STATUS OF GIANT CLAM FISHERY AND MANAGEMENT

VANUATU

A report prepared
for consultation concerning the importation of Giant Clam in the EU -
"the Implementation of CITES in the European Union"

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Ministry of Agriculture, Quarantine, Forestry and Fisheries
Republic of Vanuatu

INTRODUCTION:

Vanuatu is an archipelago of 80 volcanic islands in the Western Pacific ocean with a population of 192,000, the majority of which are Melanesian. Approximately 79% of the population live in the rural areas, and depending on subsistence lifestyle of gardening, fishing and animal keeping. The islands are geologically young with narrow fringing reefs that support a limited marine and fisheries resources. These marine resources are important source of protein and a source of income from local sale of products such as fish, crabs, shellfish and lobsters. Trochus shell (*T. niloticus*); bech-de mer (*Holothurians*) and fish are an important source of income for the coastal people. The traditional practice of Customary Marine Tenure (CMT) system constitute the main resources management strategy for the marine resources throughout Vanuatu.

Giant clam meat is an esteemed food item for the ni-Vanuatu people and because of its large meat volume, it constitute an important component of sea-food consumption in the subsistence fishery. Vanuatu has very limited giant clam resource which has been exploited by the subsistence fishery for many years. Sale of clam meat is not common in the public markets in Port Vila and Santo, an indication that the resource is not large enough to support even a small giant clam meat market.

In 1997, Vanuatu began trading wild giant clam to the marine aquarium market comprising mainly of species *T. crocea, T. maxima,* and *T. squamosa* for their beautiful colouration. The dull colours of *H. hippopus* make it unsuitable for use in the aquarium thus has not been targeted by the trade. This report provide an overview on the status of the giant clam resource of Vanuatu and the existing mechanisms in place to ensure sustainable management of the resource.

GIANT CLAM SPECIES

Four (4) species of giant clams are present in Vanuatu waters. They include *Tridacna maxima* (elongated or rugose giant clam), *T. squamosa* (scaly or fluted giant clam), *T. crocea* (boring or crocus clam), and *Hippopus hippopus* (the horse hoof, rolling clam, bear paw or strawberry clam). Though *T. gicas* and *T. derasa* were recorded by Rosewater, (1965), as present in Vanuatu waters, recent surveys have indicated the absence of the two species pointing to a conclusion that they may or have become extinct locally.

LOCAL DISTRIBUTION:

Stock assessment survey conducted by AIMS in 1988 throughout the islands reported that *T. maxima* is the most common species found in all the island reefs, and it's stock is relatively healthy (Zann and Ayling, 1988). Similar finding was also reported during the recent detail stock assessment surveys conducted by the Department of Fisheries. Recent information on stocks is presented in table 2 (clam numbers) and Tables 3a –d (total densities). *T. squamosa* is rare, found only in small numbers throughout the country. Done and Navin (1988) recorded very few specimens and no substantial population was recorded during the 1998-2000 Fisheries Department surveys. *T. crocea* is rare present

only on small areas on Efate: Moso, Lelepa, and Emau, and Ifira, and a few areas on Malekula such as Sakao Island. Local reports of the presence of *T. crocea* in other areas on Malekula is yet to be confirmed. The rarity of the species is due to lack of suitable habitats such as *Porites* microatolls and consolidated pavements. Moso Island is known for a significant population on the Havanah Harbour side of the island.

Hippopus hippopus is present on only a few islands with well developed fringing reefs and isolated islets. *Hippopus hippopus* is highly targeted for food because of its large volume of meat. As a result it has been depleted in many areas where they exist. Significant population is available only on uninhabited remote islands such as Cooks Reef and Reef Island and in some locally established giant clam sanctuary or clam gardens for example Ruing Te Sue and Uri Island on Malekula and a station on Moso Island.

THE FISHERY:

Giant clam meat market:

Giant clam meat is an esteemed food item for ni-Vanuatu. Dalzell (1990) found that ni-Vanuatu consume an average of 19.1 kg of shellfish/capita/yr making giant clam meat an important component of the subsistence sea-food consumption. An estimated subsistence harvest in 1983 was 2403 tonnes of all shellfishes comprising of oysters, clams and cockles (David, 1985). Sale of giant clam meat (raw with shell or cooked meat only) in Port Vila market is only in rare occasion and when available it is usually of the species *T. maxima* and *H. hippopus* from North Efate area. For example giant clam meat form major catch component of the subsistence fishery practiced by women of Moso Island, Efate (Pakoa pers. obs. 2003). Landing estimates and revenue is not known; however general feeling is that there is very limited giant clam resource to support any commercial export fishery for clam meat. Bleached shells of *H. hippopus* are also offered for sale as ornamentals.

