

QUEEN CONCH FISHERIES
AND THEIR MANAGEMENT
IN THE CARIBBEAN

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Front cover photographs:

Piles of empty *Strombus gigas* shells at the Southwest Cay of Pedro Bank, Jamaica. (A. Tewfik)
Larger steel hull used to harvest *Strombus gigas* in Jamaica.
Packaging of *Strombus gigas* meat in a processing plant in Jamaica.
Queen conch shells offered for sale in the Dominican Republic.

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TABLE OF CONTENT

Introduction	1
Methodology	2
International Regulations and Conventions	4
CITES - Convention of International Trade in Endangered Species of Wild Fauna and Flora	4
History of <i>Strombus gigas</i> under CITES	5
Significant Trade Review Process	5
CITES Export Quotas	5
CITES in the European Union	6
Cartagena Convention	9
Spaw Protocol – Protocol concerning Specially Protected Areas and Wildlife	9
Food Sanitary Provisions in the European Union	9
Harmonised Fisheries Regulations of the Organisation of Eastern Caribbean States	10
Partners in the promotion of regional Queen Conch management	10
Queen Conch biology	12
Distribution	12
Habitat	14
Morphology and general biology	14
Early development	14
Biology of juveniles	14
Movement and migration	15
Growth and maturation	15
Reproduction	16
Other Strombid conchs in the region	16
Resource status	17
Overview of the Queen Conch fishery	22
Fishing fleet	22
Fishing gear	23
Fishing practice	23
Processing of the meat	24
Harvest and Trade in Queen Conch	29
Reported landings of Queen Conch	29
Domestic trade in Queen Conch meat and shells	31
International trade in Queen Conch products	32
Illegal harvest of and trade in <i>Strombus gigas</i>	45
Management of Queen Conch in the Caribbean	48
Management measures in place in Queen Conch range States	48
Minimum size restrictions	48
Gear restrictions	49
Closed areas and seasons	50
Limited entry	50
Catch and export quotas	51
A case study: The Jamaica Quota system	55
The need for regional management	59
Conclusions	61
Recommendations	63
References	71
Annex	77

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INTRODUCTION

The Queen Conch *Strombus gigas*, an edible marine gastropod, is one of the most important fishery resources in the Caribbean. The fishery has a long tradition in the region and the species has been valued, especially for its meat, for several centuries dating back to pre-columbian times (Brownell and Stevely, 1981). The shells of this species are also used as curios and in jewellery, but are generally of secondary economic importance (Mulliken, 1996; Chakalall and Cochrane, 1996). Records of commercial harvest and inter-island trade are already known from the Mid-18th century, when dried conch meat was shipped from the Turks and Caicos Islands to the neighbouring island of Hispaniola (Ninnes, 1984).

With advances in freezer technology and a shift to trade in frozen meat, the fishery expanded in the 2000-century but remained largely of local importance supplying the Caribbean region with an important source of protein until the Mid-2000 century. However, since the 1970s the commercial harvest has seen a drastic increase largely driven by the increased demand overseas as well as by the growing resident population and the fast developing tourism industry. Once one of the most important source of protein to the Caribbean people Queen Conch is now largely harvested to supply the demand for its meat in foreign markets as well as in areas where local populations are no longer able to meet the demand. Today, over-harvest to meet these demands is being considered as the major cause of declines that are reported from numerous range States throughout the region.

By the end of the mid-nineties, harvest levels have been estimated to be around 6,000t of conch meat per year, not accounting for the conch meat that is harvested for local subsistence consumption and the unknown amount of conch that is taken by illegal fishing (Chakalall and Cochrane, 1996). The wholesale value of these landings is estimated to be around 60 million USD per year, but may be multiplied several fold taking into account jobs created in the processing and marketing of *Strombus gigas* products, particularly in the ornamental, tourist and restaurant industry (Chakalall and Cochrane, 1996; Appeldoorn 1994b).

The increasing exploitation of the species in the 1980s and early 1990s gave rise to concerns over the future of the Queen Conch fishery in the region and led to the inclusion of the species in Appendix II of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) in 1992. Since then, all international trade in specimens of the species requires the prior issuance of a CITES export permit by the national CITES Management Authority, and records of trade shall be reported annually to the CITES Secretariat. In addition, CITES Parties are required to make non-detrimental findings to ensure that the export of specimens of species listed under CITES does not endanger the wild populations.

Following the listing of the species in CITES Appendix II, concerns have been raised about the high levels of (illegal and legal) trade in this species and the insufficient implementation and enforcement of CITES provisions by Queen Conch range States (Mulliken, 1996; Allan, 1999). This was impeded by the fact that several range States had not acceded to the Convention until the late 1990s. Since then, several efforts have been undertaken by range States as well as regional fisheries bodies to improve the knowledge and understanding of the various aspects pertaining to the Queen Conch biology and fishery to improve its management and to enhance trade controls at the national and regional level. Several range States have for example introduced legislation pertaining to the harvest and trade in Queen Conch products and introduced Management Plans for the species. Efforts have also been undertaken at the regional and international level in attaining a common management strategy for the species and its fishery. These efforts resulted, for example, in the establishment of the “International Queen Conch Initiative” and the adoption of the “Declaration of San Juan” both in 1996.

CITES plays an important role in the development of a regional management strategy for the species. Firstly, because unsustainable and/or illegal international trade in *Strombus gigas* products is considered the primary cause for the decline of the species. Secondly, most Queen Conch range States are Parties to the Convention and CITES provides for several measures that are directly linked to the effective use of and trade in Queen Conch products, e.g. by requiring exporting nations to ensure that the trade in a CITES listed species is sustainable and not threatening the species. The need to improve CITES implementation in the region has been recognised by many Parties as well as the CITES Secretariat and the development of a regional management strategy for *Strombus gigas* was seen as one of the priorities in this context (CITES Inf. 11.7).

The purpose of this study was to examine the current status of the Queen Conch fishery in the region, to provide an overview of the various measures in place to manage and regulate the harvest and trade in Queen Conch products, to identify good management practices, and finally to assess the need for and the feasibility of developing a regional management strategy for the species.

Due to the sheer number of Queen Conch range States, this report is not all-inclusive or complete. Instead, it provides a preliminary overview of the current status of Queen Conch fisheries, management and trade. In addition, it outlines a number of possible ways that could lead to the sustainable management and conservation of this important resource through joint efforts at the regional and international level.

METHODOLOGY

This report is the result of an analysis of available literature, statistical data, stakeholder interviews, questionnaires, and field visits undertaken by TRAFFIC Europe. Research and analysis for this report began in January 2001, while the largest part of the work was undertaken in the second half of 2001.

Sources of Information

A large part of the information provided in this report was collected from available literature (scientific and gray literature; internet) that has been produced over the last few decades on *Strombus gigas*. The most important sources of information were reports published by Caribbean Fisheries Management Council (CFMC), CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP), Gulf and Caribbean Fisheries Institute (GCFI) and other organisation and institutions in the region, and the Significant Trade Review of *Strombus gigas* undertaken by IUCN/ SSC (Species Survival Commission of the World Conservation Union), TRAFFIC and WCMC (World Conservation Monitoring Centre) in 1996. In May 2001, questionnaires (in English, French or Spanish) were sent to CITES Management and Scientific Authorities, Fisheries Authorities of *Strombus gigas* range States and to other experts in the region to request specific information on conservation, management and trade of *Strombus gigas*. A copy of the English questionnaire can be found in Annex I of this report. Completed questionnaires were returned by 25 of the 39 range States contacted (see Chapter 5 for a list of range States). Annex II lists the countries and territories that returned a completed questionnaire to TRAFFIC Europe. In many instances, follow-up activities in the form of a direct interview, telephone or email correspondence was undertaken to obtain further details or clarification.

Significant information was collected during a visit to the region between 15 July and 1 August (particularly unpublished reports and interviews). During that visit, three Queen Conch range States (Puerto Rico, the Dominican Republic and Jamaica) were visited. In addition, TRAFFIC staff attended the "Second International Queen Conch Conference" that was held from 18 to 20 July in Juan Dolio in the Dominican Republic. Several Queen Conch experts and scientists, CFRAMP, FAO, CFMC, NMFS and the country representatives were interviewed during the conference. This provided an opportunity to discuss and clarify some of the information and data that was provided by the range States through the questionnaires.

During the country visits, TRAFFIC Europe visited landing sites (in the Dominican Republic and Jamaica), fishing sites (in the Dominican Republic) and processing plants (in Jamaica) and surveyed local markets (in Puerto Rico, in the Dominican Republic and Jamaica). Meetings were conducted with a large number of different stakeholders including government officials (CITES and Fisheries Authorities), traders (exporters, importers, retailers), processors, fishers, scientists, enforcement officials (Customs, Coast Guards, Police, etc.) and other knowledgeable persons.

Trade data analysis

To analyse international trade in specimens of *Strombus gigas*, trade data was obtained from various sources, including UNEP-WCMC, the US Bureau of Census, Queen Conch exporters, literature records and from national Fisheries and CITES Management Authorities of relevant range States.

CITES trade statistics for *Strombus gigas* were analysed for the years 1993-1999, the latter being the most recent year for which relatively complete data is available. The data derived from the UNEP-WCMC CITES Trade database and was obtained in August 2001. UNEP-WCMC compiles the trade data from annual reports of CITES Parties which document their international trade (import, export and re-export) in all CITES-listed species. The annual report data are entered into the UNEP-WCMC CITES Trade database and outputs can be generated to allow statistical analysis of the data. For example, reported exports or re-exports in a specific specimen can be compared with the imports reported by the reported importing country. The outputs may also show the reported source (e.g. wild, ranched, etc.) and the purpose of the trade (commercial, personal, etc.), although these records are often missing. The "Guidelines for the Preparation and Submission of CITES Annual Reports" (CITES Notification No. 1999/85) list the various terms (meat, shell, carving, etc.) and units (kilogram, pound, cases, boxes, etc.) that may be used to describe the CITES specimen in trade.

CITES Parties are requested to submit annual reports by 31st October of the following year in which the trade took place. However, late submission of annual reports is not uncommon, while in other cases annual reports are incomplete or CITES Parties failed to submit annual reports at all. Annex III provides an overview of the CITES annual reports received in recent years. The trade data contained in annual reports may be based on permits issued, on the permits used or on the actual trade levels. In some cases, issued permits are not used and in other cases the actual number of specimens traded differs from the quantity for which the permit was issued. As a result of these and other factors, CITES trade data do not necessarily provide an accurate reflection of the actual trade in *Strombus gigas* specimens. Other limitations of the CITES trade data are due to the poor quality of reporting e.g. Parties may fail to report the unit (kg, pound, etc.) of a specific shipment resulting for example, in the export of "1,500 *Strombus gigas* meat" being reported. Irrespective of all these limitations, the CITES trade data provides useful information on trade volumes, exporting and importing country, and on trade trends. It may actually provide the most accurate and comprehensive information on the global trade in *Strombus gigas* products.

Unless otherwise stated, the CITES trade data presented in this report were analysed as follows prior to further compilation and analysis:

- All trade records reported in pounds were converted to kilograms using the conversion rate of 0.4536 kg for 1 pound. All records reported in grams were converted into kilograms.
- All records reported in units of "cases" or "boxes" were converted into kilograms using the following conversion rate: 1 "case" = 50 pounds = 22.7 kg; and 1 "box" = 5 pounds = 2.3 kg (based on A Kong, Fisheries Division of Jamaica; M Day, Department of the Environment and Natural Resources of the Turks and Caicos Island and Ms Brown, Ton & Rick Fishing, Jamaica, pers. comm., July 2001).
- All trade records where meat was not reported by weight (kg or lbs) were excluded from the analysis.

Gross trade reports and comparative tabulation data were then compiled for subsequent analysis. These data are compiled by comparing reported exports with reported imports on a country-by-country basis, and the larger number being considered the gross trade figure. More detailed information on compilation and analysis of gross trade data can be found in the CITES Data Users Guide prepared by UNEP-WCMC. Gross trade data (gross imports and exports) are provided in several tables throughout the text.

Other sources of data to document international trade in *Strombus gigas* products were also used, such as national trade statistics and import data recorded by the US Bureau of Census. Where possible the information obtained from these sources has been compared with the reported CITES trade data.

Conversions of meat and shells weights

In order to calculate the number of Queen Conch specimens per unit weight (i.e. number of specimens per kg of meat), conversion factors for the different processing grades available from the Jamaican Queen Conch industry were used (see Chapter 2). According to surveys undertaken at processing plants in Jamaica, the average weight of unprocessed or "dirty" meat of an animal is 143g, and the average weight of a "100% cleaned" meat is 72g (see Tables 4 and 5, Chapter 6, p. 21-22). These figures also correspond with data provided by Ninnes (in Mulliken, 1996) for the Turks and Caicos Queen Conch fishery: 259t of processed meat (=40% cleaned based on the Turks and Caicos terminology) are equivalent to 652t of landed meat (= "dirty meat") or 3,562,500 individual

conches. This equals a meat weight of 72g per animal for processed meat and 183g per animal for unprocessed or dirty meat.

Even though these figures may not be representative for the region as a whole and may not account for different processing systems in the range States, these figures were considered as the most suitable to calculate the number of animals harvested to obtain a certain volume of Queen Conch meat.

It is known that individual weights of the meat of a Queen Conch from other regions (for example Saint Lucia or Antigua and Barbuda) may on average be larger than that of animals obtained in Jamaica or the Turks and Caicos Islands (A Tewfik, McGill University, in litt., September 2001). However, as it can be assumed that the majority of meat of Queen Conch harvested and traded internationally originate from these two countries, the use of these meat weights was considered appropriate to estimate the total number of specimens per unit weight.

For shells, a weight range rather than a mean weight was calculated in order to estimate number of individuals for kg of shells, assuming that the size and age of Queen Conch shells in international trade is variable. Based on literature records, a weight of 700-1,500g per shell was used to convert Queen Conch shells reported in kg into number of specimens (Wood, 1995)

Countries, Dependencies, Overseas Territories and Departments in the region are referred to as range States.

INTERNATIONAL REGULATIONS AND CONVENTIONS

There are a number of international and regional treaties and agreements that do assist efforts to ensure that the use and trade of Queen Conch does not threaten the species survival. The most relevant are CITES and the Protocol concerning Specially Protected Areas and Wildlife of the Cartagena Convention (SPAW Protocol). Table 1 provides an overview of the adherence of Queen Conch range States to these conventions and agreements. Other regulations such as food sanitary provisions may also impact the trade in Queen Conch products and are briefly discussed below. An overview of national regulations pertaining to Queen Conch management is presented and discussed in Chapter 8.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates and monitors international trade in more than 30,000 species of wild plants and animals, and their products and derivatives. The Convention was established in 1973 with the aim of ensuring that trade in the listed species is conducted in a non-detrimental manner and is not threatening the survival of the species in the wild. CITES entered into force on 1 July 1975. To date (November 2001) 155 Parties have joined the Convention, including the majority of the Queen Conch range States in the wider Caribbean region (see Table 1).

Species regulated by CITES are listed in one of three Appendices to the Convention, and international trade in specimens of these species is regulated on the basis of a system of permits and certificates. These permits or certificates are issued when certain conditions are met and must be acquired before international trade can take place. Different trade controls apply to species listed on each Appendix: Species included in Appendix I are considered to be threatened with extinction and international trade in specimens of wild origin is allowed only in exceptional circumstances and for non-commercial purposes only. Species that are not currently threatened with extinction but may become so if international trade is not regulated are included in Appendix II. Species listed in Appendix II can be traded commercially, provided that an export permit has been issued by the Management Authority of the exporting State, or a re-export certificate in case of re-export. Appendix III includes species that are subject to specific regulations in a range State and species origination from this country require a certificate of origin.

Upon joining CITES, each Party is required to designate one or more Management and Scientific Authorities to implement the provisions of the Convention. In addition, each Party must adopt national legislation to implement the provisions of CITES. The principal task of the Management Authority is to monitor and control international

trade in CITES-listed specimens to or from their country and to authorise such trade by issuing the relevant permits and documents. The principal task of the Scientific Authority is to advise the Management Authority in determining whether trade in a specific species may be detrimental to the survival of the species in the wild.

History of *Strombus gigas* under CITES

Strombus gigas was listed in Appendix II of CITES at the 8th meeting of the Conferences of the Parties to CITES (Kyoto, 1992), following a proposal prepared by the United States of America. CITES provisions apply to trade in all readily recognisable specimens of the species i.e. live specimens, meat, shells, pearls, carvings and all other parts of wild, ranched, or maricultured origin.

The Significant Trade Review Process

Soon after the Queen Conch was listed in Appendix II in 1992, concerns were raised about the sustainability of the large volumes of Queen Conch specimens recorded in international trade, and particularly whether Article IV of the Convention was adequately implemented by exporting Parties. Article IV lays out the basic principles regarding the regulation of trade in specimens of species included in Appendix II. These include the requirement that all Parties undertake "non-detriment findings" (=determination that the export of the resource is sustainable) before the exportation of a given amount of a species from their country is allowed and before an export permit is issued (CITES Inf. 11.2, 2000).

In response to these concerns, the CITES Animals Committee recommended to introduce *Strombus gigas* in its "Significant Trade Review" Process. This process seeks to identify problems in the implementation of Article IV and to solve these in close collaboration with the range States (CITES Inf. 11.2, 2000). Depending on the findings of the Significant Trade Review, the Animals Committee formulates specific recommendations, and range States are requested to respond to these within a given time frame. If implementation of these recommendations by the range States is satisfactory, the CITES Secretariat and the Animals Committee end the Significant Trade Review Process for the species. In cases where a range State either fails to respond or if a response is unsatisfactory, the Secretariat is authorised to recommend "specific measures" to the CITES Standing Committee, including the suspension of trade where appropriate (CITES Inf. 11.2, 2000).

The Significant Trade Review for *Strombus gigas* was undertaken in 1995 and the results of the review were presented at the 13th Meeting of the Animals Committee in 1996. In September 1997, the Animals Committee formulated recommendations and range States were requested to respond to these recommendations within 90 days. Several range States failed to respond within the given timeframe. Taking into account the difficulties some Parties might have experienced in compiling the information requested the deadline for responding was lengthened to allow more time to provide the relevant data (CITES Doc. SC.40.9, 1998). This process lasted until March 1999 by when most range States had provided a satisfactory response. However, five range States (Antigua and Barbuda, Barbados, Dominica, Saint Lucia and Trinidad and Tobago) failed to respond within the given timeframe (CITES Notification No. 1999/16). Consequently, the CITES Standing Committee agreed at its 41st meeting to recommend that Parties do not accept imports of specimens of *Strombus gigas* from these range States until further information would be provided (CITES Notification No. 1999/20). These recommendations are still in effect. It should be noted that the Standing Committee can withdraw its recommendation in the case that the relevant range State provide satisfactory evidence that it has implemented the recommendations.

CITES export quotas

Even though there are no specific requirements within the Convention to establish export quotas for Appendix II species several Parties have made communicated voluntary annual export quotas to limit the trade in a specific species. National export quotas for CITES listed species should be communicated to the CITES Secretariat (based on the guidelines of Resolution Conf. 10.2) who then informs all other Parties through Notifications. The export quotas are also appearing on the CITES website.

Table 2: CITES Export quotas established between 1996 and 2001 by *Strombus gigas* range States.

Country	Queen Conch product			1996	1997	1998	1999	2000	2001
	Source	Term	Unit						
Bahamas ¹		meat	kg		204,115	204,115			
Jamaica		meat	kg					1,216,000	946,000*
Colombia		meat	kg	203,000	285,000	300,000**	392,923	293,839	126,000
		shells	kg			11,000	10,000	9,000	
		pearls				+	+		
Nicaragua		meat	kg			19,958	19,958	19,958	45,359
Turks and Caicos Islands	Wild	meat	kg		45,359	272,155	288,036		
		dried meat	kg		454	907	907		
		shells	No.					50,000	
		shells	kg		22,679	22,679			
		shell pieces	kg					435,456	
	Ranched	trimmings	kg		136,077	435,448			
		meat	kg		452,590	4,536	3,629		
		live	kg		22,679	181,436	136,080		
		shells	No.					50,000	
		shells	kg		22,679	22,679			
	trimmings	kg		271,154					

Notes: ¹= export quotas are set per fishing season 1997/1998; * refers to 956,000 kg of 50% processed meat; ** plus 64,776 kg of meat not exported under 1997 quota; += of unspecified quantity
(Source: CITES Notification No. 980, 1998/36, 1999/21, 2000/053, 2001/041).

Several Queen Conch range States have made use of export quotas as a management tool. Table 2 provides an overview of the export quotas for specimens of *Strombus gigas* that were established in recent years. It should be noted that export quotas for *Strombus gigas* may also have been established in other years, or by range States not listed in the table, but they were not communicated to the CITES Secretariat and are therefore not included in Table 2.

CITES in the European Union: Council Regulation (EC) No 338/97

Some countries or regional entities such as the European Union (EU) may have stricter regulations pertaining to the trade in CITES listed species. For example, Council Regulation (EC) No. 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein implements CITES in the EU. This Regulation is stricter than CITES in some ways by imposing additional conditions upon which CITES-listed specimens can enter the territory of the EU, and by requiring additional documents for import of CITES listed species by the EU. For example, all trade in an Appendix II-listed species to one of the 15 Member States of the EU requires an import permit issued by the country of import (in addition to the export permit). Under Article 4(6) of Regulation 338/97, the EU can restrict or even suspend the importation of certain species into the EU. These import restrictions can for example be imposed in case the EU considers that the import would have a harmful effect on the conservation status of the species or on the extent of the territory occupied by the relevant population of the species. These import restrictions generally apply to wild specimens originating from a specific range country and are binding for all 15 Member States. They are established on a temporary basis only, and will be lifted when no longer justified. To date, the EU suspended the importation of wild Queen Conch products from Antigua and Barbuda, Barbados, Dominica, Saint Lucia and Trinidad and Tobago (following the recommendation of the CITES Standing Committee). In addition, in November 2000 the EU formulated a negative opinion on the importation of shells with a size of less than 23 cm from Haiti, banning import of shells under this size on a temporary basis (OJ L 282, 26 Oct. 2001, Commission Regulation No 2087/2001 of 24 October 2001 suspending the introduction into the community of specimens of certain species of wild fauna and flora). Other relevant EU Regulations, such as Commission Decision 97/20/EC that cover food security issues are briefly described below (see ‘EU Food Sanitary Regulations’).

Table 1: Membership of Queen Conch range States in relevant Conventions, agreements and relevant regional and international organisations

Country / territory	CITES Party *	Cartagena Convention		SPA W Protocol		CFRAMP ⁵ members	L&C RAU ⁶ member	OECS ⁴	Member of FAO
		Signature	Ratified	Signature	Ratified				
Anguilla	Non-party							Y	
Antigua & Barbuda (1)	Oct-97		Y	Y		Y	Y	Y	Y
Aruba	Mar-95								
Bahamas	Sep-79								Y
Barbados (1)	Mar-93	Y	Y			Y			Y
Belize	Sep-81		Y			Y	Y		Y
Bermuda	Oct-76								
Brazil	Aug-75								Y
British Virgin Islands	Oct-76							Y	
Cayman Islands	Oct-76								
Colombia	Nov-81		Y	Y	Y				Y
Costa Rica	Sep-75		Y						Y
Cuba	Jul-90		Y	Y	Y				Y
Dominica (1)	Nov-95		Y			Y		Y	Y
Dominican Republic	Mar-87		Y		Y				Y
France	Aug-78	Y	Y ³	Y					Y
French Guiana	Aug-78								
Guadeloupe	Aug-78								
Grenada	Nov-99	Y	Y			Y	Y	Y	Y
Guatemala	Feb-80	Y	Y	Y					Y
Guyana	May-77					Y			
Haiti *	non-Party								Y
Honduras	Jun-85	Y							Y
Jamaica	Jul-97	Y	Y	Y		Y	Y		Y
Martinique	Aug-78								
Mexico	Sep-91	Y	Y	Y					Y
Montserrat	Oct-76					Y		Y	
Netherlands	Apr-84	Y ¹	Y ¹	Y	Y				Y
Netherlands Antilles	Jul-99								
Nicaragua	Nov-77	Y	Y						Y
Panama	Nov-78	Y	Y	Y	Y				Y
Puerto Rico	Jul-75		Y						Y

Table 1 (continued)

Country / territory	CITES Party *	Cartagena Convention		SPA W Protocol		CFRAMP ⁵ members	L&C RAU ⁶ member	OECS ⁴	Member of FAO
		Signature	Ratified	Signature	Ratified				
Saint Kitts and Nevis	May-94					Y	Y	Y	Y
Saint Lucia (1)	Mar-83	Y	Y	Y	Y	Y	Y	Y	Y
Saint Vincent & the Grenadines	Feb-89		Y	Y	Y	Y	Y	Y	Y
Surinam	Nov-80								
Trinidad & Tobago (1)	Apr-84		Y	Y	Y	Y			Y
Turks & Caicos Islands	non-Party								
United Kingdom	Aug-76	Y ²	Y ²	Y					Y
United States of America	Jul-75	Y	Y	Y					Y
Virgin Islands of the United States	Aug-75		Y						Y
Venezuela	Jan-78	Y	Y	Y	Y				Y

Notes: *= date indicates month and year of the range States' accession to CITES; (1) = imports of *Strombus gigas* originating from this country are currently suspended (CITES Notification No. 1999/20), * = shells with a length of < 23cm are not allowed to be imported into the EU (OJ L 282, Commission Regulation N° 2087/2001 of 24 October 2001 suspending the introduction into the community of specimens of certain species of wild fauna and flora), ¹ = on behalf of the Netherlands Antilles and Aruba, ² = on behalf of the Cayman Islands, Turks and Caicos Islands and the British Virgin Islands, ³ = on behalf of Martinique and Guadeloupe, ⁴ = Organization of Eastern Caribbean States, ⁵ = Caribbean Community Fisheries Resources Assessment and Management Program, ⁶ = Lobster and Conch Resource Assessment Unit of CFRAMP

Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)

The Cartagena Convention is the only legally binding environmental treaty for the Wider Caribbean. The Convention entered into force on 11 October 1986 after having been ratified by the requisite nine governments. To date, 21 (out of possible) 28 States have ratified the Convention (see Table 1). It applies to the marine environment of the Gulf of Mexico, Caribbean Sea and the areas of the adjacent areas of the Atlantic Ocean, south of 30°N and within 200 nautical miles of the Atlantic coasts of the States. The Convention and its Protocols constitute a legal commitment by the participating governments to protect, develop and manage their common waters individually or jointly. Article 10 of this Convention addresses the responsibilities of Parties to take “all appropriate measures” to protect and preserve “rare or fragile ecosystems”, as well as the “habitat of depleted, threatened or endangered species” in the Convention area, and to this end, establish specially protected areas (UNEP, 2000a).

SPAW Protocol - Protocol concerning Specially Protected Areas and Wildlife

The SPAW Protocol is one of three Protocols of the Cartagena Convention. The objective of the SPAW Protocol is to protect rare and fragile ecosystems and habitats, thereby protecting the endangered and threatened species that inhabit them. The SPAW Protocol has been approved on 18 January 1990, and entered into force on 18 June 2000, after St. Lucia became the ninth of the 13 signatory countries to ratify. The list of Parties is shown in Table 1. The SPAW Protocol is administered through UNEP’s Caribbean Environment Programme (CEP). After Saint Lucia ratified the protocol, the first Meeting of the Parties to the SPAW Protocol was held from 28 to 29 of September 2001 in Havana, Cuba.

The SPAW Protocol provides a mechanism to protect species of wild fauna and flora, and the habitats on which they depend, on a regional scale. Article 10 of the Protocol stipulates national measures for the protection of wild flora and fauna that should be adopted by the contracting Parties. Parties must regulate or prohibit any activities that might adversely affect them or their habitats, and carry out species recovery, management, planning and other measures to assist the survival of such species. The Protocol provides for different levels of protection to species listed in its three Annexes. Annex I includes threatened, endangered and endemic species of flora and exempt these from all forms of destruction or disturbance. Annex II includes threatened, endangered and endemic species of fauna and provides for the total protection and recovery of the listed species, with few exceptions. Annex III, which includes *Strombus gigas*, lists species of fauna and flora which may not yet be threatened or endangered, with the objective of preventing them from becoming so. For species in Annex III, Article 11(1)(c) of the Protocol stipulates that each Party shall “adopt adequate measures to ensure the protection and recovery of the species” “to regulate the use of the species and “to formulate, adopt and implement plans for their management and use”, including the establishment of closed seasons and regulating their harvest and trade.

The SPAW protocol has common objectives and corresponding provisions with several other relevant Conventions, including CITES, and linkages of co-operation and synergies are being developed and strengthened. A “Memorandum of Co-operation (MoC)” had already been signed with the Secretariat of the CBD and RAMSAR, and is currently being prepared with the Secretariat of CITES (UNEP 2000c). This MoC addresses potential “incompatibilities” between the treaties, which, for example, include inconsistencies in the list of species of CITES and the SPAW Protocol. Several questions concerning the legal compatibility arise from this, including which of the two treaties has the priority of application (UNEP 2000b, UNEP 2000c).

Food Sanitary Provisions in the European Union

There are other regulations such as food sanitary regulations that may affect the international trade in *Strombus gigas* products. The EU implemented Commission Directive 91/492/EEC of 15 July 1991 laying down the health conditions for the production and the placing of the market of bivalve molluscs in 1991 (Official Journal [OJ] L268, 24/09/1991, p.0001-0014). Despite its title, this Directive applies also to echinoderms, tunicates and marine gastropods, including *Strombus gigas*, and lays down specific requirements harvesting, handling, storage, transport and distribution. Under this Directive, the EU is entitled to undertake veterinary and sanitary inspections, and to establish a list of countries that are considered to meet the requirements laid down in

Directive 91/492/EEC. Such a list has been published in Commission Decision 97/20/EC of 17 December 1996 establishing the list of third countries fulfilling the equivalence conditions for the production and placing on the market of bivalve molluscs, echinoderms, tunicates and marine gastropods, and which entered into force on 1 July 1997 (OJ L 006. 10/01/1997, p.0046-0047). It was amended by Commission Decision 98/571/EC (OJ L 277, 14/10/1998, p.0042-43). According to these Decisions, the import into the EU of *Strombus gigas* from a country not listed in the Annex of Decision 98/571/EC is not allowed. This applies also to the French overseas departments of Martinique, Guadeloupe and French Guiana that form a part of European Unions territory (the British and Dutch territories in the region do not form part of the Union territory). Until 2000, none of the Queen Conch range States were listed in the Annex (except for the United States of America) and hence imports from *Strombus gigas* ranges States into the EU were not in compliance with the EU Food Sanitary Directive. However in 2000, following an inspection missions undertaken in 1999 and 2000 the EU adopted Commission Decision 2001/37/EC that relates exclusively to EU imports of marine gastropods from Jamaica. Under this Decision imports of Queen Conch products from Jamaica into the EU are authorised if they originate from specific production areas (all at Pedro Banks) and if they have been produced, processed and exported by companies listed in the Annex (OJ L010, 13/10/2001.p 0064-0065).

