

# MARINE AQUARIUM FISHERY MANAGEMENT PLAN

Prepared by; Fisheries Management & Planning Section

For the

**Fisheries Division**  
**Ministry of Agriculture & Food, Forestry and Fisheries**  
**Government of the Kingdom of Tonga**



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- MAEA
- MAC
- Technical staff of Fisheries Division
- Other Stakeholders that have been approached and consult for this plan.

### **Definitions and Abbreviations**

Terms are generally used in this plan as they are defined in the Fisheries Management Act 2002 (Part I, §2), or if not defined there, as defined below. Precise definitions will be provided, where needed, in the fisheries regulations and MA Licensing Guidelines.

“Secretary” means the Head of Fisheries

“Marine aquarium” or “MA” means any fish that is fished for the purpose of being sold in a live form for recreation and not as a food product.

“MA Licence” means fishing licences which permits an applicant through the application procedures to operate as a fishing business for the purpose of aquarium.

“MA Licensing Guidelines” means the Licensing Guidelines drawn up and endorsed pursuant to §22, 23 of the Fisheries Management Act 2002.

“Minister” means the Minister responsible for fisheries.

“Fish” as define in the Fisheries Management Act 2002.

“Fishery” as defined by the Fisheries Management Act 2002.

**Abbreviations :**

<b>CITES</b>	Convention on International Trade in Endangered Species of Wild Flora and Fauna
<b>CT</b>	Consumption Tax
<b>FAO</b>	Food and Agriculture Organisation of the United Nations
<b>FD</b>	Fisheries Division (a Division of the Ministry of Agriculture & Food, Forestry and Fisheries).
<b>FOB</b>	Free on Board
<b>EU</b>	European Union
<b>ICFMaP</b>	Integrated Coastal Fisheries Management Project
<b>MAEA</b>	Marine Aquarium Exporter's Association
<b>MAC</b>	Marine Aquarium Council
<b>MCS</b>	Monitoring, Control and Surveillance
<b>OIE</b>	World Organisation for Animal Health.
<b>ProcFISH</b>	Pacific Region Oceanic Coastal Fisheries Aid.
<b>SPREP</b>	South Pacific Regional Environmental Programme
<b>SPC</b>	Secretariat of the Pacific Community

# 1. INTRODUCTION

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The Government of Tonga began promoting reef resources for generating foreign revenue in the mid 1980s. These particular reef resources include small inedible<sup>1</sup> fish, corals (soft and hard), invertebrates and live rocks (rubbles, dead rocks, aquarium rocks). The purpose of this fishery is aimed at ornamental or pets in aquaria and is not for human consumption. All fisheries fundamentally have substantial economic contribution. It follows that it also has social importance. The UNEP reported that between 1.5 to 2 million world wide keeps marine aquaria in their homes, schools, Research Institutions and in public aquaria. By global standards it is a multi million dollar trade with an estimated worth of US\$200-300 million generated annually.

The Marine Aquarium Fishery in Tonga is a fishery which has been developed over 20 years and the trade support jobs for those that are employed in certain rural, low-income coastal communities. However, damaging fishing techniques used by fishers/operators to collect the animals would result in over-fishing of some species and economic loss. It follows that the high levels of mortality and discard associated with this fishery results from inadequate handling which undermine the potential for sustainable economic benefit and continue to pose significant challenges to achieving greater sustainable development. To this end, the marine aquarium fishery has seldom been free of controversy as companies try to generate an economic benefit in an ever changing climate where the coral reefs is susceptible to environmental pressures. It is important to assemble legislative frameworks that protect reefs without threatening a legitimate business activity or the incomes of those engaged in aquarium fishing.

The fishery has operated on mutual management and compliance effort since its commencement and is now establishing a fisheries management plan. That is, the fishery has been based on guidance from mechanisms of broad policies, and now provides an opportunity to be translated into a strategic management plan. A fisheries management plan is an explicit arrangement between fisheries management authority and the recognized parties. The management implementation of the plan provides ways in which the fishery is to be managed and by whom. The management plan has been put together in consultation and cooperation with other stakeholders including the government departments, tour operators and aquarium industries and fisheries communities.

## 1.1 Purpose of the Plan

The plan shall be used by the Fisheries Division and license holders as well as other stakeholders to manage the nation's fishery for marine aquarium. The scope of the plan covers all forms and types of fishing for the purpose of aquarium in all reefs and fishing area of Tongatapu.

The main purpose for this plan is to establish a **precautionary approach**<sup>2</sup>. The plan is dynamic and flexible. The plan is a statement of the policy which has objectives, strategies, and procedures that, in particularly the government sector, shall use this for monitoring of the fishery and in trying to achieve the overriding objective for the nation's fisheries;

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<sup>1</sup> These are very small fish which is not consume by humans or have any traditional value for Tonga.

<sup>2</sup> **Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'** (Principle 15 of the Rio Declaration of the UN Conference on Environment and Development)

- (a) *The objective of fisheries management in Tonga shall be to provide for the conservation, management and sustainable utilisation and development of fisheries resources and other matters incidental thereto.*

The FMA 2002 establishes a number of principles, including precautionary approach that the government must take into account in managing fisheries and the exercise of power by the Minister and powers of the Secretary. These principles have been considered in the preparation of this plan, and the plan includes strategies.

In the essence of *precautionary approach* is the concept of **sustainable development**. The plan is in the pursuit of the three goals known to support this concept. They are;

- **Ecological integrity**, specifically referring to ecosystem diversity, their resilience and balance;
- **Economic efficiency**, implying the replacement of the conventional concept of economic growth with that of ecologically responsible economics which fully recognises and takes into account for the natural and ecological resources consumed by human activity (ecosystem approach to fisheries management, EAFM)
- **Social equity**, essentially to safeguarding of rights and other values of today as well as preserving of the rights and values of future generations.

## 1.2 Authority of the Plan

The MA Fishery occurs almost exclusively within *communal waters or in the inshore and its surrounding reefs*. The rationale for preparing this national-level plan is the determination that this fishery is one that it is to be well controlled, because of its potentially serious and widespread environmental adverse effects. It requires special consideration of consultation according to §7(3) of the FMA 2002, and in particular, a specific licensing programme. The Fisheries Division is advised to implement any suggested recommendations set out by this plan and;

1. In doing so, it may choose any legal framework on which it shall be specifically prescribed and enforced.
2. Establish precautionary approach where necessary if it is to achieve sustainable development.

The fishery plan and any future reviews shall be consulted as appropriately and to be submitted to the Minister for approval. Any changes in future shall be attached to this plan.

## 1.3 Preparation of the Plan

The Secretary for Fisheries is required to consult as appropriate with its stakeholders. The fishery began in the mid 1980's as a trial without the necessary scientific assessment. The consultations regarding the preparation of this plan began in 1993 when the Fisheries Division (then Ministry of Fisheries) had received increased interests from investors locally and from abroad. Initially, consultations were initiated when show of interests had increased and fisheries policies were formulated. The removals of live rock and live coral provided important issues and had resulted in Cabinet Decisions of 1993, 1994 and 1997 which clearly stated the need for a management plan to guide and provide control measures for this fishery.

There have been improvements to the original draft text and issues and concepts have changed which typifies the changing nature of the fishery.

The draft text has had six changes from 1996 to 2008. In the later part of 2002, a second draft was prepared and where, at the time, four companies contributed. The draft text was also made available to the Ministry of Environment for comments. Dive and tour operators were also consulted and inputs were edited into the documents. Workshop was conducted by SPREP at the Department of Environment on Coral Identifications.

The third draft text was compiled in 2004. It was a combination of different sectors and the procedures that was used in the management of this fishery at the time.

A fourth draft was done in 2005 with no significant changes from the previous draft although it provided an updated version. And was sent to SPC for their review under the ProcFISH Project funded by the EU for the region.