Aquarium market:

Harvesting and export of wild giant clams have increased over the last 6 years due to the recent development in the marine aquarium trade industry in Vanuatu. Live giant clams mostly small size clams are being targeted by the industry for export and in particular live *Tridacna crocea* and *T. maxima* for its spectacular colouration. A detail analysis of this fishery is provided in the later section.

AQUARIUM TRADE INDUSTRY:

Vanuatu has a relatively small Aquarium Trade (AT) industry involving primarily a company (Aqualife Exports Ltd. since 1993, now under a new owner since 2001 called Pacific Marine and Aquatic Exports). Another small operator (Reef Life-Vanuatu) commenced operation at Ifira Point area since 1999. In 2002, Sustainable Reef Supplies (SRS), a larger AT company established in Port Vila bringing the total to three (3) aquarium export companies in Vanuatu. The main fishery areas are located on West Efate

and offshore islands, particularly in the areas of Vila Harbour, Devil's Point, Hat island, Lelepa and Moso area.

The two major companies SRS or Sustainable Reef Supplies and Pacific Marine and Aquatic Exports trade in a variety of products including life fish, invertebrates, live rocks and live corals and giant clams and various other invertebrates. Reef Life –Vanuatu is owned by a local Ni-Vanuatu and is specialized in the supply of life aquacultured corals and live rocks. Since 1997, wild giant clam species have been harvested and exported from Vanuatu to the European and American aquarium markets.

Wild giant clam export in the Aquarium Trade:

Tridacna crocea and *Tridacna maxima* comprise the bulk of the exports. All species of giant clam were open for harvest and export provided an operator had a valid establishment License and an export permit used by the Fisheries Department. Since 1997, export soars following the high demand for *T. crocea* and *T. maxima* in the market and the widespread ban on the export of wild giant clam species by CITES member countries. Vanuatu become the only country in the Pacific region still exploiting wild stock of giant clams for the international aquarium trade.

Table 1 (page 6) gives the quantity of giant clams by species exported from 1997 until the end of 2000. These data sets are from the Environment Unit CITES database. The inclusion of *T. gigas* and *T. derasa* and *T. sp.* highlights the existing identification problems. *T. gigas* is an extinct species in Vanuatu while *T. derasa* is very rare also possibly extinct. A new *T. sp* recorded by the exporters is highly unlikely. Species identification provided by exporters should not always be trusted. Based on biological studies conducted by scientist and the Department of Fisheries, and the common understanding in Vanuatu, the species traded are either *T. maxima, T. crocea* , *T. squamosa* and *H. hippopus*. A large number of giant clam exported are *T. crocea* followed by *T. maxima* and very few *T. squamosa and H. hippopus*. In addition, there exist a level of disagreement between data held at the CITES database and those held by the Fisheries database, these are presented separately. Attempt is being made to correct the situation. The main exporting countries are the EU countries; France, Germany, Denmark, Canada and the United States and minor exports to Australia, and Hongkong.

Figure 1 (page 6) gives the exports trend for the same period indicating the decline in the export for giant clams due to the existing regulation (Order 540 of 2000). Compiled from the CITES database and the Fisheries Department Database. Only the highest export figures i.e. from the CITES databases was considered for the construction of the graph for years 2000 – 2003.

STOCK STATUS:

The AIMS stock survey of 1988 indicated vary low abundance of giant clam resource in Vanuatu reefs. The most common and abundant species found on all the island reefs is *T. maxima*. This has also been recorded in the Fisheries Department survey of 1998-2000. Recent stock assessment survey were conducted on 57 sites on the islands of Aneityum, Erromango, Tanna, Efate, Emae, Mataso and Makira, Malekula, Gaua, Vanua Lava, Mota Lava, Ureparara and Torres islands. Average density of all giant clams calculated as numbers per 100 m^2 was generally low in all the sites. Slightly high population was recorded in the Banks group sites (Table 2), which is expected as the fishing pressure is relatively low. When this is converted to density of clams (Tables 2a, b and c), a very low clam density exist throughout the country's reefs. In the Shepherd Island sites, the average density of all the clam in the sample area was less than 1 clams/100m^2, 1.5 clams/100m^2 for sites in TAFEA, 3 clams/100m^2 for TORBA province and 1.3 clams per 100m^2 for the sites in MALAMPA province.