Harmonised Fisheries Regulations of the Organisation of Eastern Caribbean States

The Organisation of the Eastern Caribbean States (OECS) is made up of nine Members (see Table 1). The OECS co-operates in a variety of sectors, including for example health, education, trade and investment, and natural resources management. The Natural Resources Management Unit (NRMU) of the OECS has the responsibility for fisheries and provides the policy instrument as well as the legal and administrative framework for the establishment of regional management programmes for the marine environment. With respect to Queen Conch, the NRMU has contributed to the harmonisation of specific regulations by recommending in the early 1990's e.g. minimum size restrictions; allowing only the harvest of shells with a flared lip; considering gear restrictions; and the establishment of closed seasons and areas. These recommendations have been implemented by a number of OECS members (see Chapter 8).

PARTNERS IN THE PROMOTION OF REGIONAL QUEEN CONCH MANAGEMENT

Several institutions, organisations, governmental and intergovernmental agencies are important partners in the development and promotion of a regional management strategy for Queen Conch resources in the Wider Caribbean region. First of all, this includes national stakeholders at the national level e.g. fisheries agencies, CITES authorities, enforcement agencies as well as other important players such as fishers, fishers co-operatives, producers and exporters.

However, to achieve management at sub-regional or regional level, partners are needed that will promote regional strategies at international level and that can mediate between different agencies and stakeholders. In recent years, several organisations and institutions have undertaken efforts to develop effective management strategies and were active in promoting regional management of Queen Conch resources. These are for example CFMC (Caribbean Fisheries Management Council); CFRAMP (CARICOM Fisheries Resources and Assessment Programme); FAO (Food and Agriculture Organisation of the United Nations), and in particular the Sub-Regional Office for the Caribbean (SLAC); the Western Central Atlantic Fishery Commission (WECAFC); the Natural Resource Unit of the OESC (Organisation of the Eastern Caribbean States); the United Nations Caribbean Environmental Programme; the US National Marine Fisheries Service; the US Fish and Wildlife Service; and several Universities, Scientific Institutions and non-governmental organisations.

The activities of two institutions, the Caribbean Fisheries Management Council (CFMC) and the CARICOM Fisheries Resources and Assessment Programme (CFRAMP) will be presented in more detail below because both organisations are considered to be important partners for the development of a regional management strategy for *Strombus gigas*, and to provide good examples of regional management efforts and initiatives. A list of some relevant partner organisations is included in Annex IV.

The Caribbean Fisheries Management Council

The Caribbean Fishery Management Council (CFMC) is one of eight regional fishery management councils of the USA and is responsible for the creation of management plans for fishery resources (FMPs) in waters off Puerto Rico and the Virgin Islands of the United States. The CFMC has been a strong supporter of a regional management approach to conserve the Queen Conch. The CFMC has been active in this field for many years and is seen as one of the most important partners in strengthening efforts to achieve improved management and conservation of Queen Conch resources at a regional and international level. The CFMC organised several bilateral, sub-regional and regional meetings regarding the management of the Queen Conch fishery. The 1st International Queen Conch Conference, for example, was held in San Juan, Puerto Rico. Supported and organised by the CFMC, Puerto Rico, and FAO, this conference brought together fisheries managers and scientists from 18 countries and territories in the Caribbean region to discuss information on Queen Conch biology and research, stock assessment and management, and options to establish a basis for a regional management approach.

The conference led to the formal establishment of the “International Queen Conch Initiative” that aims to promote a common international management strategy for Queen Conch resources in the Caribbean region. As a first step of the International Queen Conch Initiative, the participants of the Conference adopted the “Declaration of San Juan” which established a framework for more effective collaboration between Caribbean States regarding the promotion and development of a common regional management regimes for the sustainable use of *Strombus gigas* resources in the region (see Annex V). This Declaration was signed by all range States represented at the Conference and received support from other countries and territories not represented at the Conference i.e. Cuba and Nicaragua. A second Declaration pertaining to the need to strengthen regional co-operation in managing the Queen Conch fisheries, the “Declaration of San Andres”, was adopted at the Regional Fisheries Forum of the south-western Caribbean held in San Andres Colombia in 1997.

The International Queen Conch Initiative is co-ordinated and managed by the CFMC, which established and maintains a website (www.strombusgigas.com) that provides access to relevant information sources; scientific reports, information of stock assessment, management and regulations, informs about relevant meetings and provides links to other institutions and organisations.

Following the First International Queen Conch conference and the establishment of the International Queen Conch Initiative, several other regional or bilateral meetings were organised to discuss available information on the status of Queen Conch stocks, to further develop plans for a regional management strategy, to make specific recommendations and to address specific issues such as illegal fishing activities and poaching. Examples are the International Queen Conch working group on regional management held in Costa Rica in July 1997; the International Queen Conch Initiative meeting between Jamaica and Honduras held in Honduras in November 1997; the International Meeting for the management of the Queen Conch held on the Dominican Republic in March 1998; the Queen Conch stock assessment and management workshop held in Belize in March 1999; the Jamaica-Honduras International Queen Conch Meeting held in Jamaica in March 2000 and the International Queen Conch Initiative meeting between Jamaica and Honduras held in Honduras in August 2000.

In July 2001, the CFMC, with the support of the Dominican Republic and the National Marine Fisheries Service of the United States of America, organised the Second International Queen Conch Conference in Juan Dolio, Dominican Republic. This conference brought together representatives from 22 Queen Conch range States and territories, and observers from CFRAMP, FAO, the CITES Secretariat, the National Oceanic and Atmospheric Administration of the US and TRAFFIC. The Third International Queen Conch Conference is planned for 2004.

CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP)

In January 1991, 12 of the 14 Governments of the Caribbean Community (CARICOM) (see Table 1) officially launched the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP) to promote sustainable use and conservation of the fisheries resources of the participating Member States.

In 1994, CFRAMP established the “Lobster and Conch Resource Assessment Unit (RAU)” with the goal to provide data and information regarding conch and lobster resources, to promote the management and

conservation of lobster and conch resources and to permit exploitation of these on a sustainable basis (Grant, in press). Seven of the 14 CFRAMP countries participate in this initiative (see Table 1). Since 1994, various activities relevant to Queen Conch resources have been undertaken, including for example stock assessment studies in Antigua and Barbuda and Belize; capacity building, training and technical assistance; the organisation of two Lobster and Conch workshops (1995 and 2001); and the collection of biological and other fisheries related data in all seven Member States (Grant, in press).

The CFRAMP, and in particular the Lobster and Conch RAU, allowed participating countries to improve and enhance their management capacities with regard to Queen Conch. It provided a significant amount of basic data and information on Queen Conch stocks and its fishery that is needed for effective fishery management decision-making, including the development of Fisheries Management Plans. In July 2001 the Lobster and Conch Terminal workshop was held in the Dominican Republic to determine future priorities and needs for conch and lobster assessments and management in the region. The proceedings of this workshop will be published by the end of 2001.

CFRAMP was executed in two phases, Phase 1 of the project was concluded in 1998 and Phase 2 ended in September 2001. It is hoped that there will be a transition to a more permanent Regional Fisheries Mechanism once sufficient funding has been secured. The CARICOM Regional Fisheries Mechanism (CRFM) is a recent initiative of the CARICOM Fisheries Unit that is planned to replace CFRAMP as a permanent and sustainable successor to the CFRAMP.

QUEEN CONCH BIOLOGY

Strombus gigas has been subject to a considerable amount of research. The following section summarises some aspects of the species biology that are relevant in the context of Queen Conch fisheries management.

Distribution

Strombus gigas is one of the six species of the family Strombidae that occur in the Western Atlantic Ocean. Its geographic distribution extends from Florida throughout the Caribbean and into the northern coast of South America to Brazil (Chakalall and Cochrane, 1996; Woods, 1995; Tewfik, 1996). The most northerly populations in the Wider Caribbean region occur in the northern part of the Bahamas and southern Florida, but there is also a, possibly genetically isolated, population in the waters around Bermuda. The species is reported to occur in the Gulf of Mexico (Aranda and Desmarais, 1994). The range of *Strombus gigas* includes the territorial and EEZ waters of the following countries and territories (based on Anon., 1996b):

Anguilla ¹	Dominica	Netherlands Antilles ²
Antigua & Barbuda	Dominican Republic	Nicaragua
Aruba ²	French Guiana ³	Panama
Bahamas	Grenada	Puerto Rico ⁴
Barbados	Guadeloupe ³	Saint Kitts & Nevis
Belize	Guatemala	Saint Lucia
Bermuda ¹	Guyana	Saint Vincent & the Grenadines
Brazil	Haiti	Surinam
British Virgin Islands ¹	Honduras	Trinidad & Tobago
Cayman Islands ¹	Jamaica	Turks & Caicos Islands ¹
Colombia	Martinique ³	USA (Florida)
Costa Rica	Mexico	Virgin Islands of the United States ⁴
Cuba	Montserrat ¹	Venezuela

(¹= Overseas territory of the United Kingdom of Great Britain and Northern Ireland; ²= Overseas territory of the Netherlands; ³= Overseas departments of France; considered a part of the EU's territory; ⁴= Overseas territory of the United States of America)

Annex IV includes some of the common names that are used for *Strombus gigas* in the various range States.



Fig.1: Map of *Strombus gigas* range States in the Wider Caribbean region. (Source: www.lib.utexas.edu/maps/americas/caribbean.gif)

Habitats

The Queen Conch is generally found in clean waters, and primarily inhabits sandy or rubble sea floors that support the growth of seagrass and algae. However, they are also encountered in rocky habitats and on coral reefs. The Queen Conch occurs in a wide spectrum of depths, from a few centimetres up to more than 100 meters. Adults are typically found in depths of 10 to 30m, however densities decrease significantly below 30 meters due to light limitations for algae and plant growth. Juveniles occur in shallow seagrass beds and migrate into deeper waters as they mature.

Juvenile Queen Conch can have very specific habitat requirements and since these habitats are generally found near shore they are particularly vulnerable to habitat degradations and pollution. Productive nursery habitats are characterised by several factors including good current flow, access to larvae brought from offshore waters, high algae productivity, the proximity to sandy beaches or sand bars for larvae settlement and early development, moderate seagrass density and the presence of other juveniles (better protection against predators) (Appeldoorn, 1994b).

Morphology and general biology

The Queen Conch is the largest Strombid conch with a maximal shell length of around 24 - 29cm. Its shell is generally beige on the outside and pink or yellowish in the inside and has large prominent spines at the spiral end (see Annex X, Figure 10 and 11). The morphology of the shell can vary greatly depending of environmental and genetic variations (Randall, 1964; Alcolado, 1976; Appeldoorn, 1994a). The large muscular foot bears a large corneous operculum as well as the proscobis and the prolonged eyestalks and tentacles (Wu, 1999). Conch feed primarily on macroscopic algae and detritus associated with seagrasses and macrophytic algae (Stoner, 1989). Conch feed during day and night, but juvenile conches are thought to feed primarily during the night as they remain buried during the day (Brownell and Stevely, 1981). Sexual maturity occurs approximately between the age of three to four years (see below) and Queen Conch are known to live up to 20 years or more (Coulston et al., 1987; Berg et al., 1992).

Early development

Queen Conch hatch as planktonic veliger larvae approximately 3-5 days after the spawning. The tiny larvae live pelagic, drifting in the currents of the upper water column during the first weeks of their lives. After approximately two to three weeks, the larvae descend and start to settle. The metamorphosis of the veliger larvae is completed 4 to 5 weeks after hatching and the young conch begins the benthic lifestyle of adult Queen Conch (Stoner et al., 1992). After the metamorphosis the juvenile Queen Conches are about 2 mm long and start to develop a small white shell. Metamorphosis may depend on the presence of the appropriate stimulus which appear to be the presence of certain algae foods associated with the substratum and particular characteristics of the sediment (Davis and Stoner, 1994). Laboratory experiments have shown that larvae will lose the ability to metamorphose after 6 days if the appropriate habitat conditions are not found (Davis and Stoner, 1994).

Due to the pelagic lifestyle the larvae can be carried significant distances in the first weeks of its life depending on the physical environment such as ocean currents and water circulation. Larvae exchange is thought to occur over great distances. It is assumed that Queen Conch larvae might even be transported up to 900 km during the first three weeks of its life (Davis et al., 1993). Through this larval drift recruits to certain areas may therefore originate in distant populations and this plays an important role in the recruitment potential and re-population of over-fished populations. Significant re-population for example occurred in Cuba and Belize only a few years after the fisheries were closed in the 1980s (Appeldoorn, 1997). Both countries are centrally located in the distribution range of the species and are accessible to outside supplies of larvae through the larval drift from other areas. Other areas such as Florida and Bermuda, which are located at the fringe of the species' range have failed to respond to the closure of the fishery for more than 15 years and no significant stock increase has been observed (Appeldoorn, 1997).

Biology of juveniles

Juveniles bury themselves in the sediment until they are approximately one year old (Ray et al., 1994). At shell lengths of 50 to 100 mm and at an age of approximately one year, young juveniles begin to emerge and to take up an epibenthic existence. Shallow water coastal habitats such as seagrass beds and sandy bottoms in protected

bays are critical inshore habitats for juvenile Queen Conch. However, other factors such as water circulation, seagrass shoot densities, food production and the presence of other Queen Conch characterise suitable habitat for juvenile Queen Conch. Juvenile conches are known to occur in relatively large densities of 0.2 to 2.0 Queen Conch per m² (Stoner and Ray, 1993). These aggregations appear to be related to the habitat quality i.e. the production of certain macroalgal species (Stoner et al., 1994). However, the aggregations are also thought to reduce the overall predation, which is relatively high during the first years (Stoner and Lally, 1994). The main predators of juvenile conch are crabs, lobsters, octopus, and other gastropods such as tulip shell (Iverson et al., 1986).

Movement and migration

Despite the dispersal of the Queen Conch larvae in the first weeks of their life, movements in Queen Conch after metamorphosis are relatively limited however still considerable for a sedentary gastropod: adult conch commonly move 50 to 100m per day and the benthic movement is known to increase with size.

Two types of migration exist in *Strombus gigas*: the first is an ontogenetic migration into deeper waters and the second is a seasonal migration that is related to spawning. Juveniles primarily live in shallow waters of a few meters and move into deeper waters as they grow older. This migration plays an important role in the stock maintenance of deep water stocks and that is why even fishing pressure on shallow water stocks can have significant impact of population occurring in deeper waters (Appeldoorn, 1997). Deep-water populations in depths of 20m or more occur in several several areas, e.g. Bahamas, Belize, Turks and Caicos Islands, Jamaica and Puerto Rico (Stoner and Sandt, 1991; Berg 1975; Berg and Olsen 1989; Appeldoorn, 1997). Such deep-water populations are thought to play an important role in stock recruitment and are considered critical spawning stock refugia (Appeldoorn, 1997).

Adult conches are generally found in depths of up to 30 m but migrate seasonally: in March when temperatures increase, adult conch start moving inshore to spawn and return to deeper waters in October during fall (Hesse, 1979). Similar patterns have also been observed in deepwater populations (Anon., 1999). Queen Conch also aggregate during the spawning season and this aggregation behaviour combined with the migration to shallower waters make mature Queen Conches particular vulnerable for fishing during the spawning season as they are easier to be harvested (Appeldoorn, 1988).

Growth and Maturation

The most unusual aspect of the Queen Conch biology is its determinate shell growth: once the animal starts producing its typical large flared shell lip, the shell does not continue to increase in length and from then on growth occurs only in thickening the shell, especially of the flared lip. Estimates for mean shell length range from 7.6 to 10.8 cm for one year old conch; to 12.6 to 17.0 cm for two year old conches and from 18.0 to 20.5 cm at the end of three years (Appeldoorn, 1990; Brownell, 1977; Berg, 1976; Alcolado, 1976). The shell length of an adult conch can progressively decrease with age due to bioerosion of the shell.

The flaring of the lip starts at an age of ca. 3 to 4 years and lasts for approximately 7 to 10 months, or longer (Anon., 1999). During this stage the young conches are considered sub-adults: individuals that have begun flaring a shell lip but have not yet reached sexual maturity. The linear growths of the shell and the flaring of the lip may occur simultaneously for some time before the adult shell length is reached and the growth in shell length ceases. Sexual maturity usually occurs when the conch is roughly four years old, but only when the flared lip has thickened and has reached a thickness of approximately 5 mm (Berg and Olsen, 1989; Appeldoorn, 1988; Chiquillo et al. 1997). This may be as much as a year after start of the lip formation, hence at a time when the animal had already reached the shell length of an adult but was still sexually immature. In addition, the full development of the gonads is an important factor that needs to be considered, as some conch with a lip thickness of more than 5 mm can still be immature (Chiquillo et al., 1997). The unusual growth pattern of the Queen Conch has a profound impact on assessing age and sexual maturity of an individual, which are important factors in the management of a fishery. Moreover, the size of a conch can vary from one area to another depending on local conditions such as water depth, habitat and probably food (Randall, 1964). In addition, faster growing conch appear to mature earlier and at larger mean lengths than slow growing individuals (Alcolado, 1976). It is not entirely clear whether this spatial variability in size is genetic or environmental in nature (Appeldoorn,

1994a). However, if it is genetic in nature the imposition of length limits may have serious consequences for Queen Conch genetics by selecting for genetically smaller stocks (Appeldoorn, 1994a). In addition, female conches have been found to be generally slightly larger than males (i.e. Randall, 1964, Chiquillo et al. 1997; Appeldoorn, 1994a), a fact that would additionally affect the population structure if certain size limits are implemented.



Fig. 2: *Strombus gigas* shells. The shell on the left is from an immature juvenile without a flared shell lip; the shell on the right is from a mature adult with a flared lip. The bar indicates 5cm. (Source: Berg and Olsen, 1989).

Reproduction

Unlike other gastropods, sexes in Queen Conch are separate and fertilisation is internal. The males have a penis (verge) that can be extended through the siphonal canal and the females have a ‘egg groove’ on the extended foot situated under the anterior lip. Copulation generally precedes spawning by several weeks and females have been observed to copulate with several males. Spawning is on clean coral sand with low organic content (D’Asaro, 1965). Females repeatedly deposit egg masses over the course of the spawning season and produce an average of 9.4 egg masses per season (Davis et al., 1984). The production of egg masses has been correlated to temperature and weather conditions: the maximum number of egg masses occurred with high temperatures and long photoperiods; stormy weather decreased egg laying activity and potentially reduces recruitment to the adult population (Davis et al. 1984; Stoner et al., 1992). The number of eggs per egg masses ranges from 300,000 to 1.5 million. Studies have indicated that female fecundity increases with age, but this relationship may not apply for very old conches (Appeldoorn, 1993).

Reproductive activity occurs throughout most of the year but is generally highest during the warmer summer months from July to September. However, the spawning season is broad and can vary from area to area (see Table 3). In some areas, the reproductive activities may even occur throughout the year (Egan, 1985, Stoner et al., 1992) or may start considerably earlier in the year than in other areas (e.g. Randall, 1964). In Mexico and Belize for example, egg masses were found all year round (Cruz, 1986; Egan, 1985).

Table 3: Observations of spawning seasons of *Strombus gigas* in different range States.

Location	Spawning Season
Jamaica	early July – late Nov.
Florida (USA)	late May – Sept.
Bahamas	April – Oct.
Turks and Caicos Islands	mid-March – mid-Nov.
Puerto Rico	mid-May – mid-Nov.
Saint Kitts and Nevis	late April – late Sept.
Virgin Islands of the United States	Feb./March – Nov./Dec.
Venezuela	late April – late Nov.

(Source: Anon., 1999)

Other Strombidae species in the region

At least five other species of *Strombidae* are known to occur in the Caribbean sea: the Milk Conch *Strombus costatus*, the Fighting Conch *Strombus pugilis*, the Hawking Conch *Strombus raninus*, the Rooster Tail Conch

Strombus gallus and the Goliath Conch *Strombus goliath*, which is the rarest of the six *Strombus* species in the Caribbean. The Queen Conch is by far the largest of the other *Strombid* species in the region and can easily be recognised by its large flared lip, the pink coloured aperture and the pointed knobs on all whorls (Wu, 1999).

All five other *Strombus* species are fished, for their shell or meat, but normally to a much lesser extent than *Strombus gigas*. An exception may be Mexico, that traditionally had a multi-species fishery that targets besides *Strombus gigas* at least 20 other gastropods. *Strombus costatus*, *Strombus pugilis*, *Xancus angulatus* and *Pleuroploca gigagntea* constitute together with *Strombus gigas* most of the landings. Other *Strombid* species may also be exported e.g. as shells by tourists and in some cases in the form of meat: e.g. meat of *Strombus pugilis* is exported by Honduras (G. Pineda, Direccion General de Pesca y Acuicultura, in litt., June 2001).

RESOURCE STATUS

The following section provides a description of the status of Queen Conch in several range States, based on literature reviews and other available reports and publications. The overall status of the Queen Conch resources in the Caribbean ranges from areas with that were severely over-exploited in the past and show little signs of recovery (i.e. Bermuda, Florida, Mexico, Saba Bank, Los Roques in Venezuela), to stocks that appear heavily exploited and show signs of depletion and potential recruitment failure (i.e. Belize, Dominican Republic, Haiti) and to a few areas where the overall populations may still be considered stable although that local stock depletions and populations declines have started to occur (i.e. Turks and Caicos Islands and the Bahamas). After decades of intensive fishing, the majority of the Queen Conch range States are now in a situation whereby considerable over-fishing continues, with harvest targeting large numbers of juveniles and deeper-water stocks due to the increased use of scuba and hookah.

Antigua and Barbuda

Traditionally, the main commercial fishing grounds were the southern side of the shelf, but in recent years fishers broadened their activities and are nowadays also fishing in the area between Antigua and Barbuda and the north-eastern side of the shelf. Queen Conch is nowadays primarily harvested using Scuba gear. In 1996 the government initiated a data collection programme for Queen Conch in collaboration with the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP). This included the collection of catch and effort data as well as biological data (mean shell length, meat weight, etc.). In 1999, the Fisheries Division (with the assistance of CFRAMP) conducted a conch abundance survey in the primary commercial fishing ground and a morphometric analysis of two stocks at the western shelf of Antigua (Tewfik et al., 2001; Horsford, 1999). The abundance survey revealed overall densities of 17.2 individuals/ha with juveniles making up almost 80% of the surveyed population (Tewfik et al., 2001). The overall adult conch density was extremely low (3 individuals/ha), indicating consistent and high fishing pressure. The estimates of the exploitable biomass of adult meat weight were 32 tonnes for the study area. However, estimates of total abundance and exploitable biomass for Antigua and Barbuda were not possible due to the lack of information (Tewfik et al., 2001).

Bahamas

The main fishing areas for Queen Conch in the Bahamas are Little Bahama Bank and the Berry and Andros Island area located on the Great Bahama Bank. The Queen Conch fishery in the Bahamas is primarily seasonal and is mainly fished during the closed season for lobster. Queen Conch is predominately harvested by hookah diving and free diving; the use of scuba gear is prohibited. In 1997, the Government of the Bahamas initiated a three year conch assessment project to determine the current stock status and to develop management options for exploited stocks (Braynen, in press). Preliminary results suggest that the Queen Conch populations are not overexploited, but some areas are reported to be locally overfished, especially in the vicinity of population centres (Anon., 1999; E. Delevaux, Fisheries Department of The Bahamas, in litt., July 2001). The high level of poaching by foreign vessels and especially in the southern part of the Bahamian Banks, is of growing concern to the national fisheries agency. The Department of Fisheries uses Daily Landing Forms to collect catch and effort data from five landing sites. This includes information on catch, trip duration, crew, gears used, and other features (Anon., 1999).

Barbados

Queen Conch is patchily distributed all around Barbados. Although some fishers tend to target conch, most fishers are harvesting conch only opportunistically and mainly for their shell; the meat is generally consumed by the harvester or sold privately (Anon., 2001c; C Parker, Fisheries Division of Barbados, in litt., June 2001). It is estimated that around 100 individuals have been harvested in 2000 for commercial purposes, mainly to be sold locally to souvenir and curios shops. The status of the resource is largely unknown, but anecdotal information suggests that conch populations of Barbuda are typically much smaller than those of neighbouring islands (Anon., 2001c).

Belize

The Queen Conch is the second largest capture fishery of Belize. The national Queen Conch populations were reported to be overfished and to show evidence of decline (Appeldoorn, 1994a; Berg, 1987). Nowadays, this trend seems to continue and the species is reported to become scarce as progressively smaller individuals are being harvested despite national size restrictions (Marin, in press). The conch fishery is dominated by two larger and three smaller co-operatives that are entirely owned by fishermen. Data collection programmes were undertaken in 1996, 1997 and 1998. Catch and effort data was obtained from purchasing slips and morphometric data was compiled from conch meat landed at the co-operatives as well as from data collectors on the boats (Anon., 1999). In 1996, the Belize Fisheries Department, with the assistance of the CARICOM Fisheries Resource Assessment and Management Programme initiated a conch abundance survey in 1996. Preliminary results suggested that the population studied was seriously over-exploited and in danger of stock collapse, as 70% of the overall populations were found to be juveniles (Marin, in press). However, it was also found that recruitment may be unaffected by local stocks which suggest that a supporting spawning stock exists outside the studied area.

Costa Rica

Little is known about the population status of *Strombus gigas* in the territorial waters of Costa Rica, however some reports indicate that populations have been declining (Anon., 1996b). The *Strombus gigas* fishery seems to be of little importance in Costa Rica where, another *Strombus* species, *Strombus galeatus* that occurs in the Pacific, is more commonly fished and traded (D Mora, University of Costa Rica, in litt., July, 2001).

Colombia

The most important areas for the Queen Conch fishery in Colombia are the San Andres, Providencia and Santa Catalina Archipelago located off the eastern coast of Nicaragua. Based on landing statistics from San Andres and Providencia, the conch fishery peaked in 1988 at about 800t of conch meat and has since fallen due to over-fishing and local depletion (Mora, 1994). Conch abundance surveys conducted in 1995 and 1996 at four Banks in the archipelago (Ospina et al., 1996) determined that populations were over-fished, and found low densities of 70 conches / ha in the shallow waters. The overall densities of the four banks varied between 70 and 500 conch / ha depending on the different depth categories surveyed. They were found to be generally lower than densities reported from other exploited areas (Ospina et al., 1996).

Cuba

The Cuban conch fishery was historically known for its large harvests, peaking at 2,353t in 1977 (Munoz et al., 1987). In addition, large harvests of 1,500t were reported for the Cuban bait fishery (Appeldoorn, 1994b). However, it should be noted that Cuban landing figures always referred to the total animal weight (including the shell) (Formoso, pers. comm., July 2001). The weight of unprocessed meat is approximately 13-16% of the total animal weight and only 6.5 – 7% of the total animal weight is “industrial cleaned meat” that is consumed locally or exported (Formoso, 2001). In 2001, harvest levels are 768t of total animal weight at landing which refers to 50,4t industrial cleaned meat weight (Formoso, 2001). No estimates exist for the exploitation of conch as bait in the finfish fishery and it is unclear whether the existing regulations such as size restrictions, quotas, closed season, also apply to this potentially large harvest for bait (Anon., 1999). Formoso notes that this type of fishery is “hardly controlled” (Formoso, 2001). In the past, stock depletions have led to a total closure of the fishery between 1978-1982 and in 1998. In the 1980s, densities were reported to be low and decreasing (Ferrer and Alcolado, 1994) and some populations along the northern shore were considered to be depleted (Glazer, 1991). The populations along the southern shelf were considered stable, but fully exploited (Appeldoorn, 1994a).

Preliminary stock assessment studies conducted in the late 1990s by the Cuban Fisheries Research Centre in eight sample areas found densities of 20-35 ind./ha (Formoso, 2001).

Dominican Republic

The Queen Conch populations were reported to be declining and are considered seriously over-fished in the main fishing areas within the territorial waters of the Dominican Republic, i.e. in the south western area around the Jaragua National Park and in the south eastern area around the Parque Nacional del Este (Delgado et al., 1998; Posada et al., 2000; Torres et al., 2000). Delgado et al. (1998) reported a marked three-fold decline in adult density in the south eastern coast between 1996 and 1997, which was directly linked to high fishing activities. Overall densities of 57.2 conch / ha were found in the insular shelf of the Jaragua National Park (Posada et al., 2000), with juveniles dominating shallow waters, which indicates high fishing pressure. No information is available from other important conch fishing grounds such as the north-western fishing grounds around Monte Christi, or the conch populations at the offshore banks i.e. Banco de Plata and Banco de Navidad (C. Diaz, Subsecretaria de Recursos Costeros y Marinos, in litt., August 2001). The extremely high levels of Queen Conch landings (between 1,100 and 2,600t of meat/year) reported by the Dominican Republic Fisheries Department between 1993 and 2001 are cause for serious concern. These are the highest landings of Queen Conch meat within the Caribbean region, but considering the status of the Queen Conch resources in the country, it is highly likely that significant portions of these landings are fished in the territorial waters of other nations. This is confirmed by the considerable number of Dominican vessels that are being caught while illegally fishing Queen conch in neighbouring countries e.g. in the Bahamas, Jamaica and Turks and Caicos Islands (Clerveaux, Department of Environment and Coastal Resources of the Turks and Caicos Islands, Deleveaux, Department of Fisheries of the Bahamas, Kong, Fisheries Division of Jamaica, in litt. 2001).

in litt. August 2009 Stock assessment work is planned in co-operation with CFRAMP (CARICOM Fisheries Resource Assessment and Management Programme) and will be initiated in fall 2001 (Ramona Nolasco, Direccion Nacional de Recursos Pesqueros, pers. comm., August 2001).

