UNEP-WCMC **technical report**

Review of corals from Fiji, Haiti, Solomon Islands and Tonga

(Coral species subject to EU decisions where identification to genus level is acceptable for trade purposes)

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UNEP WCMC

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Review of corals from Fiji, Haiti, Solomon Islands and Tonga (coral species subject to EU decisions where identification to genus level is acceptable for trade purposes)

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4 Introduction and summary

This document provides a review of the status and management of coral harvest and trade from Fiji, Haiti, Solomon Islands and Tonga, with particular focus on genera that were selected for more in-depth review at SRG69. Those genera include species for which there are current EU decisions in place at the species level for these range States, yet identification to genus level is acceptable under CITES Notification No. 2013/035 for the purpose of implementing Resolutions Conf. 11.17 (Rev. CoP16) on *National reports* and Conf. 12.3 (Rev. CoP16) on *Permits and certificates*. These decisions may therefore provide implementation challenges, and the present document provides a basis for the SRG to reassess them.

At its 69th meeting, the SRG considered an overview of corals for which there are valid decisions that had been formed at species level, but for which CITES Notification No. 2013/035[1] specifies that trade can be reported at genus level (although species should be identified where feasible).

Based on this overview, the SRG selected a number of genera for more in-depth review in order to form an opinion at genus level where possible: *Acropora, Lobophyllia and Pocillopora* (Fiji, Solomon Islands and Tonga), *Stylophora (*Fiji and Solomon Islands*), Fungia* and *Pectinia* (Fiji), *Seriatopora* (Solomon Islands), *Agaricia* (Haiti), and *Montipora, Favites, Platygyra, Acanthastrea*, and *Oxypora* (Tonga).

The genera selected included cases which there was (virtually) no trade at species level, while there was trade at genus level. Recognizing the recommendation in Res. Conf. 11.10 (Rev. CoP15) that Parties should "adopt the principles and practice of an ecosystem approach", genus level opinions may warrant being applied across the relevant genera.

[1] The Nomenclature Specialist of the Animals Committee (AC), Ms Ute Grimm, and the AC Representative of Asia, Mr Soemorumekso, are in the process of updating the list of corals referred to in CITES Notification No. 2013/035.

Overview of status and management of corals in Fiji

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Fiji is a biodiversity hotspot for corals within the South West Pacific, and is the second largest exporter of corals globally. This section provides background information on the status and trends of corals within the country, the threats affecting corals, and management actions taken to ensure sustainability of the trade.

Status and trends

The Fiji Island Archipelago includes 320 islands and over 500 islets and cays and over 1000 reefs (Quinn and Kojis, 2008) within a coral reef area of over 10 000 km² (Morris and Mackay, 2008). The two largest islands are Viti Levu and Vanua Levu, with the largest continuous reef of 100 km occuring along the Coral Coast of the southern shore of Viti Levu (Spalding *et al.*, 2001). Fiji's reefs are diverse, including fringing, barrier, platform, oceanic, ribbon and drowned reefs (Sykes and Morris, 2009) and contain high coral biodiversity of over 350 species (Lovell and McLardy, 2008). Fiji was reported to account for approximately 10% of corals in international trade over the period 2000-2010 (Wood *et al.*, 2012), and is the largest coral exporter in the Pacific region (Cumming *et al.*, 2002).

Coral reefs in the South West Pacific were generally considered to be in good condition (Wilkinson, 2004). The status of coral reefs in Fiji is relatively well documented; monitoring has taken place since 2000 through the Global Coral Reef Monitoring Network (GCRMN), coordinated by the University of the South Pacific (Sykes and Morris, 2009). A volunteer network including the Fiji Locally Managed Marine Area Network (FLMMA) was reported to undertake annual point intercept and belt transects at 13 core locations and other sites opportunistically (Sykes and Morris, 2009). Monitoring between 1997 and 2007 showed considerable variability in coral cover, reflecting the diversity of reefs between areas; whilst signs of decline in coral cover between 1999 and 2001 were apparent at all sites surveyed, this was reported to be followed by rapid recovery to 2007 (Sykes and Morris, 2009). Live coral cover was reported to have increased at Rotuma Island (465 km north of the main Fiji Islands) between 2004 and 2006 (Mckay, 2007). Cumming *et al.* (2002) reported that reefs in Fiji were in relatively good condition.

Fiji's reefs were reported to have an average live coral cover of 45% (range 8-60%) and be able to cope reasonably well with natural and human stressors (Morris and Mackay, 2008). Sykes and Lovell (2009) reported that Fiji's reefs were remarkably resilient to sudden catastrophic events. The general status of Fiji's coral reefs was considered be stable, with reefs recovering following disturbance events, and with little evidence of widespread and prolonged stress, damage or loss of coral cover (Chin *et al.*, 2011). The Great Astrolabe Reef, south of Viti Levu was considered to remain relatively pristine and minimally impacted (Shah, 2008). However, whilst reefs were found to show strong resilience, some coastal fringing reefs were reported to exhibit signs of degradation (Chin *et al.*, 2011). Beqa Barrier Reef was shown to have a particularly slow recovery rate (Lovell *et al.*, 2004).

Threats

Key threats to coral reefs near urban centres were identified as pollution, eutrophication and coastal development (Cumming *et al.*, 2002; Chin *et al.*, 2011). Ninety percent of Fiji's population were reported to live on Viti Levu and Vanua Levu (Cumming *et al.*, 2002) and the Coral Coast of Viti

Levu was reported to be an area of major tourist activity (Shah, 2008). At all reef sites of Viti Levu, overfishing and sediment damage were assessed as a high threat (Sykes and Morris, 2009).

Two thirds of Fiji's reefs were assessed as being threatened by local activities, with 34% of reefs at medium threat, 21% at high threat and 10% at very high threat; reefs sites around Viti Levu, especially around Suva city were considered most at risk (Sykes and Morris, 2009; Chin *et al.*, 2011). Vuki *et al.* (2000) reported that the most acutely disturbed areas were Suva Harbour and Laucala Bay (pollution, euthophication, loss of habitat due to reclamation, overfishing and outbreak of Crown of thorns seastars (*Acanthaster planci*) (COTS); Lautoka Harbour and Nadi Bay were noted to be similarly disturbed.

Most of the reefs in Fiji were reported to be moderately heavily fished (Vuki *et al.*, 2000). Although destructive fishing methods, such as the use of poisons and dynamite were reported to be prohibited by law (Lovell, 2001), these practices were considered a possible threat to coral reefs (Nair *et al.*, 2003). Dynamiting was reported common in western Viti Levu (Vuki *et al.*, 2000) and this practise had reportedly caused serious damage in some parts of Fiji (Vuki, *et al.*, 2000; Cumming *et al.*, 2002). However, in a later report, Sykes and Morris (2009) stated that that such practises were rarely used.

Coral harvesting for the curio trade (dead coral skeletons) and for the live aquarium trade was also reported a threat (Cumming *et al.*, 2002). The selling of ornamental corals was reported to continue at local handicrafts stalls in Fiji despite a ban on this trade (Cumming *et al.*, 2002). Lal and Cerelala (2005) reported growing international concern relating to the environmental affects of coral harvest. The collection of reef resources for the aquarium trade was thought to be of potential concern (Chin *et al.*, 2011). Teh *et al.* (2007, 2008) stated that international trade in Fiji's coral reef resources was likely exacerbating overexploitation of already stressed reef ecosystems.

Fiji's reefs are also affected by natural degredation, including cyclones, coral bleaching and predator outbreaks (Cumming *et al.*, 2002). Mass bleaching was experienced in 2000 in all regions except from the far north, with 64% of all colonies surveyed bleached and around 10-40% coral mortality (Cumming *et al.*, 2000). Climate change induced bleaching was noted as the main threat to the Great Astrolabe Reef and North Astrolabe Reef (Obura and Mangubhai, 2003). However, mass bleaching events had not affected the entire country's reef system and some areas and habitats were reported to have elements which minimize bleaching effects allowing repopulation of affacted areas (Lovell and Sykes, 2008). It was reported that Fijian reefs had strong resilience and recovery potential after coral bleaching (Lovell and Sykes, 2008; Sykes and Morris, 2009). Predation by COTS and *Drupella* snails were reported (Chin *et al.*, 2011); COTS were reported to have significantly degraded reefs off Suva (Vuki *et al.*, 2000). Prasad (2010) reported that permanent monitoring sites had been established in Makogai for coral bleaching and disease monitoring.

Burke *et al.* (2011) considered integrated local threats to Fijian coral reefs to be low for 34% of reefs; with medium threat levels facing 34% of reefs, a high level of threat for 21% of reefs and very high threat level for 10% of reefs. In socio-economic terms, Fiji was identified as one of nine countries that globally are most vulnerable to the effects of coral reef degradation, due to high threat exposure, high reef dependence to low adaptive capacity with high priority needed to reduce reef threats (Burke *et al.*, 2011).

Protection and management

Regulatory background

Relevant legislative measures in Fiji include the Endangered and Protected Species Act (2003), in addition to the Fisheries Act (1992) and the Environmental Management Act (2005) which are administered by the Departments of Fisheries and Environment, respectively (Sykes and Morris,

2009). The Fisheries Act does not specifically refer to coral collection, and a lack of empowerment of the Fisheries Division within the Fisheries Act to regulate the industry through punitive powers was previously identified as a problem (Lovell, 2001). Updating of the Act was called for by Lovell and Whippy-Morris (2008). Management of the aquarium trade was reportedly achieved through the setting of policy and guidelines within the broader Fisheries Act (Lovell and Whippy-Morris, 2008). The aquarium trade must also comply with the Endangered and Protected Species Act (2002) (Lovell and Whippy-Morris, 2008) which lays down the requirements of permits for CITES listed species.

The coastal governance system in Fiji is a Dual Tenure System, with responsibilities for the management of aquarium products residing with both the Fisheries Division and the customary marine tenure of the *i qoliqoli* (Lovell, 2001). This system acknowledges that villagers have exclusive fishing rights to specified inshore areas that have traditionally belonged to them, although it was unclear whether the Fisheries Division had a legal right to prevent collection in the *i qoliqoli* (Lovell, 2001).

Most coral reef management in Fiji was reported to be at the community level (Chin *et al.*, 2011). Customary law determines access to collection areas, as well as benefit sharing and enforcement The requirement to revise the legislative basis to govern trade in corals and other marine products for the aquarium trade was highlighted by Manoa (2008).

Protected areas

Reef management in Fiji is largely driven by traditional communities establishing their own marine protected areas (Cumming *et al.*, 2002; Burke *et al.*, 2011; Chin *et al.*, 2011). There were reportedly 205 Locally Managed Marine Areas (FLLMAs) with varying degrees of protection, and although full government gazetting had reportedly been slow, they were recognized at provincial council level (Sykes and Morris, 2009). FLLMA protection was reported to range from 'no-take' to collection for a limited duration or specific species only (Sykes and Morris, 2009). Whilst FLLMAs were not considered supported through legislation (Chin *et al.*, 1999), 171 were reported to have management plans (Govan, 2009).

Around a third of Fiji's reef area was reported to be included within marine protected areas (MPAs), however management was reportedly effective for 0.3% of reefs; partially effective for 21%, not effective for 0.2% and of unknown effectiveness for 11% (Chin *et al.*, 2011). A commitment to include 30% of the marine environment within a comprehensive and ecologically representative network of MPAs by 2020 was made in 2008 (Sykes and Morris, 2009; Govan, 2009), and it was considered that a large part of this commitment would be met through government support of FLMMAs (Sykes and Morris, 2009). Altogether, Fiji's LMMAs have 10 800 km² under management and almost 600 km² protected as no-take zones (Govan, 2009).

Coral reef management actions

The aquarium fishery in Fiji is co-managed by the Departments of Fisheries and Environment with the CITES Scientific Council (Scientific Authority) and Management Authority situated within the Department of Environment (Lovell and Whippy-Morris, 2008). Lovell (2001) reported that management actions in Fiji were a partnership between central Government and traditional custodians of the reef areas; although the legal status of the relationship was unclear. However, coral harvesting guidelines had been set by the Fisheries Division and control of the fishery was

based on adherance to these guidelines (Lovell, 2001). According to Lovell (2001), they included measures for all types of coral extraction, such as:

- required written approval by the legal authority (*i qoliqoli)* endorsed by the provincial administration and sent to the Fisheries Division;
- a map of demarcated reef is allocated to licensed divers for coral harvest;
- concentration of collection in areas of good growth, preferably on barrier reefs not shoreline reefs;
- actual (continuation of) coral harvesting will be dependent on the favourable outcome of a survey report. Periodic monitoring will determine whether harvest is sustainable;
- the Fisheries Division should be notified of new collection areas prior to harvesting so that surveys can be carried out to assess the total allowable harvest;
- Fisheries Division will consult with collectors in management measures and give notice of over-exploitation, if it occurs;
- Export Permits from the Fisheries Division will be issued upon presentation of a list of corals and following inspection of the consignment.

Under the management arrangements, a restriction of the number of companies permitted to harvest live corals was in place; this was limited to two (Lovell and Whippy-Morris, 2008). Fiji was reported to have limited one aquarium company to each collection area to promote effective conservation (Lovell and Whippy-Morris, 2008). Additional measures included collecting only approved species and quantities outlined in the national quotas, not damaging other corals or invertebrates, minimising mortality through best practise collection techniques and propagating corals through mariculture (Lovell and Whippy-Morris, 2008).

Using the Marine Aquarium Council (MAC) criteria, efforts to develop 'Collection Area Management Plans' for certification by MAC had been underway (Lovell, 2003b). Whilst the two live coral exporters were previously MAC certified, it was reported that the Marine Aquarium Council no longer exists (Lovell, pers. comm. to UNEP-WCMC, 2014).

Progress in implementing management plans for the marine aquarium fishery in Fiji were previously reported to have been very slow (Hand *et al.*, 2005). Vuki *et al* (2000) reported that the Fiji Fish Division was not able to effectively monitor coral harvesting activities because of limited resources, and noted concerns relating to coral harvest on reefs. Similar concerns about the ability of the government to monitor the harvesting and trade of coral due to low capacity and inadequate financial resources were noted by Lovell (2001). More recently, Chin *et al*. (2011) indicated that further information would be needed to assess the effectiveness of management efforts in Fiji.

Coral harvest

The main coral collection sites in Fiji were reported to be located off the coasts of Viti Levu: offshore from Lautoka in the north, with collection mainly between the islands of Naviti and Waya and the fringing reefs of Vatukarasa and Namada villages adjacent to Sovi and Tamanua Bay, and Namoli for the Walt Smith International (WSI) company (Lovell, 2003b). In addition, the collection area for the Aquarium Fish Fiji (AFF) company is offshore from Deuba in the Beqa lagoon in the south (Lovell, 2001; Nand, 2008). Collection areas were reported to have been divided into zones for active collection and areas for which rights have been obtained but

collection is not active; the area including the east and west Motunikeasulua Reefs was reported to be subject to highest collection levels (Lovell, 2003b).

The proportion of harvest of coral species from collection areas was believed to range from 0-3%, depending on the species characteristics, abundance and size of the site (Parry-Jones, 2004). Total coral numbers for the WSI and AFF collection sites were estimated as 586 million and 41 million respectively, with the number of eligible corals for collection (due to size and appearance) estimated as 31 million and 8 million for WSI and AFF respectively (Lovell and McLardy, 2008). In 2006, the removal rate of over 48 000 coral pieces at the Aquarium Fish Fiji site was estimated at 0.12% of all corals within the collection area (or 1.2 corals in 1000) (Lovell and McLardy, 2008). Similarly for the Walt Smith International collection site, the removal rate for export was estimated at about 0.01% in 2006 (Lovell and McLardy, 2008).

Nand (2008) reported that there had been no research undertaken on natural coral stocks since the establishment of the aquarium trade in 1984 and non-detriment findings for coral harvest were required. Coral export quotas are set by the CITES Scientific Council working with the Fisheries Department (Manoa, 2008). Quotas were initially introduced in 2004 to provide limits on harvesting and trade, but they were reported to have been derived arbitrarily (Manoa, 2008). While a scheme for quota setting based on abandance of taxa had been developed for Fiji based on size of the collecting area, state of luxuriance, colony form, growth rate, reproductive mode, relative community abundance and vulnerability (Parry-Jones, 2004), quotas had not been rationalized with regard to resource assessment (Lovell and Whippy-Morris, 2008). In 2007, a 25% reduction of export quotas for live coral was recommended by the Scientific Council (Nand, 2008; Lovell and McLardy, 2008).

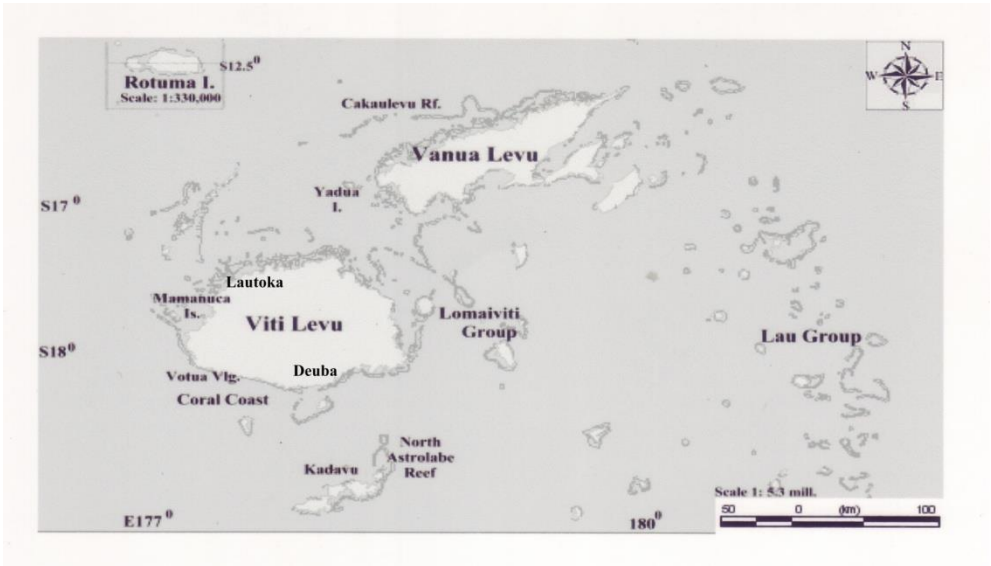


Figure 1. Map of the Fiji Islands (source: Institute of Applied Science, University of the South Pacific, Fiji). From Lovell and McLardy (2008).

Preliminary results for coral stock assessments in relation to non-detriment findings were reported by Nand (2008) through work undertaken by the Fiji Department of Fisheries and the Institue of Marine Resources of the University of the South Pacific. Coral surveys were based in the two main collection sites and covered Beqa, Yanuca, Pacific Habour and Serua reefs in the southern part of Fiji (Aquarium Fish Fiji) and Lautoka to the Yasawa group of islands in the western part of Fiji (Walt Smith International) (Nand, 2008), and the methodology was reported to be approved by the Fijian CITES Authorities (Lovell and Whippy-Morris, 2008).

AFF sites showed little variability and species were similar, although WSI sites were reported to cover different reef types and coral species composition (Nand, 2008). Coral belt transects were used to obtain coral abundance estimates and these were extrapolated across similar sites (Nand, 2008). On the basis that greater coral abundance was found at collection sites than non-collection sites for 60% and 80% of AFF and WSI sites respectively, Nand (2008) concluded that the impact of the aquarium industry appeared to be non-detrimental to coral stocks in Fiji. However, the author recommended further study of other collection sites, long-term monitoring and improvement of the survey methods would be required to confirm preliminary results (Nand, 2008).

Quotas were reviewed in 2009 by the Fiji Department of Fisheries and the University of the South Pacific's Institute of Marine Resources (IMR) by undertaking coral assessments at WSI and AFF sites using survey methods approved by the Fijian Scientific Authority (Kinch *et al.*, 2011). Densities based oncorals counted along belt transects (by genus or species category) were extrapolated to the wider collection area for the reef flat habitat and compared to percentage of corals collected by AFF in 2007 (Kinch *et al.*, 2011). A further 25% reduction in export quotas was imposed in 2009 (Kinch *et al.*, 2011).

Similarly, Lovell and Whippy-Morris (2008) reported that the percentage removal of coral colonies for the aquarium trade was 0.00085% of the total estimated colonies on the reef flat, or 0.0014% reduction in living coral of the reef flat. It was concluded coral extraction impact was minimal in terms of reduction of species, reduction in coral cover and impact on ecosystems (Lovell and Whippy-Morris, 2008). Elements of the fishery which were thought to "promote sustainability" were: the small size of corals exported (3-15 cm diameter) making the removal of coral cover small, large coral reef collection areas to minimize overall impact, high diversity of reefs within collection areas, large areas of uncollected coral reef area to ensure recruitment and customary fishing right areas (Lovell and Whippy-Morris, 2008). However, Dee *et al.* (2014) considered that whilst Fiji had implemented quotas for individual coral species, no stock assessments for marine ornamentals, including corals had been undertaken.

Mariculture

Cultivation of live coral was reported to have been successfully initiated in Fiji, with two farms located at Vunaqiliqili and Cakauvaka-I-Yata Reefs where cultivation of coral fragments had taken place (Lovell, 2003). Lal and Cerelala (2005) reported that coral mariculture in Fiji was not well developed, and though exports of six-month cultured corals had taken place, it was considered that price increases for cultured corals would need to be assured before mariculture became financially viable. Only WSI was reported to have exported cultured corals from Fiji (Lal and Cerelala, 2005).

Overview of status and management of corals in Haiti

This section provides background information on the status and trends of corals within the country, the threats affecting corals, and management actions taken to ensure sustainability of the trade.

Status and trends

Approximately 450 km² of coral reefs have been mapped in Haitian waters (Spalding *et al.*, 2001). It was noted that the status of Haitian reefs was poorly known, apart from limited surveys undertaken in the 1980s around Les Arcadins, small islands northwest of Port-au-Prince (Spalding *et al.*, 2001). Monitoring surveys at five sites in Haiti were initiated in 2003 using the Reef Check methodology (Wilkinson, 2004). Reefs were reported to appear to be "fairly healthy" with mean coral cover reported to be 21% and up to 52% in deeper water, and coral disease and bleaching were reported to be scarce (Wilkinson, 2004).

A second Reef Check survey carried out at the same localities in 2011 reported that reefs were overfished, resulting in a proliferation of algae and a reduction of coral cover (Reef Check, 2014). Wilkinson (2002) reported low coral cover on most shallow reefs in Haiti, in most cases thought to be due to on-shore pressures. Only 27 coral species have been recorded from Haiti (UNEP, 2015), although given coral diversity elsewhere in the Caribbean, it is likely that the actual species richness is higher. Haiti is not a major exporter of corals, accounting for approximately 0.6% of the international trade over the period 2000-2010 (Wood *et al.*, 2012).

Threats

Reefs in the northern Caribbean were reported to have suffered significant declines since the 1970s from mass mortality due to the grazing sea urchin *Diadema*, new coral diseases, overfishing and other anthropogenic stresses, such as nutrient and sediment pollution and habitat destruction (Wilkinson, 2008). Wilkinson and Souter (2008) reported extensive bleaching on coral reefs throughout much of the Caribbean in 2005 and impacts of the hurricanes during the same year. Haitian coral reefs were reported to have experienced probably the greatest human pressures of any Caribbean island with serious land degradation resulting in major sediment and nutrient pollution in addition to overfishing (Wilkinson, 2008). Haiti was reported to be one of the top ten countries with the largest reef associated human populations (Burke *et al.*, 2011). All reefs of Haiti were rated as threatened (Burke *et al.*, 2011) and illegal coral harvest was reported to occur (Wilkinson, 2008; Jean Wiener, Fondation pour la Protection de la Biodiversité Marine, pers. comm. to UNEP-WCMC, 2014). Harvest of corals for use as construction material, ballast and lime was reported from a survey of marine resources of the southern peninsula (Wiener, 2009). In socio-economic terms, Haiti was identified as one of nine countries that are globally most vulnerable to the effects of coral reef degradation due to high threat exposure, high reef dependence and low adaptive capacity; the reduction of reef threats was considered a high priority (Burke *et al.*, 2011).

Protection and management

Regulatory background

Article 100 of the Fisheries Laws 1978 prohibits harvest any type of coral, sea fans, or any type of calcareous rock from the ocean (Victor, 1995; Jean Wiener, pers. comm. to UNEP-WCMC, 2014).

However, it was previously reported that environmental laws were not enforced due to lack of resources for environmental protection (Wilkinson, 2004).

Protected areas

Two marine protected areas have been recently designated in Haiti: the Three Bays Protected Area which covers 90 000 ha (IUCN, 2014b) and the Protected Area of Natural Resources Management of Port Salwut/Aquin in southwestern Haiti, which encompasses 150 000 ha of marine and terrestrial sites (IUCN, 2014c).

Coral reef management actions

There was reported to be no government involvement in coral reef conservation or monitoring (Wilkinson, 2008). Jean Wiener, pers. comm. to UNEP-WCMC (2014) indicated that coral collection in Haiti occurred from many sites (>20); the size of these were unknown and locations were not specified.

Overview of status and management of corals in the Solomon Islands

The Solomon Islands have exceptionally high coral diversity and is an important exporter of corals globally. This section provides background information on the status and trends of corals within the country, the threats affecting corals, and management actions taken to ensure sustainability of the trade.

