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National Strategy on Aquatic Biosecurity for the Cook Islands

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

Ministry *of* Marine Resources
GOVERNMENT OF THE COOK ISLANDS

NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme

FAME
DIVISION

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Noumea, New Caledonia, 2018

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Abbreviations

ACIAR	Australian Centre for International Agricultural Research
CIFA	Cook Islands Fisheries Association
CIPA	Cook Islands Pearl Farmers Association
CITES	Convention on International Trade of Endangered Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
FAO	Food and Agriculture Organization of the United Nations
FFA	Pacific Islands Forum Fisheries Agency
GEF	Global Environment Facility
IMO	International Maritime Organization
JCU	James Cook University
JICA	Japan International Cooperation Agency
MOA	Ministry of Agriculture
MOT	Ministry of Transport
MMR	Ministry of Marine Resources
MPI	Ministry of Primary Industries (New Zealand)
NACA	Network of Aquaculture Centres in Asia-Pacific
NES	National Environment Service
NISSAP	Draft National Invasive Species Strategy and Action Plan
NIWA	National Institute for Water and Atmospherics (New Zealand)
NSDP	National Strategic Development Plan 2016–2020
NZAid	New Zealand Aid Agency
OIE	World Organisation for Animal Health
PICTs	Pacific Island countries and territories
SPC	the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
UNSW	University of New South Wales
USP	University of the South Pacific
WHO	World Health Organization

Foreword of the Honourable Secretary of Marine Resources

On behalf of the Ministry of Marine Resources, I have the pleasure of introducing and presenting the first National Strategy on Aquatic Biosecurity for the Cook Islands.

Aquatic biosecurity should be seen as a set of standardized measures and protocols to deal with biological risks in aquatic environments, such as the risk of aquatic diseases, pests and aquatic invasive species.

The Cook Islands is a country with a well-preserved aquatic environment, a high level of aquatic biodiversity and a relatively small but of national relevance aquaculture sector. Aquatic-related risks should be controlled and minimized in order to maintain the aforementioned characteristics in the long term.

The national aquaculture sector is indeed a relevant activity for our country and our economy, and most importantly, for our coastal communities. Good aquatic biosecurity measures are vital to maintaining healthy animals, to reducing the risk of acquiring diseases in aquaculture facilities and to harvesting high quality good yields.

Ben Ponia
Secretary of Marine Resources
Cook Islands

Executive summary

The long-term sustainability of fisheries and aquaculture resources is a major goal of the Cook Islands government, as stated in several national strategic and action plans. Aquaculture is an important income earning activity and food source for the country and its coastal communities. To achieve sustainable development of the fisheries and aquaculture sectors, ensuring that aquatic stocks are healthy and free from aquatic animal diseases and aquatic plant pests is a priority. It is also necessary to protect and conserve the highly diverse and pristine natural aquatic environment of the Cook Islands. Good aquatic biosecurity measures are vital to maintaining healthy animals, reducing the risk of developing diseases in aquatic stocks, harvesting high-quality products and ensuring good yields.

This National Strategy on Aquatic Biosecurity (hereafter, the Strategy) will serve as a 'roadmap' for setting national standards for: 1) controlling possible biological risks in aquatic environments, such as the risk of pathogens and invasive species; 2) regulating imports and exports of live aquatic organisms and their products; 3) improving disease management of aquatic organisms, and 4) building national capacities and infrastructures on aquatic biosecurity.

To successfully implement this Strategy, a holistic approach, involving a broad range of stakeholders – including government agencies, academic institutions, regional and national organisations, and civil society – will be required. The establishment of strong inter-agency collaboration is a clear and positive component of the Strategy.

1. Introduction

1.1 Rationale for the Strategy

Introduced pests and diseases can pose environmental, social, ecological and economic threats by damaging the natural balance of aquatic flora and fauna. Aquatic invasive species and aquatic pathogens are among the most dangerous aquatic biological risks, and can be accidentally introduced into Cook Islands waters in various ways, including ballast waters from ships or attached to the hulls of ships from other countries, or imported deliberately as aquarium or aquaculture species.

Aquatic biological risks can have severe ecological and economic impacts. For example, introduced or non-native species can take over large areas of habitat to the detriment of native aquatic and terrestrial species, and some prey directly on native species or compete with them for food. Aquatic risks can also cause considerable economic damage. Infestations of exotic pathogens can affect marine industries, such as aquaculture, commercial and recreational fishing and boating, tourism and even international and domestic shipping. Some marine pests, such as toxic dinoflagellates, can even threaten public health.

This Strategy will help protect the economy, human health and environment of the Cook Islands from problems associated with aquatic-related biological risks, and is an essential opportunity to not only assess and maintain the health of existing aquatic stocks, but also to develop biosecurity requirements that will maintain aquatic resources in order to retain their high quality and health status. The Strategy will provide a comprehensive guidance to Cook Islands government agencies and organisations, and aquaculture stakeholders, on building capacities of both governmental and non-governmental staff and fish farmers on aquatic animal health and aquatic biosecurity management strategies to ensure healthy and sustainable aquaculture and fisheries sectors.

Additionally, under the Strategy, surveillance systems to detect nationally notifiable diseases (focusing on diseases listed by the World Organisation for Animal Health) will be developed and implemented. Quarantine and laboratory facilities will be established or strengthened, and on-farm biosecurity at hatchery and grow-out facilities will be promoted.

The Strategy focuses on two components: 1) the management of aquatic species diseases through surveillance, monitoring, diagnosis and reporting; and 2) import and export requirements for aquatic species and organisms through the application of appropriate border controls and national standards.

2. Guiding principles of the Strategy

2.1 Mission

The mission of the Strategy is to maintain healthy[1] fisheries and aquaculture resources for sustainable economic development.

2.2 Main goal

The main goal of this Strategy is to improve national standards, infrastructures and capacities on aquatic biosecurity.

2.3 Scope

The Strategy will focus on the following two areas:

- **Aquatic species health management.** This includes the diagnosis of aquatic species diseases, prevention, control, treatment, surveillance, and national and international reporting, with special emphasis on farmed aquatic species.
- **Import and export requirements.** This includes 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 introductions of aquatic species for aquaculture purposes.