Grenada

The Queen Conch is harvested commercially on the continental shelves of Grenada and that of the Grenada Grenadines (Isaac, in press). Nowadays the greatest fishing efforts are expended in the northern parts of the continental shelves and in the Grenadines, as populations in the southern parts of the shelf appear to be over-fished and consist mainly of juveniles. Biological and Catch and Effort data was collected in 1997 and 1998 with assistance of CFRAMP, however basic data collection is still required before a reliable stock assessment is possible (Anon., 1999).

Haiti

The Queen Conch populations of Haiti are considered to be largely depleted and likely to have been over-exploited (Glazer, 1991; Mulliken, 1996), however up-to-date information is limited. Wood (1995) reported that populations around Gonaves Island and Les Arcadines were seriously over-fished, and that those around Les Cayemites were likely to be over-fished. Productive populations were only found on the Rochelois Bank and off Dame Marie (Wood, 1995).

Honduras

The main fishing areas for Queen Conch in Honduras are the waters around the Islas de la Bahia, off the northern coast. However, despite continuing large volumes of export (around 900t in 2000) information on Queen Conch populations in Honduras is minimal to non-existent, and available information is limited to a stock assessment study that was undertaken in the Biological Reserve around the Cayos Cochinos (Tewfik et al., 1998). The Cayos Cochinos are located at the northern coast and were declared a Biological Reserve in 1993, after three decades of intensive conch fishing by the local fishers. The low density and abundance of Queen Conch found in the Reserve in 1996 were seen as a direct result of the heavy exploitation prior to the creation of the reserve.

The high exports and increasing exports by Honduras are cause for serious concerns considering the status of the Queen conch populations in Honduras and the numerous reports of Honduran vessels that are caught fishing conch in waters under the jurisdiction of other States i.e. Jamaica (A. Kong, Fisheries Division of Jamaica, in litt. 2001). Current information suggest that a significant portions of Queen conch meat landed in and exported by Honduras has actually been fished illegally in waters of neighbouring states. Concerns have been also raised

about the recent increase in illegally fishing activities by Honduran vessels at the Jamaican Pedro Bank, where fishing has not been allowed since July 1999 due to a law suit.

Jamaica

It is estimated that 95% of the Queen Conch harvested in Jamaica originates from the Pedro Banks, an area where probably more than 50% of all Queen Conch meat in international trade originates from. Considerable concerns were raised in the early 1990s about the sustainability of the fast emerging industrial fishery that developed at Pedro Bank (Mahon et al., 1992). Abundance surveys at Pedro Bank were conducted in 1991, 1994 and 1997 (Aiken et al., 1992; Appeldoorn, 1995; Tewfik and Appeldoorn, 1998). The 1994 study revealed that densities in this area were considerably higher than most other areas subject to fishing, with average densities of 89.09 ind./ha in the 1-10m zone, 144.46 ind./ha in the 10-20m zone and 276.97 ind./ha in the 20-30m zone (Appeldoorn, 1995). The 1997 survey noted decreases in the density of certain age categories (Tewfik and Appeldoorn, 1998). Based on the results of these surveys and on estimates of Maximum Sustainable Yields, the National Total Allowable Catch (NTAC) was adjusted following each survey and was set at 1366t for the 1998-1999 fishing season. Since then, the NTAC has been further reduced and was set at 946t in 2001 after the fishery was closed for almost 2 years due to a law suit of conch exporters against the Jamaican government (ENS, 2001). However, it has been suggested that the sustainable yield for Pedro Bank may be below 900t (Anon., 1999). A fourth abundance survey at Pedro Banks is planned before the fishery will be opened in 2002 (A. Kong, Fisheries Division of Jamaica, pers. comm., July 2001). The Fisheries Division collects catch and efforts data through logsheets that are obtained from the industrial vessels operating at Pedro Banks.

Martinique

The Queen Conch populations and fishery were studied in 1986 and 1987 and revealed that shallow water populations were seriously over-fished and that the majority of the harvest had been sustained by juveniles (Rathier and Battaglia, 1994). Deep-water populations were considered to be healthy despite depletion of inshore populations (Appeldoorn, 1994a). Since then, no further population studies have been undertaken (Doray and Reynal, 2001). Martinique is considered to be one of the largest consumers of Queen Conch meat in the region and average consumption was estimated to be around 300 to 400t, of which approximately 350t are imported (Rathier and Battaglia, 1994). However, since July 1997 no imports of Queen Conch meat were authorised due to EU Food Sanitary Regulation (M. Delbé, regional Council of Martinique, pers. comm, July 2001). However, anecdotal information suggests that illegal imports from neighbouring islands further provided some Queen Conch meat to the Martinique market (Joseph, in press; Anon., in press b). Moreover, recent reports suggest that gillnets are now used to harvest Queen Conch in deeper waters (Doray and Reynal, 2001). Catches of this previous marginal type of fishing can reach around 40kg per fishing trip.

Mexico

In Mexico, several shell species have been traditionally fished in the States of Yucatan and Quintana Roo. The Mexican 'conch' fishery, which targets some 20 species (including *Strombus gigas*), has drastically declined in the 1980s due to overexploitation and unregulated fishing (Reguero, in litt, August 2001). Since 1988, the Yucatan fishery has been permanently closed, and in 1991 an indefinite closure was enacted in the State of Quintana Roo. Despite these closures, the stocks show little signs of recovery, which may be due to continuing poaching of juveniles and illegal fishing (Anon., 1999). Nowadays, the harvest is restricted to two banks: Bancos Chinchorro and Banco de Cozumel (Anon., 2001d).

Netherlands Antilles

Stocks are considered severely depleted in the Leeward Islands, Curacao and Bonaire. Adult Queen Conches are reported to be extremely rare in Curacao, and surveys conducted in 1999 in Bonaire found only 111 conches in a 51,000m² sampling unit (van Buurt, 2001). In the Windward Islands, stocks in the inshore areas around Sint Maarten and Saba are probably entirely depleted (in Anon., 1996b). The Saba Bank is the only area remaining in the Netherlands Antilles, which may still have considerable numbers of Queen Conch. However, in the past Queen Conch were heavily fished on the bank by foreign vessels and the status of the Queen Conch stocks is not well known (van Buurt, 2001).

Puerto Rico

Primary Queen Conch fishing grounds in Puerto Rico include areas on the south-west and east coast of the island. Over the past decade a pronounced decline in Queen Conch landings has been reported for Puerto Rico (Anon., 1996a) and resulted in recent harvest, of around 70t of conch meat. The majority of conch meat consumed locally is being imported (Anon., 1996a). Mean densities of 8.11 ind./ha have been reported in the Parguera area (Appeldoorn, 1991) and the overall populations is considered depleted and over-fished (Glazer, 1991; Appeldoorn, 1994a). Catch and effort data is available since 1980, including information on landings per trips and fishing ground (Anon., 1999).

Saint Kitts and Nevis

A study by Wilkins et al. (1987) indicated that the Queen Conch populations were in serious danger of over-exploitation at that time with a harvest of 45t to 68t per year. Most recent harvests are around 55t per year plus an additional 5–10% for local consumption (Anon., 1999). Queen Conch populations are still considered to be over-fished, especially on the leeward side of the islands. However, there are indications that depleted stocks start to recover in near shore areas, possibly due to increased fishing efforts in deeper waters and the reduction of exports to Martinique due to EU Food Sanitary Regulations (Anon., 1999).

Saint Lucia

Near shore stocks of *Strombus gigas* have been over-exploited in Saint Lucia and most fishers target now populations at deeper depths by using scuba gear. Even though the species is thought to be distributed around the island, two significant populations have been identified, in the north and the south, with the northern population thought to be more heavily exploited than the southern population (Nichols and Jennings-Clark, 1994). Data collection programmes have been implemented since 1979, but have been significantly improved with the assistance of CFRAMP data collection programmes (Joseph, in press)

Saint Vincent and the Grenadines

Data on Queen Conch populations in the Saint Vincent and the Grenadines are limited. Most fishing takes place around the islands Mustique, Union and Bequia (Anon., in press b). The Fisheries Division collects catch data from local markets to assess overall harvest. An implementation plan to collect catch and effort data as well as biological data is available but is not yet implemented (Murphy, Fisheries Division of Saint Vincent and the Grenadines, pers. comm., July 2001).

Turks and Caicos Islands

The Queen Conch populations of the Turks and Caicos Islands are generally considered to be stable, although intensively fished and possibly over-fished in certain areas (Ninnes, 1994; Fenton et al., 1997). It is assumed that unexploited 'deep-water' stocks exists that contributes significantly to recruitment of the fished stocks in shallower waters (Ninnes and Medley, 1995). The Turks and Caicos Islands have one of the longest catch-effort time series data, which date back to 1977 (Ninnes and Medley, 1995). Catch data are collected in the processing plants at the end of each day per fishing boat and efforts are measured in boat/days. The overall fishing efforts under the current national annual export quota of 600,000lbs (=272,160kg) are considered to be maintaining the stock size at sustainable levels (Anon., 1999). Studies on protected versus fished populations found differences in densities as well as age structure, with juveniles being significantly more dense in fished areas than adults (Tewfik and Béné, 1998). The overall mean density for both protected and fished areas was reported to be the highest in the region.

Virgin Islands of the United States

In the past two decades local inshore populations of the Virgin Islands of the United States quickly became depleted and densities were reported to range from 2-10 ind./ ha (Wood and Olsen, 1983). Over-fishing led to a five-year moratorium in St Thomas and St John between 1987-1992. However, when the ban was lifted, no new management measures were in place, and the resource was depleted in a short time (Anon., 1999). New management measures were adopted in 1994. Queen Conch populations around St Croix have not been surveyed since 1983. At present the fishery is considered to be fully exploited and shell lengths and lip frequency values indicate that increasingly smaller conch are harvested each year (Anon., 1999). Commercial landing data provide

information per trip, gear used, area fished, hours and catch and have to be submitted on a monthly basis (Anon., 1999).

Venezuela

With the exception of 1999, the Venezuelan Queen Conch fishery has been closed since 1991. Before this closure 90% of the Queen Conch harvested in Venezuela came from Los Roques, Las Aves and Los Testigos Archipelago. Population studies in 1980s determined that the Queen Conch populations around Los Roques were severely over-fished with densities of 0.46 ind./ m² in protected and 0.08 ind./ m² in non-protected (Laughlin et al., 1985). Following these surveys the Los Roques Archipelago was closed in 1985 and in 1991 the Government adopted a total closure for Venezuela in 1991 (Solórzona, pers. comm., July 2001). After the total closure, the fishing activity was reported to be on-going and harvests were mainly of juveniles (Rodríguez and Posada, 1994). Despite supporting signs of recovery of local Queen Conch populations, a management plan was established and the fishery was re-opened in 1999 for one year following strong social pressure from fishermen and the industry (Solórzona and Lagarde, 2001). Illegal fishing and poaching by foreigners, mainly in Las Aves and Los Testigos Archipelago, is reported to be ongoing and to severely undermine the recovery of exploited Queen Conch populations (Solórzona and Lagarde, 2001).

OVERVIEW OF THE QUEEN CONCH FISHERY

Strombus gigas is commercially harvested in more than 20 countries throughout the region. In some Caribbean countries, the Queen Conch fishery is only second after the spiny lobster fishery in terms of economic importance (e.g. in the Bahamas, Belize, Turks and Caicos Islands). In other countries, the Queen Conch fishery has become the most important fishery product both with regard to annual landings and as a source for economic income. In Jamaica for example the Queen Conch industry earns between 8-12 million USD per year and employs several hundreds of people, especially in the processing and packaging sector. Similarly, in the Turks and Caicos Islands the value of the Queen Conch fishery to the fishermen is approximately 615,000 USD, or 22% of the value of all fisheries of the country (Ninnes, 1994).

In many Caribbean countries the spiny lobster fishery and the Queen Conch fishery are inter-linked and may influence each other as they can involve the same vessels and same individuals, with some vessels targeting lobster and Queen Conch at the same time. Moreover, fluctuations in annual Queen Conch landings have been reported to depend on fluctuations in spiny lobster landings and in some countries such as the Bahamas most fishing for Queen Conch is done during the closed season for spiny lobster (Anon., 1999).

The size and structure of the Queen Conch fishery in the region may vary greatly from country to country, depending on the nature and status of the fishery, fishing traditions, the presence of other important fisheries (i.e. spiny lobster), its primary market structure and use of the Queen Conch (local markets versus export) and other factors. In some countries such as Dominica or Barbados the fishery plays a relatively minor role and the species is only fished opportunistically and primarily involves subsistence fishing for local consumption. In other countries (i.e. Antigua and Barbuda, Saint Lucia, Saint Vincent and the Grenadines) the fishery is mainly artisanal in nature, moderate in size (with harvests between 10 and 50 t per year, See below) and has traditionally supplied local demand while exporting some meat within the region.

However, in some countries the Queen Conch fishery is industrial in nature, involving larger vessels and higher production levels, and is supported by a well-developed processing sector (Jamaica, Belize, Colombia, Honduras, Turks and Caicos, etc.). In these countries and territories, the fishery is mainly export oriented and one of the most important fisheries sectors that earns several million USD per year. Depending on the nature of the fishery (i.e. artisanal or industrial) the organisation of the fishing sector and market, and the boats and gears involved vary from one country to the other. The following section provides a brief overview of the fishing fleets, the gear, the most common fishing practices and the processing sector in the Queen Conch fishery. Table 6 summarises important features of the fishery for the various range States together with information on the status of *Strombus gigas* in the country or territory concerned

Fishing fleet

With the exception of the larger industrial sector, the Queen Conch fishery can be generally described as artisanal (=small-scale), involving relatively small boats and fishermen that may also target other shallow water species (i.e. spiny lobster) pending on the fishing season or time of the year. The boats commonly used are small canoes or “dories” of 7 to 10 meters powered by an outboard engines or sail oars (see Annex X, Figure 16). Fishing is generally done in day trips along the island shelf or near banks. The boats usually carry 1 to 4 divers and a non-diving boat driver. The Queen Conch is landed at the end of the day to be sold directly at the landings sites or is brought directly to processing plants.

In areas where an industrial Queen Conch fishery has developed (i.e. Jamaica, Honduras, Dominican Republic, and others) industrial vessels such as inboard powered steel-hulls of up to 35m length are used, besides the smaller boats in the artisanal sector. These vessels can carry up to 40 or more divers and are part of a “supply-and-collector boat systems” that allows weeklong fishing trips to offshore banks. The larger boats can serve as so-called “mother” vessels that provide housing to the crew and divers and that are used as a base for the daily fishing trips. The actual day fishing is done with smaller outboard powered boats of around 6m that carry 1-2 divers and possibly a driver. They dive for conch during the day and provide the meat to so-called “packer boats”. These are larger vessels that travel between the shore and the fishing areas to supply fishers at distant fishing areas and to collect or purchase the catch from the smaller boats and transport it to the processing plants on the island. Fishing trips can last several weeks or up to a month and fishers may stay on board of the “mother boat” or at smaller Cays near the fishing ground. The larger boats are often owned by the processing plant or by the fishers co-operatives, and the divers are hired directly for a certain period of time.

Fishing gear

In some areas traditional gear such as long hooked poles (i.e. ‘conch staff’), tangle nets, bottom gillnets or free diving are still used to harvest Queen Conch. However, with the over-exploitation and resulting decline of shallow water stocks, modern diving technologies such as scuba gear or compressor (hookah) diving are increasingly used and are nowadays the dominant gear used to harvest Queen Conch (see Table 6).

The use of these modern diving techniques has allowed divers to exploit Queen Conch in deeper habitat at depths of up to 30m or more. It has decreased the required fishing efforts and allows harvests of up to 200 kg of Queen Conch meat per day and per diver (Ms Brown, Ton & Rick Fishing, Jamaica, pers. comm., July 2001). The use of these techniques and the exploitation of deeper Queen Conch populations is of particular concern as deep water populations are considered important spawning stock refugia (Appeldoorn, 1997; Tewfik, in press). An equally important concern is the effects of scuba and hookah gear on the divers safety. Unsafe diving practices are often a result of no formal dive training, poor conditions of the diving equipment and the lack of understanding of diving physiology and the threats of prolonged diving. As Queen Conch fishing moves into ever increasing depths, dive related accidents and even fatalities have become more frequent (Espeut, 1997).

Dive depths of free divers range between a few meters to 12 or even more, but generally they remain in shallow waters. They also prefer shallow waters since the weight of the shell does not allow carrying a larger number of individuals per dive trip. Scuba and hookah divers reach considerable deeper waters of up to 40m and carry larger volumes of meat per dive trip, as they generally do not take the shells to the surface.

Fishing practice

In areas where scuba and hookah gear are used, it is common practice to extract the conch meat directly underwater or on the boat and to leave the shell behind. The conch meat is extracted by cutting a small hole in the fourth whorl of the spire and subsequently severing the columellar muscle attached to the central axis. This practice is termed “knocking” or “breaking” and is the standard method used by divers in harvesting Queen Conch meat (see Annex X, Figure 15). It allows the divers to carry more meat per dive trip and the dive crew to transport higher volumes of conch meat per fishing trip at greater speed, as they avoid the relatively high excess weight of the shells on board. In areas where the fishery is more artisanal in nature and harvest is by free diving, the animals are generally knocked on board of the diving boat by the boat diver while the divers are diving and providing new shells to the boat. In other cases the animals are landed whole in the shell either at the landing site or near cays. The shells are then broken and discarded at the landing sites or at fish markets resulting in large piles of broken Queen Conch shells (see Annex X, Figure 14).

In some countries, e.g. in Saint Lucia and Saint Vincent and the Grenadines the animals are stored after landing in wire-meshed cages in shallow waters close to the shore until the sale is obtained. The meat of the Queen Conch can also be removed by boiling or freezing the animal or by hanging it for several hours which may be used in order to keep the shell intact (Brownell and Stevely, 1981; Wood, 1995). However, these methods are more time consuming and significantly reduce the quality of the meat and its potential value, and in most cases this method is only used if the fisher has an assured sale for the shell (Wood, 1995).

Processing of the meat

Some preliminary processing of the meat may be done directly by the diver or may take place on board of packer or freezer boats that collect conch meat from offshore divers and transport it to processing plants or local fish markets. However most processing takes place after the conch meat has been landed at the fish markets or processing plants. The level of processing of the Queen Conch meat varies and depends for example on the marketing system and the final destination (export versus national market) or cultural preferences. The French markets for example generally prefer less processed meat than the US markets (D. Roberts, DYC Fishing Ltd., Jamaica, pers. comm., July 2001). In general, the processing is relatively simple and entails the removal of the intestines (=viscera) and the actual peeling of the darker portion of the outer “skin”. Depending on the desired level of processing the original tissue weight of the animal can be reduced by 50% or more. The meat is landed fresh, on ice or frozen and is first washed in water. Depending on the desired level of processing certain parts of the animal body are then removed by cutting (see Annex X, Figure 20). Depending on the degree of processing and the experience of the cutter, a single person can process up to 500kg of Queen Conch meat a day (D Roberts, DYC Fishing Ltd., Jamaica, pers. comm., July 2001).

Within the commercial sector specific terms are used to describe the different processing grades. However the terminology used is not yet standardised throughout the region and within the seafood industry. In general the different grades refer to the level of tissue loss that occurs with processing. For example, in the Jamaican Queen Conch fishery, “100% cleaned” meat or “fillet” refers to conch meat where all parts of the animal’s body have been removed except for the pure white meat of the foot (=fillet). Meat where only very basic processing has taken place and only parts of the animal such as the viscera and the operculum has been cut away is referred to as “50% cleaned”. Unprocessed conch meat is generally referred to as “dirty conch” – as it still includes the viscera of the animal.

Table 4 provides an overview of the different levels of processing and describes the associated tissue loss per processing grade. The terms and grades used in this table are based on the standards used in the Jamaican Queen Conch industry (Tewfik, 1996). However, these terms can be applied differently: e.g. “40% cleaned” conch meat refers in the Turks and Caicos to meat where only 40% of the original tissue weight of the animal is left after processing (W Clerveaux, Department of Environmental and Coastal Resources, in litt., October 2001). Parts of the remaining 60% may be used as ‘trimmings’, which can be sold at the local food market and are also exported.

Table 4: Processing grades and tissue loss of Queen Conch in the Jamaican processing industry

Processing grade	Tissue loss
Unprocessed (“dirty conch”)	None; animal simply removed from shell
50% cleaned	Removal of the operculum (“claw”) and viscera (“bag”)
65% cleaned (“semi-fillet”)	All of the above plus “head (eyes, stalks and proscobis) and parts of the mantle (“skirt”)
85% cleaned	All of the above plus verge, mantle and part of the skin
100% cleaned (“fillet”)	Only the pure white meat remains

(Source: Tewfik, 1996; Smikle, 1997)

Due to the relatively high tissue loss of up to 50% or more during processing, it is important to determine conversion factors to assess the equivalent of animals that need to be harvested to obtain a certain volume of processed Queen Conch. This is also important in cases where harvest and export quotas are introduced to compare exports of processed product with actual harvest volumes. 500 kg of unprocessed Queen Conch meat, for example, may be equivalent to ca. 3,500 harvested animals (assuming an average meat weight of 143g, see Chapter 2), whereas 500 kg of 100% Queen Conch meat would equal almost 7,000 animals (assuming an

average meat weight of 100% cleaned meat of 72g). Standardised conversion factors are particularly important when catch or export quotas are implemented in order to manage the fishery and the international trade in Queen Conch products.

Table 5: Tissue weight, percentage tissue loss and conversion factors for the different processing grades as defined for the Jamaican Queen Conch fishery.

Processing grade	Tissue weight	Percentage tissue loss	Jamaican conversion factor
Unprocessed - (“dirty conch”)	142.5 g / meat	0%	0.85
50% cleaned	121.3 g / meat	15%	1.00
65% cleaned (“semi-fillet”)	108.9 g / meat	24%	1.113
85% cleaned	96.7 g / meat	32%	1.282
100% cleaned (“fillet”)	72.1 g / meat	50%	1.429

Note: Conversion factors use “50% cleaned” grade as a base unit. The figures for the tissue weight per processing grade were obtained from Tewfik 1996. The Jamaican Conversion Factors were slightly revised in 1995 (A Kong, Director of the Jamaican Fisheries Division, pers. comm., July 2001).
 (Source: Tewfik, 1996, Smikle, 1997)

Table 6: Overview of status of Queen Conch fishery and resources for selected range States. Harvest volumes based on reported landings of Queen Conch meat for the past 5 years (see Table 7). Export figures based on trade reported in CITES annual report data (see Table 8).

Country	Type of fishery	Fleet and gear	Landings		Export		Overall stock status
Antigua & Barbuda	Mainly export to the region	1 large (13m) fibreglass boats, 6 small (7m), Scuba	35-46t	+/- stable	0.5-4t (between 1990-96)	CITES import suspension	Some areas overfished; current harvest rate possibly unsustainable; poaching of juveniles and low adult densities
Bahamas	Commercial, domestic & exports	Small boats; free-diving and hookah	453-680t	Fluctuating	47-285t	Fluctuating	Overall populations status considered stable, but local depletions; unknown levels of poaching by foreigners
Barbados	Small scale & artisanal; tourist	Small boats; free-diving		Small scale only; levels unknown	?	CITES import suspension	Populations largely unknown but smaller than neighbouring islands; most harvest is for shell only; no protected areas for Queen Conch
Belize	Commercial, and mainly export	Sailing sloops (10m) and small, canoes; free-diving	138-257t >500t (in 1970s)	Fluctuating	26-157t	Increasing	Populations seriously overexploited; harvest dominated by juveniles; adults becoming rare, unknown level of poaching by foreigners
British Virgin Islands	Artisanal, mainly domestic and tourist		4.8-6.2t	Stable	?		Local populations possibly overfished; no protected areas for Queen Conch
Cayman Islands	Small scale, tourist and recreation	Small boats	?	No commercial fishery	?		Some areas overfished
Colombia	Mainly industrial and mostly export	Larger boats; free-diving	104-199t (800t in 1988)	Fluctuating	64-224t	Fluctuating	Some areas overfished; overall stock status insufficiently known
Cuba	Commercial, export and bait	Free-diving	141-163t (1,500t in 1990)	+/- stable	7t	?	Overall population probably stable, but stock status not well known; large scale fishing for bait
Dominica	Domestic & tourist; some regional export?	Small boats; free-diving & bottom gillnets	?		3t	CITES import suspension	Populations status largely unknown
Dominican Republic	Industrial and artisanal, (mainly) domestic and export	Some larger steel vessels (20m) plus small boats; free-diving, hookah	1,145-2,209t	Decreased	50-276t	Increasing	Current harvest rate probably not sustainable; harvest largely juveniles, adults rare; illegal harvest in MPAs and by foreigners; no sufficient info on stock status
Guadeloupe	Moderate, mainly domestic	Free-diving	?		?		Population affected by over-exploitation, especially in shallow waters; levels of trade to St. Martin unknown

Table 6 (continued)

Country	Type of fishery	Fleet and gear	Landings		Export		Overall stock status
Guatemala	Artisanal	?	?	No commercial fishery	none		Only very small population off the Atlantic coast, population status not well known
Haiti	Commercial, mainly domestic; shell export	Hookah, free-diving	?		<1-159t	Increasing	Local populations seriously over-fished; densities in several fishing areas very low; harvest of juveniles
Honduras	Mainly industrial and export	Large industrial vessels (15) and auxiliary boats, Scuba	636-1050t	Fluctuating	459-966t	Fluctuating	No sufficient info on stock status, current harvest rate probably not sustainable and several,
Jamaica	Mainly industrial and export	11 larger industrial vessels (20-30m) plus auxiliary boats; Scuba and hookah, free-diving	1,008-1950t	Decreased	473-1,989t	Decreasing	Overall status +/- stable but unknown level of poaching by foreigners; status of inshore populations unknown
Martinique	Mainly domestic, meat imports	Small boats; free-diving, gillnets	?				Shallow water populations overfished; population status not sufficiently known
Mexico	Moderate fishery, domestic	Smaller boats (5-8m); Scuba and free-diving	42t* (>300t in 1970s)	+/- stable??	?		Populations affected by over-exploitation; no protected areas for juveniles
Montserrat	?		No harvest for last five years				Populations affected by over-exploitation; no protected areas for Queen Conch
Netherlands Antilles	No real commercial conch fishery		?	Decreased (fishery almost stopped since 1996)	2t (61t in 1994)		Stocks at Saba Bank seriously overfished; and depleted – close to stock collapse (?); depletions caused by over-fishing in Curacao, and more severely in Bonaire
Nicaragua	Domestic and export		17-65t	Increased	7-15t	Increasing	Poaching by foreign vessels
Panama	Mainly domestic	Free-diving	32t	?	?		Status not well known
Puerto Rico	Commercial, domestic and meat import	Scuba, free-diving	97-130t	+/- stable			Affected by over-exploitation
Saint Kitts and Nevis	Domestic but mainly regional export	10 small boats (5-7m); scuba, free-diving	8.9-59t	Increased	2t	?	Some areas (shallow waters) over-exploited; mostly mature animals being harvested; little info on overall stock status

Table 6 (continued)

Country	Type of fishery	Fleet and gear	Landings		Export		Overall stock status
Saint Lucia	Domestic and some (illegal export)	12 small boats (8m); scuba, free-diving and gillnets	23t	Decreased	Illegal	CITES import suspension	Shallow water stocks largely overexploited; mostly mature animals being harvested; no protected areas for Queen Conch; better stock info needed to implement quotas; illegal exports to Martinique
Saint Vincent and the Grenadines	Domestic and (regional) export	Small boats (6m); scuba and hookah	7-21t	Decreased	3-9t	Fluctuating	Stock status not well known, some local depletions
Trinidad & Tobago	Artisanal, some regional exports?	Small boats	?		1-6t	CITES import suspension	?
Turks & Caicos Isl.	Commercial, mostly export	Smaller boats; free-diving	737-965t	+/- stable	68-482t	Decreasing	Overall population +/- stable; harvest and export quota controlled; unknown level of poaching by foreigners
US Virgin Island	Mostly domestic	Smaller boats; Scuba	12-35t	Increased	4t	?	Affected by over-exploitation; densities in some areas low and deep water population possibly over-fished; harvest of undersized and juveniles
Venezuela	(illegal) exports	Smaller boats; free-diving	Harvest banned (up to 360t in 1988)		Illegal		Los Roques population largely affected by over-exploitation; harvest banned since 1991 (except for 1999); some recovery; illegal harvest and trade (both national and international e.g. to NL Antilles)

* = 42t refers to overall harvest of "conch" of which harvest of *Strombus gigas* accounts for approximately 20%. (M. Basurto and Reguero, Instituto Nacional de la Pesca, in litt. July 2001). Source: Based on literature and reports referenced in the text and on Appeldoorn, 1994b; Chakalall and Cochrane, 1996; Tewfik, in press, and on information provided by range States in litt. to TRAFFIC Europe through questionnaires).

HARVEST AND TRADE IN QUEEN CONCH PRODUCTS

Reported landings of *Strombus gigas*

Landing data for Queen Conch meat is limited and not available for all countries. Data collections systems have been established in several countries, but reported conch landings are usually only estimates. It should be noted that there is an important difference between total catch and total landings in case of the Queen Conch fishery: catch represents the amount of live animals or shell caught, whereas landings are the portion that is brought to shore for distribution. Therefore it is of significant difference whether landings of Queen Conch refer to live animals (animal in shell) or to weight of conch meat only, which can - depending on the size and age of the animal, and the processing practice - account for only 15% of the weight of a live animal (Formoso, 2001). Moreover, as different levels of processing of the Queen Conch meat may be undertaken at sea or on board of the vessels, the recorded weights of landings may include Queen Conch meat that has been processed to different grades. This makes it difficult to calculate the actual catch volume (and to the total number of conches harvested).

Landing data for Queen Conch range States have been obtained from various sources, in most cases directly from the National Fisheries agencies of the respective range States. Table 7 provides an overview of the total reported landings of Queen Conch meat for the last eight years (1993 - 2000). Not all countries are represented in the table, but it includes landing estimates for the most important producing States. As mentioned before, these landing figures should only be seen as an order of magnitude: in many cases the data refer to different grades of processed meat which are not always known, or may refer to unprocessed meat for one country but for processed meat for another country, and in other cases, no information on the actual total landings were available (e.g. for Honduras). In these instances, the known volumes of meat exports were included in the table as a minimum of Queen Conch meat landings.