Significant population of *T. maxima* was observed on Anelgouhat reef, Aneityum, Dillons Bay reef on Erromango (Pakoa, pers. obs), Vao and Labubu on Malekula, Cooks Reef and Reef Island in the Banks group. *Tridacna crocea* was observed in abundance at Moso reef (Tassiriki side to Tranquility Reserved area), also on Lelepa Island, and Ifira & Malapoa Point area (Fisheries Department obs.). Recent survey indicated a significant population of *T. crocea* on the giant clam reserved area owned by Tranquility Island Resort on Moso Island.

H. hippopus stock has been heavily fished in all the coastal reefs except remote reefs and small community protected giant clam gardens. Stock assessment survey is an ongoing activity for the Fisheries Department. These figures clearly indicate the scarcity of the resource in the country. It is therefore very limited to sustain any commercial harvesting pressure.

The growth of the aquarium trade industry over the last 5 years have drawn mounting concern on the sustainability of Vanuatu's limited giant clam resource in particular *Tridacna crocea.* Efate and surrounding islands of Moso, Lelepa and Emau and Ifira have been targeted as the major suppliers of live giant clam by the Industry because they are the only areas with the resource. Their accessibility of these areas to the markets is an added advantage.

Concern was raised in 1999/2000 on the unsustainable exploitation of wild giant clam resources of Vanuatu, requiring an enquiry into the fishery by the International Marinelife Alliance (IMA), Marie Aquarium Council (MAC), and the Vanuatu Tourism Operator and other stake holders (Hickey, 2002). An initiative was taken by Vanuatu Fisheries took at the time to prepare an urgent management proposal which instigate the existing Ministerial order to control the fishery.

Table 1: Total giant clam exports by species from 1997- 2000 (CITES database as reported in Hickey, (2002); 2001-2003 data form CITES database, compared with the fisheries data.

Species	1997	1998	1999	2000		2001		2002	
				CITES	DoF	CITES	DoF	CITES	DoF
T. crocea	250	15,360	10,830	17,836	13,940	8,040	6,228	120	737
T. maxima	50	800	375	6,336	4,825	2,642	1,731	3,923	
T. squamosa			200	2,510	1,420	2797	1,099	7	
H. hippopus			150	4		17		7	
T. derasa **			150						
T. gigas **			100						
T. sp **	50		30	60					
TOTAL	***350***	***16160***	***11,835***	***26,746***	*20,185*	***13,496***	*9,058*	***4057***	*737*

** - Identification problem (should be either one *of T. maxima, T. crocea* and *T. squomosa*
CITES: CITES database, Environment Unit
DoF : Department of Fisheries

Figure 1: Total Giant clam exports from Vanuatu (1997-2003).

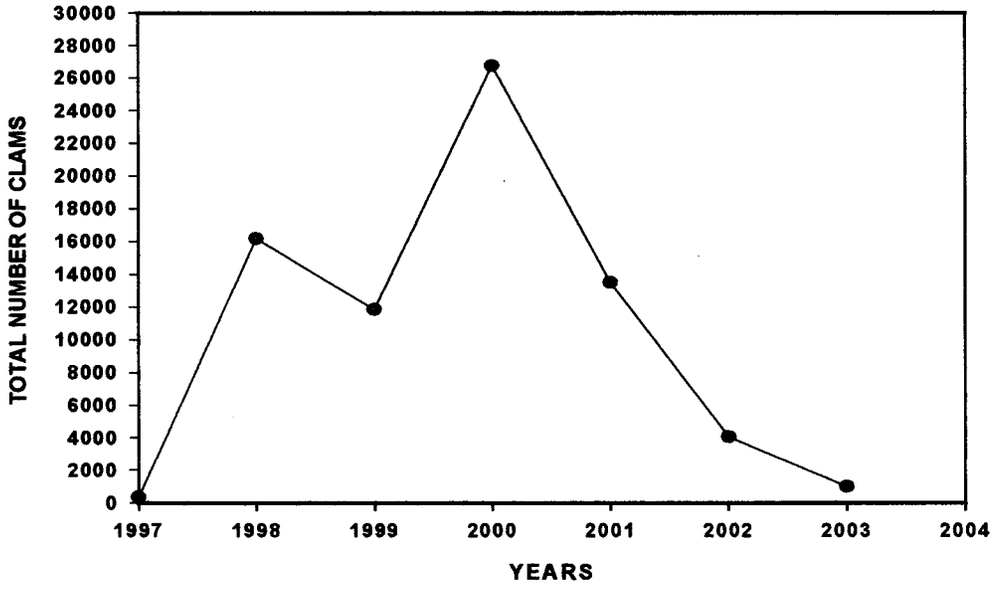

Table 2: Numbers of giant clams per sampled area taken during the stock assessment survey -1998-2000 (Refer to density/100m^2 in table 3 a, b & c for comparison)