2.4 Guiding principles

Any national activity in the aquaculture sector will be guided by the following principles and measures:

1. Aquaculture development should be ecologically sustainable.
2. Biological diversity of aquatic environments and habitats, especially those of particular significance for fisheries management, should be protected.
3. The impacts of aquaculture on aquatic ecosystems and aquatic resources should be assessed, and potential negative impacts prevented or minimised before aquaculture is permitted.

2.5 Implementation

A work plan has been prepared (see Section 4) to assist key stakeholders with implementing this Strategy.

[1] The term healthy includes the following two concepts: 1) status of fisheries and aquaculture stocks in terms of population and biodiversity; and 2) disease-free status of fisheries and aquaculture stocks.

3. Aquaculture in the Cook Islands

3.1. National outlook on coastal fisheries and aquaculture

The Cook Islands will support all efforts for sustainable coastal fisheries, healthy coral reefs, and the protection of aquatic biodiversity. Long-term scientific monitoring programmes for coral health and aquatic biodiversity will be of crucial importance as aquatic ecosystems come under global, local and natural stresses. Integrated and holistic approaches to managing the ecological health and economic benefits of lagoon-wide and island ecosystems will require innovative management approaches.

The Cook Islands will also seek economic opportunities to expand the contribution of fisheries through developing possibilities, especially in its outer islands or pa enua, to supply fish products to domestic markets on Rarotonga and markets overseas.

With the Cook Islands Fisheries Association, the Ministry of Marine Resources (MMR) will continue to maintain the traditions and culture that have sustained the food supply of Cooks Islanders. Developing sustainable benefits (in the form of services and products) from aquatic resources will be done by strengthening co-management strategies with coastal communities. In addition, continuing to develop the rā'ui, or marine protected areas, provides an opportunity for traditional and modern forms of aquatic resource management to co-exist.

3.2 Status of the aquaculture sector in the Cook Islands

Like most Pacific Island countries and territories (PICTs) in the region, the Cook Islands relies heavily on its coastal fisheries resources as its major source of animal protein, as well as for income generation. This means that the Cook Islands, as custodian of this extremely important natural resource, has a mandatory obligation to manage these resources sustainably and to implement preventive management, conservation and protective measures.

Although aquaculture trials were implemented back in the 1950s, the aquaculture sector in the Cook Islands is still in its infancy. A very brief overview of past, current and future trends in aquaculture in the Cook Islands is provided in this section, with the purpose of clarifying the relevance of the present Strategy.

Trochus

Since the introduction of trochus (Trochus niloticus) to the Cook Islands in 1957 for trial purposes, a number of aquatic species have been purposely introduced for both commercial and subsistence-based aquaculture, with very limited success in most cases.

Exotic aquatic species were introduced to the Cook Islands, as well as to other PICTs, for a number of reasons, such as:

1. ease of working with domesticated exotic aquatic species;
2. market demand for certain products and commodities;
3. most native aquatic species in the Pacific have not been domesticated or have complex life cycles, and therefore, are difficult to farm; and
4. high availability of seeds, feeds and broodstock of exotic aquatic species.

Seaweed

The red seaweed, *Kappaphycus alvarezii*, was introduced to Aitutaki Island in 1986 and to Rakahanga in 2001. This seaweed contains high levels of a chemical component known as carrageenan, which has been in high demand for many years by the pharmaceutical and food production sectors. The production of this red seaweed is exclusively for export. Growth rates of this seaweed in the Cook Islands are quite limited on both islands, mainly due to poor water quality, high predation rates by herbivorous aquatic species, and poor management. No further trials were conducted after 2001.

Giant freshwater prawns

Between 1994 and 2000, over 100,000 live post-larvae giant freshwater prawns (*Macrobrachium rosenbergii*) were introduced from French Polynesia, and were successfully farmed on Rarotonga. Although freshwater prawn farming was shown to be technically feasible after a few trials, the activity was not economically viable, mostly due to the high costs of imported feeds and limited marketability.

Giant clams

During the 1990s, giant clam (*Tridacna* sp. and *Hippopus* sp.) specimens were introduced from Australia and Palau to the Cook Islands, for the purposes of restocking and stock enhancement. Since then, MMR has established a giant clam hatchery on Aitutaki Island, where giant clam juveniles are produced and used for restocking and stock enhancement in various coastal locations in the Cook Islands.

In 2003, MMR conducted trials on exporting live giant calms for the aquarium trade, which proved to be a commercially viable operation. Although the economic viability of this farming activity was promising, there were not enough farmers interested in the activity and, therefore, there was not enough production volume for a sustainable export market.

Tilapia

In 2007, Nile tilapia (*Oreochromis niloticus*) specimens were introduced from the Philippines, and being a robust species, they survived and reached export sizes of 150–200 grams in four to five months. Tilapia proved to be a successful commodity to farm in the Cook Islands, although it was quite difficult to sell at local markets, prompting private farmers to explore other aquaculture commodities.

Pacific oyster

In 2009, with the assistance of MMR, Pacific oyster (*Crassostrea gigas*) specimens were introduced from Tasmania (Australia) for commercial farming. This trial failed due to basic farming issues, such as poor water quality, inadequate site selection and limited management.

Milkfish

It should be noted that aquaculture for human food consumption remains a community initiative in the Cook Islands, and includes current traditional farming methods of milkfish (*Chanos chanos*), which are restricted to a few outer islands in the northern group. Milkfish farming was trialled on the island of Mitiaro in the late 1980s as part of the Mitiaro Milkfish Project. Although the feasibility study reported the survival and growth rates of milkfish as being normal and promising, there were challenges in sustaining fingerlings production, as the breeding stocks were unable to spawn in the lake on Mitiaro Island, which meant a reliance on an expensive supply of fingerlings from outside the Cook Islands.