The fifth draft in 2007 provided not only an updated version but also included the latest important information of the SPC preliminary survey conducted in 2005. In 2008 the final report of the survey has yet to be released and its content being revealed in the draft plan drew different opinions resulting in accusations from the MAEA. Further consultation had been conducted at the request by MAEA. The Fisheries Division maintains that the activities of the past and present needs to be effectively managed.

The Fisheries Management & Planning Section reinforces the plan's objectives and continues its consultation with MAEA through the electronic mailing system to produce the sixth and final draft. To this end, various administration responsibilities and management tasks are recommended for both MAEA and Fisheries Division.

#### **1.4 Future of the Plan**

Coral reefs are critical habitat for an unparalleled diversity of marine life that provides important resources for both local sustenance and commerce. It is recognised that every fisheries evolves continuously, as do the biological, social, and economic environments in which fisheries occur. The plan is to be fundamentally adaptable to changing circumstances. That is, that the plan is dynamic. As time progresses specific regulations and other legal framework may be drawn out from the suggested recommendations of this plan. Specific requirements for data, MCS of any fishing activities or any method shall be from time to time prohibited to allow greater ecosystem recovery and where human resources are lacking for enforcing and implementation. This shall be established in the framework of precautionary approach. For these reasons, the plan includes a process for evaluating management success and for modifying the plan if and as needed.

As the plan is a flexible document there is the aim of seeing the plan gradually evolve in two particular directions.

1. Notwithstanding the strong management role for control prescribed in this plan, a move towards aquaculture based aquarium products is envisage,
2. As envisioned in §14 of the FMA 2002, there is an aim that through community based management certain devolving management responsibility shall affect the current open access the MA Fishery currently operates under to respective local coastal communities



## 2. FISHERY DESCRIPTION

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This section defines the marine aquarium fishery in Tonga and its trade. It also provides a brief description of the fishery.

### 2.1 Fishery Identification

For the purposes of this plan, the Marine Aquarium Fishery (MA Fishery), is defined to encompass all commercial fishing and related activities involved in or supporting the supply of aquarium fish from Tonga's marine resources.

The MA Fishery is one component of what could be considered the "reef fish fishery" or "inshore fishery," and it is therefore closely related to, and overlaps with, other components of that broader fishery. The three characteristics that distinguish the MA Fishery from other components of the reef fish fishery are:

- 1) It is a commercial fishery,
- 2) the product form is live rather than chilled, frozen, dried, smoked, or otherwise preserved, and
- 3) The primary use of the product is as ornamental or pet rather than for food, medicinal, or other purposes.

Three other characteristics of the MA Fishery, at least as it has been practised in Tonga so far, are conspicuous, but none of the three are defining characteristics for the purposes of this plan.

1. First, the product includes finfish, invertebrates, live corals (both hard and soft corals) and live rock.
2. Second, the main markets for MA are abroad in the United States of America, Australia and Europe, so most of the product has to be exported.
3. Third, the entire product has been wild-caught, with some species cultured reared such as giant clams with the assistance of the Aquaculture Section of the Fisheries Division.

However, even though the MA Fishery is distinctive from other fisheries, it is possible that some of the management measures prescribed in this plan may affect participants in other fisheries. Moreover, the objectives are similar to all commercial fisheries.

### 2.2 The Regional Trade

The marine aquarium trade started in the Pacific in the early 1970's first in Fiji and then in Kiribati. Later in the mid 1970's Solomon Islands joined the trade. American Samoa and Samoa entered into the trade next in the early 1980's followed by Palau and the Cook Islands in 1988, Tonga in 1989 and then Vanuatu, Federated States of the Micronesia (FSM) and the Republic of the Marshall Islands (RMI) in the early 1990's. To date, out of the 11 countries only 2, Samoa and FSM, have decided to put their marine aquarium trades on hold.

The marine aquarium trade operations in the Pacific all started with a strong focus on the export of fish and invertebrates. This has changed in the last few years with the strong demand for live rock mainly from the US market causing a dramatic shift towards the export of live rock by most Pacific marine aquarium trade companies. The trade is believed

to be around US\$50 million annually from the Pacific region alone. Marine aquarium products are saltwater fish, corals and invertebrates (e.g., soft corals, shrimp, small clams) that can be kept in an aquarium. Fish make up about 85% of the trade by value. Indonesia and the Philippines supply more than half of the global marine ornamental fish trade. Indonesia and Fiji are the largest suppliers of live coral.

Globally, the UNEP in 2003 reported that the marine aquarium trade involves around 102,928 trade records (7.7 million imported and 9.4 million exported animals and believed to be increasing) covering a total of 2,393 species of fish, corals and invertebrates since 2003. A total of 1,471 species of fish are traded worldwide. And in particular Damselfish (*Pomacentridae*) make up almost half of the trade, with species of angelfish (*Pomacanthidae*), surgeonfish (*Acanthuridae*), wrasses (*Labridae*), gobies (*Gobiidae*) and butterflyfish (*Chaetodontidae*) accounting for approximately another 25-30 per cent. These fish species are very common in Tonga's trade. There is a total of 140 species of hard corals, nearly all *scleractinians*, are traded worldwide, it is clear that species in seven genera (*Trachyphyllia*, *Euphyllia*, *Goniopora*, *Acropora*, *Plerogyra*, *Catalaphyllia*) are the most popular which has accounted for approximately 56 per cent of the live coral. More than 500 species of invertebrates (other than corals) are traded as marine ornamentals, though the lack of a standard taxonomy makes it difficult to arrive at a precise figure. The best estimate of global annual trade ranges between 9 and 10 million animals, mostly molluscs, shrimps and anemones. This provides a trade of around 200 to 300 million annually.

All species of giant clams and live hard corals are listed in Appendix II of CITES, an international agreement that protects wildlife by ensuring that international trade is based on sustainable use and does not threaten the survival of a species in the wild. Species listed in Appendix II can be traded, provided an export permit accompanies shipments and a 'non-detriment finding' is made (i.e. the collection is not detrimental to the survival of the species). Tonga is not a party to the treaty.

More than 75 species of coral can be captive bred, but only fast-growing corals appear to be economically profitable. Hence propagation in species of stony coral is mainly targeted at the fast growing branching species such as *Acropora*, *Pocillopora*, *Seriatopora* and *Stylophora*. Soft corals such as *Clavularia*, *Sarcophyton*, *Lobophytum*, *Sinularia*, *Alcyonium* and *Cladiella* are suitable for aquarium propagation, due to their ability to heal wounds and regenerate tissue rapidly (UNEP Report 2003).

The demand for Pacific marine aquarium products has been consistently high from the US and the Japanese markets and is likely to increase further in the future as new markets open up in Europe and Asia. With this increasing demand, there is also likely to be an increased pressure on the resources and a strong need for effective management measures to put in place which the majority of the Pacific countries currently do not have. The Secretariat of the Pacific Community under its Regional Live Reef Trade Initiative is providing technical assistance to the Pacific countries in developing such management plans. The present plan is being developed under such assistance.

### 2.3 Fishing Patterns

There are four current operators that are fully locally owned. One company is foreign owned as joint venture. The collection of marine aquarium products in the MA Industry is characterised by a team of local divers usually led by an expatriate diver (usually Filipino),

who has a lot of experience in the collection and handling methods. The expatriate diver provides hands on training to the local divers (*personal communication with companies*), and is also often involved in collecting during his term with the employer company in Tonga. With the noticeable very efficient expatriate Filipino divers/collectors compared to local divers, companies are showing a preference to employ these expatriate Filipinos.

To date the harvesting has been done only around Tongatapu although some have initially experimented from the Ha'apai group of islands. The harvesting method employed by the collectors/divers, uses small barrier nets, pokers to lure fish and small hand scoop nets to collect the fish. In Tonga, there has been no evidence in the use of such chemicals which is prohibited under §17(1) of the FMA 2002. Although fish can be caught by snorkelling, collectors preferentially use SCUBA. The marine aquarium products collected are transferred into a land based facilities for storage before it is to be exported. Most products are packed for export usually one day before air freighted. All fish products are being air freight from Tonga on passenger airliners.