Status and trends

The Solomon Islands form an arc of islands (Figure 1) delimiting the northeast boundary of the Coral Sea (Sulu *et al.*, 2000) with a maximum coral reef area estimated at 6743 km² (Chin *et al.*, 2011). The largest coral reefs were reported to mainly occur where large lagoons are protected by raised or semi-submerged barrier reefs or raised limestone islands (Sulu *et al.*, 2000). A total of 496 species of hard coral records were reported from the Solomon Islands (Chin *et al.*, 2011), which was considered to be the second highest diversity globally after the Raja Ampat islands of Indonesia (Green *et al.*, 2006). The Solomon Islands were reported to account for approximately 4.2% of corals in international trade over the period 2000-2010 (Wood *et al.*, 2012)

The Solomon Islands Marine Assessment, noted to be the first in-depth survey of Solomon Islands' corals, was undertaken in 2004 and concluded that the country's marine habitats/reefs were in good condition (Green *et al.*, 2006). Localized degradation of reefs was assessed as low to moderate (Green *et al.*, 2006).

Chin *et al.* (2011) considered survey data to be limited, but reported that the country showed high coral cover. In 2008, the average coral cover in reefs of the Solomon Islands was reported to be 30% (Morris and Mackay, 2008); in 2004, levels of coral cover of 29-47% were reported from the six main islands, with cover decreasing from east to west (Green *et al.*, 2006).

The general status of Solomon Islands' coral reefs was considered to be stable (with confidence in the assessment noted to be low), although more monitoring was considered necessary to ensure an adequate assessment (Chin *et al.*, 2011). Chin *et al.* (2011) also reported that insufficient information was available to assess the resilience of reefs.

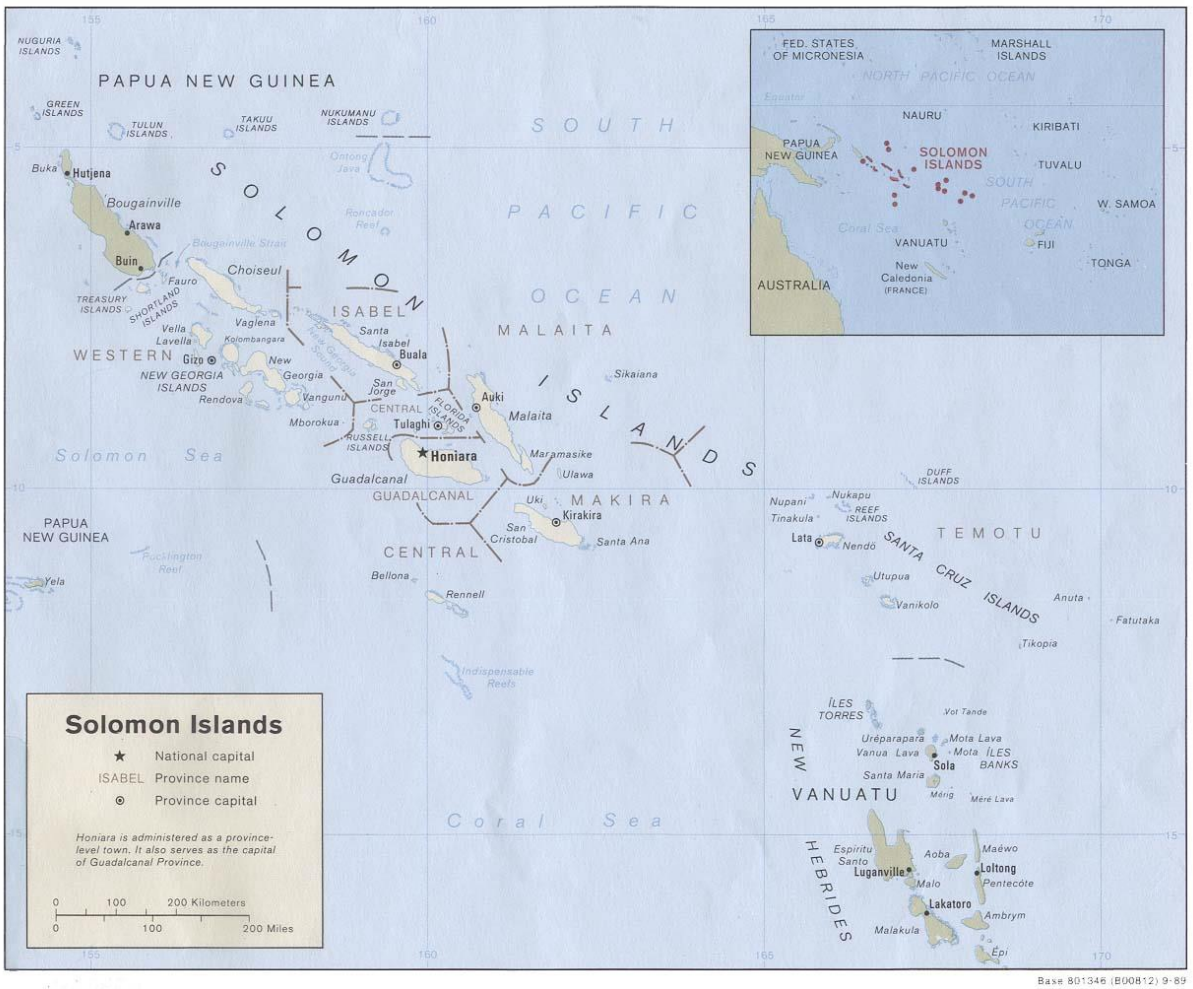


Figure 1: Solomon Islands, produced by the U. S. Central Intelligence Agency (1989), from the Perry-Castañeda library map collection www.lib.utexas.edu.

Threats

Based on surveys in 2004, the main threat to reefs in Solomon Islands was identified by Green *et al.* (2006) as predation by COTS, with above natural densities found at most sites in the country (Green *et al.*, 2006). However, general risks to reefs in the Solomon Islands were thought to be increasing due to rapid human population growth (Chin *et al.*, 2011; Green *et al.*, 2006). Masu and Vave-Karamui (2012) considered rapid population growth, development and climate change to be threats to coral reefs in the Solomon Islands.

The extraction of live corals for the international aquarium trade was reported to be of concern, and was judged to have a moderate impact on reefs (Caldwell *et al.*, 2009), with villagers reporting local depletion of reefs due to coral extraction in Nggela (Sulu *et al.*, 2000). Chin *et al.* (2011) noted increasing exploitation and Burke *et al.* (2011) considered 82% of the reef area to be threatened by local threats and thermal stress. In 2012, coral harvest was reported to have led to reef degradation locally, with higher value species found to have declined (Albert *et al.*, 2012b).

Mining for coral lime (mainly *Acropora* spp. for the production of betel nut lime (Albert *et al.*, 2012a) was considered to be of concern (Pacific Horizon Consultancy Group, 2008; Whippy-Morris, 2009; Veron and Turak, 2006). Logging was reported as an additional threat (Veron and Turak, 2006; Kere, 2008). Sediment discharge from widespread logging was reported to have caused major impacts on lagoons and coral reefs (Sulu *et al.*, 2000). However, Chin *et al.* (2011)

noted relatively low levels of pollution in the Solomon Islands. Despite a prohibition, dynamite fishing was found to be practised locally (Albert *et al.*, 2012b).

Both coral bleaching and white syndrome coral disease have been reported in Solomon Islands; showed genus-specific variations in susceptibility (Albert *et al.*, 2012c) and have been linked to increased water temperatures in several countries (Bruno *et al.*, 2007; Loya *et al.*, 2001, for example, and references therein). Widespread bleaching during 2000 was reported around Gizo, Marovo and Nggela in the Western and Central Provinces (Lovell and Sykes, 2004). A survey of reef condition in 2004 found evidence of coral bleaching following 2000-2001 bleaching events, though patchy and less extensive than in Fiji, as well as some minor ongoing bleaching damage (Green *et al.*, 2006). White syndrome was the most widespread disease observed during surveys of Roviana (Western Province), leading to high rates of mortality in infected colonies (Albert *et al.*, 2012c).

Leisz (2009) projected that by 2040, ocean acidification would exceed the threshold beyond which growth rates of reef organisms exceed bioerosion rates in the south of the country, whereas in the north of the country, acidification would remain at or slightly below the threshold. Albert *et al.* (2010) noted uncertainty in relation to critical thresholds, but considered that the evidence suggested that Solomon Islands reefs would be vulnerable to dissolution.

Burke *et al.* (2011) considered integrated local threats to Solomon Islands coral reefs to be low for 29% of reefs; with a medium threat levels facing 42% of reefs, high level of threat for 24% of reefs and very high threat level for 6% of reefs.

Protection and management

Regulatory background

The Wildlife Protection and Management Act 1998 (National Parliament of Solomon Islands, 1998) implements the requirements of CITES; however, it does not appear to restrict the trade and export of corals. The Fisheries (Amendment) Regulations 1993 provide for the declaration of areas in which the collection of coral (dead or alive, or coral sand) is prohibited, and prohibits the use of machines for coral gravel or sand extraction (Solomon Islands, 1993). Exemptions were reported to be allowed for taking live coral as part of traditional lime production for betel nut consumption, and for clearing passageways through reef areas, provided that the clearing was authorized by the government authorities (Solomon Islands, 1993). The Fisheries Act 1998 was reported to prohibit use of explosives or poison for fishing and the export of live corals without a licence (Solomon Islands, 1998).

Understanding of national fisheries regulations and resource management issues was reported to be poor locally and enforcement was reported to be relatively difficult due to the extensive coastlines (Wilkinson, 2008; Pacific Horizon Consultancy Group, 2008). Albert *et al.* (2012) flagged the need for policy that addresses impacts of coral harvesting.

Protected areas

The Solomon Islands Locally Managed Marine Area Network (SILMMA) was formed in 2003 to help communities with marine resource management and conservation activities (SILMMA, 2009). Although such community management efforts were considered to be promising, the overall effectiveness of management was unknown (Chin *et al.*, 2011). Tabu areas are closed marine areas, reported to have been traditionally practiced in the Solomon Islands for restocking purposes, or to mark the death of an important community member (Worldfish, 2013).

Burke *et al.* (2011) estimated that 6% of the Solomon Islands reefs were protected. According to Chin *et al.* (2011) there were 127 Marine Managed Areas (MMAs) in the Solomon Islands; 22 were recorded in the World Database on Protected Areas and 113 were Locally Managed Marine Areas

(LMMAs), with around 90 that were reported to be active. Within the LMMAs there were estimated to be 155 no-take areas, although these could be periodically opened for extraction (Chin *et al.*, 2011). Altogether, Solomon Islands MMAs have 1381 km² under management and over 300 km² protected as no-take zones (Govan, 2009).

Coral reef management actions

The Solomon Islands Coral Reef Monitoring Network monitors five reef locations in the country (Chin *et al.*, 2011), although these do not appear to include Nggela (the main area of harvest for the aquarium trade (Teitelbaum, 2007)). Albert *et al.* (2012b) identified a need for comprehensive baseline coral assessments at primary harvest sites focusing on coral species targeted for the trade as part of a proposed National Coral Management Plan, noting the lack of information on status of coral reefs in extraction areas.

Traditional management through tenure and ownership were reported from the Solomon Islands (Spalding *et al.*, 2001; Green *et al.*, 2006); this approach was considered very important for the management of coral reefs (Sulu *et al.*, 2000), allowing reef owners to declare short term protected areas or closed/open zones (Ramohia, 2001). Community managed marine conservation areas have been established in Marau Sound, Nggela, Marovo Lagoon, Tetepare, Roviana Lagoon and Gizo, and the incorporation of these areas within a larger, legalized marine protected area network was suggested by Green *et al.* (2006).

A five year National Plan of Action (NPOA) for the regional Coral Triangle Initiative was officially endorsed in 2010, focusing on community-based management to achieve sustainable use of marine resources and biodiversity conservation (MECM/MFMR, 2010). Prioritised national actions included: development of protected areas legislation and establishment and effective management of Marine Protected Areas, developing best practice and guidance for community fishery management, implementing surveys for priority species and collating information on threatened species in a national list (MECM/MFMR, 2010). Although community management efforts were considered to be promising, the overall efficacy of management was unknown and further studies of these systems were recommended (Chin *et al.*, 2011).

Coral harvest

The use of corals in the Solomon Islands for the curio trade was reported to have begun in 1984, and although trade was stopped by the government in 1994, it was restarted in 2003 (Teitelbaum, 2007). Harvest for curios was reported to involve *Acropora* spp., *Pocillopora* spp., *Turbinaria* spp., *Heliopora* spp. and *Seriatopora* spp. with corals harvested for the ornamental trade involving around 70 species (Teitelbaum, 2007). One operator, Aquarium Arts Solomon Islands, was reported to hold a licence to export live corals, and a further two operators had licences to export curios; over time, the curio coral trade was noted to have become more significant than the trade in live specimens (Trinidad *et al.*, 2012).

Live corals destined for the aquarium trade were reported to be mainly extracted from Nggela in the Florida Islands (Central Province), with smaller quantities from Munda (Western Province) (Ramohia, 2001) the Marau Sound and in and around the capital, Honiara (Sulu *et al.*, 2000; Kinch, 2004; Lal and Kinch, 2005; Teitelbaum, 2007). The impact of harvest was reported to be limited to localized areas (Albert *et al.*, 2012a). Coral fishers from Leitongo (Central Province) were reported to be increasingly concerned that the coral resource in their waters seemed to be suffering from over-collection for export (Teitelbaum, 2007).

Albert *et al.* (2012b) noted that very little information had been collected to assess the sustainability of coral harvest for trade.

Mariculture

Coral mariculture in the Solomon Islands began in the late 1990s, and was reported to have increased rapidly since 2004 (Teitelbaum, 2007). By 2012 coral mariculture for the aquarium trade was reported to be established in the country (Albert *et al.,* 2012b). Corals derived from mariculture were reported to fetch higher prices than wild caught corals; however not all coral species were considered to be suitable for mariculture (Teitelbaum, 2007).

In 2001, there were reported to be several small facilities for coral mariculture in the Solomon Islands capable of producing several thousand fragments per month for the export market (D. Palmer, pers. comm, in Delbeek, 2001). Fragments of branching corals, mainly *Acropora*, *Seriatopora*, *Stylophora* and *Montipora* were reported to be selected from the reef and raised on cages in sandy areas at depths of 2-6 m for approximately six months and then exported via Fiji (Delbeek, 2001).

The Coral Gardens Solomon Islands Initiative, funded by the European Commission, was reported to build capacity in coral mariculture and promote coral reef conservation and habitat enhancement (Kinch, 2004). The project was completed in 2006, by which time three sites were established in Marau (Guadalcanal Province), six in Nggela (Central Province) and three in Langalanga (Malaita Province) (Kinch, 2006). Mariculture was reported to account for less than 5% of the corals harvested in the Solomon Islands, and a reported failure of permit issuing authorities to distinguish between wild and maricultured specimens on export permits was thought to reduce incentives to culture corals (Albert *et al.*, 2012a). However, trade in maricultured corals appears to have increased in recent years for some genera.

Illegal trade

A shipment containing hundreds of corals illegally harvested in the Solomon Islands was reported to have been seized in July 2010 by the United States authorities (Long, 2013). The shipment included ten accurately declared species, and 12 species that were not declared; furthermore some quantities were understated (Long, 2013). Another commercial shipment from the Solomon Islands containing over 7500 pieces of coral that were not properly identified on the CITES permit were also seized in Florida during 2009-2010 (USFWS, 2011), and 107 corals from the Solomon Islands were seized in Florida in 2011-2012 (USFWS, 2013).

18 Overview of status and management of corals in Tonga

This section provides background information on the status and trends of corals within the country, the threats affecting corals, and management actions taken to ensure sustainability of the trade.

Status and trends

Tonga consists of 174 islands spread over four main island groups: Tongatapu; Ha'apai; Vava'u; and Niua. There are approximately 1500 km² of reef in a marine area of 700 000 km² (Spalding *et al.*, 2001) and 189 species of coral have been recorded from Tonga (Lovell and McLardy, 2008). Tonga's islands are either volcanic, including active volcanoes which prohibit reef development, or uplifted coral islands and reefs which emerge from two submarine ridges that run north-northeast from Tongatapu (Chin *et al.*, 2011). In the eastern islands, reefs are widespread and well developed with fringing reefs surrounding most coasts and platform and barrier structures located at the main island groups (Spalding *et al.*, 2001). The most extensive reef area is the Ha'apai group, and in the Niue group in the north, coral cover is high (Spalding *et al.*, 2001). The bulk of the human population is located on the island of Tongatapu and the provincial centres on 'Eua, Lifuka in the Ha'apai and Neiafu in Vava'u; 75% of the islands are uninhabited (Lovell and Palaki, 2002). Tonga was reported to account for approximately 5% of corals in international trade over the period 2000-2010, and is one of the five main global coral exporters (Wood *et al.*, 2012).

Wilkinson (2004) reported that the reefs of the 'Polynesia Mana Node' (southeast and central Pacific, including Tonga) were predominantly healthy and at low threat risk in the short term due to their relative remoteness. Vieux *et al.* (2008) estimated that 90% of reefs in the Polynesia Mana region were healthy, 5% had been destroyed and 5% were under threat. Chin *et al.* (2011) reported that 63% of Tongan reefs were estimated to be under low threat, 26% was at medium threat, 9% was at high threat and 2% at very high threat.

The most recent assessment of coral reefs in Tonga (Chin *et al.*, 2011) noted that existing data from Tonga on reef status, health and resilience, were insufficient to gauge overall trends, and an overall assessment of the status of coral reefs in the country was therefore not possible. Chin *et al.* (2011) noted that a long-term monitoring site was established in 2009 off the west coast of Tongatapu, at Ha'atafu, by the CNRS (French National Centre for Scientific Research) and the IRCP (Institute for Pacific Coral Reefs) in collaboration with the Tongan Ministry of Fisheries. Permanent quadrats were photographed for coral monitoring and relatively low percentages of coral cover (14%) and high cover of soft corals (31%) were found (Chin *et al.*, 2011).

Some reef monitoring data are also available from surveys conducted between 2002 and 2008 (Friedman *et al.*, 2009). Six locations were surveyed in Tonga during 2001 and 2002, and four locations around Tonga in 2008; these were Ha'atafu and Manuka on Tongatapu (12 transects in each location), and Koulo and Lofanga on Ha'apai (13 transects in each location) (Friedman *et al.*, 2009). Comparisons of sites surveyed in both 2002 and 2008 showed increasing coral cover at all sites: Ha'afatu (increased from 17% to 28%); Manuka (21.4% to 28%); Koulo (16% to 32%); and Lofanga (16% to 25%) (Friedman *et al.*, 2009).

Threats

Major threats to Tongan coral reefs were identified as large scale phenomena such as global warming and bleaching events. However, significant anthropogenic threats included overfishing,

pollution, declining water quality, sedimentation and coastal development (Chin *et al.*, 2011; Wilkinson, 2008). In addition, Lovell and Palaki (2002) reported impacts from construction, quarrying, recreational activities and tourism. Major cyclones were reported to have affected Tonga in 1982, 1995, 1997, 1999, and 2000 (Salvet, 2002). Tongan reefs also suffered a major bleaching event in 2000 (Spalding *et al.*, 2001).

Fishing activities such as gleaning, dynamite or poisoning were reported to have had persistent impacts (Lovell and Palaki, 2002). Siltation from construction and quarrying sites were reported to have caused localized degradation of reefs adjacent to Nuku'alofa and Neiafu (Lovell and Palaki, 2002). Causeway construction in the Ha'apai and Vava'u and sand mining from beaches and dunes was also cited as a major problem (Lovell and Palaki, 2002). Tonga was reported not to have a centralized sewerage system and eutrophication from sewage and septic tanks systems was reported to occur particularly from the main urban centre of Nuku'alofa on Tongatapu (Newton, 2008). Eutrophication from untreated sewage and fertilizer runoff was reported to have led to seagrass and mangrove increases and a decline in corals in Fangu'uta Lagoon, Tongatapu (Spalding *et al.*, 2001; Vieux *et al.*, 2004).

In an assessment of coral reefs of Polynesia Mana region, Vieux *et al.* (2004) reported that the most disturbed areas in Tonga were: Faga'uta lagoon in Tongatapu, Nuku'alofa and adjacent northern Tongatapu, which was affected by physical disturbance, loss of habitat, eutrophication, over-fishing, and coral mortality; inner Neiafu harbour in Vava'u, which was affected by sedimentation, COTS and overfishing; and Pangae harbour on Lifuka Island in Ha'apai, which was reported to be affected by eutrophication and high coral mortality.

Protection and management

Regulatory background

The main legal instruments for managing fisheries in Tonga are the Fisheries Management Act 2002 (Tongan Ministry of Fisheries, 2002) and the Aquaculture Management Act 2003 (Tongan Ministry of Fisheries, 2003). The Aquaculture Management Regulations set out requirements for certification and licencing of operators and equipment (Tongan Ministry of Fisheries, 2008a). The Fisheries Management Regulations specify permitted fishing areas, quotas, equipment and methods (Tongan Ministry of Fisheries, 2008b).

Conditions for undertaking aquaculture activities were outlined in the Marine Aquarium Fishery Management Plan which includes guidelines and regulations for marine aquarium fisheries operators, primarily for inshore waters (Tongan Ministry of Fisheries, 2008c). Tonga is not a signatory to CITES, however it has designated competent authorities to issue comparable documentation and to undertake non-detrimental findings for exports of CITES-listed species (CITES, 2014).

Protected areas

Five marine protected areas which included coral reef were established in 1979 (Ha'atafu Beach, Hakaumama'o Reef, Malinoa Island Park and Reef, Monuafe Park and Reef and Pangaimotu Reef) (Nakaya, 2002; Spalding *et al.*, 2001). However, management of these MPAs was reported to have been inadequate with no monitoring, management plan, or staff allocated (Nakaya and Palaki, 2006). In a survey of reefs north of Tongatapu, van Woesik (1997) recorded scleractinian coral cover within the marine reserves of between 35-50% and at Hakaumama'o coral cover was 2-5%. Ease of access and lack of enforcement of marine protected areas was reported to be an issue (van Woesik, 1997).

Vieux *et al.* (2004) reported that there were nine marine protected areas off Tongatapu in the 1990s, but these were noted to have no management, enforcement or education programs.

Nakaya (2002) attempted monitoring at two protected reef areas and noted the lack of previous surveys, manpower and personnel with SCUBA diving experience to undertake monitoring (Nakaya, 2002). Similarly, Wilkinson (2004) noted considerable constraints in conducting baseline and monitoring studies due to poor capacity for monitoring, surveillance and enforcement.

Tonga was reported to have introduced limits on catch sizes for invertebrates, but enforcement was considered poor (Vieux *et al.*, 2004). South *et al.* (2012) also noted deficiencies in enforcement of fishery regulations, largely due to lack of capacity. Whilst Tonga was reported to monitor the marine parks and reserves for certain threats (e.g. nutrients, pesticides, pollution) and assess the status of the marine benthos (Salvet, 2002), no specific information relating to monitoring of coral cover within protected areas was located.

Coral reef management actions

Tonga has traditionally had open access fisheries and was the only country in the South Pacific region not to have any form of community tenure (Bowden-Kerby, 2003). Establishing effective legislation, enforcement and management were reported to be significant challenges in Tonga, although several community-based management initiatives were reported to have shown promising results (Chin *et al.*, 2011). Community-based Special Management Areas (SMAs) were reported to have been set up to address issues of declining fisheries (South *et al.*, 2012). The Fisheries Division Minister can designate any local community as a coastal community for the purposes of fisheries management (Tongan Ministry of Fisheries, 2008b). The Ministry of Fisheries monitors SMAs especially for vulnerable invertebrate species (South *et al.*, 2012). Funding for management and capacity building of three SMAs was reported to be provided by the GEF Small Grants programme and the Department of Fisheries provides training for communities (South *et al.*, 2012).

Coral harvest

The marine ornamental industry in Tonga is established on Tongatapu (Wabnitz and Nahacky, 2014). The Marine Aquarium Fishery Management Plan stated that given the lack of information on the state of reefs and shortage of scientific expertise, a precautionary approach should be established to manage the fishery (Tongan Ministry of Fisheries, 2008c). A ban on the harvest of live corals was reported to have been introduced in 1994 until a comprehensive resource assessment could determine the status and health of the corals around Tongatapu (Tongan Ministry of Fisheries, 2008c). The Secretary of the Pacific Community (SPC) and the Tongan Government conducted an assessment of corals around the Tongatapu reefs in 1995 and concluded that resources were not seriously depleted and that harvesting could resume within set quota limits (Tongan Ministry of Fisheries, 2008c). The ban on exports was revoked in 1997, and a limit of five licences to harvest coral was introduced (Tongan Ministry of Fisheries, 2008c). The harvest quota of 300 pieces per company per week was subsequently recommended to be halved to 150 pieces (Tongan Ministry of Fisheries, 2008c) and this was reported to have been implemented (Teitelbaum *et al.*, 2010).

In addition, restrictions on the use of hookah and SCUBA gear for fishing activities were imposed, limiting the aquarium trade only to shallow areas (Tongan Ministry of Fisheries, 2008c). A move towards aquaculture based aquarium products was envisaged by the Tongan Ministry of Fisheries (Tongan Ministry of Fisheries, 2008c).

