture management	No specific articles on aquatic animal health management or border control. Mostly focused on production, conservation and exports of seafood products from fisheries (not from aquaculture).
Biosecurity Act	2013	Prevention of introduction, spread and distribution of exotic pests, diseases, pathogens and invasive species, including terrestrial and aquatic organisms	Mostly focused on terrestrial organisms, but with provisions to consider aquatics.
Biosecurity Regulations	2015	Regulation of terrestrial agriculture products exports and imports	Currently nothing for aquatics.
Food Safety Act	1996	Food safety standards for exports and also for the domestic markets	Does not consider products of aquaculture.
Wild Life Protection Act	2017	Conservation of biodiversity	Nothing on health management but some articles on invasive species control and eradication.
Land Management Act	1996	Land management and registration	Based on customary law.
Customs Act	1996	Exports and imports requirements and fees	Some articles based on aquatic products
Environment Act	1998	<ul style="list-style-type: none"> • Assessment of environmental impacts • Control of pollution • Development of agriculture and industrial activities 	Nothing specific on aquatics.
Environmental Regulations	2008	Pollution control	Nothing specific on aquatics.
National aquaculture management and development strategy	in draft	Strategy for the sustainable development and promotion of the aquaculture sector at the national level	Specific actions on aquatic biosecurity.

1.2.2 Main aquatic biosecurity stakeholders

During the aforementioned consultation, an evaluation of the main national stakeholders involved, either directly or indirectly, with aquatic biosecurity was made, and included a description of their major roles and responsibilities. A summary of this evaluation is provided in Table 3.

Table 3. Aquatic biosecurity stakeholders

Stakeholder	Roles and responsibilities with regard to aquatic biosecurity
MFMR – Aquaculture Division	Development and management of aquaculture
MFMR – Enforcement, Licensing and Compliance Division	Enforcement of the Fisheries Management Act and Regulations
MFMR – All other divisions	Research and community-based resource management
Biosecurity Solomon Islands Department	Department under Ministry of Agriculture and Livestock and Leading government agency for biosecurity, by controlling and minimizing the introduction and spread of biological risks into and within the country.
Livestock Division	A division under Ministry of Agriculture and Livestock responsible for livestock-related policy, development and research in Solomon Islands by managing, conserving and protecting the nation's livestock resources and promoting the agricultural sector for socio-economic development.
Ministry of Health and Medical Services	Provides health services for the country. The four units covered under the service are: 1) health improvement, 2) health care (including hospital services), 3) health policy and planning, and 4) administration and management.
Ministry of Environment, Climate Change, Disaster Management and Meteorology	Protecting the environment, through the formulation of policies and enforcement of existing environmental legislation, reduce disaster risks, adaptation, and mitigation of climate change impacts.
Customs and Excise Division	Surveillance, verification and declaration of import and export goods.
Solomon Islands Ports Authority and airport authorities	Entry and exit point of incoming and outgoing cargo.
Farmers	Rearing and production of aquatic organisms.
Importers	Importing aquatic goods and feeds from overseas.
Exporters	Exporting live aquatic organisms and products to overseas markets.



James and Catherine preparing settlement nets for juvenile *Stichopus horrens*. Photo: Sylvester Diake, MFMR (2018)



Inoculation of PSB bacteria in culture medium. Photo: Sylvester Diake, MFMR (2018)

2. Technical justification of the strategy

2.1 Main objectives of the strategy

The goals of this strategy are to:

- safeguard and sustain the health of the environment and aquatic organisms, and to maintain biodiversity;
- provide information on the health status of aquatic organisms;
- conserve traditional practices relevant to aquatic organisms; and
- ensure sustainable and productive aquaculture development in Solomon Islands.

2.2 Vision

The vision of the strategy is: Sustainable aquaculture and coastal fisheries sectors with robust aquatic biosecurity systems in place, to assure the protection of the health of environment, aquatic organisms, humans and the economy of Solomon Islands.

2.3 Mission

The strategy's mission is to develop the fisheries and aquaculture sectors in Solomon Islands while safeguarding aquatic resources from potential biosecurity risks.

2.4 Scope

The National Aquatic Biosecurity Strategy will provide policy guidance and direction on: 1) aquatic animal health management; 2) national standards for imports and exports of live aquatic species and their products (seafood products); 3) regulatory instruments related to aquatic biosecurity; 4) emergency planning in case of aquatic species disease outbreaks; and 5) international collaboration on aquatic biosecurity.