Cook Islands Aquaculture Development Plan 2012–2016

The Cook Islands Aquaculture Development Plan for 2012–2016 highlighted several key areas for economic development through aquaculture. An important expected output under the Aquaculture Development Plan was the establishment of partnership arrangements between public and private sectors (also known as public–private partnerships, or PPPs) as a way to strengthen the aquaculture infrastructure gap in the public sector. As part of this output, a PPP was established between MMR and a private individual in 2008, and later between MMR and Te Raurau Kainga Vai, a private company in 2013. As a result, several aquaculture feasibility trials were conducted; however, while the results of these trials were relatively good, no more PPPs have been attempted since 2014. It is expected that the Aquaculture Development Plan will be reviewed in early 2018.

Black-lip pearl oyster

Since the mid to late 1990s, black-lip pearl oyster (*Pinctada margaritifera*) farming has been the most important aquaculture activity in the Cook Islands. It is heavily subsidised by the government and donor agencies. In 2000, this sector earned NZD 20 million, however immediately afterward, the export value plunged, and by 2008, the annual value remained around NZD 2 million, a drastic reduction of 90%. Today, this figure has further dropped to just half a million dollars annually. About 200,000 pearls were harvested in 2016. Nowadays, MMR estimates that there are around 12 oyster farmers in the Cook Islands, all located on Manihiki Island.

The Cook Islands Pearl Authority is funded by the government. Through the Competent Authority in charge of pearl farming, technical assistance is provided to farmers, mostly on better farming practises, seeding, marketability and business planning.

There is a Lagoon Management Plan that governs the pearl production sector: the Manihiki Lagoon Management Plan (2009–2013). The plan provides guidelines on site selection, water quality control, market access, and best farming practices, such as the spacing of floating lines as well as the required depths of farmed shells, among others. These are practices that each registered farmer must adhere to, and are monitored by both the Manihiki Island Council as well as by MMR fisheries officers.

In the Cook Islands, there has been a distinctive shift by farmers towards sales on the domestic market, with a focus on visitors. As a result, export values are no longer representative of production levels.

Water quality monitoring

MMR has a basic water quality laboratory, where regular water quality monitoring on the islands of Rarotonga, Aitutaki and Manihiki is conducted. Water parameters are analysed, reported on and graded against three standards of reference: bacterial count, water clarity and nutrient concentration. A secondary benefit of water quality monitoring is the collection of long-term data, which allows for the assessment of trends over time. Assessing data over long periods allows MMR and pearl farmers to better understand natural fluctuations and variability within the water, and assess large-scale changes that may go undetected at a smaller scale or with a single snapshot of the system.

Biosecurity actions

Most aquatic species introductions conducted in the past were implemented with limited import risk analysis, environmental impact assessment, or evaluation of import requirements. Current national knowledge and skills on aquatic biosecurity and aquatic animal health is limited, and there are major gaps in the areas of import and export requirements for aquatic organisms and products, aquatic species diseases management, quarantine for live aquatic organisms, emergency planning in the case of an aquatic disease outbreak, and international collaboration on aquatic biosecurity.

Future directions

Apart from the aforementioned aquatic species, there has not been any further attempt of farming aquatic species in the Cook Islands, although exploring possible aquatic species introductions, particularly the re-introduction of giant freshwater prawns from Fiji (*Machrobrachium rosenbergii*), have been considered.

MMR intends to review the current Aquaculture Development Plan in 2018 to determine how much has been achieved.

Broodstock of the giant clam, *Tridacna gigas* - Photo Ministry of Marine Resources

3.3 Analysis of strengths, weaknesses, opportunities and threats

A strengths, weaknesses, opportunities and threats (SWOT) analysis on aquatic biosecurity capacities and infrastructures at the national level was conducted in Rarotonga in July 2017 during national stakeholder consultations on aquatic biosecurity. The results of the SWOT analysis are provided in Table 1.

Table 1: Strengths, weaknesses, opportunities and threats regarding biosecurity capacity and infrastructure in the Cook Islands

Strengths	Weaknesses
• Existing institutions working on general biosecurity • In theory, all imports of agriculture products (80–90% of products available in the Cook Islands' markets) come through one port of entry (Rarotonga) • Disease-free status (in theory) • Isolation • Pristine environment • Strong support from key agencies such as the Pacific Community, New Zealand Ministry of Primary Industries, Food and Agriculture Organization of the United Nations, and the Secretariat for the Pacific Regional Environment Programme	• Lack of knowledge on exporter's history or background • Public awareness on aquatic biosecurity is limited • Biosecurity Act of 2008 does not cover aquatic organisms • Absence of a national pathogen list for aquatic animals • Human capacities are limited in aquatic biosecurity and aquatic animal health • Geographical isolation of islands makes policing of areas difficult • Limited infrastructures for quarantine • Limited infrastructures for disease diagnosis • No national instruments on aquatic biosecurity
Opportunities	**Threats**
• Existing Emergency Response Plan for terrestrial animals, which can be adapted for aquatic animals • Capacity building on aquatic biosecurity has been offered by various agencies and institutions • MMR laboratory services have been improved (infrastructure, new equipment, and training for staff) • Research opportunities on general biosecurity and aquatic biosecurity are available through different partners	• Regular cruise ship visits (ballast water) • Yacht biofouling • No aquatic response plan • Climate change • Introduction of new aquatic species • Depopulation of the islands, which means fewer people to maintain and operate biosecurity facilities

This Strategy is designed to address some key, basic national requirements regarding the establishment of robust systems towards:

1. Aquatic species disease management: disease diagnosis, prevention, control, treatment, monitoring, surveillance and reporting.
2. Import and export requirements for aquatic organisms and their products.
3. Conservation and management of aquatic biodiversity and aquatic ecosystems.
4. Emergency planning in the case of aquatic species disease outbreaks.
5. Regulatory framework related to aquatic biodiversity.
6. International collaboration on aquatic biodiversity.

3.4 Regulatory framework related to aquatic biosecurity

Nowadays, three agencies have policies in place related to different aspects regarding the management of aquatic organisms. As noted in the tables below, the Ministry of Agriculture manages national biosecurity. MMR is the lead agency for developing and managing aquaculture, with the National Environment Service being responsible for conducting environmental impact assessments. The intention of the Strategy is to ensure that resources and capacities are applied efficiently and effectively across government agencies and institutions.