Employment opportunities may vary from time to time. This depends on an individual company needs. Any one company may employ from 20-30 people including divers, packers and office workers. Usually the most number of workers are hired during the packing day or for the packing hours.

The aquarium infrastructures in Tonga are well developed and companies are forced to form their operation from a land-based infrastructure. Tonga lacks a traditional Marine customary tenure system of which other pacific countries have enjoyed in centuries. Tonga will soon adopt a similar community based management system and concept.

The extraction of live rocks had increased rapidly in the mid 90s and well into 2007 given the number of companies operated at the time. Initially live fish were the most preferred aquarium fish. Almost all the companies have utilised their live rock quota before the end of their licence period.

#### **2.4 Aquarium Survey 1996 and 2005**

There have been two scientific surveys conducted by SPC. The initial survey was conducted in 1995 to 1996. The second survey was conducted in 2005. The final report of this survey is yet to be finalised.

Due to availability of scientists and funding further surveys is not possible. As such, given the result of the both survey, the following assumptions can be made;

- A precautionary approach should be established to manage this fishery
- There are continuous drastic climate change
- Adjacent communities needs to be involve in the decision making process.
- That the live hard coral should continue for the time being but a decreased of the current quota is to be established as a precautionary measure.
- The harvest of live hard corals shall be conducted only from the selected area (ANNEX 3). Other areas may be further identified and assessed by both the industry and FD for aquarium use.
- The harvesting of live rocks of any kind or form should be prohibited
- It is clear that aquarium live fish fishing remains sustainable. As shown by table 1 they are mostly herbivores and most species spawn at all times while others depend on the time of the day.

## 2.5 History of the Fishery

The MA trade started in 1988, pioneered by a company called the Exotic Tropic of Tonga. This company had very limited capacity and therefore did not do very well. Another company, Walt Smith International commenced operation about the same time and was more successful, focussing mainly on harvesting and exporting live hard corals. It was the only MA operation in Tonga until 1992. In 1993, three other operators/exporters joined the trade, these include; Intra-Pacific Marine Products, Sea of Colours and the Dateline Aquarium Fish Co. Live hard coral was again the main targeted product being exported and there was a concern on the effects of removing live corals from the coastal reef areas.

In 1993, SPREP presented a report to the Prime Minister's Office. It provided quota on fish and dead rocks (aquarium rocks/ live rocks). Cabinet (CD573, April 1994) were issued to ban the harvesting of live corals, subject to a comprehensive scientific resource assessment to determine the current status and health of the corals around Tongatapu. By 1996, the ban resulted in the closure of two operators. This created an opening for new companies to enter the trade and indeed two new companies, Mele D. Vaha'i and Topac Marine joined the trade. Both companies lacked experience and the technical know-how of the trade and therefore only lasted less than 12 months.

SPC responded to a request for assistance from the Tongan Government in 1995 provided a team of scientists (as prescribed elsewhere in thi plan). They were assisted by some local researchers from the Tongan Fisheries Division. They conducted an assessment of the corals and the organisms for this fishery around Tongatapu reefs. **The study concluded that 'the resources were not seriously depleted'**. It recommended that harvesting should resume. But harvest quotas on live (hard) corals, dead rock and aquarium fish should be adopted.

In 1997, Cabinet, supported by recommendations provided from the 1996 study, revoked the ban on the harvest and export of live hard coral. Furthermore, it permitted only 5 licenses at any time. During this time only two companies were still in full operation, namely Walt Smith International (Tonga) and the Dateline Aquarium Fish Co. Ltd. By 2000, two new companies, Vanisi International and Coral Kingdom Co. Ltd entered the trade. Coral Kingdom Co. Ltd, did not operate for long before being closed. South Pacific Paradise Export entered and unlike the other companies, their initial operations were focussed on harvesting and exporting marine aquarium fish only. A company known as Vanisi International's operation never really took off and in 2003, it was taken over by another company called Jay Hawk Inc., and they initially targeted live rock but later moved to aquarium fish and now harvesting and exporting all aquarium species and organisms. But fish is a major export. In 2005, Island Marine Tropical as a successful applicant took the fifth available license. The companies currently owning the five licenses are:

- Walt Smith International Co Ltd.
- Dateline Aquarium Fish Export Co Ltd.
- South Pacific Paradise Export Co Ltd.
- Jay Hawk Inc. Ltd. and
- Island Tropical Co Ltd.

The use of scuba in other fisheries activities has caused deaths and unnecessary injuries in

the past. As a result the Tongan Government imposed a blanket restriction on the use of hookah and SCUBA gear for all fishing activities. This decision was clearly a problem for the development of the aquarium trade at the time. It prohibits and limits collection of fish in all but the shallowest reef areas. However, in the same provision exists an exemption clause that the Secretary for Fisheries may grant. Operators however must get authorisation from the Secretary for Fisheries to use scuba under strict conditions.

Live rock (aquarium rock, dead rock, live rock)<sup>3</sup> has been an important revenue earner for the industry over the years. There have been several applications from the industry (MAEA) to permit transfer of quotas and serious consideration of compliance issues involved in such requirement were considered unwise to allow such transferral.

In 2008, the Fisheries Division is continuing to assess its focus for this fishery. It further took the stance under its authority to prohibit the collection and fishing for live rocks in any area in Tongatapu. Consultations have been as appropriate as it can be with continuing dialogue between the Fisheries Division and the MAEA. The Fisheries Division is ensuring that it protects the nursery grounds for many fish species and the biodiversity of our ecosystem for social equity. Moreover, greater focuses are now aimed at ensuring fishing communities are provided with adequate management authority. This means that the open access systems approached of the past has been unproductive and are unable to be managed.

## **2.6 Target Species and their State of Exploitation**

The fishery targets and exports marine aquarium fish, invertebrates, live corals and live rock. Historical data collected by the Fisheries Division shows that marine aquarium fish was initially the most targeted aquarium product followed by live hard coral. However, in the early 1990's, a shift of interest from fish to invertebrates and an increase fishing for live corals in the later part of the 1990s. Soft coral has always been an essential component of the trade and is being fished more than live hard corals. In the late 1990s and early 2000s live rock became an important aquarium product for export in terms of value. It became an increase activity. Two companies shifted their interest and focussed their operation on it. In 2005 as compared to the other aquarium products, live rock was the only product that had some companies exceeded their harvest quota. MAEA began to request for a quota increase and to allow quota transfer. In essence this should have triggered the cancellation or suspension of one or two licences. There needs to be better records of fishing activities is required by the Fisheries Division and from operators.

The concerns for this fishery are commonly based on;

- Use of destructive collection methods
- Poor handling and husbandry practices
- Unnecessary animal mortality
- Collection of unwanted and/or unsuitable species
- Potential for stock depletion
- Ecosystem effect of live coral and live rock exports
- Lack of reliable data fishing on the resources
- Limited government capacity for reef management and enforcement
- Potential for government trade restrictions

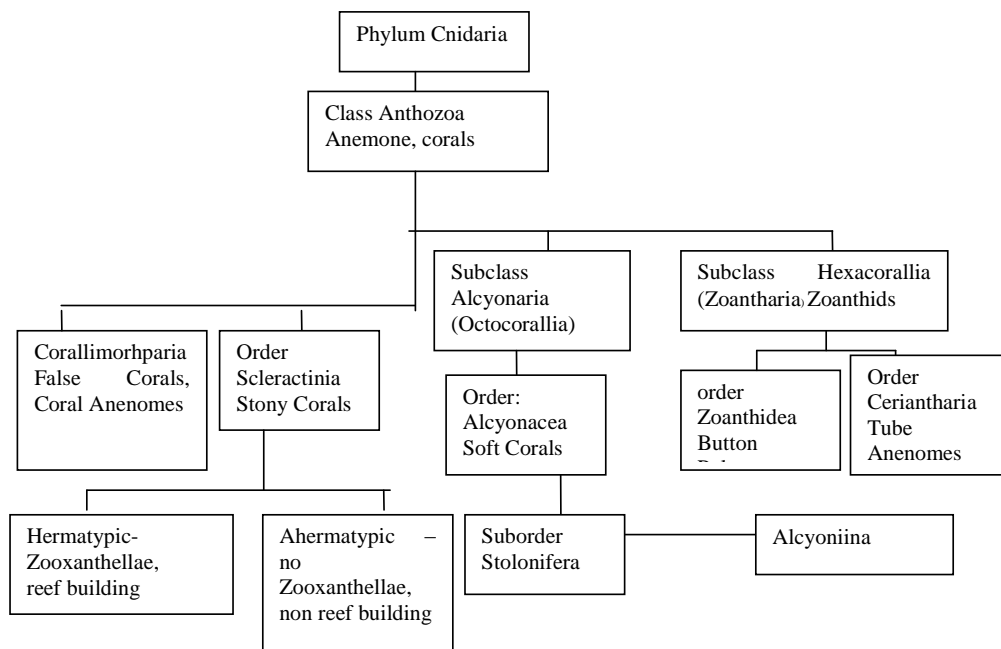
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<sup>3</sup> Can either be branch (can be rubbles), slab or solid rocks.