The strategy is focused on the three main areas* listed below, within the broad concept of aquatic biosecurity:

- Aquatic animal health management: including aquatic species disease diagnosis, prevention, control, treatment, surveillance, and national and international reporting, with special emphasis on farmed aquatic species.
- Aquatic species imports and exports: including the development and/or update of national standards for live aquatic species (and their products), imports and exports, with special emphasis on quarantine procedures and operations, certification schemes, permitting, border control, import risk analysis and environmental impact assessment. This component also includes future introduction of aquatic species for aquaculture purposes.
- Food safety of aquatic products: including the development and/or update of food safety standards for national and international markets, with special emphasis on farmed aquatic products.

**It should be noted that capacity building, institutional strengthening, and research and education are considered to be 'issues' under the present National Development Strategy.*

2.5 Technical aspects

Biosecurity is a very important component in the trade and movement of aquatic organisms and food products. The strong emphasis on controlling the spread of viruses and pathogens from one country to another to safeguard the health of animals, humans and the economy makes biosecurity the highest priority for governments and countries.

In Solomon Islands, BSI has been mandated to deal with all biosecurity matters, and has legal instruments and frameworks that guide the movement, control and management of terrestrial plants and animals. The major legal instruments currently in force are the Biosecurity Act 2013 and Biosecurity Regulations 2015. These regulatory frameworks have limitations in terms of addressing the technical components that directly deal with aquatic organisms and products. Hence, through the analysis of the scope and focus of the current frameworks, gaps have been identified that need to be addressed.

In collaboration with the Pacific Community, MFMR organised a two-days consultation workshop on 14 and 15 November 2017 for all relevant government ministries, stakeholders, private sectors, institutes, non-governmental organisations and local

aquaculture farmers. The objectives of this workshop were to ascertain the status of biosecurity in Solomon Islands, identify the gaps in the current legal instruments, and draft a biosecurity strategy that would be specific to the needs of aquatic biosecurity, and to regulate the imports and exports of aquatic species and products. At present, there is no specific document within MFMR to manage, implement and enforce biosecurity measures more efficiently and competently.

Having a plan or strategy in place will enable Solomon Islands to have an effective biosecurity system in the fisheries and aquaculture sector. The plan is extremely important in mitigating the risk of introduction and/or spread of aquatic diseases, viruses and pathogens because it contains protocols in pre-border introductions, border inspections and post-border quarantine and surveillance, and all of the measures to mitigate the risk of disease entry or spread.

3. Guiding principles

The effective implementation of this biosecurity strategy is to ensure that guiding principles encompasses:

- Adherence to conventional scientific standards and precautionary approaches.
- Promoting sustainable and friendly environmental aquaculture and fisheries practices.
- Strengthening networking among existing and future technical resources locally, regionally and Internationally.
- Uphold transparency and timely reporting.
- Maintain the health status of aquatic organisms, ecosystems and their environment.



Installation of settlement plates for juvenile *Stichopus horrens*. Photo: Sylvester Diake, MFMR (2018)

4. Work plan

Six expected outputs have been included into the present strategy (detailed in the work plan below), including activities, timeline for implementation, and responsible officers.

4.1 Expected output 1 on export requirements: Export requirements based on national and international standards are developed and applied

Solomon Islands has been involved in the export of various seafood commodities, such as tuna, coastal fish species, dry seaweed and ornamental aquatic species. There is a strong need to harmonise and standardise existing export requirements for different aquatic products derived from the coastal fisheries and aquaculture sectors, in order to comply with national and, most importantly, international commitments.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 1: Export requirements based on national and international standards are developed and applied.							
Needs assessment at various levels	X		X			X	MFMR, MHMS, BSI, MAL, farmers and exporters
Training on export permit issuing	X	X		X		X	MFMR, MHMS, BSI, exporters, Customs and Excise Division
Training on Health Certification	X		X		X		MFMR, MHMS and BSI
Training on species identification	X		X		X		SINU, farmers and exporters
Training on food safety standards	X		X		X		MFMR, SINU and MHMS

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.