The Tongan Authorities confirmed that live hard coral fishing is only permitted on a rotating cycle of 2-4 months at each of three areas to the north of Tongatapu: Area 1) Ualanga Lalo, Ualanga ‘Uta, Mounu; Area 2) ‘Onevai, Onevao, and Velitoa; and Area 3) reefs from Motutapu islet to Tau islet (Tongan Ministry of Fisheries, 2008c) (Figure 1). Operators are required to record

harvests of each species, including harvest areas and quantities taken. Log books must be kept by each harvesting company to submit to Ministry of Fisheries when permits expire on a given area (Lotoahea pers. comm. to UNEP-WCMC, 2014). The maximum permitted size of coral for harvest and exports was stated to be 20 cm and coral must be cut by hand (Tongan Ministry of Fisheries, 2008c; Lotoahea pers. comm. to UNEP-WCMC, 2014).

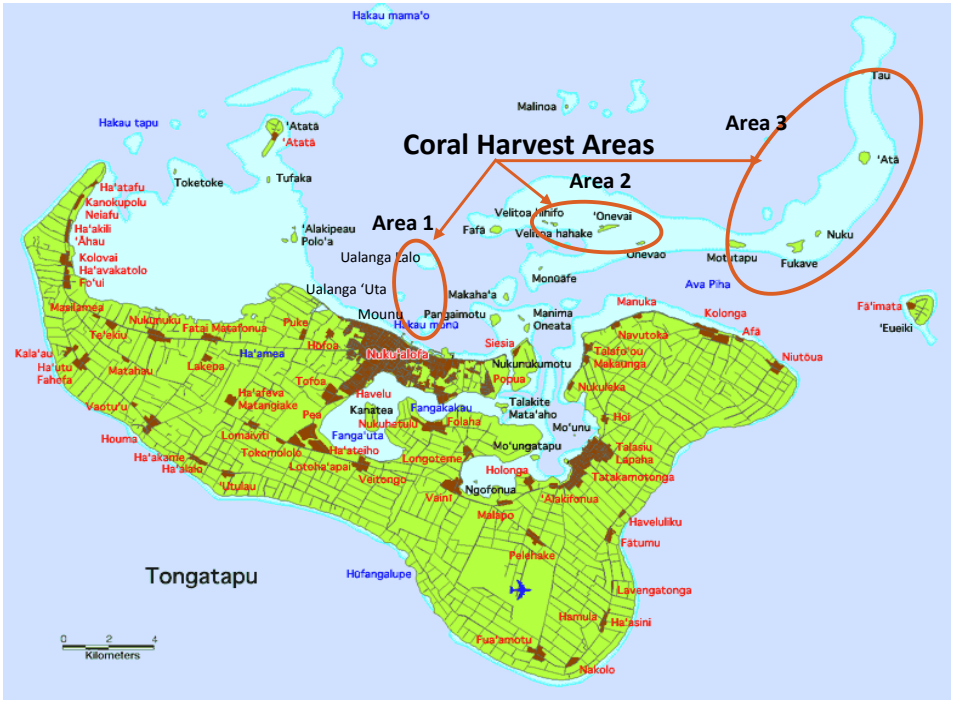


Figure 1. Map of Tongatapu Island showing designated coral harvest areas. (Base map from Tau'olunga, 2007, http://to.wikipedia.org/wiki/File:Tongatapu.gif)

A study of the export trade in fish and coral from Tonga found that adherence to best practices for coral collection was generally evident (Wabnitz and Nahacky, 2014).

22 Overview of genera

This section provides an overview of the status of, and trade in, 13 genera from one or more of the range States (Fiji, Haiti, Solomon Islands and Tonga) that were selected for assessment at SRG 69: *Acropora, Montipora, Agaricia, Favites, Platygyra, Fungia, Lobophyllia, Acanthastrea, Oxypora, Pectinia, Pocillopora, Seriatopora* and *Stylophora*.

Information on the conservation status of, and trade levels in, these 13 coral genera is provided for each range State under review at the genus level; the full conservation status of individual species has not been reviewed.

In order to assess overall trade volumes in these genera, a number of conversions have been run on the data. For all trade tables, sources have been combined ('mariculture' contains sources C, F and R; source W contains sources W, U and unspecified; see (Wood *et al.*, 2012)). Purposes other than purpose T have also been combined as 'other'.

Trade reported at both the genus and species level for each genus has been aggregated. For genera included within this review, the majority of trade reported by Fiji and Tonga was reported at the genus level. The Solomon Islands reported most trade at the level of species, although trade in *Lobophyllia* was reported at the genus level. Haiti reported the vast majority of trade in *Agaricia* at the species level (*A. agaricites*).

Imports into the EU-28 and elsewhere included mainly live and raw corals, reported in both number of pieces and in weight. To facilitate an analysis of trends in sources in trade over the years 2004-2013 and present these graphically, the volume reported in number of pieces was converted into weight, based on the conversion factors established by Green and Shirley (1999). They estimated the mean mass of pieces of live coral in trade at 206.1±13.1 g and the mean mass of raw corals at 580±121 g.

The full dataset is available here: https://db.tt/itVQffBI (direct trade) and https://db.tt/4Xv8R1NA (indirect trade).

The CITES Authorities in Fiji and Solomon Islands were contacted in the context of these reviews and invited to provide updated information on the status management of the coral taxa under review; no replies were received from these Authorities.

SCLERACTINIA: ACROPORIDAE

Acropora spp. II/B

UNDER REVIEW:	Fiji, Solomon Islands, Tonga
SPECIES (IUCN):	**Fiji:** 76 species: 25 VU, 21 NT, 23 LC, 6 DD and 1 not assessed **Solomon Islands:** 110 species: 42 VU, 20 NT, 25 LC, 22 DD and 1 not assessed. **Tonga:** 50 species:14 VU, 18 NT, 17 LC and 1 not assessed
EU DECISIONS : (range States under review only)	**Fiji:** Current no opinion i) for *Acropora echinata, A. florida, A. humilis* and *A. nasuta* from Fiji formed on 28/05/2013. Previous positive opinions for these species from Fiji formed on 22/07/1997. **Solomon Islands:** Current positive opinion for *Acropora florida* from the Solomon Islands formed on 22/07/1997 and last confirmed on 12/06/2006. Positive opinion for *Acropora humilis* from the Solomon Islands formed on 22/07/1997, removed and replaced with a no opinion ii) on 28/05/2013. No opinion ii) removed on 27/02/2014. Positive opinion for *Acropora nasuta* and *A. echinata* from the Solomon Islands formed on 22/07/1997, removed and replaced with a no opinion i) on 02/12/2011. No opinion i) was removed on 27/02/2014. **Tonga:** Current no opinion i) for *Acropora echinata, A. florida* and *A. nasuta* formed on 02/12/2011 and for *A. humilis* formed on 28/05/2013. Previous positive opinions for these species formed on 22/07/1997.

Trade patterns

Fiji

Between 2004 and 2014, Fiji published CITES export quotas (in number of pieces) for live and dead wild-sourced corals at genus level for every year with the exception of 2006. Quotas for corals may have been exceeded in 2004 according to importer reported trade data, and in 2008 and 2010 according to data reported by Fiji (Table 1).

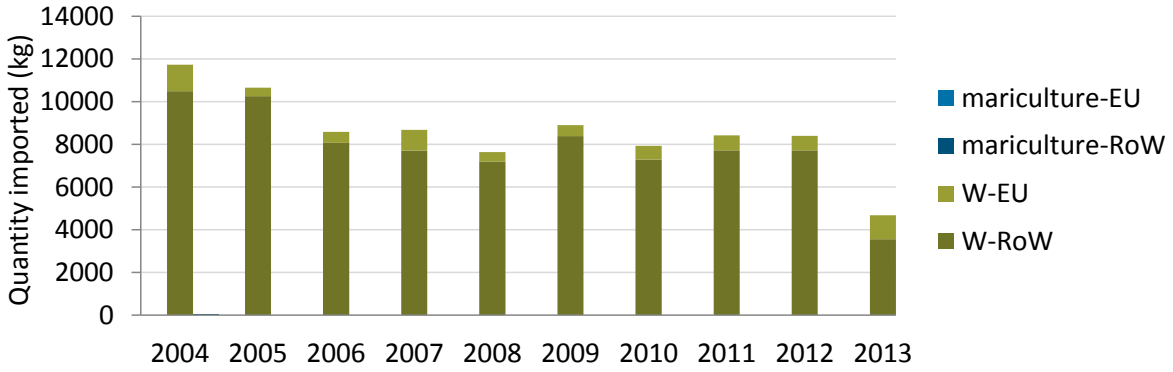
Table 1: CITES export quotas for wild-sourced live and dead *Acropora* (in number of pieces) from Fiji and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	48180	96360		96360	72270	72270	40000	40000	40000	40000	40000
Importer	55211	50514	41667	42113	33688	31852	30181	35881	32304	20755	
Exporter	47114	43406	38110	34454	80950	70420	57654	10517			

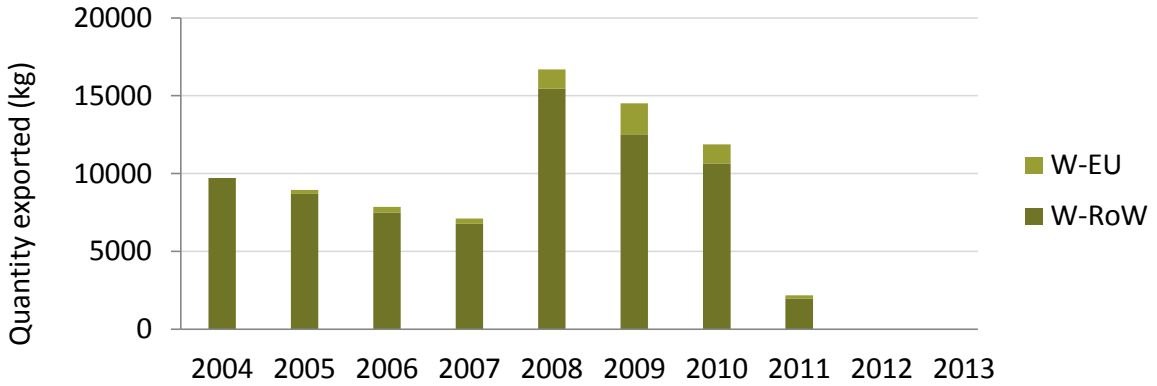
When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global exports of *Acropora* from Fiji appear to be declining overall since 2004, according to importer reported data. According to data reported by Fiji, exports declined 2004-2007 before peaking in 2008 and subsequently declining (Figure 1).

Direct exports of *Acropora* from Fiji comprised moderate levels of trade to the EU-28 (EU) and very high levels to the rest of the world, primarily in live wild-sourced coral pieces which were mainly traded for commercial purposes (Table 2).

Indirect exports of *Acropora* originating in Fiji to the EU-28 comprised very low levels of trade in live, wild-sourced coral pieces in 2004, 2007 and 2011; indirect exports were mainly re-exported via the United States for commercial purposes.



a)



b)

Figure 1: Main sources of direct exports of raw and live *Acropora* (in kg, converted from number of pieces where appropriate) from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Fiji**. Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 2: Direct exports of *Acropora* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete. (Source 'mariculture' includes source C; source W includes source U and source unspecified. Purpose 'other' includes all purposes other than T (commercial)).

Importer	Term (unit)	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	T	Importer	6041	1901	2497	4692	2133	2487	3102	3397	3150	5458	34858
				Exporter		1211	1707	1600	5974	9663	5998	1041			27194
	raw corals	W	T	Importer									51		51
				Exporter											
RoW	live (kg)	W	T	Importer		37									37
				Exporter											
		I	T	Importer			1		40	10	18		34		103
				Exporter											
		mariculture	T	Importer	75										75
				Exporter											
	live	W	T	Importer	47976	47800	39160	37421	29255	21638	21429	29100	23383	13977	311139
				Exporter	47114	42195	36403	32854	74976	60757	51656	9476			355431
			other	Importer			8								8
				Exporter											
	raw corals (kg)	I	T	Importer						16					16
				Exporter											
			other	Importer				0.023	0.01		1.848				1.881
				Exporter											
		W	T	Importer								800			800

Importer	Term (unit)	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
				Exporter											
		I	other	Importer								21			21
				Exporter											
		W	T	Importer	1194	813			2300	7727	5650	2784	5670	600	26738
				Exporter											
			other	Importer			2					600	50	720	1372
				Exporter											

Source: CITE S Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Table 3: Indirect exports of *Acropora* originating in Fiji to the EU-28, 2004-2013.

Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
live	W	T	Importer	70			350				51			471
			Exporter	70			350							420

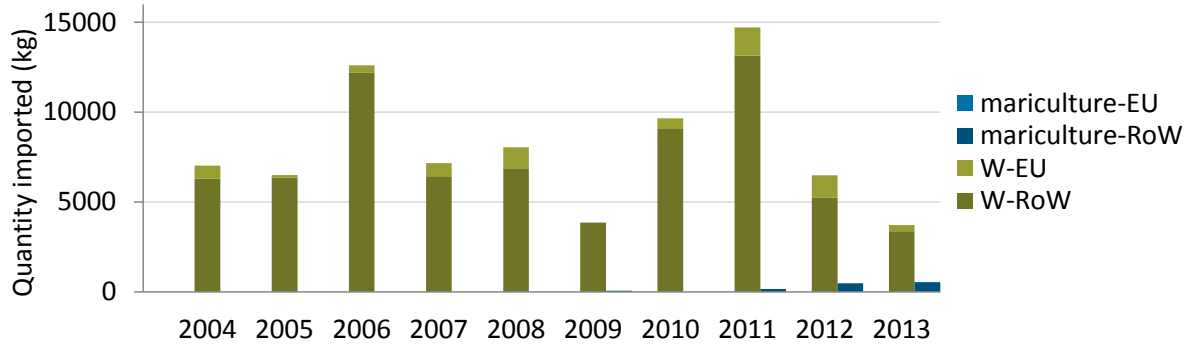
Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Solomon Islands

The Solomon Islands have not published any CITES export quotas for *Acropora*. Solomon Islands became a Party to CITES in 2007 and has submitted annual reports for 2008-2010 only.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals appears to be fluctuating; trade peaked in 2011 and has declined in subsequent years according to importers (Figure 2). Trade reported by Solomon Islands more than doubled each year 2008-2010 but remained below the volumes reported by importers in these years.

Direct exports of *Acropora* from Solomon Islands to the EU comprised relatively low levels of trade, primarily comprising wild-sourced raw coral pieces traded for commercial purposes; small numbers of live maricultured coral pieces were reported by EU Member States in 2013 (Table 4). Trade to the rest of the world comprised high levels of wild-sourced raw coral pieces; in addition to the trade summarized in the Table 4, 25 wild-sourced coral derivatives were exported to the United States in 2009. Indirect exports of *Acropora* to the EU comprised very low quantities of trade, the majority of which consisted of live, wild-sourced individuals exported via the United States for commercial purposes (Table 5).



a)

b)

Figure 2. Main sources of direct exports of raw and live *Acropora* (in kg, converted from number of pieces where appropriate) from Solomon Islands to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Solomon Islands.** Solomon Islands became a Party to CITES in 2007, and have submitted annual reports for 2008-2010 only. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 4: Direct exports of *Acropora* (main terms) from Solomon Islands to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Solomon Islands became a Party to CITES in 2007 and has submitted annual reports for 2008-2010 only; importer-reported trade data for 2013 may be incomplete. (Source 'mariculture' is primarily source 'C' but also includes trade reported as source F and R; source W includes source W, U and unspecified. Purpose 'other' contains all purposes other than T (commercial)).

Importer	Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	mariculture	T	Importer										15	15
				Exporter											
	raw corals	W	T	Importer	1449	299	770	1522	2318		1167	3106	2449	673	13753
				Exporter					1360		1167				2527
RoW	live (kg)	W	T	Importer				20							20
				Exporter											
	live	W	T	Importer	6787	3276	6782	5710	1846	1045	3167	7266	1190	1183	38252
				Exporter						645	2160				2805
		I	T	Importer							7	3	9		19
				Exporter											
		mariculture	T	Importer						300		749	2297	2385	5731
				Exporter						103					103
	raw corals (kg)	W	T	Importer				12				20			32
				Exporter											
		mariculture	T	Importer									6		6
				Exporter											
	raw corals	W	T	Importer	9632	11158	21288	10186	12776	7160	16563	22880	9829	6166	127638
				Exporter					12	6444	15554				22010
			other	Importer						3					3
				Exporter											
		I	T	Importer							57	213			270
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Table 5: Indirect exports of *Acropora* originating in Solomon Islands to the EU-28, 2004-2013. All trade was for commercial purposes.

Term	Source	Reported by	2006	2007	2008	2010	2012	Total
live	W	Importer	170		8	5		183
		Exporter						
raw corals	W	Importer						
		Exporter		3	5	8	5	21
	I	Importer						
		Exporter	1					1

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Tonga

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Acropora* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced *Acropora* appear to be declining, according to importer data (Figure 3).

Direct exports of *Acropora* from Tonga comprised low levels of trade to the EU-28 and relatively high levels to trade to the rest of the world, primarily comprising live wild-sourced pieces exported for commercial purposes (Table 6). Trade to the rest of the world also included notable quantities of maricultured (primarily source C) live corals along with small quantities of wild-sourced raw corals. No indirect exports of *Acropora* originating in Tonga to the EU-28 were reported 2004-2013.

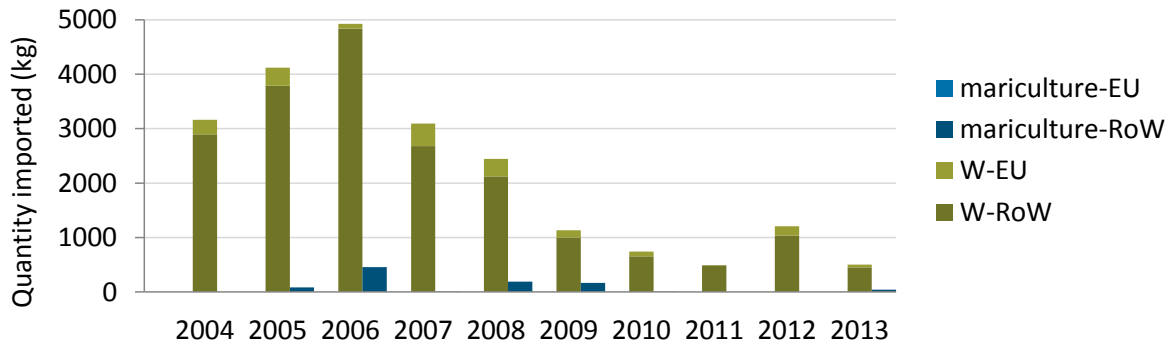


Figure 3: Main sources of direct imports of raw and live *Acropora* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and therefore has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 6: Direct exports of *Acropora* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. Tonga is not a Party to CITES and therefore has not submitted annual reports. All trade was for commercial purposes.

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	1296	1603	421	2007	1577	637	443	30	813	241	9068
RoW	live	W	11385	18078	23408	12739	9434	4019	2776	2210	4165	2097	90311
		I	18	253			1	11	15		37		335
		mariculture		405	2223	30	923	803	39			209	4632
	raw corals	W	950	105	20	15	305	300	140	55	311	37	2238
		I						1					1

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Acropora are mostly hermaphroditic (Wabnitz *et al.*, 2003) reef building corals (Wallace 1999). It is the largest and most diverse extant genus of reef-building corals (Wallace, 1999), with 185 species recorded globally (UNEP, 2015).

Acropora are fast-growing corals of many different shapes (Tomascik *et al.*, 1997), with linear growth rates of 2.3-20 cm/year and area growth rates of 19-1404 cm^2/year (Green and Shirley, 1999). Some *Acropora* corals reach sexual maturity at 3-8 years (Wallace, 1999). Life history traits of the genus were considered to enable it to rapidly adapt to environmental change (Guest *et al.*, 2012), and their rapid growth and ability to colonize new areas was considered to give this genus the greatest potential for reef recovery (Tomascik *et al.*, 1997).

These corals were reported to occur in a great variety of habitats, although being characteristic of shallow environments of less than 25m (Tomascik *et al.*, 1997). In some locations, certain *Acropora* species were reported to be restricted to particular reef and habitat types (Wallace *et al.*, 2001). The genus was reported to be amongst the most widespread coral genera globally (Wallace, 1999), ranging from southeastern Africa to the Arabian peninsula, across the Indian and Pacific Ocean (Veron, 2000).

Acropora spp. were reported to be strongly impacted by physical factors such as high temperature and sedimentation (Baird *et al.*, 2002) and appear to be more susceptible than other common coral species to disease (Haapkyl and Trebilco, 2007; Page and Willis, 2006). They are frequently affected by coral bleaching (Baird and Marshall, 2002). However, *Acropora* may also be quick to recover from anthropogenic effects, provided impacts are not chronic and healthy coral colonies are close by (Tomascik *et al.*, 1997).

Acropora is one of the top coral genera in international trade. Between 1985 and 1997, live corals of *Acropora* were the fourth most highly traded genus, comprising over 226 000 corals (Bruckner, 2001). Large colonies of branching *Acropora* were also reported to be harvested for the curio trade, but this trade was found to focus on a small number of taxa (Bruckner, 2001).

In mariculture, *Acropora* spp. were reported to grow to a size suitable for the aquarium market within four to six months (Wabnitz *et al.*, 2003) and many initiatives have focused on fast growing and small-polyp corals such as *Acropora* (Wood *et al.*, 2012). A number of *Acropora* species were considered suitable to husbandry in aquaria (Fossa and Nilsen, 1996; in: Wabnitz *et al.*, 2003; Yates and Carlson, 1992).

Fiji

Of the 185 species of the genus *Acropora* (UNEP-WCMC, 2012), 76 have been confirmed to occur in Fiji (UNEP, 2015). 2012). None were reported to be endemic to the country..

Acropora were found to be "by far" the most abundant corals across the Indo-Pacific, and were reported to be able to out-compete other corals (Veron, 2000). The genus was reported to be the most species-rich genus on Indo-Pacific reefs (Fenner, 2006a).

Acropora appears to occur widely across Fiji, and was found to be locally dominant in a number of locations across Fiji. Reefs of the Mamanuca Islands, which are heavily protected from wave action, were reported to be heavily dominated by *Acropora* spp., with some sites having "spectacular *Acropora* communities" in shallow water with high coral cover and diversity (Fenner, 2006a). Fifty-five *Acropora* species were recorded in the Mamanuca Islands, with no one species dominating (Fenner, 2006a). Nuku was also reported to have high *Acropora* cover on the reef top (Fenner, 2006a). Reef slopes of the Coral Coast were reported to have very little *Acropora,* although 21 species were recorded; *Acropora abrolhosensis* and *A. plana* were considered

uncommon to rare in the Mamanuca Islands and Coral Coast (Fenner, 2006a).

During surveys in the Great Astrolabe Reef and North Astrolabe Reefs on the northeast and northern end of the Kadavu island group (70 km south of Viti Levu) in 2001, massive corals were dominant, followed by a mix of submassive, encrusting, branching corals and *Acropora* (Obura and Mangubhai, 2003). Eastern windward barrier reefs were dominated by *Acropora* and branching corals (Obura and Mangubhai, 2003).

Acropora was also abundant at other specific sites of the Great and North Astrolabe Reefs including the reef crest at Naigoro Passage, Kawakawa Reef (Yamotubalavu), Buliya Patch Reef, and the Buliya Western Barrier Reef (Obura and Mangubhai, 2003). Healthy growth of *Acropora* was reported from the North Astrolable Reefs (North Channels and Outer-Northwest), however, at the Yanuyana-I-Sau fringing reef, 100% *Acropora* mortality had occurred, and although expansive areas of dead *Acropora* were reported from Narikoso, North Astrolabe Reef (patch reef and South Lagoon), Solo Lighthouse and Vanuakula Island, new growth was reported to be evident at Narikoso (Obura and Mangubhai, 2003). Koven and Pauley (2007) also reported the occurrence of 10 (probably 11) *Acropora* species in the Great Astrolable reefs.

In the Great Sea Reef (Cakaulevu), *Acropora* dominated the habitats of the reef flats and shallow offshore areas without high wave action as well as on the reef crest of mangrove island reefs; in the outer barrier which was reported to be characterized by high wave action, both *Acropora* and *Montipora* dominated (Jenkins *at al.*, 2004).

Acropora was the genus exported in highest numbers from Fiji in each year 1999-2002 (Lovell, 2003a). It was identified as the most common coral genus at both the two main collection sites in Fiji (Nand, 2008). At the Aquarium Fish Fiji collection sites (including Beqa, Yanuca, Pacific Harbour and Serua reefs in the southern part of Fiji) the area of *Acropora* cover was reported to be 13 711 737.7 m^2 (Nand, 2008). However, collection areas were noted to have a high coral diversity and abundance compared to other areas (Nand, 2008).

Cover area at the Walt Smith International collection site (Lautoka to the Yasawa group of islands in the western part of Fiji) was 23 944 064 m^2 (Nand, 2008). Relative percentage composition of branching and tabulate *Acropora* at the WSI collection area was calculated as 13.7% and 3.7%, respectively (Lovell and McLardy, 2008).