There has been little vigorous ongoing monitoring of the activity that would detailed out fishing for aquarium products by species. This makes it difficult to identify which fish group or fish species has been the most targeted during fishing trips each year. And this is true also for invertebrates as well. The current log book for this fishery identifies the current fishing of live hard corals from its specified areas. Appendix 4 provides a new log book for fish, invertebrates and soft corals.

Corals are marine animals from the Phylum Cnidaria (detail is provided in the schematic diagram in Figure 1). They exist as small sea-anemone-like polyps, typically in colonies of many identical individuals. There are a number of classifications of marine organisms within the Phylum Cnidaria, which include primitive animals generally known as jellyfish, sea anemones and corals. The largest of the Cnidarian classes is the Class Anthozoa, which contains over 6,000 species of coral and ‘coral-like’ species.

In scientific language, coral is generally the common name for members of the Order Scleractinia, which all possess hard limestone or carbonate skeletons – the ‘stony’ or ‘hard’ corals (Tonga uses the name hard corals). Other Anthozoan groups include soft corals (Order Alcyonacea), false corals and coral anemones (Order Coralliomorpha) and the button polyps (Order Zoanthidea). It is these groups, alongside the stony corals, that are commonly found in the aquarium trade. Figure 1 represents the taxonomic relationships within this group. There is a current quota for hard corals of 300 pieces per company per week. There is also further recommendation for a decrease in quota in the hard coral fished and shall be fished from the area as specified in Annex 3..



**Figure 1: Taxonomic relationships of corals and associated orders**

The species which have been approved to be fished are provided in table 1 below. There shall be a maximum of 20cm by length;

**Table 1: Species of live hard corals exported from Tonga**

Acropora	Stylophora	Millepora	Hydnophora	Catalaphyllia
Pocillopora	Seriatopora	Tubipora		Pectinia
Turbinaria	Fungia	Favia	Pachyseris	Plerogyra
Tubastrea	Goniopora	Platygyra	Pavona	Merulina
Lobophyllia	Echinophyllia Sp.	Euphyllia	Acanthastrea	Micromussa
Caulastrea	Montastrea Sp.	Montipora	Porites	
Favites	Oxypora	Galaxea	Scolymia	

The live rocks are assemblages of living marine organisms attached to a hard substrate (including dead coral or rock usually calcareous in nature). Although less in value per kilogramme to live coral, it has become the most important aquarium export product in terms of volume and dollar contribution to some companies. The harvest quota currently stands at 100 tons per company per year.

The current quota of aquarium fish is 100,000 fish per company per year. Important biological live fish are prescribed in ANNEX 5. Table 2 lists species of aquarium fish which are harvested and exported from Tonga.

**Table 2: Fish species exported from Tonga:**

<b>FAMILY</b>	<b>COMMON NAME</b>
<i>Chaetodontidae</i>	butterflyfish
<i>Pomacentridae</i>	anemonefish and damselfish
<i>Acanthuridae</i>	surgeonfish, tangs and Moorish idols
<i>Labridae</i>	wrasse
<i>Pomacanthidae</i>	angelfish
<i>Balistidae</i>	triggerfish
<i>Gobiidae</i>	gobies
<i>Blenniidae</i>	blennies
<i>Serranidae</i>	basslets and small groupers)
<i>Tetraodontidae</i>	pufferfish
<i>Cirrhitidae</i>	hawkfish
<i>Apogonidae</i>	cardinalfish
<i>Aluteridae</i>	leatherjackets
<i>Ostraciontidae</i>	boxfish

According to the operators there is usually a high demand for aquarium products from October to April and low demand from May to September. All aquarium products are exclusively being air freighted and there is continue reasons to compete for air cargo spaces with other export commodities such as sashimi tuna and deep bottom snappers has been a limiting factor for the industry. Table 3 provides some known species of invertebrates which are harvested and exported from Tonga. There is currently no quota set for these animals.

**Table 3: List of known invertebrate fished and exported from Tonga**

<b>Common name</b>	<b>Scientific Name</b>	<b>Common name</b>	<b>Scientific Name</b>
Anemone Crab	<i>Neopetrolisthes sp.</i>	Black longspine Urchin	<i>Diadema sp.</i>
Anemone crab pair	<i>Neopetrolisthes sp. pair</i>	Blue Star	<i>Linckia laevigata</i>
Anemone shrimp	<i>Periclemenes sp.</i>	Box crab	<i>Calappa sp.</i>
Banded Moray Eels	<i>Gymnothorax sp.</i>	Cherry slug	<i>Pleurobranchus sp.</i>
Black Knobby slug	<i>Opistobranchus sp.</i>	Cleaner shrimp	<i>Lysmata sp.</i>
		Coloured slug	<i>Phyllidia sp.</i>



### 3. ADVERSE ENVIRONMENTAL EFFECTS

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#### 3.1 Possible Adverse Effects

In any fisheries, there is potential to result in two related types of adverse environmental effects:

- degradation of marine habitat, and
- Over-exploitation of stocks of fish and other aquatic organisms.

Both of these effects reduce the productivity of marine resources which can result in adverse impacts to biodiversity and ecosystem function. Consequently, it follows that there are reductions in the values and services provided by the marine resources. At extreme levels of these effects, irreversible losses in productivity, biodiversity, ecosystem function, and associated values could occur. In particular, the concept of sustainable development must be respected.

Some of the faster growing live hard branching corals (*Acropora sp.*), usually sought after in the MA fishery are known to be quite resilient to controlled levels of exploitation. Other species such as *Porites* are very slow growing and therefore are likely to be overexploited easily. The targeted fish species are the same. Some species such as *Pomacentrids* are fast growing but others like *Pomacanthids* are slower growing.

The exploitation level in the MA is mainly driven by the demand from the market and the market value of the target species. Aquarium products are often more commonly sold by the piece rather by weight. The value, by weight of aquarium products, is much higher compared to other reef food fish products. For example, you will get a flame-angel (*Centropyge loriculus*) which are normally on average about 7-8 cms and which will be about 80g weight selling at US\$5 – US\$10 a piece thus giving a per kg price of US\$63 – US\$125. Prices between species can even differ more greatly from as low as US\$2 to an high of US\$15,000 per piece. Rarity of species increases value and therefore economically, exporters tend to aim for high valued rare species to increase their profit returns (given that freight costs is standard retrospective of the value of the product). The incentive to collect these rare fish species is therefore high and which consequently can increase fishing effort. Rare species often relates to limited productivity for that species, and therefore the potential for overexploitation of these fish species is relatively great.

The rate at which fish can be removed from a stock on a sustainable basis depends in part on habitat quality and the life stages at which the fish are removed, so it is influenced by the degree of habitat degradation (see above) and size preferences. With regard to the latter, given the fact that most home aquariums are on average about 0.3 cubic meters in holding capacity, which is not that big, then the preference will be for small size fish and other aquarium animals.