There is no legislation that directly addresses aquatic biosecurity; however, the Ministry of Agriculture is considering amending its Biosecurity Act 2008 to include aquatic organisms, which will enable aquatic animal health management to be integrated with terrestrial animal biosecurity measures. Table 2 identifies key pieces of legislation related to aquaculture and the protection of the marine environment.

Table 2: Current legislation related to aquatic biosecurity in the Cook Islands

Legal instrument	Scope	Responsible agency
Prevention of Marine Pollution Act 1998	To provide for the prevention of marine pollution, dumping and transportation of other waste in Cook Islands waters; gives effect to various international conventions on marine pollution and protection of the marine environment. Section 3, in particular, prohibits pollutants from being released into Cook Islands waters, with 'pollutants' defined as including any that are released into coastal, inland and oceanic waters.	Ministry of Transport
Ministry of Marine Resources Act 1984	To manage the conservation and utilisation of fisheries and marine resources to increase self-sufficiency in marine-sourced foods, and to encourage import substitution and further development of Cook Islands fisheries. 'Aquaculture' means any activity designed to cultivate or farm fish and other living aquatic resources, and includes the cultivation, propagation or farming of aquatic organisms from eggs, spawn, spat or seed or by rearing fish or aquatic plant lawfully taken from the wild or lawfully imported into the Cook Islands, or by other similar process.	Ministry of Marine Resources
Environment Act 2003	To provide for the protection, conservation and management of the environment in a sustainable manner. S. 36 states that no person shall undertake any activity that causes, or is likely to cause, significant environmental impacts except in accordance with a project permit issued under this section. S. 55 states that the Island Environment Committee for an island, from time to time by notice in the Gazette, designate specified animals and plants on the island as protected species.	National Environment Service
Marine Resources Act 2005	To confirm the Ministry as the principal authority for the conservation, management and development of living and non-living resources. Provides that the introduction or removal of fish to and from fishery waters require a permit from the Secretary of Marine Resources provided a quarantine permit be also obtained. Any person who contravenes the Act shall be liable for conviction and, in addition, shall be liable for the extent of damage, which may be caused by diseases in the fishery waters because of the introduction of live fish.	Ministry of Marine Resources
Biosecurity Act 2008	To prevent the entry of animal and plant pests and diseases, and control their establishment and spread into the Cook Islands. The Act regulates the movement of animal and plant pests and diseases, and of animals and plants and their products, and facilitates international cooperation with regard to animal and plant diseases. Approval from the Ministry of Agriculture is required for any ship to discharge ballast water in the Cook Islands. S. 21 sets out the environmental obligations of masters and captains by providing that: a) no garbage containing any animal, plant, animal product or plant product; and b) no bilge water or ballast water will be discharged from the vessel into the sea while the vessel is in the Cook Islands.	Ministry of Agriculture
Maritime Transport Act 2008	To provide for the maritime safety of the Cook Islands and its vessels, the Act enables the implementation of Cook Islands' obligations under international maritime agreements, and ensures that participants in the maritime transport system are responsible for their actions, and are responsible for the protection of the marine environment. The Cook Islands is a signatory to the Ballast Water Convention. The Act authorised the making of rules such as the 'Maritime (International Convention for the Control Management of Ships Ballast water and Sediments) Rules 2014 No.1' to give effect to the Ballast Water Convention in the Cook Islands.	Ministry of Transport

The regulatory and policy framework for aquatic biosecurity in the Cook Islands is primarily guided by national policies and legislation that are implemented by various stakeholders across government.

Table 3: Current national policies related to aquatic biosecurity in the Cook Islands

Policy/Plan	Scope
National Sustainable Development Plan 2016–2021	Sets out the 16 national goals that represent the aspirations of Cook Islands' people across the different dimensions of society and development. Goal 11 promotes the need to protect biodiversity and Goal 12 encourages the sustainable management of the ocean, lagoons and marine resources.
Ministry of Marine Resources Sector Policy 2017–2021 (draft)	Sets out the three areas of focus for the Ministry: Offshore, Coastal and Aquaculture. It is anticipated that the Policy will be adopted by the end of the 2018 calendar year.
Ministry of Marine Resources Strategic Plan 2017–2021	Identifies the areas of priority focus for the Ministry of Marine Resources over a four-year period. It confirms the need to explore new economic opportunities to expand the contribution of fisheries, such as aquaculture development, to the country's gross domestic product.
Manual of Biosecurity Procedures for the Cook Islands 2015	Sets out the procedures to be observed by biosecurity officers for clearances of aircraft and passengers, vessels and yachts, imports and export certification, and internal quarantine movements of plants, to ensure implementation of the Biosecurity Act 2008.
Ministry of Marine Resources Business Plan 2017/18	Output 3 of the Business Plan pertains to managing the National Strategy on Aquatic Biosecurity. Given that the Strategy was conceived after the Business Plan was adopted, there is no specific work programme for implementing the National Strategy on Aquatic Biosecurity. It can, however, be incorporated into existing projects that focus on the development of Island Lagoon Master Plans.
Ministry of Agriculture Business Plan 2017/18	To monitor their progress in implementing their national priorities, the National Sustainable Development Plan sets out indicators that the Ministry of Agriculture will use, including the number of reported biosecurity outbreaks. It should be noted that this is referring to terrestrial outbreaks of plants and animals.
National Environment Service Business Plan 2017/18	This Business Plan will support the implementation of the National Invasive Species Strategy and Action Plan and have a relatively comprehensive work programme centering around the management of introduced (terrestrial) invasive species. The National Environment Service has also factored in an education awareness programme on invasive species. NES is responsible for coordinating the National Biodiversity Steering Committee, which is responsible for providing a forum for discussing biodiversity issues, including assessment of capacity building needs, and defining the specific priorities in the areas of in situ and ex situ conservation, methods to assess threats to biodiversity and traditional knowledge, practices and innovations. A Cook Islands Biodiversity Database has been established by the Cook Islands Natural Heritage Project, which lists most plants and animals found in the Cook Islands. Presently, the database lists about 4,000 species of plants, animals and microorganisms; however, there are still more species that are unrecorded.
Cook Islands Aquaculture Development Plan 2012–2016	Sets out a comprehensive guide for the development and management of the aquaculture sector in the Cook Islands. The plan indicates the best path forward to increase and diversify sustainable benefits from aquaculture development. It also provides guidance to aquaculture investors, by indicating which aquaculture commodities in the Cook Islands show the most development potential and carry the fewest risks.
Manihiki Lagoon Management Plan 2016–2021	The plan, administered by the Manihiki Island Government, facilitates the management and use of the Manihiki Lagoon for the purposes of pearl production and other uses. It is relevant for the purposes of this National Aquatic Biosecurity Strategy because it identifies potential entry points for biosecurity risks that can have a detrimental effect on pearl farming.
National Ballast Water Management Strategy 2016–2020	Intends to strengthen and develop national regulatory frameworks related to marine invasive alien species, in particular with respect to the transfer of potentially harmful aquatic organisms and pathogens in ships' ballast water and sediments.
Draft National Invasive Species Strategy and Action Plan	This plan was released by the National Environment Services in July 2015, and seeks to bring together previously fragmented and under-resourced management efforts with an agreed plan of priority actions. This plan notes that no work has been conducted on the control of any marine alien invasive species, with one example being that the native crown-of–thorns starfish (*Acanthaster planci*), which feeds on corals which undergoes periodic outbreaks.