The occurrence of many *Acropora* colonies that would qualify for collection were recorded from the centre of the Walt Smith International collection site; 42 and 53 colonies from the East and West Motunikeasulua Reefs respectively, 142 from the Cakauvakababa-i-Yata Reef, 221 from the Nakuba Reef, and 10 from the Yakauke Reef (Lovell, 2003a).

At the Aquarium Fish Fiji collection site, Lovell (2008) reported that total living coral cover was estimated as 51%, comprising 18% *Acropora* spp. on average (Lovell and Whippy-Morris, 2008). *Acropora* spp. was recorded as the most abundant genus with an estimated 73 million colonies, of which 0.014% was calculated to have been exported based on the 2007 export levels (Lovell and Whippy-Morris, 2008).

In surveys of the reef corals of the Volivoli Beach area near Rakiraki, northern Veti Levu in 2006, Fenner (2006) reported the occurrence of 33 *Acropora* species. In 2006, tabular and branching *Acropora* corals were found to make up 15 and 11 per cent respectively of the live coral of the Rotuma Islands, north of the main Fijian islands (McKay, 2007).

Acropora spp. was found to be significantly (3-11 times) more abundant in three no-take MPA sites along the Coral Coast of Viti Levu than in adjacent non-MPA sites surveyed, which had 4-9 fold higher macroalgae cover (Bonaldo and Hay, 2014).

The IUCN classified 25 of the *Acropora* species that occur in Fiji as Vulnerable globally, 21 as Near Threatened, 23 as Least Concern; six species are Data Deficient and one species has not yet been assessed (IUCN, 2014). Of the 70 species which had been assessed, the global population trend was reported to be decreasing for 69, with one stable (IUCN, 2014).

Based on global assessments in Veron (2000), it could be inferred that 33 species of *Acropora* that occur in Fiji are common, nine are sometimes common, one is rarely common, 22 are uncommon and four are rare (seven are not included). More recently, of the Fijian *Acropora* species, approximately nine species were considered to be very common globally, two locally common, 27 common, 24 uncommon, one rare while six have not been assessed and six have not enough information (IUCN, 2014)(figures based on estimates, due to differences in nomenclature).

Much of the decline in Fiji's hard coral cover was attributed to the decline in fast-growing *Acropora* corals; however rapid recolonisation and growth of acroporid corals on affected reefs led to an increase in hard coral cover in some locations that reached pre-disturbance levels by 2007 (Sykes and Morris, 2009; Chin *et al.*, 2011).

More than half (52%) of all coral recruits at Suva Harbour, Great Astrolabe Reef and Taveuni were reported to be of the family Acroporidae, with 55% of these recruited to shallow waters (5m) (Quinn and Kojis, 2008). The high number of spawning acroporids was thought to be related to the high frequency and occurrence of the family and the large numbers of larvae produced (Quinn and Kojis, 2008).

According to Lovell and McLardy (2008), Fiji's quota for *Acropora* spp. included 76 species.

Their high recruitment and replacement rates were considered to make *Acropora* relatively tolerant of harvest (Wabnitz *et al.*, 2003). However, some of the rare *Acropora* species with restricted ranges were considered to be threatened by over-use, such as *A. halmaherae, A. pichoni, A. tortuosa* and *A. simplex* (Wallace *et al.*, 2001); *A. tortuosa* does occur in Fiji (UNEP, 2015).

Solomon Islands

A total of 110 *Acropora* spp. are known to occur in the Solomon Islands (UNEP, 2015). The occurrence of 103 species of *Acropora* in the country was confirmed during a survey in 2004 (Green *et al.*, 2006). *Acropora* was described as having a "significant presence" in the country, particularly in exposed habitats (Green *et al.*, 2006). The genus was reported from all 19 reefs included in a wide ranging survey of the Solomon Islands in 1965 (Morton, 1974). The genus was among the most common corals found on shallow reef flats, or clear deep water communities representing 51 out of 114 sites surveyed in 2004 (Green *et al.*, 2006).

Acropora spp. was reported to be visibly more abundant in exposed habitats than sheltered habitats in the country (Green *et al.*, 2006). The entire slope at one locality from Mbanika Island (Central Province) characterized by wave-swept slopes or benches under constant surf attack was reported to be dominated by *Acropora* (Morton, 1973). The Solomon Islands were reported to have an exceptional number of enclosed lagoons with steep sides and clear, deep water; however *Acropora* was not usually dominant in these lagoons (Green *et al.*, 2006).

A survey of corals in the Western Province in October 2007 following an earthquake and tsunami in that year, revealed high amounts of re-growth of tabular *Acropora* in Titiana, with the genus accounting for an average ground cover of 24 per cent (Schwarz *et al.*, 2007). The average live coral cover over two sites in Paelonge comprised 17 percent *Acropora*; in Babanga, broken *Acropora* corals were found, and live *Acropora* cover was "relatively low"; and at one site in Pusinau, *Acropora* was particularly damaged, and covered an

average of less than 1 per cent (Schwarz *et al.*, 2007).

The IUCN classified 42 of the *Acropora* species that occur in the Solomon Islands as Vulnerable globally, 20 as Near Threatened, 25 as Least Concern; 22 species are Data Deficient and one species has not yet been assessed (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that 41 species of *Acropora* that occur in the Solomon Islands are common in the Solomon Islands, 18 sometimes common, 38 uncommon and 13 rare. One species, *A. multiacuta*, considered globally uncommon by Veron (2000), was found be highly abundant at one site (Green *et al.*, 2006).

Acropora was reported to be the main genus involved in the curio trade in the Solomon Islands, whereby live corals are harvested and placed in the sun to die and bleach white (Albert *et al.*, 2012b). *Acropora* was also reported to be collected for use in betel nut lime, estimated to amount to 10 million kg of live coral per year (Spalding *et al.*, 2001; Albert *et al.*, 2012b).

Since *Acropora* exhibits relatively fast growth rates, re-growth was reported to be realistic within 3-5 years allowing for sustainable harvest if only coral tips are broken off (WorldFish Center, unpublished data, in Albert *et al.*, 2012a). However, concern was expressed by community members regarding the sustainability of the *Acropora* harvest given low abundance and a number of harvesters reportedly collecting entire colonies (Albert *et al.*, 2012b). Furthermore, harvest for betel nut lime was expected to increase significantly in line with human population growth, potentially making the practice one of the largest threats to reefs in the Solomon Islands (Green *et al.*, 2006). In Malaita Island, a low presence of *Acropora* was attributed to the relatively high human activities, such as harvest for Betel nut lime (Green *et al.*, 2006).

Other causes of mortality have been reported to affect *Acropora* in the Solomon Islands. Damage from the Pacific bleaching events in 2000-2001 was reported to have particularly affected *Acropora* corals in some areas (Green *et al.*, 2006). The corals of one site in NW Guadalcanal, with 100 percent cover of mainly *Acropora* were predicted to "most likely be totally dead in the coming months/year" due to predation by COTS (Green *et al.*, 2006). In Roviana (Western Province), white syndrome was found to be strongly over-represented relative to abundance of *Acropora* (Albert *et al.*, 2012c).

Acropora mariculture was reported from the Solomon Islands (Teitelbaum, 2007), and programmes in the country based on coral fragmentation were reported to have been commercially viable (Delbeek, 2001).

Tonga

Fifty species of *Acropora* have been reported from Tonga (UNEP, 2015). None are endemic to the country (UNEP-WCMC, 2012). The most recent surveys with details of relative abundance of coral genera were undertaken by Adjeroud *et al.* (2013) at 10 sites off Tongatapu in 2006. A total of 37 adult and 28 juvenile coral genera with a mean density of 11.6 adult and 5.5 juvenile colonies m^{-2} was recorded (Adjeroud *et al.*, 2013). *Acropora* was reported to be the second most abundant genus after *Montipora* and accounted for approximately 16% of adult colonies and 22% of juvenile colonies in reef assemblages (Adjeroud *et al.*, 2013).

Older surveys of reefs around Vava'u during the 1990s recorded various growth forms of *Acropora* at most sites on the reef; *Acropora* was dominant on some reefs and common or abundant at most others included in the survey (Holthus, 1996). Branching, plate, corymbose, digitate and bottlebrush *Acropora* were recorded from Vava'u, in addition to *A. palifera* and *A. aspera* (Holthus, 1996). Van Woesik (1997) noted an abundance of variety and quantity of *Acropora* of Malinoa Reef on the northwest tip of Tongatapu.

The IUCN classified 14 of the *Acropora* species that occur in Tonga, as Vulnerable globally, 18 as Near Threatened, 17 as Least

Concern and one species has not yet been assessed (IUCN, 2014).

Based on global assessments in Veron (2000), it could be inferred that 23 species of *Acropora* that occur in Tonga are common, six are sometimes common, 16 are uncommon and two are rare (three are not included). More recently, of the Tongan *Acropora* species, eight species were considered globally very common, 22 species were considered to be common, two were considered locally common, 15 were uncommon, while three have not been assessed (IUCN, 2014)(figures based on estimates, due to differences in nomenclature). Globally, populations of all the *Acropora* spp. which occur in Tonga are considered to be decreasing (IUCN, 2014).

The Tongan Management Plan noted that faster growing branching *Acropora* corals were resilient to controlled levels of exploitation (Tongan Ministry of Fisheries, 2008c).

SCLERACTINIA: ACROPORIDAE

Montipora spp. II/B

UNDER REVIEW:	Tonga
SPECIES (IUCN):	28 species: 5 VU, 8 NT, 15 LC
EU DECISIONS : (range States under review only)	Current no opinion iii) for *Montipora caliculata* formed on 16/02/2010 replacing an import suspension under Article 4.6 (b) for wild-sourced coral in place since 29/10/2001. A previous negative opinion was formed on 26/03/2001.

Trade Patterns

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Montipora* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals have declined overall from 2007 onwards, except from a spike in reported trade in 2012 (Figure 1).

Direct exports of *Montipora* from Tonga to the EU-28 consisted of relatively low levels of live wild-sourced coral pieces exported for commercial purposes; direct exports to the EU in 2013 decreased by more than half compared to 2012. Moderate levels of trade were reported as direct exports from Tonga to the rest of the world and principally consisted of live wild-sourced coral pieces for commercial purposes (Table 1).

Indirect exports of *Montipora* originating in Tonga to the EU consisted of 10 wild-sourced, live coral pieces exported via the United States to Denmark for commercial purposes in 2013.

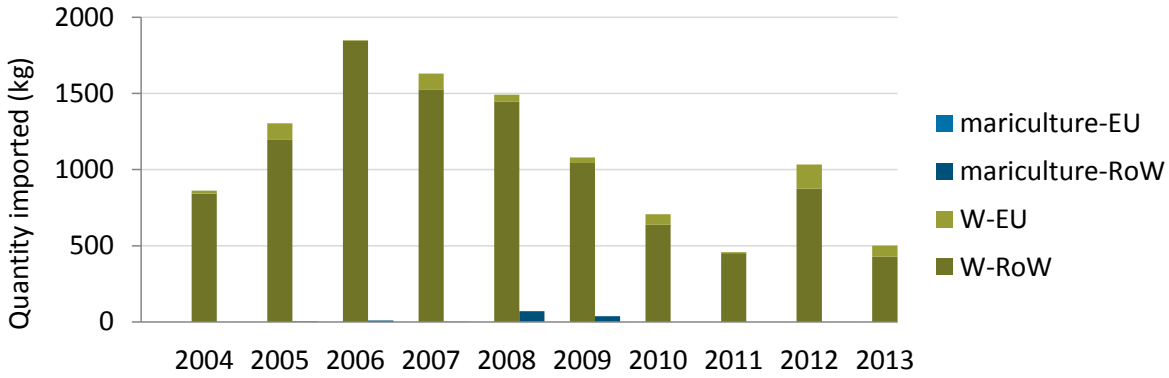


Figure 1: Main sources of direct imports of raw and live *Montipora* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and therefore has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 1: Direct exports of *Montipora* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. Tonga is not a Party to CITES and therefore has

not submitted annual reports. All trade was for commercial purposes. (Source 'mariculture' includes source C, F and R; source W includes U and source not specified).

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	95	534	15	505	220	180	336	30	769	352	3036
RoW	live (kg)	W				15							15
	live	W	3495	5784	8934	7334	6743	4780	3096	2112	3858	2070	48206
		I		26			11	11	5	4	19		76
		mariculture		13	45	7	345	183					593
	raw corals	W	210	5	10		100	100		29	137	4	595

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Montipora are colonial, zooxanthellate corals with submassive, laminar, encrusting or branching colonies with small corallites (Veron, 2000). *Montipora* spp. may reach sexual maturity at 3-8 years, based on most reef-building coral having been reported to reach sexual maturity at that age (Wallace, 1999). The genus is widely distributed globally (Veron, 2000) and comprises 76 species (UNEP-WCMC, 2012). The IUCN has classified one species as Endangered, 26 as Vulnerable, 17 as Near Threatened, 19 as Least Concern, seven as Data Deficient and six were not assessed (IUCN, 2014).

Montipora has been reported as characteristic of turbid waters in the Indo-Pacific (Rogers, 1990) while encrusting *Montipora* are well adapted to turbid conditions on the Great Barrier Reef (van Woesik and Done, 1997). Darling *et al.* (2012) reported that species of this genus utilize a variety of life-history strategies with some rapidly growing, branching and plating species of *Montipora* classified as competitive species, other slow-growing species, typically with domed colonies, were thought to be more stress-tolerant.

Tonga

Twenty eight species of *Montipora* have been reported from Tonga (UNEP, 2015). Adjeroud *et al.* (2013) recorded *Montipora* as the most abundant coral genera from 10 sites around Tongatapu during 2006. *Montipora* colonies accounted for approximately 27% and 17% of adult and juvenile colonies respectively (Adjeroud *et al.*, 2013). Lovell and Palaki (2002) noted that the nearshore lagoon of the Ha'atafu reserve on Tongatapu was dominated by *Montipora hispida* with *M. incrassata* subdominant and that both showed less bleaching relative than other genera. Van Woesik (1997) also reported *M. hispida* to be dominant in this area. Encrusting *Montipora* were reported to be common around Vava'u on steep sided reefs on the east of the island complex and Kapa Island (Holthus, 1996).

Five Tongan species have been classified by the IUCN as Vulnerable globally, eight as Near Threatened, and 15 as Least Concern (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that 14 species of *Montipora* that occur in Tonga are common, two are sometimes common, eight are uncommon and two are rare (two are also noted to be common in other regions).

More recently, of the Tongan *Montipora* species, 16 species were considered globally common or moderately common, 22 species were considered to be common, one were considered possibly common, ten were uncommon, and one was rare (IUCN, 2014)(figures based on estimates, due to differences in nomenclature). Globally, populations of all the *Montipora* spp. which occur in Tonga are considered to be decreasing (IUCN, 2014).

SCLERACTINIA: AGARICIIDAE

Agaricia spp. II/B

UNDER REVIEW:	Haiti
SPECIES (IUCN):	1 species, (*Agaricia agaricites*) Least Concern
EU DECISIONS : (range States under review only)	Current 4.6 (b) import suspension in place for *Agaricia agaricites* since 01/10/2007. Previous negative opinion formed on 13/06/2005.

Trade patterns

Haiti is not a Party to CITES and therefore has not published CITES export quotas for *Agaricia* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals have declined according to importer-reported data, with a particularly sharp deline between 2007 and 2008. Since 2008 direct trade levels have remained relatively constant (Figure 1).

Direct trade in *Agaricia* from Haiti to the EU comprised 1635 kg wild-sourced raw corals imported by Denmark in 2004; no other imports of this genus from Haiti were reported by EU Member States 2004-2013 (Table 2). Direct exports to the rest of the world mainly consisted of live corals, the majority of which were wild-sourced and traded for commercial purposes. All direct trade to the rest of the world was imported by the United States.

Indirect trade in *Agaricia* originating in Haiti to the EU consisted of 1360 live coral pieces, 1300 kg of live corals and 8998 raw coral pieces, all of which were wild-sourced and exported via the United States for commercial purposes.

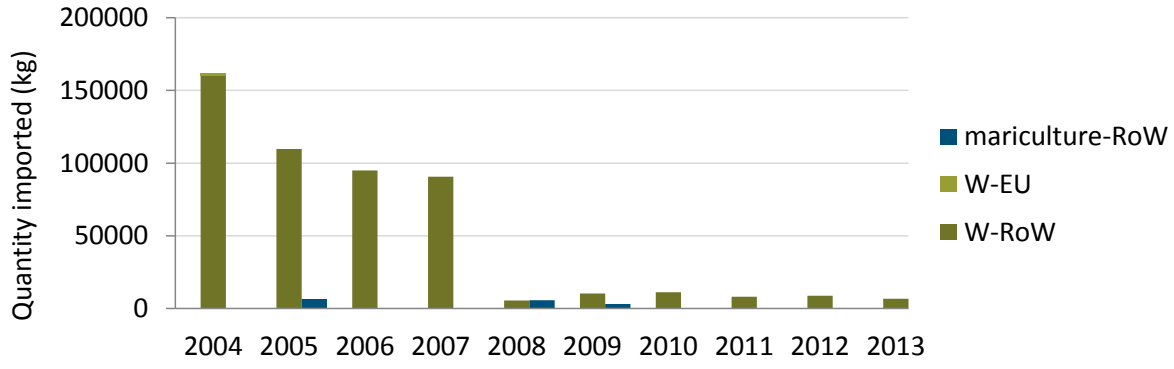


Figure 1: Main sources of direct imports of raw and live *Agaricia* (in kg, converted from number of pieces where appropriate from Haiti to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, for commercial purposes as reported by the importers. Haiti is not a Party to CITES and therefore has not submitted annual reports. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 2: Direct exports of *Agaricia* from Haiti to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. All trade was for commercial purposes. Haiti is not a Party to CITES and therefore has not submitted annual reports. (Source 'maricultured' is primarily source C, but also includes trade recorded as source F and R; source W contains source W, U and unspecified).

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	raw corals (kg)	W	1635										1635
RoW	live (kg)	W	119175	103021	93538	80826	5516	644	199	883	740		404542
		maricultured		6544			2991	7.73					9542.73
	live	W	4535	4661	1580	11779		12449	14587	12795	3740	10681	76807
		maricultured								541			541
		I								727			727
	raw corals (kg)	W	40103	5675	1169	7471		1394	1062			1776	58650
		maricultured					2718	1892					4610
		I						6295					6295
	raw corals	W						9710	11899	7863	12438	4732	46642
		maricultured					4	1957					1961

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Agaricia are colonial, zooxanthellate corals that form either submassive, encrusting colonies or upright bifacial fronds that form large irregularly dividing plates (Veron, 2000). *Agaricia* occur within shallow or sheltered reef environments, although *A. humilis* occurs in most reef environments except shallow lagoons (Veron, 2000). *Agaricia* species may reach sexual maturity at 3-8 years, based on most reef-building corals having been reported to reach sexual maturity at that age (Wallace, 1999).

There are seven species in the genus which is restricted to the Caribbean, Gulf of Mexico and warm waters of the West Atlantic (Veron, 2000). Whilst three species of the genus are globally common, four are generally uncommon (Veron, 2000).

The IUCN have classified three *Agaricia* species as Least Concern, one as Near Threatened and one as Vulnerable with two species Data Deficient (IUCN, 2014). Threats to species of *Agaricia* were reported to include: bleaching, outbreaks of predators, coral diseases (white plague and black band), and a range of localized anthropogenic threats such as fisheries, development, pollution, invasive species and sedimentation, as well as natural phenomena such as the El Niño Southern Oscillation and hurricanes (IUCN, 2014).

Agaricia was found to be one of the most vulnerable genera to bleaching across the Caribbean (Wilkinson and Souter, 2008).

Haiti

Agaricia agaricites is the only species of the genus reported from Haiti (UNEP, 2015).The species occurs in the Caribbean, Gulf of Mexico and on the Brazilian coast (Aronson *et al.*, 2008). It inhabits various reef environments from shallow back reefs, lagoons and channels to reef platforms and seagrass beds to depths of 75 m (Aronson *et al.*, 2008; Reed, 1985). It was reported to be a short-lived species, and to be generally small in size, but it can have extremely high rates of recruitment and be one of the early colonizers of formerly disturbed areas (Aronson *et al.*, 2008).

A. agaricites was reported to be widespread throughout its range and may be abundant or dominant on reefs (Aronson *et al.*, 2008). Veron (2000) considered the species to be common. The IUCN classified the species as Least Concern globally and considered it to have a stable population trend (Aronson *et al.*, 2008).

Surveys around Navassa island (60 km west of Haiti), during a coral mass bleaching event in 2006, found that *Agaricia* was the coral taxon most susceptible to bleaching with up to 80% of colonies affected (Miller

et al., 2011). However, it was reported to be relatively tolerant of sedimentation (Rogers, 1990).

The status of *Agaricia* in Haiti was reported to be currently unknown, but to be slowly recovering after having been virtually wiped out in the 1980s and 1990s (Jean Wiener, pers. comm. to UNEP-WCMC, 2014). It was also noted that there are no harvest quotas for *Agaricia* and there is no monitoring of coral collection sites (Jean Wiener, pers. comm. to UNEP-WCMC, 2014).

40 SCLERACTINIA: FAVIIDAE

Favites spp. II/B

UNDER REVIEW:	Tonga
SPECIES (IUCN):	7 species: 6 NT, 1 LC
EU DECISIONS : (range States under review only)	Current suspension under Article 4.6 (b) for wild-sourced *F. halicora* in place since 03/09/2008. A negative opinion for this species was formed on 20/02/2007.

Trade patterns

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Favites* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade in wild-sourced corals is declining, and appears to have decreased by around 10-fold 2008-2013 (Figure 1).

Direct exports of *Favites* from Tonga to the EU-28 comprised very low levels of wild-sourced live corals exported for commercial purposes 2006-2010; no imports of *Favites* from Tonga were reported by EU Member States 2011-2013 (Table 1). Direct exports to the rest of the world principally consisted of live wild-sourced coral pieces for commercial purposes.

Indirect exports of *Favites* originating in Tonga to the EU-28 consisted of two wild-sourced live corals pieces exported via Singapore to Slovenia for commercial purposes in 2006.

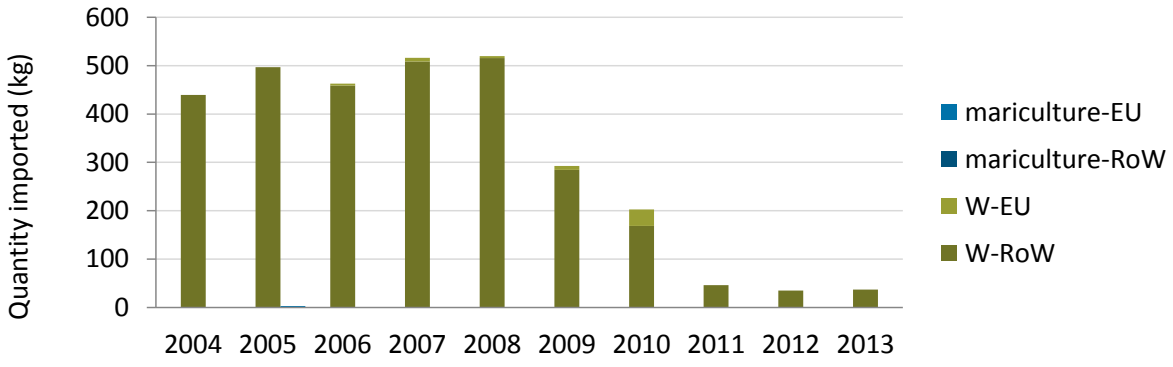


Figure 1: Main sources of direct imports of raw and live *Favites* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and therefore has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 1: Direct exports of *Favites* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. All exports were for commercial purposes. Tonga is not a Party to CITES and therefore has not submitted annual reports. (Source 'mariculture' includes source C; source W includes U and source unspecified.)

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W			20	38	20	40	165				283
RoW	live (kg)	W	10				20						30
	live	W	1324	2382	2198	2456	2209	1267	818	224	169	178	13225
		I	27	6	3		5	3			2		46
		mariculture	5		15								20
	raw corals	W	270	10	10	4	70	40					404

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Favites is a colonial, zooxanthellate genus, colonies are usually massive, flat or dome shaped (Veron, 2000). The genus is comprised of 15 species (UNEP-WCMC, 2012) and is widespread throughout the Indo-Pacific (Veron, 2000). *Favites* were reported to inhabit a range of reef environments although *Favites halicora* was noted to prefer shallow water (Veron, 2000).

IUCN assessments have classified one species as Vulnerable, twelve as Near Threatened, one as Least Concern and one as Data Deficient (IUCN, 2014).

Favites spp. may reach sexual maturity at 3-8 years, based on most reef-building corals having been reported to reach sexual maturity at that age (Wallace, 1999) although colony size was reported to be main determinant of age of sexual maturity (Kai and Sakai, 2008). Sexual reproduction by gamete release was reported to be common in this genus (Kojis and Quinn, 1982).

Favites is common in trade and it was considered to be sensitive to unfavourable environmental conditions (Green and Shirley, 1999). *Favites complanata* was found to have intermediate bleaching tolerance to elevated temperatures (Strychar and Sammarco, 2009). *Favites chinensis* was found to increase in relative abundance after bleaching events at one location (van Woesik *et al.*, 2011).