#### 3.2 Managing Adverse Effects

This section looks into how the fishery can manage adverse effects.

##### 3.2.1 Habitat Degradation

Habitat degradation caused by the MA can be largely avoided by ensuring that collectors use the barrier net, the poker to lure fish and the scoop net to catch the fish. The catching

method should be made as an official condition and requirement for the collectors. Collectors can be given provided with training at their costs with a certificate awarded if the training is successfully completed. Part of the training should include a good awareness training package that explains in simple term the life of corals highlighting their vulnerability.

Clear guidelines should also be drawn up and provided to collectors and boat operators on the implications of anchor damage. The use and setting up of mooring buoys in designated collecting and fishing areas should be considered.

The use of cyanide and chemicals is already prohibited by law. It should however be emphasised again as part of the license requirements. There have already exists policies which have been directed to companies to under take their fishing accordingly.

**(i) Stock Depletion**

In order to avoid excessive stock depletion, fishing effort must be controlled so as to limit the rate at which fish in a given stock are removed.

This plan will control fishing effort and catch through a limit on the number of licences that may be issued to operators and collectors. And the future prohibit of fishing of some species. Company/Operators should be given annual export quotas by species or by aquarium product. The company quota will be a portion of a national quota that is shared by all licensed operations.

It is not possible to predict whether these controls will successfully avoid excessive stock depletion, either in localised areas or in the country as a whole. This plan provides for additional controls to be implemented if found to be needed, such as through special licence conditions. The status of affected resources and the need for additional controls will be monitored through various information systems.

The highly selective nature of these fisheries increases their impact on populations of targeted species. They may also, directly through the use of destructive fishing practices or indirectly through the removal of key species (e.g. cleaner fish/shrimp), impact other species and ecological processes in the habitats where fishing for the aquarium trade occurs

**(ii) Economic Efficiency**

The Marine Aquarium Fishery has over the years produced foreign revenue to Tonga. And for most part of its years in operation it is the second highest revenue earner in terms of FOB value. It is well documented in the Annual Reports of the Ministry of Fisheries of past years.

Fundamentally the economics must be in balance with the environment and the ecosystem in managing stock depletion and habitat degradation. It is understood that live rocks are a source of over 40% of aquarium revenue for each company. However, the economic benefits should not be a means to degrade the marine ecosystem. The economic contribution of the fishery through the Fisheries Division is well published in Annual Reports of the Fisheries Division. The international market benefits greatly from these resources as the MAEA continues to face strong competition from other pacific countries but moreover the Asian markets. Discrepancies of market and local fees are of concerns to

the Fisheries Division. It is imperative for Tonga to be able to establish sustainable development it must foster precautionary approach wherever possible and wherever needed. The Fisheries Division is currently revising all economic contributions from its fees structure.

## **4. MANAGEMENT OBJECTIVES**

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### **4.1 National Fisheries Policy**

The overriding management objective for fisheries in Tonga shall be:

*To provide for the conservation, management and sustainable utilisation and development of fisheries resources and other matters incidental thereto.*

### **4.2 Fishery Goal**

The management goal for the MA Fishery is to ensure the long-term conservation and sustainable utilisation of the marine aquarium fishery resources and to maximise the benefits through economic efficiency and social equity.

This can be achieved by working to achieve the set out objectives prescribed here.

### **4.3 Fishery Objectives**

Specific management objectives for the MA Fishery are as follows. These objectives are designed to be measurable, although very broad, and tied to indicators that can be monitored for the purpose of assessing management success

Objective 1: To avoid any significant degradation of marine habitat and any significant disruption of marine ecosystem structure or processes.

Objective 2: To ensure that Tonga benefits economically and socially.

Objective 3: To ensure that in the absence of best scientific evidence the use of precautionary approach to fisheries management is fully utilised.

## 5. MANAGEMENT FRAMEWORK

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### 5.1 Authorities and Institutions

The Fisheries Division has the mandate to manage all living marine resources. Coastal communities may have the power to manage special management areas. Through the authority of the Minister who has the power to designate any local community to be a coastal community. This is for the purposes of community based fisheries management. Also relevant to management of the MA Fishery are several international agreements and other instruments.

#### 5.1.1 International Agreements

The Kingdom of Tonga is party to relevant international conventions and regional requirements, including the;

- 1982 United Nations Convention on the Law of the Sea and the
- 1992 Convention on Biological Diversity.
- 2004 A Pacific Plan for Strengthening Regional Cooperation and Integration (Pacific Plan)

A convention to which Tonga is not a party to but that may nevertheless be relevant to the MA Fishery is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Parties to CITES agree not to allow any trade of certain listed species (Appendix I of the CITES), and to allow only approved and documented trade of a second tier of less critically threatened species (Appendix II of the CITES). Exports of the latter class of species from Tonga to party nations, such as the USA, England or France, would require documentation from a competent authority, currently designated as the Fisheries Division for most marine aquarium species. Coral reef resources that are listed under Appendix II include the hard corals, the giant clams (Tridacnidae), the seahorses (*Hippocampus* spp.) and the yellow crowned butterflyfish (*Chaetodon flavocoronatus*) which are in demand for ornamental as well as medicinal purposes.

There are a number of other international instruments, which, although not legally binding, establish widely accepted principles for resource management and conservation. They include:

- Chapter 17 of the Agenda 21 Programme of Action for Sustainable Development;
- the FAO Code of Conduct for Responsible Fishing;
- the Jakarta Mandate on Marine and Coastal Biological Diversity 1995; and the
- Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security 1995.
- 2007 Vava'u Declaration on Pacific Fisheries Resources

#### 5.1.2 Fisheries Division

The main legal instrument for managing fisheries in Tonga is the Fisheries Management Act 2002 and the Fisheries (Conservation and Management) Regulation 1994. Draft Regulation contains specific provisions aimed at controlling this fishery. The draft is in its natural progression to be approved in government. This management plan establishes the kind of licences involved in the MA Fishery, puts a limit on the number of licences that may be issued, and establishes a process for allocating the available licences. The

Licensing Guidelines, therefore, are central to the management of the fishery, and associated with this plan is a set of guidelines that are specific to the MA Fishery

The Aquaculture Management Act 2003 provides the legal framework for controlling the management of aquaculture or any related activities of culturing and rearing of marine organisms in Tonga. . Activities which require aquarium fish to be cultured or reared will require a different licence under the Aquaculture Act 2003 and its regulation and management and development plan.

## **5.2 Processes for the Plan**

### **5.2.1 Consultation**

It is a requirement under §7(3) of the Fisheries Management Act 2002 that the contents of fishery management plans be based on consultations with interested parties ‘*as appropriately*’. The management measures in this plan are based on such consultations. Much of the consultation needed in the actual implementation of the plan has been done through the built-in linkages between the requirements for fishing licences, export licenses and other administration needs.

Consultation can help ensure transparency in the management system and serve to reduce the abuse of discretionary power to:

- 1) allocate licences among competing applicants,
- 2) refuse a licence application, and
- 3) attach special conditions to fishing vessel licences.

Consultation with stakeholders is important in providing the support from the industry for implementing the management plan. This Plan therefore recognises the need to involve stakeholders in the whole process of developing the management plan right to its implementation and its future reviews. The MA Industry in Tonga already has formed an association of MA operators, known as MAEA (Marine Aquarium Exporters Association) this give a good central point for communicating and for consultations with stakeholders.

### **5.2.2 Agency Co-operation**

The Fisheries Management Act 2002 is the most important national law with respect to the MA Fishery. For the most part, the procedures associated with each Act (e.g., for the issuance of various approvals) are dictated by the provisions of the laws themselves and will not require further development or refinement. In some cases, however, it will be beneficial to develop particular policies and procedures to provide for effective co-ordination among the various agencies responsible for implementing these acts, both to ensure compliance and to streamline the process as much as possible for the public. There is a need to coordinate efforts between various agency of government in enforcement and compliance issues.