A second set of data that may be used to assess total landings of Queen Conch over the past years are the data reported by Member States of FAO. However, analysis of this data is very limited as it does not refer to *Strombus gigas* only but to catch in 'Strombiid conches' which may include several shell species. Moreover, the data reported by the countries may in some cases be a very rough estimate that either largely under- or overestimates actual catch (B. Chakalall, FAO/WECAFC, pers. comm., July 2001). Therefore, FAO data is not further discussed in this report. A table presenting the reported catch of *Strombiid* conches for the period of 1983 - 1998 is included in the Annex VII for reference and comparison.

According to the available information, total annual landings of Queen Conch meat in recent years by relevant range States were around 4,500-6,500 t (see Tab. 7). However, it should be noted that landing data is lacking for several countries and that the available information is largely based on estimates. Moreover no landing data was available for Honduras, one of the most important conch meat producers, and the data included in the table refers to the reported exports of processed meat only, not taking into account meat that is consumed locally. Moreover, it is known that a significant volume of conch meat is not reported and/or is taken illegally (e.g. Chakalall and Cochrane, 1996, Appeldoorn, 1994a) (see Chapter 'Illegal harvest of and trade in *Strombus gigas*'). For example, Cuba is known for considerable landings of conch meat for the bait fishery, however the size of conch meat harvested for this purpose is not known (Anon., 1999) and current meat landings report only the conch meat harvested for consumption and for export (Formoso, 2001).

Based on these and other factors, it is assumed that the total annual landings of Queen Conch meat in the Caribbean is considerably higher than the totals indicated in Table 7, and that an annual landing of 4,500 to 6,500 t of conch meat can only be considered as a preliminary assumption. As a rough estimate, and assuming that the reported landings would refer to meat taken from adult conches where only the viscera and the operculum was removed (= "50% processed", mean weight 143g; see Chapter 'Methodology'), 4,500 to 6,500 t of conch meat would represent between 31 to 46 million harvested animals. This is however, a very rough estimate that does not take into account unreported or illegally taken conch meat, or conch meat that was processed before landing, and is based on the assumption that only adult conches were being landed.

Table 7: Reported landings (in kg) of Queen Conch meat per range States. Please note that landing figures can refer to different levels of processed meat which can significantly influence the reported weight (up to 50% or more). For countries where no landing data was available the reported export volumes are included (e.g. Honduras).

Range State	1993	1994	1995	1996	1997	1998	1999	2000	Total	References
Antigua & Barbuda		69,000	45,600	38,800	35,000	44,700	46,000		279,100	1
Bahamas			493,000	589,680	635,040	680,400	453,600	668,000		1, 2
Belize		149,000		138,080	257,264	209,042	178,215	234,670	1,166,271	3
British Virgin Is.					5,200	5,530	4,890	6,155	21,775	4
Colombia	227,900	240,300	206,700	107,143	174,450	155,816	199,044	104,134	1,415,487	5, 6
Cuba			55,000		141,000			163,000	359,000	
Dominican Republic	2,600,000	1,857,000	2,209,800	1,957,400	1,573,100	2,668,700	1,242,500	1,145,800	15,254,300	7
Grenada	26,000								26,000	8
Haiti			55,000	70,000					125,000	9, 10
Honduras (export)	450,000	858,000	832,300	721,900	956,600	636,200	1,046,600	916,500	6,418,100	10, 11
Jamaica	3,000,000	2,051,000	1,950,000	1,900,000	1,645,000	1,700,000	1,008,000		13,254,000	1
Mexico	45,000	45,000	45,000	42,000	42,000	42,000	42,000	42,000	345,000	12
Montserrat			500	3,000					3,500	13
Nicaragua					16,783	19,051	24,948	65,318	126,101	14
Panama				31,780					31,780	15
Puerto Rico	74,972	77,507	97,832	110,098	108,359	118,278	97,201	130,287	814,533	16, 17
Saint Kitts and Nevis				19,850	8,900	59,200	46,000	41,713	175,663	18
Saint Lucia		20,000	34,000	28,000	26,000	29,000	34,000	40,000	211,000	19
Saint Vincent & the Grenadines		34,050	7,722	12,431	8,183	20,763	6,822	6,900	96,872	20
Turks & Caicos Islands	737,866	953,875	964,597	736,801	787,698	645,433	736,616	816,986	6,379,872	21, 22
US Virgin Islands	15,890	10,896		11,972	35,233	30,916			104,907	23, 24
Total	6,423,872	5,844,732	6,032,454	5,770,163	5,632,879	6,246,414	4,384,364	4,381,463	44,716,341	

1=Tewfik, in press; 2= Questionnaire Bahamas; 3=Questionnaire Belize; 4=Questionnaire British Virgin Islands; 5=Questionnaire Colombia; 6=Ospina et al.1996; 7= in. litt., C. Diaz, Subsecretaria de Recursos Costeros y Marinos, July, 2001; 8=Issac, in press; 9=Wood, 1995. 10=Granier, 1996; 11=Morales, 1996; 12=Questionnaire Honduras; 13=Villarreal Rios, 1996; 14=Jeffers, 1996; 15=Questionnaire Nicaragua; 16=Martans, 1996; 17=Garcia-Moliner, 1996; 18=Questionnaire Puerto Rico; 19=Anon., in press a; 20=Joseph, in press; 21=Cruikshank and Morris, 1996; 22= Questionnaire Turks and Caicos; 23=Ninnes and Medley, 1996; 24=Garcia-Moliner, 1996; 25=Questionnaire US Virgin Islands.

Annual meat harvests of 500 to 1,000t or larger have been reported for the Bahamas, the Dominican Republic, Honduras, Jamaica and the Turks and Caicos Islands. Belize, Colombia, Cuba and Puerto Rico have reported annual harvests of approximately 100 to 200t.

Compared to data available for previous years harvests continued to decrease in Colombia (800t in 1988, 400t in 1990), Mexico (450t in 1979, 125t in 1989) and Puerto Rico (340t in 1983, but 73t in 1989) (Chakalall and Cochrane, 1996). Considerable increases in reported landings are apparent in Nicaragua, where they increased consistently from 16,783kg in 1997 to 65,318kg in 2000 (no data available for years before).

Domestic trade in Queen Conch products

Domestic trade in Queen Conch meat

Levels of domestic consumption of Queen Conch meat vary considerably between the range States due to differences in e.g. traditional diets, availability of other fishery resources and access to local and regional markets. Local consumption of *Strombus gigas* meat may exceed exports several times in certain countries (e.g. Haiti, Dominican Republic), whereas in others, most of the Queen Conch harvest is probably destined for external markets while only a small portion of the total landings are consumed locally (e.g. Honduras, Jamaica). In some areas national demand may outweigh the supply and the majority of the conch meat has to be imported (e.g. Martinique, Guadeloupe, Netherlands Antilles) (Mulliken, 1996).

Queen Conch meat is generally offered at local fish markets fresh or on ice, but can also be found in supermarkets (for example in the Dominican Republic or in Jamaica, pers. obser., July 2001). Restaurants serving locals and tourist are probably the most important vendors of conch meat at national level. Conch meat is served in a wide variety of dishes, including conch steaks, conch fritters (minced conch meat), salads and soup.

Nowadays, conch meat is no longer considered an inexpensive dish as it may was some decades ago, and it is now consumed predominately as a speciality food (Mulliken, 1996). Prices for Queen Conch meat at local markets vary general between 3 to 8 USD/kg (see Annex VIII). In Jamaica for example, conch meat is offered in supermarkets for around 7 USD/kg, and for approximately 4 to 5 USD/kg in a local fish shop in the Dominican Republic (pers. observation, July 2001). However, prices can be considerably higher, e.g. in the French Antilles (Martinique and Guadeloupe) where retail prices at local markets are between 11 USD/kg for locally harvested meat and up to 20 USD / kg for imported meat (Mr Gourbeyre, DIREN of Martinique, in litt., June 2001).

Domestic trade in Queen Conch shells

The large shells of the Queen Conch are valued for their bright colours and attractiveness and have been used for decorative purposes and to manufacture jewellery for several centuries. They are now a popular item to be sold to tourist at the local markets. The shells can provide additional income to the fishers and their family, especially when they have been polished, painted or manufactured into lamps or other curios. However, the shells of *Strombus gigas* are largely considered a by-product of the Queen Conch fishery rather than a result of a direct harvest, offering the fishers and their families additional income (Wood, 1995).

In many countries, specifically in countries that have a significant commercial Queen Conch fishery (such as the Bahamas, Belize, Dominican Republic, Honduras, Jamaica, etc.), it is common practice to extract the conch meat directly and to discard the shells at sea or near the landing sites. The knocked and empty shells are often sold on local markets as tourist souvenirs or marine curios. Queen Conch shells in souvenir shops in the tourist centres throughout the region are a common site (pers observ. August 2001; Allan, 1999). However, the majority of the shells offered for sale in local markets and in souvenir shops (e.g. in Puerto Rico and the Dominican Republic) are shells that have been knocked indicating that the meat had been extracted (pers. observ., July, 2001).

Tour operators in some countries (e.g. Cayman Islands) include the collection of Queen Conch as part of their tourist tour. The collected conches are consumed at the end of the trip and the shells are given to the tourists (Department of Environment of the Cayman Island, in litt., June 2001).

Prices for shells at local markets can vary between USD5 and 15 and more, depending on their size, shell and whether they have been further processed in any way e.g. polished or painted (See Annex VIII).

International trade in Queen Conch products

International trade in Queen Conch products is reported to be large and the overall volumes of Queen Conch products in trade increased drastically in the last two decades. The main product in trade is the meat of *Strombus gigas*, which is nowadays mostly traded frozen. However some meat may also be exported fresh or dried. Whether meat is exported frozen, fresh or dried may play an important role in assessing the total volumes. This applies in particular if trade data are used to estimate the total number of Queen Conch extracted from wild populations. Moreover most Queen Conch meat undergoes various levels of processing before it is exported. Based on the different levels of processing, this may result in a reduction of up to 50% or more of the original tissue weight after extraction from the shell. Unfortunately, available trade statistics such as the CITES annual report data or national trade statistics rarely provide information on the form of the meat traded or its processing grade. Without knowing the processing level of the various meat exports it is difficult to assess the total volume of Queen Conch harvested to export a certain amount of Queen Conch meat, and to compare meat exports between range States.

Other products of the Queen Conch such as shells, carvings and pearls, are also traded in considerable quantities, however such products are largely considered to be by-products of the fishery and are rarely the result of a direct harvest (e.g. Mulliken, 1996; Chakalall and Cochrane, 1996).

International Trade in Queen Conch meat

The trade in Queen Conch products involves a significant number of countries and territories: 90 States in total were recorded in CITES annual report data as being involved in the international trade of Queen Conch products between 1993 and 1999, either as (re-)exporter or importer.

As outlined earlier, trade information was mainly obtained from the trade data reported by CITES Parties in their annual reports. Due to incomplete reporting or failure to submit annual reports, this data may only provide an indication of actual trade levels and trends, and it is assumed that actual trade is considerably higher than the data suggests. This may apply specifically to trade reported in the years 1993 and 1994, the first two years after the inclusion of the species in CITES Appendix II. Moreover, some Queen Conch range States are not yet a party to CITES (Haiti, Turks and Caicos Islands) and others have only recently acceded to the Convention (Aruba, Jamaica and the Netherlands Antilles). In addition, the quality and the accuracy of the reported trade in *Strombus gigas* products varies, and in some instances no units were reported resulting in records of for instance "1,000 meats". Such cases have been excluded from the following analysis and only meat that was reported in units (e.g. kg, pounds, etc.) was considered for further analysis.

Due to these deficiencies, other sources such as import data compiled by the US Bureau of Census were compiled to compare such data with trade reported to CITES and to get a more comprehensive picture of the total Queen Conch meat in international trade. CITES annual report data was available for the years 1993 to 1999 (no trade in Queen Conch meat reported to CITES in 1992) and is presented in Table 8. The US Bureau of Census data was available for the period of July 1996 until June 2001 and is presented in Table 9.

Table 8: Reported gross trade in *Strombus gigas* meat (kg) from 1993 to 1999 shown per exporting State, in descending order.

Country/ Territory	1993	1994	1995	1996	1997	1998	1999	Total	% of total export
Jamaica		808,347	1,338,404	1,989,560	1,423,309	1,497,456	473,455	7,530,531	46
Honduras			459,339	737,102	965,652	636,252	746,854	3,545,199	22
Turks and Caicos Is.	9,440	117,534	481,750	420,735	329,861	67,805	160,320	1,587,445	10
Bahamas	293,099	88,984	185,482	285,897	94,236	46,514	142,954	1,137,166	7
Colombia			155,791	63,688	224,443	155,826	208,358	808,106	5
Dominican Republic		32,210	155,830	49,647	101,897	58,643	276,009	674,236	4
Belize			26,129	80,169	70,896	113,527	157,430	448,151	3
Haiti			34	17,043	159,494			176,571	1
Netherlands Antilles		122,472			2			122,474	<1
United States			601		50,000	34,627	7,943	93,171	<1
French Antilles	59,082							59,082	<1
Saint Vincent and the Grenadines	1,800	12,590	7,780	3,200	8,527			33,897	<1
Nicaragua					7,023	6,750	14,677	28,450	<1
Saint Lucia		15,000		600	6,000			21,600	<1
Cuba				7,000				7,000	<1
Trinidad & Tobago				5,670	1,249			6,919	<1
Venezuela						4,930		4,930	<1
Costa Rica					4,309			4,309	<1
Dominica				2,500				2,500	<1
Saint Kitts & Nevis				2,294				2,294	<1
Bermuda							836	836	<1
Caribbean		137						137	<1
US Virgin Island			4					4	<1
Non range States *		25	13,805	5,895	13,772		85	33,582	<1
Total	363,421	1,197,299	2,824,949	3,671,000	3,460,670	2,622,330	2,188,921	16,328,590	100

(Source: UNEP-WCMC, 2001); * = refers to exports or re-exports of *Strombus gigas* meat from non-range states and included the following countries and territories: Argentina, Australia, Belgium, Brazil, Cape Verde Islands, People's republic of China, Canada, Chile, Cook Islands, Hong Kong, Italy, India, Indonesia, Kiribati, Maldives, Nepal, Papua New Guinea, Philippines, Solomon Islands, Singapore, Saudi Arabia, South Africa, Switzerland, Taiwan, Thailand, United States Minor Outlying Islands and Vanuatu. Reported exports from certain non-ranges States may likely be a mistake in reporting and may refer to other CITES listed molluscs i.e. *Tridacnidae spp.*

Table 9: Annual imports of *Strombus gigas* meat (kg) by the USA between May 1996 and June 2001.

COUNTRY	May-Dec. 1996	1997	1998	1999	2000	Jan.-June 2001	Total	Average Value in USD
Honduras	234,246	762,968	466,934	652,076	958,367	517,046	3,591,637	6.60
Jamaica	450,643	698,590	938,275	715,442			2,802,950	5.04
Turks and Caicos Is.	234,854	238,118	212,656	232,284	335,755	225,793	1,479,460	6.25
Dominican Republic	17,705	31,707	12,727	131,769	217,039	472,905	883,852	2.65
Belize	59,814	86,786	130,983	126,839	198,358	144,377	747,157	8.49
Bahamas	149,372	102,663	61,482	57,941	42,916	120,039	534,413	7.03
Colombia		44,263	57,679	240,039	84,308	34,533	460,822	5.19
Haiti	17,043	175,894	15,515		5,441		213,893	5.00
Nicaragua	6,720	3,022	4,780	18,819	18,158		51,499	7.24
Bermuda				836	12,448		13,284	9.74
Venezuela			4,930				4,930	5.50
Trinidad and Tobago		113			77	1,584	1,774	4.49
St. Vincent & Grenadines						1,364	1,364	8.80
Grenada						1	1	6.00
Totals	1,170,397	2,144,124	1,905,961	2,176,045	1,872,867	1,517,642	10,787,036	6.29

(Source: US Bureau of Census data, 2001)

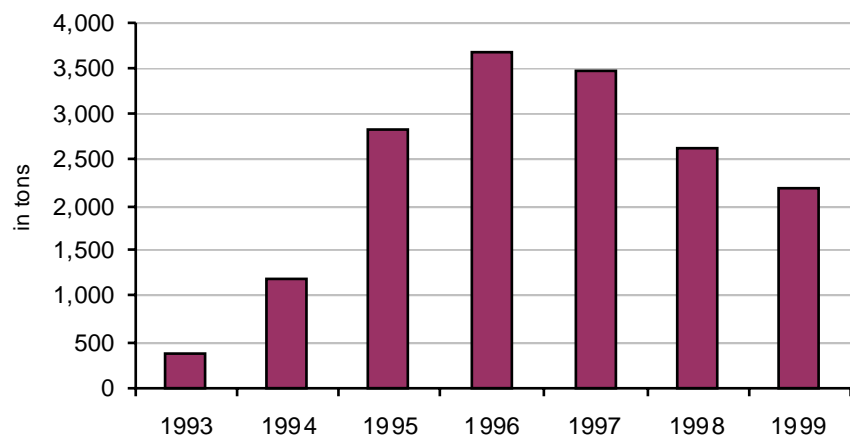


Fig. 3: Annual reported trade in Queen Conch meat (tons) between 1993-1999. (Source: UNEP-WCMC, 2001)

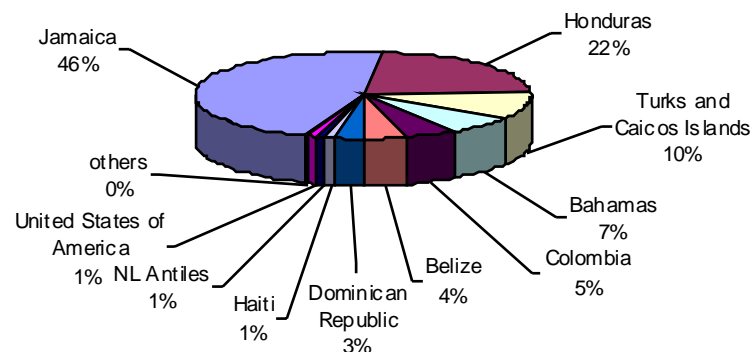


Fig.4: Total exports of Queen Conch meat per exporting States between 1993 and 1999. (Total exports: 16,328,590kg). others = 0.4%. (Source: UNEP-WCMC, 2001).

Table 8 shows the gross trade in Queen Conch meat per year and (re-)exporting country as recorded in the CITES annual report data between 1993 and 1999. According to this data, the annual total trade ranged from a minimum of around 360t in 1993 to more than 3,500 t in 1997. In total, more than 16,000t of *Strombus gigas* meat were reported in international trade in the seven years between 1993 to 1999.

The annual volume of reported Queen Conch meat in trade was relatively low in the first year after the CITES listing, which is most probably due to low levels of reporting rather than too low levels of trade. However in the following years, reported trade levels increased considerably and were around 3,000 in 1996 and even more than 3,500 t in 1997 (see Figure 5). After that peak annual trade volume dropped again and ranged from 2,622t in 1998 down to around 2,200t in 1999. Unfortunately, trade data for 2000 was only available from some range states at the time this report was written (Oct. 2001), and was therefore only considered for these countries (e.g. Honduras; see below).

Based on the assumption that most Queen Conch meat reported in trade refers to conch meat that has been processed and has an average weight of 72 – 121g (see Tab. 5, Chapter 6), an annual trade of 3,500t would refer to around 29 to 49 million individual Queen Conches.

Main exporters of Queen Conch meat

At least 21 Queen Conch range States were recorded in CITES annual report data as having exported (or re-exported) *Strombus gigas* meat between 1993 and 1999. Figure 6 shows the top-ten exporters of Queen Conch meat and the percentage of their exports in the total trade. The most important exporting countries will be discussed below in more detail.

Jamaica

According to the reported CITES data Jamaica was the largest exporter of Queen Conch meat for the time period under consideration. In total more than 7,500 t of Queen Conch meat were reported as exports from Jamaica between 1993 and 1999 accounting for 46% of all Queen Conch meat recorded in international trade during this seven year period. Meat exports reported in 1993 were relatively low (around 800t), which is probably due to poor reporting by CITES Parties in the first years after the Appendix II listing. However figure of the national statistical bureau of Jamaica (STATIN) indicate that exports were around 1,800t in 1993 and 1,400t in 1994 (A Kong, Fisheries Division of Jamaica, in litt., July 2001). The highest exports of conch meat from Jamaica were recorded in the CITES data for the year 1996 when almost 2,000t were reported in international trade. In 1999, reported meat exports decreased by approximately 50% compared to the previous year and less than 500t were recorded as exports in the CITES annual trade data. This decrease in 1999 is due to an prohibition of Queen Conch exports in Jamaica that was imposed in August 1999 due to a law suit related to the national Queen Conch fishery against the Jamaican Government (see Chapter ‘A case study: The Jamaican Quota System’). This resulted in a cessation of Queen Conch exports from Jamaica until 2001, when exports were again allowed as from the month of July (A. Kong, Director of the Fisheries Division of Jamaica, pers. comm., July 2001).

According to CITES annual report data, 53% of the total reported exports from Jamaica were imported by the USA and 47% by France. Before 1997, much of the Queen Conch meat exported from Jamaica was exported to the French overseas departments in the region, Martinique and Guadeloupe which are considered one of the most important consumers of Queen Conches in the region (Mulliken, 1996). In 1996, for example, more than 1,200t of the almost 2,000t Queen Conch meat reported in the CITES annual report data as exports from Jamaica were exported to “France”. Due to reporting standards by France, most trade involving the French overseas departments is reported as trade involving ‘France’ and no further specification is provided (S. Guillaume, CITES Management Authority of France, pers. comm. Sept. 2001; John Caldwell, UNEP-WCMC, in litt., August 2001). However, information provided by Jamaican exporters suggest that the majority of Queen Conch meat exported from Jamaica were destined for Martinique and Guadeloupe, and only a small portion (less than 5%) was imported by ‘metropolitan’ France (Mrs Brown, B & D Trawling, pers. comm. July 2001). Since 1 July 1997, Queen Conch meat from Jamaica could no longer be exported to the French overseas departments in the region due to Food Sanitary Regulations imposed by the European Union (see chapter 3). However, following EU inspections at a number of processing plants in Jamaica, two of the currently seven authorised exporters are allowed to export again Queen Conch meat to the EU, including the French overseas departments of Martinique and Guadeloupe.

Jamaica established quotas for the export of Queen Conch meat in 1993. These quotas are set per fishing season, which normally lasts from November to June the following year. Since the establishment of export quotas in 1993, quotas gradually reduced (see Table 10), following abundance surveys and estimates of potential yields that were undertaken in 1991, 1994 and (Anon, 2001, JA Management Plan). As mentioned above no harvest was allowed between August 1999 and June 2001 due to a lawsuit against the Government. According to the trade reported by the CITES annual report data the export quota may have been exceeded twice: in 1996/97 and in 1998/99. However due to the fact that the export quotas are set per fishing season it is difficult to compare to trade reported by CITES Parties per calendar year.

Table 10: Comparison of the reported exports of Queen Conch meat (kg) with national export quotas per fishing season.

	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000	2001
National Export quota	3,000,000	2,000,000	1,900,000	1,800,000	1,700,000	1,366,000	1,216,000	-	946,000
Meat exports (kg) reported by CITES		808,347	1,338,404	1,989,560	1,423,309	1,497,456	473,455	-	

(Source: Anon. 2001b; UNEP-WCMC, 2001)

Honduras

As shown in Table 8, Honduras exported in total more than 3,500t of Queen Conch meat between 1993 and 2000, which accounts for 20% of total trade recorded during that time period. No trade in Queen Conch meat involving Honduras was recorded in the CITES annual report data in 1993 and 1994 and hence the total volume of Queen Conch meat exported during the seven year period is most likely to be higher than the reported 3,500t. The reported exports increased from 1995 to 1997 to peak at almost 1,000 t, and ranged from around 600t to almost 750t in the years 1998 to 1999. However, data provided by the National Directorate General for Fisheries and Aquaculture of Honduras (DIGEPESCA) suggest that 1,046t of conch meat were exported in 1999, and that in 2000 a total of 916t was exported (L. Morales, in litt., September 2001). This was confirmed by the CITES Management Authority of Honduras which reported the export of 931,531kg of Queen Conch meat in their Annual report (UNEP-WCMC, Sept. 2001). The United States of America is the principle market for conch meat from Honduras and the United States of America was recorded in the CITES data as the sole importer. Available data from the US Bureau of Customs suggest that exports from Honduras continued to increase in 2000 and in the first half of 2001: almost 1,000t of conch meat were imported by the US in 2000 and more than 500t in the first six months of 2001 (see Table 9). According to the US Bureau of Census, the exports to the US came in total from 16 different Honduran exporters. Honduras does not set harvest or export quotas and there are concerns that significant parts of the exported meat may have been fished illegally.

Turks and Caicos Islands

According to the CITES annual report data the Turks and Caicos Islands are the third largest exporter of Queen Conch meat, exporting more than 1,500 kg, or around 10% of the total trade in Queen conch meat, between 1993 and 1999. Most of the conch meat from the Turks and Caicos is exported as “40% cleaned meat”, which refers in the Turks and Caicos to meat where only 40% of the original tissue weight of the animal is left after processing (W. Clerveaux, Department of Environmental and Coastal Resources, DECR, in litt., October 2001). Parts of the remaining 60% may be used as ‘trimmings’, which are sold locally as bait for the lobster trap fishery processing (W. Clerveaux, DECR, in litt., October 2001). However, according to DECR the trade data recorded in the CITES annual report data does not correspond to exports recorded by the department which is possibly due to the difference in the time periods use by CITES and the DECR, the latter recording exports per fishing season rather than calendar years (Clerveaux, DECR, in litt. October 2001). Since the introduction of a closed season in 2000 the fishing season for conch spans from October to July the following year.

The Department of Environment and Coastal Resources sets a national harvest quota for wild harvested queen conch meat, which is then further broken down into different segments, attributed to export and local consumption. The harvest quota refers to unprocessed meat of wild origin and was in recent years around 700,000 to 750,000kg (1,600,000 to 1660,000lbs), which is equivalent to approximately 290,000kg of cleaned processed conch meat. The majority of conch meat landed in the Turks and Caicos Islands is destined for export and less than 5% are consumed locally (see Table 11a and b). Around 100,000lbs (approximately 45,260kg) are used locally either fresh or as dried meat.

Table 11 a: National harvest quota of wild harvested Queen conch meat from the Turks and Caicos Islands in kg for unprocessed (unproc.) and processed (proc., =40%) meat (further divided into national export quota and local consumption) in comparison with actual harvest and exports levels reported by the Department of Environmental and Coastal Resources (DECR) and recorded in the CITES annual report data (CITES)

	1995/1996		1996/1997		1997/1998		1998/1999		1999/2000	
	unproc.	proc.	unproc.	proc.	unproc.	proc.	unproc.	proc.	unproc.	proc.
National Harvest quota	725,760	290,304	725,760	290,304	725,760	290,304	725,760	290,304	725,760	290,304
<i>National Export quota</i>	680,400	272,160	680,400	272,160	680,400	272,160	680,400	272,160	680,400	272,160
<i>Local consumption</i>	45,360	18,144	45,360	18,144	45,360	18,144	45,360	18,144	45,360	18,144
Actual harvest (DECR)	964,596	385,838	736,801	294,720	781,425	312,570	640,310	256,124	730,770	292,308
Actual export (DECR)						270,536				279,023
Exports (CITES)		481,750		367,198		294,219		67,805		205,297

(Source: Department of Environment and Coastal Resources, in litt. July 2001; UNEP-WCMC, 2001)

In recent years the Turks and Caicos Islands have communicated export quotas for different specimens of Queen conch to the CITES Secretariat. These referred to wild harvested Queen conch and to ‘rancher’ Queen conch, the latter originating from the Caicos Conch Farm in Providenciales, the only commercial ranching operation for the species. Quotas were set for meat, live animals, trimmings, shells, and pieces of shells. There are some significant differences between the export quotas communicated by the CITES Secretariat and the ones set by the DECR. For example, in 1997 the export quota for wild taken meat was 45,359kg according to the CITES Secretariat, but based on information from the DECR (in litt. 2001) the national export quota was 272,160kg (processed meat).

Table 11 b: Export quotas communicated by the CITES Secretariat for different Queen conch specimens for the Turks and Caicos Islands for the years 1997 to 1999 (CITES Notification 980, 1998/36 and 1999/21):

Origin	specimens	1997	1998	1999
wild	meat (kg)	45,359	272,155	272,160
	dried meat (kg)	454	907	907
	trimmings (kg)	136,077	435,448	
	shells (kg)	22,679	22,679	
	shells (No)			50,000
	pieces of shell (kg)			435,456
rancher	meat (kg)	453,590	4,536	3,629
	live (kg)	22,679	181,436	136,080
	trimmings (kg)	272,154		
	shells (kg)	22,679	22,679	
	shells (No)			50,000

The Caicos Conch Farm mainly exports live conch for sushi and the aquarium trade, and exports are regulated through export quotas set for the different products. The export quota set in 1997 as communicated by the CITES Secretariat for rancher meat was relatively high (more than 450t of meat; 270t of trimmings) but according to the CITES annual trade data, only 1,400 kg of meat declared as captive bred or rancher were exported in that year. In 1999, the export quota was 3,629kg of rancher meat, but according to the CITES annual report data the US imported more than 14,000kg of conch meat declared as rancher or captive bred in that year. However, it should be noted that export quotas set by the Turks and Caicos refer to the seasonal year which make it difficult to (calendar year versus seasonal year) make it difficult to compare

The Bahamas

According to the CITES annual report data the Bahamas are the fourth largest exporter of Queen Conch meat. In total more than 1,000t of conch meat were exported between 1993 and 1999, which is equivalent to 7% of all Queen Conch meat recorded in international trade during this period. The meat exports from The Bahamas varied from a maximum of 293,099 kg in 1993 to a minimum of 46,514 kg in 1998 (see Table 8). In 1999, 142,954kg were recorded as being exported by the Bahamas. The USA was the main destination for meat exports from The Bahamas and 95% of the

1,137,166kg of conch meat recorded as exports between 1993 and 1999 were reported as being imported by the US. The remaining 8% were reported as being imported by Japan (5%) and France (3%).