	Abundance							
	Reef crest/Lagoon				**Reef slope**			
	T.m	T.sq	T.c	H.h	T.m	T.sq	T.c	H.h
Gaua-Losolava	6	1		1	5			3
Vanua Lava-Vureas Bay					44			
Pakea Island					31	1		
Ravenga -west					41			2
- North				2	66	1		2
Mota Lava-Ra					20			
Reef Island –N.West					174	8		
-West	4				126			
Ureparapara-Lagoon					97			2
Hiu-Picot Bay					153			
Metoma						1		
Tegua-South					19	1		2
Loh					7			
Malekula - Sakau	7	3	7	3				
-Lamap	71	5	4	2				
-Uri	19	3		1				
-Tedka	37	17	5	2				
-Pinalum	27	4						
-Vao	26	14	3					
-Port Stanley		3	6					
-Litz Litz	16	12	4					
-Lambubu	37	14						
-Crab Bay	1	1						
-Avok	25	7		2				
Emae -Marae					80	5		
-Sulua		1		1	100	2		1
-Worarana	1							
-Makatea	1							
-Siiwo	8	2		2				
-Vaitini					24	6		
Cooks Reef –West lagoon	14	6		2				
- North flat	1			4				
Makira					1			
Mataso-Na'asang	1	1						
-south					10	1		
Mistry Island -East reef flat	65	25		1				
-North lagoon					15			
Aneityum – Anegouhat -east					102	5		
-Port Patrick -central	19							
-South	15	2						
Tanna – Port Resolution -east	10							

CURRENT LEGISLATION REGULATING & ASSISTING THE MANAGEMENT OF THE GIANT CLAM TRADE.

VANUATU INVESTMENT PROMOTION AUTHORITY (VIPA)

VIBA CERTIFICATION:

Foreign Investors wishing to invest in AT require approval from the VIPA and register under a company in Vanuatu. VIPA conduct background enquiries on the investors before granting an approval. Approval by VIPA is currently based on economic grounds and is not based on resource management issues. This is left for the Department of Fisheries to deal with.

THE DEPARTMENT OF FISHERIES

LICENSING:

Under the Fisheries Act Cap 158 Fisheries Regulation Part III, require an exporter of aquarium fish, giant clams, live coral and live rock to obtain a separate "Fish Export Processing Establishment Licenses" (Establishment Licenses) annually for each separate commodity being exported. This means an exporter wishing to export all four products will require four Establishment Licenses at a cost of VT20,000 (plus VAT at 12.5%) each. License conditions are set as a management tool of the resource and it include:

a) record of quantity and type and quality of all aquarium products including giant clam that are exported and these records be available for Fisheries inspection.

b) The returns shall be made to the Director of Fisheries concerning the operation of the business as he may require from time to time.

PROHIBITION OF THE USE OF EXPLOSIVES AND POISONS FOR FISHING:

Part II, Section 19 of the Fisheries Act prohibits the use of any explosive or poison for the purpose of killing, stunning or disabling fish for the purpose of easy capture.

EXPORT PERMIT:

Under Fisheries Regulations Part IV, Section 20:

1) No person shall export marine aquarium fish (defined as aquatic animals including corals), except with the written permission of the minister and in accordance with such conditions as he may specify.

2) A permission granted under this regulation shall not affect any obligation to reach agreement with custom owners regarding the use of land and waters for the catching of aquarium fish.

A signed export permit is issued for different product in a consignment, meaning an exporter of giant clam, coral and fish require three export permits. Data on the permit include total number of pieces, type, weight and destination of shipment.

Prior to 2000, giant clam was lump together under one fisheries export permit with aquarium fish and live corals making it impossible to know the exact quantity exported. The only data available for those years were from the CITES database held at the Environment Unit. By year 2000, Fisheries have separated all the AT licenses to each individual products exported, i.e. giant clam, aquarium fish, live coral, live rock, invertebrates and soft coral. This has made it easier to track the quantity of individual products leaving the country. Export permit provide the main data used for the management of AT industry. Monthly reports have also been provided by SRS Company documenting the origin, quantity, species exported and new species found. These reports are submitted as conditions for the issue of permits.