4.2 Expected output 2 on import requirements: Import requirements based on national and international standards are developed and applied

Importing aquatic organisms or products possesses a risk of introducing foreign pathogens, parasites and invasive species. The introduction of foreign pathogens may cause harmful effects to animal or human health. Therefore, it is important that proper inspection and surveillance of any imports and the validation of documents be conducted at the pre-border and border controls.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 2: Import requirements based on national and international standards are developed and applied.							
Development of quarantine guidelines and protocols	X						MFMR, MAL and BSI
Establishment of a quarantine area or facility	X						MFMR, MAL and BSI
Training on quarantine protocols	X		X		X		MFMR, SINU, MAL and BSI
Development of import risk analysis guidelines	X						MFMR, MAL, BSI and MECDM
Training on import risk analysis	X		X		X		MFMR, SINU, MAL, BSI and MECDM
Development of specific import requirements for live aquatic organisms	X						MFMR, MAL, BSI and MECDM
Training on import requirements	X		X		X		MFMR, SINU, MAL, BSI, Customs and Excise Division

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.

4.3 Expected output 3 on aquatic health management: Better management practices on aquatic diseases are developed and implemented.

Maintaining the health of aquatic organisms is important to the sustainability of productivity, food security and income generation. Taking care of the health of aquatic organisms is not only for their welfare, but for the welfare of humans. Raising healthy organisms will also provide healthy food for human consumption and reduce economic loss through disease outbreaks, which cause loss of productivity and costly recovery.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 3: Better management practices on aquatic diseases are developed and implemented.							
Development of best aquaculture practices manual	X						MFMR
Development of a list of national aquatic pathogens list	X						MFMR, MAL, BSI and SINU
Training on disease diagnosis	X	X	X	X	X	X	MFMR, MAL, BSI and SINU
Training on diseases prevention, control and treatment	X	X	X	X	X	X	MFMR, MAL, BSI and SINU
Training on disease reporting at the national level	X		X		X		MFMR, MAL, BSI and SINU
Training on World Organisation for Animal Health (OIE) reporting	X		X		X		MFMR, MAL, BSI and SINU
Reporting to the OIE	X	X	X	X	X	X	MFMR, MAL and SINU

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.

4.4 Expected output 4 on good governance: Aquatic biosecurity is included in the new regulatory frameworks.

MFMR plans to develop new aquaculture legislation, which should incorporate specific aspects related to aquatic biosecurity and aquatic animal health management.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 4: Aquatic biosecurity is included in the new regulatory frameworks.							
Inclusion of aquatic biosecurity-related articles under the upcoming aquaculture legislation	X						MFMR
Improve enforcement mechanisms	X	X	X	X	X	X	MFMR, Customs and Excise Division, and RSIPF

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.

4.5 Expected output 5 on emergency planning: A basic emergency plan for aquatic disease outbreaks is developed and tested.

Emergency backup plans with standard operational procedure must be in place. The plan will direct managers and operators the appropriate actions to take should there be any disease out breaks or natural disasters.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 5: A basic emergency plan for aquatic diseases outbreaks is developed and tested.							
Develop a basic emergency response system	X						MFMR, MAL, BSI, SINU and MECDM
Training of trainers on the implementation of the system	X	X	X	X	X	X	MFMR, MAL, BSI and SINU
Monitoring and evaluation		X	X	X	X	X	MFMR, MAL, BSI and SINU
Collaborate with the Ministry of Agriculture and Land	X	X	X	X	X	X	MFMR, MAL, BSI and SINU
Routine exercises with stakeholders	X		X		X		MFMR, MAL, BSI and SINU
Training on the application of the system with stakeholders	X		X		X		MFMRD, MAL, BSI and SINU

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.

4.6 Expected output 6 on international collaboration: International collaboration on aquatic biosecurity is strengthened.

Solomon Islands has been collaborating and exchanging with a wide range of international institutions and academia from a broad range of countries for many years in the areas of coastal fisheries, aquaculture, animal health and general biosecurity. Aquatic biosecurity was not specifically in any of the collaborative approaches established; therefore, this specific objective is designed to build on existing collaborations and develop new ones on the thematic area of aquatic animal health and aquatic biosecurity.

Tentative activities	2018	2019	2020	2021	2022	2023	Responsible stakeholders*
Expected output 5: International collaboration on aquatic biosecurity is strengthened.							
Review of existing international and regional partners on aquatic biosecurity	X	X					MFMR, MAL, BSI and SINU
Strengthen existing partnerships	X	X	X	X	X	X	MFMR, MAL, BSI, SINU and MECDM
Develop new partnerships with key stakeholders	X	X	X	X	X	X	MFMR, MAL, BSI, SINU and MECDM

* For the full names of responsible stakeholders, see the list of abbreviations at the beginning of this strategy.