Tonga

Seven species have been reported from Tonga (UNEP, 2015). *Favites abdita* was reported from the outer windward side of Atata reef and small colonies were noted on Monu afe reef (van Woesik, 1997). In addition, six other species of *Favites* were reported from around Tongatapu but without details of abundance or location (van Woesik, 1997). More recently, Adjeroud *et al.* (2013) reported on a survey of 10 sites around Tongatapu in 2006 in which *Favites* was the sixth most abundant genus. Adults and juvenile colonies were reported to make up approximately 4% and 2% respectively of recorded although the abundance of juvenile *Favites* was low in surveyed sites. No *Favites* were reported from Vava'u by (Holthus, 1996).

The IUCN classified six of the Tongan species as Near Threatened globally on the basis of global declines in coral reef habitat (IUCN, 2014). One species, *Favites pentagona,* was classified as Least Concern globally as the species was thought to be more resilient to some of the threats faced by corals (DeVantier *et al.*, 2014a).

Based on global assessments in Veron (2000), it could be inferred that four species of *Favites* that occur in Tonga are common or sometimes common, and three are uncommon. Similarly, the IUCN (2014) considered three species to be globally common and four as globally uncommon. Globally, populations of all the *Montipora* spp. which occur in Tonga are considered to be decreasing (IUCN, 2014).

SCLERACTINIA: FAVIIDAE

Platygyra spp. II/B

UNDER REVIEW:	Tonga
SPECIES (IUCN):	4 species: 1 NT, 3 LC.
EU DECISIONS : (range States under review only)	Current suspension under Article 4.6 (b) for wild *Platygyra sinensis* originally formed on 01/10/2007. Previous negative opinion formed on 09/03/2006.

Trade patterns

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Platygyra* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade appears to have declined 2007-2011, although 2012 saw an increase in reported exports (Figure 1).

Direct exports of *Platygyra* to the EU-28 from Tonga entirely comprised live wild-sourced pieces traded for commercial purposes. Export levels were very low, remaining below 50 pieces in all years other than 2010 (Table 2). Exports to the rest of the world principally consisted of live wild-sourced coral pieces for commercial purposes; in addition, smaller quantities of wild-sourced raw coral pieces were exported for commercial purposes 2004-2013.

Indirect exports of *Platygyra* to the EU-28 originating in Tonga comprised very low quantities of live coral pieces exported via the United States for commercial purposes: six pieces to the UK in 2004 and two pieces to Denmark in 2013.

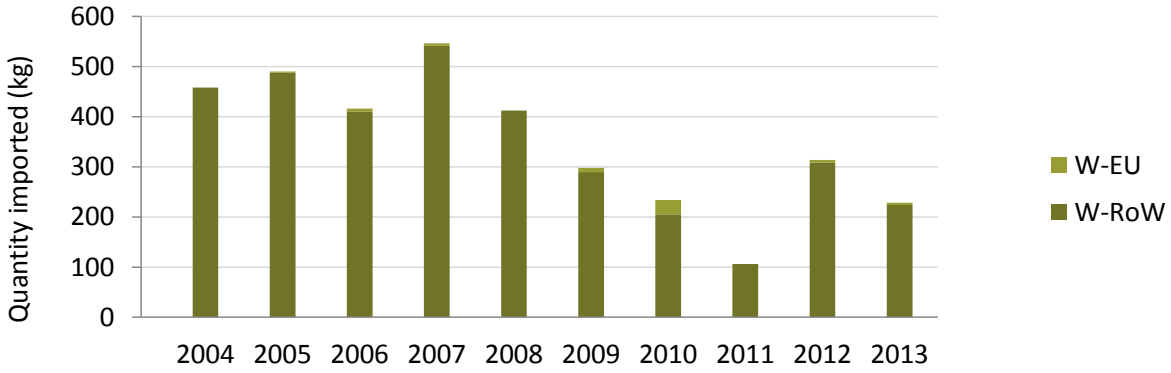


Figure 1: Main sources of direct imports of raw and live *Platygyra* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and therefore has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 2: Direct exports of *Platygyra* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. Tonga is not a Party to CITES and therefore has not submitted annual reports. (Source 'W' includes source U and source unspecified. Purpose 'other' contains all purposes other than T (commercial).)

Importer	Term	Source	Purpose	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	T		10	30	25		40	139		25	22	291
RoW	live (kg)	W	T					11						11
	live	W	T	1407	2369	1950	2615	1778	1348	996	515	1498	1072	15548
		I	T	16	20				6	3	1	3		49
	raw corals (kg)	I	other					0.899	1.775					2.674
	raw corals	W	T	290		14	4	60	20				5	393
		I	other					5						5

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Platygyra are colonial, zooxanthellate corals with massive, flat or dome-shaped colonies (Veron, 2000). *Platygyra* are widely distributed (Veron, 2000) and occupy a variety of reef habitats (DeVantier *et al.*, 2014b). There are 11

species recognized globally (UNEP-WCMC, 2012); IUCN assessments have classified one species as Vulnerable, six species as Near Threatened and four species as Least Concern (IUCN, 2014).

The genus *Platygyra* contains slow-growing, domed colonies with large corallites and high fecundity which were reported to be advantageous traits in harsh environments (Darling *et al.*, 2012). Species may reach sexual maturity at 3-8 years, based on most reef-building corals having been reported to reach sexual maturity at that age (Wallace, 1999).

Tonga

Four species of *Platygyra* these have been recorded from Tonga (UNEP, 2015). The Tongan species were reported to inhabit most reef environments especially back reef margins (Veron, 2000). All four *Platygyra* species were recorded during a survey was undertaken on the coral reefs extending north from Tongatapu in March 1996 (van Woesik, 1997). *P. pini* was reported to be one of the dominant coral species at Hakau mama'o marine reserve where coral cover was recorded at 35-50%. Surveys around Tongatapu in 2006 reported that *Platygyra* was the ninth most abundant genus. Adult and juvenile colonies were reported to make up around 3% and 2% of recorded colonies (Adjeroud *et al.*, 2013). Holthus (1996) recorded *Platygyra*/*Leptoria* as rare/occasional in surveys of reefs off Vava'u. In 2000, up to 90% of *Platygyra* and *Goniastrea* were reported to have been bleached in Tonga (Lovell and Palaki, 2002).

The IUCN classified one of the *Platygyra* species that occur in Tonga as Near Threatened globally and three as Least Concern (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that one species of *Platygyra* that occurs in Tonga is common and the other three are usually uncommon. More recently, of the Tongan *Platygyra* species, three were considered to be globally common, with one assessed as uncommon (IUCN, 2014). Globally, populations of all the *Platygyra* spp. which occur in Tonga are considered to be decreasing (IUCN, 2014).

SCLERACTINIA: FUNGIIDAE

Fungia spp. II/B

UNDER REVIEW:	Fiji
SPECIES (IUCN):	**Fiji:** 24 species: 1 NT, 21 LC,2 not assessed
EU DECISIONS : (range States under review only)	Current no opinion i) for *Fungia concinna, F. fungites, and F. repanda* from Fiji formed on 02/12/2011. Previous positive opinions for these species from Fiji formed on 22/07/1997.

Trade patterns

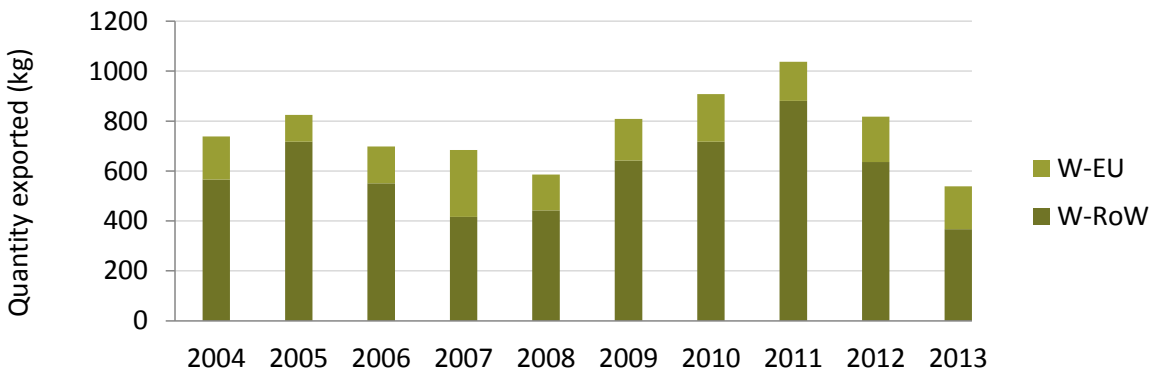
Between 2004 and 2014, Fiji published CITES export quotas (in number of pieces) for wild-sourced corals at genus level every year with the exception of 2006. Trade appears to have remained within quota in all years, with the exception of 2008 according to data reported by Fiji (Table 1).

When conversion factors are applied to convert all trade reported in pieces to kilograms, global direct trade fluctuated 2004-2013; data reported by Fiji shows a peak in 2011 and subsequent declines in 2012 and 2013, while trade reported by Fiji shows a peak in 2008 and a subsequent decline overall (Figure 1). No trade in maricultured corals was reported by Fiji or importers 2004-2013.

Direct exports of *Fungia* from Fiji comprised relatively low levels to the EU-28 and moderate levels to the rest of the world, principally comprising live wild-sourced coral pieces traded for commercial purposes. Indirect exports of *Fungia* originating in Fiji to the EU-28 consisted of very low levels of live coral pieces for commercial purposes in 2006 and 2011 (Table 2); one specimen was also reported in 2011.

Table 1: CITES export quotas for wild-sourced live and dead *Fungia* (in number of pieces) from Fiji, and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	6233	12466		12466	9349	9349	7800	7800	7800	7800	7800
Importer	3433	3821	3389	3321	2668	3059	3922	4638	3450	2592	
Exporter	2902	2921	3117	2098	18775	6057	7120	1361			



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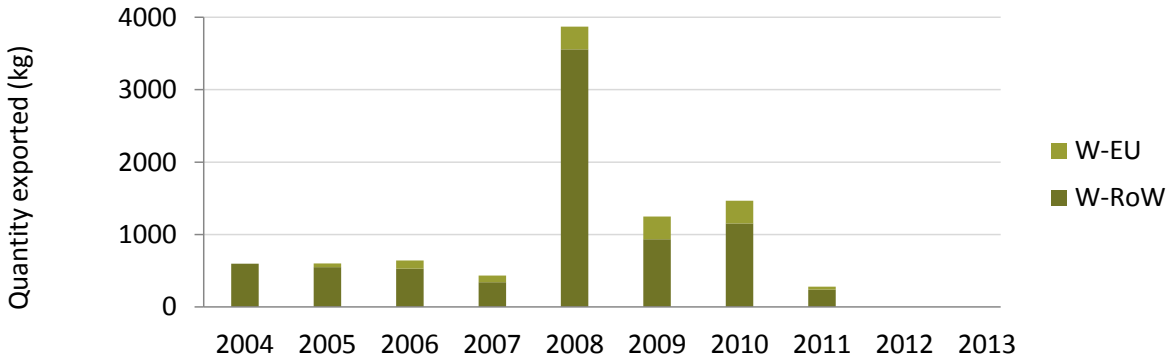


b)

Figure 1: Direct exports of raw and live *Fungia* (in kg, converted from number of pieces where appropriate) from Fiji to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Fiji.** Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 1: Direct exports of *Fungia* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Purpose 'other' includes all purposes other than T (commercial).

Importer	Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	T	Importer	834	520	719	1301	697	806	926	757	847	833	8240
				Exporter		259	542	439	1515	1520	1530	205			6010
	raw corals	W	T	Importer									15		15
				Exporter											
RoW	live	W	T	Importer	2498	3179	2670	2020	1851	1664	2664	3611	2248	1659	24064
				Exporter	2902	2662	2575	1659	17260	4537	5590	1156			38341
		I		Importer						2	9	15			26
				Exporter											
	raw corals (kg)	W	T	Importer								50			50
				Exporter											
	raw corals	W	T	Importer	101	122			120	589	332	270	340	50	1924
				Exporter											
			other	Importer										50	50
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Table 2: Indirect exports of *Fungia* originating in Fiji to the EU-28, 2004-2013. All trade was wild-sourced. 'Other' includes all purposes apart from T (commercial).

Term	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
live	T	Importer								10			10
		Exporter			15								15
specimens	other	Importer											
		Exporter								1			1

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014.

Conservation status

Fungia are zooxanthellate[2] corals (Veron, 2000), which are solitary or colonial as adults, and which are generally free-living (not attached to substrate), although they undergo an attached phase as juveniles (Tomascik *et al.*, 1997).

These corals may reach sexual maturity at 3-8 years, based on most reef building corals having been reported to reach sexual maturity at that age (Wallace, 1999). Fungiids reproduce sexually but also asexually, the most common type being the regeneration of the stalk with which the juvenile became attached to the substrate (Hoeksema 1989; in: Tomascik *et al.*, 1997). *Fungia* corals were found to often generate asexual buds, especially after being damaged (Hoeksema 1986; in: Tomascik *et al.*, 1997). Linear growth rates of 0.8-2.8 cm/year, with area growth rates of at least 2.2 cm^2/year were reported for this genus (Green and Shirley, 1999).

The genus *Fungia* comprises 29 species (UNEP-WCMC, 2012), all of which were considered to be widespread globally (IUCN, 2014). Fungiidae were found to be amongst the dominant coral groups in shallow-water lagoons subject to high sedimentation (Tomascik *et al.*, 1997). The ability of fungiids to move and survive on soft strata is unique among corals, which mainly require hard surfaces as a reef base (Littler *et al.*, 1997).

Fungia is included in the top 20 live coral genera traded internationally; large colonies of *Fungia* were reported to also be harvested for the curio trade – a trade focussing on a small number of taxa (Bruckner, 2001).

Fiji

Twenty four species of *Fungia* been confirmed to occur in Fiji (UNEP-WCMC, 2012).The genus was reported to be the fourth most species-rich genus in Fiji, which was considered characteristic within Indo-Pacific reefs (Fenner, 2006a).

In Fiji, the genus' distribution was reported from across the country. *Fungia* species were reported from the Great Sea Reef (Cakaulevu), with *F. danae* specifically noted to be common, and *F. simplex* noted as common on sandy substrate (Jenkins *et al.*, 2004). *Fungia* was confirmed from the Volivoli Beach area near Rakiraki, Veri Levu with five species reported; all were uncommon to rare (Fenner, 2006b).

During surveys in the Great Astrolabe Reef (GAR) and North Astrolabe Reefs (NAR) on the northeast and northern end of the Kadavu island group (70 km south of Viti Levu) in 2001, *Fungia* was amongst the more common genera at the NAR Patch reef and South Lagoon; five species were recorded during these surveys in total (Obura and Mangubhai, 2003).

A unique coral reef comprising almost entirely Fungiidae was reported from a lagoon of the GAR with 12 species of *Fungia* recorded; along with *Ctenactis* spp, these genera comprised 3% of coral cover (Littler *et al.*, 1997). Koven and Pauley (2007) also reported the occurrence of 14 *Fungia* species in the GAR.

The genus was recorded to occur in the Mamanuca Islands, with ten species recorded; with most present from multiple sites; only *Fungia corona* and *F. spinifier* were assessed as uncommon to rare, and were recorded from only one or two sites (Fenner, 2006a).

Fungia spp. was identified as one of the top ten most common coral genera at both of the two main collection sites in Fiji (Nand, 2008). At the Aquarium Fish Fiji (AFF) collection sites (including Beqa, Yanuca, Pacific Harbour and Serua reefs in the southern part of Fiji) the area of *Fungia* cover was reported to be 475 749 m^2 (Nand, 2008).

At the AFF collection site, *Fungia* spp. was recorded as an abundant genus with an

[2] with symbiotic zooxanthellae (dinoflagellate)

estimated 5.8 million colonies, of which 0.000% was calculated to have been exported based on the 2007 export levels (Lovell and Whippy-Morris, 2008).

The occurrence of *Fungia* colonies that would qualify for collection were recorded from the centre of the Walt Smith International collection site; seven and ten colonies from the East and West Motunikeasulua Reefs respectively, nine from the Cakauvakababa-i-Yata Reef, 12 from the Nakuba Reef, and 14 from the Yakauke Reef (Lovell, 2003a).

Area of *Fungia* cover at the Walt Smith International collection site (Lautoka to the Yasawa group of islands in the western part of Fiji) was estimated at 3 800 630 m^2 (Nand, 2008). Relative percentage composition of *Fungia* at the WSI collection area was calculated as 4.9% (Lovell and McLardy, 2008).

The IUCN classified one of the *Fungia* species that occurs in Fiji as Near Threatened globally (*F. fungites*), 21 as Least Concern and two species have not yet been assessed (IUCN, 2014). Of the species assessed, population status was unknown for 21, but *F. distorta* was recorded to have a stable global population (IUCN, 2014).

Based on global assessments in Veron (2000), it could be inferred that six species of *Fungia* may be common in Fiji, three are uncommon and two are rare, with 13 not assessed. More recently, 14 species were considered to be common globally or abundant, one was locally common, four uncommon, one was rare, while five other species have not been assessed (IUCN, 2014) (IUCN, 2014) (figures based on estimates, due to differences in nomenclature).

According to Lovell and McLardy (2008), Fiji's quota for *Fungia* spp. included 14 species.

50 SCLERACTINIA: MUSSIDAE

Lobophyllia spp. II/B

UNDER REVIEW:	Fiji, Tonga
SPECIES (IUCN):	**Fiji:** 5 species: 1 NT, 4 LC, one not assessed **Solomon islands:** 9 species: 1 EN, 3 VU, 1 NT, 4 LC. **Tonga:** 2 species: 2 LC
EU DECISIONS : (range States under review only)	**Fiji:** Current no opinion i) for *Lobophyllia corymbosa* from Fiji formed on 02/12/2011. Previous positive opinions for this species from Fiji formed on 22/07/1997. **Tonga:** Current no opinion i) for *L. corymbosa* formed on 02/12/2011 replacing previous positive opinion formed on 22/07/1997.

Trade patterns

Fiji Between 2003 and 2014, Fiji published CITES export quotas (in number of pieces) for wild-sourced corals at genus level every year with the exception of 2006 (Table 1). Quotas may have been exceeded in 2009 and 2010 according to data reported by Fiji and in 2011 according to data reported by importers.

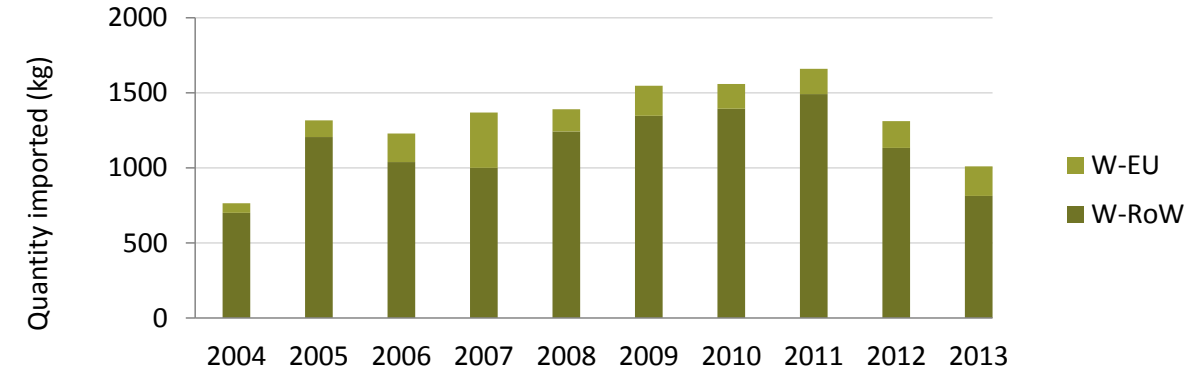
When conversion factors are applied to convert trade reported in pieces to kilograms, direct global exports of *Lobophyllia* from Fiji show a steady increase 2004-2011 and a subsequent decrease in 2012 and 2013, according to importers. According to data reported by Fiji, exports increased up to 2010 but declined more than fourfold in 2011 (Figure 1).

Direct exports from Fiji comprised relatively low levels of trade to the EU-28 and moderate levels of trade to the rest of the world, mainly in wild-sourced live coral pieces traded for commercial purposes. Smaller quantities of wild-sourced raw corals were exported to the rest of the world, according to importers (Table 2).

Indirect exports of *Lobophyllia* originating in Fiji to the EU-28 consisted of very small quantities of live wild-sourced corals, mainly re-exported via the United States for commercial purposes.

Table 1: CITES export quotas for wild-sourced live and raw *Lobophyllia* (in number of pieces) from Fiji, and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	4889	9778		9778	7333	7333	7340	7340	7340	7340	7340
Importer	3707	6122	5964	6641	6544	6246	7013	7744	5713	4845	
Exporter	2722	4738	5452	4923	6310	8515	10042	2097			



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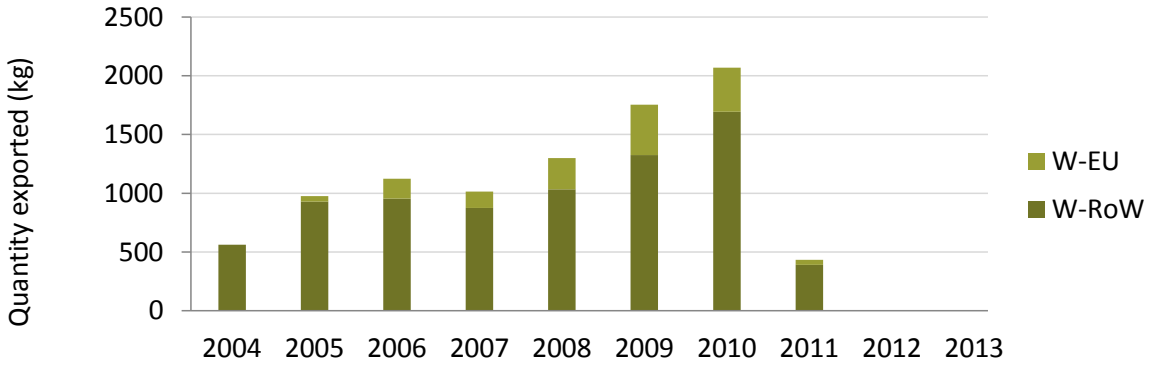


b)

Figure 1. Direct exports of raw and live *Lobophyllia* (in kg, converted from number of pieces where appropriate) from Fiji to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Fiji.** Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 2: Direct exports of *Lobophyllia* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Source W includes source U and unspecified. Purpose 'other' includes all purposes other than T (commercial).

Importer	Term (unit)	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	T	Importer	304	543	922	1786	719	972	801	823	844	954	8668
				Exporter		235	821	680	1300	2085	1820	201			7142
	raw corals	W	T	Importer									11		11
				Exporter											
RoW	live	I		Importer					20	1			5		26
				Exporter											
		W	T	Importer	3403	5395	5042	4855	5685	4410	5834	6706	4423	3651	49404
				Exporter	2722	4503	4631	4243	5010	6430	8222	1896			37657
	raw corals (kg)	W	T	Importer								120			120
				Exporter											
		W	T	Importer		184			140	864	378	215	435	120	2336
				Exporter											
			other	Importer										120	120
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Table 3: Indirect exports of *Lobophyllia* originating in Fiji to the EU-28, 2004-2013.

Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
live	W	T	Importer				25				10			35
			Exporter				20							20

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

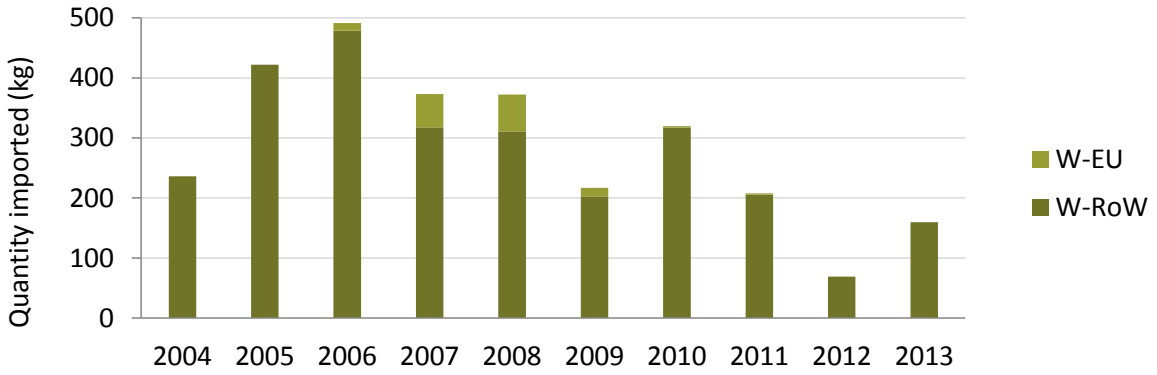
Solomon Islands

The Solomon Islands became a Party to CITES in 2007 and have submitted annual reports for 2008-2010 only. No CITES export quotas for *Lobophyllia* from the Solomon Islands have been published.