The Department of Customs also maintain record of commodities exported by broad classification e.g. giant clam, live coral, etc. Sometimes the data is specified as aquarium fish so become difficult to monitor by species.

PROVINCE ACCESS FEES

The Decentralization and Local Government Act No. 1 of 1994 empowers the Provincial Governments to claim an area of 6 nautical miles from the shoreline, and Part V of the Act allows the Provinces to make "By Laws" amongst other things on rules governing fishing and condition relating to issue of access licenses.

Access to any fishing ground over Vanuatu has to go through the Office of the Provincial Government of which they wish to be based or operate. An access license "ACCESS PERMIT" of VT20,000 fee is paid to the Provincial Office once agreement has been sought with the resource owners. The granting of access permits has no basis on the number of operators in an area deem to be sustainable. Likewise there are no enforcement mechanism for the Province to enforce the license conditions.

Problems associated with this Legislation:

The following problems have been highlighted by Hickey (2002). The provinces have little technical expertise and management capabilities to assess the sustainability of each fishery and AT collection activities. There is existing confusion regarding the role of Provinces, the communities and the Fisheries Department in management of fisheries. Access Permit is merely a revenue generation tool rather than resource management tool.

COMMUNITY ACCESS AGREEMENT

The present Policy of the Department is that an operator shall negotiate and entered into an agreement with custom owner or owners or a community (such as village council) and lodge a copy of the signed agreement to the Office of the Department while a copy each to be retained by the two parties. A rent in the form of royalty should be paid to the land owner(s) or community for the specified resources over certain period of time as determine under the agreement. In addition, communities should also be allowed to be employed as collectors. This however, is not consistent as other at collection method are highly specialized requiring certain skills such as the use of certified diving apparatus such as scuba and hookah. Companies, use their own divers in such situation. General feeling is that training of local collectors are time consuming and expensive for the AT companies. All giant clam collection is done by the communities.

CITES REQUIREMENT

Export of corals, giant clams and live rock is regulated under the Appendix II of CITES, managed by Vanuatu's CITES which the Environment Unit. The mentioned products therefore require a CITES permit to be issued by the Environment Unit for all exports levied at VT25/piece or T250/kg for all coral, giant clams and live rocks (Hickey, 2002). A database known as CITES database is held and managed by the Environment Unit Office an is also accessed by Fisheries Department. CITES database has been the only database where data on giant clam, coral and live rock exports are being held since the crash of the Fisheries Database.

MINISTERIAL ORDER

The Council of Minister's Decision -540 of 14 September 2000 and effected in April 24, 2001 make the following order;

a) Ban on the export of all wild harvested *T. crocea* from Vanuatu except aquacultured specimens. Cultured specimens must be clearly proven before export.
b) Ban on the purchase and commercial collection of all giant clam species from Efate and surrounding islands.
c) *T. maxima* and *T. squamosa* may be purchased form other islands apart from Efate and should be accompanied by a proof of airway bills.
d) A quota allocation has been ordered decreasing over a four year period from 9000 clams in 2001 to 3000 at the end of the third year and no wild clams in the final year. The quota is currently in force and is being closely monitored.
e) The same order also emphasizes the need to promote and develop giant clam mariculture in the country in an attempt to phase out the present wild harvest and move to cultured clams.

RECENT DEVELOPMENTS AND PROPOSED MANAGEMENT MEASURES

1) Fisheries Department Statistics

Fisheries statistics has been one of the constraints for Vanuatu Fisheries for a long time. Two separate databases using different formats and no proper management and analysis of data. As a result Fisheries Department activities have been poorly recorded over the last 10-15 years. Thus fisheries production cannot be properly assessed. The problem will now be resolved with the establishment of the Management & Policy Section and the establishment of a centralized Fisheries Department database. A Fisheries Statistician has been recruited whose responsibility is to manage the database. This is a major development for the Fisheries Department administration, a tool that will allow a better understanding of fisheries, proper record keeping, and sound management decision making.

2) Review of fisheries management regulations

The existing Fisheries management Regulations is now being revised to include new measures to strengthened existing Management measures. Amongst others:

A policy on the introduction of giant clam minimum size limit is currently being researched. The size limit regulation could apply to the collection of broodstocks for mariculture purposes and also traditional harvest. The following are some ideas of minimum sizes that could be introduced. These sizes are based on size limit regulation used in other Pacific Island countries.