3.5 National stakeholders involved in aquatic biosecurity

Responsibility for the prevention and management of aquatic pests and diseases is shared between the Ministry of Agriculture and the Ministry of Marine Resources, along with the island government of each respective *pa enua*. Table 4 describes the roles and responsibilities of key domestic and external stakeholders in managing aquatic biosecurity matters.

Table 4: Key stakeholders involved in aquatic biosecurity

GOVERNMENT	
Stakeholder	**Role/Responsibility**
Ministry of Agriculture	Responsible for the pest surveillance and monitoring programme throughout the Cook Islands as well as implementation of biosecurity legislation. During an emergency, the Secretary of Agriculture will give a notice of declaration and prohibit the movement of regulated articles in and out of the emergency area.
Ministry of Marine Resources	Responsible for offshore and inshore fisheries and aquaculture, as well as pearl industry support and environmental management. MMR leads lagoon and coastal areas water testing, including ciguatera monitoring, through its Water Quality Programme.
National Environment Service	The central government agency in charge of protecting, managing and conserving the environment of the Cook Islands. NES also has responsibility for the Cook Islands' National Invasive Species Strategy and Action Plan.
Ministry of Transport	The administering agency for the Prevention of Marine Pollution Act and the Maritime Transport Act.
Island governments	Manage all governance issues on each island. Island councils with areas within their jurisdiction may also request the Secretary of Agriculture to take steps under this act to prevent the movement of specific articles from or to another Island.
Manihiki Island Government	Manages pearl farming in Manihiki through issuing of permits. The Ministry of Marine Resources supports the Manihiki Island government via the Pearl Industry Support Division through governance support, management of pearl quality production, lagoon health and monitoring, and research and development. The Ministry of Marine Resources provides advice to pearl farmers, regarding activities such as water quality analysis, pearl production reporting, and farming permits.
NON-GOVERNMENT	
Stakeholder	**Role/Responsibility**
Manihiki Pearl Farmers Association Cook Islands Fisheries Association	Training, monitoring, advocacy, dissemination, community-based management, conservation, environmental security and advocacy. The Ministry of Marine Resources provides water quality reports and mapping for pearl farms
EXTERNAL STAKEHOLDERS	
Stakeholder	**Role/Responsibility**
International organisations	
Food and Agriculture Organization, World Organisation for Animal Health, International Plant Protection Committee, CODEX Alimentarius, World Health Organization, International Maritime Organization, Network of Aquaculture Centres in Asia-Pacific	Training, capacity building, technical expertise and support, funding, infrastructure, equipment, diagnostic tools.
Regional organisations	
The Pacific Community, Secretariat of the Pacific Regional Environment Programme, Pacific Islands Forum Fisheries Agency	Training, capacity building, technical expertise and support, funding, infrastructure, equipment, and diagnostic tools.
Academic institutions	
University of the South Pacific, University of New South Wales, James Cook University, Massey University	Training and provision of technical assistance and expertise.
Laboratories	
National Institute for Water and Atmospherics (New Zealand), Plant Health and Environment Laboratory (New Zealand), University of New South Wales (Australia), Commonwealth Scientific and Industrial Research Organisation (Australia)	Plant health, entomology, environment, conservation, animal health, water quality, and pathology.
Donors	
United Nations Development Programme, Japan International Cooperation Agency, New Zealand Ministry of Primary Industries, Australian Centre for International Research on Agriculture, New Zealand Aid Agency, Global Environment Facility	Funding for training, capacity building, technical advice, infrastructure and equipment.

4. Work plan

This Strategy will be implemented through a work plan (shown in Table 5), which has been prepared by stakeholders during the consultation process. It sets out the specific tasks to be undertaken by the stakeholders and identifies the periods and resources for these activities.

Table 5: The work plan for the National Strategy on Aquatic Biosecurity

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
Expected output 1: Improving aquatic species disease management, strengthening emergency disease preparedness and response capability, and enhancing surveillance and diagnostic services								
1.1 Conduct assessment of capacities on aquatic species diseases	X	X				• MMR (lead agency) • MOA • NES • SPC	• National capacities are identified • Training plan developed based on capacity gaps identified	• E-questionnaire • MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Via email with SPC's assistance
1.2 Training on aquatic species disease management for MOA, NES MMR and farmers		X	X			• MMR (lead agency) • MOA • NES • MOT • Local farmers • SPC	• Skills and knowledge of staff improved • Acquired knowledge and skills applied	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Farmers • Domestic travels • Venue • Catering
1.3 Development of a national pathogen list for farmed aquatic species						• MMR (lead agency) • SPC	• National pathogen list developed	Via email with SPC's assistance
1.4 Screening of listed pathogens						• MMR (lead agency) • MOA • SPC	Screening of listed pathogens conducted	• Collection and preservation of samples • Analysis in an external laboratory
1.5 Development and implementation of a surveillance programme for listed pathogens						• MMR (lead agency) • SPC	Surveillance programme developed	Via email with SPC's assistance