### **5.2.3 Administration and Enforcement**

The requirements for fishing vessel licences are the core elements of the Fisheries Management Act 2002. The Fisheries Division has a well established system for administering a system for fishing vessel licences, as fish export permits. It therefore

already has in place the necessary administrative framework, personnel, and procedures, and the licensing and permitting provisions prescribed in this plan will not require any substantial modifications to the existing system.

The enforcement powers of the Fisheries Division with respect to fisheries are established in the Fisheries Management Act (Part X - XV) and other relevant laws. The enforcement tasks prescribed in this plan will be undertaken by the Fisheries Division, and other relevant agencies as part of their routine duties. The Minister may designate any category of Government officers or any person whom the Minister considers suitable to be authorized officers for the purpose of this act. The licence for this domestic fishing is vested in the authority of the Secretary for Fisheries. The Secretary for Fisheries prepares the plan and the approval of such a plan is in the powers of the Minister.

### 5.3 Controls

#### Management strategies and measures;

The plan establishes management strategies in each of the following four areas: controls, administration, enforcement and information. **These strategies provided in sections 5.3, 5.4, 5.5 and 6 are recommendations and to be implemented by the Fisheries Division and the industry wherever possible and as appropriate**

Some of the controls prescribed in the plan are already established by the Fisheries Management Act 2002 or its regulations. Others will be given effect through the making of regulations, pursuant to §101 of the Fisheries Management Act or other applicable law. Some aspects of the controls will be given effect through the preparation and endorsement of the Licensing Guidelines specific to the MA Fishery, pursuant to §33 of the FMA 2002.

**As a major control for this fishery, consideration being a member to OIE and CITES would be a benefit to Tonga.**

Indicated for each control described in this section is its legal source, such as the Fisheries Management Act 2002, the Fisheries Regulations 1994 (and the draft regulations which shall be effective as soon as it is endorsed and approved), Terms and Conditions of licences (ANNEX 1).

The current licence fee is \$300 per company per year. This licence fee has remained constant since the mid 1990s. Other fees associated with this fishery includes 0.5% resource rent taken from the total FOB export and a further tax of 15% CT is charged. New fees structure is given in the ANNEX 1.

#### 5.3.1 Authorisation to Engage in Fishing;

The Fisheries Division will, in order for its implementation will use, where appropriate, these recommendations and may use parts or parts thereof as in the form of regulation or in the terms and conditions of the licence holder including details Annex 1;

- (1) That companies shall submit the following;

- Divers to be certified by a valid competent diving agency registered<sup>4</sup> in Tonga. They shall be required to be registered with the Fisheries Division.
- Notify the Fisheries Division of the names of divers being dismissed and the reasons to that effect.
- The necessary names of certified divers employed before the beginning of every quarter and further requesting authorisation to use scuba for aquarium purposes only. If favourable the Secretary for Fisheries shall issue;
  1. A confirmation letter of authorisation/permit.
  2. A company is therefore authorised to use scuba under provided strict conditions.

(2) Vessels used for this fishery shall be required to be licence as a local fishing vessel no matter the size, length or tonnage Vessel License. All aquarium companies shall be required to obtain a *Licence to fish*<sup>5</sup> for aquarium fish and an *Export Licence* ( Annex 1).

(3) All MA -related Licences will be valid only for the duration of time as indicated in its licence certificate.

(4) MA Licences will be subject to special conditions that may be prescribed by the Head of Fisheries on a case by case basis.

(5) MA Licences, like all fishing licences, will be subject to the possibility of termination, cancellation, or suspension.

(6) Fishing quotas shall not be transferable amongst companies at any time.

(7) Export permit shall not be issued to a company/companies until it has been fished and is ready for export.

### 5.3.2 Restrictions on the Number of Licence

(1) The maximum number of MA operations in Tongatapu shall remain as the current number. That is only five.

(2) There shall be no aquarium activities in Vava'u, Ha'apai and 'Eua

(3) The limited number of MA Licences will be allocated through a competitive process in which applicants first submit for the upcoming licence year, applications with operational plans to the Head of Fisheries. Existing companies may not be required to

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<sup>4</sup> The minimal requirement shall be the use of the current registered diving company in Tonga.

<sup>5</sup> Means the holder is authorized to fish and hold fish as prescribed in the licence condition.

provide operational plan except if the operator is planning of further developing its existing operation. An operational plan must include but not limited to:

- (a) a description of the proposed operation (address, employment, market address/confirmation)
- (b) numbers and sizes of vessels to be involved
- (c) aquarium animals/plants to be target
- (d) details of the facilities and equipment
- (e) a description of the area of operation
- (f) estimates of the amounts of fish, by species, to be procured, and estimated harvest rates of all species, including those not actually procured,
- (g) an assessment of the likely impacts of the operation on fishery and marine resources

(3) Based on the information provided in the operational plans, the Head of Fisheries will rank the applications according to specified criteria that are linked to the objectives of this plan and reserve the licences for the successful applicants, called “Qualified Applicants.” Once a licence has been reserved, the Qualified Applicants will have 30 days to submit the necessary documentation of any other required approvals or agreements, such as agreements with coastal communities for operations in community based managed fishing areas. The Head of Fisheries may then issue or refuse the licence.

(4) In determining whether or not to issue a MA Licence, the Head of Fisheries may seek and consider the advice and recommendations of its Technical Division Heads and may, if required, to consult stakeholders, experts, and other relevant parties including the Fisheries Management Committee.

### **5.3.3 Restrictions on Who May Engage in Fishing for Aquarium Purposes**

- (1) Persons not registered<sup>6</sup> by the Fisheries Division, shall not search for fish, catch, take, or harvest MA products from the wild, or attempt to do so for any means.
- (2) Persons or entity not licence by the Fisheries Division for the purpose of aquarium fish exports shall not or attempts to export MA products.

### **5.3.4 Restrictions and Prohibition on Amounts of Fish, Live Corals and Live Rock**

The following quotas are recommended to continue such as;

- 100,000 pieces of Fish per licensing period per licensed company
- Unlimited invertebrates
- Unlimited soft corals.

And furthermore the following shall be implemented through necessary legislative framework;

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<sup>6</sup> A Marine Aquarium Fisheries Registry book shall be maintained by the Compliance Division of the Fisheries Division.



- **That fishing and export of live rocks (aquarium rocks) also known as dead rocks or dead corals from anywhere in Tongatapu are to be prohibited (this will be effective as and when the legislations are in place).**
- **That the current quota of live hard coral is to be decreased from 300 pieces to 150 pieces harvested/removed/fished/export per week per company. And to be effective as when the proper legislations is approved.**
- **The Fisheries Division shall consider separately issues of culturing and rearing of live hard corals and live rocks or any culturing of other fish under the Aquaculture Act 2003. It shall be managed under the Aquaculture management and development plan as a separate fishery. Requirements for licence shall be under the provisions of the Aquaculture Act 2003.**

No exportation of any species shall be permitted until it is verified by the Fisheries Division. Any new species identified shall be made known to the Fisheries Division promptly and appropriately.

**The Fisheries Division shall review the current reporting on Invertebrates. Companies are to identify each invertebrate, soft coral and live fish by species in an approved log form. This is aimed at understanding target species during fishing activities. (refer ANNEX 4)**

#### **5.3.5 Authorisation to Hold Fish**

The following measures for holding of aquarium fish;

- (1) No separate processing establishment facility licence is required for this fishery
- (2) That a one licence which includes the '*licence to fish*' is to include terms and condition for holding of fish
- (3) That all aquarium fish shall be returned to the wild if it is not exported by the end of the licensing period.
- (4) No selling of any fisheries aquarium products is at this time permitted between licence companies.