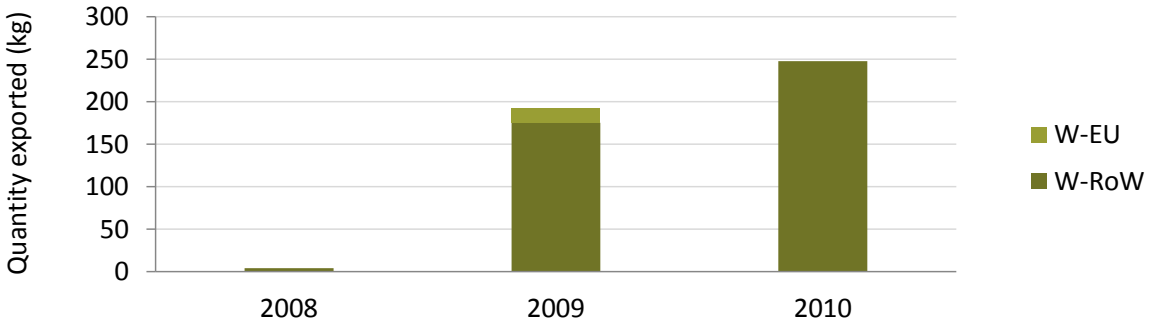
When conversion factors are applied to convert all trade reported in pieces to kilograms, global direct exports of wild-sourced corals declined over the period 2004-2013 overall, according to importer data (Figure 2); according to data reported by Solomon Islands, global export levels increased 2008-2010 but remained below levels reported by importers in those years.

Direct exports of *Lobophyllia* from the Solomon Islands comprised very low levels of trade to the EU-28 and moderate levels of trade to the rest of the world, mainly in live wild-sourced corals exported for commercial purposes (Table 4). In addition to trade shown in the table, 25 wild-sourced coral derivatives were exported to the United States in 2009 for commercial purposes.

No indirect exports of *Lobophyllia* from Solomon Islands to the EU-28 were reported 2004-2013.



a)



b)

Figure 2: Main sources of direct imports of raw and live *Lobophyllia* in kg (converted from number of pieces where appropriate) from Solomon Islands to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Solomon Islands.** Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 4: Direct exports of *Lobophyllia* from Solomon Islands to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. All trade was for commercial purposes. Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Source W includes source U and unspecified.

Importer	Term	Source	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	Importer			60	270	299	69	12	10			720
			Exporter						81					81
RoW	live (kg)	W	Importer					22						22
			Exporter											
	live	W	Importer	1146	1998	2323	1540	1302	984	1538	997	334	775	12937
			Exporter						729	1202				1931
		I	Importer						11	1				12
			Exporter											
	raw corals	W	Importer		20			40						60
			Exporter					8						8

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Tonga

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Lobophyllia* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals appear to have declined from 2008 onwards, based on importer reported data (Figure 3).

Direct exports of *Lobophyllia* from Tonga comprised low levels of trade to the EU-28 and moderate levels of trade to the rest of the world, primarily in live wild-sourced coral pieces, all of which were traded for commercial purposes (Table 5). No indirect exports of *Lobophyllia* originating in Tonga to the EU-28 were reported 2004-2013.

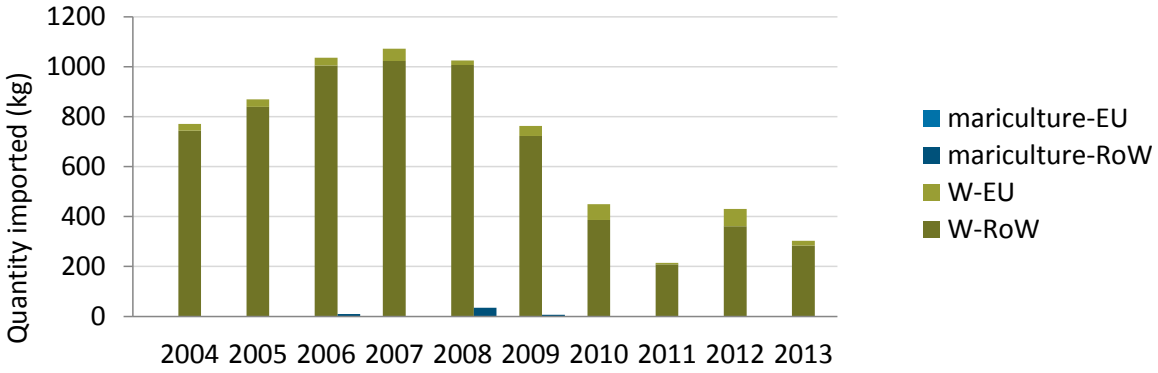


Figure 3: Main sources of direct imports of raw and live *Lobophyllia* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 5: Direct exports of *Lobophyllia* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. All trade was for commercial purposes. Tonga is not a Party to CITES and has not submitted annual reports. (Source 'mariculture' includes source C, F and R; source W includes U and source not specified.)

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	128	147	151	240	86	193	306	25	336	94	1706
RoW	live (kg)	W					1						1
	live	W	2794	3988	4821	4944	4600	3225	1873	977	1711	1377	30310
		I	34	16	15			3	2	2	18		90
		mariculture			49		171	33					253
	raw corals	W	290	30	20	6	100	100		13	15		574

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Lobophyllia are zooxanthellate[3] colonial corals (Green and Shirley, 1999; Veron, 2000) ranging through the western Atlantic, western and central Pacific, and Indian Oceans (Cairns *et al.*, 1999). They may reach sexual maturity at 3-8 years, based on most reef building corals having been reported to reach sexual maturity at that age (Wallace, 1999; in IUCN, 2014). They are hermaphroditic corals (Tomascik *et al.*, 1997), with linear growth rates of at least 1.6 cm/year (Green and Shirley, 1999).

The genus *Lobophyllia* comprises 10 species (UNEP-WCMC, 2012). Although *Lobophyllia* was described as very common (Veron, 1995) and *L. hemprichii* as very common (Veron, 1995) and frequently dominant (Veron, 2000), most species in this genus were reported to be uncommon (Veron, 2000).

Extensive reduction of coral reef habitat was identified as a threat for all species assessed by the IUCN Red List (IUCN, 2014). Bleaching was reported as a threat for seven species of *Lobophyllia*, with bleaching referred to as a general threat to corals in the remaining two species (IUCN, 2014). Disease was reported as a threat for three species (and as a general threat to corals), and COTS was reported as a threat for two species (IUCN, 2014). Anchor damage was also reported as a localized threat in Micronesia (Maynard, 2007).

L. hemprichii was considered one of the most suitable corals for husbandry in aquaria (Fosså and Nilsen, 1996; in Wabnitz *et al.*, 2003).

The genus was found to be among the top ten of the most commonly confiscated coral genera at Heathrow airport (UK) over the period 2003-2007, although the origin of these corals was not known (Jones, 2008).

Fiji

Six species were reported to occur in Fiji (UNEP, 2015).

Lobophyllia was reported from the Great Sea Reef (Cakaulevu) with massive colonies present at the perimeter of the reef area of Vatia Island; it was specifically noted from the Motuli Bawa Reef Flat where the reef rises abruptly, and from the Shallow Namotu Passage (*L. pachysepta*), and from the Mali Passage and Bellas Reef near Nadago Island (*L. corymbosa*) (Jenkins *et al.*, 2004).

Lobophyllia was also confirmed from the Volivoli Beach area near Rakiraki, Veri Levu with two species reported, *L. corymbosa* and *L. hemprichii*; they were recorded as rare or uncommon to rare, respectively (Fenner, 2006b).

During surveys in the Great Astrolabe Reef (GAR) and North Astrolabe Reefs (NAR) on the northeast and northern end of the Kadavu island group (70 km south of Viti Levu) in 2001, large massive *Lobophyllia* was recorded from the Dravuni Patch Reef (GAR), with four species recorded (*L. corymbosa, L. hataii, L. hemprichii* and *L. pachysepta*) (Obura and Mangubhai, 2003). Koven and Pauley (2007) also reported the occurrence of three and possibly four *Lobophyllia* species in the GAR.

The genus was recorded to occur in the Mamanuca Islands, with four species recorded; *L. corymbosa, L. hataii, L. hemprichii* and *L. robusta*, with all present at multiple sites (Fenner, 2006a).

Lobophyllia spp. was identified as one of the top twenty most common coral genera at both of the two main collection sites in Fiji (17th and 11th at AFF and WSI, respectively (Nand, 2008). At the Aquarium Fish Fiji (AFF) collection sites (including Beqa, Yanuca, Pacific Harbour and Serua reefs in the southern part of Fiji) the area of *Lobophyllia* cover was reported to be 340 789 m^2 (Nand, 2008).

Lobophyllia was the genus exported in the second highest numbers from Fiji in each

[3] with symbiotic zooxanthellae (dinoflagellate)

year 1999-2002, following *Acropora* (Lovell, 2003).

Area of *Lobophyllia* cover at the Walt Smith International collection site (Lautoka to the Yasawa group of islands in the western part of Fiji) was estimated at 3 098 592 m² (Nand, 2008). Relative percentage composition of *Lobophyllia* at the WSI collection area was calculated as 5.1% (Lovell and McLardy, 2008).

The IUCN classified one of the *Lobophyllia* species that occurs in Fiji as Near Threatened globally (*L. pachysepta*), four as Least Concern, and one species has not yet been assessed (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that two species of *Lobophyllia* may be common in Fiji and three are uncommon (one was not assessed). According to the IUCN (2014), four species of *Lobophyllia* that occur in Fiji are common globally, whilst one is uncommon (one not assessed) (figures based on estimates, due to differences in nomenclature). No global population trends are known for species of *Lobophyllia* (IUCN, 2014).

According to Lovell and McLardy (2008), Fiji's quota for *Lobophyllia* spp. included five species.

Solomon Islands

Nine species of *Lobophyllia* occur in the Solomon Islands (UNEP, 2015), all of which were recorded during a survey in 2004 (Green *et al.*, 2006). The genus was reported from Roviana (Western Province) (Albert *et al.*, 2012c). *Lobophyllia* was found to be among the most common genera on the deeper reef slopes of highly protected bays and inlets with low underwater visibility, representing 15 out of 114 sites surveyed in the country, and also present in sheltered and semi sheltered reefs in moderate clarity water, representing a further 14 sites (Green *et al.*, 2006). Approximately half of the species known from the Solomon Islands were considered to be widespread globally (IUCN, 2014).

The IUCN classified one of the *Lobophyllia* species that occur in the Solomon Islands as Endangered globally (*L. serratus*), three as Vulnerable, one as Near Threatened, and four as Least Concern (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that one species of *Lobophyllia* may be common in the Solomon Islands and one locally common, while seven are uncommon.

In Roviana (Western Province), white syndrome was found to be over-represented relative to the abundance of *Lobophyllia* (Albert *et al.*, 2012c).

Tonga

Two species have been recorded from Tonga (*L. corymbosa* and *L. hemprichii*) (UNEP, 2015) both of which are classified as Least Concern (IUCN, 2014). Adjeroud *et al.* (2013) recorded *Lobophyllia* as one of the 20 most abundant coral genera off Tongatapu in 2006, with mean relative abundance of adults and juvenile recorded at around 1% and 2% respectively. Massive *Lobophyllia* was reported from several sites around Vava'u, including Kapa/Pangaimotu and sheltered eastern reefs; the genus was recorded from Vava'u as rare/occasional (Holthus, 1996). *L. hemprichii* was also recorded from Funafuti (Lovell and Palaki, 2002).

Based on the global assessments by Veron (2000), and IUCN (2014), it could be inferred *L. corymbosa* is common in Tonga, and *L. hemprichii* is very common or may be a dominant species. Globally, population trends for these two species are unknown (IUCN, 2014).

SCLERACTINIA: MUSSIDAE

Acanthastrea spp. II/B

UNDER REVIEW:	Tonga
SPECIES (IUCN):	5 species: 2 VU, 2 NT, 1 LC.
EU DECISIONS : (range States under review only)	Current 4.6 (b) import suspension for wild-sourced *Acanthastrea hemprichii* in place since 21/05/2009. Previous negative opinion formed on 20/02/2007. Current negative opinion for *Acanthastrea amakusensis* and *A. ishigakiensis* from Tonga formed on 20/02/2007 (although occurrence in the country unconfirmed). Current positive opinion formed on 15/09/2008 for *A. echinata* and *A. hillae* replacing previous negative opinions formed on 20/02/2007. An import suspension under Article 4.6 (b) was in place for *Acanthastrea* spp., *A. bowerbanki, A. brevis, A. faviaformis A. lordhowensis* and *A. maxima, A. minuta, A. regularis, A. rotundoflora, and A. subechinata* from 03/09/2008 to 21/05/2009. Previous negative opinions for the individual species (but not the genus) were formed on 20/02/2007.

Trade patterns

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Acanthastrea* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals have shown an overall decline after peaking in 2008, according to importer data (Figure 1).

Direct exports of *Acanthastrea* from Tonga comprised low levels of trade to the EU-28 and moderate levels of trade to the rest of the world 2004-2013, mainly in live wild-sourced pieces, all of which were traded for commercial purposes (Table 2). Indirect exports of *Acanthastrea* originating in Tonga to the EU-28 comprised 10 live wild-sourced coral pieces commercially exported via the United States to Denmark in 2013.

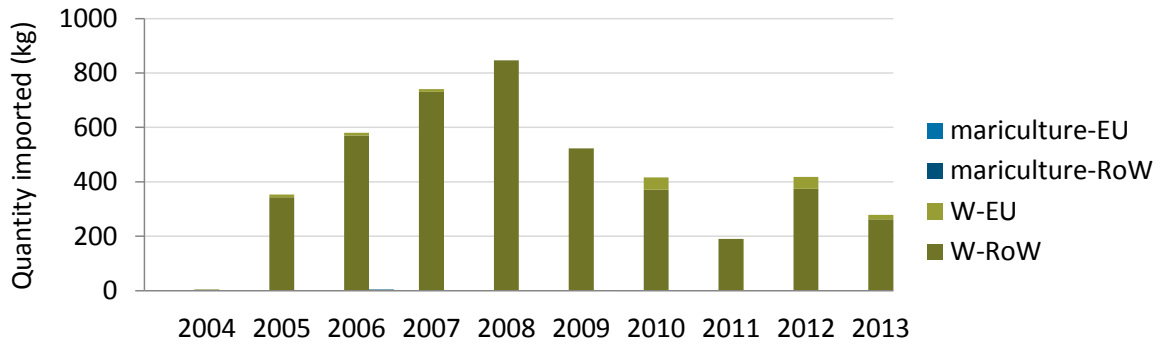


Figure 1: Main sources of direct imports of raw and live *Acanthastrea* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and has not submitted annual reports. Quantities reported

in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 2: Direct exports of *Acanthastrea* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. All trade was for commercial purposes. Tonga is not a Party to CITES and has not submitted annual reports. Source 'mariculture' contains source C; source W includes source U and unspecified.

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W		50	50	50			215		213	77	655
RoW	live (kg)	W			18	15							33
	live	W	22	1666	2658	3472	3976	2537	1804	922	1733	1273	20063
		I					11	67	4	4	7		93
		mariculture			20			11					31
	raw corals	W			8		47				30		85

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Acanthastrea are colonial, zooxanthellate coral with massive, encrusting or flat colonies (Veron, 2000). The genus is widespread in the Indo-Pacific (Veron, 2000) and is comprised of 14 species (UNEP-WCMC, 2012).

Species may reach sexual maturity at 3-8 years based on most reef-building corals having been reported to reach sexual maturity at that age (Wallace, 1999). The IUCN have assessed 12 species of *Acanthastrea* and classified one as Least Concern, five as Near Threatened and six as Vulnerable, all with unknown population trends (IUCN, 2014). *Acanthastrea echinata* was reported to be targeted for the aquarium trade (Turak *et al.*, 2014a).

Tonga

Five species of *Acanthastrea* have been recorded from Tonga (UNEP, 2015). Three of the Tongan species *A. amakusiensis, A. hillae* and *A. ishigakiensis* were reported to inhabit shallow or sheltered reef environments and two were reported to occur in most reef environments (Veron, 2000). Two species: *A. hemprichii* and *A. ishigakiensis* were classified by the IUCN as Vulnerable due to declines in overall coral reef habitat and the susceptibility of these species to bleaching and disease (Turak *et al.*, 2014b). The IUCN classified two further species that occur in Tonga as Near Threatened, and one as Least Concern (IUCN, 2014). *A. ishigakiensis* was reported to be restricted to a narrow depth range (Turak *et al.*, 2014b). Holthus (1996) noted from surveys of Vava'u that the genus was rare although it was recorded from four of the 18 sites surveyed. *Acanthastrea* was reported to be the 13th most abundant genus in a survey of sites around Tongatapu in 2006 with adult and juvenile colonies reported to account for approximately 2% and 3% of colonies respectively (Adjeroud *et al.*, 2013).

Based on global assessments in Veron (2000), it could be inferred that one species of *Acanthastrea* that occurs in Tonga is common and three are uncommon (one was not assessed). Of the Tongan *Acanthastrea* species, two species were considered globally common, two were considered uncommon and one was not assessed (IUCN, 2014)(figures based on estimates, due to differences in nomenclature). Globally, the population status of four of the *Acanthastrea* spp. which occur in Tonga is unknown, with one species not yet assessed (IUCN, 2014).

SCLERACTINIA: PECTINIIDAE

Oxypora spp. II/B

UNDER REVIEW:	Tonga
SPECIES (IUCN):	2 species: 2 LC
EU DECISIONS : (range States under review only)	Current no opinion ii) for *Oxypora lacera* formed on 27/03/2007.

Trade patterns

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Oxypora* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, global trade in wild-sourced corals has shown an overall decline from 2009 onwards, based on importer reported data (Figure 1).

Direct exports of *Oxypora* from Tonga comprised very low levels of trade to the EU-28 and relatively low levels to the rest of the world, the vast majority comprising live, wild-sourced coral pieces exported for commercial purposes (Table 1). No indirect exports of *Oxypora* originating in Tonga to the EU-28 were reported 2004-2013.

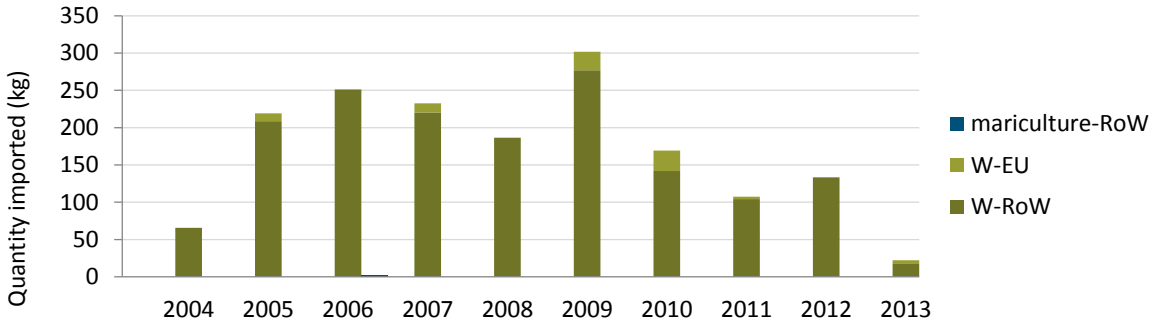


Figure 1: Main sources of direct imports of raw and live *Oxypora* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 1: Direct exports of *Oxypora* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013, as reported by importers. All trade was for commercial purposes. Tonga is not a Party to CITES and has not submitted annual reports. (Source 'mariculture' includes trade reported as source C, F and R; source W includes U and source not specified).

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W		50	4	60		120	134	15		25	408
RoW	live	W	319	1013	1188	1069	905	1344	688	506	647	83	7762
		I		1				18	3	1			23
		mariculture			11								11
	raw corals	W			10								10

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Oxypora are colonial, zooxanthellate corals with laminar colonies composed of thin plates (Veron, 2000). Five species are known worldwide (UNEP-WCMC, 2012), two of which are restricted to the Red Sea (Veron, 2000). Species may reach sexual maturity at 3-8 years based on most reef-building corals having been reported to reach sexual maturity at that age (Wallace, 1999). *Oxypora* spp. can tolerate shaded habitats (Dinesen, 1983) and slow growth rates of 0.2 and 0.5 mm/month have been reported for the genus (Babcock and Mundy, 1996).

Tonga

Two species have been reported from Tonga (UNEP, 2015). Both species: *Oxypora glabra* and *O. lacera*, are widespread in the Indo-Pacific (Veron, 2000) and are mainly found on shallow, protected reef slopes from 3-40 m (Sheppard *et al.*, 2014) and both have be classified by the IUCN as Least Concern (IUCN, 2014). *O. lacera* was reported to be distinctive and usually inconspicuous because of its cryptic colouration (Sheppard *et al.*, 2014). It was reported to occur in shaded situations or in deep water (Babcock and Mundy, 1996).

Oxypora was recorded around Tongatapu but without details of location or abundance (van Woesik, 1997), but it was not reported in other surveys around Vava'u (Holthus, 1996) or in more recent surveys around Tongatapu (Adjeroud *et al.*, 2013).

Based on global assessments in both Veron (2000) and IUCN (2014), it could be inferred that both *O. glabra O. lacera* are common in Tonga. Globally, the population status of these species is unknown (IUCN, 2014).

SCLERACTINIA: PECTINIIDAE

Pectinia spp. II/B

UNDER REVIEW:	Fiji
SPECIES (IUCN):	3 species : 2 VU and 1 NT
EU DECISIONS : (range States under review only)	Current no opinion i) for *Pectinia lactuca* from Fiji formed on 02/12/2011. Previous positive opinion for this species formed on 22/07/1997.

Trade patterns

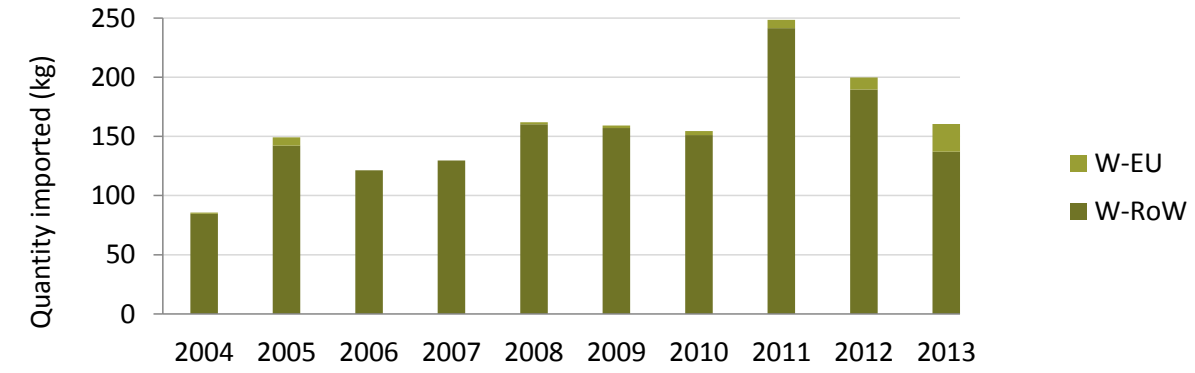
Between 2004 and 2014, Fiji published export quotas for *Pectinia* at the genus level for all years with the exception of 2006. According to data reported by Fiji, exports may have exceeded quotas in 2008, 2009 and 2010 (Table 1), although according to data reported by importers, trade has remained within quota for all years.

Direct exports of *Pectinia* to the EU-28 comprised very low levels of trade in live wild-sourced coral pieces, traded for commercial purposes; exports to the rest of the world comprised moderate levels of principally commercial trade in live, wild-sourced coral pieces (Table 2). When conversion factors are applied to convert all trade reported in pieces to kilograms, global direct exports peaked in 2011 and subsequently declined, according to importer data (Figure 1). According to data reported by Fiji, trade levels peaked in 2010 but showed a notable decline in 2011.

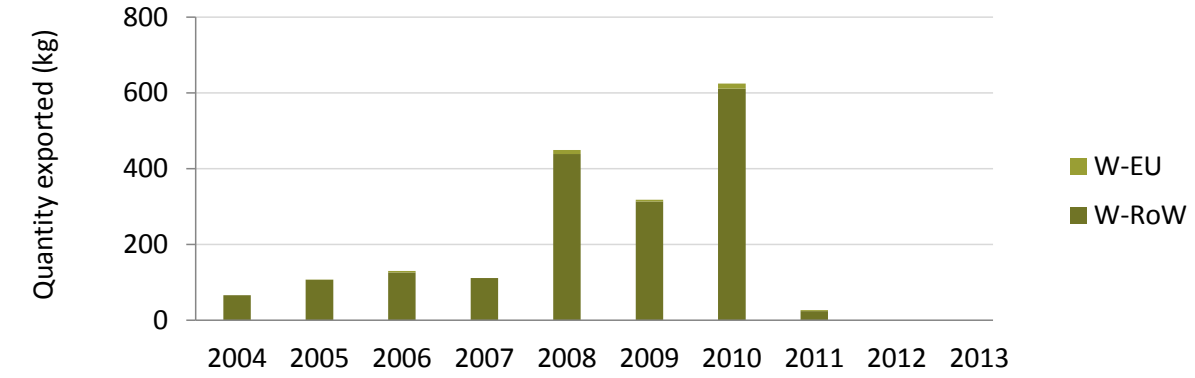
Indirect exports of *Pectinia* originating in Fiji to the EU-28 comprised 10 live wild-sourced coral pieces exported via Malaysia to France in 2013.