Table 4: Continued

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
1.6 Development of a record keeping methodology on health status of aquatic species				X	X	• MMR (lead agency) • MOA • NES	• Record keeping strategy developed • Data on aquatic species health status collected and compiled	Via email with SPC's assistance
1.7 Training on OIE reporting		X				• MOA (lead agency) • MMR • OIE • SPC	Agencies trained	• MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering
1.8 Development and submission of OIE bi-annual reports			X	X	X	• MOA (lead agency) • MMR • OIE • SPC	National report produced and submitted	• Via email
1.9. Establishment of a basic laboratory on aquatic animal health			X	X		• MMR (lead agency) • MOA • SPC	National laboratory on aquatic organisms pathology is established	• Surgery equipment • Microscope • Basic laboratory equipment
Expected output 2: Import and export standards and requirements								
2.1 Development of import risk analysis guidelines (IRA) for the introduction of live aquatic species	X	X				• MMR (lead agency) • MOA • NES • Island governments • Local farmers • SPC	Basic guidelines on risk assessment, risk management and risk communication for imports of aquatic organisms developed	• Via email

Table 4: Continued

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
2.2 Training on IRA for national stakeholders			X	X	X	• MMR (lead agency) • MOA • NES • MOT • Island governments • Local farmers • SPC	• National capacities are improved • Acquired knowledge and skills applied	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering
2.3 Development of quarantine protocols and operations for live aquatic species			X	X		• MMR (lead agency) • NES • MOA • Island governments • SPC	• Basic quarantine protocols and operations aligned to OIE and FAO standards developed	• Via email
2.4 Conduct national training on quarantine operations and inspections for aquatic species				X	X	• SPC (training provider) • MMR • MOA • NES • MOT • Island governments • FAO • OIE	• National capacities are improved • Acquired knowledge and skills applied	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • MOE • Domestic travels • Venue • Catering
2.5 Develop environmental impact assessment (EIA) guidelines for the introduction of live aquatic species		X	X	X		• MMR (lead agency) • NES • MOA • Island governments • SPC	Basic guidelines on assessing environmental impacts from the introduction of live aquatic species developed	Via email

Table 4: Continued

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
2.6 Training on aquatic EIA for national stakeholders					X	• SPC (training provider) • MMR • NES • MOA • MOT • Island governments	• National capacities are improved • Acquired knowledge and skills applied	• MMR staff involved in aquatic biosecurity • MOA staff involved on aquatic biosecurity • MOE • Domestic travels • Venue • Catering
2.7 Training on national health certification and CITES implementation for national stakeholders					X	• NES (lead agency) • MOA • MMR • SPC	• National capacities on specific templates of health certificates and CITES are improved • Acquired knowledge and skills applied	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • MOE • Domestic travels • Venue • Catering
2.8 Training on farmed aquatic species identification for imports and exports for national stakeholders		X	X			• MMR (lead agency) • MOA • NES • SPC	• National capacities on species identification and taxonomy of live aquatic organisms are improved • Acquired knowledge and skills applied	• MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering
2.9 Establish basic quarantine areas at MMR hatcheries				X	X	• MMR (lead agency) • MOA • SPC	• Basic quarantine area established	• Water pump • Basic filtration system • PVC raceways
Expected output 3: Legislation, policy and planning framework								
3.1 Establish the Cook Islands Aquatic Biosecurity Task Force	X					• MMR (lead agency) • MOA • NES • Island governments • Local farmers	Task Force developed and activated	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering

Table 4: Continued

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
3.2 Review, amend and update current regulatory framework – Biosecurity Act 2008	X	X	X			• MOA (lead agency) • MMR • NES • CLO • SPC	Current regulatory framework related to aquatic biosecurity is reviewed, amended and updated	Via email
3.3 Review policies and procedures related to aquatic biosecurity						• MMR (lead agency) • MOA • NES • SPC	Policies and procedures updated and developed	Via email
3.4 Review the Cook Islands Aquaculture Development Plan 2012–2016	X	X	X			• MMR (lead agency) • MOA • NES • Island governments • Local farmers • CIFA • CIPA • SPC	• Consultations conducted with relevant stakeholders • Cook Islands Aquaculture Development Plan developed, approved and implemented	Via email
Expected output 4: Emergency planning								
4.1 Review the existing Emergency Response Plan for Terrestrial Animals, and incorporate aquatic organisms	X	X				• MOA (lead agency) • MMR • Island governments • NES • Local farmers • SPC	Aquatic organisms component incorporated into the Emergency Response Plan	Via email

Table 4: Continued

Activities	Timeline					Responsible agencies	Indicators	Resources needed
	2018	2019	2020	2021	2022			
4.2 Conduct training on the implementation of the Emergency Response Plan			X	X		• MOA (lead agency) • SPC • MMR • Island governments • NES • Local farmers	• National partners trained and applied for emergency preparedness • Brochures developed	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering
4.3 Conduct disease outbreak drills to test the Emergency Response Plan			X	X	X	• MMR (lead agency) • SPC • MOA • Island governments • NES • Local farmers	• National capacity of all responsible partners on a real emergency or disease outbreak is improved and applied • Gaps in emergency drills identified and resolved	• MMR staff involved in aquatic biosecurity • MOA staff involved in aquatic biosecurity • Domestic travels • Venue • Catering
Expected output 5: International collaboration								
5.1 Strengthen existing international collaborations on aquatic biosecurity	X	X	X	X	X	• MMR (lead agency) • MOA • NES • SPC • OIE • FAO	International collaboration strengthened	Via email
5.2 Establish new collaborations with international partners on biosecurity (OIE, NACA, IMO)						• MOA (lead agency) • MMR • NES • SPC	New collaboration with partners and networks established	Via email

Note: Definitions for all abbreviations used in this table can be found in the list of abbreviations at the beginning of this document.

5. Implementation strategies

The implementation of the Strategy will be led by MMR as agreed on by key national stakeholders. MMR's Inshore Fisheries and Aquaculture Division will lead and coordinate the implementation of the four-year Strategy in collaboration with SPC's Aquaculture Section and other relevant international and national stakeholders (e.g. OIE, Food and Agriculture Organization). Moreover, activities detailed in the work plan will be led by national agencies specified in Section 3 of the Strategy.