Minimum size limits for giant clams are (applicable to wild resources only):

Species	*Minimum Size*
Tridacna maxima	15.00cm
Tridacna squamosa	18.00cm
Tridacna crocea	10.00cm
Hippopus hippopus	-??

3) Aquarium Trade Management Plan

An AT management Plan is urgently needed. A project has been submitted by the Department for a consultancy work on a new AT management Plan and is awaiting approval.

4) Giant Clam Mariculture

Mariculture of giant clam has been emphasized under the Ministerial Order 540. It stated that mariculture of giant clam be promoted to ensure sustainable supply to the existing market demand at the same time to phase out all wild harvests. Fisheries Department is ready to support private development in mariculture to fill gaps where Fisheries Department is unable to contribute.

A small satellite mariculture farm is being setup by the Nguna-Pele Marine Protected Area, a small MPA initiated by the community of Tikilasoa village and Pele Island, North Efate under the management of a US Peace Corp Volunteer. With the support of the Department, the project has obtained funding from the British High Commission to setup a giant clam hatchery. Coral farming is now underway and the clam hatchery construction is almost complete. Plan is underway to co-organize with Peace Corp-Vanuatu a national mariculture workshop in 2004 on coral and giant clam farming.

Sustainable Reef Supply (SRS), a major AT company in Vanuatu is also looking at venturing into giant clam farming with the expertise of the company scientist and a recognized giant clam and soft coral Mari culturist, Mr Larry Sharron.

CONCLUSIONS

The implementation of the existing management policy and in particular the Ministerial Order 540 0f 2000, has been a timely move. The implementation of the policy has caused a signification reduction in the export of wild giant clams from Vanuatu.
The existing companies have been cooperative with the Fisheries Department over the last two years to slowly come within the new management arrangements. This year, Fisheries have stepped up enforcement of the existing ban on Efate and for *T. crocea* export. Harvesting in Moso and Lelepa Islands have also declined rapidly. The present level of exploitation i.e. the quota allocation is to encourage a slow integration from wild harvest to mariculture. A means to honour the licensed conditions by the government.

The management of giant clams in Vanuatu is therefore under control and the existing management measures are being effectively implemented to control the trade of aquarium giant clams. Any giant clam exported from Vanuatu today are those allowed under the quota allocation for other islands outside of Efate. The irregularities concerning data variations is currently being addressed by the Fisheries Department.

Therefore, there should not be any alarming concern on the continuation of harvest and export of wild giant clams from Vanuatu. The resource and it's fishery is now sustainable and there are no threat concerning improper practices.

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Table 3a: Total densities (nos /100m^2) of all giant clam species taken during the stock assessment survey-1998-2000. **Malekula**

Species	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
T. maxima	0.07			1.95	1.76	1.71	0.74	3.61	0.14	1.26	5.14	0.14	3.15	0.19	1.30
T. crocea	0.07			0.11		0.23		0.42	0.28	0.32	1.94	0.14	0.19	0.37	0.74
T. squamosa	0.07			0.14	0.28	0.79	0.11	1.94		0.95					0.37
H, hippopus	0.07			0.05	0.09	0.09									

Table 3b: Total densities (nos/100m2) of all giant clam species taken during the stock assessment survey - 1998-2000. **Shepherds Islands**

Species	E1	E2	E3	E4	E5	E6	E7	Ms1	Ms2	M1
T.maxima	0.65	0.79	0.02			0.16	0.53	0.02	0.37	0.02
T.crocea										
T.squamosa	0.04	0.02				0.04	0.13			
H.hippopus		0.01				0.04				

Table 3c: Total densities (nos/100m2) of all giant clam species taken during the stock assessment survey -1998-2000. **Tafea islands.**

Species	A1	A2	A3	A4	A5	A6	A7	A8	A9	T1	T2
T. maxima	5.35		1.47	0.70				O.27	0.97	0.33	
T. crocea											
T. squamosa	0.5		0.02	0.17	1.25			0.79			
H. hippopus											

Table 3d: Total densities (nos/100m2) of all giant clam species taken during the stock assessment survey 1998-2000, **Banks/Torres Islands.**

Species	G1	VL1	VL2	VL3	ML1	ML2	R1	U1	H2	T1	L1
T.maxima	0.34	0.94	0.97	1.86	1.21		9.17	6.5	15.30	0.2	0.7
T.crocea											
T.squamosa			0.03	0.02							
H.hippopus	0.04			0.06							