A: Young farmers proudly showing healthy seaweed plants at their farm at Manaoba Island, Malaita Province. (2016)
 B: Phenotypic variation of the *Kappaphycus alvarezii* seaweed in Solomon Islands. (2015)
 C: Ideal site and water conditions for seaweed farming at Manaoba Island, Malaita Province. (2015)
 D: Setting up of semi-commercial farm site at Tan Island, Russell Islands Province. (2017)
 E: Seaweed drying bed built on the ground at Wagina, Choiseul Province. (2013)

All photos by Sylvester Diake, MFMR

5. Implementation strategies

This five-year strategy will be implemented by MFMR, with technical support from the Aquaculture Section of SPC's Fisheries Aquaculture and Marine Ecosystems Division, BSI, and other relevant ministries, private sector enterprises and stakeholders. The DDA of the Aquaculture Division will be the national implementing coordinator. MFMR will always seek professional assistance, technical advice and guidance from SPC's aquatic biosecurity specialist, as needed.

MFMR will set up a task force to manage and deliberate on the implementation of the five-year strategy. Setting up the taskforce will be done early in the first quarter of 2018. The DDA will be the chairperson of the taskforce. The task force will comprise members from the following sections and organisations:

- MFMR Aquaculture Division, and the Policy and Planning Division (two members)
- MAL Livestock Division (one member)
- MAL Biosecurity Solomon Islands (one member)
- Ministry of Environment, Climate Change, Disaster Management and Meteorology – Environment Division (one member)
- Solomon Islands National University-Institute of Technology and Marine Studies, and the School of Natural Resources and Applied Science (two members)
- WorldFish (one member)
- Exporters' representative for seaweed (one member)
- Farmers' representative for seaweed and tilapia (one member)

The mandate of the aquatic biosecurity taskforce will be to coordinate, monitor and evaluate the implementation of the five-year strategy, as specified in Section 6 – Monitoring and evaluation.

In addition to the taskforce, MFMR will setup an implementing committee, as a subgroup, to action the five-year strategy at the operational level. The committee will comprise two aquaculture or fisheries officers, two farmers' representatives, and one exporter representative. The roles and responsibilities of the committee are to provide logistics, mobility and administrative support to ensure the smooth and timely implementation of the five-year strategy.

Equally important, the implementing committee is required to meet regularly (i.e. quarterly) to review the implementation progress and address any needs, change, issues or problems that may potentially jeopardise the implementation process.

Lastly, the committee is responsible for organising training sessions, assessments, the procurement of equipment and materials, and attending to any needs or activities that are relevant to the implementation process.



A: Typical backyard tilapia pond in the central highland of Lau and Mbaelelea, North Malaita. (2017)
 B: Tilapia farmer from Guadalcanal receiving material support from MFMR. (2017)
 C: Aquaculture officers from MFMR unloading material for tilapia farmers at the weathercoast of southwest Guadalcanal, Guadalcanal Province. (2017)
 D: A typical tilapia pond at Peochakuri village, Weathercoast, Guadalcanal Province. (2017)

All photos by Billy Meu, MFMR

6. Monitoring and evaluation

The monitoring and evaluation (M&E) component of the strategy will assist MFMR with improving performance and achieving expected outputs and results through a continuous assessment of the performance of the strategy and how it is implemented. Through monitoring, MFMR will be able to ask the question, ‘Are we on the right track?’ or ‘Are we doing the right thing?’ The M&E tool (Table 5) will provide MFMR, as the implementing agency, information on what the strategy is doing, how well it is performing, and whether it has achieved its aims and objectives. Lessons learned from M&E can be used to as guidance for review and improvement on the current strategy. The task force has the responsibility to carry out the M&E process with the help of its implementing committee and other implementing agencies.