Table 1: CITES export quotas for wild-sourced live and dead *Pectinia* (in number of pieces) from Fiji, and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	605	1210		1210	907	907	1500	1500	1500	1500	1500
Importer	415	665	589	629	786	538	615	948	786	767	
Exporter	321	519	631	543	2180	1545	3031	131			



a)



b)

Figure 1: Direct exports of raw and live *Pectinia* (in kg, converted from number of pieces where appropriate) from Fiji to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b)**Fiji.** Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 2: Direct exports of *Pectinia* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. All trade was wild-sourced. Fiji has not yet submitted annual reports for the years 2012 or 2013.

Importer	Term (unit)	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	T	Importer	5	34			8	10	16	34	49	113	269
			Exporter		1	18		50	25	65	12			171
RoW	live	T	Importer	410	591	589	629	778	368	507	816	612	604	5904
			Exporter	321	518	613	543	2130	1520	2966	119			8730
	raw corals (kg)	T	Importer								25			25
			Exporter											
	raw corals	T	Importer		40				160	92	95	125	25	537
			Exporter											
		other	Importer								3		25	28
			Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Pectinia are zooxanthellate[4] colonial corals (Veron, 2000), which may reach sexual maturity at 3-8 years, based on most reef building corals having been reported to reach sexual maturity at that age (Wallace, 1999). *Pectinia* have a wide global distribution (Veron, 2000) and occur in most reef habitats, in shallow and deep areas (Wood, 1983 cited in Sheppard *et al.*, 2014). *Pectinia* were found to be particularly abundant in turbid coastal areas, which was thought to indicate their ability to reject sedimentation (Tomascik *et al.*, 1997). In some areas, *Pectinia* has shown a high susceptibility to bleaching (Baird *et al.*, 2000).

Fiji

The genus *Pectinia* comprises eight species, three of which have been confirmed to occur in Fiji: *P. alcicornis, P. lactuca* and *P. paeonia* (UNEP-WCMC, 2012). All three are widely distributed within the Indo-Pacific (IUCN, 2014).

Pectinia species were reported in Fiji from the Great Sea Reef (Cakaulevu), with *P. paeonia* reported from Tilagica Island (back barrier reef) and abundant small *P. paeonia* reported at Nananu Islet (off Mali Island); *P. lactuca* was noted to be abundant at Motuli Bawa (inner patch reef) (Jenkins *et al.*, 2004). Lots of small *Pectinia* were also reported at Talailau Island fringing and patch reefs (Jenkins *et al.*, 2004).

P. alcicornis was recorded to occur at ten sites within the Mamanuca Islands (Fenner, 2006x) and from the Volivoli Beach area near Rakiraki, Veri Levu (Fenner, 2006b). Koven and Pauley (2007) reported the occurrence of *P. paeonia* in the Great Astrolabe Reefs.

Pectinia spp. was not identified as one of the most common coral genera at the two main collection sites in Fiji (Nand, 2008). According to Lovell and McLardy (2008), all three *Pectinia* species that occur in Fiji are included within the export quota.

Based on global assessments in Veron (2000), it could be inferred that two of the three species of *Pectinia* that occur in Fiji may be common in the country (*P. lactuca* and *P. paeonia*); whereas *P. alcicornis* is globally uncommon.

P. lactuca was classified as Vulnerable by the IUCN as although it was considered to be common and widespread globally and found in most reef environments, it was noted to be subject to a number of threats, including harvest pressure (IUCN, 2014). *P. alcicornis* was also classified as Vulnerable, and was considered to be widespread but usually uncommon; this species was noted as particularly susceptible to bleaching, harvest for trade and reduction of coral reef habitat (Sheppard *et al.*, 2014). *P. paeonia* was classified as Near Threatened; it was considered to be widespread and common throughout its range and moderately susceptible to threats including harvest for trade (Sheppard *et al.*, 2014). The population trend for all three species is unknown (IUCN, 2014).

[4] with symbiotic zooxanthellae (dinoflagellate)

SCLERACTINIA: POCILLOPORIDAE

Pocillopora spp. II/B

UNDER REVIEW:	Fiji, Solomon Islands, Tonga
SPECIES (IUCN):	**Fiji**: 7 species: 1 VU, 1 NT and 5 LC **Solomon Islands:** 2 VU, 1 NT, 5 LC **Tonga:** 5 species: 1 NT, 4 LC
EU DECISIONS : (range States under review only)	**Fiji:** Current no opinion i) for *Pocillopora capitata, P. eydouxi, P. verrucosa* formed on 02/12/2011 and for *P. damicornis* formed on 28/05/2013. Previous positive opinions for these species formed on 22/07/1997. **Tonga:** Current no opinion i) for *P. eydouxi* formed on 20/12/2011 and for *P. verrucosa* formed on 28/05/2013. Previous positive opinions for these species formed on 22/07/1997.

Trade patterns

Fiji

Between 2004 and 2014, Fiji published CITES export quotas (in number of pieces) for live and dead wild-sourced corals at genus level for all years with the exception of 2006. Trade appears to have been within quota in all years, with the exception of 2010, when the quota was apparently exceeded according to data reported by Fiji (Table 1).

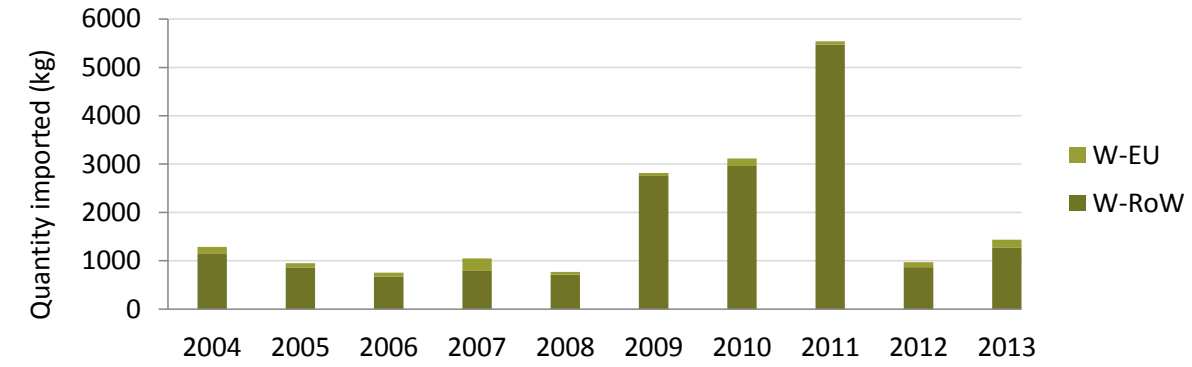
When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global exports of *Pocillopora* from Fiji increased from initially low levels to a peak in 2011, with a subsequent drop in trade in 2012, according to importer data (Figure 1). A similar trend is also reflected in the trade data reported by Fiji.

Direct exports from Fiji comprised moderate levels of trade to the EU-28 and relatively high levels of trade to the rest of the world, mainly in wild-sourced live coral pieces traded for commercial purposes (Table 2). In addition, there were moderate levels of trade in wild-sourced raw coral pieces to the rest of the world from 2008 onwards.

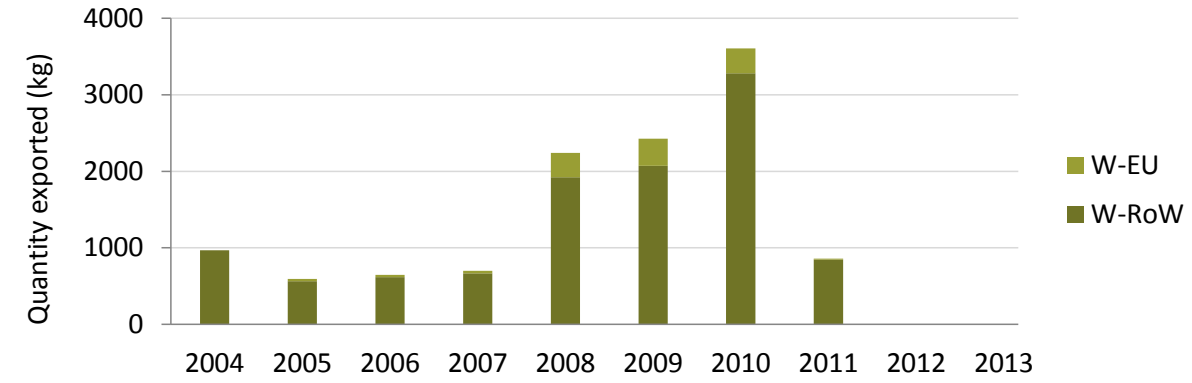
Indirect exports of *Pocillopora* originating in Fiji to the EU-28 consisted of very low levels of trade in live wild-sourced coral pieces, the majority of which were exported via the United States, for commercial purposes (Table 3).

Table 1: CITES export quotas for wild-sourced live and dead *Pocillopora* (in number of pieces) from Fiji, and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	33202	66404		66404	49803	49803	15000	15500	15500	15500	15500
Importer	5760	4370	3661	5078	3269	7695	11744	13251	3797	4245	
Exporter	4695	2876	3141	3400	10867	11777	17485	4172			



a)



b)

Figure 1: Exports of raw and live *Pocillopora* (in kg, converted from number of pieces where appropriate) from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported a) the **importers** and b) **Fiji.** Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 2: Direct exports of *Pocillopora* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013. (Source W includes source W, U and unspecified. Purpose 'other' includes all purposes other than T (commercial trade)).

Importer	Term (unit)	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	Live (kg)	W	T	Importer											
				Exporter							672				672
	live	W	T	Importer	691	424	386	1252	280	324	764	322	495	755	5693
				Exporter		141	148	170	1545	1730	1562	65			5361
			other	Importer						85					85
				Exporter											
	raw corals	W	T	Importer									4		4
				Exporter											
RoW	Live (kg)	W	T	Importer						175					175
				Exporter						280	5111				5391
	live	I		Importer			55				336				391
				Exporter											
		W	T	Importer	4748	3776	3269	3826	2671	3724	8670	3284	2597	1470	38035
				Exporter	4695	2735	2993	3230	9322	10047	15923	4107			53052
			other	Importer			1								1
				Exporter											
	raw corals (kg)	I		Importer						314.045					314.045
				Exporter											

Importer	Term (unit)	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
		W	T	Importer								100			100
				Exporter											
			other	Importer							0.25				0.25
				Exporter											
	raw corals	W	T	Importer	321	170			318	3562	2310	9245	651	1920	18497
				Exporter											
			other	Importer			5					400	50	100	555
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Table 3: Indirect exports of *Pocillopora* originating in Fiji to the EU-28, 2004-2013. (Source W includes source W, U and unspecified).

Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
live	W	T	Importer				20				5		13	38
			Exporter				20							20

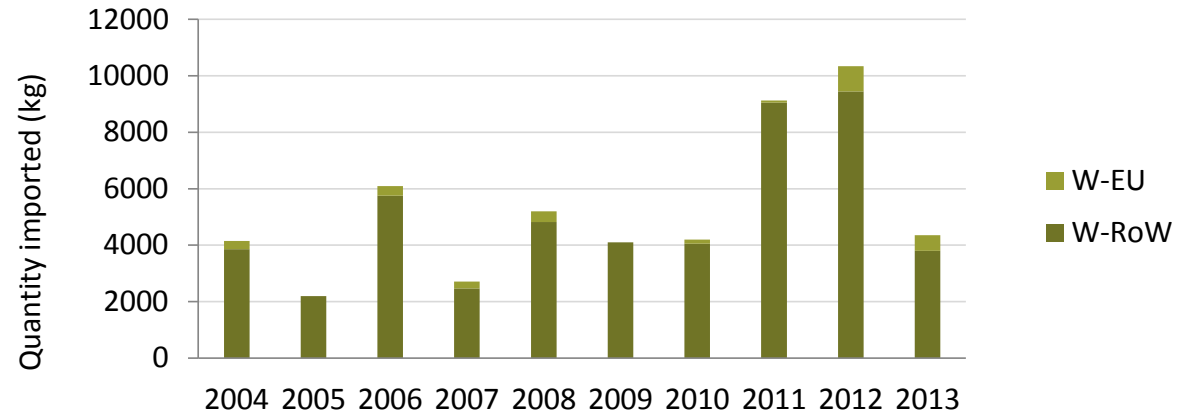
Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Solomon Islands

Solomon Islands became a Party to CITES in 2007 and has submitted annual reports for 2008-2010 only. No CITES export quotas have been published for *Pocillopora* from Solomon Islands.

When conversion factors are applied to convert all trade reported in pieces to kilograms, global direct exports of *Pocillopora* from the Solomon Islands appear to be fluctuating; trade peaked in 2012 and then declined by more than half in 2013, according to importer data (Figure 2). Trade levels reported by Solomon Islands show an increase in trade 2008-2010.

Direct exports of *Pocillopora* from the Solomon Islands to the EU 2004-2013 consisted of wild-sourced raw corals traded for commercial purposes (Table 4). Direct exports to the rest of the world primarily comprised relatively high levels of commercially exported wild-sourced raw corals; in addition, notable levels of live wild-sourced coral pieces were also directly exported to the rest of the world for commercial purposes. Indirect exports of *Pocillopora* originating in the Solomon Islands principally comprised very low levels of wild-sourced raw corals (<10) exported via the United States for commercial purposes.



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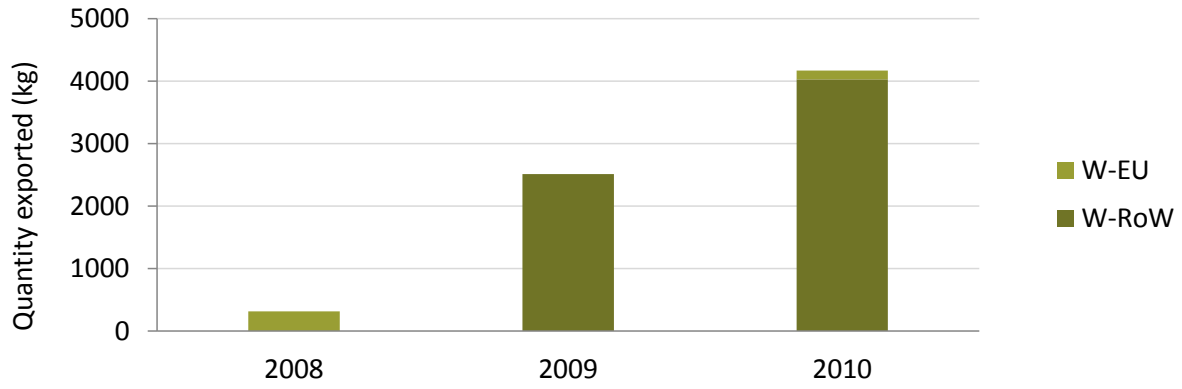


b)

Figure 2: Main sources of direct imports of raw and live *Pocillopora*(in kg, converted from number of pieces where appropriate) from Solomon Islands to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Solomon Islands.** Solomon Islands became a Party to CITES in 2007, and have submitted annual reports for 2008-2010 only. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 4: Direct exports of *Pocillopora* from Solomon Islands to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Solomon Islands became a Party to CITES in 2007, and have submitted annual reports for 2008-2010 only. (Source W includes source W, U and unspecified. Purpose 'other' includes all purposes other than T (commercial trade)).

Importer	Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	raw corals	W	T	Importer	574		670	463	739		276	159	1773	1099	5753
				Exporter					614		276				890
RoW	live (kg)	W	T	Importer					6						6
				Exporter											
	live	W	T	Importer	2250	105	98	44	29	151	32	99	4	168	2980
				Exporter						989	26				1015
	raw corals (kg)	W	T	Importer								20			20
				Exporter											
	raw corals	W	T	Importer	6672	4281	11291	4843	9461	8014	7987	17730	18588	7400	96267
				Exporter					1	4544	7921				12466
			other	Importer							20				20
				Exporter											
		I		Importer									25		25
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Tonga

Tonga is not a Party to CITES and therefore has not published CITES export quotas for *Pocillopora* or submitted annual reports. Trade data analysed below is reported by importers.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced corals peaked in 2007 and subsequently declined according to importer data (Figure 3).

Direct exports of *Pocillopora* from Tonga comprised very low levels of trade to the EU and relatively low levels of trade to the rest of the world, mainly in live wild-sourced coral pieces, all of which were exported for commercial purposes (Table 5). No indirect exports of *Pocillopora* originating in Tonga to the EU were reported 2004-2013.

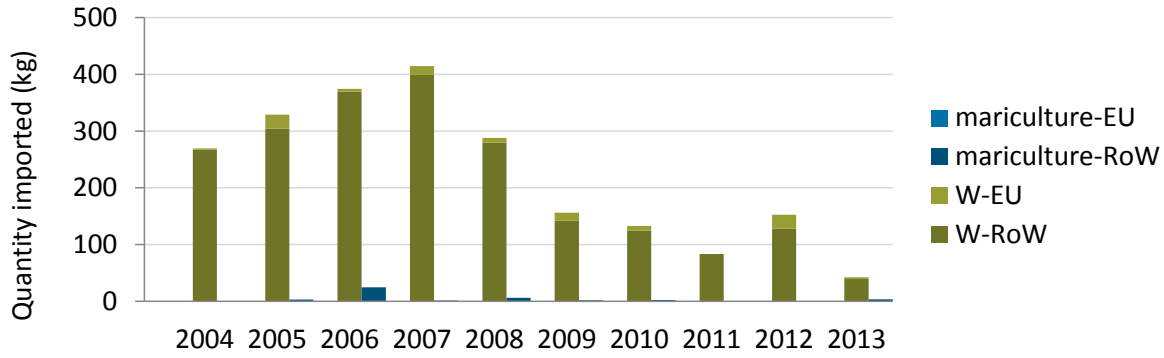


Figure 3: Main sources of direct imports of raw and live *Pocillopora* (in kg, converted from number of pieces where appropriate) from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by the **importers.** Tonga is not a Party to CITES and has not submitted annual reports. Quantities reported in number of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 5: Direct exports of *Pocillopora* from Tonga to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. All trade was for commercial purposes. Tonga is not a Party to CITES and has not submitted annual reports. (Source 'mariculture' is primarily source 'C' but also includes trade recorded as source F and R; source W contains source W, U and unspecified.)

Importer	Term	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	W	8	120	24	75	41	70	42		118	15	513
RoW	live (kg)	W			3								3
	live	W	792	1406	1773	1937	1074	406	349	361	406	172	8676
		I	4								2		6
		mariculture		15	119	5	29	8	9			17	202
	raw corals	W	180	25	2		100	100	90	15	77	6	595

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Pocillopora are zooxanthellate[5] colonial corals (Green and Shirley, 1999). Sexual maturity was thought to be reached at around 18 cm (six years) (Bruckner, 2002).

Pocillopora are widely distributed, possibly as a result of "rafting"; they can attach to floating objects and be carried long distances (Veron, 2000). Habitats range from exposed reefs to protected reef slopes and abundance can be rare to common (Veron, 2000). Globally, 17 species are recognized (UNEP-WCMC, 2012). The IUCN have assessed one species as Endangered, five species as Vulnerable, one species as Near Threatened, eight species as Least Concern and two species as Data Deficient (IUCN, 2014).

Wabnitz (2003) considered *Pocillopora* spp. to have both relatively high growth and recruitment rates. The genus was considered to generally be suitable for aquarium husbandry and for continued collection from the wild (Borneman, 1999; 2005). In mariculture, success has been achieved with fast growing and small-polyp corals such as *Pocillopora* (Wabnitz *et al.*, 2003; Wood *et al.*, 2012).

Pocillopora was considered one of the dominant taxa traded for curios (Bruckner, 2002). The genus has been shown to be susceptible to bleaching (Wilkinson, 2004)

Fiji

Seven of the 17 species of *Pocillopora* have been confirmed to occur in Fiji (UNEP-WCMC, 2012). *Pocillopora* was reported to be a common genus in Fiji (Nand, 2008). Coral cover was reported to be dominated by *Pocillopora* at multiple sites surveyed in Fiji including: Beqa Barrier Reef (outer sides of channels and outer reef slope), Suva Barrier Reef (southern Viti Levu), Caqalai Island (western Viti Levu), Wakaya Island (eastern Viti Levu), Savusavu Bay and Rainbow Reef (southern Vanua Levu) (Cumming *et al.*, 2000).

The genus was recorded to occur in the Mamanuca Islands, with four species recorded; *P. damicornis, P. eydouxi, P. meandrina* and *P. verrucosa*; all four were reported from multiple locations, with *P. damicornis* being particularly common and widespread across sites surveyed (Fenner, 2006a).

Three species of *Pocillopora* were confirmed from the Volivoli Beach area near Rakiraki, Veri Levu; all were uncommon to rare (Fenner, 2006b). In the Great Sea Reef (Cakaulevu), *Pocillopora* (as well as *Montipora*) dominated outer barrier reefs, with *P. eydouxi and P. meandrina* noted in abundance (Jenkins at al., 2004). Large colonies of *Pocillopora* corals were recorded from the Vatia Islet (off Kia Island); *P. verrucosa* was specifically noted from the Nuku Passage and Mali Passage, as was *P. eydouxi* from the Raviravi Back Reef and Sausau and Tilagica Passages, *P. damicornis* from the Mali and Sausau Passages and *P. meandrina* from the Cakaulevu Outer Barrier Reef (Jenkins *at al.*, 2004).

During surveys in the Great Astrolabe Reef (GAR) and North Astrolabe Reefs (NAR) on the northeast and northern end of the Kadavu island group (70 km south of Viti Levu) in 2001, three species of *Pocillopora* were reported with one or more species reported as common at the Herald Passage (western barrier outer slope) and NAR Patch Reef and South Lagoon (Obura and Mangubhai, 2003). Koven and Pauley (2007) also reported the occurrence of four *Pocillopora* species in the Great Astrolable reefs.

Pocillopora spp. was identified as the second most common coral genus and fifth most common genus at the two main collection sites in Fiji (AFF and WSI, respectively) (Nand, 2008). At the Aquarium Fish Fiji (AFF) collection sites (including Beqa, Yanuca, Pacific Harbour and Serua reefs in the southern part of Fiji) the area of

[5] with symbiotic zooxanthellae (dinoflagellate)

Pocillopora cover was reported to be 4 455 934 m² (Nand, 2008).

At the AFF collection site, *Pocillopora* spp. was recorded as an abundant genus with an estimated 33.5 million colonies, of which 0.003% was calculated to have been exported based on the 2007 export levels (Lovell and Whippy-Morris, 2008).

The occurrence of *Pocillopora* colonies that would qualify for collection were recorded from the centre of the Walt Smith International collection site; 21 and 23 colonies from the East and West Motunikeasulua Reefs respectively, 30 from the Cakauvakababa-i-Yata Reef, and two from the Nakuba Reef (Lovell, 2003a).

Area of *Pocillopora* cover at the Walt Smith International collection site (Lautoka to the Yasawa group of islands in the western part of Fiji) was estimated at 7 845 965 m² (Nand, 2008). Relative percentage composition of *Pocillopora* at the WSI collection area was calculated as 8.7% (Lovell and McLardy, 2008).

Pocilloporidae had the second highest recruitment rates (30.3%) at various sampling sites on Fijian reefs (Quinn and Kojis, 2008).

The IUCN classified one of the *Pocillopora* species that occurs in Fiji as Vulnerable globally (*P. danae*), one as Near Threatened (*P. eydouxi*), and five as Least Concern (IUCN, 2014). The population trend for all species was unknown (IUCN, 2014). Based on global assessments in both Veron (2000) and IUCN (2014), it could be inferred that four of the seven species of *Pocillopora that* occur in Fiji may be common; the remaining three may be uncommon.

Pocillopora spp. were reported to be amongst the most popular species for the curio trade in Fiji (Lovell and Tumuri, 1999). According to Lovell and McLardy (2008), Fiji's quota for *Pocillopora* spp. included six species.

Solomon Islands

Eight of the 17 species of *Pocillopora* occur in the Solomon Islands (UNEP, 2015), all of which were recorded during a survey in 2004 (Green *et al.*, 2006). The genus was reported from Mbanika Island (Central Province), Vangunu Island (Western Province), Ghizo Island (Western Province), and South Guadalcanal (Morton, 1973), Marau Sound (Guadalcanal Province) (Morton, 1974) and Roviana (Western Province) (Albert *et al.*, 2012c).

The IUCN classified two of the *Pocillopora* species that occur in Solomon Islands as Vulnerable globally, one as Near Threatened and five as Least Concern (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that three species of *Pocillopora* that occur in the Solomon Islands are common, one may be locally common, one is common on exposed reefs, and three are uncommon.

The genus was reported to be harvested in the Solomon Islands for the curio trade (Teitelbaum, 2007). *Pocillopora* were found to be affected by a widespread but relatively low severity bleaching event during a survey in Roviana (Western Province) in 2011 (Albert *et al.*, 2012c). In the same location, white syndrome was found to be strongly over-represented relative to the abundance of *Pocillopora* (Albert *et al.*, 2012c).