#### **5.3.6 Area Restrictions**

- (1) Fishing/harvesting/removing of any aquarium fish product shall be restricted to designated areas as may be allocated by the Head of Fisheries
- (2) All Marine Parks and Reserves must be respected by this fishery of which this management plan controls. The Marine Reserves are located on the northern side of Tongatapu. No fishing or any collection is permitted from these specified areas (ANNEX 2). They are:

- Hakaumama'o Reef.
- Reef's surrounding Malinoa Island.
- Reefs surrounding Mounuafe.
- Pangaimotu.
- Ha'atafu Reefs. (western area)

(3) In addition to the Marine Reserves specified in (2) above, fishing/collection/harvesting or removal is also prohibited from the areas such as all fringing reefs of Tongatapu<sup>7</sup>, Fafa, Atata, Eueiki and Eua. The Island Groups of Vava'u and Ha'apai are also prohibited.

(4) Operators shall seek permission on Special Management Areas from communities if they are to use such areas. Benefits shall be for the communities.

(5) The fishing for Live Hard Coral shall be conducted only in the areas provided in Annex 3.

### **5.3.7 Gear and Method Restrictions**

(1) No person shall use any explosive, poison, or other noxious substance for the purpose of killing, or catching fish, or have in his possession explosives or poisons with the intent of using them for any purposes.

(2) The use of hooker equipment is strictly prohibited. Should any company permits the use of hooker and has cause hospitalisation or loss of life the plan recommends that the responsible license company shall immediately loose its license without due notice.

(2) No use of axe of any size or of any length, crow bars of any size or of any length, any metal rod of any size or length, working tools such as garden spade are permitted.

### **5.3.8 Inspection and Observation Requirements** **That the;**

(1) Operator shall notify the Fisheries Division at least one day prior to the start of any trip involving fishing so that the Division may place a fisheries observer on board the vessel for the purpose of monitoring compliance with applicable laws and gathering information useful for fishery management.

(2) Vessel operators must allow boarding, inspection, and searching by authorised officers as authorised under the Fisheries Management Act 2002.

### **5.3.9 Reporting Requirements**

As part of the essential components of the plan it requires that;

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<sup>7</sup> Only to inhabitat islets.

(1) Holders of any of the MA Licences must maintain a MA Fishing Log in the approved form prescribed, and to submit a copy of the log to the Head of Fisheries no later than 14 days after the each fishing trip.

(2) Concurring to the recommendation in (1), individual holders of MA collecting licences should maintain information about their fishing trip and catch in the form prescribed and provided by the Head of Fisheries (ANNEX 4)

- (a) Name of collector
- (b) Date of fishing trip
- (c) Location of collecting areas
- (d) Time spent at each collecting areas
- (e) Species and numbers collected by collecting area
- (f) Species and numbers by collecting area that died during handling (which should be labelled appropriately, preserved and handed in to the Head of Fisheries with the logs)
- (g) Name of facility owner/local buyer for whom the fish would be sold.

#### **5.3.10 Training Requirements**

(1) Training is recommended to be conducted as a partnership between the Fisheries Division and licence companies.

(2) Fishers will have to go through training on collection practices from time to time as may be agreed upon by the Fisheries Division and the companies.

#### **5.4 Administration and Enforcement**

The Section focuses on the Administration of licence and enforcement of legislations.

##### **5.4.1 Licensing and Permitting**

(1) The licence conditions shall be established by the Fisheries Division from time to time as may be required or amended. Consultations may be required for condition of licences.

(2) The licence period is to commence on the date as prescribed in the licence and shall end on the specified date.

(3) Renewal of licences shall be submitted 30 days before the expiry date shown on the licence.

(4) Licences shall be revoked if the expiry date is reached and no formal application has been forwarded to appropriate section.

(5) No pre warning of these dates shall be further announced by the Fisheries Division. Companies are hereforth advice to know their expiry dates.

(6) All licence, fees requirements shall be at the discretion of the Fisheries Division. The Administration of the licences shall also be the sole responsibility of the Fisheries Division and no further need to be prescribed in this management plan

(7) All necessary information shall be met before a licence, permit, authorisation is granted.

#### **5.4.2 Enforcement**

(1) The rules prescribed in this plan, once given effect through regulations, will be enforced by authorised officers of the Fisheries Division. Such enforcement will be conducted in co-operation with local community authorities to the extent possible.

(2) The Fisheries Division will, if determined to be appropriate, prepare an enforcement sub-plan (Compliance plan) for the purpose of guiding enforcement activities for the MA Fishery, including the activities prescribed in this section. The sub-plan would be for operational purposes only and would not necessarily require endorsement by the Minister as part of this management plan.

(3) The Fisheries Division shall perform inspections of all loadings-for-export of MA exports live fish.

(7) The Fisheries Division shall also perform spot checks of MA operations, including at-sea patrolling to observe fishing and transport operations, observations of fishing holding and rearing facilities, and surveillance at points of export.

(8) The Fisheries Division, in collaboration with local community authorities, will conduct outreach activities aimed at achieving a high level of awareness of MA-related rules among fishery participants. Such awareness may also allow the communities under Special management Area to consider allowing this fishery in their waters.

#### **5.5 Information**

(1) The Fisheries Division will, as needed to effectively implement the information strategies prescribed in this section, seek and work with partners such as other national and local government agencies, non-governmental organisations, academic and research institutions, industry, and communities.

##### **5.5.1 Research and Awareness Raising**

(1) The Fisheries Division will identify indicators that can be monitored over time for the purpose of periodically assessing the degree of achievement with each of the objectives of this plan and with the overall goal.

(2) The Fisheries Division will seek assistance from regional and international donors for assistance in research and surveys. It will also require assistance from all operators of this fishery.

(3) For the purpose of improving compliance with rules, minimising disputes, and making clear the licence application process, the Fisheries Division will produce and disseminate a brochure that summarises the rules that apply to fishery participants, including rules associated with national, local and customary authorities.

(4) The Fisheries Division will seek to raise the public's awareness of the MA Fishery, particularly in the communities most likely to be affected. In particular, the Fisheries Division will:

- (a) distribute awareness-raising materials regarding both the regional trade in live reef food fish, including videos, posters, and brochures, and the local fishery, including the brochures that summarise the rules that apply to fishery participants and Materials that highlight the important aspects of the fishery, including monitoring and research results and the main findings in the biannual reports of the fishery; and
- (b) on an as-needed basis, organise community-level meetings for the purpose of providing information about the fishery and its local implications, including the opportunities and threats associated with the fishery, the rights and management roles of affected communities, and constraints to effective management of the fishery.

## **6. PLAN REVIEW**

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The plan shall be reviewed according to the following sections.

### **6.1 The MA Fisheries Management Committee**

(1) Within the powers of the Minister and as required under this management plan, a MA Fisheries Management Committee would be established as the body to co-ordinate the implementation and review of this plan and to oversee the effective management created under this plan.

(2) The Head of Fisheries would be the main government link and appointed Chairman of the MA Fisheries Management Committee.

(3) The MA Fisheries Management Committee would provide the required co-management link between the government, the community and the industry players in the Marine Aquarium Industry.

(4) The members of the MA Fisheries Management Committee should consist of as a minimum:

- (a) The Head of Fisheries from the Fisheries Division
- (b) The Fisheries Legal Advisor
- (c) A representative from the following government offices
  - 1. Ministry of Environment
  - 2. Customs
- (d) representatives from the Hahake, Hihifo District Officers
- (e) representatives from TEFA
- (f) 3 representatives from MA operators
- (g) representatives from TNFA (when it is adopted)

and, including others that may be co-opt as determined necessary by the Head of Fisheries . The Committee may meet atleast twice in a calendar year.

The review shall be to adopt an ecosystem approach to fisheries management and shall always, upon reviewing this plan, consider the use of the precautionary approach wherever and whenever necessary.

## **6.2 Modifications**

The Head of Fisheries will keep this plan under review under the MA Fishery Management Committee and whenever needed, propose modifications to the strategies as needed to achieve the goal and objectives of the plan. The Head of Fisheries will also from time to time consider modifications to the management goal and objectives, the management framework, and other elements of the plan. In reviewing the plan, the Head of Fisheries will consider:

- (a) the directions for future management
- (b) the management capacities of the local government authorities and communities;
- (c) emerging capture, culture, handling, and transport technologies and practices;
- (d) monitoring and research findings,
- (e) Consider the issues of precautionary approach in concept of sustainable development to be achieved.