Table 5. Monitoring and evaluation of the National Aquatic Biosecurity Strategy 2018–2023

Activities	Indicator	Baseline What is the current situation?	Target What is the target situation?	Data source How will it be measured?	Frequency How often will it be measured?	Responsibility Who will measure it?	Reporting Where will it be reported?
Expected Output 1: Export requirements based on national and international standards are developed and applied.							
Needs assessment at various levels	Assessment report produced	No data	Assessment of major needs related to exports of aquatic products and live animals	Individual questionnaire to targeted officers	Baseline data (2018) medium-term data (2020) and final data (2023)	Strategy manager	MFMR annual report*
Training on export permit issuing	Officers trained on issuance of permits	No trainings on issuing of permits	Competent officers issuing permits	Number of qualified officers trained	Yearly	Strategy manager	MFMR annual report
Training on health certification	Officers trained on health certification	Most certificates are issued without scientific verifications. Only one veterinary doctor is specialised with terrestrial animals	Specialised officers have technical skills on aquatic health certification	Number of qualified officers trained and available to issue and inspect health certificates	Yearly	Strategy manager	MFMR annual report
Training on species identification	Officers trained in species identification	Inspection officers are not familiar with species identification	Officers specialised in identification of common aquatic species	Number of officers qualified in species identification	Yearly	Strategy manager	MFMR annual report
Training on food safety standards	Food inspectors trained and specialised in food safety standards such as HACCP (hazard analysis and critical control points)	Knowledge gap on food safety standards for inspectors	Inspectors have up-to date information and skills on food safety standards	Number of officers qualified in food safety standards	Yearly	Strategy manager	MFMR annual report

Table 5. Continued

Activities	Indicator	Baseline What is the current situation?	Target What is the target situation?	Data source How will it be measured?	Frequency How often will it be measured?	Responsibility Who will measure it?	Reporting Where will it be reported?
Expected Output 2: Import requirements based on national and international standards are developed and applied.							
Development of quarantine guidelines and protocols	Quarantine manual developed	There is no guide and protocols for quarantine of aquatic animals	Separate quarantine document for aquatic animals developed and implemented	Number of documents developed (e.g. guides, standard operating procedures)	Once guidelines are finished and published	Strategy manager	MFMR annual report
Establishment of a quarantine area/facility	Facility constructed and operational	There is no facility for aquatic species	A quarantine facility constructed	All quarantining of aquatic species done by MFMR	Once the quarantine area is established	Strategy manager	MFMR annual report
Training on quarantine protocols	MFMR Staff trained on quarantine protocols	Capacity gap in aquatic quarantine protocols	MFMR officer familiar with quarantine protocols and implement them	Number of officers trained on quarantine protocols	Yearly	Strategy manager	MFMR annual report
Development of import risk assessment (IRA) guidelines	IRA document developed	There is no IRA guides and most importation does not follow any IRA guidelines	All importations must meet the IRA guidelines developed	An IRA document developed and enforced	Once guidelines are finished and published	Strategy manager	MFMR annual report
Training on IRA	Officers trained in IRA	Knowledge gap in IRA	Officers build their capacity in IRA matters	Number of attended IRA training	Yearly	Strategy manager	MFMR annual report
Development of specific import requirements for live aquatic organisms	Document on import requirements developed (e.g. standard operating procedures, guides)	There is no import requirement documents for aquatic species	Document on import meets international required standards	Documents on import requirements developed and enforce	Once import requirements are finished and published	Strategy manager	MFMR annual report
Training on import requirements	Officers trained in surveillance and verification of documents	Limited knowledge on verification of import requirements	Officer capacity is built to verify import documents	Number of officers trained	Yearly	Strategy manager	MFMR annual report
Expected Output 3: Better management practices on aquatic diseases are developed and implemented.							
Development of best aquaculture practices manual	Manual on best aquaculture practices developed	There is no document available	Simple manual on best practices that farmers can understand	Number of aquacultures accessing the manual of best practices	Once guidelines are finished and published	Strategy manager	MFMR annual report
Development of a list of national aquatic pathogens	List of national pathogens developed	There is no list of national aquatic pathogens	List of pathogens for major commodities such as seaweed and tilapia developed	Pathogen list available for officers doing surveillance and reporting	Once the list is finished and published	Strategy manager	MFMR annual report
Training in disease diagnosis	Officers attended training in disease diagnosis	No specialised officers trained in disease diagnosis	Specialised officers can respond to disease outbreaks and disseminate information	Number of officers trained	Yearly	Strategy manager	MFMR annual report