Tonga

Five species of *Pocillopora* are reported from Tonga (UNEP, 2015). In a survey of reefs off Vava'u, Holthus (1996) reported four species of *Pocillopora* including very large mounds of *P. damicornis.* This species was recorded from 36 of the 50 locations examined and generally noted as occasional or common although at some locations in shallow water it was the dominant coral. *P. meandrina* was recorded from 20 locations mainly as occasional or common. *P. verrucosa* and *P. eydouxi* were reported from 12 and 13 locations respectively (Holthus, 1996). Van Woesik (1997) reported *P. meandrina* from Atata reef and *P. damicornis* from Fukave reef off Tongatapu. In surveys around Tongatapu in 2006 *Pocillopora* was reported

to be 10th most abundant coral genus with relative abundance of adult and juvenile colonies was reported to be around 3% and 2% respectively (Adjeroud *et al.*, 2013).

The IUCN classified four of the *Pocillopora* species that occur in Tonga as Least Concern globally and one as Near Threatened (IUCN, 2014). Based on global assessments by both Veron (2000) and IUCN (2014) it could be inferred that four of the five species of *Pocillopora* that occur in Tonga may be common; the remaining species may be uncommon.

SCLERACTINIA: POCILLOPORIDAE

Seriatopora spp. II/B

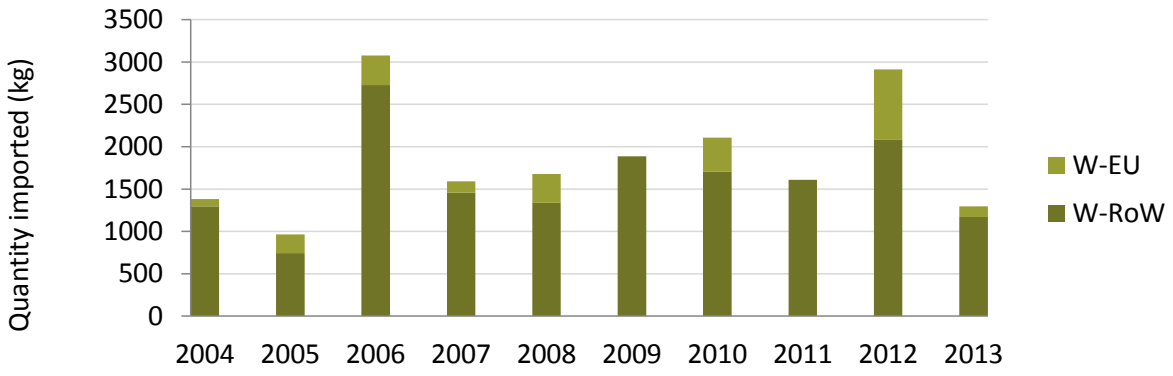
UNDER REVIEW:	Solomon Islands
SPECIES (IUCN):	6 Species: 2VU, 2NT, 2LC
EU DECISIONS : (range States under review only)	Current no opinion ii) formed on 28/05/2013 for *S. hystrix* from the Solomon Islands; this replaced a previous positive opinion formed on 22/07/1997.

Trade patterns

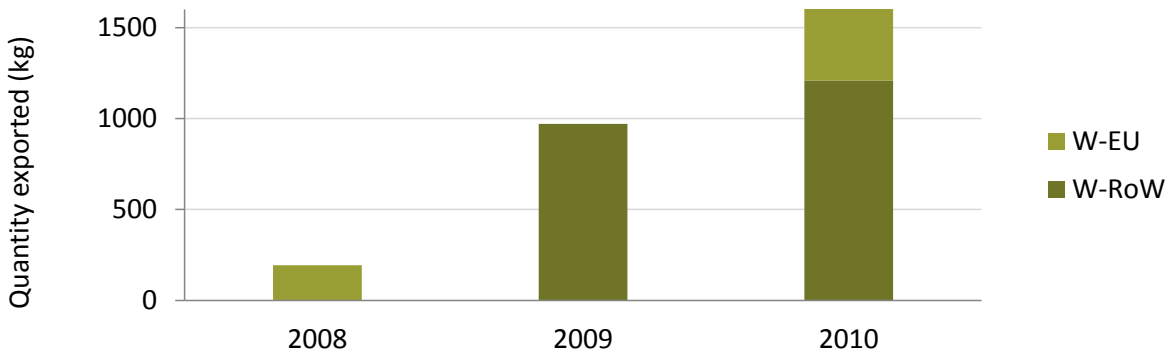
The Solomon Islands became a Party to CITES in 2007 and has submitted annual reports for 2008-2010 only. Solomon Islands has not published any CITES export quotas for *Seriatopora*.

When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global exports of wild-sourced corals fluctuated 2004-2013, with spikes in trade levels in 2006 and 2012, according to importer data. According to data reported by the Solomon Islands, trade increased every year 2008-2010 but was at much lower levels than was reported by importers in those years (Figure 1).

Direct exports of *Seriatopora* from Solomon Islands to the EU consisted of wild-sourced raw corals traded for commercial purposes; direct exports to the rest of the world also primarily comprised moderate levels of wild-sourced raw coral pieces for commercial purposes (Table 1). Indirect exports of *Seriatopora* originating in Solomon Islands to the EU 2004-2013 comprised one wild-sourced raw coral exported via the United States to Italy for commercial purposes in 2010.



a)



b)

Figure 1: Main sources of direct exports of raw and live *Seriatopora* (in kg, converted from number of pieces where appropriate) from Solomon Islands to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Solomon Islands.** Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 1: Direct exports of *Seriatopora* from Solomon Islands to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Purpose 'other' includes all purposes other than T (commercial).

Importer	Term	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	raw corals	W	T	Importer	170	435	690	260	667		790		1624	243	4879
				Exporter					382		790				1172
RoW	live	W	T	Importer	718	238	99	24	10	150		16	3	198	1456
				Exporter						533					533
		I	T	Importer								2			2
				Exporter											
	raw corals	W	T	Importer	2262	1368	5330	2861	2631	3654	3361	3164	4107	2227	30965
				Exporter						1695	2380				4075
			other	Importer						1	20				21
				Exporter											
		I	T	Importer									82		82
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Seriatopora ranges through the Indian Ocean and the western and central Pacific Ocean (Cairns *et al.*, 1999). The genus was reported to be very common (Veron, 1995). Two species were reported to be common globally; whereas four were reported to be uncommon or usually uncommon (Veron, 2000).

Spawning was reported to be seasonal in the central Great Barrier Reef and Okinawa, but year-round in Palau and Enewetak (Fan and Dai, 1996, and references therein) and to involve mixed mating, self-fertilization (Sherman, 2008) and asexual polyp bailout (Sammarco, 1982; Fan and Dai, 1996). Adaptation to local environments by *S. hystrix* was thought to have led to genetic isolation between corals from habitats within a reef, while specimens inhabiting similar habitats separated by considerable distances were found to show genetic similarity (Bongaerts *et al.*, 2010).

McClanahan *et al.* (2004) considered *S. hystrix* to be highly susceptible to temperature stress. Large-scale bleaching in 1998 was found to have severely affected *Seriatopora* spp. in the Seychelles (Spencer *et al.*, 2000), and *S. hystrix* in the Great Barrier Reef, Australia (Underwood *et al.*, 2007), and Japan (Loya *et al.*, 2001). However, *S. hystrix* was found to often be one of the first species to recolonize disturbed areas (Underwood *et al.*, 2007).

Solomon Islands

The genus *Seriatopora* comprises six species (UNEP-WCMC, 2012), which were all reported to occur in the Solomon Islands during a survey in 2004 (Green *et al.*, 2006). The genus was reported from Roviana (Western Province) (Albert *et al.*, 2012c).

The IUCN Red List classified two of the species that occur in the Solomon Islands as Vulnerable globally, two as Near Threatened and two as Least Concern (IUCN, 2014). Based on global assessments in Veron (2000), it could be inferred that two species may be common in the Solomon Islands, and four are uncommon.

Seriatopora spp. corals were reported to be primarily harvested in the Central and Guadalcanal Provinces, with specimens then dried and bleached in the sun prior to being shipped internationally as curios (Teitelbaum, 2007).

Mariculture of the genus was reported to be established in the country (Delbeek, 2001).

80 SCLERACTINIA: POCILLOPORIDAE

Stylophora spp. II/B

UNDER REVIEW:	Fiji
SPECIES (IUCN):	**Fiji:** 3 species: 1 NT, 1 LC, 1 not assessed **Solomon Islands:** 3 species 1 NT, 1 LC, 1 not assessed
EU DECISIONS : (range States under review only)	Current no opinion i) for *Stylophora pistillata* from Fiji formed on 02/12/2011. Previous positive opinion for this species from Fiji formed on 22/07/1997. Current positive opinion for *S. pistillata* from the Solomon Islands formed on 22/07/1997and confirmed on 12/06/2006

Trade patterns

Fiji

Between 2004 and 2014, Fiji published export quotas for live and dead pieces of *Stylophora* at the genus level for all years other than 2006. Trade reported by importers and reported by Fiji appears to be within quota in all years (Table 1).

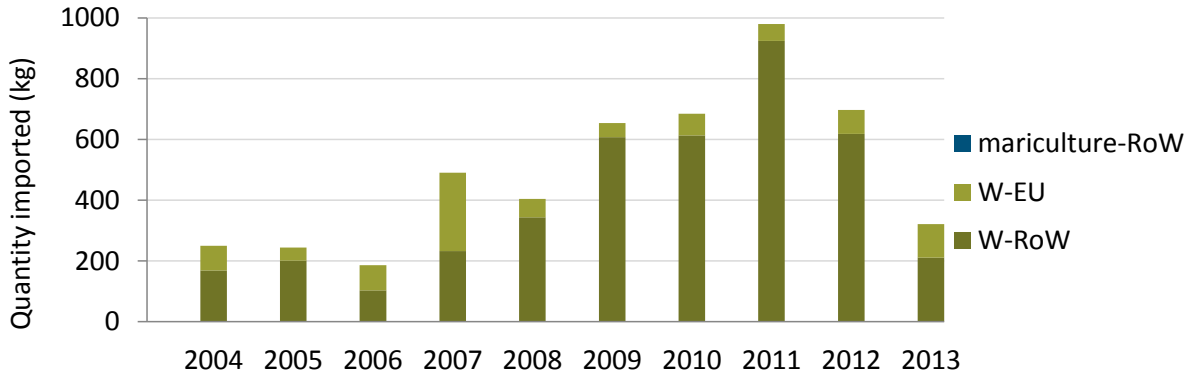
When conversion factors are applied to convert all trade reported in pieces to kilograms, direct global trade levels in wild-sourced coral pieces peaked in 2011 ans subsequently declined, according to data reported by importers (Figure 1). According to data reported by Fiji, exports remained at low levels with the exception of 2008-2010, when trade levels spiked.

Direct exports from Fiji comprised relatively low levels of trade to the EU-28 and moderate levels to the rest of the world, primarily in wild-sourced live coral pieces for commercial purposes (Table 2). In addition, notable quantities of wild-sourced raw coral pieces were exported to the rest of the world, of which the vast majority were for commercial purposes.

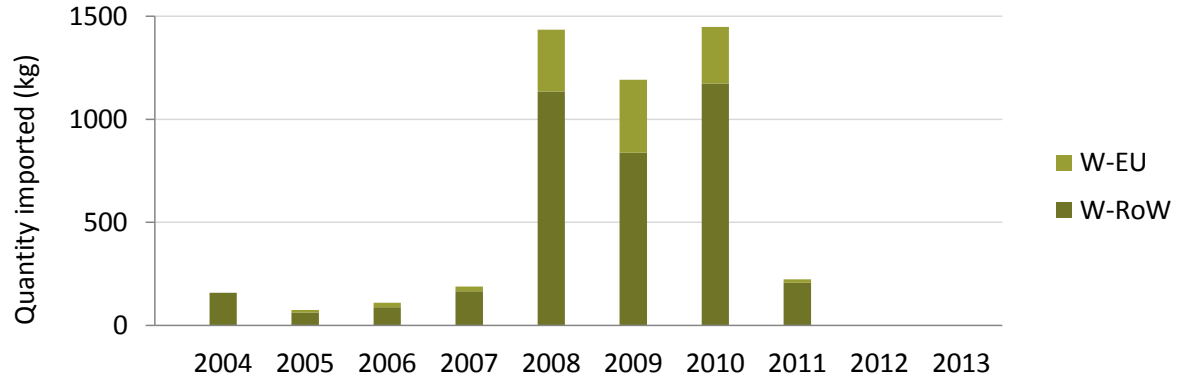
Indirect exports of *Stylophora* originating in Fiji to the EU-28 comprised very low levels of live wild-sourced coral pieces traded for commercial purposes: 11 pieces exported via Indonesia in 2011 and five pieces exported via Malaysia in 2013.

Table 1: CITES export quotas for wild-sourced live and dead *Stylophora* (in number of pieces) from Fiji and global direct exports, as reported by the countries of import and Fiji 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013; importer-reported trade data for 2013 may be incomplete; trade data for 2014 are not yet available.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quota	33202	66404		66404	49803	49803	15000	15500	15500	15500	15500
Importer	1174	980	901	2380	1745	1857	2386	3825	2288	1519	
Exporter	771	364	535	913	6965	5782	7026	1087			



a)



b)

Figure 1: Main sources of direct exports of raw and live *Stylophora* (in kg, converted from number of pieces where appropriate) from Fiji to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Fiji.** Fiji has not yet submitted annual reports for the years 2012 or 2013. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); 'mariculture' includes source F, C and R; source W includes U and source not specified.

Table 2: Direct exports of *Stylophora* from Fiji to the EU-28 (EU) and the rest of the world (RoW), 2004-2013. Fiji has not yet submitted annual reports for the years 2012 or 2013. (Source 'mariculture' is source 'F'; source W includes source W, U and unspecified. Purpose 'other' contains all purposes other than T (commercial trade).

Importer	Term	Unit	Source	Purpose	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	live	-	W	T	Importer	393	212	401	1251	294	227	346	269	371	538	4302
					Exporter		57	105	109	1455	1715	1330	81			4852
	raw corals	-	W	T	Importer									4		4
					Exporter											
RoW	live	kg	W	T	Importer	8										8
					Exporter											
		-	maricultured	T	Importer								4			4
					Exporter											
			I	T	Importer							1				1
					Exporter											
			W	T	Importer	781	655	500	1129	1331	904	1524	3176	1313	881	12194
					Exporter	771	307	430	804	5510	4067	5696	1006			18591
	raw corals	kg	W	T	Importer								50			50
					Exporter											
		-	W	other	Importer										50	50
					Exporter											
				T	Importer		113			120	726	516	380	600	50	2505
					Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

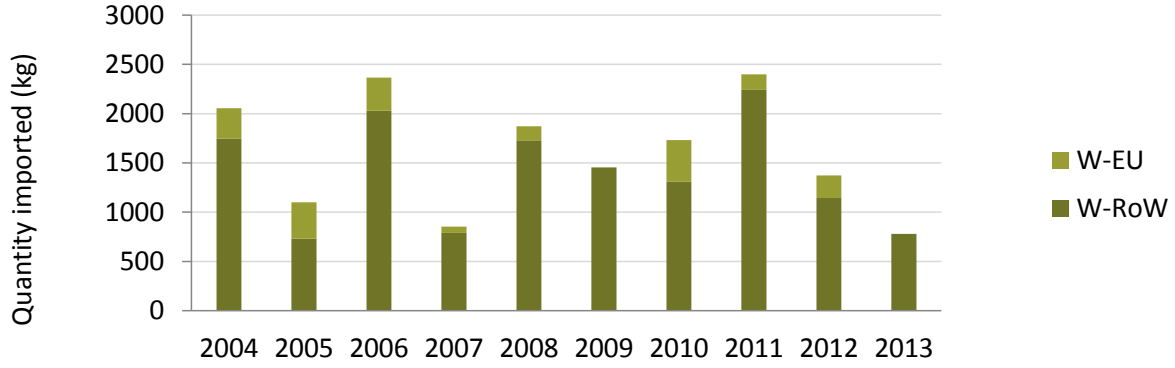
Solomon Islands

Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Solomon Islands have not published CITES export quotas for *Stylophora*.

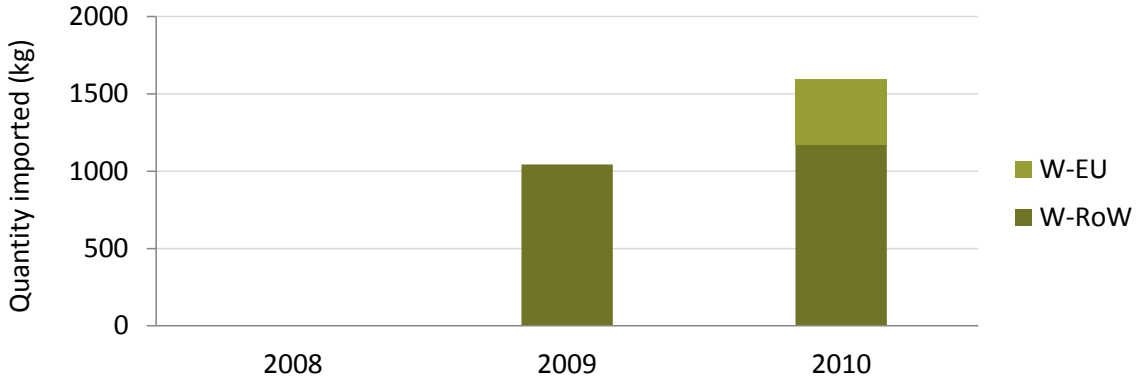
When conversion factors are applied to convert all trade reported in pieces to kilograms, global direct exports of wild-sourced *Stylophora* fluctuated 2004-2013, according to importer data. Data reported by the Solomon Islands shows an increase in exports of wild-sourced corals 2008-2010, with levels remaining below those reported by importers in all years (Figure 2).

Direct exports of *Stylophora* comprised low levels of trade to the EU and moderate levels to the rest of the world, mainly in raw, wild-sourced pieces exported for commercial purposes (Table 3). No imports of this genus were reported by the EU in 2013.

Indirect exports of *Stylophora* originating in the Solomon Islands consisted of one raw wild-sourced piece exported via the United States to Italy for commercial purposes in 2010; this trade was reported by the Solomon Islands only and not by the importer.



a)



b)

Figure 2: Direct exports of raw and live *Stylophora* (in kg, converted from number of pieces where appropriate) from Solomon Islands to EU-28 (EU) and the rest of the world (RoW), 2004-2013 for commercial purposes, as reported by a) the **importers** and b) **Solomon Islands.** Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only. Quantities reported in numbers of pieces of coral converted to weight according to Green and Shirley (1999); source W includes U and source not specified.

Table 3: Direct exports of *Stylophora* from Solomon Islands to the EU-28 and the rest of the world (RoW), 2004-2013. All trade was for commercial purposes. Solomon Islands became a Party to CITES in 2007, and has submitted annual reports for 2008-2010 only.

Importer	Term	Source	Reported by	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
EU	raw corals	W	Importer	610	724	660	126	282		829	312	451		3994
			Exporter							829				829
RoW	live	W	Importer	1133	96	93	37	10	150	2		1	21	1543
			Exporter						311	42				353
	raw corals	W	Importer	2978	1403	3959	1539	3400	2804	2582	4410	2252	1525	26852
			Exporter						1929	2291				4220
		I	Importer								1			1
			Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 03/12/2014

Conservation status

Stylophora are zooxanthellate[6] colonial corals (Veron, 2000), which may reach sexual maturity at 3-8 years, based on most reef building corals having been reported to reach sexual maturity at that age (Wallace, 1999; in IUCN, 2014).

Stylophora ranges through the Indian Ocean and the western and central Pacific Ocean (Cairns *et al.*, 1999). Three species were reported to be common globally; whereas four were uncommon or usually uncommon (Veron, 2000). One species, endemic to Madagascar, was classified as Endangered by the IUCN Red List (Hoeksema *et al.*, 2008a). *S. pistillata* and *S. subseriata* were described as common, and the former may be dominant (Hoeksema *et al.*, 2014, 2008b).

Stylophora pistillata was reported to be a common, sometimes dominant species of shallow water environments exposed to strong wave action; it forms branching colonies with thick, sub-massive blunt-ended branches (Veron, 2000). Unlike other coral genera, the centre of diversity for *Stylophora* was reported to be the western Indian Ocean and Red Sea (Veron, 1995). *Stylophora* was reported to probably be the only major genus with a higher species diversity in the western Indian Ocean and Red Sea than in the central Indo-Pacific (Veron, 1995). Genetic studies suggested high levels of connectivity across the distribution range of *S. pistillata* (Takabayashi *et al.*, 2003).

Fiji

Three species of *Stylophora* were reported to occur within Fiji (UNEP-WCMC, 2012) *Stylophora* spp. were reported from the Great Sea Reef (Cakaulevu) and noted specifically from Talailau Island; *S. pistillata* was reported to be common at Mali Passage (Jenkins *et al.*, 2004).

Stylophora was confirmed from the Volivoli Beach area near Rakiraki, Veri Levu with two species reported; *S. pistillata* was found at one site and was reported to be rare, and *S. subseriata* was found to occur at two sites and was uncommon (Fenner, 2006b).

During surveys in the Great Astrolabe Reef (GAR) and North Astrolabe Reefs (NAR) on the northeast and northern end of the Kadavu island group (70 km south of Viti Levu) in 2001, *Stylophora* was reported to be present at sites on the southeast of the NAR (Southern Point and Windward) although only one species (*S. pistillata*) was reported confirmed (Obura and Mangubhai, 2003). Koven and Pauley (2007) also reported the occurrence of *Stylophora pistillata* in the GAR.

Two species of the genus were recorded in the Mamanuca Islands; *Stylophora pistillata* was found to occur at six sites surveyed and was mostly common in occurrence, *S. subseriata* was reported from 14 sites and was common to rare (Fenner, 2006a).

Stylophora spp. was identified as the tenth and thirteenth most common coral genus at the two main collection sites in Fiji (AFF and WSI, respectively) (Nand, 2008). At the Aquarium Fish Fiji (AFF) collection sites (including Beqa, Yanuca, Pacific Harbour and Serua reefs in the southern part of Fiji) the area of *Stylophora* cover was reported to be 605 074 m² (Nand, 2008). At the AFF collection site (reef flat portion), Lovell and Whippy-Morris (2008) estimated 2.4 million colonies of *Stylophora* spp., of which 0.021% was calculated to have been exported based on the 2007 export levels.

Area of *Stylophora* cover at the Walt Smith International collection site (Lautoka to the Yasawa group of islands in the western part of Fiji) was estimated at 2 781 166 m² (Nand, 2008). Relative percentage composition of *Stylophora* at the WSI collection area was calculated as 0.8% (Lovell and McLardy, 2008).

The IUCN classified one of the *Stylophora* species that occurs in Fiji as Near Threatened globally (*S. pistillata*), one as Least Concern (*S. subseriata*), and one has not yet been

[6] with symbiotic zooxanthellae (dinoflagellate)

assessed (IUCN, 2014). Population status for the two species assessed was unknown (IUCN, 2014).

Based on global assessments by both Veron (2000) and IUCN (2014), it could be inferred that two of the three species of *Stylophora* that occur in Fiji may be common in Fiji (the other was not assessed).

According to Lovell and McLardy (2008), Fiji's quota for *Stylophora* spp. included two species.

Solomon Islands

Two species reported from the Solomon Islands, *S. pistillata* and *S. subseriata* (Veron and Turak, 2006), were classified by the IUCN Red List as Near Threatened and Least Concern, respectively (IUCN, 2014). A further species, *S. mordax* (not assessed) was confirmed from New Georgia, Western Province (Morton and Challis, 1965). Based on global assessments in Veron (2000), it could be inferred that *S. pistillata* and *S. subseriata* may both be common in the Solomon Islands. The species assessed by the IUCN Red List which occur in Solomon Islands were considered to be widespread globally and common throughout their ranges (IUCN, 2014).

Branching *Stylophora* were among the species most affected by widespread but relatively low severity bleaching during a survey in Roviana (Western Province) in 2011 (Albert *et al.*, 2012c). In the same location, white syndrome was found to be over-represented relative to abundance of the genus (Albert *et al.*, 2012c). *Stylophora* was one of only three genera which were found to be highly susceptible to both bleaching and white syndrome (Albert *et al.*, 2012c).

Mariculture of the genus was reported to be established in the Solomon Islands (Delbeek, 2001).

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Appendix

Table 1: Purpose of trade

Code	Description
T	Commercial
Z	Zoo
G	Botanical garden
Q	Circus or travelling exhibition
S	Scientific
H	Hunting trophy
P	Personal
M	Medical (including biomedical research)
E	Educational
N	Reintroduction or introduction into the wild
B	Breeding in captivity or artificial propagation
L	Law enforcement / judicial / forensic

Table 2: Source of specimens

Code	Description
W	Specimens taken from the wild
R	Ranched specimens: specimens of animals reared in a controlled environment, taken as eggs or juveniles from the wild, where they would otherwise have had a very low probability of surviving to adulthood
D	Appendix-I animals bred in captivity for commercial purposes in operations included in the Secretariat's Register, in accordance with Resolution Conf. 12.10 (Rev. CoP15), and Appendix-I plants artificially propagated for commercial purposes, as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 4, of the Convention
A	Plants that are artificially propagated in accordance with Resolution Conf. 11.11 (Rev. CoP15), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5 (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III)
C	Animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5
F	Animals born in captivity (F1 or subsequent generations) that do not fulfil the definition of 'bred in captivity' in Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof
U	Source unknown (must be justified)
I	Confiscated or seized specimens (may be used with another code)
O	Pre-Convention specimens