In addition, a National Steering Committee on Aquatic Biosecurity (NSCAB) will be established, with the following composition: one member each from MMR, Ministry of Agriculture and the National Environment Service.
There will be terms of reference for NSCAB and members. The tasks of NSCAB under the Strategy are to undertake implementation, logistics, administrative issues, periodic monitoring and reporting.

The overall coordination of the implementation of the Strategy falls under MMR, which includes the review of the Strategy and coordination of logistical and administrative procedures.

It is anticipated that funding of each respective work plan activity in the Strategy would be sought from donor partners as well as being complemented by the three respective government agencies involved.

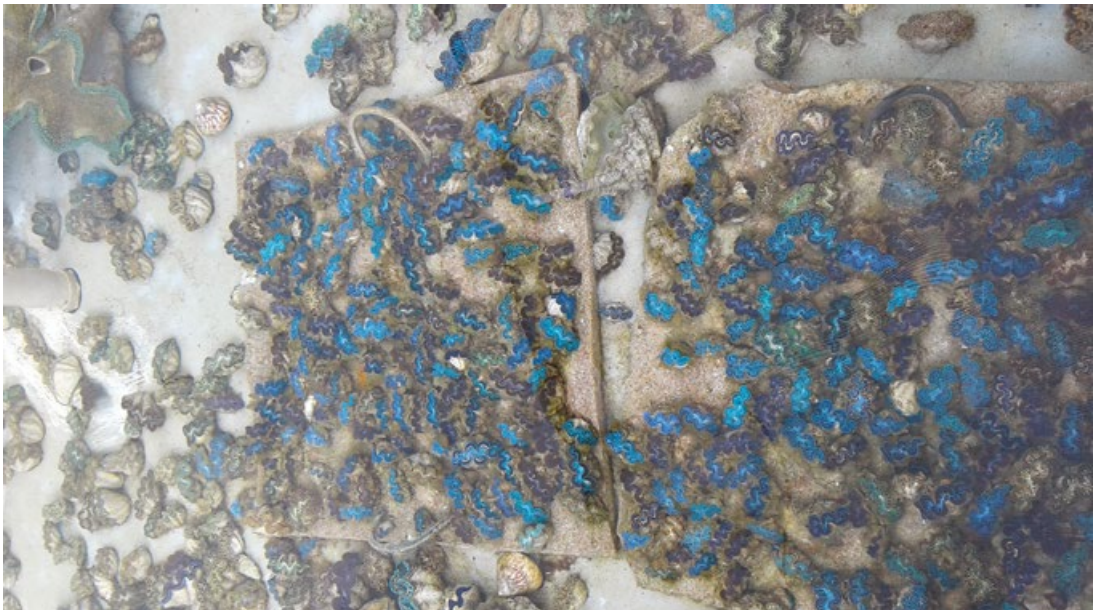
6. Monitoring and evaluation

The main task of NSCAB is to take charge of the monitoring and evaluation of the Cook Islands Biosecurity Strategy as described in Section 5 of the Strategy, within the timeframe of four years. For effective implementation of the Strategy, it is recommended that NSCAB meet on a six- monthly basis to ensure that appropriate resources and strategies are put in place and imposed.

The main purposes of monitoring and evaluation under NSCAB are to:

- ensure the timely and efficient achievement of expected outputs;
- ensure the timely and efficient implementation of activities;
- ensure the timely and efficient finalisation and submission of OIE reporting;
- act in cases of disease-related emergencies, as defined in the Emergency Plan;
- provide technical assistance when necessary; and
- assess suitable methodologies for the dissemination of relevant information.

MMR will report on the progress of this Strategy on a monthly basis during the MMR management meeting and at MMR's annual reporting to the Ministry of Finance and Economic Management and the Office of the Public Service Commission.



Giant clam juveniles at the marine hatchery - Photo Ministry of Marine Resources

7. Glossary of aquatic biosecurity terms

Aquatic Animal Health Services: The governmental and non-governmental organisations that implement animal health and welfare measures and other standards and recommendations contained within the Cook Islands Aquatic Code. Aquatic Animal Health Services are under the overall control and direction of the Competent Authority. Private sector organisations, veterinarians and aquatic animal health professionals are normally accredited or approved by the Competent Authority to deliver the delegated functions.

Aquatic animal health status: The status of a country, zone or compartment with respect to an aquatic animal disease in accordance with the criteria listed in the relevant chapter of the Aquatic Code dealing with the disease.

Aquatic animals: Refers to life stages (including eggs and gametes) of fish, molluscs, crustaceans and amphibians originating from aquaculture establishments or removed from the wild, for farming purposes, for release into the environment, for human consumption or for ornamental purposes.

Aquatic Code: The World Organisation for Animal Health's Aquatic Animal Health Code (or OIE Aquatic Code).

Basic biosecurity conditions: A set of conditions that apply to a particular disease, and a particular zone or country, which are required to ensure adequate disease security. For example:

- The disease, including suspicion of the disease, is compulsorily notifiable to the Competent Authority;
- An early detection system is in place within the zone or country;
- and Import requirements to prevent the introduction of disease into the country or zone, as outlined in the Aquatic Code, are in place.

Biosecurity: A set of management and physical measures designed to reduce the risk of introduction, establishment and spread of pathogenic agents to, from, and within an aquatic animal population.

Biosecurity plan: A plan that identifies significant potential pathways for the introduction and spread of disease in a zone or compartment, and describes the measures that are being, or will be, applied to mitigate the risks of introducing and spreading disease, taking into consideration the recommendations in the Aquatic Code. The plan should also describe how these measures are audited, with respect to both their implementation and their targeting, to ensure that the risks are regularly re-assessed and the measures are adjusted accordingly.

Certifying official: A person who is authorised by the Competent Authority to sign health certificates for aquatic animals.

Competent Authority: The Veterinary Authority or other governmental authority of a country having the responsibility and competence for ensuring or supervising the implementation of aquatic animal health and welfare measures, international health certification, and other standards and recommendations in the Aquatic Code for the entire territory.