The Department of Fisheries of The Bahamas provided different exports volumes for the years 1993 to 1999 when compared to trade reported in the CITES annual trade data (see Table 12). Considerably higher exports were for example recorded in 1994, 1997 and 1998, while lower exports than those recorded by CITES were noted in 1993, 1995, 1996 and 1999. In 1995, the Department of Fisheries of the Bahamas established export quotas to control and monitor the exports of Queen Conch meat from the Bahamas. However, export quotas were only communicated to the CITES Secretariat in the years 1997 and 1999 (see Table 12).

The Department of Fisheries sees the establishment of export quota as an effect tool to control and monitor the amount of conch meat exports from The Bahamas. However, it notes that it has failed to stem the levels of recorded conch meat landings, which seem to be largely driven by local demand for conch meat (Braynen, 2001).

Table 12: Comparison of Queen Conch meat exports reported by the Bahamian Department of Fisheries and exports recorded in the CITES annual trade data for 1993 to 2000 with national exports quotas.

	1993	1994	1995	1996	1997	1998	1999	2000
National Export quota				201,836	204,120	204,120	158,760	136,080
CITES Export quota					204,115	204,115		
meat exports (kg) reported by DF	217,000	356,000	126,000	166,000	165,000	92,000	91,000	118,000
meat exports (kg) reported by CITES	293,099	88,984	185,482	285,897	94,236	46,514	142,954	-

(Source: UNEP-WCMC, 2001; CITES Notification No. 980, 1998/36, 1999/21, 2000/053 and 2001/041; Braynen, 2001; E. Deleveaux, Department of Fisheries, in litt., June 2001)

Colombia

According to the CITES annual trade data, Colombia exported a total of 808,106kg of Queen Conch meat between 1993 and 1999. However, no trade was reported for 1993 and 1994. The annual exports varied from a minimum of 63,688kg in 1996 to a maximum of 208,358 kg in 1999. The USA is the most important market for conch meat from Colombia and 75% of all meat exports between 1995 and 1999 went to the USA. However, Colombia was also an important supplier of Queen Conch meat to the French Antilles. According to the CITES annual trade data almost 40% of the total conch meat exported from Colombia between 1995 and 1997 were exported to Martinique or 'France'. Since 1997, Colombia is not allowed to export Queen Conch meat to Martinique and Guadeloupe due to EU Food Sanitary Regulations, and since then the majority of exports from Colombia (94% of all exports between 1998 and 1999) are sent to the USA.

In 1996, Colombia established annual export quotas for the export of conch meat (see Table 13). In the first four years (1996-1999) the export quotas increased steadily from 203,000kg in 1996 to 482,923kg in 1999. In the following two years the quota was reduced to 293,839kg in 2000 and 126,000kg in 2001.

Table 13: Comparison of reported exports of Queen Conch meat from Colombia with the national export quota.

	1996	1997	1998	1999	2000	2001
CITES export quota for meat (in kg)	203,000	285,000	364,776*	392,923	293,839	126,000
Export reported by CITES (in kg)	63,688	153,443	155,826	208,358	84,308**	-

* includes 64,776 kg not exported under the 1997 export quota, ** no CITES trade data available yet, figure refers to US imports recorded by the US Bureau of Census

(Source: UNEP-WCMC, 2001; US Bureau of Census, 2001; CITES Notification No. 980, 1998/36, 1999/21, 2000/053 and 2001/041).

Dominican Republic

Trade data obtained from the CITES annual report data and from the US Bureau of Census suggest that exports of Queen Conch meat from the Dominican Republic increased significantly over the last years. According to the CITES annual report data the Dominican Republic exported a total of 674,236kg of Queen Conch meat between 1994 and 1999 (no exports reported in 1993). The USA is the major destination of conch meat exports from the Dominican Republic and almost 80% of all conch meat exported between 1994 and 1999 were exported to the USA. In the first years after

the CITES Appendix II listing, exports from the Dominican Republic were between 30,000kg (e.g. in 1993) and 155,000kg (in 1995). In recent years however, the recorded exports increased five-fold: from 58,643kg in 1998 to 276,009kg in 1999, making the Dominican Republic the third largest exporter of Queen Conch meat in that particular year (after the Honduras with more than 700,000kg and Jamaica with almost 500,000kg). Data for exports in 2000 are unfortunately not yet reported, but data obtained from the US Bureau of Census (see Table 9) suggest that exports from the Dominican Republic remained high in 2000, when 198,358kg were recorded as imports to the US alone. In 2001, the meat exports from the Dominican Republic seem to have increased dramatically compared to previous years, as 472,905kg of conch meat were recorded as being imported by the USA between January and June 2001 alone (US Bureau of Census, 2001). The Dominican Republic does not have an export quota for the export of Queen Conch meat.

Belize

Belize is another range States with significant meat exports of Queen Conch meat. In total 448,151kg of Queen Conch meat were reported to be exported from Belize between 1995 and 1999 (no trade in conch meat involving Belize was reported in 1993 and 1994) based on the CITES annual export data. The annual exports ranged from less than 30,000kg in 1995 to 157,430kg in 1999, and increased steadily between 1997 and 1999. However, according to the Fisheries Department of Belize, considerably higher volumes of Queen Conch meat have been exported between 1995 and 1999 (see Table 14). Based on this data, a total of 1,017,170kg Queen Conch meat was exported between 1995 and 1999, or more than twice the volume that was recorded in trade according to the CITES annual report data.

Table 14: Comparison between the exports of Queen Conch meat (in kg) reported by the Fisheries Department of Belize (FD) and the CITES annual trade data.

	1996	1997	1998	1999	2000	Total
Exports reported by FD	138,080	257,165	209,042	178,214	234,669	1,017,170
Export reported by CITES (in kg)	80,169	70,896	113,527	157,430	198,358*	620,380

* CITES annual report data for that year was not available at the time of writing, figure is based on US imports reported by the US Bureau of Census.

(Source: UNEP-WCMC, 2001; A. Marin, Fisheries Department of Belize, in litt., July 2001).

Exports by other range States

Meat exports from Nicaragua were only reported for the years 1997 to 1999 and ranged from 6,750 kg in 1998 to 14,677kg in 1999. Since 1998, Nicaragua established a quota for the export of Queen Conch meat, which was 19,958kg of conch meat in 1998, 1999 and 2000. The quota increased considerably recently, and based on the new quota, up to 45,359kg of conch meat can be exported in 2001. Considering that exports reported for Nicaragua were always well below the quota in previous years, this increase seems little justified. Exports from Haiti were reported between 1995 and 1997. High exports were recorded in the latter year, accounting for a total of 159,494kg of meat. For other range States, exports of Queen Conch meat were reported in the CITES annual report in one or more years but not consistently. Saint Vincent and the Grenadines for example exported a total of 33,897 kg of Queen Conch meat in the years 1993 up to 1997, but no exports were reported for the following two-year period. Relatively significant meat exports of 122,472 kg were reported for the Netherlands Antilles in 1994, but only two additional kilograms were reported in total for the following 5 years.

Re-export of Queen Conch meat

The re-export of Queen Conch meat is limited and in total only 12 countries were recorded in the CITES annual report data as having re-exported Queen Conch meat between 1993 and 1999. Six of them are range countries (Honduras, Jamaica, Trinidad and Tobago, the Turks and Caicos Islands, the United States, and one unspecified Caribbean country). The total volume of re-exported meat was 328,068kg which accounts for less approximately 2% of the total trade recorded between 1993 and 1999 (=16,328,590kg). The largest portion of this goes back to a seizure in 1994, when 114,000kg of Queen Conch meat were reported as being seized by the United States.

All reported exports of Queen Conch meat from the United States of America were exclusively reported as re-exports consisting of a total of 93,171 kg, most of which was re-exported between 1997 and 1999.

Major Importers of Queen Conch meat

Table 15 shows the reported imports of Queen Conch meat between 1993 and 1999 for the most important importers. The United States of America and the Member States of the European Union (EU) are the largest importers of Queen Conch meat, accounting for almost 98% of all imports during 1993 and 1999. The United States of America is by far the largest importer of Queen Conch meat, totalling 11,886,119 kg, or 73 % of all Queen Conch meat recorded in international trade between 1993 and 1999. 363,588 kg were reported as being imports by Puerto Rico. Trade involving the Puerto Rico and the Virgin Islands of the United States is normally not reported separately from trade involving mainland USA in the CITES annual reports of the USA, which makes it difficult to quantify the volumes of Queen Conch meat imported by Puerto Rico, the US Virgin Islands and mainland USA.

Within the European Union, France (which includes the French Over Sea Departments in the region, Martinique, Guadeloupe and French Guiana) is the second largest importer of Queen Conch meat, importing in total 4,096,000 kg. This accounts for 25% of all meat imported during that period. Other EU Member States for which Queen Conch meat imports were reported during 1993 and 1999 are the Netherlands and Spain. The remaining 2% of Queen Conch meat were imported by a total of 14 other countries and territories, including eight Queen Conch range States.

Table 15: Gross trade in *Strombus gigas* meat (kg) between 1993 and 1999 by importing country.

Importer	1993	1994	1995	1996	1997	1998	1999	Total	% of Total
USA	293,097	197,434	1,873,916	2,403,322	2,480,897	2,214,240	2,059,625	11,522,531	71
Puerto Rico					44,001	279,687	39,900	363,588	2
Total USA	293,097	197,434	1,873,916	2,403,322	2,524,898	2,493,927	2,099,525	11,886,119	73
France	11,235	887,149	908,533	1,245,765	107,468			3,160,150	19
Martinique		61,261		12,600	588,558		60,000	722,419	4
Guadeloupe					213,431			213,431	1
Netherlands		95	859	2,268	1,136	10,896		15,254	< 1
Spain				7,000				7,000	< 1
Total EU	11,235	948,505	909,392	1,267,633	910,593	10,896	60,000	4,118,254	25
Range States			41,641		14,515	76,315	11,374	143,845	< 1
Others	59,089	51,360		45	10,663	41,193	18,022	180,372	< 1
Total	363,421	1,197,299	2,824,949	3,671,000	3,460,669	2,622,331	2,188,921	16,328,590	100

(SOURCE: UNEP-WCMC, 2001)

Annual imports of the USA increased drastically in the first five years after the Queen Conch was listed in CITES Appendix II, and was around 2,000 to 2,500t between 1996 and 1999 (see Table 15 and Figure 5). Between 1994 and 1997, imports by the EU Member States were around 900,000 and 1,200,000 kg per year, but decreased drastically in the following two years when the EU implemented new food sanitary rules. However, two range States, Colombia and the Dominican Republic, reported the export of Queen Conch meat to EU Member States after the EU regulation came into force, but these exports were not reported as being imported by the two declared EU Member States, the Netherlands and the French Department Martinique.

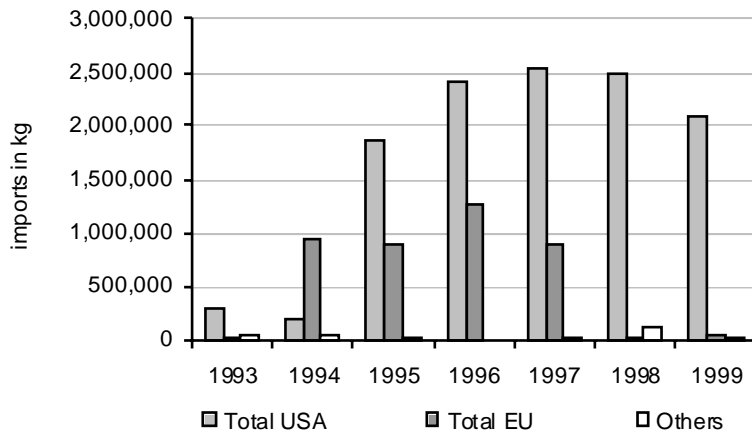


Fig.5: Imports of Queen Conch meat (in kg) by the most important importing countries, the USA and the Member States of the EU, between 1993 and 1999. (Source: UNEP-WCMC, 2001)

Prices of Queen Conch meat in international trade

According to data obtained from the US Bureau of Census, prices for Queen Conch meat per kg vary to some extent depending on the country of exporter. The exported meat is processed to different grades, which also influences the export value. According to Table 9, the average value for Queen Conch meat exported between 1997 and 2001 was 6.29 USD / kg. The highest values were documented for Queen Conch meat exported by Bermuda (9.74 USD / kg), the Saint Vincent and the Grenadines (8.80 USD / kg), and Belize (8.49 USD / kg). The lowest values were obtained for Queen Conch meat exported by the Dominican Republic (2.65 USD / kg).

International trade in Queen Conch shells

The shells of the Queen Conch are also exported in considerable quantities. Table 16 shows the volumes of *Strombus gigas* shells recorded in international trade per exporter based on the CITES annual report data for 1992 to 1999. CITES Parties report shell trade either in kg or in numbers of specimens, making it difficult to assess the total number of shells recorded in international trade. 1,628,436 individual conch shells in total, plus 131,275 kg of shells, were recorded during the seven year period. Assuming that a Queen Conch shell in international trade may weight between 700 and 1500g (see Chapter 2), the total reported volume of the recorded trade may be equivalent to approximately 1,720,000 to 1,816,000 shells. Considering that an adult Queen Conch may provide on average between 150 up to 220g of 50% cleaned meat (excluding the viscera and operculum), the total number of shells recorded in international trade in the CITES annual report data would have provided approximately 399,500kg of Queen Conch meat, which is less than 3% of the total recorded trade in *Strombus gigas* meat in that period.

Haiti, a non-Party, was reportedly exporting the majority of the shells, accounting for 77% of all shells recorded in trade in numbers of specimens and 28% of the shells recorded in kg. The Bahamas and the Turks and Caicos Islands were also recorded as being important exporters of Queen Conch shells(217,256 shells and 10,433 kg of shells from the Bahamas, and 59,479 shells and 35,022 kg of shells from the Turks and Caicos Islands).

The USA is reportedly the largest consumer of Queen Conch shells, importing 1,093,706 shells of all shells reported in numbers of specimens (67% of total trade) and 110,292kg of shells (84% of all shells reported in kg). The Member States of the EU were the second largest importer of Queen Conch shells during 1993 and 1999, importing 441,545 shells (27% of all shells in reported in trade) and 8,239kg (of all shells % of all shells reported in kg). Hong Kong and Japan imported together 11,691kg of shells and 14,168 shells, and Australia together with New Zealand 11,055 Queen Conch shells between 1993 and 1999.

As mentioned earlier, the shells of the Queen Conch are popular tourist souvenirs and are widely offered in tourist centres and shops throughout the region. The shells are traded whole, polished or painted and sometimes crafted into souvenirs such as table lamps or jewellery.

The control of shells exported by tourist is a major administrative burden for CITES Management Authorities of range States and difficult to regulate and monitor. The issuance of export permits to tourists is a problem, as most tourist are unaware that such trade requires CITES documents. Tourists would have to locate the respective CITES Management Authority which may not be in the vicinity of the tourist centres. This results in large numbers of seizures of Queen Conch shells in importing countries, primarily in the USA, Canada, and the Member States of the EU (see Table 15). For example, according to Dutch Customs “some thousand” Queen Conch shells are seize every year from tourist returning from the Caribbean without the required CITES documents (J. Reijngoud, General Inspection Service, in litt., May 2001). The German Customs authorities seized between 1997 and 2000 a total of 4,640 *Strombus gigas* shells, mostly from tourist that returned from their holiday destination with one to three shells in their luggage (F. Boehmer, CITES Management Authority of Germany, pers. comm., Oct. 2001).

The USA has addressed this issue by allowing the import of a small number of shells per person for personal effects for which they do not require a CITES export permit. The import of shells of *Strombus gigas* is exempted from the CITES provisions if the importing party is carrying eight or fewer specimens of Queen Conch shells (J. Field, U.S. Fish and Wildlife Service, in litt., Oct. 2001). Inspectors also have discretion to exempt larger amounts of personal effects e.g. a family that is carrying 12 shells instead of eight, and to stop small personal effect shipments if they have reason to believe they are for commercial purposes

Several ranges States have initiated public awareness campaigns, including the production of posters and leaflets distributed in tourist centres, beaches and airports to inform tourist and vendors about the requirements under CITES applicable to the export of shells (e.g. in the Bahamas, Cayman Islands, Dominican Republic, Jamaica, Netherlands Antilles and others). However, awareness among tourists and souvenir vendors alike is still reported to be low.

According to interviews with CITES Management Authorities and Fisheries Agencies of Queen Conch range States, CITES export permits are almost exclusively issued for commercial trade in shells, but rarely for tourists (e.g. CITES Management Authority of Dominican Republic, Jamaica and Bahamas, Department of Environmental and Coastal Resources Turks and Caicos Islands, in litt., October 2001, pers. comm. July 2001). Hence, most shells bought by tourist leave the countries / territories unreported and without the required CITES documentation. Several range States regard this trade as personal or household effects (e.g. as referred to in Article VII,3 of the Convention) and hence exempted from Article IV of the Convention. Others have started issuing pre-stamped export permits to souvenir shops and tour operators, or are considering doing so, in order to address this issue (e.g. in the Bahamas; M Braynen, Department of Fisheries, pers. comm., July 2001; and the Turks and Caicos Island, M. Day, Department of Environment and Coastal Resources, pers. comm., July 2001).

Tab.16: Gross trade in *Strombus gigas* shells reported in Numbers and kg between 1993 and 1999 by exporting country / territory.

Country / territory	1992		1993		1994		1995		1996		1997		1998		1999		Total		
	No	Kg	No	Kg	No	Kg	No	Kg	No	kg	No	kg	No	kg	No	kg	No	Kg	
Jamaica						11 640		1				2		5		1		9	11 640
Honduras								20 000		19 822	20 093							39 822	20 093
Turks and Caicos Is			6		160	19 986		38 219	4 444	2 572	6 011	17 738	4 468	48		736	113	59 479	35 022
Bahamas	3 000		139 027		15 014			1 727	907	17 450				10 390	30 641	9 526		217 256	10 433
Colombia											963		419			1		1 383	0
Dominican Republic								2			28		149			12		372	0
Belize											4 536		6		2		22	30	4 536
Haiti			254 548		31 874		182 285	4 950	199 040	6 500	170 631	13 689	148 664	1 000	261 262	10 650		1 248 304	36 789
Other range States		866			10 648			623		56		692	11 696	19 246		1 090		32 355	12 562
Non range States					2 993		15 315		5 716		2 219		2 016		1 167	200		29 426	200
Total	3 000	866	393 581	0	60 689	31 626	258 172	10 301	244 684	37 140	192 407	29 853	180 971	1 000	294 932	20 489	1 628 436	131 275	

(Source: UNEP-WCMC, 2001)

International trade in other Queen Conch products

Other Queen Conch products reported in the CITES annual report data involved live specimens, “bodies”, carvings, pearls, and other products such as soup, specimens and unspecified specimens (see Table 17).

Live specimens of *Strombus gigas* in international trade were reported in kg or in numbers of specimens. The largest exporter of live specimens reported by CITES Parties during 1992 and 1999 was Honduras with 128,584 live specimens and 103,248 kg of live specimens, followed by the Turks and Caicos Islands with 49,219 live specimens and 122,417 kg of live specimens. 93,600 live specimens and 37,395 kg of live specimens were reported as being exported from St. Lucia (in 1995, 1996 and 1998). The USA was reportedly importing the majority of these live specimens, consisting of 276,602 specimens (71% of total trade) plus 262,820 kg of live specimens (81% of total trade). The purpose of this trade in live specimens is primarily to supply the aquarium trade as well as the demand for live conch for the preparation of sushi in the US and elsewhere (M. Day, Department of Environmental and Coastal Resources, pers. comm., July 2001). According to Clerveaux (Department of Environmental and Coastal Resources, in litt., Oct. 2001) exports of live specimens from the Turks and Caicos Islands consist of juvenile specimens (approx. 3 cm shell length) that were raised at the Caicos Conch Farm in Providenciales.

Table 17: Gross trade in ‘other’ Queen Conch products reported in the CITES annual report data between 1992 and 1999.

	Live		Bodies No.	Carvings No.	Pearls No.	Other products* No.
	No.	kg				
1992				20,345		
1993			287,172	3,718		
1994	16,641			2,628		
1995	87,956	64,687	32,530	43,033		4,026
1996	108,848	139,591		29,142		1
1997	98,001	39,549	101	20,491	323	206
1998	36,439	27,767	1	18	421	
1999	41,992	54,111	2	60	425	
Total	389,877	325,705	319,806	119,435	1,169	4,233

*= includes “specimens”, “unspecified specimens” and “soup”

(Source: UNEP-WCMC, 2001)

The majority of *Strombus gigas* reported as “bodies” in international trade go back to a single shipment of 259,242 that was reported by France as an import from Jamaica in 1993. The majority of the *Strombus gigas* carvings (73,929 or 62%) recorded in trade are re-exports from the Philippines with unknown origin that have been reported by the United States. The pearls are reported as exports by Colombia and the Dominican Republic to Japan and Italy, but these two countries did not report the importation of these Queen Conch products in their CITES annual reports. Other Queen Conch products reported in the CITES annual report data include 3,226 unspecified specimens reported as re-export by Italy to the USA, 994 ‘specimens’, and one ‘soup’ exported from the Cayman Islands to Japan.

Illegal harvest of and trade in *Strombus gigas*

Over the past decade serious concerns have been raised about the alleged high levels of illegally harvest and traded Queen Conch products, especially in Queen Conch meat (e.g. Mulliken, 1996; Chakalall and Cochrane, 1996). This illegal harvest and trade is of major conservation concern and undermines management efforts and CITES implementation. It was documented that harvest of and international trade in Queen Conch meat is often unregulated and conducted in contravention of CITES provisions (Mulliken, 1996). This may especially occur at sub-regional level, for example around Martinique in the Lesser Antilles (Appeldoorn, 1996).

Different forms of illegal harvesting and trade

Illegal trade across international borders still occurs due to lack of knowledge, awareness and enforcement of CITES in Queen Conch range States, as well as importing countries. However, intentional and concealed illegal trade, especially in the form of poaching of Queen Conch in foreign territorial or EEZ waters and subsequent landing of the product in their home port as legally caught product, seems widespread and of serious concern for many range States. In other cases, vessels have been reported to illegally harvest Queen Conch products in their own territorial waters and to sell the product directly at sea to vessels of foreign registry which land the product in their home ports as their own catch (in the Saint Vincent and the Grenadines; Murphy, 2001).

At national level illegal fishing and trade can occur in a variety of forms, for example as harvest of juveniles or undersized conches, harvest of Queen Conch in closed areas or during closed seasons, harvest in excess of quota or daily bag limits, harvest by unauthorised, unlicensed persons and / or vessels, harvest using prohibited or restricted gear, e.g. scuba and many more. Illegal fishing activities have been reported for the majority of the Queen Conch range States and is considered a major concern.

Poaching in foreign waters

Among the different forms of illegal activities, poaching by foreign vessels in the territorial or EEZ waters of a neighbouring range States as well as the trade of illegally caught Queen Conch products to foreign vessels at sea seem to be the most significant forms of illegal harvest and international trade.

These forms of illegal activities are especially problematic to handle as surveillance of often far-away fishing areas is particular problematic, due to the often-isolated geographical location, limited capacities, poorly equipped Marine Interdiction Agencies (such as the Coast Guards), and lack of co-operation at regional and international level. Understandably, the extent of illegal fishing and poaching is not well known but it is believed to be extensive in some cases and to seriously affect already exploited stocks.

Most range States reported some form of poaching and illegal trade and several range States have raised concerns over the levels of poaching and illegal trade of Queen Conch products in and from their territorial waters (for example and based on questionnaires and interviews: the Bahamas, Belize, Colombia, Jamaica, Nicaragua, Saint Lucia and Venezuela). Illegal fishing by foreigners is reported to take place at Pedro Banks in Jamaica, in southern Belize, in the islands around Martinique and Guadeloupe (e.g. Saint Lucia, Antigua and Barbuda and Saint Vincent and the Grenadines), in the Colombian Banks, in Los Roques, Venezuela, in the Bahamas, especially in the southern parts, and in other areas.

Anecdotal information suggests that large scale poaching by foreign vessels on the off-shore Banks of Jamaica, especially on the Pedro Banks, has been occurring for years and several foreign fishing vessels have been apprehended by the Jamaican Defence Force Coast Guards and brought before court (Anon., 2001b). The extent of poaching at Pedro Banks is not known, however it is thought to be significant and to seriously undermine national management efforts. In response to alleged high poaching levels at Pedro Banks, the National Total Allowable Catch for the 2001 season was reduced by 22% as a 'precautionary measure' (Anon., 2001b). Anecdotal information from other range States suggests that this problem is wide-spread. The Department of Fisheries of the Bahamas, for example, reported ongoing poaching activities, especially during the summer (E Deleveaux, Department of Fisheries of the Bahamas, in litt., June 2001). In the past, several vessels with Dominican Republic registry have been arrested with large quantities of conch meat. Attempts have been made to have the Royal Bahamian Defence Force to keep up its patrols, especially in the southern Bahamas. The CITES Management Authority of Colombia reported poaching by foreign vessels in their territorial waters, especially in San Andres Archipelago (INPA, 2001). In 1995, a foreign vessel was caught in Colombian territorial waters and a fine of 50,000 USD was imposed and product on board confiscated (CITES Management Authority of Colombia, in litt., June 2001). Belize reported significant poaching activities by fishers of neighbouring countries during most parts of the year (Marin, 2001). Venezuela reported 'unknown levels' of poaching at Los Roques, based on observations of local fishers (E Solórzona, Ministry of Environment and Natural Resources of Venezuela, pers. comm., 2001).

CITES “Alert” and reported illegal trade in specimens of *Strombus gigas*

In May 2001, the CITES Secretariat issued “Alert No. 5” that was sent to CITES law enforcement authorities addressing large-scale illegal fishing and trade in Queen Conch products. Through this Alert, the CITES Secretariat recommends Parties to scrutinise applications for export permits for Queen Conch products, to regularly inspect vessels and catches at landing, to inspect satellite navigation equipment and logs to determine whether the vessels has e.g. foreign territorial waters, to regularly check and inspect vessels at sea, and to ensure that air and sea patrols that may be targeting other forms of illegal activities at sea are aware of the possibility of encountering illegal fishing, transport or trade of Queen Conch products at sea. Further, the CITES Alert encourages range States involved in the harvest of Queen Conch to undertake joint actions against poachers and to facilitate the exchange in formation regarding illegal activities in their territorial waters, to improve the combat of illegal fishing and trade of Queen Conch products throughout the region (T. De Meulenaer, CITES Secretariat., pers. comm., June 2001).

Some CITES Parties also report seizures and confiscations of CITES listed specimens in their annual reports to the CITES Secretariat. Table 18 shows seizures and confiscations of *Strombus gigas* products reported by CITES Parties between 1993 and 1999. It should be noted that this information is not considered comprehensive or complete, because many countries do not report seizures and confiscations in their national annual reports, or do so only inconsistently. According to this table a total of 156,783 kg of Queen Conch meat, 13,104 shells and 213 carvings and one “body” of *Strombus gigas* were reported as being seized or confiscated between 1993 and 1999. The majority of seizures and confiscations were reported by the USA and by Member States of the EU. The USA reported for example the seizure of a total of 149,726kg of conch meat, with most of this originating from a seizure of 113,636kg of meat that was re-exported from Jamaica in 1994 but originated from the Netherlands Antilles. Another interesting seizure of conch meat was reported by the Netherlands (but not recorded in the CITES annual report of the Netherlands): according to information received from the Dutch Investigation Agency (J. Reijngoud, General Inspection Service, in litt., May 2001), 7,900kg of *Strombus gigas* meat originating from the Dominican Republic and destined for France were seized in the Netherlands in 1998. Interestingly, the shipment was reported as being re-exported via Peru and the conch was declared as *Strombus peruvianus* but later identified as *Strombus gigas*.

Of the 13,104 shells recorded in Table 18 as being seized between 1993 and 1999, 10,004 originated from Haiti and were seized in the USA, Spain and New Zealand. A large part of the seizures of Queen Conch shells is due to US or European tourists returning from Caribbean destinations to their home countries with a small number of *Strombus gigas* shells (normally one to two) which they bought as souvenir or curio, not being aware of the need for export permits.

Table 18: Confiscated or seized *Strombus gigas* products reported between 1993 and 1999 by reporting country and country of export.

Country of import	Country of export							Total
	Jamaica	Haiti	Guyana	Colombia	Netherlands	Cuba	others	
Meat (kg)								
USA	118,421	34		17,406	13,805		60	149,726
Spain						7,000		7,000
Netherlands							57	57
Sub-Total Meat	118,421	34		17,406	13,805	7,000	117	156,783
Shells (No.)								
USA		6,000	2,000				279	8,279
New Zealand	6	4					287	297
Luxembourg								2
United Kingdom								101
Spain		4,000					35	4,035
Czech Republic								95
Netherlands							295	295
Sub-Total Shells	6	10,004	2,000				896	13,104
Other specimens (No.)								
USA							213	213
United Kingdom							1	1
Sub-Total specimens							214	214

(Source: UNEP-WCMC, 2001)

MANAGEMENT OF QUEEN CONCH IN THE CARIBBEAN

Management measures in place in Queen Conch range States

Since the mid 1980, several Queen Conch range States began adopting management measures to attempt to prevent further declines of already over exploited resources and to ensure a sustainable fishery in those areas that still had healthy and stable populations. Other range States followed in the mid-1990s and by today, most range States have employed some form of management for the fishery, implemented species specific management plans or included the species in the national fisheries management plans. In most range States the legislative framework is the national fisheries legislation, and some have implemented regulations that specifically deal with the Queen Conch fishery and its management. The measures adopted in the different range States to manage Queen Conch fishery are shown in Table 19 and are discussed in more detail in the following section.

Minimum size restrictions

Minimum size restrictions generally aim to limit the harvest to mature individuals in order to ensure a vital spawning stock and to give all individuals a chance to breed. The most commonly used measure for minimum size restriction is the length of an individual, assuming that sexual maturity occurs at a certain size. However, the unusual growth pattern of the Queen Conch, where growth in shell lengths ceases at a certain age, has a profound impact on assessing age and sexual maturity of an individual, which are important factors in the management of a fishery.