Table 5. Continued

Activities	Indicator	Baseline What is the current situation?	Target What is the target situation?	Data source How will it be measured?	Frequency How often will it be measured?	Responsibility Who will measure it?	Reporting Where will it be reported?
Training in diseases prevention, control and treatment	Officers attended training are certified	No specialised officers trained in disease prevention, control and treatment	Specialised officers can respond to disease outbreaks and disseminate information	Number of officers trained	Yearly	Strategy manager	MFMR annual report
Training in disease reporting at national level	Officers trained in local reporting	No specialised officers trained in disease reporting	Specialised officers can respond to disease outbreaks and disseminate information	Number of officers trained	Yearly	Strategy manager	MFMR annual report
Training in OIE reporting	Officers trained in OIE reporting	No specialised officers trained in disease reporting to OIE	Specialised officers can report to OIE accurately and timely	Number of officers trained	Yearly	Strategy manager	MFMR annual report
Reporting to OIE	Six-month reports on aquatic animal health status submitted to OIE	No of reports submitted and validated by OIE for aquatic animals	Specialised officers can report to OIE accurately and timely	No of OIE reports submitted	Yearly	Strategy manager	MFMR annual report and OIE World Animal Health Information System
Expected Output 4: Aquatic biosecurity is included in the new regulatory frameworks.							
Inclusion of aquatic biosecurity-related articles under the upcoming aquaculture regulations	Biosecurity component included in aquaculture regulations	Specific articles related to aquatic biosecurity under the new aquaculture regulation	Articles on aquatic biosecurity meet the needs of the aquaculture sector	New aquaculture regulation	Once the new regulation has been developed	MFMR directors	MFMR annual report
Improve enforcement mechanisms	MFMR, stakeholders and RSIPF enforce biosecurity regulations	Enforcement strategies are developed and implemented for the articles on aquatic biosecurity	Articles on aquatic biosecurity meet the needs of the aquaculture sector	Application and enforcement of articles on aquatic biosecurity	Yearly	Strategy manager	MFMR annual report
Expected Output 5: A basic emergency plan for aquatic disease outbreaks is developed and tested.							
Develop a basic emergency response system	Emergency response system developed	Emergency plan developed and tested	Published emergency plan	Specialised officers can react in case of an aquatic disease outbreak	Once the new plan has been developed	Strategy manager	MFMR annual report
Training trainers on the implementation of the system	Trainers trained and emergency system implemented	Officers trained in the emergency plan	No specialised officers trained on the implementation of the emergency plan	Specialised officers can react in case of an aquatic disease outbreak	Yearly	Strategy manager	MFMR annual report
Collaborate with the Ministry of Agriculture and Livestock	MFMR and MAL sign collaboration agreement	Collaboration agreement signed	Collaborative agreement	Effective collaboration between MAL and MFMR on emergency preparedness	Once the agreement has been signed	Strategy manager	MFMR annual report

Table 5. Continued

Activities	Indicator	Baseline What is the current situation?	Target What is the target situation?	Data source How will it be measured?	Frequency How often will it be measured?	Responsibility Who will measure it?	Reporting Where will it be reported?
Routine exercises with stakeholders	Stakeholders attended number of refresher exercises	Officers trained in the emergency plan	No specialised officers trained in the implementation of the emergency plan	Specialised officers can react in case of an aquatic disease outbreak	Yearly	Strategy manager	MFMR annual
Training in the application of the system with stakeholders	Number of stakeholders trained in the emergency response system	Officers trained in the emergency plan	No specialised officers trained on the implementation of the emergency plan	Specialised officers can react in case of an aquatic disease outbreak	Yearly	Strategy manager	MFMR annual

Expected Output 6: International collaboration on aquatic biosecurity is strengthened.

Review of existing international and regional partners on aquatic biosecurity	Number of partners reviewed and updated	List of existing partnerships developed	Number of existing partnerships and their roles in aquatic biosecurity and aquaculture	Assessment of the impact of existing partnerships on aquatic biosecurity and identification of main gaps and needs	Once the existing collaborative approaches have been reviewed	Strategy manager	MFMR annual report
Strengthen existing partnerships	Improved networking and communication with partners	Existing partnerships strengthened	Number of partnerships strengthened	Partnerships with international organisations assist Solomon Islands with the control of biological risks	Yearly	Strategy manager	MFMR annual
Develop new partnerships with key stakeholders	Developed partnership agreement with new partners	New partnerships developed	Number of partnerships established	Partnerships with international organisations assist Solomon Islands with the control of biological risks	Yearly	Strategy manager	MFMR annual

*MFMR annual report refers to the annual report developed by the different divisions within MFMR.