Contingency plan: A documented work plan designed to ensure that all needed actions, requirements and resources are provided in order to eradicate or bring under control outbreaks of specified diseases of aquatic animals.

Diagnosis: Making a determination of the nature of a disease.

Disease: A clinical or non-clinical infection with one or more aetiological agents.

Disinfectants: Chemical compounds or physical processes capable of destroying pathogenic agents or inhibiting their growth in the course of disinfection.

Disinfection: The process of cleaning and applying disinfectants to inactivate pathogenic agents on potentially contaminated items.

Early detection system: An efficient system for ensuring the rapid recognition of signs of a listed disease, or an emerging disease situation, or unexplained mortality, in aquatic animals in an aquaculture establishment or in the wild, and the rapid communication of the event to the Competent Authority, with the aim of activating diagnostic investigation by the Aquatic Animal Health Services with minimal delay. Such a system includes the following characteristics:

- Broad awareness among personnel employed at aquaculture establishments or involved in processing, of the characteristic signs of the listed diseases and emerging diseases;
- Veterinarians or aquatic animal health professionals trained in recognising and reporting suspicions of disease occurrence;
- Ability of the Aquatic Animal Health Services to undertake rapid and effective disease investigation based on a national chain of command;
- Access by the Aquatic Animal Health Services to laboratories with the facilities for diagnosing and differentiating listed diseases and emerging diseases;
- The legal obligation of private veterinarians or aquatic animal health professionals to report suspicions of disease occurrence to the Competent Authority.

Emerging disease: A disease, other than national-listed diseases, which has a significant impact on aquatic animal or public health resulting from:

- change of known pathogenic agent or its spread to a new geographic area or species; or
- newly recognised or suspected pathogenic agent.

Exporting country: A country from which aquatic animals or aquatic animal products, biological products or pathological materials are sent to a destination in another country.

Free country: A country that fulfils the requirements for self-declaration of freedom from disease with respect to the disease(s) under consideration in accordance with the relevant chapter(s) in the Aquatic Code.

Hazard: A biological, chemical or physical agent in, or a condition of, an aquatic animal or aquatic animal product with the potential to cause an adverse effect on aquatic animal health or public health.

Importing country: A country that is the final destination to which aquatic animals, aquatic animal products, biological products or pathological materials are sent.

Incidence: The number of new outbreaks of disease within a specified period of time in a defined aquatic animal population.

Infected zone: A zone in which a disease has been diagnosed.

Infection: The presence of a multiplying or otherwise developing or latent pathogenic agent in a host. This term is understood to include infestation where the pathogenic agent is a parasite in or on a host.

International aquatic animal health certificate: A certificate issued in conformity with the provisions of Chapter 5.11 of the OIE Aquatic Code, describing the aquatic animal health and/or public health requirements that should be fulfilled prior to export of a commodity.

Listed diseases: Diseases referred to in Chapter 1.3 of the OIE Aquatic Code or diseases that have been listed by the national competent authority as nationally relevant and, therefore, notifiable.

Notification: The procedure by which a Competent Authority informs OIE headquarters and the headquarters informs the Competent Authorities of other OIE member countries of the occurrence of a disease in accordance with the provisions of Chapter 1.1 of the OIE Aquatic Code.

Outbreak: An occurrence of one or more cases in an epidemiological unit.

Pathogenic agent: An organism that causes or contributes to the development of a disease.

Pathological material: Samples obtained from live or dead aquatic animals containing or suspected of containing pathogenic agents to be sent to a laboratory for analytical purposes.

Prevalence: The total number of infected aquatic animals expressed as a percentage of the total number of aquatic animals in a given aquatic animal population at one specific time.

Quarantine: The procedure for means maintaining a group of aquatic animals in isolation with no direct or indirect contact with other aquatic animals, in order to undergo observation for a specified length of time and, if appropriate, testing and treatment, including proper treatment of the effluent waters.

Risk: The likelihood of the occurrence and the likely magnitude of the biological and economic consequences of an adverse event or effect to animal or human health.

Risk analysis: The process comprising hazard identification, risk assessment, risk management and risk communication.

Risk assessment: The scientific evaluation of the likelihood and the biological and economic consequences of entry, establishment and spread of a hazard.

Risk communication: The interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, risk communicators, the general public and other interested parties.

Risk management: The process of identifying, selecting and implementing measures that can be applied to reduce the level of risk.

Sanitary measure: A measure, such as those described in various chapters of the Aquatic Code, designed to protect aquatic animal or human health or life within the territory of the member country from risks arising from the entry, establishment and/or spread of a hazard.

Self-declaration of freedom from disease: A declaration by the Competent Authority of the member country concerned, that the country, zone or compartment is free from a listed disease based on implementation of the provisions of the OIE Aquatic Code and the Aquatic Manual. (Note: The member country is encouraged to inform OIE of its claimed status. OIE may publish the claim but publication does not imply OIE endorsement of the claim.)

Sensitivity: Refers to the proportion of true positive tests given in a diagnostic test (i.e. the number of true positive results divided by the number of true positive and false negative results).

Specificity: Refers to the probability that absence of infection will be correctly identified by a diagnostic test (i.e. the number of true negative results divided by the number of true negative and false positive results).

Surveillance: A systematic series of investigations of a given population of aquatic animals to detect the occurrence of disease for control purposes, and which may involve testing samples of a population.

Susceptible species: A species of aquatic animal in which infection has been demonstrated by the occurrence of natural cases or by experimental exposure to the pathogenic agent that mimics natural transmission pathways.

Target population: For the purposes of demonstrating freedom from infection, the population of interest is usually made up of all aquatic animals of species susceptible to a specified pathogenic agent in a defined country, zone or aquaculture establishment.

Targeted surveillance: Surveillance that is targeted at a specific disease or infection.

Veterinarian: A person with appropriate education, or is registered or licensed by the relevant veterinary statutory body of a country to practise veterinary medicine or science in that country.

Veterinary Authority: The governmental authority of a member country comprising veterinarians, other professionals and para-professionals, having the responsibility and competence for ensuring or supervising the implementation of aquatic animal health and welfare measures, international aquatic animal health certification, and other standards and recommendations in the Aquatic Code for the entire territory.