Sexual maturity has been found to occur when the shell lip has started flaring and has reached a thickness of approximately 5mm (Appeldoorn, 1988). However, because this may occur as much as one year after the start of the shell lip formation, even animals that have the shell length of an adult conch (ca. 20-24 cm) may still be immature, but legal to harvest if only a minimum shell length restriction is imposed. The imposition of shell lengths limits can also put a selective pressure on local stocks, due to the fact that the size of a conch can vary from one area to another, and that the females are generally slightly larger than males (see Chapter 'Queen Conch Biology').

Consequently, the shell size alone does not provide an appropriate indication to determine whether an individual is sexually mature or not and does therefore not appear to be the most appropriate tool to ensure that only mature animals are being harvested. For example, with a minimum shell size of 18 cm (as currently imposed in Belize, the British Virgin Islands, St. Lucia and the Turks and Caicos Islands) up to 94% of a population may still be legally fished before they are mature and had the chance to reproduce (Blakesley, 1977). Only the legal minimum size without associating it with regulations on the shell lip thickness may not help to stop this problem. Therefore protection of immature Queen Conch is most effectively achieved with the use of a shell lip thickness minimum which is known to be an indicator of sexual maturity (Tewfik, in press). Generally, a minimum lip thickness of 5 mm or more is seen as the appropriate size (Appeldoorn, 1996) and some countries have imposed such restrictions in combination with a minimum shell length (e.g. Cuba). However, studies in Puerto Rico have shown that a high proportion of conches with a lip thickness of 5 mm were still immature. Consequently the minimum shell thickness was increased to 9.5 mm to ensure that harvest is mainly of mature animals.

As discussed earlier, in many areas the Queen Conches are not landed in the shell but are knocked immediately and the shell will be discarded at sea. This creates an enforcement problem, because it is difficult to control the legality of conch meat landings where the minimum size restrictions concern the shell only (such as shell length or lip thickness). Therefore several countries introduced regulations that require that the conch is landed whole and in the shell (e.g. Puerto Rico and the Virgin Islands of the United States). This not only helps to facilitate enforcement of shell size restrictions but also helps to reduce fishing mortality to the extent of the vessels holding capacity. However, such measure may be difficult to impose as it significantly reduces the amount of conch that can be transported per fishing trip, and thus impact on the overall profitability of the fishery, specifically on the industrial fishery, but also on small scale fishers. Due to these difficulties several countries where such requirements are in place mentioned that these provisions are largely ignored by fishers and that no sufficient enforcement is in place (e.g. in the Virgin Islands of the United States, Anon., 1996).

Therefore in areas where only the meat is landed minimum meat or tissue weight may be considered to achieve the protection of juveniles. Such measures have been implemented for example in the OECS countries, Belize, Colombia, Guadeloupe, Martinique, and others (see Table 19). However, this can only be effective if more biological information on the relationship of shell thickness and tissue weight becomes available – data that is already available from certain areas but may be missing from others. Moreover, meat weights may be very variable due to the different levels of processing making it difficult to control the meat weight unless all meats are required to be landed unprocessed. Another problem related to the use of meat weight is that tissue weight of older conches, known as “senil” or “stoned” conches, can decrease due thickening of the inner shell surface (aperature) reducing the animals volume.

Another factor to be considered in this case may be to use the condition of mature external reproductive organs, (the verge in the male and the vaginal groove on the female) which are both easily seen on mature individuals (Tewfik, 2001). Therefore a combination of minimum size requirements such as a minimum lip thickness associated with a minimum shell length, and in cases where only the meat is landed, the existence of mature sexual organs, appears to be the most effective tool to ensure that the harvest of Queen Conch is restricted to sexual mature animals (see also e.g. Appeldoorn, 1994). Enforcement of such regulations is feasible, as both features are easy to recognise by simple eyesight in case of the condition of mature sexual organs or with the help of gauges to measure shell length and lip thickness. The government of the Virgin Islands of the United States for example designed a gauge that helps fishers as well as enforcement officials to control shell length and lip thickness of a Queen Conch shell (see Annex IX, Figure 8) and that is provided free of charge to fishers. Similar gauges are also used in other countries, for example in Saint Lucia (see Annex IX, Figure 9).

Gear restrictions

The different types of gear used in the conch fishery have already been discussed earlier. The modern gears used nowadays in the Queen Conch fishery such as scuba and hookah have greatly impacted on the fishery by allowing fishers to harvest more conches per hour and fishing trip. Moreover the use of these gears also allowed divers to exploit populations which were normally not reached by free divers and which were formally important spawning stock refugia. For example, deep-water populations are known to be heavily exploited in countries that use scuba (e.g. Dominican Republic, Puerto Rico, Virgin Islands, and Honduras), but are considered to be in a healthy state in areas where scuba is prohibited (e.g. the Bahamas, Turks and Caicos Islands and Belize) (Appeldoorn, 1997). However, in some areas the ban of the use of scuba has also shown negative effects as it may increase the fishing pressure on shallow water stocks and can lead to the increased exploitation of juvenile Queen Conch in the shallower waters (Appeldoorn, 1997).

Several nations have introduced regulations on the use of these diving techniques. These range from a total ban on the use of hookah and scuba gear (e.g. in Belize, Colombia, Cuba, Guadeloupe, Turks and Caicos Islands), to a seasonal prohibition (e.g. in the Bahamas) or to a ban on the use of only one of the two techniques (e.g. hookah in Puerto Rico and the Virgin Islands of the United States, scuba in Martinique) (see Table 19). Other countries such as Saint Kitts and Nevis and Saint Lucia have tried to regulate the use of scuba and hookah gear by introducing provisions that require the registration and licensing before such gear may be used commercially.

In general, a total prohibition of these two types of gear seem not only to effectively limit the areas (depths) that can be fished and to reduce the overall harvest rate, but would also help to prevent the serious health problems that divers can experience by using scuba and hookah. However, this may not always be a feasible option for certain areas, as a total prohibition can significantly impact on the economy of the fishery and could lead to a total collapse of the commercial Queen Conch fishery and in destruction of numerous livelihoods (Espeut, 1997; Anon., 1996a; Tewfik, in press). Although there may not be a universal answer, the issue of diving gears needs to be carefully examined and all available options, benefits as well as consequences of diving gear restrictions should be seriously revised. It may be that there are different solutions for the different countries and areas depending on the diving gear used in the fishery and the type of fishery. Feasible options may be for example restricting the number of divers using hookah and / or scuba through limited entry systems or by prohibiting the use of hookah and scuba in certain zones (artisanal versus commercial zones). The latter system was for example successfully established at the Pedro Banks in Jamaica. In additions, all range States should strengthen efforts to improve the dive safety and reduce the risk to divers using scuba and hookah. Measures to consider could

include providing regular training on dive safety and the risk of unsafe diving practices, require all divers to be licensed and trained and covered by medical insurance, and requiring all scuba and hookah gear to be licensed and provide for regular controls.

Closed season / areas

Closure of the fishery either by closing certain areas or by closing the total fishery for a certain time period can effectively limit the fishing activity. Crucial information to establish effective closures are e.g. information on important nursery grounds and spawning areas as well as the peak time of the reproductive activity.

Closed seasons can be used to ensure unhindered reproduction. During spawning season, Queen Conches are known to migrate to shallow waters where they can be found in large aggregations. This behaviour makes Queen Conch particular vulnerable to harvest during the reproductive period. Seasonal closures are only effective if a biological significant portion of the breeding populations remains unfished, and should therefore cover three to four months of the most important reproduction period. Seasonal closures are in place in several range States (see table) however they are not yet harmonised at regional or sub-regional level. Harmonisation of closed seasons, especially at sub-regional level, would greatly assist their enforcement, as Queen Conch product, that was illegally taken in foreign waters during a closed season, could no longer be landed legally as product harvested in national waters. Several countries do not yet have a closed season (e.g. Antigua and Barbuda, British Virgin Islands, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines), although they may have provisions to establish a closed season in their national Fisheries Regulations. In several States, seasonal harvest closures are supplemented with a seasonal ban on processing, trade and exports of Queen Conch meat during the closed season which greatly facilitates the enforcement of closed seasons (for example in the Dominican Republic or Jamaica).

Closed areas in the form of “no take zones” can be an important way of preserving important Queen Conch habitats and nursery grounds. Closed areas could also be important deep-water refugia where older conches are protected from harvest even within the open fishing season. Surely such management measures are only effective if critical spawning sites and nursery grounds have been identified and if they are protected and conserved. As critical nursery sites are often found near-shore, these are particular vulnerable to habitat degradation and other human impacts. Some areas may depend largely on recruitment from faraway stocks (through larval drift) and hence depend on the protection of nursery habitats in other regions, a fact that underlines the importance of regional management efforts. Reserves or “no take zones” should be large enough to ensure that most of the reproductive stock can not migrate out of the protected areas (Stoner, 1996). Also, potential larval drift and hence physical oceanography should be considered when designing protected areas as important factors to the overall Queen Conch population. Another consideration may be the closure of certain fishing grounds on a rotating basis, which may allow the recovery of heavily fished zones (Tewfik, 1996). Such measures have for example been considered by the CFMC for Puerto Rico and the US Virgin Islands (Anon., 1999). However, in this particular case a rotating closure was not regarded as an effective measure as it was considered to be insufficient to ensure the recovery of the stock and could lead to increased fishing pressure in open areas (Anon., 1999).

Limited entry

Limited entry into the fishery is normally regulated through restriction of the number or types of vessels and / or the number of divers that are allowed to harvest conch. Such restrictions can help to reduce the overall fishing pressure and may be a useful tool in areas where the fishery is rapidly expanding (Tewfik, in press). Restrictions can for example be in the form of licensing and registration of fishers, vessels, processors or exporters. In areas where a larger commercial sector exist (in Jamaica), large factory vessels that process most of the harvested conch on board should not be permitted as they make it difficult to estimate the total volume of conch harvested (Tewfik, 1996). An important issue to be considered when restricting the entry into the fishery is who the access should be allocated to. Limited entry can affect the fishery significantly with respect to its economical and social characteristics (Appeldoorn, 1996) and therefore such regulations should be based on the relative importance given to the various sectors involved (e.g. artisanal, commercial or recreational sector) (Chakalall and Cochrane, 1996). In Jamaica for example a exclusive zone for small-scale artisanal fishers was established in the vicinity of

the Pedro Cays in order to avoid conflicts between the artisanal and the commercial sector and discrimination against small scale fishers. Limited entry systems for the Queen Conch fishery have been established in several countries, for example in Belize, Colombia, Honduras, Jamaica, Mexico and others (see Table 19). In these countries all users involved in the Queen Conch fishery are required to be registered and to obtain an annual fishing licence.

Catch and export quotas

Restrictions on the overall catch and export by setting an annual quota or a quota per fishing season can be another effective tool to manage actual fishing efforts. A rather simple is to restrict the number of specimens that may be harvested per person or boat. Such regulations have for example be implemented in the Cayman Islands, Puerto Rico, Saint Kitts and Nevis, Saint Lucia and in the Virgin Islands of the United States, where the daily harvest is restricted to the number of specimens that can be taken per person or boat per day (see Table 19).

Other countries have introduced harvest restrictions in the form of harvest quotas, or limited the amount of specimens that can be exported. Within the framework of CITES, the establishment of export quotas is considered to be one of the most effective tools currently available to regulate and monitor international trade (Wijnstekers, 2000). However, quotas can only be effectively used when sufficient information on the stock status and the sustainable yields for the exploited population are available and they should always be based on the best scientific information available. In cases where uncertainties exist or valuable information is missing a precautionary approach is necessary.

Moreover, a clear and distinct difference should be made between catch quotas and export quotas. In general the export quota should be lower than the catch quota, taking into account national consumption and the loss between capture and export, due to processing and other factors. The use of harvest or export quotas may also depend on the nature of the fishery (artisanal or commercial) and whether the conch is mainly harvested for export or to supply national markets. CITES offers a useful mechanism to monitor exports through the establishment of export quotas. Catch quotas may be more difficult to monitor because of the need to have landing statistics available in real time, however a number of Queen Conch range States have successfully made use of harvest quotas such as Turks and Caicos Islands or Jamaica. In these range States, harvest quotas are monitored in a timely fashion by requesting the individual quota holders to maintain e.g. “remaining balance sheets” that are submitted at the end of the fishing trips, as they are for example used in Jamaica, or by the use of log books that are maintained at the landing or processing plants (e.g. in the Turks and Caicos).

In recent years, several range States made use of the establishment of catch and or export quotas to manage and control their national Queen Conch fisheries. Catch and / or export quotas are for example in place in the Bahamas, Belize, Colombia, Jamaica, Mexico and the Turks and Caicos Islands (see Table 19). Most of these range States consider quotas as an effective tool that enabled them to better control fishing mortality and to monitor exports of Queen Conch products. The inclusion of *Strombus gigas* in Appendix II and the resulting need to issues export permits was not only instrumental in the decisions to employ export quotas but also facilitated the control and monitoring of export quotas for several range States (e.g. in the Bahamas, Braynen, 2001; in Jamaica, Anon., 2001b). However, in some countries no difference seems to exist between the national catch and export quotas and this may, depending on the nature of the fishery and the management of the quota system, lead to several concern. For example, it is not clear whether national consumption of Queen Conch products is taken into account by all range States when establishing quotas, which can seriously affect generally fishing mortality, especially when local consumption is high. Another important factor is the loss of Queen Conch (meat) between catch, landing and export due to processing. The Jamaican fishery addressed this issue by introducing conversion factors that can be used to convert weights of export to the equivalent of 50% cleaned meat depending on their different processing grades (see Chapter ‘Overview of the Queen Conch Fishery’). This allows to compare meat exports of different processing grades and to calculate the amount of Queen Conch that was harvested to produce a given volume of processed meat. Another example is the quota system of the Turks and Caicos Islands that takes into account national consumption as well as weight loss due to processing. The national catch quota refers to landings of unprocessed meat, e.g. 720t of meat in 2001. 675t of this amount is allowed to be exported and the remaining 45t are destined for national consumption. Through processing, 60% of the meat weight landed is lost and hence the export quota for 2001 is 270t of cleaned meat, which equals 40% of the 675t of unprocessed meat caught for export.

Table 19: Overview of the management measures adopted in Queen Conch range States. “Lip size” refers to restrictions on the lip thickness (minimum thickness of the lip in mm) or simply the presence of a flared or well formed lip; “Shell length” refers to the shell length measured from the tip of the spire to the end of the siphonal canal.

Country/ Territory	Size restriction concerning the minimum			Closed season	Limited entry	Gear Restriction	Closed areas	Harvest Quota meat in t / (shell in kg)	Export Quota (in t)
	Lip size	meat weight	shell length						
Antigua & Barbuda	Flared lip	225g (excl. viscera)	180mm	considered but not yet implemented					
Aruba	Harvest banned								
Bahamas	Well formed					no scuba no hookah (Aug-Mar)	yes		1996: 201.8t 1997: 226.8t 1998: 226.8t 1999: 158.8t 2000: 136.1t
Barbados	Only subsistence fishing, no regulations								
Belize		85g (3oz.) cleaned meat	(18cm) 7 inch	1 Jul-30 Sep	yes	no scuba no hookah	yes		
Bermuda	Total ban since 1978								
British Virgin Islands			(18cm= 7 inch proposed)	(1 Dec - 21 May, proposed, not yet implemented)					
Cayman Island				(2 year ban planned)		no scuba	yes	15 ind. /person 20 ind. /boat	
Colombia	7mm	cleaned: 100g uncleaned: 225g	24cm	1 Jun-31 Oct	20 boats (in 2001)	no scuba no hookah	yes	1996: 203t 1997: 285t 1998: 364.8t (11,000) 1999: 392.9t (10,000) 2000: 293.8t (9,000)	1996: 203t 1997: 285t 1998: 364.8t (11,000) 1999: 392.9t (10,000) 2000: 293.8t (9,000)
Cuba	5mm		20cm	1 May-30 Sep		no scuba no hookah	yes	1999: 50t 2000: 50t	1999: 50t 2000: 50t
Dominica						no scuba			
Dominican Republic	Well formed		25cm	1 Jul-31 Oct			yes		

Country/ Territory	Size restriction concerning the minimum Lip shell meat weight Shell length			Closed season	Limited entry	Gear restriction	Closed areas	Harvest Quota meat in t (shell in kg)	Export Quota
Florida, USA	Harvest banned since 1985								
Grenada	Well formed lip	225g (excl. viscera)	180mm	considered but not yet implemented					
Guadeloupe		250g cleaned		1 Apr-31 Aug	only professional fishers (+ registered vessels)	no scuba no hookah	yes		
Guatemala	Only subsistence fishing, no regulations								
Haiti	Well formed lip					no scuba no hookah			
Honduras			22cm	15 May-15 Sep	No. of licensed vessels limited (15 in 2000)	no hookah	yes		
Jamaica		84g (market clean)	22cm	1 Jul-30 Oct (normally)	No. of vessels limited, ind. Quotas and license system	prohibition of scuba under consideration	yes	1996: 1,900t 1997: 1,800t 1998: 1,700t 1999: 1,366t 2000: 1,216t* 2001: 946t	1996: 1,900t 1997: 1,800t 1998: 1,700t 1999: 1,366t 2000: 1,216t* 2001: 946t
Martinique	Formed lip	250g (cleaned meat)							
Mexico			20 cm	1 May-31 Oct Apr-Sep	Yes	no scuba no hookah	yes	1996: 47t 1997: 47t 1998: 47t 1999: 47t 2000: 47t	
Montserrat	No harvest since 1996								
NL Antilles		225g	18 cm			no hookah			
Nicaragua			20cm					1998-2000: 20t of meat, 2001: 45t of meat	1998-2000: 20t of meat, 2001: 45t of meat

Country/ Territory	Size restriction concerning the minimum			Closed season	Limited Entry	Gear restriction	Closed areas	Harvest Quota meat in t (shell in kg)	Export Quota
	Lip size	Meat weight	Shell length						
Panama						no scuba			
Puerto Rico (US)	9.5mm (3/8 inch)		23cm (9 inches)	1Jul-30Sep		no hookah		must be landed in shell, 150 conch/day/ fishermen; recreational bag limit of 6 conch/ person/day or 24 conch/boat	
Saint Kitts/Nevis	Well formed	225g (after removal of digest gland)	180mm	considered but not yet implemented		permit required for scuba and hookah			
Saint Lucia	Flared lip	280g meat (incl. viscera); 1000g total weight (incl. shell)	18cm	considered but not yet implemented	only licensed fishers and divers	Authorisation for scuba needed		must be landed in shell, 100 conch/day/ fishermen	
Saint Vincent & the Grenadines	Flared lip	225g (incl. viscera)	18cm	considered but not yet implemented					
Trinidad & Tobago	No regulations								
Turks & Caicos Islands	Flared lip	225 g (8 oz.)	18cm (7 inch)	15 Jul-15Oct		no scuba no hookah	yes	1996-2001: Meat: 720t unprocessed 288 processed; Shell: 22,680 ind. Live: 22,680 ind.	1996-2001: Meat: 675t unprocessed, 270t processed; Shell: 22,680 ind. Live: 22,680 ind.
US Virgin Island	9.5mm (3/8 inch)		23cm (9 inches)	1Jul-30Sep, 1990-95 harvest ban in St Thomas/ St John		No hookah	yes	must be landed in shell, 150 conch/day/ fishermen; recreational bag limit of 6 conch/person/ day or 24 conch/boat	Ind. are allowed to export up to 300 conch per months
Venezuela (harvest ban from 1991-1998 & 2000)	5mm	220g	20cm	1Jul-30Sep		no scuba no hookah	yes	1999: 200t cleaned meat	

*= Jamaican conch fishery was closed in 2000 and re-opered in June 2001

A case study - The Jamaican Quota System

The following sections describes the management of the Jamaican Queen Conch fishery at Pedro Banks in more detail and should be seen as a descriptive example for a management regime for the Queen Conch fishery that uses quotas as an important basis to regulate the harvest of its national Queen Conch populations. The Jamaican Queen Conch fishery at Pedro Banks has over the past ten years evolved into a fishery with industrial characteristics and Jamaica can now be considered to be one of the largest Queen Conch producers. Considerable efforts have been undertaken to manage the fishery and to prevent scenarios that have been experienced in other countries in the decades before. However, it should be noted that the Queen Conch fishery of Jamaica has several specific aspects that may not be easily transferable to the Queen Conch fisheries of other countries in the region, that are e.g. smaller in scale, are mainly operated by a large number of smaller boats that harvest and land Queen Conch in several fishing grounds distributed over the islands. The fact that the majority of the Queen Conch harvested in Jamaica is destined for export fostered the imposition of export quotas since the inclusion of the species in Appendix II of CITES in 1992.

Jamaica joined CITES in 1997. The Natural Resources Conservation Agency (NRCA) is the CITES Management Authority. The CITES Scientific Authority consists of a committee of experts and scientist. The Fisheries Divisions is the Authority responsible for the management of the national Queen Conch fishery.

Nowadays, Jamaica is one of the largest producers and exporters of Queen Conch meat in the region. However, up to the mid 1980s the Queen Conch fishery of Jamaica was a rather small-scale artisanal fishery that consisted of free-diving fishers harvesting less than 50t of conch meat per year for local consumption (Aiken et al., 1999). Most of the fishing was done along the southern Island shelf with some fishing taking place at the offshore banks (chiefly Morant and Formigas Banks) (Smikle, 1997). However, in the late 1980s the situation changed drastically, when significant landings from the offshore Pedro Banks started to be recorded. This large submarine plateau with an total area of approximately 3,750km² lies 70km south-west of the island and is nowadays probably the most important Queen Conch production area in the region (Aiken et al., 1992). The average depth of the bank is 25m and therefore large-scale exploitation of the Queen Conch resources of the bank was facilitated by the increased use of scuba and hookah gear in the beginning of the 1990s (Aiken et al., 1999). There are three smaller Cays, the North East, Middle and South West Cay, located at the eastern part of the bank that provide some basic housing for the artisanal Queen Conch fishers and that are used as a base for the smaller fishers operating at the bank (see Figure 7).

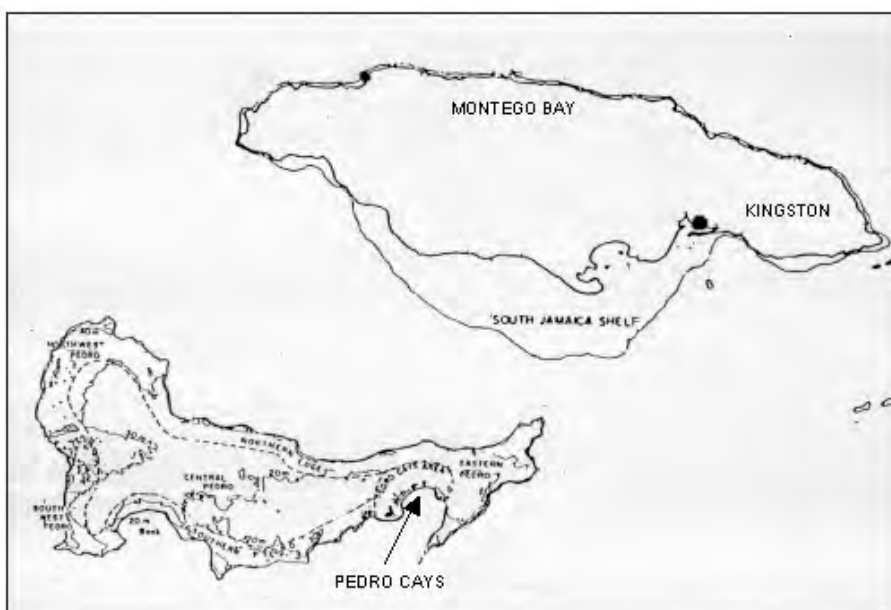


Fig. 7: Map of Jamaica and the Pedro Bank showing the location and size of the Pedro Bank relative to the island. The location of the Pedro Cays is indicated. (Source: based on Aiken et al., 1997)

The Queen Conch fishers that operate nowadays at Pedro Banks can be roughly grouped into two different categories: 1.) small-scale free- and scuba diving artisanal fishers that are resident at Pedro Cays and use small motorised canoes (referred to as “offshore artisanal sector”) and 2.) the industrial sector that involve large, decked “mother” vessels with scuba and hookah divers operating from smaller auxiliary boats. The area around the Pedro Cays up to a depths of 15m is reserved exclusively for the artisanal sector and no larger vessels are allowed in this “artisanal zone” (Anon., 1999). A third category of fishers that mainly harvest Queen Conch for local consumption are the “mainland artisanal fishers” that operate from the mainland and fish around the southern shelf. However, these fishers may also fish conch around the Pedro Cays (Aiken et al., 1999).

Landings of Queen Conch from the island shelf are not regularly recorded and hence the levels of *Strombus gigas* taken from the island shelf are not well known. In general, it is estimated that less than 5% of the total annual landings of Queen Conch in Jamaica originate from the island shelf (Smikle, 1997). Based on surveys undertaken in 1997 at landing sites the total landings, of Queen Conch from the island shelf was estimated to be around 21t (Anon., 1999). The Jamaican Quota system only concerns the Queen Conch fishery at Pedro Banks, the Queen Conch harvested at the island shelf is not affected in the quota system.

Before 1992, the Jamaican Queen Conch fishery was virtually unmanaged. But following indications that the fishery would collapse within several years if the levels of exploitation were not reduced and controlled, the Jamaican Fisheries Division drafted a Management Plan that included (among other measures) the development of a quota system (National Total Allowable Catch or NTAC). The focus of this Management Plan was the rapidly expanding industrial fishery for Queen Conch especially at the Pedro Banks. It included the establishment of a NTAC for the Queen Conch fishery. The NTAC is then subdivided into Total Allowable Catch (TAC) Quotas that are designated for specific Fisheries Management Areas (FMA), such as Pedro Banks. The quota system that governs the commercial Queen Conch fishery at Pedro Bank is considered a key element in the management of the Queen Conch resources in Jamaica.

The current NTAC for *Strombus gigas* applies exclusively to Queen Conch resources at Pedro Bank as a specially designated Fishery Management Area. The quota system also has provisions for other FMAs, however these are currently closed for the industrial Queen Conch fishery. Other measures included in the Management Plan are e.g. the establishment of a limited entry system (all fishers and vessels need to be licensed), the introduction of minimum size limit (harvest restricted to shells with a siphonal length of 22 cm and a well formed lip; minimum weight for “market clean meat” = 84g), the establishment of an four months closed season restricting the Queen Conch fishing season to eight months, and the registration and licensing of processors (Aiken et al., 1999). These measures apply to the Queen Conch fishery as a whole and therefore also affect the Conch fishers at the island shelf.

Since its introduction in 1993, the Jamaican Management Plan for *Strombus gigas* has been revised several times. The Management Plan for 2001-2002 sets out additional measures which include the prohibition to process and sale Queen Conch meat during the annual closed season. All Queen Conch meat in storage needs to be declared before the start of the annual closed season. It also includes provisions that allow for the inspection of Queen Conch meat in possession at any time through the Veterinary Service, the Fisheries Division or the NRCA (Anon., 2001). In 2001, the Fisheries Division also designed new licenses for the various vessels and crew members, including the Queen Conch divers (A Kong, Fisheries Division, pers. comm., July 2001).

Relevant legislation

The primary legislation that governs the Queen Conch industry in Jamaica are the *Fishing Industry Act 1975* and its regulations and amendments that is administered by the Fisheries Division. The *Fishing Industry Act 1975* and the *Fishing Industry Regulation of 1976* are the two pieces of primary fishery legislation that include provisions for licensing of fishers and vessel, declares fish sanctuaries, specify the fishing seasons and fishing areas for each type of species, as well as conditions and restrictions of fishing methods and gear. Several Regulations made under of the Act specifically govern the management of the Queen Conch fishery such as e.g. Regulation 2000 No. 18 that defines the Individual Queen Conch quotas and the NTAC, and sets out the procedure for proper reporting and inspections of Queen Conch.

Another important piece of primary legislation is the Aquaculture Inland and Marine Product and By-Product Act 1999 administered by the Veterinary Services Division that focuses on the processing regime and regulates the sanitary conditions of marine products for the export. The Endangered Species Act (Protection, Conservation and Regulation of Trade) 2000, and relevant Regulations is used to implement and enforce the provisions of CITES and is administered by the Natural Resources Conservation Authority. It also has several specific Regulations that govern the trade in *Strombus gigas*, e.g. Regulation 2000, No. 25 that establishes Individual Export Quotas and sets out the procedure for applications for such quotas. Within the framework of the Endangered Species Act of 2000, Individual Export Quotas for the export Queen Conch meat are only issued in tandem with the Individual Allowable Catch Quotas that were issued under the Fishing industry Act (Anon., 2001b). Other relevant legislation includes the Natural Resources Conservation Agency Act of 1991, the Exclusive Economic Zone Act of 1991 and the Customs Act of 1941.

The Quota system

The first NTAC for the Queen Conch at Pedro Banks was first set in 1993, and over the past years this system has been revised and refined several times to allow for the specific characteristics of the Queen Conch fishery at Pedro Banks. One complex area, for example, was the distribution and allocation of the quotas among the different users, e.g. the industrial and the artisanal sector. An important component in the design of the Management Plan and the Quota system was the participatory approach towards the Queen Conch industry and fishers, who were involved in this process and the drafting of the Plan through consultative meetings. The industry also agreed to partly fund abundance surveys that were undertaken on the Pedro Bank in 1997 and helped largely in the design and the implementation of the conversion factor system.

Since the first preliminary survey was undertaken in 1991, three additional surveys and stock abundance studies were conducted (in 1994, 1995 and 1997) at the Pedro Bank, with the aim to estimate Maximum Sustainable Yields. Following the results of these surveys, the National Total Allowable Catch (NTAC) was reduced several times from initially 3,000 tonnes for the 1993/94 fishing season to 946 tonnes in 2001 (see Table 20) (Anon., 2001).

Table 20: National Total Allowable Catch for Pedro Banks since 1993.