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UNEP 2003

# ANNEX 1. TERMS AND CONDITIONS OF LICENCES

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## TERMS AND CONDITIONS FOR LICENCES TO FISH FOR AQUARIUM FISH

### PART I - GENERAL

1. Must notify the Secretary within 14 days of any change to the address of the Licence Holder.
2. Must ensure that only employees **OF LICENCE HOLDER** fish for marine aquarium fish under this licence.
3. Must provide the Secretary, in writing, with a list of all employees operating under this licence. All employees shall wear identification card.
4. Must not use any vessel to conduct any activity under this licence without a local fishing vessel licence.

### PART II – RESTRICTED FISHING

5. Must not fish in any Marine Reserve and all fringing reefs surround Tongatapu, 'Eueiki, 'Atata, Fafa and 'Eua Island.
6. Must not receive any marine aquarium fish from any person unless that person is an employee of the licence holder.
7. Must not use diving equipment that utilizes surface supplied air (hookah equipment) or self contained under water breathing apparatus (SCUBA) equipment or any diving equipment that utilizes compressed gas to fish for hard and soft corals.
8. Must not fish more than 150 pieces of live hard coral per week.
9. Must not fish live hard coral of the genera specified in Table 1 that is over the maximum size of 20 centimetres in length.

**Table 1**

1	<b>Genera</b> Acropora	14	<b>Genera</b> Stylophora
2	Pocillopora	15	Seriatopora

3	Turbinaria	16	Fungia
4	Tubastrea	17	Goniopora
5	Lobophyllia Caulastrea	18	Echinophyllia Montastrea Sp.
6	Favites	19	Oxypora
7	Pachyseris	20	Catalaphyllia
8	Pavona	21	Pectinia
9	Acanthastrea	22	Plerogyra
10	Porites	23	Merulina
11	Scolymia	24	Micromussa
12	Hydnophora	25	
13			

10. Must not fish more than 100,000 aquarium fish for the 12 month period of this licence.
11. Must not use destructive fishing techniques for harvesting marine aquarium fish or use or have in possession any destructive fishing gear (such as hammers, crowbars and poisons) at the point of harvesting or on any vessel used under this licence.
12. Must ensure that all employees operating under this licence are sufficiently trained in and operate using best practice for harvesting to minimize mortalities post harvest and to minimize damage to non-harvested reef life.

**GENERAL TERMS AND CONDITIONS  
FOR  
LICENCE TO EXPORT AQUARIUM FISH**

**PART I - GENERAL**

A Licence to export Aquarium Fish shall be subject to the following conditions (in addition to any other conditions required under the Fisheries Management Act 2002):

13. Must notify the Secretary within 14 days of any change to the address of the Licence Holder.



**PART II – EXPORT**

- 14. Must not export more than 150 pieces of live hard coral, harvested from wild, per week.
- 15. Must not export live hard coral of the genera specified in Table 1 that is over the maximum size of 20 centimetres in length.

**Table 1**

1	<b>Genera</b> Acropora	14	<b>Genera</b> Stylophora
2	Pocillopora	15	Seriatopora
3	Turbinaria	16	Fungia
4	Tubastrea	17	Goniopora
5	Lobophyllia	18	Echinophyllia
6	Caulastrea	19	Montastrea Sp.
7	Favites	20	Oxypora
8	Pachyseris	21	Catalaphyllia
9	Pavona	22	Pectinia
10	Acanthastrea	23	Plerogyra
11	Porites	24	Merulina
12	Scolymia	25	Micromussa
13	Hydnophora		

- 16. Must not export more than 100,000 aquarium fish for the 12 month period of this licence.
- 17. Must ensure that all employees operating under this licence are sufficiently trained in and operate using best practice for handling and packing to minimize mortalities during transportation.

**Fees for a Marine Aquarium Fishery:**

- Application for an aquarium fish export licence: \$50
- Application to renew an aquarium fish export licence: \$10

- An Aquarium fish export licence: \$1000
- Application for a licence to fish for Aquarium Fish: \$100
- An Aquarium licence to fish for aquarium fish and to hold fish:\$2000

## ANNEX 2: THE COORDINATION FOR THE AREA OF THE MARINE RESERVES

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Reef Reserves	Map Coordination
Hakaumama'o	Lat.20° 59' 30.6"S – Long. 175° 12' 57.3" W
	Lat.20° 59' 30.0" S– Long. 175° 12' 04.4" W
	Lat.21° 00' 13.2"S – Long. 175° 12' 03.8" W
	Lat.21° 59' 13.7"S – Long. 175° 12' 56.8" W
Pangaimotu	Lat.21°07' 09.8"S-Long. 175° 09' 54.1"W
	Lat.21°06' 56.7"S-Long. 175° 09' 64.2"W
	Lat.21°06' 56.4"S-Long. 175° 09' 29.1"W
	Lat.21°07' 09.5"S-Long. 175° 09' 29.1"W
Mounuafe	Lat.21°06' 44.7"S-Long. 175° 08' 37.0"W
	Lat.21°06' 12.7"S- Long. 175° 08' 37.4"W
	Lat.21°06' 12.5"S -Long. 175° 08' 20.0"W
	Lat.21°06' 44.5"S -Long. 175° 08' 19.0"W
Ha'atafu Beach	Lat. 21° 04' 11.6"S- Long.175° 20' 00.3"W
	Lat. 21° 04' 05.9"S- Long.175° 20' 09.6"W
	Lat. 21° 04' 00.1"S- Long.175° 20' 04.3"W
	Lat. 21° 04' 05.2"S- Long.175° 09' 56.1"W
Malinoa Island	Lat.21° 24' 24"S-Long. 175o 07' 59.1"W
	Lat.21° 01' 48.7"S-Long. 175o07' 59.6"W
	Lat.21o 01' 48.2"S-Long. 175o 07' 21.3"W
	Lat.21o 23.6"S-Long.175o 07' 20.8"W.

## ANNEX 3: LIVE HARD CORAL FISHING AREAS;

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Site Number (area)	Name of Site
1	Ualanga Lalo, Ualanga 'Uta, Mounu.
2	'Onevai. 'Onevao. Velitoa.
3	Reefs from Motutapu islet to Tau islet

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## ANNEX 4: MARINE AQUARIUM FISH, INVERTEBRATES AND SOFT CORAL FISHING LOG SHEET;

Name of Company:											
Date	Fishing Effort					Aquarium animals					
						Fish		Invertebrate		Soft coral	
	hours	no. of diver	Site of fishing *	scuba **	no. tanks	family	no.	family	no.	family	no.

Indicate number of species died after collection;

\* specify the area of fishing (e.g N/W Velitua); \*\* if do not use scuba indicate 'NIL' ;

## ANNEX5: BIOLOGY INFORMATION OF AQUARIUM LIVE FISH.

Common names	Scientific family names	Feeding	Reproductive	Habitat
Angel Fish	Pomacanthidae	Herbivore/omnivore	Spawn at dusk, pelagic eggs	Shallow to deep reef; rubble/coral
Butterfly fish	Chaetodontidae	Omnivore/herbivore	School forming, pelagic eggs	Shallow to deep reef; coral and ledges
Damsels	Pomcentridae	Herbivore/omnivore	Spawn in morning, demersal eggs	Shallow reef, coral/rubble and inside sea anemone
Tangs	Acanthuridae	Herbivore	School forming, spawn at dusk in large groups and pelagic eggs	All habitats
wrasses	Labridae	omnivore	School forming, spawn at all time of the day, pelagic eggs	All habitats depending on the species
Hawkfish	cirrihtidae	Carnivore	Spawn at dusk, pelagic/demersal eggs	Shallow reef in association with coral

Source: Bell, Fa'anunu and Koloa 1995 Ministry of Fisheries

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