Fishing season	NTAC
1993/94:	3,000,000 kg
1994/95:	2,000,000 kg
1995/96:	1,900,000 kg
1996/97:	1,800,000 kg
1997/98:	1,700,000 kg
1998/99:	1,366,000 kg
1999/00:	1,216,000 kg
2000/01:	fishery closed
2001:	946,000 kg

(Source: Anon., 2001)

As all Queen Conch meat harvested at Pedro Banks is destined for export the NTAC is considered as catch and export quota at the same time (Anon., 2001; Y Strong, CITES Management Authority of Jamaica, pers. comm., July 2001). In order to convert the weight of exports of processed *Strombus gigas* meat to the weight of Queen Conch catch quota the Jamaican Fisheries Division established, in co-operating with the Queen Conch industry, specific conversion factors (see Table 5). These refer to the weight of Queen Conch meat that has been processed to the grade “50% cleaned” (=total tissue weight excluding viscera and operculum, 15% loss of total tissue weight) which is used as a basis for the quota system. The weight of the processed meat that is destined for export is calculated to the equivalent of “50% cleaned” meat using specific conversion factors for the processing grade of the shipment.

The NTAC are set at the beginning of each conch fishing season (normally in November) by the Fisheries Division. The NTAC is set in kg and refers to the equivalent of the weight of “50% cleaned” meat. Following the approval of the Natural Resources Conservation Authority (NRCA, CITES Management Authority of Jamaica) and the CITES Scientific Authority, the individual catch quotas are then allocated to the individual companies. Until 1999, 20% of the NTAC was destined for the ‘offshore artisanal fishery’ at Pedro Banks and the remaining 80% were distributed among the industrial sector. Since 2001, and with the imposition of new licenses for the conch fishery at Pedro Banks, the NTAC is now distributed between a small number of companies that employ fishers from the artisanal sector or operate their own larger vessels. The ‘mainland artisanal sector’ that fish for *Strombus gigas* around the island shelf is not affected by these measures. These fishers also need to be licensed and registered, however they are not controlled by the national quota system and hence Queen Conch harvested at the island shelf is not allowed to be exported or to be supplied to processing plants (A Kong, Fisheries Division of Jamaica, pers. comm., July 2001). In the past this has led to difficulties as mainland fishers tried to sell Queen Conch meat to processing plants or to packer vessels at sea.

The quota allocation is based on a set of criteria that consider economical (e.g. investment), socio-economical (number of employee) and other factors. The licensed company is allowed to employ a specific number of divers and to operate different types of vessels, e.g. “mother or housing” vessels that provide housing for the crew and divers, or “packer boats” that receive and transport Queen Conch meat from the fishing grounds to the processing plants. The actual fishing is done from smaller boats, or “dories”.

The licenses for the different vessels specify the quota allocated by the quota holder (=the company), the number of crew members and divers that are authorised to fish for Queen Conch as well as the gear used. During one season, all divers and vessels that operate on behalf of a specific “quota holder” are allowed to fish, store, and transport Queen Conch exclusively for this specific individual quota holder. Moreover, all fishing vessels are required to submit after each fishing trip specific ‘Catch Data Forms’ to the Fisheries Division, that includes catch and effort data, and to maintain ‘Summary Catch Reports’ that include the total quantity of Queen Conch meat fished or taken on board in respect of each trip and the total number of trips as well as a ‘Remaining Balance’ of Queen Conch meat that the particular vessel is allowed to fish, receive or store (A Kong, Fisheries Division, pers. comm., July 2001). Once the total allowable catch quota of that company has been fished, no further Queen Conch meat landings or exports are allowed.

The Fisheries Division also has the right to board and inspect vessels operating in the Queen Conch fishery and their catch and to place authorised observers on vessels. Likewise, the NRCA, the CITES Management Authority that has the responsibility to issue export permits for the Queen Conch meat shipments, has the right to inspect each shipment prior to export, verify its processing grade and weight (Y Strong, NRCA, pers. comm., July 2001).

As mentioned earlier in the report, poaching and illegal fishing, especially through foreign vessels from neighbouring States, is known to take place on a large-scale at Pedro Banks, however levels of illegal off-take are not known. Illegal fishing is also to take place at local level, e.g. in form of fishing during the closed season, fishing of juvenile and undersized conch, fishing in ‘no take zones’, or as mentioned earlier illegal fishing at Pedro Bank and the subsequent sale of conch meat to packer vessel or processing plants. In order to control illegal fishing activities at Pedro Bank, the Jamaican Defence Force and the Fisheries Division established in 1997 an ‘anti-poaching’ offshore base at the north-east Cay of Pedro Bank (Aiken et al., 1996). This offshore base is jointly operated by the Defence Force Coast Guard and the Fisheries Division and up to 10 staff of the Coast Guards and the Marine Police are based on this base. The base is equipped with a small boat, to patrol the Bank and its surroundings effectively, a large boat has to be sent from Kingston (Commander Lewin, Jamaican Defence Force Coast Guard, pers. comm. July 2001).

As mentioned earlier, the Jamaican Queen Conch fishery has several specific aspects, and therefore management measures employed to regulate the fishery may not be easily transferable to other countries in the region. However, the system provides an example of how the use of catch and export can help to regulate and control a large-scale and mainly export oriented Queen Conch fishery. The current system has been revised several times since the

introductions catch and export quota in 1992, and it is likely to be revised and refined further (A Kong, Fisheries Division of Jamaica, pers. comm., July 2001). An important aspect in this regard is the management and regulation of the Queen Conch fishery on the island shelf which is currently not affected by the quota system. The extent of this fishery and its impact on the island shelf populations is currently not well known and is in need of enhanced attention. Likewise additional stock assessments and biological surveys will be needed to carefully monitor populations and the fisheries impact at Pedro Bank, and to ensure that the NTAC are within sustainable levels. Survey should include various depths range and should include an assessment of different age categories. The quota setting should continue to take into account illegal off-take and as these levels are not well known, a precautionary approach is highly recommended.

The need for regional management

Proper management of a fishery such as the Queen Conch fishery in the Caribbean should take the long-term sustainability of the resources into account. Therefore, regardless of the management measures or regulations used (e.g. size restrictions, closed areas or seasons, gear restrictions etc.) they must be based on a scientifically sound basis. At the same time, they should be practical and tailored to complement other characteristics of the Conch fishery in the area concerned e.g. on the state of the stock (healthy versus overfished), stock location (near shore versus off shore banks), nature of the harvest sector (artisanal versus commercial) and the primary use of the Conch products (local consumption versus export).

Management must also consider long-term consequences of Queen Conch harvest, especially regarding the genetic character of the species. Fishing generally places a selective pressure on a population's gene pool and the scope of this selection depends on specific management strategies. For example size restrictions can be over-selective for females which are generally larger than males; prohibition of scuba can result in harvest of juveniles which largely inhabit shallow waters; and no restriction could result in a selection of fast growing individuals (Appeldoorn, 1994). Therefore management measures imposed need to be carefully considered, management successes should be evaluated and possible genetic or biological consequences should be reviewed.

One vital aspect when discussing management measures and fishery policies is enforcement, and it is clear that management regulations are only as effective as is their enforcement. In the past, effective enforcement of fisheries regulations pertaining to Queen Conch management and fishery in the Caribbean has been limited, and was virtually not existent in some areas (e.g. Berg, 1989; Appeldoorn 1994b; Tewfik, in press). Therefore more efforts should be undertaken to improve enforcement and to identify the most important obstacles that have hindered effective enforcement in the past. The lack of interest and attention given to this issue, in particular at higher governmental levels seem one of the hurdles that undermined effective management in recent years. Another important aspect in this regard is the involvement of the various stakeholders of the fishery, e.g. through consultative meetings with fishers as well as the seafood industry, to ensure their participation in and support of national management measures applicable to the Queen Conch fishery. The need for and rational of regulations must be clear and well understood by the various user groups, who are the most important partners in ensuring the long-term survival of this important resource.

The overview provided in Table 19 shows that most range States have implemented some measures to manage the national Queen Conch fishery. Most range States have for example introduced minimum size restrictions (except for the Barbados, the Cayman Islands, Dominica and Panama). The majority of the range States under consideration have also established closed seasons for the harvest of Queen Conch and have restricted the use of gear in some ways. However, Table 19 also indicates a lack of uniformity in the different approaches to managing the local Queen Conch resources and the fishery. This is not surprising considering the existing differences in the areas in the characteristics and importance of the fishery, the use of the species and the population status in the range States. Therefore, it may seem unlikely that management measures will be found that will uniformly apply at the local level

in all range States. However, there are several factors that clearly speak for a common regional approach in management.

Firstly, the species is nowadays mainly fished to supply external markets, both within the region and at international level. Ensuring that this trade is not threatening the survival is a multi-national task for the exporting States and consumer nations. Secondly, range States may be directly dependent on the well-being of Queen Conch populations in neighbouring nations. The fact that the Queen Conch larvae may travel hundreds of kilometres before they settle is probably one of the most important reasons for regional management of the Queen Conch resources within the Wider Caribbean Region. Due to this planktonic dispersal mode of the Queen Conch larvae, conch populations of one nation may largely depend on the well-being of far away stocks, and the loss the fishery in one nation may potentially endanger the fishery throughout the region. An equally important reason for an regional management approach are the high levels of poaching and illegal trade that are being reported throughout the region and that seriously undermine the management and conservation efforts employed in a nation. The proximity of neighbouring States foster poaching and illegal trade in waters under the jurisdiction of other States and these problems can only be addressed and effectively reduced at regional levels. They require the commitment and co-operation of all nations involved. Enforcement and co-operation can be facilitated by regional management efforts, and a harmonisation of management regulations such as closed seasons would assist efforts to prevent poaching and illegal trade.

CONCLUSIONS

Strombus gigas is commercially fished in at least 26 of its 39 range States (countries and dependencies) in the Wider Caribbean Region. The Queen Conch fishery can generally be described as artisanal. However, in a number of countries, the fishery has evolved over the past 10 years into a large-scale commercial fishery and the species has become the most important fishery product in terms of annual landings and income generated. The overall wholesale value of the Queen Conch fishery in the Wider Caribbean is estimated at around 60 million USD per year. But its true economic value may be significantly higher, taking into account the employment created, particularly in the processing industry.

The status of Queen Conch as a fishery resource in the Caribbean is variable, but the majority of the stocks seem to be in decline. In certain areas where the resource has been severely over-exploited, little sign of recovery is shown, even after years of closure of the fishery (i.e. Bermuda, Florida, Saba Bank, Mexico and Venezuela). In other areas, stocks appear overexploited, show signs of local depletion and potential recruitment failure (i.e. Belize, Dominican Republic, Haiti, Puerto Rico and US Virgin Islands). Only a few areas in the species' range exist where the populations can still be considered stable (i.e. Turks and Caicos Islands and the Bahamas), although local stock depletions and population declines have also been reported in these regions. Current information on the population status is lacking from a number of countries, which is of particular concern for countries with a large Queen Conch fishery such as the Dominican Republic, Haiti and Honduras. After decades of intensive fishing, the stocks in the majority of the Queen Conch range States can now be characterised as over-exploited with harvest in some areas consisting largely of juveniles and increasingly targeting deeper-water stocks by an expanding use of scuba and hookah.

Over-fishing to supply the domestic and, more importantly, the international demand for Queen Conch meat, in combination with a persistent lack of enforcement of existing regulations, are considered to be the primary causes for the population declines that are noted throughout most of the species' range.

In the second half of the 1990s, records indicate that at least 4,500 to 6,500t of Queen Conch meat were landed every year, which is equivalent to approximately 31 to 46 million individual animals. However, total annual landings of *Strombus gigas* are likely to be considerably higher taking into account unreported and illegal landings, as well as Queen Conch fished for other purposes, such as bait or in the recreational sector.

Currently, Jamaica, Honduras and the Dominican Republic are the largest producers of Queen Conch meat with each country reporting annual landings of around 1,000t of meat between 1995 and 1999. Other important producers are the Bahamas and Turks and Caicos Islands, with landings of up to 680t and 780t per year respectively; followed by Belize, Colombia, Cuba and Puerto Rico, with annual harvests of between 100 and 200t per year.

High volume landings, especially the landings reported by the Dominican Republic and Honduras, cause concerns because recent information on the species population status in these two countries is limited and monitoring of harvest and exports appears insufficient. Despite this, both fisheries have been expanding in recent years. Anecdotal information indicates that the Queen Conch meat exported from these two countries may partially originate from waters under the jurisdiction of other States. Other concerns were also raised about other countries in the region, where large parts of the harvest were comprised of juveniles and undersized specimens (e.g. Antigua and Barbuda, Belize).

Anecdotal large scale poaching by foreigners is reported to occur e.g. in the waters of the Bahamas, Colombia, the Dominican Republic, Jamaica, Nicaragua and Venezuela, and others, and could be particularly detrimental to *Strombus gigas* populations of off shore banks that are difficult to patrol (e.g. the Pedro Banks of Jamaica; Las Aves and Los Testigos Archipelago in Venezuela; the San Andres, Providencia and Santa Catalina Archipelago in Colombia). Unreported trade at sea and transfer of illegally harvested *Strombus gigas* products between neighbouring States seem also to be a common practice. This is especially the case in Eastern Caribbean countries around the

Islands of Martinique and Guadeloupe, which that have traditionally been amongst the most important consumers of Queen Conch meat in the region.

Except for Haiti and the Turks and Caicos Islands, all *Strombus gigas* range States are Parties to CITES and for most Parties in the region, *Strombus gigas* is by far the most important species regulated under CITES, both in terms of the quantity traded and with regard to its socio-economic importance. Many countries in the region face difficulties in implementing and enforcing the provisions of CITES and several countries still lack adequate CITES implementing legislation. Annual reporting of international trade in specimens of *Strombus gigas* improved gradually after the inclusion of the species in Appendix II of CITES in 1992. However, reporting standards of some range States are still poor and several Parties in the region fail to regularly submit annual reports. Due to trade policies and reporting standards of the EU and USA and their overseas territories, departments and dependencies in the Caribbean region, a considerable portion of the trade in *Strombus gigas* may not be reported. This is primarily because trade between the mainland USA, EU and their respective departments and territories, is considered to be internal in nature.

Between 1992 and 1999, more than 16,000t of Queen Conch meat were recorded in international trade according to the CITES annual report data. Jamaica, Honduras and the Turks and Caicos Islands are the most important exporters of *Strombus gigas* meat, exporting together almost 80% of all Queen Conch meat recorded in international trade from 1992 to 1999. The USA is the largest importer of Queen Conch meat, importing between 2,000 and 2,500t / year. The EU Member States, and in particular France and its overseas departments in the region, represent another important destination of Queen Conch meat exports: 25% of the total trade between 1993 and 1999 were recorded as being imported by EU Member States.

Other specimens of *Strombus gigas* such as whole shells, shell carvings, shell jewellery, conch pearls and live specimens are also traded, but in less significant quantities than the trade in meat and they are largely considered a by-product of the harvest for meat.

Over the past two decades, the majority of Queen Conch range States in the region have imposed specific regulations regarding the management of *Strombus gigas* fisheries. Exceptions are Barbados, Guatemala, Panama and Trinidad and Tobago, and some other countries where the fishery is generally of minor importance and the species is only harvested opportunistically. The majority of the management measures imposed by Queen Conch range States aim at restricting and regulating the harvest of *Strombus gigas*. Management measures include minimum specimen size, closed seasons, restrictions on the types of fishing gear and annual harvest restrictions. However, the measures vary considerably and are not yet harmonised throughout the region. Some of these regulations may lack effectiveness due to insufficient assessment of biological criteria, such minimum shell length, or because they are difficult to enforce e.g. where most landings are meat only, without the shell. Minimum size restrictions are in place in at least 23 range States, but only five of these (Colombia, Cuba, Puerto Rico, US Virgin Islands, and Venezuela) have set a minimum size for the shell lip thickness. Moreover, 13 countries and territories have prohibited the harvest of Queen Conch for some months during the reproductive period (closed seasons). However, closed seasons are not always harmonised between neighbouring States, which may foster illegal fishing and poaching by fishermen from neighbouring States.

Export quotas for *Strombus gigas* meat have been established by six range States (Bahamas, Colombia, Cuba, Jamaica, Nicaragua and the Turks and Caicos Islands). However, only five of the six range States have declared their export quota to the CITES Secretariat and three failed to do so on a regular basis. In general, there seems to be a persistent need to improve the scientific basis for the quota setting and for monitoring their impacts on the fishery and species populations. Some States may not have sufficient knowledge of the levels of domestic consumption or of the loss of tissue weight before export due to different processing methods, which may hinder the effective use of quotas at a national level.

The large scale exploitation of *Strombus gigas* to supply international markets, together with high levels of illegal fishing and trade in the region, demonstrate the need for greater efforts to adopt common management policies at the regional level. This is evidenced by several factors of the species biology and particularly its life strategy of dispersing large volumes of larvae in the first weeks of its life. The variability of the status and the nature of the

fisheries throughout the species' range as well as the diversity of management measures and capacities in the different range States may impede the feasibility of a common management plan. However, measures such as size restrictions, closed seasons, 'no-take zones', the protection of critical habitats, limited entry systems, and the establishment for quota systems, constitute a potential basis from which a model management plan could be established. Range States could adapt and tailor the plan to their specific needs and requirements of their Queen Conch fishery. The adoption and successful implementation of such a model management plan should take into account the specific aspects of the fishery and the available capacities at national levels. This is a crucial element to ensure that the Queen Conch fishery in the region is brought to sustainable levels and not endangering the future of this important fishery resource.

RECOMMENDATIONS

The following section focuses on providing recommendations on efforts and activities needed to assist in the development and implementation of a model management plan and improve the co-ordination, expertise, knowledge and monitoring of the harvest and trade in *Strombus gigas* in the region. It is important that the provisions of CITES are effectively implemented and this can only be assured through sound fisheries management.

Improve the management of the species

- **Establish of a team of experts and a *Queen Conch Action Plan***

The International Queen Conch Initiative (IQCI), is encouraged to establish, in close co-operation and consultation with the governments of *Strombus gigas* range States, regional and international fisheries and conservation organisations such as the CARICOM Fisheries Management Unit, the Natural Resource Unit of the OESC, FAO and the Western Central Atlantic and Fishery Commission, and the CITES Secretariat, a team of experts that will develop a Queen Conch Action Plan. This Action Plan shall set specific milestones and a timetable for the development and implementation of the model management plan taking into account recommendations made in already adopted international, regional or bilateral Declarations and Agreements such as the Declaration of San Juan (1996) and the Declaration of San Andres (1997), and hurdles that have hindered the implementation of a regional management strategy in the past, and should identify priority areas for further research.

The model management plan should include some key elements that should be considered a basis for the establishment of national management plans. Depending on already existing management measures and capacities in place in the different range States and of specific characteristics of the countries' Queen Conch fishery. Key elements to be included are for example:

- The establishment of minimum size restrictions that uses the shell lip thickness for animals that are landed whole and the gonad maturity in cases where only the meat is landed
- The establishment of closed season for minimum of four months depending on the peak months of the spawning season. Closed seasons should be harmonised at least at sub-regional level to assist efforts to prevent poaching in neighbouring nations. Prohibition of trade, sale or export of Queen Conch meat during the closed season (and possibly the declaration of Queen Conch meat in stock at the beginning of the closed season) should also be considered.
- The establishment of important nursery areas and areas that host important deep water stocks taking into account larvae retention as well as larvae drift to other areas for the establishment of closed areas or 'no take zones'

- The establishment of catch and export quotas in countries with a commercial and export oriented Queen Conch fishery. Quotas should be based on a sound scientific basis and should take into account levels of domestic consumption and meat tissue loss due to processing.
 - The requirement for all fishers and vessels to be registered and licensed. Establish a limited entry system, where appropriate for the number of divers, vessels and gear (i.e. scuba) through license and registration.
 - Explore feasibility of gear restrictions taking into account socio-economic aspects and impacts. Range States should consider imposing gear restrictions in certain areas to protect deep-water stocks (e.g. no scuba and hookah allowed in these areas), provide dive safety training and regularly inspect dive gear where in countries where scuba and / or hookah remains legal
- **Ensure sufficient funding**

Governments of Queen Conch range States and of the major importing countries of specimens of *Strombus gigas*, CITES Parties, relevant organisations and institutions and the Queen Conch industry are encouraged to provide sufficient funding for this Team of experts and for the development of the Queen Conch Action Plan. Funds would for example be needed for the co-ordination of the group, regular meetings and communications, and further research. Once an Action Plan is established additional funds would be needed to promote the Action Plan and ensure participation of the range States.
 - **Improve data collection systems and monitoring programmes**

Queen Conch range States should increase efforts to develop or improve existing data collection systems and monitoring programmes for the *Strombus gigas* fishery that will enable fisheries managers and relevant authorities to better assess the fisheries impact and populations status. Data collection systems should include the collection of fisheries dependent, biological and morphometric data and should be based on experiences and recommendations made in the “Stock assessment and management workshop” undertaken in 1999 by CFMC and CFRAMP.
 - **Increase awareness amongst stakeholders**

Range States should strengthen efforts to increase the awareness and understanding among relevant stakeholders such as fishers, fisher co-operatives, producers and exporters for the need to conserve Queen Conch populations through the establishment of specific management measures and ensure that the rationale for the establishment of specific measures is well understood. Activities to increase awareness may include the organisation of consultative meetings with the *Strombus gigas* fishing industry, and the production of posters and leaflets e.g. at landing sites and beaches to inform the wider public. Range States are also encouraged to make more use of the media (TV and print media) to create a wider understanding and awareness.

Fill information gaps for improved management of the species

- **Undertake further research on the species**

Fisheries management, research and scientific institutions are encouraged to continue to research various aspects of the Queen Conch biology that are of particular relevance for Queen Conch management, undertaking stock assessments and monitoring populations. Priority should be given to research aspects that will:

 - facilitate the stock assessments and monitoring of Queen Conch populations
 - assist in determining minimum size restrictions to restrict the harvest to mature individuals (relationship of tissue weight, shell lip thickness and maturity)
 - determine the peak reproductive period of Queen Conch in countries that have not yet imposed a closed season
 - identify the location of key spawning habitats, nursery grounds and deep-water refugia, taking into account larval retention and the source of recruitment to other regions

– increase knowledge on the size needed for appropriate no-take zones, and the length and period of the peak spawning seasons.

Stock assessments and maximum sustainable yield studies should be regularly undertaken in all Queen Conch range States that maintain a commercial important Queen Conch fishery, but priority should be given to range States where little information has so far been made available (e.g. Cuba, the Dominican Republic, Haiti, Honduras, Nicaragua) or where information may be outdated (e.g. Belize, Colombia, Puerto Rico).

Improve the implementation of CITES in the region

- **Undertake Phase V of the Significant Trade Review Process for *Strombus gigas***

Information in this report suggests that several range States may insufficiently implement provisions of CITES especially with regard to the requirement of making non-detrimental findings in compliance with Article IV of CITES. This applies in particular to Honduras and the Dominican Republic, however may also be valid for other range States such as Belize, Colombia, Cuba, Haiti, Nicaragua, and others.

At the 17th meeting in Hanoi in August 2001, the CITES Animals Committee decided to re-introduce *Strombus gigas* into the Significant Trade review pursuant to Resolution Conf. 8.9 (Rev.). This review should focus on specific information gaps that have been identified under the current project such as up-to-date information on populations status and trends, habitats and fishing impacts in range States that are known to be important Queen Conch harvester, but lack effective management regimes (see countries above). Particular emphasis should also be given to reviewing and assessing existing monitoring and data collection programmes in the different range States, taking into account specific requirements and aspects of the countries fishery and Queen Conch population. The review should include an analysis of the species status throughout its range, on a range State basis, resulting in the production of a review sheet for the species following the standard format, in addition to specific "country review sheets" for a number of selected range States (Honduras, Dominican Republic, Colombia, Belize, Cuba, Nicaragua, and others). This should enable the Animals Committee to provide country-specific recommendations on how to improve the harvesting and trade control regimes, the existing data collection and monitoring systems, and the making of non-detriment findings. The review should be undertaken in close collaboration with the relevant authorities in the range States (CITES and Fisheries Authorities) and the International Queen Conch Initiative, particularly with the Caribbean Fisheries Management Council, the CARICOM Fisheries Management Unit and other relevant experts.

- **Conduct CITES training workshops for Scientific Authorities**

Taking into account the findings of the Significant Trade Review, the CITES Secretariat should conduct training workshop(s) for relevant authorities (Fisheries Authorities and CITES Scientific Authorities) of the major harvesting States of *Strombus gigas*, with emphasis on the responsibilities in making non-detriment findings, the data requirements for making non-detrimental findings for *Strombus gigas* and the production of guidelines for the establishment of long term monitoring systems.

This workshop should be conducted in close collaboration with the Caribbean Fisheries Management Council, CARICOM Fisheries Management Unit, FAO and other regional and international expert organisations, and should build upon experience and lessons learned from similar workshops undertaken in previous years.

The output of the workshop could be the production of appropriate tool(s) such as guidelines on methodology and data collection requirements that will assist CITES and Fisheries Authorities of Queen Conch range States in developing and / or improving the management and monitoring programmes for harvest and exports in compliance with Article IV of CITES.

- **Develop a draft CITES Resolution on *Strombus gigas* for consideration at the next Conference of the Parties to CITES**

Range States, in consultation with the CITES Secretariat as well as other relevant institutions and organisations, should consider to develop a CITES Resolution specifically dealing with the trade, management and conservation of *Strombus gigas* for adoption by the next Conference of the Parties to CITES in 2002. This Resolution could be drafted in close consultation among Queen Conch range States and with the technical input of relevant regional bodies and experts such as the International Queen Conch Initiative, the CARICOM Fisheries Management Unit, FAO and others and should be taking into account recommendations made in already adopted international, regional or bilateral Declarations and Agreements such as the Declaration of San Juan (1996) and the Declaration of San Andres (1997). The Resolution should address several issues and problems pertaining to the trade, management and conservation of *Strombus gigas* and should promote and set the grounds for the implementation of a common management strategy by making specific recommendations for the management of the species, its fishery and trade.

This Resolution should be accompanied by specific Decisions e.g. directed to the major exporters of specimens of *Strombus gigas* (e.g. range States exporting more than 100t of *Strombus gigas* meat a year) requesting these to establish export quotas for the export of *Strombus gigas* meat and to declare these quotas in a timely manner to the CITES Secretariat. Moreover Queen Conch range States should be requested to inform CITES Parties about the conversion factors used to calculate tissue loss of *Strombus gigas* meat due to processing.

Improve the monitoring of trade in *Strombus gigas* meat

- **Establish consistent conversion factors for processed Queen Conch meat**

National fisheries authorities and national processing industries, especially in the Bahamas, Belize, Colombia, Dominican Republic, Honduras, Turks and Caicos Islands, should collaborate to compile information on the different processing grades used in their country and should determine mean tissue loss and weight of meat per processing grade. This data should be used in combination with morphometric data on the mean tissue weight of unprocessed meat to establish statistically valid conversion factors for the different levels of processing that will allow to convert the weight of processed Queen Conch meat to the actual weight of harvested conch meat. Where appropriate the conversion factors system used in the Jamaican Queen Conch fishery should be used as a basis to determine conversion factors at national level.

- **Create a standard terminology within the seafood industry**

The Queen Conch processing and seafood industry, especially the importing industry in Miami, is encouraged to collaborate with exporting countries to establish a standardised terminology for the different processing grades of *Strombus gigas* meat in trade. This should ideally refer to the tissue loss based on the weight of unprocessed meat. The industry is further encouraged to collaborate with national authorities to determine tissue loss and weight of *Strombus gigas* meat for the different processing grades.

- **Improve the monitoring and control of Queen Conch meat in international trade**

CITES Parties as well as authorities responsible for the collection of national trade statistics such as the US Bureau of Census should record all trade in *Strombus gigas* meat taking into account the percentage loss in mean tissue weight due to processing. This should make use of standards developed in the processing and seafood industry, and could be achieved through the introduction of specific terms that refer to the tissue loss for the different processing grades of *Strombus gigas* meat in trade (e.g. based on the three letter codes used for the description of terms in the UNEP-WCMC database: SGA = processed *Strombus gigas* meat with percentage loss of < 25% of edible soft tissue; SGB = processed *Strombus gigas* meat, percentage loss of 25 - 50% of edible soft tissue; SGC= processed *Strombus gigas* meat, percentage loss of > 50% of edible soft tissue).

In order to convert tissue loss into tissue weight, range States should inform CITES Parties about the mean tissue weight of unprocessed Queen Conch ('dirty conch' = all soft tissue after removal from the shell) in their fishery based on morphometric studies undertaken on fished populations. Such information should be communicated to the CITES Secretariat and should be updated regularly. This could also assist CITES Parties to monitor the weight of conch being harvested in the various range States.

Facilitate the regulation of non-commercial trade in *Strombus gigas* shells

- **De-regulate the non-commercial trade in *Strombus gigas* shells as personal effects**

Queen Conch range States that export *Strombus gigas* shells should, in accordance with Article VII.3(iii) of the Convention, notify all CITES Parties that they will no longer require the prior granting of export permits before the export of maximum of a small number of Queen Conch shells per importing party as personal effects and for non-commercial purposes. Exports of larger quantities of shells and commercial shipments should continue to require the prior issuance of an export permit. Further, range States should inform CITES Parties about domestic measures relevant to the harvest and trade in Queen Conch shells (i.e. minimum size restrictions) and all trade in shell specimens not in consistence with national regulation should be considered illegal. Range States should develop this policy in close collaboration with the CITES Secretariat and once established, the export policy of the range States should be communicated to all CITES Parties through a Notification.

To facilitate this process and to ensure that *Strombus gigas* shells will not be seized at the port of entry, importing countries and in particular the EU Member States, where stricter requirement for the importation of specimens of CITES Appendix II species are in place, should ensure that shipments below the maximum allowable number of shells as personal effects will not require the prior issuance of an import permit.

Improve information exchange and co-operation

- **Co-operation between CITES Management and Scientific Authorities**

CITES Management and Scientific Authorities of *Strombus gigas* range States are encouraged to share information and co-ordinate their activities related to *Strombus gigas* with the national agencies responsible for the management of the species on a regular basis.

- **Designation of Scientific Authorities for *Strombus gigas***

Range States could consider designating the authorities responsible for the management of the *Strombus gigas* resources as an additional CITES Management or Scientific Authority, that would be responsible for issues relating to the trade in *Strombus gigas* (similar to Parties such as Russia and Iran), which have designated an additional CITES Management or Scientific Authority for *Acipenseriformes*. This would ensure that Fisheries Authorities are informed about relevant issues and about decisions taken within the framework of CITES, and have access to information circulated by the CITES Secretariat.

- **Assist Parties affected by the CITES Standing Committee's recommendations**

The CITES Secretariat should undertake targeted and proactive efforts to assist Queen Conch range States that are currently affected by the recommendations of the Standing Committee to suspend all imports of *Strombus gigas* specimens from these range States (Antigua and Barbuda, Barbados, Dominica, Saint Lucia and Trinidad and Tobago). The current review has shown that these range States are likely to have information available that will provide a satisfactory response to the primary recommendations made in September 1997 (in case of Saint Lucia and Antigua and Barbuda), or have undertaken efforts to implement these recommendations (Barbados, Dominica and Trinidad and Tobago). All five range States responded to the request for information undertaken

within the course of the present study and provided the requested information, except for Trinidad and Tobago, where a response was promised but is still pending. The CITES Secretariat should contact CITES Management Authorities of these range States (and where appropriate the Fisheries Authorities using the contacts established through this project), provide background information on the evolution of the recommendation made by the CITES Standing Committee and guidelines for the preparation of an adequate response.

- **Information exchange with the International Queen Conch Initiative**

The CITES Secretariat, CITES Parties in the region and the International Queen Conch Initiative should explore synergies and specific areas of potential collaboration with regard to data and information exchange. For example the International Queen Conch Initiative and the CITES Secretariat are encouraged to explore the feasibility of making more use of already established communication tools such as the www.strombusgigas.com – website currently run by the Caribbean Fisheries Management Council and should for example consider using the website to publish landing and trade data per range States, develop and disseminate guidelines for standardised collection and reporting, to disseminate information on the various management measures in place, provide more background information on CITES and its provisions relevant to *Strombus gigas*, for example by setting up links between the IQCI website other relevant websites such as the CITES website or websites of National CITES Authorities.

- **Undertake targeted diplomatic missions**

The CITES Secretariat should consider undertaking a ‘targeted mission’ to the sub-region to discuss specific issues pertaining to the development and implementation of a model management plan. The participation in the discussions should include experts consisting of CITES and Fisheries Authorities of the most important producer nations of *Strombus gigas* (e.g. Bahamas, Dominican Republic, Honduras, Jamaica and Turks and Caicos), the Caribbean Fisheries Management Council, the CARICOM Fisheries Management Unit, experts of FAO and other experts. This mission should also be used to create high level political awareness of the need to ensure sustainable management of *Strombus gigas* resources. Range States should be urged to implement appropriate measures to sustainably manage their Queen Conch populations and to improve the implementation of CITES.

Strengthen national legislation

- **Review national legislation**

Strombus gigas range States should with the assistance from the CITES Secretariat review their national legislation on a basis of model law and checklists provided by the CITES Secretariat and, where necessary, should revise and develop the appropriate legislative measures. At a minimum, legislation should prohibit trade in violation of CITES provisions and should provide for sanctions and penalties appropriate to deter illegal trade.

- **Strengthen CITES in the European Overseas Territories and Departments**

CITES Management Authorities in the United Kingdom, the Netherlands and France are encouraged to review their obligations and responsibilities for ensuring the compliance with CITES and the EU Wildlife Trade Regulations in their overseas territories and departments, in particular in Martinique and Guadeloupe; Aruba and the Netherlands Antilles, and in Anguilla, the British Virgin Islands, Cayman Islands and Montserrat. These EU Member States are encouraged to provide the necessary assistance to their territories and departments to achieve compliance especially with regard to the trade in specimens of *Strombus gigas*. For example they should assist in the development of CITES legislation, ensure that the authorities charged with the implementation and enforcement have the technical and administrative capacities and tools for adequate compliance.

Strengthen law enforcement

- **Regularly inspect vessels at sea and landing sites**

Strombus gigas range States should also provide for the regular inspections of vessels at landing sites to determine whether the vessels and its crew have been fishing lawfully.

These inspections should include:

- Inspection of the log books and licences of crew members
- inspections of the catch to determine whether the catch complies with national regulations (size restrictions, bulk harvest restrictions) and where appropriate with crew member's licenses,
- inspections of the number of crew members, the type and quantity of gear used and the declared fishing time away from port to determine whether the catch matches fishing efforts,
- thorough inspection of the whole vessel with a view to detect any concealed illegal catches, and
- where appropriate, inspection of satellite navigation systems, to determine whether the vessels has entered foreign waters or other areas that are not consistent with national regulation (closed areas, no take zones) or with the vessel authorisation.

Coast Guards, Navy and other enforcement agencies patrol vessels should be encouraged to regularly board and inspect vessels at sea to determine whether they are fishing lawfully. Air and sea patrols whose primarily task may be to detect other forms of illegal activity (e.g. drugs, contraband or illegal immigration) should be made aware of the possibility to encounter illegal fishing and trade in *Strombus gigas* products and should be authorised to act accordingly.

- **Establish a system of observers**

Range States should consider establishing system of observers on board of fishing vessels and at landing and processing sites. Observers should be entitled to undertake regular inspections to determine legality of the landed products, and of shipments that are destined for export.

- **Develop bilateral agreements**

Range States (in particular Jamaica, Honduras, the Bahamas, the Dominican Republic, Colombia, and Nicaragua) are encouraged to establish bilateral agreements between neighbouring States to ensure better co-operation. Co-operation could focus on joint patrols and surveillance of offshore banks, exchange of information on vessels (name and description) authorised to fish Queen Conch, on vessels and crew members that were found to be involved in illegal fishing activities, and on intercepted illegal landings. Range States should seek the assistance from the International Queen Conch Initiative and other relevant bodies e.g. CFMU, FAO and CITES to draft and adopt such agreements.

- **Regional training and capacity building workshops for enforcement personnel**

Regional training and capacity building workshops for enforcement personnel should be convened with technical support from the CITES Secretariat, the USFWS, the UNEP Caribbean Environment Programme and other relevant organisations. These workshops should specifically be targeted at law enforcement personnel and marine interdiction agencies and should cover issues such as training on surveillance techniques of vessels activities, common methods used to fish and trade illegally, inspections methods for checks of vessels and at landing sites, identifications of illegally fished / traded Queen Conch, and legal issues. Training should also provide information on how to access useful resource materials and aim to strengthen co-operation between different agencies.

- **Awareness of enforcement personnel in importing countries**

CITES Parties, especially the USA and the Member States of the EU, (especially France, the United Kingdom and the Netherlands), are encouraged to ensure that enforcement personnel responsible for CITES are trained in detection of illegal shipments and identification of Queen Conch products.

Increase participation in regional and international conventions and programmes

- **Parties to CITES**

Haiti is urged to take the necessary steps to accede to CITES and are encouraged to proactively contact the CITES Secretariat to seek technical assistance in drafting CITES implementing legislation and establish the relevant administrative capacities. Relevant organisations in the region and non-governmental organisations should undertake efforts that will encourage and assist Haiti in ratifying the Convention.

The Government of the United Kingdom should strengthen its efforts to encourage and assist the Turks and Caicos Islands in ratifying CITES and should assist its territory in drafting the relevant legislation and establishing the administrative and technical capacities.

- **CITES and the SPAW Protocol**

The CITES Secretariat and the Secretariat of the SPAW Protocol of the Cartagena Convention should undertake all necessary steps to ensure that the two treaties complement each other. The countries in the Caribbean region that have not done so (= Antigua and Barbuda; France - on behalf of its overseas departments in the region; Guatemala; Jamaica; Mexico; the United Kingdom - on behalf of the British Virgin Islands, Cayman Islands and the Turks and Caicos Islands, and the United States - on behalf of Puerto Rico and the US Virgin Islands) should ratify the SPAW Protocol.

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ANNEX

Annex I: Copy of the *Strombus gigas*– Questionnaire (in English)

Annex II: List of range States that responded to the TRAFFIC questionnaires

Annex III: Annual reports submitted by Queen conch range states

Annex IV: List of relevant partner organisations

Annex V: Declaration of San Juan

Annex VI: Common names of Queen conch in selected range states

Annex VII: FAO - Catch of *Strombid* conchs reported from Atlantic West Central Ocean

Annex VIII: Prices for Queen conch meat and shells in range States

Annex IX: Queen conch gauge used in the Virgin Island of the United States

Annex X: Photographs

STROMBUS GIGAS QUESTIONNAIRE

We have tried to keep the questionnaire as short and focussed as possible, but still the length of the questionnaire may appear daunting. Please do not be put off, the information that you will provide will be very valuable and important to the outcome of the first phase of this project. Please complete as much of the questionnaire as you can and indicate those sections for which you have no knowledge. If the information that you provide is taken from a published reference, we would be grateful to have the full citation to that reference. If it is based on your personal observations, please note that so that we can refer to the information accordingly.

The questionnaire, as well as any other comments or information that you wish to provide should be returned as soon as possible, or by **30 June 2001** at the latest. Thank you very much in advance for your kind co-operation and assistance.

Questionnaire Respondent:

Name/ Title:

Institution:

Address:

Country/territory:

Phone:

Fax:

Email:

Date:

1. Distribution and Population Status of Queen Conch

1.1. Is your country a range state for Queen Conch *Strombus gigas* ?

YES / NO

1.2. Are population abundance information and/or stock assessments for *Strombus gigas* populations in your country available ?

YES / NO

1.3. Are national Queen Conch populations monitored?

YES / NO

1.4. Have the Queen Conch populations in your country been affected by over-exploitation?

YES / NO

1.5. Does your country have protected areas that provide suitable habitat for,

adult Queen Conchs

YES / NO

If yes, please list the names of these areas:

juveniles Queen Conchs

YES / NO

If yes, please list the names of these areas:

1.6. Are you a range state for other Strombid conchs (e.g. *S. costatus*, *S. pugilis*, *S. gallus*, *S. raninus*)? If so, are these species also harvested ? Are these other conch species exported from your country? If so for what purpose (shell trade, local consumption, etc.)

ANNEX I

<i>Species</i>	<i>Occurs (y/n)</i>	<i>Is harvested(y/n)</i>				<i>Is exported (y/n)</i>			
		<i>Meat</i>	<i>shell</i>	<i>Live</i>	<i>others</i>	<i>Meat</i>	<i>shell</i>	<i>live</i>	<i>others</i>
<i>S. costatus</i>									
<i>S. pugilis</i>									
<i>S. gallus</i>									
<i>S. raninus</i>									
<i>Other Strombus species</i>									

2. Harvest, Use and Trade of Queen Conch products

2.1. Is the Queen Conch commercially harvested in your country ?

YES / NO

2.2. What is the main purpose for harvesting Queen Conch ? (e.g. meat is used mainly by local population, by restaurants to sale to tourist, or destined for the export market; shells are sold to tourist, used for jewellery, exported, not used at all; are there any other types of use?). Please specify Queen Conch products in domestic / international trade.

Queen Conch Product	Used in domestic market (y/n)	Main purpose in domestic market	Exported (y/n)	Main purpose in international market
Meat				
Shell				
Live				
Others				

2.3. Approximately, how many fishermen are involved in the harvest of Queen Conch in your country (estimates) ? Please tick one of the following answers:

- | | |
|--------------------------|---------------------------|
| < 20 fishermen | 100-250 fishermen |
| 20-50 fishermen | 250-500 fishermen |
| 50-100 fishermen | > 500 fishermen |

2.4. In what form are the Queen Conchs usually landed at the landing sites (e.g. meat including gland, meat without gland or otherwise processed, live animal in its shell, etc.)? And what is the average weight per individual product ?

- | | |
|-------------------------|------------------------|
| Live animal | Average weight: |
| Shell | Average weight: |
| Unprocessed meat | Average weight: |
| Processed meat | Average weight: |

If only meat is landed, what is done with the shells? Is the common practise to discard the shells directly at sea ?

2.5. Please provide information on the annual commercial harvest volumes of Queen Conch in your country for the last five years / fishing seasons. Where necessary, please be as specific as possible by providing per product harvest volumes in weight and / or number of specimens.

ANNEX I

Year/ Season	Total		Meat		Shells		Live		Others	
	Weight	No.	Weight	No.	Weight	No.	Weight	No.	Weight	No.
1996										
1997										
1998										
1999										
2000										

2.6. What is the average price (in your national currency) for Queen Conch products in your country? Please specify, price per product (unprocessed meat / processed meat, live specimens, shell, others) and for different levels of the market (e.g. retail price, wholesale price / local, international).

Queen conch product	Local market		Export	
	wholesale	retail	wholesale	retail
Unprocessed meat				
Processed meat				
Shell				
Live specimen				
Others				

3. Management of the Queen Conch fishery

3.1. Is there a minimum size limit (or weight limit) for the commercial harvest of Queen Conch?

YES / NO

If yes, what is the limit and in what year was it imposed.

Size / weight limit:

Year:

3.2. Are there limitations with regard to the fishing gear used to catch Queen Conchs (e.g. is the use of scuba and / or hookah prohibited in your country)? Please tick one of the following answers:

No restrictions

Scuba prohibited

Hookah prohibited

Others e.g.

3.3. Are there limitations with regard to the number or type of fishing boats that are allowed to catch Queen Conchs?

YES / NO

If yes, please provide (an estimate of the) number/type of boats that are allowed?

ANNEX I

3.4. Does your country have closed fishing seasons for Queen Conch ?

YES / NO

If yes, please specify period of time when commercial harvest for Queen Conch is closed and since when this was imposed:

Months of the year when commercial harvest is closed:

Year since closed season is in place:

3.5. Does your country have areas that are closed for fishing Queen Conch ?

YES / NO

If yes, please provide the name of these closed areas and specify since when this area is closed.

3.6. Does your country have set specific quotas for the harvest and / or the export of Queen Conch products ?

YES / NO

If yes, please provide details on the quotas for the last five years / fishing seasons:

Year/Season	1996	1997	1998	1999	2000
Harvest quota					
Meat					
Shells					
Live animals					
Others					
Export quota					
Meat					
Shells					
Live animals					
Others					

3.7. Is the number of landing sites for the Queen Conch catch limited by the government?

YES / NO

If yes, please provide the names of these sites:

4. Control regimes and Legislation covering Queen Conch fishery and the trade in Queen Conch products

4.1. Does your country have specific legislation that covers the harvest, sale, domestic / international trade of Queen Conch products ?

YES / NO

If yes, please provide specific information and name title and date of entry of the relevant legislation.

Title :

Date of entry:

ANNEX I

- 4.2. Which authority is responsible for the enforcement of these regulations ?
- 4.3. Are the measures that regulate and manage the Queen Conch resources in your country appropriate? If required, where would you see room for improvement ?
- 4.4. Have there been incidences of poaching of or illegal trade in Queen Conch products in your country ?

YES / NO

If yes, please provide further information and describe type or form of poaching and /or illegal trade.

- 4.5. Are there cases where sanctions have been imposed ?

YES / NO

If yes, please provide further information on examples.

5. *Other initiatives, measures and activities*

- 5.1.** Do you have scientific and conservation programmes for Queen Conch in your country? E.g. programmes for the assessment of wild Queen Conch populations, conservation of spawning grounds and important juvenile recruitment areas, conservation of Queen Conch habitat)

YES / NO

If yes, please provide further information

- 5.2. Is there any commercial Queen Conch mariculture operations in your country ?

YES / NO

If yes, please provide names of the mariculture operations in your country ?

6. *Other comments or information*

- 6.1. Please provide any additional information that you think might be useful.

Thanks you very much for completing this questionnaire!!

Please return this questionnaire to
Stephanie Theile - TRAFFIC Europe
Bd. Emile Jacqmain 90, B-1000 Brussels
Tel.: +32-2-343 25 65; Fax.: +32-2-343 25 65
email: stheile@traffic-europe.com

ANNEX II

Completed questionnaires were returned by the following range States:

Bahamas
Barbados
Belize
Bermuda
British Virgin Islands
Cayman Islands
Colombia (2 questionnaires)
Cuba
Dominica
Dominican Republic
Guadeloupe
Guatemala
Honduras
Jamaica
Martinique
Mexico (2 questionnaires)
Montserrat
Nicaragua
Puerto Rico
Saint Kitts and Nevis
Saint Lucia
Turks & Caicos Islands
United States
US Virgin Islands
Venezuela (2 questionnaires)

TOTAL **25**

ANNEX III

Annual reports submitted by Queen conch range states from 1991 to 1999. (The shading indicates the years of the range States' membership to CITES. The codes refer to the two letter ISO codes as used in the UNEP-WCMC data base)

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999
Antigua & Barbuda									
Aruba									
Bahamas			BS		BS	BS			BS
Barbados				BB	BB	BB	BB	BB	
Belize	BZ	BZ	BZ	BZ	BZ	BZ	BZ	BZ	BZ
Bermuda		BM	BM	BM		BM	BM	BM	
British Virgin Islands						VG	VG	VG	
Cayman Island		KY	KY	KY	KY	KY	KY	KY	
Colombia	CO	CO	CO	CO	CO	CO	CO	CO	CO
Costa Rica	CR	CR	CR	CR	CR	CR	CR	CR	CR
Cuba	CU	CU	CU	CU	CU	CU	CU	CU	CU
Dominica									
Dominican Rep.	DO	DO	DO	DO	DO	DO	DO	DO	DO
France	FR	FR	FR	FR	FR	FR	FR	FR	FR
French Guiana									
Grenada									
Guadeloupe			XA				GP		
Guatemala	GT	GT	GT	GT	GT		GT	GT	
Guyana	GY	GY	GY	GY	GY	GT	GY	GY	GY
Haiti (non-Party)									
Honduras					HN	HN	HN	HN	HN
Jamaica								JM	
Martinique			XA			MQ	MQ		
Mexico	MX	MX	MX		MX	MX	MX	MX	MX
Montserrat									
Netherlands	NL	NL	NL	NL	NL	NL	NL	NL	NL
Netherlands Antilles		AN	AN	AN					
Nicaragua	NI	NI	NI	NI	NI	NI	NI	NI	NI
Panama	PA	PA	PA	PA	PA	PA			PA
Puerto Rico	US	US	US	US	US	US	US	US	US
St Kitts/Nevis				KN	KN				
St Lucia	LC	LC	LC	LC					
St Vincent & the Grenadines									
Suriname	SR	SR	SR	SR	SR	SR			SR
Trinidad & Tobago	TT		TT	TT		TT	TT	TT	TT
Turks & Caicos (Non Party)			TC	TC	TC	TC	TC		
United Kingdom	GB	GB	GB	GB	GB	GB	GB	GB	GB
United States	US	US	US	US	US	US	US	US	US
Venezuela	VE	VE	VE	VE	VE	VE		VE	VE
US Virgin Island	US	US	US	US	US	US	US	US	US

(Source: UNEP-WCMC, August 2001)

ANNEX IV

List of relevant partner organisations:

Contact Person	Institution	Address
<u>Food and Agriculture Organisation of the UN (FAO)</u>		
Bisessar Chakalall	Regional Fishery Officer for Latin America and the Caribbean; Secretary of Western Central Atlantic Fishery Commission (WECAFC)	FAO Sub-Regional Office for the Caribbean, 6th Floor, Tom Adams Financial Center, P.O. Box 631-C, Bridgetown, Barbados Tel.: (246) 426 71 10 Fax: (246) 427 60 75 Email: bisessar.chakalall@fao.org
<u>Caribbean Fisheries Management Council (CFMC)</u>		
Virdin C. Brown	Chairman	268 Muñoz Rivera Avenue, Suite 1108 San Juan, Puerto Rico 00918 Tel.: (787) 766-5926, (787) 766-6239
Miguel A. Rolón	Executive Director	268 Muñoz Rivera Avenue, Suite 1108 San Juan, Puerto Rico 00918 Tel.: (787) 766-5926, (787) 766-6239 Email: miguelar@coqui.net
<u>CARICOM Fisheries Management Unit (CFM / CFRAMP)</u>		
Milton Haughton	Scientific Director CARICOM Fisheries Unit	Princess Margaret Drive, PO Box 642, Belize City, Belize Tel.: (501) 2 344 435, Fax: (501) 2 344 46 Email: cfamp@bt.net or haughton@caricom-fisheries.com
<u>Organisation of the Eastern Caribbean States (OECS)</u>		
Peter A. Murray	Programme Officer Marine Resources Management	Natural Resources Management Unit The Mome, P.O. Box 1383 Castries, St. Lucia WI Tel.: (758) 453-6208, (758) 452-1847, (758) 451-8930 Fax.: (758) 452-2194 Pamollox@yahoo.co.uk
<u>University of Puerto Rico</u>		
Richard Appeldoorn	Queen conch scientist	University of Puerto Rico, RUM, P.O. Box 9013, Dept. of Marine Sciences, Mayaguez, Puerto rico 00681-9013 Tel.: (787) 899 2048
<u>McGill University</u>		
Alexander Tewfik	Scientist, CFRAMP Consultant	McGill University, Department of Biology, 1205 Dr Penfield Ave, Montreal Que, Canada H3A 1B1 Tel.: (514) 398 41 08, Fax: (514) 398 50 69 Email: atewfi@po-box.mcgill.ca
<u>UNEP – Caribbean Environment Programme</u>		
Nelson Andrade Colmenares	Co-ordinator UNEP-CAR/RCU	UNEP – Caribbean Environment Programme Regional Co-ordinating Unit 14 - 20 Port Royal Street Kingston, Jamaica

INTERNATIONAL QUEEN CONCH CONFERENCE
SAN JUAN, PUERTO RICO
JULY 29-31 1996

DECLARATION OF SAN JUAN

CONSIDERING

The importance of the conservation of queen conch (*Strombus gigas*) throughout the Wider Caribbean (see Appendix I of this Declaration);

The importance of the queen conch (*Strombus gigas*) fishery as a source of income and nutrition for the nations in the Caribbean Sea region;

The importance of conservation and sustainable use of the marine environment, including regionally-shared species such as *Strombus gigas*;

The serious problem of overfishing in many of the areas where *Strombus gigas* was once abundant, and the pressures on this important fishery resource from international trade;

The need to improve fishing practices and management of this fishery resource through national action and regional co-operation;

The listing of *Strombus gigas* in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and in Annex III of the Protocol Concerning Specially Protected Areas and Wildlife to the Cartagena Convention;

That the United Nations Convention on the Law of the Sea, done at Montego Bay, Jamaica, on 10 December 1982, provides the relevant legal principles for fishing in areas under national jurisdiction and on the high seas;

The relevance of the deliberations of this Conference to the goal of sustainable development as expressed at the United Nations Conference on Environment and Development, and the conservation of biological diversity as called for by the Convention on Biological Diversity;

The adoption, in August 1995, of the United Nations Agreement for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and the adoption in November 1995, of the FAO Code of Conduct for Responsible Fisheries;

The efforts under the International Coral Reef Initiative, which includes promotion of sound management strategies for the sustainable yield of fisheries linked to coral reef ecosystems, such as the *Strombus gigas* fishery;

The report of the November 1995 meeting of the Western Central Atlantic Fishery Commission of the Food and Agriculture Organisation of the United Nations, which recognised that the status of *Strombus gigas* would be enhanced through the development of a common international management strategy for the *Strombus gigas* fishery.

DECLARES

1. Caribbean States continue to implement management practices, taking into account the FAO Code of Conduct for Responsible Fisheries, so as to effectively conserve and to produce sustainable *Strombus gigas* fisheries throughout the region;
2. Caribbean States continue to implement appropriate mechanisms to ensure the long-term conservation and sustainable use of *Strombus gigas* in waters under their national jurisdiction;
3. Caribbean States continue to take measures to protect critical habitats for *Strombus gigas*, including wetlands, seagrass beds, coral reefs, coastal areas and oceanic banks from degradation;
4. Caribbean States continue to promote and enhance the collection and exchange of *Strombus gigas* biological, socio-economic and other relevant data necessary to evaluate the conservation and utilisation of the fishery resource;
5. Caribbean States continue to develop and establish mechanisms for international co-operation to prevent poaching and other illicit fishing of *Strombus gigas* without affecting the sovereignty of the State;
6. Caribbean States continue to effectively regulate international trade in *Strombus gigas* through strict adherence to existing conventions/agreements and through recognition of maritime jurisdictions;
7. Caribbean States whenever possible and applicable continue to promote and strengthen mechanisms for regional and sub-regional co-operation that will enhance *Strombus gigas* fishery management.

AGREE

The participants (see Appendix I) at the International Queen Conch Conference Agreed:

- I. To establish a working group, to be convened by the Caribbean Fishery Management Council, to develop a regional management strategy, in accordance with the best available scientific evidence, and subject to the national management strategies to be presented to all Caribbean States for their consideration and adoption;
- II. To begin efforts to consider a consultative mechanism to promote the conservation and sustainable use of *Strombus gigas* and other marine living resources of the Caribbean Sea region;
- III. To call upon all States of the Caribbean Sea region to co-operate in efforts to ensure the long-term sustainable use of *Strombus gigas*;
- IV. To meet as needed to discuss management of *Strombus gigas* and review progress toward sustainable use.

INTERNATIONAL QUEEN CONCH CONFERENCE
SAN JUAN, PUERTO RICO
JULY 29-31 1996

APPENDIX I

I.) Wider Caribbean States:

-Aruba	-Dominica	-Panamá
-Anguilla	-Dominican Republic	-Saba
-Antigua and Barbuda	-El Salvador	-St. Barthelemy
-Bahamas	-French Guiana	-St. Eustatius
-Barbados	-Grenada	-St. Kitts / Nevis
-Belize	-Guadaloupe	-St. Marteen
-Bermuda	-Guatemala	-St. Martin
-Bonaire	-Guyana	-St. Vincent and the Grenadines
-Brazil	-Haiti	-St. Lucia
-British Virgin Islands	-Honduras	-Suriname
-Cayman Islands	-Jamaica	-Trinidad and Tobago
-Colombia	-Martinique	-Turks and Caicos
-Costa Rica	-México	-U.S.A. (includes Puerto Rico and the U.S. Virgin Islands)
-Cuba	-Montserrat	-Venezuela
-Curaçao	-Nicaragua	

II.) Participant delegations to the International Queen Conch Conference, July 29-31 1996, San Juan, Puerto Rico:

-Antigua and Barbuda	-Haiti	-St. Marteen
-Bahamas	-Honduras	-St. Vincent and the Grenadines
-Belize	-Jamaica	-St. Lucia
-Bonaire	-México	-Turks and Caicos
-Colombia	-Montserrat	-U.S.A. (includes Puerto Rico and the U.S. Virgin Islands)
-Curaçao	-Panamá	
-Costa Rica	-Saba	
-Costa Rica	-St. Eustatius	-Venezuela

Other Participants:

- CFRAMP
- CITES
- FAO
- OECS

Common names of Queen conch in selected range states.

Common Name	Country
Botuto	Venezuela
Cambombia	Panama
Cambute	Costa Rica
Caracol abulon	Guatemala
Caracol pala	Colombia
Caracol gigante	Honduras
Caracol rosado	Mexico
Cobo	Cuba
Lambi	Dominican Republic, French Guyana, Guadeloupe, Haiti, Martinique
Queen Conch (or Pink Conch)	Antigua & Barbuda, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Grenada, Jamaica, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Turks and Caicos, Trinidad and Tobago, US Virgin Islands

ANNEX VII

Catch of *Strombiid* conchs in tons reported from Atlantic West Central -no catch reported from other areas).

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Anguilla	11	5	18	8	9	10	15	20	20	116.0
Antigua & Barbuda	104	175	201	70	74	47	60	55	55	841.0
Bahamas	335	409	358	527	693	494	589	648	670	4,723.0
Belize	185	229	231	232	208	137	148	257	252	1,879.0
British Virgin Islands	.	.	.	.	71	96	119	56	33	375.0
Cuba	61	63	51	90	47	32	717	1,234	487	2,782.0
Grenada	8	15	<0.5	11	1	2	6	1	24	68.0
Guadeloupe	520	470	470	480	500	500	430	470	550	4,390.0
Haiti	400	400	350	400	380	350	400	380	350	3,410.0
Honduras	216	775	722	485	402	410	490	2,987	2,987	9,474.0
Jamaica	800	1,000	1,500	2,000	2,300	2,133	2,850	1,821	1,700	16,104.0
Mexico	3,105	1,478	3,218	4,023	2,670	4,963	2,566	5,218	3,293	30,534.0
Netherlands Antilles	10	10	5	5	5	6	6	10	10	67.0
Nicaragua	-	-	-	-	-	-	-	-	162	162.0
St Kitts & Nevis	.	.	.	.	21	13	29	20	22	105.0
St Lucia	4	6	8	10	13	15	15	25	28	124.0
St Vincent & the Grenadines	.	.	.	.	32	30	25	10	21	118.0
Turks & Caicos Is.	426	507	439	738	699	695	647	650	788	5,589.0
USA	857	1,273	878	1,181	1,489	1,491	1,193	1,017	908	10,287.0
US Virgin Islands	24	32	32	35	35	37	37	40	40	312.0
Venezuela	35	27	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	62.0
TOTAL	7,101	6,874	8,481	10,295	9,649	11,461	10,342	14,919	12,400	91,522.0

(Source: FAO, 2001)

ANNEX VIII

Overview of prices in USD for Queen conch meat and Queen conch shells. (Based on information provided by range countries in questionnaires and pers. observ. 2001; export data based on data provided by the US Bureau of Census, 2001)

Country	Meat price USD / kg		shell price in USD per piece	
	Local markets	Export	Local markets	Export
Antigua & Barbuda				10.00
Bahamas	6-9	7.03		1.66
Barbados	8		3 – 20	10.00
Belize	4-9	8.49	4	10.00
British Virgin Islands	13			
Colombia	3.5	5.19	5	10.00
Cuba	5			
Dominican Rep.	3-9	2.65		8.12
Grenada		6.00		10.00
Guadeloupe	11			
Guatemala	2-3		2.5	
Haiti		5.00		0.34
Honduras	5	6.60		4.17
Jamaica	7	5.04		
Martinique (FR)	7 - 15		7 - 14	10.00
Mexico	13		20	
Nicaragua	3	7.24	2	
Puerto Rico (US)	5-10		5	
St Kitts/Nevis	3		10	10.00
St Lucia	6			10.00
St Vincent and the Grenadines		8.80		10.00
Turks and Caicos Islands		6.25		0.59
US Virgin Island	5		5 -25	
Price Range	3.5 - 15	2.65 – 8.80	2.5 - 25	0.59 - 10.00